# Thermodynamic Properties of Nitrogen Including Liquid and Vapor Phases from 63 K to 2000 K with Pressures to 10,000 Bar*

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Tables of thermodynamic properties of nitrogen are presented for the liquid and vapor phases for temperatures from the freezing line to 2000 K and pressures to 10,000 bar. The tables include values of density, internal energy, enthalpy, entropy, isochoric heat capacity ($C_v$), isobaric heat capacity ($C_p$), velocity of sound, the isotherm derivative $(\partial P/\partial \rho)_T$, and the isochor derivative $(\partial P/\partial T)_\rho$. The thermodynamic property tables are based on an equation of state, $P = P(\rho, T)$, which accurately represents liquid and gaseous nitrogen for the range of pressures and temperatures covered by the tables. Comparisons of property values calculated from the equation of state with measured values for $P$-$\rho$-$T$, heat capacity, enthalpy, latent heat, and velocity of sound are included to illustrate the agreement between the experimental data and the tables of properties presented here. The coefficients of the equation of state were determined by a weighted least squares fit to selected $P$-$\rho$-$T$ data and, simultaneously, to $C_v$ data determined by corresponding states analysis from oxygen data, and to data which define the phase equilibrium criteria for the saturated liquid and the saturated vapor. The vapor pressure equation, melting curve equation, and an equation to represent the ideal gas heat capacity are also presented. Estimates of the accuracy of the equation of state, the vapor pressure equation, and the ideal gas heat capacity equation are given. The equation of state, derivatives of the equation, and the integral functions for calculating derived thermodynamic properties are included.

Key words: Critical point; density; enthalpy; entropy; equation of state; heat capacity; ideal gas properties; latent heat; nitrogen; second virial coefficient; vapor pressure; velocity of sound; critically evaluated data.

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*This work was supported by the National Bureau of Standards, Office of Standard Reference Data under contract number CST-962-5-69, and by the National Aeronautics and Space Administration, Manned Spacecraft Center under contract number NAS 9-12078.

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## Nomenclature

| Symbol | Physical Quantity | Unit Symbol |
|---|---|---|
| $T$ | Temperature | K |
| $P$ | Pressure | bar |
| $\rho$ | Density | mol/liter |
| $U$ | Internal energy | J/mol |
| $H$ | Enthalpy | J/mol |
| $S$ | Entropy | J/mol · K |
| $C_p$ | Isobaric heat capacity | J/mol · K |
| $C_v$ | Isochoric heat capacity | J/mol · K |
| $W$ | Velocity of sound | m/s |
| $L$ | Latent heat | J/mol |
| $B(T)$ | Second virial coefficient | liter/mol |
| $(\partial P/\partial\rho)_T$ | Isotherm derivative | liter bar/mol |
| $(\partial P/\partial T)_\rho$ | Isochor derivative | bar/K |

Superscript

| | |
|---|---|
| $^0$ | Ideal gas property |

Subscripts

| | |
|---|---|
| 0 | Reference state property |
| calc | Calculated property value |
| eq( ) | Calculated property value from equation indicated in parentheses |
| data | Measured property value |

Molecular weight of nitrogen, 28.0134.

Gas constant, $R = 8.31434$ J/mol · K

## 1. Introduction

An equation of state is presented for nitrogen which covers the full range of liquid and vapor values for temperatures from the triple-point temperature to 2000 K, and pressures to 10,000 bar. The equation of state reproduces the experimental $P$-$\rho$-$T$ data which were used in the determination of the coefficients of the equation of state to within the claimed accuracies of these data. The thermodyanmic property table is based on this equation of state, and a function representing the ideal gas heat capacity. The equation also conforms to the Maxwell criterion, which provides for a thermodynamically consistent table of properties, without discontinuities at the two-phase boundaries.

In addition to providing an accurate means for the calculation of the thermodynamic property tables, the equation of state is particularly useful in the analysis of thermodynamic systems since it may be readily used with input variables other than density and temperature (i.e., by iterative solution using any pair of independent thermodynamic coordinates).

In the determination of the equation of state, considerable experimentation was carried out in the simultaneous fitting of $P$-$\rho$-$T$ and related thermodynamic property data using the method of least squares. A large number of independent data sets were used in the determination of the equation, which made weighting of the data imperative in the least squares determination of the coefficients. These methods are discussed in section 4. Additional discussion of the effects of simultaneous fitting of related property data and weighting of the data are reported in [114][1].

In addition to the equation of state, the adjunct functions required for the calculation of thermodynamic property tables and a description of the methods of determining the equation are presented. A summary of the data which forms the basis for the equations is given and corrections made to the data are identified (e.g., adjustments of temperature scales). Particular attention has been given to a comparison of available measured thermodynamic data with values calculated using the equation of state. The $P$-$\rho$-$T$ data used for calculating the coefficients for the equation are compared to values calculated from the equation of state. Similar comparisons are also illustrated for other thermodynamic properties which have been measured for nitrogen.

The thermodynamic property table included in this volume has been calculated by use of the equation of state and the derivative functions relating the various thermodynamic properties. Since the equation of state conforms to the Maxwell criterion, properties of the liquid have been calculated by continuous integration along hypothetical isotherms through the two-phase (liquid-vapor) region. An evaluation of this procedure is given in [114]. The phase boundary properties included in the table have been identified by simultaneous solution of the equation of state with the vapor pressure equation or the fusion line equation. This equation of state is unique since the single equation represents a wide range of states including liquid and vapor, and returns values of the first and second derivatives which allow for accurate calculations of the heat capacities ($C_v$, $C_p$), and the velocity of sound. The user of these functions is cautioned that some properties become discontinuous at the critical point, and no estimate of accuracy can be made regarding these properties in the vicinity of the critical point. The extrapolation of the equation of state in the liquid region to the fusion line, and for the vapor at low temperatures and at high pressures, is illustrated. The thermodynamic property tables included these extrapolations.

The derivatives of the equation of state and the integrals used in the calculation of thermodynamic properties are given in Appendix A. The derivative and integral functions are presented in a convenient format for computer programming.

The authors have attempted to be comprehensive in reviewing the scientific literature for thermodynamic property measurements. The National Bureau of Standards—Cryogenic Data Center prepared the initial bibliography used in this study. Particular attention has been given to maintaining a search of current documents for new measurements, and the authors have maintained a world-wide correspondence with others working in the field to obtain current information on new measurements. Following the development of the equation of state, new data on vapor pressure, saturated liquid density, enthalpy, and $P$-$\rho$-$T$ data for high density values extending to the fusion line have been obtained. Although these data were not incorporated in the determination of the functions, comparisons to the equation of state are reported here.

A parallel study of thermodynamic properties of oxygen has also been made by the authors which is reported in [108] and [115]. The form of the equation of state used for oxygen is the same as reported here for nitrogen. In the determination of the coefficients for the equation of state for oxygen, the task was considerably simplified since the bulk of the data were values of high accuracy from a single source. In addition, measurements of the isochoric heat capacity

[1] Numbers in brackets refer to citations in the bibliography.

($C_v$) for oxygen for the same range as the $P$-$\rho$-$T$ data are also available. The values of the isochoric heat capacity ($C_v$) for oxygen were the basis for estimating values for nitrogen which were used in determining the equation of state. The conformance of the nitrogen $C_v$ and $C_p$ values in these tables with values predicted from the oxygen data lend assurance of the relative accuracy of these estimated data. An evaluation of the results of using estimated values of $C_v$ in the determination of the coefficients for the equation of state is summarized in [114].

The work reported here is a culmination of a study which was initiated in 1968 at Worchester Polytechnic Institute. Interim reports were presented in [99] and [100]. The final formulation was first reported in [107] and later in [108], and [115]. Additional tests of the equations, a study of the methods used in determining the equations as reported in [114], and comparisons to data reported subsequently to the publication of [107] have now been completed. In initiating this work, the authors have made substantial use of techniques and previous work published by the staff of the National Bureau of Standards, Cryogenics Division in Boulder, Colorado (e.g., the earlier nitrogen property table of Strobridge [116], and the curve fitting techniques suggested by Hust and McCarty [105]).

## 2. Data for Determining the Equation of State

### 2.1. Pressure-Density-Temperature Data

The sources of experimental $P$-$\rho$-$T$ data that form the basis of this work are listed in table 1. This table summarizes the literature in which data are reported for the liquid phase, the vapor phase, the saturated liquid, and the liquid on the freezing line. The 1246 $P$-$\rho$-$T$ data values used in the determination of the equation of state are described in section 5. Figure 1 is a map of the $P$-$\rho$-$T$ data used in the final formulation of the equation of state.

### 2.2. Saturated Liquid and Saturated Vapor Densities

Three sources of experimental saturated liquid density data are listed in table 1. These data are not generally concordant with the selected $P$-$\rho$-$T$ values for the

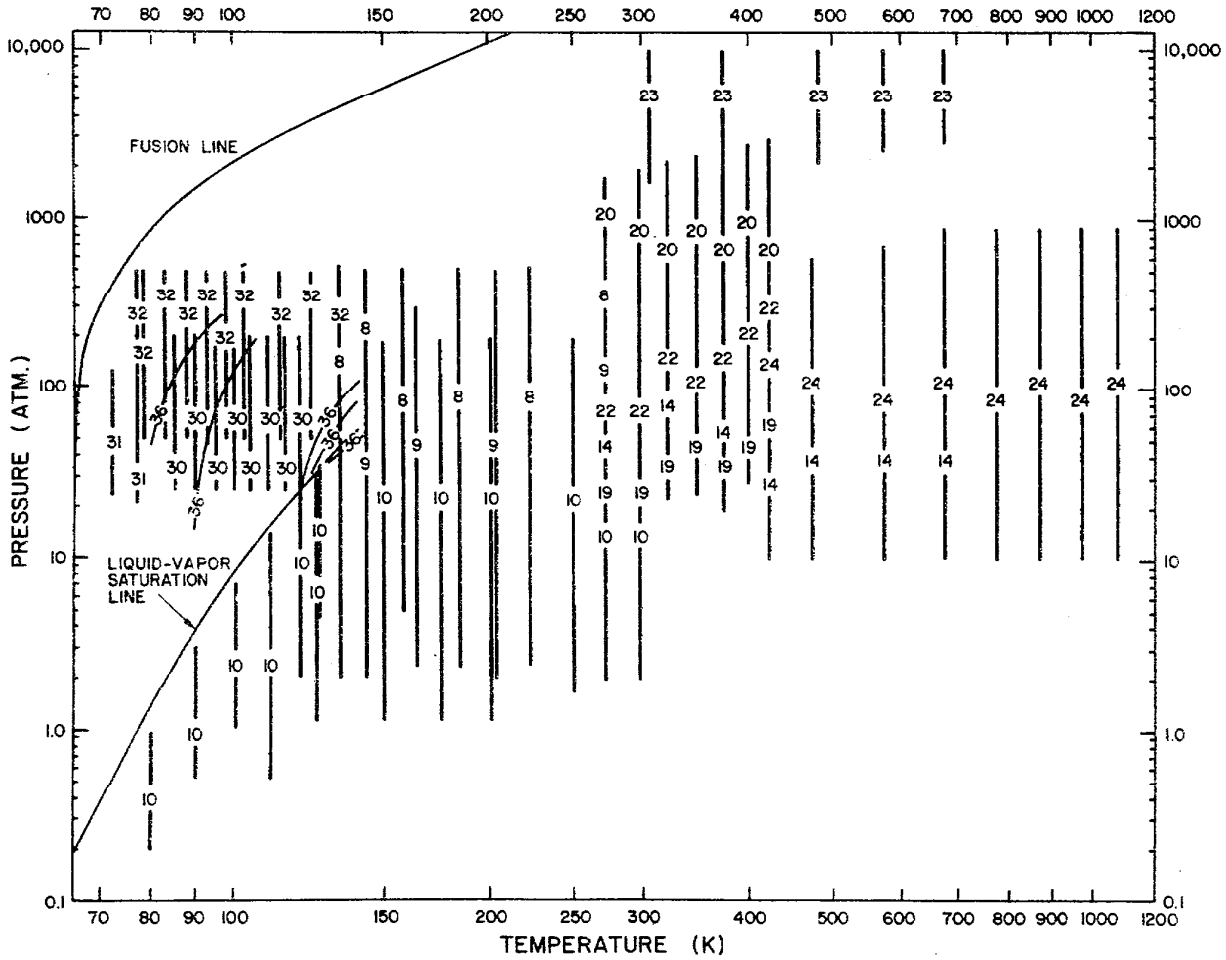


FIGURE 1. Map of the $P$-$\rho$-$T$ data used in the determination of the equation of state.

single phase liquid near the saturation line. Therefore, these data were not used in the determination of the equation of state. These experimental saturated liquid density data are described in section 6. Eleven measured values of the density of the saturated liquid and six measured values of the density of the saturated vapor were reported by Mathias, et al [110] in 1914, but these data were not used in determining the equation of state.

The method for fitting the data to the equation of state, as described in section 4, requires values of saturated liquid and saturated vapor densities. Two hundred forty-one values were estimated by the simultaneous solution of the vapor pressure equation and interim equations of state at intervals of 0.25 K between the triple point and the critical point. Separate interim equations of state were determined for the liquid and vapor phases for calculating these values.

### 2.3. Isochoric Heat Capacity

Isochoric Heat capacity values were included in the data used in the determination of the coefficients of the equation of state. To provide a set of $C_v$ data, 396 values of $C_v$ were determined using the principle of corresponding states and the calculation procedure suggested by Diller [101]. The equation for $C_v$ for oxygen from Goodwin and Weber [103] was used as the basis for estimating the values of $C_v$ for nitrogen. The range of values for nitrogen was limited to the corresponding range of experimental values for which $C_v$ data for oxygen were reported in [103]. These calculated values for nitrogen are for 14 isochors between 5 and 31 mol/liter. This included $C_v$ values along isochors from 10 to 31 mol/liter from the saturated liquid (or vapor) line to approximately 240 atm, and along isochors from 5 to 7 mol/liter from the saturated vapor line to 230 K. An accuracy of $\pm 5$ percent was estimated for these calculated $C_v$ values.

The only measurements of $C_v$ reported in the literature are values along the critical isochor from Voronel et al. [57]. These data, which were not used in the determination of the equation of state, are discussed in section 10.3.

### 2.4. Critical Point Parameters

The method for fitting the equation of state to the data, as described in section 4, uses selected values of the critical parameters $P_c$, $\rho_c$, and $T_c$. The values selected for these critical parameters were $P_c = 33.555$ atm., $\rho_c = 11.21$ mol/liter, and $T_c = 126.20$ K. These values were selected to be in accord with the best values from the literature, and with the $P$-$\rho$-$T$ and vapor pressure data near the critical point.

Measurements of the critical pressure and temperature are reported by White, et al. [118] as $33.54 \pm 0.02$ atm and $126.26 \pm 0.04$ kelvin, respectively. (This value for critical temperature converted to the IPTS-68 temperature scale is 126.25 K.) A more recent experiment reported by Voronel [57] identifies the critical temperature as between 126.191 K and 126.197 K. Wagner [90] used a critical temperature of 126.20 K and reports a measured value of the vapor pressure at 126.20 K of $34.002 \pm 0.02$ bar (33.557 atm). The value of the critical temperature selected for use in the least squares fitting procedure for the equation of state was 126.20 K. A solution of a preliminary vapor pressure equation gave a pressure of $P = 33.555$ atm at $T = 126.20$ K, which is the critical pressure used in this work.

The generally accepted value for the critical density from the literature is 0.311 g/cm$^3$ (11.10 mol/liter) which was recommended in a critical review of the critical constants by Pickering [113] in 1924. This recommended value was based primarily on the critical density value published in 1914 by Mathias, et al. [110], which was determined by the method of rectilinear diameters. Wagner [117] used a value of 11.25 mol/liter in a recent study of equations of state. A new value for the critical density was determined in this work by the method of rectilinear diameters using the calculated saturated liquid and saturated vapor densities described in section 2.2. This calculated value for the critical density which was selected for use in the least squares fitting procedure for the equation of state is 11.21 mol/liter.

TABLE 1. Summary of $P$-$\rho$-$T$ data for nitrogen

| Source | Temp range (K) | Pressure range (atm) | Number of data points |
|---|---|---|---|
| **Vapor** | | | |
| Amagat [1] | 273–473 | 100–1000 | 72 |
| Amagat [2] | 273–317 | 100–3000 | 75 |
| Bartlett [3] | 273 | 1–1000 | 9 |
| Bartlett et al. [4] | 273–673 | 50–1000 | 46 |
| Bartlett et al. [5] | 203–293 | 75–1000 | 43 |
| Benedict [6] | 90–273 | 100–1563 | 25 |
| Benedict [7] | 98–473 | 981–5879 | 124 |
| *Canfield [8] | 133–273 | 2–541 | 152 |
| Cheng [87] | 87–309 | 225–10,245 | 420 |
| *Crain [9] | 143–273 | 2–506 | 90 |

TABLE 1. Summary of $P$-$\rho$-$T$ data for nitrogen—Continued

| Source | Temp range (K) | Pressure range (atm) | Number of data points |
|---|---|---|---|
| *Friedman [10] | 80–300 | 0.2–200 | 201 |
| Hall and Canfield [11] | 103, 113 | 2–16 | 18 |
| Heuse and Otto [12] | 273 | 0.4–1.2 | 8 |
| Holborn and Otto [13] | 273–373 | 19–99 | 32 |
| *Holborn and Otto [14] | 273–673 | 19–99 | 66 |
| Holborn and Otto [15] | 143–273 | 20–99 | 24 |
| Kamerlingh Onnes and van Urk [16] | 124–293 | 23–63 | 143 |
| Malbrunot and Vodar [17] | 473–1274 | 1000–4000 | 63 |
| Malbrunot [18] | 473–1274 | 790–4935 | 191 |
| *Michels et al. [19] | 273–423 | 19–85 | 56 |
| *Michels et al. [20] | 273–423 | 192–2961 | 147 |
| Miller et al. [21] | 294 | 9–263 | 10 |
| *Otto et al. [22] | 273–423 | 46–415 | 63 |
| *Robertson and Babb [23] | 308–673 | 1621–9983 | 170 |
| *Saurel [24] | 423–1074 | 10–900 | 87 |
| Smith and Taylor [25] | 273–473 | 34–339 | 40 |
| Townsend [26] | 298, 323 | 2–140 | 35 |
| Tsiklis and Polyakov [27] | 294–673 | 1500–10,000 | 69 |
| Tsiklis [28] | 323–423 | 3000–10,000 | 45 |
| Verschoyle [29] | 273, 293 | 25–205 | 36 |
| **Liquid** | | | |
| *Cockett et al. [30] | 85–120 | 25–200 | 63 |
| *Gibbons [31] | 72–78 | 21–125 | 17 |
| *Golubev and Dobrovolskii [32] | 77–133 | 49–485 | 59 |
| Streett and Staveley [33] | 77–120 | 4–680 | 107 |
| Van Itterbeek and Verbeke [34] | 66–91 | 13–144 | 67 |
| Van Itterbeek and Verbeke [35] | 77, 90 | 79–815 | 13 |
| *Weber [36] | 80–140 | 14–266 | 76 |
| **Saturated liquid** | | | |
| Goldman et al. [37] | 79–126 | 1–33 | 30 |
| Terry et al. [38] | 78–105 | 1–10 | 15 |
| Brauns [87] | 66–111 | 0.2–15 | 49 |
| **Liquid on the freezing line** | | | |
| Grilly and Mills [39] | 65–120 | 77–3441 | 10 |

*$P$-$\rho$-$T$ data selected for the determination of the equation of state.

## 3. Preparation of Data for Use in the Least Squares Fitting of the Equation of State

### 3.1. Weighting the Data

In a preliminary evaluation of the $P$-$\rho$-$T$ data for nitrogen, estimates of the accuracy of the data were made, and the data sets to be used for determining the equation of state were selected. (Comparisons of the equation of state were made to both the data used in fitting the equation and to the data not selected, to further verify the data selection.) Preliminary weighting of the $P$-$\rho$-$T$ data for fitting the equation of state used estimated uncertainties in density assigned to measurements from each experimenter. These uncertainty values were generally based on the experimenter's estimates of the accuracy of his measurements, and on the estimated uncertainties expressed by other data evaluators. In cases where there was very little information on the data, preliminary uncertainties were assessed on the basis of the precision of the data.

The uncertainty of the dependent variable (pressure) may be expressed as a function of the uncertainties of the independent variables (temperature and density) by the error propagation formula.

$$\sigma_P^2 = [\sigma_\rho(\partial P/\partial \rho)_T]^2 + [\sigma_T(\partial P/\partial T)_\rho]^2 \qquad (1)$$

where $\sigma_P$ is the uncertainty in pressure due to the uncertainties in density ($\sigma_\rho$) and in temperature ($\sigma_T$).

The isotherm derivative and the isochor derivative in eq (1) were taken from a preliminary equation of state. Incorporating the estimated experimental uncertainty in pressure, $\sigma_p$, the weighting factor to be applied to each data point in performing a least squares fit to the data may then be calculated as,

$$W = \frac{1}{\sigma_P^2 + \sigma_p^2} \tag{2}$$

However, it is usually difficult to determine independently the uncertainty of each variable, and the preliminary weights applied to the data were calculated using the error propagation formula with the uncertainty in pressure determined from the estimated uncertainty in density of each data point. With this approximation, the weighting function becomes,

$$W = \frac{1}{[\sigma_\rho (\partial P/\partial \rho)_T]^2} \tag{3}$$

The relative weights of the $P$-$\rho$-$T$ data, as calculated by eq (3) were judged to be essentially equivalent to weights based on the uncertainties as determined by the error propagation equation, as expressed in eq (1), for most of the $P$-$\rho$-$T$ data, with the following exceptions.

(1) In the region near the critical point, the values of $(\partial P/\partial \rho)_T$ become very small, and values of $W$ calculated by eq (3) were consequently very large. If separate estimates of $\sigma_\rho$, $\sigma_P$, $\sigma_T$ had been used with eq (1), the resulting weights for the $P$-$\rho$-$T$ data in the critical region would not have been disproportionately large.

(2) In the low pressure vapor region, the values of $(\partial P/\partial \rho)_T$ are again small, which may have resulted in unrealistic weights for the $P$-$\rho$-$T$ data in this region.

(3) In the liquid region, values of $(\partial P/\partial \rho)_T$ are very large, which may have resulted in weights for the liquid data that were smaller than would have resulted from weights based on eqs (1) and (2).

As a consequence of the approximation of the uncertainties of the dependent variable as introduced by the use of eq (3), it was found that the accuracy of the equation of state determined by a weighted least squares fit to $P$-$\rho$-$T$ data with weights determined by eq (3) was not satisfactory in the vicinity of the critical point. This was considered to be a reflection of the disproportionately large weights used with the $P$-$\rho$-$T$ data in the critical region.

An alternate method of weighting the $P$-$\rho$-$T$ data was then introduced, which was based on the equation of state, as determined by a weighted least squares fit with weights determined from eq (3). This method of weighting used the root-mean-square deviation in pressure for a given data set (usually an isotherm) from each experimenter. This rms deviation is expressed as,

$$\text{rms} = \left[\frac{\Sigma[(P_{\text{calc}} - P_{\text{data}})/P_{\text{data}}]^2}{N}\right]^{1/2} \tag{4}$$

where $N$ is the number of data points. The weight for each data point based on the rms deviation is then,

$$W = \frac{1}{(\text{rms} \times P_{\text{data}})^2} \tag{5}$$

The use of eq (5) avoids the errors in weighting introduced by the approximation of eq (3) as outlined above. The use of the rms deviation for the calculation of weights gives approximately the same weights as the error propagation formula eq (3), except for the critical region, the low pressure vapor region, and the liquid region. In the use of eq (4), values of $[P_{\text{calc}} - P_{\text{data}}]$ were assigned as average deviations for a given run (usually an isotherm) as reported by the experimenter. Although the equation being developed was to represent the entire $P$-$\rho$-$T$ surface, an accurate equation of more limited range is easier to obtain, and rms values in eq (4) were determined from pressures calculated using preliminary equations of state valid only for limited ranges of the data. This procedure allowed for some judgment to be used to reflect systematic errors which appeared to be present in a data set. This judgment was based on comparisons with data in the same region as reported by other experimenters.

Following the development of the functional form of the equation of state using $P$-$\rho$-$T$ data, calculated values of $C_v$ and saturation density data to define the equilibrium criteria for the liquid-vapor phases were included in the least squares fit of the equation of state. The method of simulaneously fitting these data is discussed in section 4.2. The calculated isochoric heat capacity data were weighted by, $W = 10{,}000/(C_v)^2$ with $C_v$ in liter · atm/mol · K, and the saturation data by, $W = 100/(P + 0.01)$, with $P$ in atm. The relations for the weights were determined to produce an equation of state which would return accurate calculated values of $C_v$ and of the saturation densities without a significant change in the accuracy of the $P$-$\rho$-$T$ representation obtained by an interim equation determined from $P$-$\rho$-$T$ data alone.

### 3.2. Temperature Scale Corrections

The data sets used in this investigation span the period of the evolution of interim uniform temperature scales, terminating with the adoption of the International Practical Temperature Scale of 1968 (IPTS–68) by the Comité International des Poids et Mesures (CIPM) in October of 1968 [106]. Temperature scale corrections were applied to all experimental data to correct all data temperatures to the IPTS–68 scale as specified in [92], [93], [102], and [104]. Details of the temperature scale corrections may be found in [107].

## 4. The Determination of the Equation of State

### 4.1. Analysis of the Functional Form of the Equation of State

In the selection of the functional form for the equation of state, theory is inadequate to indicate the functional form of the equation except for some of the boundary conditions. Several years experience in the determination of equations of state had indicated the terms of an equation of state that were generally useful in fitting $P$-$\rho$-$T$ data. To systematically evaluate the terms in the equation of state, a stepwise multiple regression analysis was developed to ascertain the best of 50 terms for fitting the selected $P$-$\rho$-$T$ data for nitrogen. The first term for the equation was selected as the one which had the highest correlation coefficient for the data used. The second term was chosen from among the remaining terms to provide the highest correlation coefficient for two terms including the first term as selected above. This procedure was continued until all 50 terms with undetermined coefficients had been utilized in the final fit. The fitting process was then repeated with 45 terms by deleting the 5 terms which had the lowest $F$-statistics of the group of 50, and repeated again with 43 terms after the deletion of 2 more terms with the least significant $F$-values. To eliminate further terms which had small or negligible contributions to the fit, the analysis of the $F$-statistics of the coefficients was continued until an equation was obtained with only one term with an $F$-statistic below the value of significance at the one percentile level. This resulted in eq (6) below. This equation, when fit to the $P$-$\rho$-$T$ data for the entire range of available measurements, had 31 coefficients with $F$-values above the level for significance.

$$\begin{aligned}P=\rho RT&+\rho^2(N_1T+N_2T^{1/2}+N_3+N_4/T+N_5/T^2)\\&+\rho^3(N_6T+N_7+N_8/T+N_9/T^2)\\&+\rho^4(N_{10}T+N_{11}+N_{12}/T)+\rho^5(N_{13})\\&+\rho^6(N_{14}/T+N_{15}/T^2)+\rho^7(N_{16}/T)\\&+\rho^8(N_{17}/T+N_{18}/T^2)+\rho^9(N_{19}/T^2)\\&+\rho^3(N_{20}/T^2+N_{21}/T^3)\exp(-\gamma\rho^2)\\&+\rho^5(N_{22}/T^2+N_{23}/T^4)\exp(-\gamma\rho^2)\\&+\rho^7(N_{24}/T^2+N_{25}/T^3)\exp(\gamma\rho^2)\\&+\rho^9(N_{26}/T^2+N_{27}/T^4)\exp(-\gamma\rho^2)\\&+\rho^{11}(N_{28}/T^2+N_{29}/T^3)\exp(-\gamma\rho^2)\\&+\rho^{13}(N_{30}/T^2+N_{31}/T^3+N_{32}/T^4)\exp(-\gamma\rho^2)\end{aligned}\qquad(6)$$

### 4.2. Simultaneous Least Squares Fitting of the Equation of State to Related Thermodynamic Property Data

In a least squares fit to determine the coefficients for the equation of state it is often desirable to include related thermodynamic data with the $P$-$\rho$-$T$ data. Procedures were developed for including the values of $C_v$, and the criteria for phase equilibrium between saturated liquid and saturated vapor, simultaneously with the $P$-$\rho$-$T$ data in a least squares fitting technique. The inclusion of $C_v$ values proved successful for determining an equation of state which provides accurate second derivatives of the $P$-$\rho$-$T$ surface. An equation which conforms to the conditions for phase equilibrium (i.e., the Maxwell criterion) is particularly useful since the integration of functions for property calculations along hypothetical isotherms through the two-phase region is then possible, and the use of an independent definition of vapor pressure as required in the Clapeyron relation is eliminated. (The inclusion of the Maxwell criterion with the least squares methods was recently described by Bender [94], [95], [96], and Wagner [50], [117].) Because of the paucity of data for the vapor near the saturated vapor states, and the disagreement in the liquid density values near the saturated liquid line (see figure 3), the calculated saturation density data were required in the least squares fit to achieve an equation of state which conforms to the Maxwell criterion.

In the least squares formulation incorporating $P$-$\rho$-$T$ data, isochoric heat capacity data, and the phase equilibrium conditions, the sums of the squares of the weighted residuals of the functions in table 2 were minimized simultaneously. Equations (A) and (B) express the fit parameters for the $P$-$\rho$-$T$ and $C_v$ data, respectively, ane eqs (C) and (D), the conditions for equilibrium for the liquid and vapor phases (i.e., equal pressures and Gibbs functions of the saturated liquid and the saturated vapor at a given temperature.)

TABLE 2. Functions for simultaneous fitting

| Function | |
|---|---|
| $P=\Sigma N_iP_i(\rho, T)+\rho RT$ | (A) |
| $C_v=\Sigma N_iC_i(\rho, T)+C_v^\circ$ | (B) |
| $\Sigma N_iP_i(\rho_{SL}, T_S)-\Sigma N_iP_i(\rho_{SV}, T_S)=(\rho_{SV}-\rho_{SL})RT_S$ | (C) |
| $\Sigma N_iG_i=P_S\left(\frac{1}{\rho_{SL}}-\frac{1}{\rho_{SV}}\right)+RT\ln\left(\frac{\rho_{SL}}{\rho_{SV}}\right)$ | (D) |

$P$, $\rho$, $T$, and $C_v$ are respectively the pressure, density, temperature, and constant volume heat capacity of data points used in the fit: $P_S$, $T_S$, $\rho_{SL}$, $\rho_{SV}$, are the saturation pressure, saturation temperature, density of the saturated liquid, and density of the saturated vapor respectively; the $P_i$ are the individual terms of the equation of state, the $C_i(\rho, T)$ are given by

$$C_i(\rho, T)=\int_0^\rho\frac{T}{\rho^2}\left[\frac{\partial^2P_i(\rho, T)}{\partial T^2}\right]d\rho,$$

the $G_i$ are given by

$$G_i=\int_{\rho_{SL}}^{\rho_{SV}}\left[\frac{P_i(\rho, T_S)}{\rho^2}-\frac{RT_S}{\rho}\right]d\rho,$$

and the $N_i$ are the coefficients of the equation of state to be determined.

### 4.3. Critical Point Constraints for the Equation of State

The final coefficients of the equation of state were determined by a weighted least squares fit using the

criteria outlined above, and constrained to the critical point which was determined independently. The procedure for constraining the equation of state to a selected critical point used the method of undetermined LaGrange multipliers in the least squares fit. The equation of state was constrained to give a pressure of 33.555 atm at a temperature and density of 126.20 K and 11.21 mol/liter, respectively, and a first and second isotherm derivative of zero at this selected critical point. (The vapor pressure equation was constrained to the same critical pressure and temperature, with the slope at the critical point constrained to the value of the slope of the critical isochor calculated from the equation of state.)

### 4.4. Coefficients for the Equation of State

The coefficients for the equation of state (6) for nitrogen are presented in table 3. These coefficients were determined by a weighted least squares fit using the functions given in table 2. The data used for the calculation of these coefficients included the $P$-$\rho$-$T$ measurements, saturated liquid and vapor densities, and $C_v$ values summarized in sections 2.1, 2.2, and 2.3.

TABLE 3. Coefficients for the equation of state (6) for nitrogen*

| Coefficient | Numerical value | Coefficient | Numerical value |
|---|---|---|---|
| $N_1$ | $0.136097243686983 \times 10^{-2}$ | $N_{17}$ | $-0.110400310752087 \times 10^{-5}$ |
| $N_2$ | 0.107028500555504 | $N_{18}$ | $0.341309483327025 \times 10^{-3}$ |
| $N_3$ | $-0.243926251659031 \times 10^{1}$ | $N_{19}$ | $-0.166216790652177 \times 10^{-5}$ |
| $N_4$ | $0.341240789637052 \times 10^{2}$ | $N_{20}$ | $-0.164616585853003 \times 10^{5}$ |
| $N_5$ | $-0.422956791527436 \times 10^{1}$ | $N_{21}$ | $-0.119724198386865 \times 10^{6}$ |
| $N_6$ | $0.105277159433708 \times 10^{-5}$ | $N_{22}$ | $-0.948085610750225 \times 10^{2}$ |
| $N_7$ | $-0.111355267180312 \times 10^{-1}$ | $N_{23}$ | $0.554879602331972 \times 10^{5}$ |
| $N_8$ | $0.142748464727047 \times 10^{-5}$ | $N_{24}$ | −0.174677685666810 |
| $N_9$ | $0.179621096187021 \times 10^{5}$ | $N_{25}$ | $-0.256709963280944 \times 10^{1}$ |
| $N_{10}$ | $0.751267113751007 \times 10^{-7}$ | $N_{26}$ | $-0.404528219006087 \times 10^{-3}$ |
| $N_{11}$ | $0.231737284741220 \times 10^{-2}$ | $N_{27}$ | −0.257279422571519 |
| $N_{12}$ | −0.509008258448481 | $N_{28}$ | $-0.121204517440575 \times 10^{-6}$ |
| $N_{13}$ | $0.488523311385766 \times 10^{-4}$ | $N_{29}$ | $0.104690038752288 \times 10^{-4}$ |
| $N_{14}$ | $-0.112001704676209 \times 10^{-2}$ | $N_{30}$ | $-0.529499586313775 \times 10^{-9}$ |
| $N_{15}$ | −0.678366343173806 | $N_{31}$ | $-0.774723053052639 \times 10^{-8}$ |
| $N_{16}$ | $0.742796115735318 \times 10^{-4}$ | $N_{32}$ | $0.610368224362452 \times 10^{-7}$ |

$\lambda = 0.0056$; $R = 0.0820562$ liter·atm/mol·K

*Coefficients are for temperature in kelvin, pressure in atmospheres, and density in mols/liter.

## 5. Comparison of P-$\rho$-T Data to the Equation of State

Figures 2, 3, 4, and 5 illustrate the accuracy of the equation of state (6) in representing the $P$-$\rho$-$T$ data selected for the determination of the coefficients for the equation of state. The basis for data selection among the values reported by the several experimenters was concordance of data in the same region of the $P$-$\rho$-$T$ surface, and the relative agreement with trends established by the data selected to define adjacent regions. The $P$-$\rho$-$T$ data sets utilized in the calculation of the coefficients in table 3 consisted of 1246 weighted data points from [8], [9], [10], [14], [19], [20], [22], [23], [24], [30], [31], [32], and [36]. Comparisons were also made of data not used in determining the equation of state to confirm the data selections. Graphs of deviations between densities calculated by eq (6) and all the $P$-$\rho$-$T$ data listed in table 1 were published in [107].

Figures 2, 3, 4, and 5 are comparisons of the percent density deviation $[(\rho_{exp}-\rho_{calc})/\rho_{exp}] \times 100$, along approximate isotherms (in figure 5, along approximate isochors). where $\rho_{exp}$ is the observed density reported by the experimenter at a particular temperature and pressure, and $\rho_{calc}$ is the density calculated from eq (6) for each experimental temperature and pressure. The density deviations for some data points exceeded the percent density deviation scales used in figures 2, 3, 4, or 5, and are listed in table 4.

Table 5 lists the root-mean-square deviations in pressure and in density for the various $P$-$\rho$-$T$ data sets. Comparison of the several data sets should be made only for data in the same ranges of pressure and temperature. Table 5 has, therefore, been divided into four ranges where the deviations of the data are comparable. In comparing these results consideration must also be given to individual differences of the various data sets. For example, the data by Saurel [24] is for pressures considerably higher than the other data listed for vapor above 273 K (below 1000 atm) (see table 1). The vapor data by Friedman [10] below 273 K includes numerous points in the vicinity of the critical point where large deviations in density are expected. The data of Weber [36] listed under liquid in table 5 includes some data for

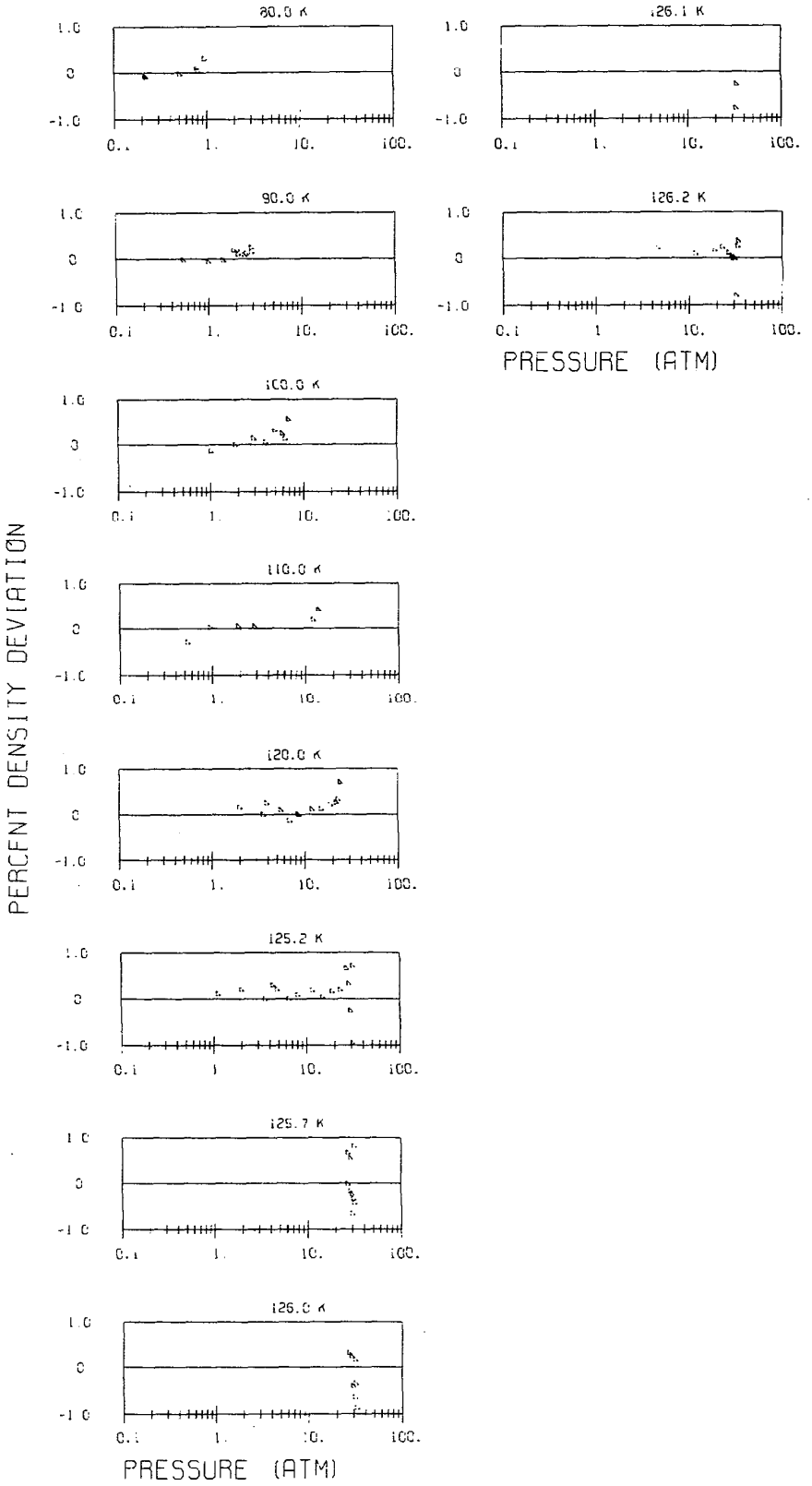


FIGURE 2. Deviations in density of equation (6) from the $P$-$\rho$-$T$ data for the low temperature vapor from Friedman [10].

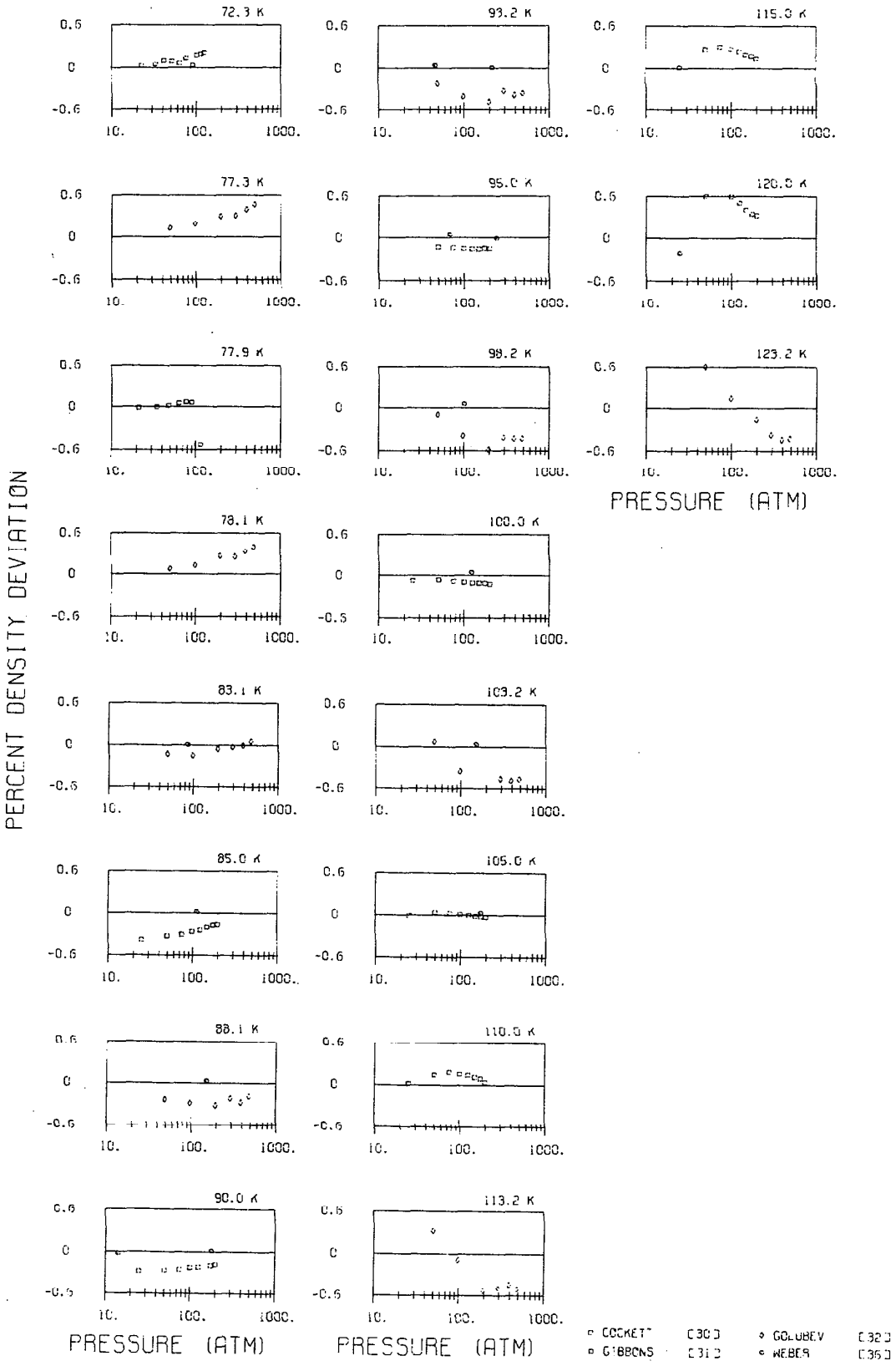


FIGURE 3. Deviation in density of equation (6) from the $P$-$\rho$-$T$ data of the liquid from the references cited.

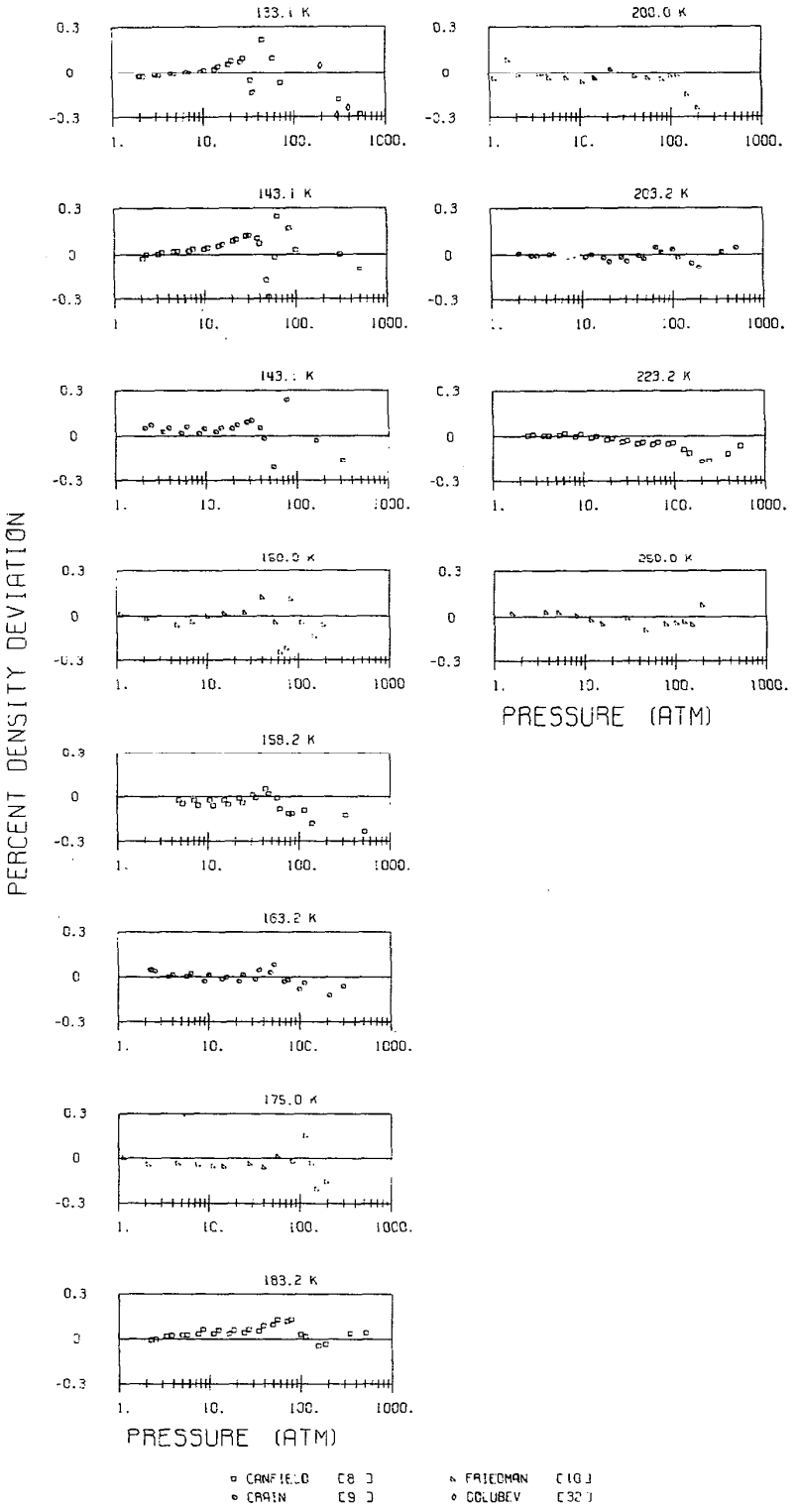


FIGURE 4. Deviation in density of equation (6) from the $P$-$\rho$-$T$ data at temperatures above the critical temperature from references cited.

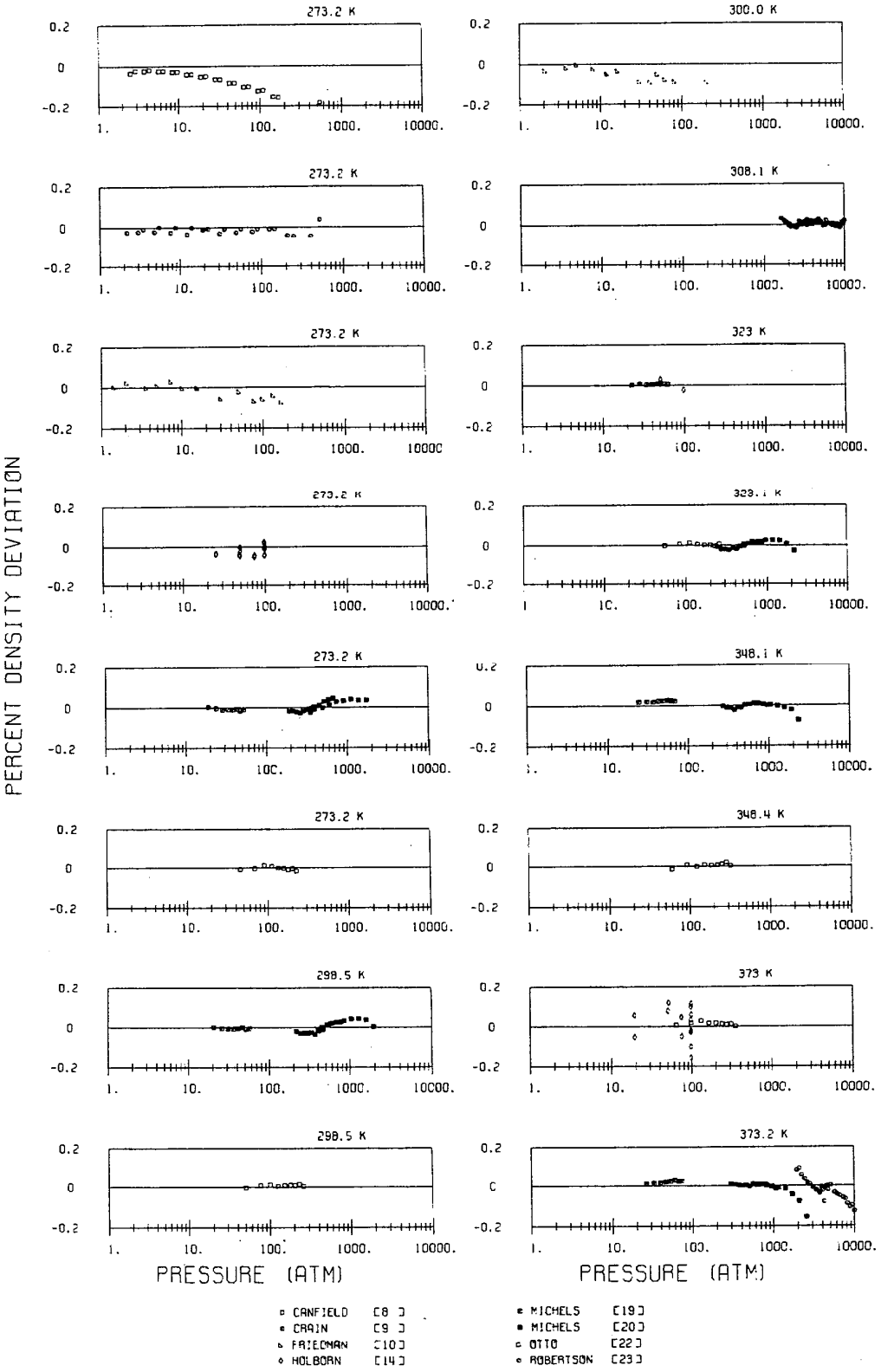


FIGURE 4. Deviation in density of equation (6) from the $P$-$\rho$-$T$ data at temperatures above the critical temperature from references cited.—Continued

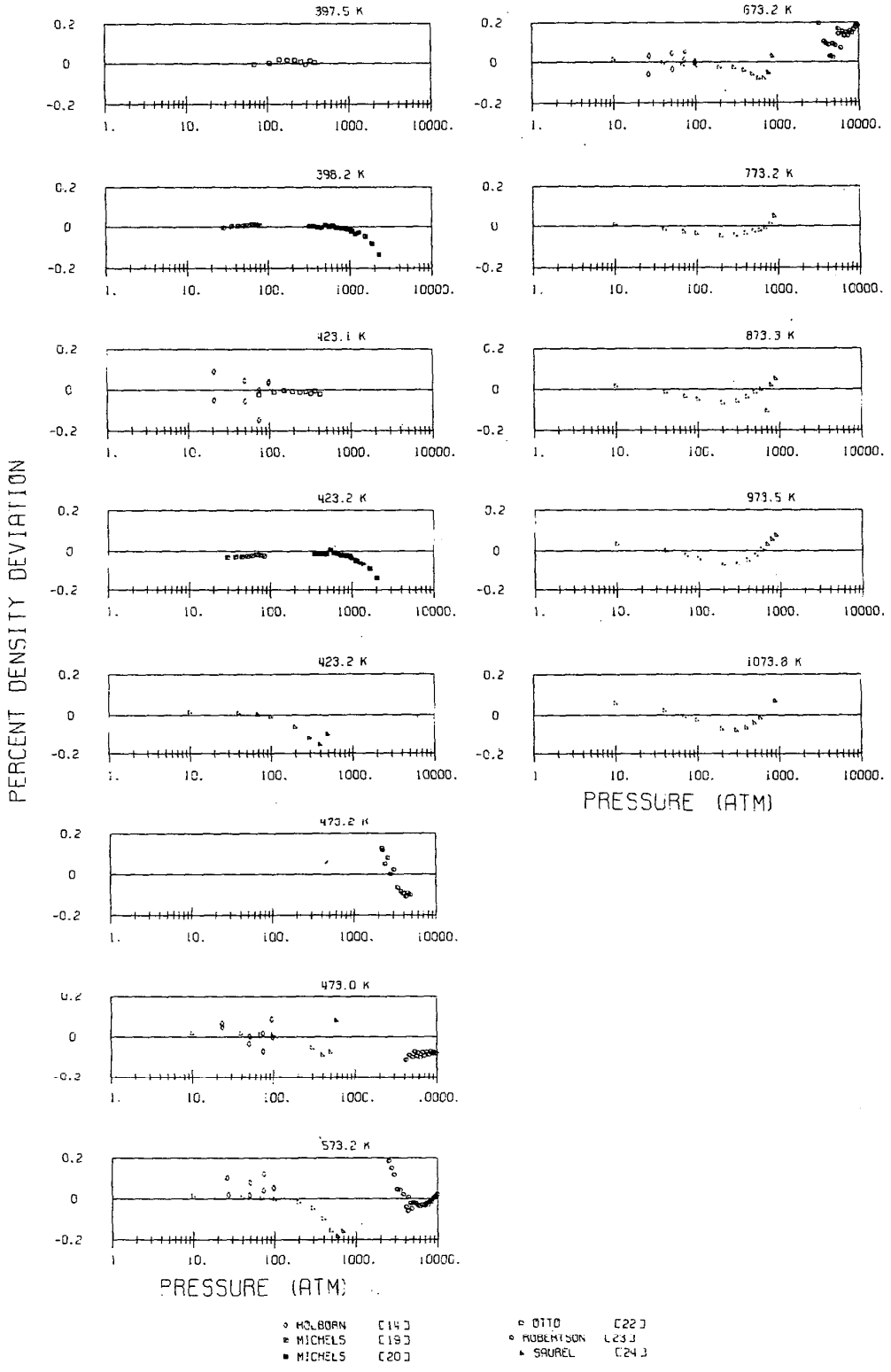


FIGURE 4. Deviation in density of equation (6) from the $P$-$\rho$-$T$ data at temperatures above the critical temperature from references cited.—Continued

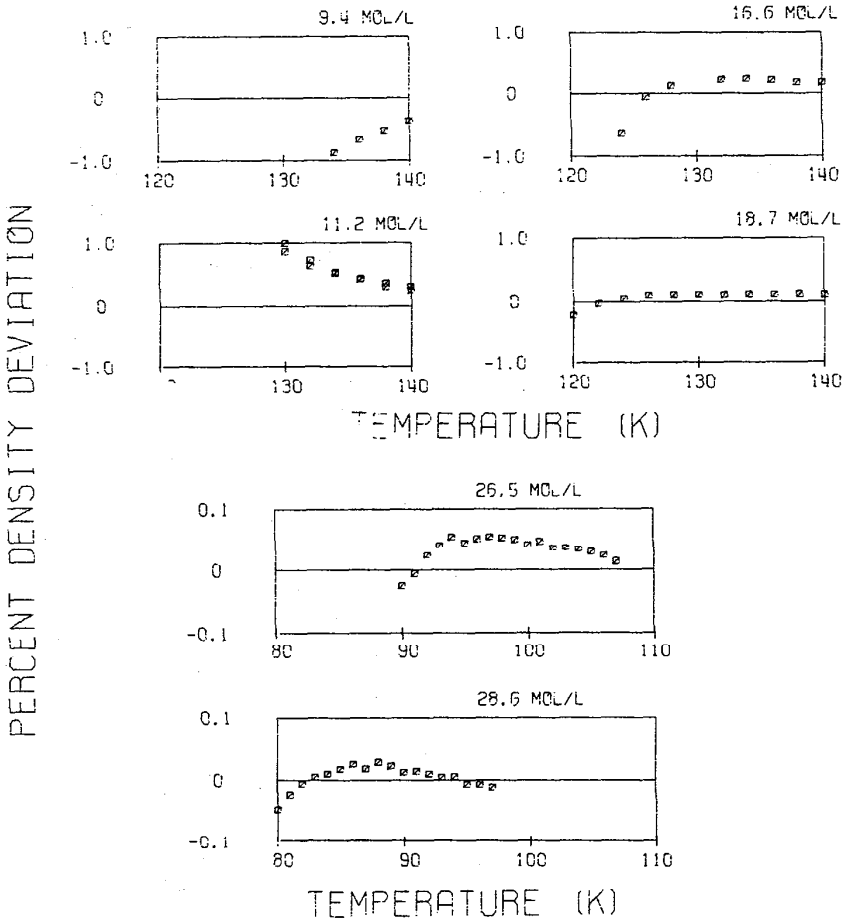


FIGURE 5. Deviation in density of equation (6) from the $P$-$\rho$-$T$ data of Weber [36] along approximate isochors.

TABLE 4. $P$-$\rho$-$T$ data with density deviations in excess of the scale used in figures 2, 3, 4, or 5

| Figure | Temp (K) | Pressure (atm) | Density deviation (percent) | Reference |
|---|---|---|---|---|
| 2 | 110.02 | 8.91 | −1.24 | [10] |
| 2 | 125.21 | 31.67 | −1.35 | [10] |
| 2 | 125.73 | 32.12 | −1.97 | [10] |
| 2 | 125.73 | 32.77 | −5.53 | [10] |
| 2 | 125.73 | 31.66 | −1.42 | [10] |
| 2 | 125.73 | 31.21 | −1.91 | [10] |
| 2 | 126.17 | 33.17 | −1.42 | [10] |
| 2 | 126.17 | 33.08 | −1.26 | [10] |
| 2 | 126.17 | 33.46 | −1.09 | [10] |
| 2 | 126.17 | 33.51 | −1.20 | [10] |
| 3 | 103.16 | 194.60 | −0.64 | [32] |
| 3 | 119.99 | 25.00 | −0.61 | [30] |
| 3 | 119.99 | 75.00 | 0.69 | [30] |
| 4 | 133.14 | 45.79 | 0.97 | [8] |
| 4 | 133.14 | 40.74 | −1.11 | [8] |
| 4 | 133.14 | 39.56 | −0.89 | [8] |
| 4 | 133.14 | 97.80 | 0.71 | [32] |
| 4 | 133.14 | 485.00 | −0.33 | [32] |
| 4 | 143.14 | 66.67 | 0.41 | [9] |
| 4 | 143.14 | 51.07 | −0.31 | [9] |
| 4 | 150.03 | 91.35 | −0.32 | [10] |
| 4 | 273.15 | 277.19 | −0.21 | [8] |
| 4 | 273.15 | 415.03 | 0.29 | [8] |
| 4 | 273.15 | 230.43 | −0.20 | [8] |
| 4 | 273.15 | 199.61 | −0.25 | [10] |
| 4 | 299.97 | 111.78 | −0.34 | [10] |
| 4 | 299.97 | 153.76 | −0.44 | [10] |
| 4 | 398.15 | 2766.00 | −0.26 | [20] |
| 4 | 423.17 | 2437.94 | −0.25 | [20] |
| 4 | 423.17 | 2960.95 | −0.36 | [20] |
| 4 | 473.19 | 200.00 | −0.27 | [24] |
| 4 | 673.45 | 3466.07 | −0.28 | [23] |
| 4 | 673.45 | 3003.21 | 0.23 | [23] |
| 4 | 673.45 | 2797.93 | 0.29 | [23] |
| 4 | 1073.82 | 800.00 | −0.28 | [24] |
| 4 | 1073.82 | 700.00 | −0.21 | [24] |

| Figure | Temp (K) | Density (mol/liter) | Density deviation (percent) | Reference |
|---|---|---|---|---|
| 5 | 132.00 | 9.4 | −1.16 | [36] |
| 5 | 130.00 | 9.4 | −1.59 | [36] |
| 5 | 128.00 | 9.4 | −2.39 | [36] |
| 5 | 128.00 | 11.2 | 1.15 | [36] |
| 5 | 128.00 | 11.2 | 1.24 | [36] |

TABLE 5. Root mean square deviations in density and pressure of $P$-$\rho$-$T$ data from the equation of state

| Source | RMS deviation in density (percent) | RMS deviation in pressure (percent) |
|---|---|---|
| Vapor – above 273 K (below 1000 atm) | | |
| Amagat [1] | 0.298 | 0.499 |
| Amagat [2] | 0.136 | 0.402 |
| Bartlett et al. [4] | 0.315 | 0.478 |
| Bartlett et al. [5] | 0.152 | 0.421 |
| Heuse and Otto [12] | 0.009 | 0.009 |
| Holborn and Otto [13] | 0.082 | 0.084 |
| *Holborn and Otto [14] | 0.066 | 0.068 |
| Holborn and Otto [15] | 0.681 | 0.551 |
| *Michels et al. [19] | 0.015 | 0.016 |
| Miller et al. [21] | 0.264 | 0.303 |
| *Otto et al. [22] | 0.011 | 0.012 |
| *Saurel [24] | 0.074 | 0.093 |
| Verschoyle [29] | 0.129 | 0.139 |
| Vapor – below 273 K (below 1000 atm) | | |
| Bartlett et al. [5] | 0.152 | 0.421 |
| Benedict [6] | 1.110 | 3.505 |
| *Canfield [8] | 0.166 | 0.225 |
| *Crain [9] | 0.077 | 0.114 |
| *Friedman [10] | 0.552 | 0.166 |
| Kamerlingh Onnes and van Urk [16] | 6.105 | 0.333 |
| Vapor at high pressures (above 1000 atm) | | |
| Amagat [2] | 0.136 | 0.402 |
| Benedict [7] | 0.279 | 1.786 |
| Malbrunot and Vodar [17] | 3.570 | 4.521 |
| Malbrunot [18] | 1.590 | 2.327 |
| *Michels et al. [20] | 0.053 | 0.149 |
| *Robertson and Babb [23] | 0.077 | 0.294 |
| Tsiklis and Polyakov [27] | 0.580 | 2.393 |
| Tsiklis [28] | 0.483 | 1.423 |
| Liquid | | |
| *Cocket et al. [30] | 0.260 | 7.077 |
| *Gibbons [31] | 0.161 | 7.901 |
| *Golubev and Dobrovolskii [32] | 0.352 | 5.522 |
| Streett and Staveley [33] | 0.377 | 26.805 |
| Van Itterbeek and Verbeke [34, 35] | 0.372 | 19.604 |
| *Weber [36] | 0.496 | 0.813 |

*$P$-$\rho$-$T$ data selected for the determination of the equation of state.

the low pressure vapor, and data along an approximate critical isochor, which have significantly higher deviations than the remainder of the liquid data.

The equation of state generally shows agreement with $P$-$\rho$-$T$ data within the experimental uncertainty of the measured values, except in the vicinity of the critical point, in the low temperature liquid region, and in the high pressure supercritical region. The data in these regions are discussed below.

### 5.1. Data Near the Critical Point

The data of Friedman [10] (fig. 2) for temperatures above 125 K, illustrate the imprecision of the data in the region of the critical point. In this region the slopes of the isotherms, $(\partial P/\partial \rho)_T$, are small, and small errors in pressure result in large errors in calculated density. This is a difficult region for fitting the equation of state and also a difficult region for precise experimental measurements. Systematic deviations between the equation and the data near the critical point are apparent for isotherms above the critical temperature at 133.1 K and 143.1 K in the data of Canfield [8] (fig. 4), and that of Crain [9] at 143.1 K (fig. 4), and for the data along the 11.2 mol/liter isochor of Weber [36] (fig. 5).

### 5.2. Low Temperature Liquid Data

The data for the liquid from the several experimenters indicate a lack of agreement larger than the discordance for the vapor data. The differences between the liquid $P$-$\rho$-$T$ data and equation (6) illustrated in figure 3 are generally systematic, but the trend of the deviations for data from various sources is dissimilar. Data selected for the determination of the coefficients of eq (6) cover most of the range of temperatures and pressures of the data that were not used (see table 1).

The density deviations of the equation of state from the data of Weber [36] are illustrated on several isotherms in figure 3 to facilitate comparison to other liquid data. All of Weber's data are compared with eq (6) in figure 5 for approximate isochoric values between 9 and 28 mol/liter. (At 9.47 mol/liter the state is vapor, while all other isochors are for liquid density values.) These data exhibit general agreement with the equation of state, although the isochoric plots indicate a systematic deviation with a maximum discrepancy of −2.4 percent for the 9.47 mol/liter vapor isochor, and systematic trends are evident for the 11.2 and 16.0 mol/liter isochors.

### 5.3. High Pressure Data

The data of Saurel [24] (shown in figure 4 for several isotherms from 423.2 K to 1073.8 K), and those of Robertson and Babb [23] (illustrated in figure 4 for several isotherms from 308.1 K to 673.1 K) were used in the determination of the equation of state. These measurements were judged to be the most accurate of the available high pressure data, and thus were used to define this region. The data of [17], [18], [27], [28], and [88] exhibit large systematic deviations from the equation of state, and are generally not in accord with measurements by the other experimenters.

The high pressure $P$-$\rho$-$T$ data of Cheng [88] include high pressure values at lower temperatures than other available measurements, except for some measurements of density on the fusion line. These measurements include 420 $P$-$\rho$-$T$ values along 16 isotherms ranging from 87 K to 309 K, with pressures from 225 atm to 10,245 atm. (The maximum pressures for data below 200 K were the fusion line pressures.) The values of density calculated from the equation of state (6) deviate systematically from the measurements of [88], with

maximum deviations generally within 1 percent, except for values near the fusion line (see fig. 7). These data are adjacent to the range of values measured by Robertson and Babb [23], and overlap the measurements of Michels et al. [20] at temperatures of 273 K and 298 K. Values of density calculated from the equation of state (6) are essentially in agreement with the data of [20] and [23] for these isotherms (see fig. 4). The agreement of the extrapolated values from the equation of state with Cheng's measurements confirms the validity of the extrapolation of the equation to the melting line, with an uncertainty as indicated by the agreement with the data from [88]. Comparisons of the density measurements of Cheng [88] on the fusion line are given in section 6.

## 6. Extrapolation of the Equation of State

The $P$-$\rho$-$T$ data for the saturated liquid and the freezing line were excluded in the determination of the coefficients of the equation of state (6). Extrapolations of the equation of state to the saturated liquid line have been made and are compared with the experimental data from references [37], [38], and [87] in figure 6. The $P$-$\rho$-$T$ values calculated for these comparisons were determined using the vapor pressure equation (9) to calculate the pressure corresponding to the measured temperature. A comparison of the density deviations for the lowest pressure values for each isotherm given in figure 3 to the density deviations given in figure 6, indicates the lack of concordance between these measured data. In the least squares fitting of the equation of state, the values required for functions C and D in table 2 were determined as outlined in section 2.2.

The saturated liquid data of Brauns [87] were received after the coefficients for eq (6) had been determined. These measurements include one set of values from 66 to 78 K, and a second set of measurements from 76 to 111 K from a separate experiment using a different apparatus. Brauns has reported smoothed values in two tables which represent two separate experiments. The deviations between these smoothed values and eq (6) are illustrated in figure 6.

Extrapolation of the equation of state to the melting curve was made with pressures on the melting curve determined from the Simon melting curve equation (7) as reported by Grilly and Mills [39] with appropriate temperature corrections.

$$P = a + bT^c, \tag{7}$$

where $a=-1579.08$, $b=0.926302$, and $c=1.795$, with pressures in atmospheres and temperatures in kelvin. Densities at the melting curve calculated from the equation of state are compared to the measured values of Grilly and Mills [39] and Cheng [88] in figure 7. The data by Cheng [88] for the high pressure liquid are discussed in section 5.

In addition to the extrapolation of the equation of state in the liquid range it is also desirable to extrapolate the equation of state in the vapor phase to higher and lower temperatures. At both high and low temperatures, the dominant portion of the equation of state is $\rho RT + \rho^2(N_1T + N_2T^{1/2} + N_3 + N_4/T + N_5/T^2)$. With eq (6) expanded as a power series (i.e., a virial equation), the second virial coefficient becomes,

$$B(T) = (N_1T + N_2T^{1/2} + N_3 + N_4/T + N_5/T^2)RT, \tag{8}$$

where the $N_i$ are the coefficients from table 3, and $T$ is the temperature in kelvins. Hence, the dominant terms

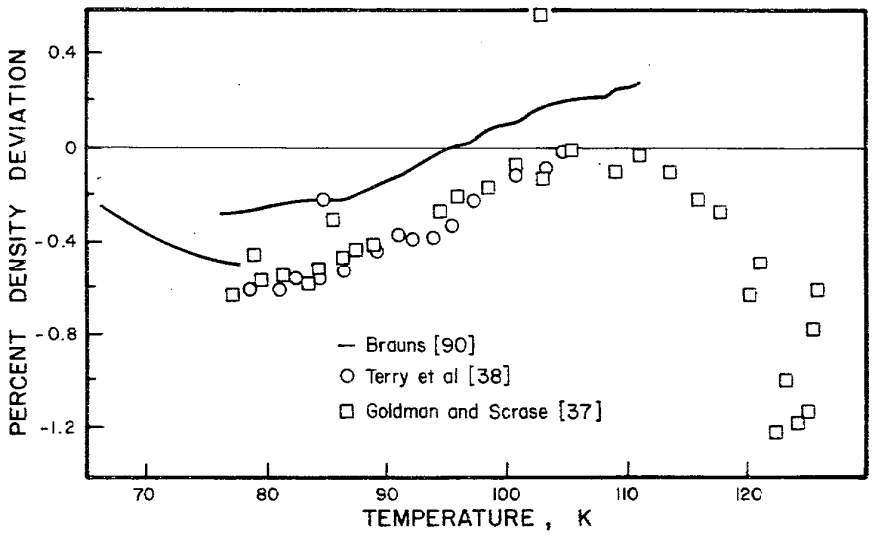


FIGURE 6. Deviation of equation (6) from liquid $P$-$\rho$-$T$ data at the vapor pressure.

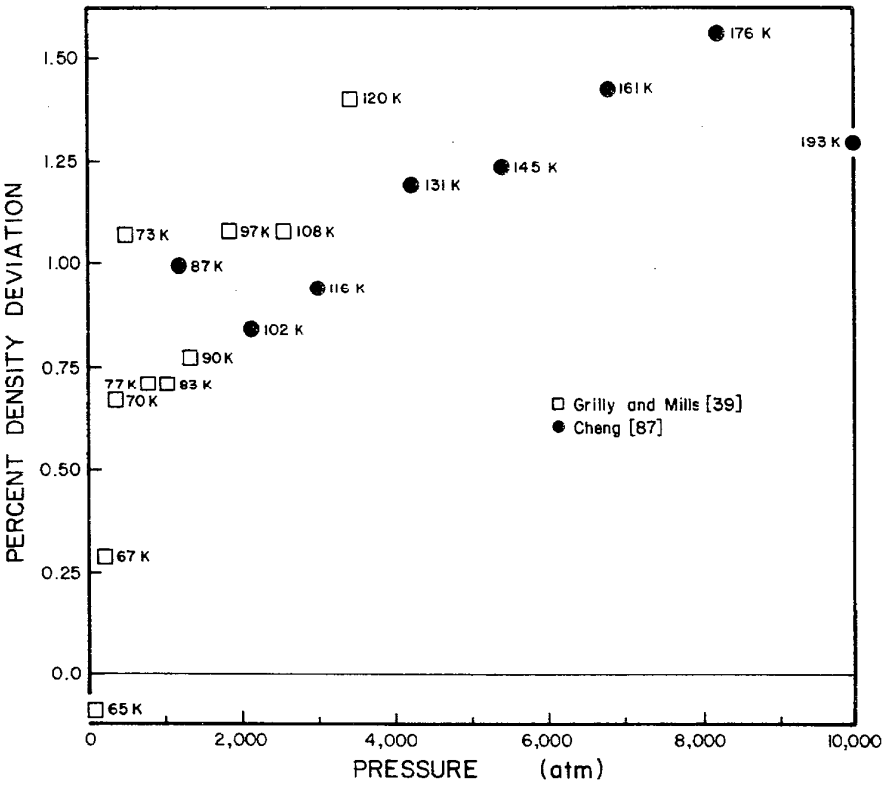


FIGURE 7. Deviation of equation (6) from liquid $P$-$\rho$-$T$ on the freezing line from [39] and [88]. (Nominal temperatures are given beside each point.)

are the contributions from first and second virial terms.

The contribution to the total pressure, as calculated by eq (6), from the ideal gas and second virial terms is illustrated in figures 8, 9, and 10. This contribution is expressed as (percent $P = (\mathscr{P}/P_{eq}) \times 100)$. where $P_{eq}$ is the pressure calculated from eq (6) at the specified temperature $T$, and density $\rho$, and $\mathscr{P}$ is the contribution to the calculated pressure (i.e., the sum of the ideal gas and second virial term $(\mathscr{P} = \rho RT + B(T)\rho^2/RT)$ in figures 8 and 9, and in figure 10 of the ideal gas term alone $(\mathscr{P} = \rho RT)$).

Examination of figures 8, 9, and 10 indicates that the extrapolation of the equation of state for the vapor at high and low temperatures is reasonable, and for higher

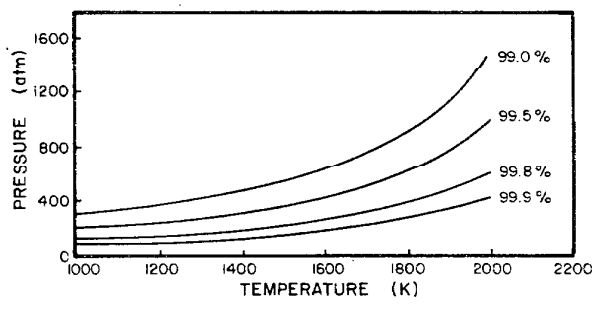


FIGURE 8. Percentage contribution of first and second virial terms to pressure from equation (6) at high temperature.

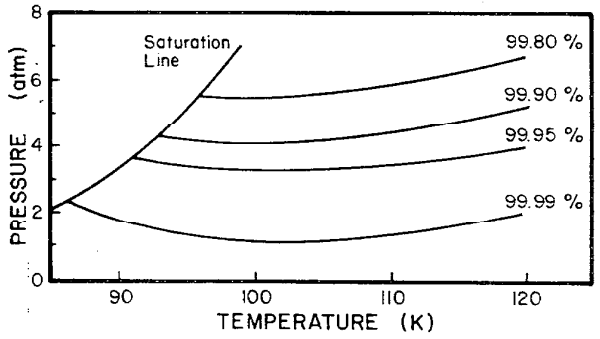


FIGURE 9. Percentage contribution of first and second virial terms to pressure from equation (6) at low temperature.

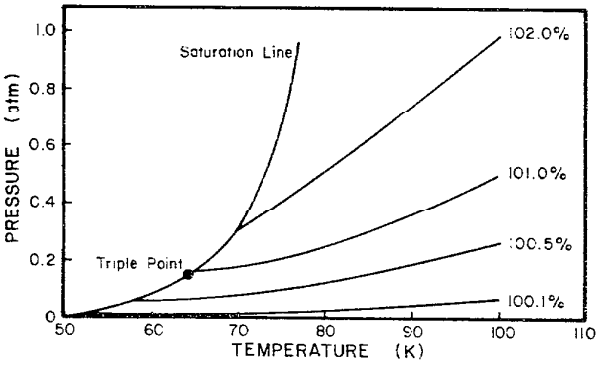


FIGURE 10. Percentage contribution of first al (ideal gas) term to pressure from equation (6) at low perature.

temperatures is essentially limited by the accuracy of the second virial coefficient as predicted by eq (8). Figure 11 is a comparison of values from eq (8) with the experimental virial coefficients from the references cited. Figure 10 indicates that eq (6) may also be extrapolated to lower temperatures for the gas to the saturated vapor line. These comparisons indicate that the extrapolations suggested have the anticipated physical features and are prudent for the range of values included in these thermodynamic property tables.

## 7. The Vapor Pressure Equation

The literature reporting measurements of the vapor pressure of nitrogen is summarized in table 6. A preliminary study of the vapor pressure data, and a preliminary vapor pressure equation were reported in [99] and [100]. Following the development of the equation for the vapor pressure of oxygen using calorimetric as well as vapor pressure measurements [112], a new vapor pressure equation was developed for nitrogen. This

TABLE 6. Summary of vapor pressure data

| Source | Temperature range (K) | Number of data points |
|---|---|---|
| *Armstrong [40] | 64–78 | 74 |
| Cath [41] | 58–84 | 10 |
| Crommelin [42] | 81–124 | 9 |
| Dodge and Davis [43] | 76–122 | 30 |
| Friedman and White [44] | 78–126 | 19 |
| Giauque and Clayton [45] | 65–78 | 10 |
| Keesom and Bijl [46] | 65–78 | 18 |
| Michels et al. [47] | 97–125 | 10 |
| Moussa et al. [48] | 63–78 | 32 |
| Porter and Perry [49] | 90–121 | 12 |
| Wagner [50] | 63–126 | 75 |
| *Weber [36] | 65–126 | 47 |

*Data selected for the determination of the vapor pressure equation.

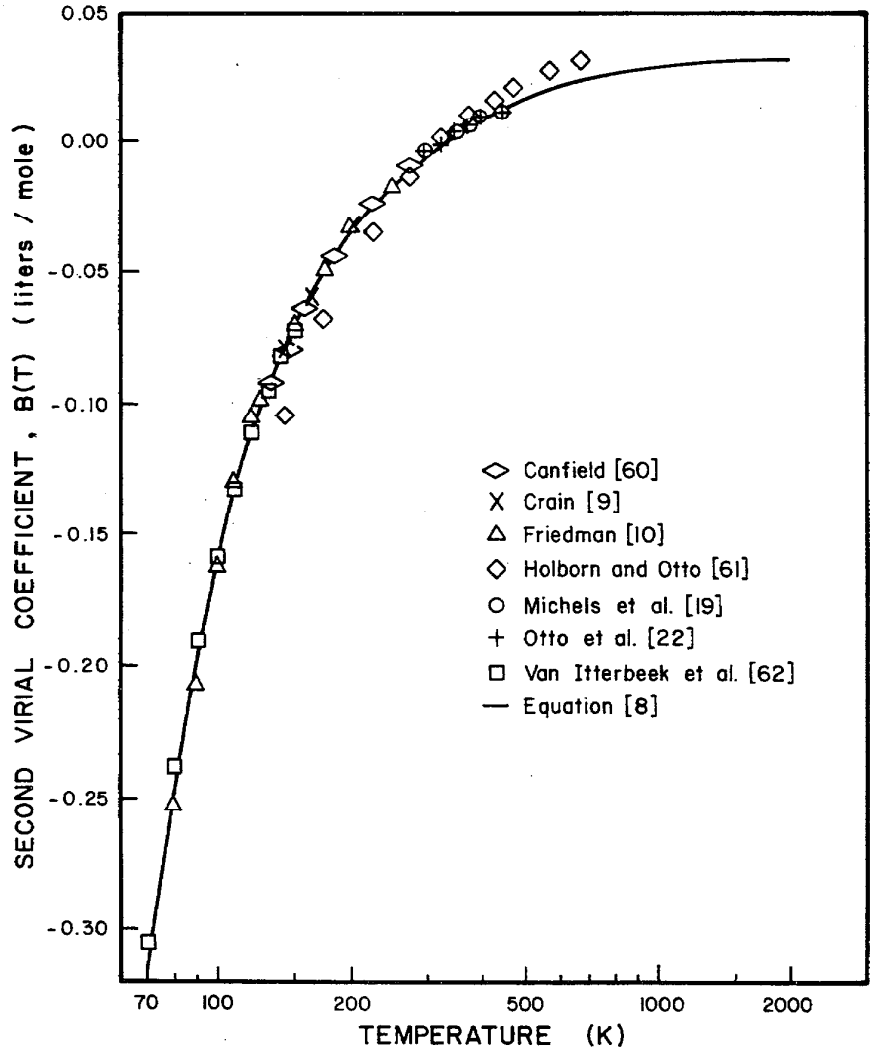


FIGURE 11. Comparison of second virial coefficient from equation (8) to experimental values from the sources indicated.

TABLE 7. Coefficients for nitrogen vapor pressure equation (9)*

| Coefficient | Numerical value | Coefficient | Numerical value |
|---|---|---|---|
| $N_1$ | $0.8394409444 \times 10^{2}$ | $N_6$ | $-0.5944544662 \times 10^{-5}$ |
| $N_2$ | $-0.1890045259 \times 10^{4}$ | $N_7$ | $0.2715433932 \times 10^{-7}$ |
| $N_3$ | $-0.7282229165 \times 10^{1}$ | $N_8$ | $-0.4879535904 \times 10^{-10}$ |
| $N_4$ | $0.1022850966 \times 10^{-1}$ | $N_9$ | $0.5095360824 \times 10^{3}$ |
| $N_5$ | $0.5556063825 \times 10^{-3}$ | | |

*Coefficients are for temperature in kelvin, and pressure in atmospheres.

equation is the result of a least squares fit to the nitrogen data of Armstrong [40], and Weber [36]. These data were used since they cover the range from the triple point to the critical point, have a high precision, and appeared to be the most accurate measurements available. The vapor pressure measurements from [36] are reported by the experimenter to include possible systematic errors in temperature of 0.003 K at 65 K increasing to 0.007 K at 140 K, and to have an accuracy in pressure of 0.01 percent. The form of the vapor pressure equation used in this work is

$$\ln(P) = N_1/T + N_2 + N_3 T + N_4 (T_c - T)^{1.95} + N_5 T^3 + N_6 T^4 + N_7 T^5 + N_8 T^6 + N_9 \ln(T) \qquad (9)$$

where $T_c = 126.20$ K, the critical point temperature, $T$ is the saturation temperature, and $P$ is the vapor pressure. The coefficients for this equation for temperature in kelvin and pressure in atmospheres are given in table 7.

The new vapor pressure measurements by Wagner [50] were brought to the attention of the authors following the determination of the vapor pressure equation. Wagner reports an accuracy of $\pm 0.005$ K in temperature, and an uncertainty of one part in 10,000 in pressure. A comparison of the vapor pressure equation (9) with the data from [36], [40], [48], and [50] is given in figure 12. The data of the experimenters listed in table 6 not included in the comparisons of figure 12 are either not concordant with the data of [36], [40], [48], and [50], or

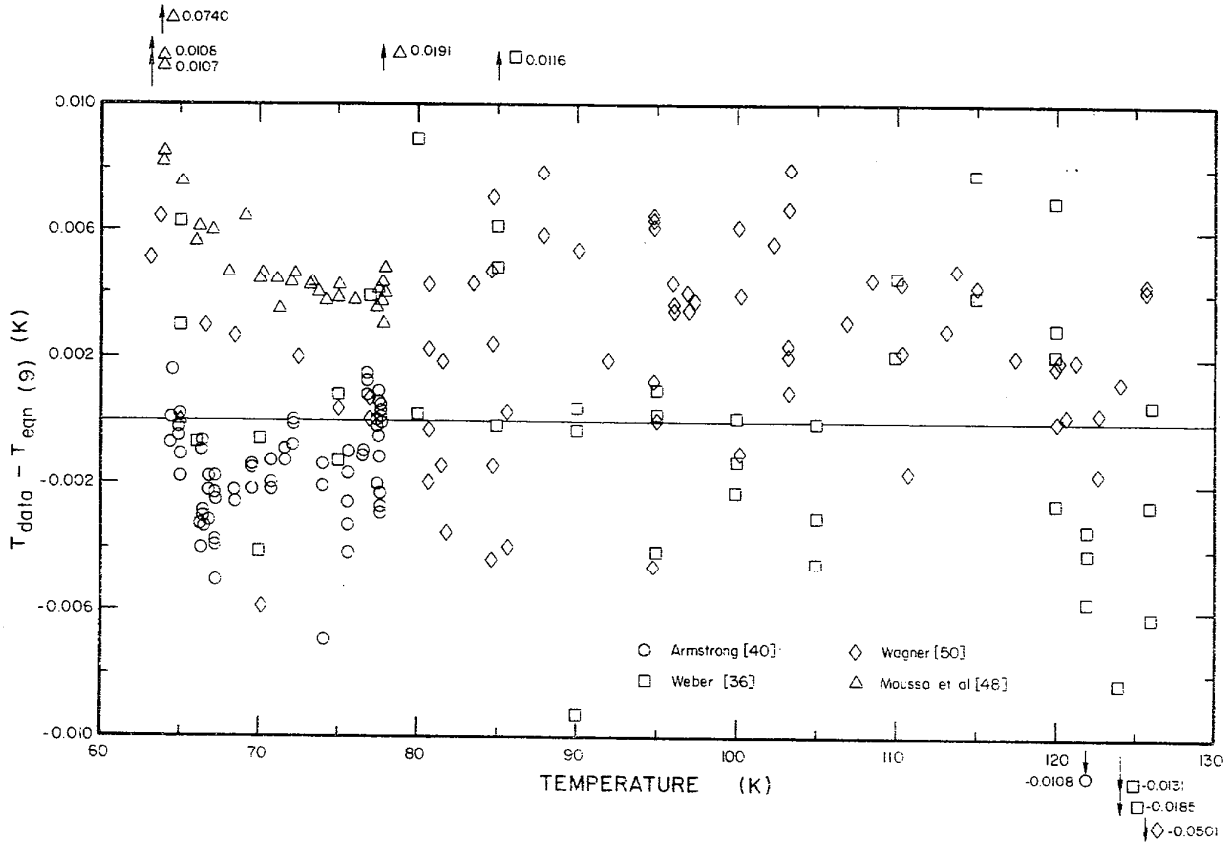


FIGURE 12. Deviations of nitrogen vapor pressure equation (9) from selected vapor pressure data.

exhibit imprecisions which are an order of magnitude larger than that of the selected data. Equation (9), with the coefficients given in table 7 gives a temperature at one atmosphere pressure of 77.347 K. This value is 0.001 K lower than the value published as a secondary reference point for the International Practical Temperature Scale of 1968 [93].

A recent paper by Wagner [90] reports a new vapor pressure equation which may be more accurate than eq (9). Wagner indicates that the data of [36], [40], [48], and [50] cover a field of maximum deviations of 0.006 K, whereas figure 12 illustrates a field of maximum deviations of 0.01 K. Since eq (9) represents the data of [36] and [50] within the reported accuracy of the measured data, the determination of the coefficients for the vapor pressure equation was not repeated to include the new data from [50].

The vapor pressure equation has been constrained at the critical point to a temperature of 126.20 K, a pressure of 33.555 atmospheres, and the slope $dP/dT$ of 1.6569 atm/K, which is the value of $(\partial P/\partial T)_\rho$ at the critical point from the equation of state (6). In the calculation of the thermodynamic property tables, the vapor pressure equation (9) was used only to determine the vapor pressure for the saturation table, and the saturation temperature for each isobar.

## 8. The Ideal Gas Heat Capacity

The values for ideal gas heat capacity used in the calculation of the thermodynamic property tables are from [85] and [86]. These values appear to be the most accurate to date.

The equation suggested by Barieau [91], has been fitted to the data from [85]. This equation is

$$C_p^0/R = N_1/T^3 + N_2/T^2 + N_3/T + N_4 + N_5T + N_6T^2 + N_7T^3 + N_8u^2e^u/(e^u - 1)^2, \quad (10)$$

where $C_p^0$ is the ideal gas heat capacity, $T$ the temperature, and $\mu = N_9/T$. The coefficients for eq (10) with values of $T$ in kelvin are given in table 8.

Table 9 is a listing of the ideal gas heat capacity values $(C_p^0/R)$ as a function of temperature as reported in [85]. A comparison between these values from [85] and values calculated from eq (10) indicates exact agreement within the number of figures reported, except above 1200 K. Above 1200 K the differences between the values from eq (10) and from [85] is no more than ± 0.0001.

TABLE 8. Coefficients for the ideal gas heat capacity equation (10) for nitrogen

| Coefficient | Numerical value | Coefficient | Numerical value |
|---|---|---|---|
| $N_1$ | $-0.7352104012 \times 10^3$ | $N_6$ | $0.1746508498 \times 10^{-7}$ |
| $N_2$ | $0.3422399804 \times 10^2$ | $N_7$ | $-0.3568920335 \times 10^{-11}$ |
| $N_3$ | $-0.5576482846$ | $N_8$ | $0.1005387228 \times 10^1$ |
| $N_4$ | $0.3504042283 \times 10^1$ | $N_9$ | 3353.4061 |
| $N_5$ | $-0.1733901851 \times 10^{-4}$ | | |

TABLE 9. Values of ideal gas heat capacity, $C_p^0/R$, from Baehr et al. [85]

| Temperature (K) | $C_p^0/R$ | Temperature (K) | $C_p^0/R$ |
|---|---|---|---|
| 50.0 | 3.4999 | 270.0 | 3.4995 |
| 60.0 | 3.4998 | 280.0 | 3.4998 |
| 70.0 | 3.4998 | 290.0 | 3.5001 |
| 80.0 | 3.4997 | 300.0 | 3.5006 |
| 90.0 | 3.4997 | 310.0 | 3.5011 |
| 100.0 | 3.4996 | 320.0 | 3.5018 |
| 110.0 | 3.4996 | 330.0 | 3.5027 |
| 120.0 | 3.4995 | 340.0 | 3.5038 |
| 130.0 | 3.4995 | 350.0 | 3.5050 |
| 140.0 | 3.4994 | 360.0 | 3.5065 |
| 150.0 | 3.4994 | 370.0 | 3.5081 |
| 160.0 | 3.4994 | 380.0 | 3.5101 |
| 170.0 | 3.4993 | 390.0 | 3.5122 |
| 180.0 | 3.4993 | 400.0 | 3.5147 |
| 190.0 | 3.4992 | 410.0 | 3.5174 |
| 200.0 | 3.4992 | 420.0 | 3.5203 |
| 210.0 | 3.4992 | 430.0 | 3.5235 |
| 220.0 | 3.4992 | 440.0 | 3.5270 |
| 230.0 | 3.4992 | 450.0 | 3.5308 |
| 240.0 | 3.4992 | 460.0 | 3.5349 |
| 250.0 | 3.4993 | 470.0 | 3.5392 |
| 260.0 | 3.4994 | 480.0 | 3.5438 |

TABLE 9. Values of ideal gas heat capacity, $C_p^0/R$, from Baehr et al. [85]—Continued

| Temperature (K) | $C_p^0/R$ | Temperature (K) | $C_p^0/R$ |
|---|---|---|---|
| 490.0 | 3.5487 | 710.0 | 3.7014 |
| 500.0 | 3.5538 | 720.0 | 3.7095 |
| 510.0 | 3.5591 | 730.0 | 3.7176 |
| 520.0 | 3.5647 | 740.0 | 3.7257 |
| 530.0 | 3.5705 | 750.0 | 3.7338 |
| 540.0 | 3.5765 | 760.0 | 3.7419 |
| 550.0 | 3.5828 | 770.0 | 3.7500 |
| 560.0 | 3.5892 | 780.0 | 3.7581 |
| 570.0 | 3.5958 | 790.0 | 3.7662 |
| 580.0 | 3.6026 | 800.0 | 3.7742 |
| 590.0 | 3.6095 | 810.0 | 3.7822 |
| 600.0 | 3.6166 | 820.0 | 3.7902 |
| 610.0 | 3.6239 | 830.0 | 3.7982 |
| 620.0 | 3.6312 | 840.0 | 3.8061 |
| 630.0 | 3.6387 | 850.0 | 3.8139 |
| 640.0 | 3.6463 | 860.0 | 3.8217 |
| 650.0 | 3.6539 | 870.0 | 3.8295 |
| 660.0 | 3.6617 | 880.0 | 3.8372 |
| 670.0 | 3.6695 | 890.0 | 3.8448 |
| 680.0 | 3.6774 | 900.0 | 3.8524 |
| 690.0 | 3.6854 | 910.0 | 3.8599 |
| 700.0 | 3.6934 | 920.0 | 3.8674 |

TABLE 9. Values of ideal gas heat capacity, $C_p^0/R$, from Baehr et al. [85]—Continued

| Temperature (K) | $C_p^0/R$ | Temperature (K) | $C_p^0/R$ |
|---|---|---|---|
| 930.0 | 3.8748 | 1350.0 | 4.1192 |
| 940.0 | 3.8821 | 1400.0 | 4.1404 |
| 950.0 | 3.8894 | 1450.0 | 4.1601 |
| 960.0 | 3.8966 | 1500.0 | 4.1786 |
| 970.0 | 3.9037 | 1550.0 | 4.1959 |
| 980.0 | 3.9107 | 1600.0 | 4.2120 |
| 990.0 | 3.9177 | 1650.0 | 4.2271 |
| 1000.0 | 3.9246 | 1700.0 | 4.2413 |
| 1050.0 | 3.9579 | 1750.0 | 4.2546 |
| 1100.0 | 3.9893 | 1800.0 | 4.2671 |
| 1150.0 | 4.0188 | 1850.0 | 4.2789 |
| 1200.0 | 4.0465 | 1900.0 | 4.2899 |
| 1250.0 | 4.0724 | 1950.0 | 4.3003 |
| 1300.0 | 4.0966 | 2000.0 | 4.3101 |

## 9. Derived Thermodynamic Properties

The values of entropy, enthalpy, internal energy, the isotherm derivative, the isochor derivative, $C_v$, $C_p$, and the velocity of sound at various state points are calculated from the equation of state (6), and the ideal gas heat capacity equation (10). The vapor pressure equation (9) and the Simon melting curve equation (7) were used to identify the temperatures of the phase changes from vapor to liquid, and solid to vapor, respectively, for each isobar. The representations for the properties are continuously integrated through the two-phase region to calculate properties in the liquid range. This was made possible by the fitting procedures employed in the development of the equation of state as described in section 4.2 in which the conditions for two-phase equilibrium were included in the least squares determination of the coefficients for the equation of state (6). The thermodynamic formulations for the calculation of the thermodynamic property tables are summarized in the following paragraphs. Functions for the integrals and derivatives of the equation of state required to perform these calculations are given in Appendix A.

The entropy of any thermodynamic state was calculated from

$$S(T,\rho) = S^0_{T_0} + \int_{T_0}^{T} (C_p^0/T)dT - R\ln(RT\rho) + \int_0^{\rho} [R/\rho - (1/\rho^2)(\partial P/\partial T)_\rho]_T d\rho. \quad (11)$$

The ideal gas specific heat, $C_p^0$, is from eq (10). The reference entropy of the ideal gas at $T_0 = 298.15$ K and $P_0 = 1$ atmosphere, $S^0_{T_0} = 191.502 \pm 0.025$ joules/mol · K is taken from [98].

The enthalpy of any state may be calculated from

$$H(T,\rho) = H^0_{T_0} + T\int_0^{\rho} [(P/T\rho^2) - (1/\rho^2)(\partial P/\partial T)_\rho]_T d\rho + (P - \rho RT)/\rho + \int_{T_0}^{T} C_p^0 dT. \quad (12)$$

However, it is convenient to replace the first integral term in eq (12) as follows:

$$T\int_0^{\rho} [(P/T\rho^2) - (1/\rho^2)(\partial P/\partial T)_\rho]_T d\rho \equiv T\int_0^{\rho} [(R/\rho) - (1/\rho^2)(\partial P/\partial T)_\rho]_T d\rho + \int_0^{\rho} [(P/\rho^2) - (RT/\rho)]_T d\rho. \quad (13)$$

By substitution of the identity of (13) in eq (12), the expression for enthalpy is given as

$$H(T,\rho) = H^0_{T_0} + T\int_0^{\rho} [(R/\rho) - (1/\rho^2)(\partial P/\partial T)_\rho]_T d\rho + \int_0^{\rho} [(P/\rho^2) - (RT/\rho)]_T d\rho + (P - \rho RT)/\rho + \int_{T_0}^{T} C_p^0 dT. \quad (14)$$

The reference enthalpy of the ideal gas at $T_0 = 298.15$ K of $H^0_{T_0} = 8669 \pm 3$ joules/mole was taken from the value of $(H^0 - H^0_0)$ in [98] with $H^0_0 = 0.0$. The internal energy of a fluid state was calculated from

$$U(T,\rho) = H(T,\rho) - P/\rho. \quad (15)$$

The specific heat at constant volume, $C_v$, of liquid and gas phase points was calculated using the relation

$$C_v(T,\rho) = (C_p^0 - R) - \int_0^{\rho} (T/\rho^2)[(\partial^2 P/\partial T^2)_\rho]_T d\rho, \quad (16)$$

where $C_p^0$ at temperature, $T$, is calculated from eqn (10). The specific heat at constant pressure, $C_p$, is given by

$$C_p(T,\rho) = C_v(T,\rho) + [(T/\rho^2)(\partial P/\partial T)^2_\rho/(\partial P/\partial\rho)_T] \quad (17)$$

It is notable that the calculation of properties from the equation developed in this work is considerably simplified from the prior methods of [99] by the continuous integration along isotherms through the two-phase region due to the imposing of the requirements for phase equilibrium in the determination of the equation of state. Differences between values of the thermodynamic properties for the liquid calculated by continuous integration along isotherms through the vapor-liquid phase change, and those calculated by

TABLE 10. Comparison between liquid thermodynamic properties of nitrogen calculated by continuous integration along isotherms and the Clapeyron equation for the vapor-liquid phase change.

(Subscript $_c$ refers to Clapeyron calculation, $_b$ to continuous integration; $H$ = enthalpy, $S$ = entropy, $C_v$ = isochoric heat capacity, $W$ = velocity of sound.)

| Temp (K) | $H_b$ | $H_c - H_b$ | $S_b$ | $S_c - S_b$ | $C_{v_b}$ | $C_{v_c} - C_{v_b}$ | $W_b$ | $W_c - W_b$ |
|---|---|---|---|---|---|---|---|---|
| | (J/mol) | | (J/mol · K) | | (J/mol · K) | | (m/s) | |
| 65 | −4109 | +1 | 69.60 | 0.08 | 27.71 | −4.45 | 1247 | 52 |
| 70 | −3826 | −12 | 73.80 | −.08 | 28.50 | −.71 | 1092 | 5 |
| 75 | −3538 | −13 | 77.75 | −.11 | 28.11 | −.29 | 983 | 2 |
| 80 | −3248 | −15 | 81.47 | −.14 | 27.49 | −.66 | 894 | 5 |
| 85 | −2954 | −19 | 84.99 | −.18 | 26.96 | −.59 | 817 | 4 |
| 90 | −2656 | −21 | 88.34 | −.20 | 26.57 | −.05 | 746 | 0 |
| 100 | −2033 | −18 | 94.73 | −.16 | 26.19 | +.39 | 613 | −2 |
| 110 | −1345 | −16 | 100.99 | −.15 | 26.21 | +.55 | 484 | −3 |
| 120 | −505 | +14 | 107.85 | +.11 | 26.86 | +4.94 | 338 | −26 |
| 126.20 | 863 | 0 | 118.41 | 0 | 30.68 | 0 | 182 | 0 |

use of the Clapeyron equation for the phase change are given in table 10. The differences in liquid properties indicated in table 10 are generally within the uncertainty of the property values.

## 10. Comparison of the Equation of State with Related Thermodynamic Data

Experimental measurements of properties of nitrogen in addition to the $P$-$\rho$-$T$ data are available for comparison to values calculated using the equation of state developed in this work. Comparisons between measured and calculated values of the heat capacities, latent heats of vaporization, enthalpies, and sonic velocities are reported here. The thermodynamic property formulations used in the calculation of various properties from the equation of state are presented in the preceding section.

### 10.1. Calculated Heat Capacity Values

Values of $C_p$ and $C_v$ for nitrogen calculated by integration along isotherms using eq (6) with coefficients from table 3 are illustrated in figures 13 and 14 for isobars of 1, 10, 40, 100, 150, 200, and 400 atm.

### 10.2. Comparison to the Estimated Isochoric Heat Capacity Data Used in the Least Squares Fit for the Equation of State

In the determination of the coefficients for the equation of state, the 396 values of $C_v$ described in section 2.3, were used. These generated values of $C_v$ were compared with isochoric heat capacity values calculated with the equation of state (6) and the ideal gas heat capacity eq (10). This comparison shows that only 19 of the calculated $C_v$ values differ from the corresponding generated data in excess of 5 percent. Two-thirds of the calculated $C_v$ values differ from the generated data in excess of 1 percent, and 53 values have differences exceeding 2 percent. The root-mean-square deviation between the calculated $C_v$ values and the input values is 4.14 percent. Since the estimated uncertainty of the 396 $C_v$ values used for the determination of the equation of state is 5 percent, the accuracy of the equation of state for use in calculating heat capacity values was considered to be satisfactory.

Some of the calculated values of $C_v$ which differed in excess of 5 percent from the input $C_v$ values were near the critical point (i.e., for isochors between 7 and 13 mol/liter and temperatures from 126 K to 131 K). The remaining data points with deviations in excess of 5 percent were in the low temperature liquid, (i.e., for isochors from 27 to 31 mol/liter and temperatures from 72 K to 88 K). The maximum $C_v$ deviation observed in the critical region was 16 percent, and in the low temperature liquid region, 12 percent.

### 10.3. Comparison of the Heat Capacity Data

Comparisons of isobaric heat capacity values, $C_p$, calculated from the equation of state (6) and the ideal gas heat capacity equation (10) to measured values from Krase and Mackey [55] and Mage et al. [56] are given in table 11. The data reported in [56] also includes the values from [52] and [54]. The isobaric heat capacities, $C_p$, listed in table 11 from [55] and [56] agree with the values calculated from the equation of state generally within 0.6 percent, except for five values of Mage et al. [56] in the region of the critical point where the calculated $C_p$ values reflect the imprecision of the experimental data and the fitting problems in the critical region.

Comparisons of isochoric heat capacity values, $C_v$, calculated from the equation of state (6) and the ideal gas heat capacity equation (10) to measured values along the critical isochor published by Voronel et al. [57] are also given in table 11. (The value of the critical density determined in this work is 11.21 mol/liter while that of

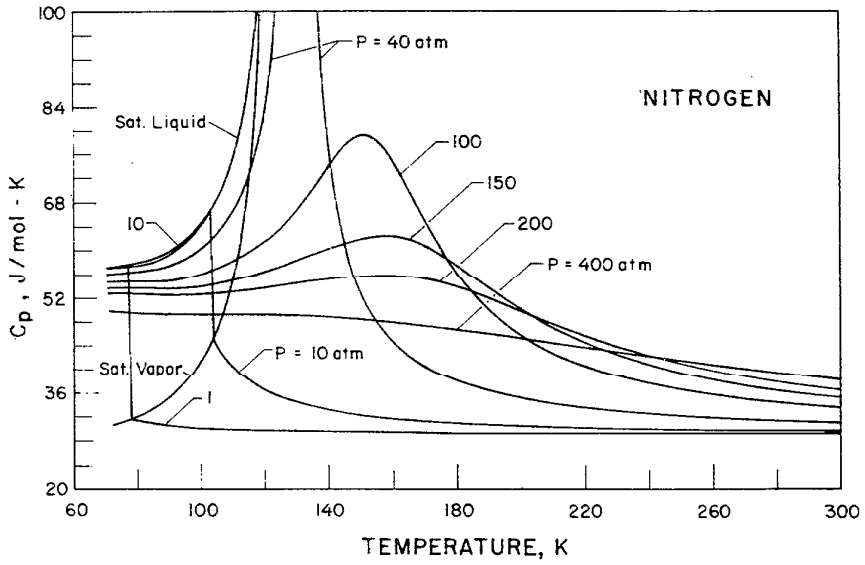


FIGURE 13. Constant pressure heat capacity ($C_p$) of nitrogen calculated from equation of state (6) with coefficients of table 3.

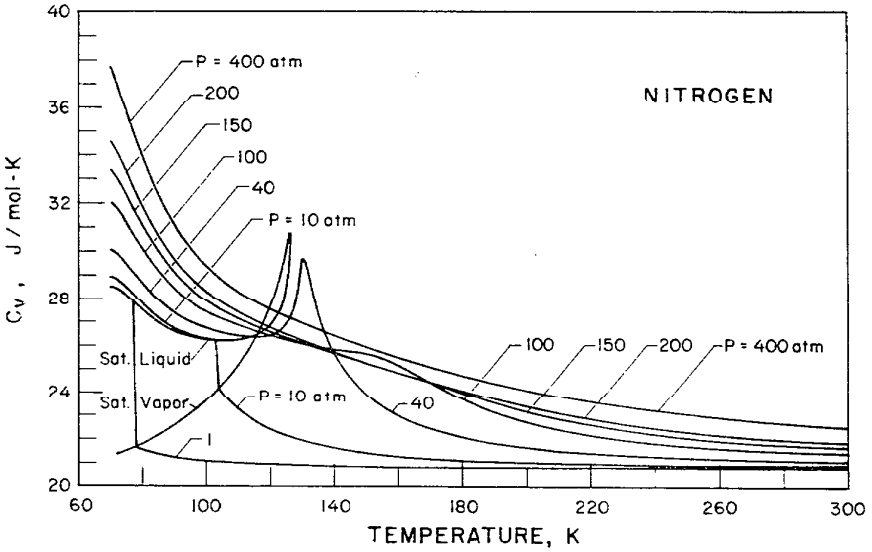


FIGURE 14. Constant volume heat capacity ($C_v$) of nitrogen calculated from equation of state (6) with coefficients of table 3.

TABLE 11. Comparison of heat capacity measurements with values calculated from the equation of state (6) and the ideal gas heat capacity equation (10)

| Comparison to $C_p$ data of Krase and Mackey [55] | | | |
|---|---|---|---|
| Temp (K) | Press (atm) | $C_p$ [55] (J/mol · K) | $\Delta C_p^*$ (J/mol · K) |
| 303.1 | 1 | 28.94 | −0.22 |
| 303.1 | 50 | 31.03 | −0.31 |
| 303.1 | 100 | 33.17 | −0.20 |
| 303.1 | 200 | 36.18 | −0.10 |
| 303.1 | 300 | 37.44 | −0.22 |
| 303.1 | 400 | 37.98 | −0.13 |

TABLE 11. Comparison of heat capacity measurements with values calculated from the equation of state (6) and the ideal gas heat capacity equation (10)—Continued

| Comparison to $C_p$ data of Krase and Mackey [55] | | | |
|---|---|---|---|
| Temp (K) | Press (atm) | $C_p$ [55] (J/mol · K) | $\Delta C_p^*$ (J/mol · K) |
| 303.1 | 500 | 38.19 | 0.02 |
| 303.1 | 600 | 38.27 | 0.17 |
| 303.1 | 700 | 38.36 | 0.35 |
| 323.1 | 1 | 28.98 | −0.18 |
| 323.1 | 100 | 32.33 | −0.40 |
| 323.1 | 200 | 34.84 | −0.43 |

TABLE 11. Comparison of heat capacity measurements with values calculated from the equation of state (6) and the ideal gas heat capacity equation (10)—Continued

Comparison to $C_p$ data of Krase and Mackey [55]

| Temp (K) | Press (atm) | $C_p$[55] (J/mol · K) | $\Delta C_p^*$ (J/mol · K) |
|---|---|---|---|
| 323.1 | 300 | 36.43 | −0.16 |
| 323.1 | 400 | 36.89 | −0.26 |
| 323.1 | 500 | 37.06 | −0.28 |
| 323.1 | 600 | 37.10 | −0.27 |
| 323.1 | 700 | 37.19 | −0.15 |
| 323.1 | 800 | 37.23 | −0.05 |
| 373.2 | 1 | 29.06 | −0.14 |
| 373.2 | 50 | 30.19 | −0.32 |
| 373.2 | 100 | 31.32 | −0.38 |
| 373.2 | 200 | 33.17 | −0.38 |
| 373.2 | 300 | 34.46 | −0.23 |
| 373.2 | 400 | 34.97 | −0.38 |
| 373.2 | 500 | 35.13 | −0.56 |
| 373.2 | 600 | 35.30 | −0.57 |
| 373.2 | 700 | 35.39 | −0.57 |
| 398.2 | 1 | 29.10 | −0.14 |
| 398.2 | 50 | 30.15 | −0.22 |
| 398.2 | 100 | 30.99 | −0.40 |
| 398.2 | 200 | 32.50 | −0.49 |
| 398.2 | 300 | 33.54 | −0.50 |
| 398.2 | 400 | 34.21 | −0.47 |
| 398.2 | 500 | 34.59 | −0.47 |
| 398.2 | 600 | 34.76 | −0.52 |
| 398.2 | 700 | 34.97 | −0.44 |
| 423.2 | 1 | 29.15 | −0.15 |
| 423.2 | 50 | 30.11 | −0.16 |
| 423.2 | 100 | 30.82 | −0.34 |
| 423.2 | 200 | 32.08 | −0.49 |
| 423.2 | 300 | 33.04 | −0.48 |
| 423.2 | 400 | 33.58 | −0.56 |
| 423.2 | 500 | 34.04 | −0.50 |
| 423.2 | 600 | 34.34 | −0.45 |
| 423.2 | 700 | 34.55 | −0.39 |

Comparison to $C_p$ Data of Mage et al. [56]

| Temp range (K) | Press (atm) | $C_p$[56] (J/mol·K) | $\Delta C_p^{**}$ (J/mol·K) |
|---|---|---|---|
| 268.3–279.6 | 10.0 | 29.58 | −0.09 |
| 222.7–233.9 | 10.0 | 29.87 | −0.13 |
| 194.3–205.0 | 10.0 | 30.23 | −0.17 |
| 166.6–177.7 | 10.0 | 31.02 | −0.06 |
| 267.7–279.0 | 20.0 | 30.19 | −0.07 |
| 222.7–233.9 | 20.0 | 30.85 | −0.11 |
| 194.3–205.3 | 20.0 | 31.62 | −0.20 |
| 166.6–177.6 | 20.0 | 33.53 | 0.05 |
| 116.5–119.2 | 27.2 | 94.76 | 2.48 |
| 122.5–124.7 | 33.6 | 166.32 | 25.25 |
| 122.5–125.6 | 33.6 | 265.07 | 99.49 |
| 122.5–125.7 | 33.6 | 496.48 | 323.99 |
| 122.5–128.0 | 33.6 | 409.22 | −1.38 |
| 122.5–153.0 | 33.6 | 128.31 | −0.35 |
| 267.8–279.0 | 40.0 | 31.35 | −0.09 |
| 222.7–234.0 | 40.0 | 32.86 | −0.10 |
| 194.3–205.3 | 40.0 | 34.98 | −0.08 |

TABLE 11. Comparison of heat capacity measurements with values calculated from the equation of state (6) and the ideal gas heat capacity equation (10)—Continued

Comparison to $C_p$ Data of Mage et al. [56]

| Temp range (K) | Press (atm) | $C_p$[56] (J/mol·K) | $\Delta C_p^{**}$ (J/mol·K) |
|---|---|---|---|
| 166.6–177.7 | 40.0 | 39.85 | −0.04 |
| 119.3–125.1 | 40.0 | 96.50 | 0.81 |
| 267.8–279.2 | 80.0 | 33.67 | −0.04 |
| 222.8–234.1 | 80.0 | 37.19 | 0.07 |
| 194.3–205.3 | 80.0 | 42.32 | −0.15 |
| 166.6–177.7 | 80.0 | 57.19 | −0.72 |
| 119.3–125.0 | 80.0 | 66.63 | −0.23 |
| 267.8–279.0 | 136.1 | 36.48 | 0.06 |
| 222.9–234.2 | 136.1 | 41.78 | −0.07 |
| 194.3–205.4 | 136.1 | 49.36 | −0.16 |
| 166.6–177.6 | 136.1 | 61.38 | −0.13 |
| 146.0–148.0 | 136.1 | 64.90 | 0.35 |
| 146.0–150.3 | 136.1 | 65.17 | 0.40 |
| 146.0–154.6 | 136.1 | 65.58 | 0.49 |
| 146.0–165.4 | 136.1 | 65.51 | 0.41 |
| 126.9–129.1 | 136.1 | 59.82 | 0.27 |
| 126.9–131.3 | 136.1 | 60.23 | 0.41 |
| 126.9–135.4 | 136.1 | 60.85 | 0.51 |
| 119.3–125.1 | 136.1 | 58.01 | −0.20 |

Comparison to $C_v$ data of Voronel [57]

| Temp (K) | $C_v$[57] (J/mol · K) | $C_{v_{calc}}$ (J/mol · K) | Temp (K) | $C_v$[57] (J/mol · K) | $C_{v_{calc}}$ (J/mol · K) |
|---|---|---|---|---|---|
| 126.21 | 95.7 | 30.7 | 126.57 | 54.7 | 30.6 |
| 126.22 | 94.8 | 30.7 | 126.73 | 50.5 | 30.6 |
| 126.23 | 85.6 | 30.7 | 126.87 | 49.2 | 30.5 |
| 126.23 | 87.9 | 30.7 | 126.97 | 47.1 | 30.5 |
| 126.23 | 79.5 | 30.7 | 127.06 | 45.8 | 30.5 |
| 126.25 | 79.7 | 30.7 | 127.35 | 43.8 | 30.4 |
| 126.25 | 84.2 | 30.7 | 127.91 | 40.4 | 30.2 |
| 126.26 | 76.6 | 30.7 | 128.75 | 37.6 | 30.0 |
| 126.27 | 77.8 | 30.7 | 129.79 | 35.7 | 29.8 |
| 126.29 | 75.7 | 30.7 | 130.87 | 34.0 | 29.5 |
| 126.29 | 71.0 | 30.7 | 131.97 | 32.8 | 29.2 |
| 126.33 | 65.3 | 30.7 | 133.10 | 31.8 | 29.0 |
| 126.34 | 67.9 | 30.7 | 135.36 | 29.9 | 28.5 |
| 126.34 | 65.6 | 30.7 | 136.34 | 30.0 | 28.3 |
| 126.38 | 65.0 | 30.7 | 142.18 | 28.1 | 27.3 |
| 126.38 | 61.5 | 30.7 | 143.05 | 27.8 | 27.1 |
| 126.45 | 58.8 | 30.6 | 155.66 | 26.4 | 25.6 |
| 126.40 | 58.8 | 30.7 | 156.72 | 26.1 | 25.5 |
| 126.47 | 56.6 | 30.6 | 167.04 | 26.1 | 24.6 |

*$\Delta C_p = C_p[55] - C_{p_{calc}}$

**$\Delta C_p = C_p[56] - C_{p_{calc}}$

[57] is 11.1 mol/liter.) The calculated values of $C_v$ do not exhibit the large increase in value near the critical point that is evident in the data of [57]. It is well known that the critical region is non-analytic, and all analytic equations must fail in this region.

Some of the data reported in [57] are for temperatures below 126.20 K (i.e., for the two-phase fluid). These two-phase data points are not included in the comparison in table 11.

### 10.4. Comparison of Latent Heat Data

Furukawa and McCoskey [53] have published measured latent heats of vaporization at low temperatures (67 K–78 K), and Jones [54] has presented five measurements of the latent heat of vaporization for the range from 119 K to 124 K. The comparisons of calculated values from eqs (6), (9), and (10) to these measured values are given in table 12.

TABLE 12. Comparison of latent heats of vaporization from [53] and [54] with values calculated from equations (6), (9), and (10).

Comparison to data of Furukawa and McCoskey [53]

| Temperature (K) | Pressure (atm) | Latent heat [53] (joules/mole) | $\frac{L[53]-L_{calc}}{L[53]}\times 100$ (percent) |
|---|---|---|---|
| 67.96 | 0.28 | 5901.6 | 0.29 |
| 67.96 | 0.28 | 5899.0 | 0.24 |
| 73.09 | 0.59 | 5739.1 | 0.40 |
| 73.09 | 0.59 | 5732.1 | 0.28 |
| 78.02 | 1.08 | 5579.4 | 0.70 |
| 78.01 | 1.08 | 5563.1 | 0.41 |

Comparison to data of Jones [54]

| Temperature (K) | Pressure (atm) | Latent heat [54] (joules/mole) | $\frac{L[54]-L_{calc}}{L[54]}\times 100$ (percent) |
|---|---|---|---|
| 119.20 | 23.80 | 2702.3 | −1.10 |
| 119.19 | 23.80 | 2678.2 | −2.04 |
| 121.89 | 27.18 | 2220.4 | −2.33 |
| 124.29 | 30.61 | 1681.3 | 0.56 |
| 119.16 | 23.80 | 2714.7 | −0.82 |

### 10.5. Comparison of Enthalpy Data

Wiener [58] has reported measurements of the enthalpy of nitrogen made prior to measuring hydrocarbon enthalpy values. A comparison of the measured enthalpy values by Wiener to values calculated from the equation of state (6) is presented in table 13. The values of [58] have been adjusted to the ideal gas reference enthalpy of 8669 joules/mole at 298.15 K from the datum of 0.0 Btu/lbm at 75 F and 14.7 psia used in [58]. Wiener has estimated the accuracy of the measured values of [58] as ± 130 joules/mole. The calculated values of enthalpy at the experimental temperature and pressure are well within this uncertainty with the exception of the two points which are indicated in [58] to be in doubt.

TABLE 13. Comparison of enthalpy data with values calculated from the equation of state (6) and the ideal gas heat capacity equation (10)

Comparison to data of Wiener [58]

| Temperature (K) | Pressure (atm) | $H$[58] (joules/mole) | $H[58]-H_{calc}$ (joules/mole) |
|---|---|---|---|
| 138.71 | 67.37 | 621 | −248 |
| 142.59 | 52.06 | 1988 | −107 |
| 142.04 | 29.26 | 3551 | 323 |
| 145.93 | 28.58 | 3421 | −10 |
| 143.15 | 21.78 | 3551 | 8 |
| 142.04 | 17.69 | 3616 | −16 |
| 158.71 | 28.92 | 3877 | −69 |
| 159.26 | 28.58 | 4072 | 96 |
| 199.82 | 51.72 | 5049 | −22 |
| 202.04 | 28.99 | 5505 | 33 |
| 207.59 | 65.32 | 5179 | −1 |
| 310.93 | 34.02 | 8826 | −24 |
| 322.59 | 27.90 | 9151 | −85 |
| 359.26 | 40.83 | 10258 | −33 |
| 421.48 | 47.63 | 12146 | −10 |
| 422.04 | 40.83 | 12146 | −41 |
| 449.26 | 47.63 | 12993 | −3 |

Comparison to data of Dawe [89]

| Temperature (K) | Pressure (atm) | $H$[89] (joules/mole) | $H[89]-H_{calc}$ (joules/mole) |
|---|---|---|---|
| 273.15 | 1.0 | 7934.6 | 0.8 |
| 283.15 | 1.0 | 8225.5 | 0.2 |
| 293.15 | 1.0 | 8517.1 | 0.2 |
| 357.65 | 1.0 | 10397.7 | 0.0 |
| 273.15 | 4.0 | 7911.9 | 1.1 |
| 283.15 | 4.0 | 8204.6 | 0.6 |
| 293.15 | 4.0 | 8497.6 | 0.6 |
| 357.65 | 4.0 | 10385.9 | 0.5 |
| 273.15 | 7.0 | 7889.2 | 1.4 |
| 283.15 | 7.0 | 8183.7 | 1.0 |
| 293.15 | 7.0 | 8478.2 | 1.0 |
| 357.65 | 7.0 | 10374.1 | 1.0 |
| 273.15 | 10.0 | 7866.6 | 1.6 |
| 283.15 | 10.0 | 8162.9 | 1.4 |
| 293.15 | 10.0 | 8458.9 | 1.3 |
| 357.65 | 10.0 | 10362.4 | 1.5 |
| 273.15 | 14.0 | 7836.7 | 1.9 |
| 283.15 | 14.0 | 8135.3 | 1.8 |
| 293.15 | 14.0 | 8433.3 | 1.7 |
| 357.65 | 14.0 | 10346.9 | 2.0 |
| 273.15 | 17.0 | 7814.3 | 2.1 |
| 283.15 | 17.0 | 8114.6 | 2.0 |
| 293.15 | 17.0 | 8414.2 | 1.9 |
| 357.65 | 17.0 | 10335.3 | 2.3 |
| 273.15 | 20.0 | 7792.1 | 2.3 |
| 283.15 | 20.0 | 8094.1 | 2.2 |
| 293.15 | 20.0 | 8395.2 | 2.1 |
| 357.65 | 20.0 | 10323.8 | 2.6 |
| 273.15 | 30.0 | 7718.7 | 2.7 |
| 283.15 | 30.0 | 8026.3 | 2.6 |
| 293.15 | 30.0 | 8332.7 | 2.7 |
| 357.65 | 30.0 | 10286.1 | 3.4 |
| 273.15 | 40.0 | 7646.7 | 3.0 |
| 283.15 | 40.0 | 7959.7 | 2.6 |
| 293.15 | 40.0 | 8271.5 | 2.9 |
| 357.65 | 40.0 | 10249.2 | 3.8 |

TABLE 13. Comparison of enthalpy data with values calculated from the equation of state (6) and the ideal gas heat capacity equation (10)—Continued

Comparison to data of Dawe [89]

| Temperature (K) | Pressure (atm) | $H$[89] (joules/mole) | $H$[89] $-H_{calc}$ (joules/mole) |
|---|---|---|---|
| 273.15 | 50.0 | 7576.4 | 3.0 |
| 283.15 | 50.0 | 7894.6 | 2.4 |
| 293.15 | 50.0 | 8211.7 | 3.0 |
| 357.65 | 50.0 | 10213.3 | 3.9 |
| 273.15 | 60.0 | 7507.8 | 2.9 |
| 283.15 | 60.0 | 7831.2 | 2.0 |
| 293.15 | 60.0 | 8153.5 | 2.9 |
| 357.65 | 60.0 | 10178.5 | 3.8 |
| 273.15 | 70.0 | 7441.2 | 2.7 |
| 283.15 | 70.0 | 7769.8 | 1.5 |
| 293.15 | 70.0 | 8097.1 | 2.6 |
| 357.65 | 70.0 | 10144.9 | 3.6 |
| 273.15 | 80.0 | 7376.8 | 2.4 |
| 283.15 | 80.0 | 7710.5 | 1.2 |
| 293.15 | 80.0 | 8042.6 | 2.3 |
| 357.65 | 80.0 | 10112.6 | 3.3 |
| 273.15 | 90.0 | 7314.8 | 2.2 |
| 283.15 | 90.0 | 7653.6 | 1.0 |
| 293.15 | 90.0 | 7990.1 | 2.0 |
| 357.65 | 90.0 | 10081.7 | 3.1 |
| 273.15 | 100.0 | 7255.3 | 2.1 |
| 283.15 | 100.0 | 7599.3 | 1.2 |
| 293.15 | 100.0 | 7939.8 | 1.9 |
| 357.65 | 100.0 | 10052.3 | 3.1 |

New enthalpy measurements for nitrogen by Dawe [89] show very close agreement with the values calculated using the equation of state (6). A representative comparison of the enthalpy values from [89] to calculated values is inclued in table 13. These data are more precise than the other available enthalpy data for nitrogen, and serve to further establish the validity of the derivative behavior of the equation of state.

### 10.6. Comparison of Selected Velocity of Sound Data

The velocity of sound data from references [63] through [84] have been reviewed, and the data from [74], [75], [76], and [84] have been selected for comparison in table 14 with sonic velocities calculated from the equation of state. The values given in table 14 include data for the liquid, the vapor to high pressures, and values for the saturated liquid and the saturated vapor. A large proportion of the available velocity of sound data for nitrogen not included in these comparisons is for pressures of 1 atmosphere or less.

The calculated values of the velocity of sound for the vapor phase including the saturated vapor and the high pressure region above the critical temperature are generally within 1 percent of the measured values. However, deviations for the calculated sonic velocities in the low temperature liquid region are as large as 12 percent, while the saturated liquid values indicate

TABLE 14. Comparison of selected velocity of sound data to calculated values

Comparison to low temperature liquid data of [74]

| Pressure (atm) | Temperature (K) | Experimental velocity of sound (m/s) | $\frac{W_{data}-W_{calc}}{W_{data}}\times 100$ (percent) |
|---|---|---|---|
| 84.3 | 113.6 | 589 | 1.73 |
| 68.3 | 109.2 | 617 | 2.02 |
| 104.7 | 113.4 | 634 | 2.15 |
| 104.7 | 113.6 | 631 | 1.95 |
| 42.2 | 104.8 | 614 | 0.66 |
| 43.6 | 105.0 | 616 | 1.00 |
| 57.1 | 105.9 | 629 | 1.24 |
| 94.8 | 110.2 | 646 | 1.81 |
| 126.8 | 113.8 | 659 | 1.82 |
| 104.7 | 109.5 | 666 | 1.84 |
| 8.5 | 90.6 | 725 | −2.38 |
| 8.5 | 90.6 | 726 | −2.24 |
| 46.9 | 85.5 | 819 | −2.89 |
| 86.0 | 87.6 | 836 | −1.17 |
| 136.9 | 91.0 | 850 | 0.16 |
| 38.4 | 84.3 | 822 | −3.72 |
| 84.3 | 87.7 | 834 | −1.12 |
| 134.3 | 90.6 | 853 | 0.30 |
| 8.2 | 81.0 | 826 | −6.76 |
| 1.6 | 77.6 | 851 | −9.89 |
| 8.1 | 75.3 | 883 | −10.87 |
| 52.0 | 77.5 | 897 | −6.64 |
| 116.6 | 81.0 | 917 | −2.39 |
| 61.5 | 77.6 | 902 | −6.30 |
| 121.9 | 80.9 | 920 | −2.47 |
| 1.7 | 73.6 | 896 | −12.82 |
| 112.6 | 75.0 | 959 | −5.97 |
| 111.5 | 75.0 | 959 | −5.93 |
| 120.0 | 73.8 | 975 | −6.35 |

Comparison to saturated liquid data of [75]

| Temperature (K) | Experimental velocity of sound (m/s) | $\frac{W_{data}-W_{calc}}{W_{data}}\times 100$ (percent) |
|---|---|---|
| 65.4 | 968 | −27.16 |
| 66.4 | 959 | −24.81 |
| 68.1 | 942 | −21.37 |
| 70.0 | 924 | −18.21 |
| 71.9 | 905 | −15.64 |
| 74.2 | 881 | −13.17 |
| 76.0 | 864 | −11.44 |
| 79.3 | 831 | −8.99 |
| 79.6 | 829 | −8.77 |
| 80.3 | 822 | −8.31 |
| 82.7 | 796 | −6.95 |
| 83.2 | 791 | −6.69 |
| 84.9 | 772 | −5.85 |
| 86.7 | 755 | −4.93 |
| 86.9 | 753 | −4.79 |
| 87.4 | 748 | −4.54 |
| 88.2 | 739 | −4.26 |
| 91.3 | 705 | −3.27 |
| 93.1 | 685 | −2.72 |
| 97.4 | 636 | −1.74 |
| 99.4 | 612 | −1.47 |
| 101.2 | 590 | −1.36 |
| 103.7 | 559 | −1.22 |

TABLE 14. Comparison of selected velocity of sound data to calculated values—Continued

| Temperature (K) | Experimental velocity of sound (m/s) | $\frac{W_{data}-W_{calc}}{W_{data}}\times 100$ (percent) |
|---|---|---|
| 108.7 | 493 | −1.50 |
| 110.2 | 472 | −1.73 |
| 112.9 | 434 | −2.32 |
| 115.0 | 403 | −3.05 |
| 117.1 | 369 | −4.22 |
| 119.3 | 329 | −6.30 |
| 119.4 | 327 | −6.11 |
| 120.2 | 313 | −6.91 |
| 121.2 | 290 | −9.10 |
| 122.4 | 265 | −10.52 |
| 124.3 | 220 | −14.94 |
| 124.3 | 219 | −14.96 |
| 125.1 | 191 | −20.47 |
| 125.5 | 183 | −19.91 |

Comparison to saturated vapor data of [76]

| | | |
|---|---|---|
| 79.2 | 177 | 0.46 |
| 78.4 | 177 | 0.78 |
| 78.0 | 176 | 0.39 |
| 71.9 | 171 | 0.45 |

Comparison to high pressure data of [84]

| Pressure (atm) | Temperature (K) | Experimental velocity of sound (m/s) | $\frac{W_{data}-W_{calc}}{W_{data}}\times 100$ (percent) |
|---|---|---|---|
| 200 | 298.14 | 426 | −0.18 |
| 600 | 298.14 | 655 | −0.90 |
| 1000 | 298.14 | 844 | −0.36 |
| 1500 | 298.14 | 1030 | 0.35 |
| 2500 | 298.14 | 1296 | 0.39 |
| 3500 | 298.14 | 1500 | 0.94 |
| 200 | 323.14 | 440 | 0.37 |
| 600 | 323.14 | 650 | −0.59 |
| 1000 | 323.14 | 830 | −0.38 |
| 1500 | 323.14 | 1010 | 0.08 |
| 2500 | 323.14 | 1280 | 0.59 |
| 3500 | 323.14 | 1480 | 0.75 |
| 400 | 348.14 | 551 | 0.15 |
| 600 | 348.14 | 655 | 0.73 |
| 1000 | 348.14 | 825 | 0.26 |
| 1500 | 348.14 | 1000 | 0.46 |
| 2500 | 348.14 | 1262 | 0.42 |
| 3500 | 348.14 | 1463 | 0.63 |
| 200 | 373.15 | 462 | 0.02 |
| 600 | 373.15 | 648 | −0.19 |
| 1000 | 373.15 | 820 | 0.57 |
| 1500 | 373.15 | 985 | 0.08 |
| 2500 | 373.15 | 1248 | 0.39 |
| 3500 | 373.15 | 1442 | 0.12 |
| 200 | 398.16 | 476 | 0.55 |
| 600 | 398.16 | 654 | 0.60 |
| 1000 | 398.16 | 818 | 0.98 |
| 1500 | 398.16 | 978 | 0.29 |
| 2500 | 398.16 | 1232 | 0.05 |
| 3500 | 398.16 | 1424 | −0.31 |
| 200 | 423.17 | 486 | 0.30 |
| 600 | 423.17 | 658 | 0.86 |

TABLE 14. Comparison of selected velocity of sound data to calculated values—Continued

| Pressure (atm) | Temperature (K) | Experimental velocity of sound (m/s) | $\frac{W_{data}-W_{calc}}{W_{data}}\times 100$ (percent) |
|---|---|---|---|
| 1000 | 423.17 | 810 | 0.43 |
| 1500 | 423.17 | 972 | 0.41 |
| 2500 | 423.17 | 1223 | 0.15 |
| 3500 | 423.17 | 1420 | 0.16 |
| 200 | 448.18 | 500 | 0.92 |
| 600 | 448.18 | 660 | 0.68 |
| 1000 | 448.18 | 810 | 0.69 |
| 1500 | 448.18 | 960 | −0.24 |
| 2500 | 448.18 | 1216 | 0.29 |
| 3500 | 448.18 | 1410 | 0.13 |

differences of nearly 30 percent at pressures below 0.5 atm and near the critical point.

## 11. Estimated Accuracy

The estimation of the accuracy of this thermodynamic property table, which is based on information assembled from a large number of sources, is a difficult undertaking. However, the authors have attempted to summarize below, what in their judgment are prudent estimates of the uncertainties of the essential equations. Whenever possible these estimates were based on the agreement of independent data sets in the same or adjacent ranges of values. However, the indications of agreement of the various data sets as determined in this work, are subject to the manner in which the equations represent the data. It is possible that some of the comparisons have led to unwarranted conclusions.

### 11.1. The Equation of State

The equation of state (6) developed in this work represents the experimental $P$-$\rho$-$T$ data in the liquid and vapor phases for pressures from 0 to 10,000 atmospheres and for temperatures of 65 to 1073 K. At temperatures above the critical temperature for pressures up to 1000 atmospheres, the uncertainty is probably within 0.1 percent except in the region near the critical point between temperatures of 126.2 K and 150 K at pressures between 30 and 150 atmospheres where the density deviations from experimental data are as large as 0.7 percent. Vapor values at temperatures below the critical temperature have an uncertainty of ± 0.5 percent. In the range from 1000 to 10,000 atmospheres the accuracy of eq (6) is estimated to be within 0.3 percent.

The equation may be extrapolated to 2000 K at pressures below 300 atmospheres with a probable accuracy of ± 0.5 percent. The equation may also be extrapolated to lower temperatures for the vapor with an accuracy of at least ± 0.2 percent down to 20 K.

It is estimated that values of density calculated iteratively by the equation of state in the liquid region have

an accuracy of ± 0.5 percent, except in the vicinity of the critical point where larger deviations are to be expected. The uncertainty of the equation of state for the liquid for pressures above 500 atm (and to the melting line) must be regarded as ±1.5 percent which is the maximum difference between the data from Cheng [88] and values from the equation of state.

### 11.2. The Vapor Pressure Equation

The vapor pressure equation (9) represents the selected data used in the formulation of the equation generally within an accuracy of ± 0.01 K between the triple point and the critical point.

### 11.3. The Ideal Gas Heat Capacity Equation

The equation for the ideal gas heat capacity (10) has been used to represent the recent values of $C_p^0/R$ from [85] with an accuracy of ± 0.00005 for values to 1200 K, and within ± 0.0001 above 1200 K.

### 11.4. Derived Thermodynamic Properties

Values of the heat capacity, enthalpy, and latent heat of vaporization are presented with comparisons to available measurements. Although the paucity of these measurements makes it difficult to define the accuracy of the equation of state (6) for the calculation of heat capacity values, these comparisons further indicate that the behavior of the isobaric calculated values is correct. The new enthalpy data by Dawe [89] indicate an exceptionally close agreement with calculated values.

The derived properties which depend on the first derivatives of the surface (e.g., entropy, enthalpy) are considered to be well established by the equation of state (6). However, properties related to the second derivatives (e.g., $C_p$, $C_v$, velocity of sound) may have uncertainties an order of magnitude larger than the properties related to the first derivatives.

It is possible that large errors in the properties related to the second derivative of the equation of state exist in those regions wher $C_v$ data were not used in the determination of the coefficients of equation (6). (The $P$-$\rho$-$T$ range for which $C_v$ values were used is given in section 2.3.) A review of the values of $C_v$, $C_p$, and the velocity of sound outside the range of values given in 2.3 indicated the behavior of these values at temperatures below 72 K is questionable. Values of $C_v$, $C_p$, and the velocity of sound have, therefore, been deleted from the tables of properties for temperatures below 72 K.

The least squares techniques used in the formulation presented here include the simultaneous fitting of $P$-$\rho$-$T$ data, $C_v$ data, and the criteria for phase equilibrium to allow for continuous integration along isotherms through the two-phase region. It is recommended that the derived properties for the liquid phase be calculated by this method in preference to the use of the Clapeyron equation for the difference in entropy or enthalpy for the phase change.

## APPENDIX A

### Functions for the Calculation of Thermodynamic Properties from the Equation of State (6)

*The Equation of State*

Equation (6) may be written in the form:

$$P = \rho RT + \sum_{i-1}^{32} N_i X_i,$$

where the $N_i$ are listed in table 3 and the $X_i$ are as follows:

| | | |
|---|---|---|
| $X_1 = \rho^2 T$ | $X_{12} = \rho^4/T$ | $X_{23} = \rho^5 F/T^4$ |
| $X_2 = \rho^2 T^{1/2}$ | $X_{13} = \rho^5$ | $X_{24} = \rho^7 F/T^2$ |
| $X_3 = \rho^2$ | $X_{14} = \rho^6/T$ | $X_{25} = \rho^7 F/T^3$ |
| $X_4 = \rho^2/T$ | $X_{15} = \rho^6/T^2$ | $X_{26} = \rho^9 F/T^2$ |
| $X_5 = \rho^2/T^2$ | $X_{16} = \rho^7/T$ | $X_{27} = \rho^9 F/T^4$ |
| $X_6 = \rho^3 T$ | $X_{17} = \rho^8/T$ | $X_{28} = \rho^{11} F/T^2$ |
| $X_7 = \rho^3$ | $X_{18} = \rho^8/T^2$ | $X_{29} = \rho^{11} F/T^3$ |
| $X_8 = \rho^3/T$ | $X_{19} = \rho^9/T^2$ | $X_{30} = \rho^{13} F/T^2$ |
| $X_9 = \rho^3/T^2$ | $X_{20} = \rho^5 F/T^2$ | $X_{31} = \rho^{13} F/T^3$ |
| $X_{10} = \rho^4 T$ | $X_{21} = \rho^5 F/T^3$ | $X_{32} = \rho^{13} F/T^4$ |
| $X_{11} = \rho^4$ | $X_{22} = \rho^5 F/T^2$ | |

$$F = \exp\,(-0.0056\,\rho^2)$$

*The Isotherm Derivative*

The isotherm derivative of the equation of state (6) may be represented as:

$$(\partial P/\partial \rho)_T = RT + \sum_{i=1}^{32} N_i X_i,$$

where the $N_i$ are given in table 3 and the $X_i$ are as follows:

| | | |
|---|---|---|
| $X_1 = 2\rho T$ | $X_{12} = 4\rho^3/T$ | $X_{23} = F_{22}/T^4$ |
| $X_2 = 2\rho T^{1/2}$ | $X_{13} = 5\rho^4$ | $X_{24} = F_{23}/T^2$ |
| $X_3 = 2\rho$ | $X_{14} = 6\rho^5/T$ | $X_{25} = F_{23}/T^3$ |
| $X_4 = 2\rho/T$ | $X_{15} = 6\rho^5/T^2$ | $X_{26} = F_{24}/T^2$ |
| $X_5 = 2\rho/T^2$ | $X_{16} = 7\rho^6/T$ | $X_{27} = F_{24}/T^4$ |
| $X_6 = 3\rho^2 T$ | $X_{17} = 8\rho^7/T$ | $X_{28} = F_{25}/T^2$ |
| $X_7 = 3\rho^2$ | $X_{18} = 8\rho^7/T^2$ | $X_{29} = F_{25}/T^3$ |
| $X_8 = 3\rho^2/T$ | $X_{19} = 9\rho^8/T^2$ | $X_{30} = F_{26}/T^2$ |
| $X_9 = 3\rho^2/T^2$ | $X_{20} = F_{21}/T^2$ | $X_{31} = F_{26}/T^3$ |
| $X_{10} = 4\rho^3 T$ | $X_{21} = F_{21}/T^3$ | $X_{32} = F_{26}/T^4$ |
| $X_{11} = 4\rho^3$ | $X_{22} = F_{22}/T^2$ | |

$$F = \exp\,(-0.0056\,\rho^2)$$
$$F_1 = 2F\rho(-0.0056)$$
$$F_{21} = 3F\rho^2 + F_1\rho^3$$
$$F_{22} = 5F\rho^4 + F_1\rho^5$$
$$F_{23} = 7F\rho^6 + F_1\rho^7$$
$$F_{24} = 9F\rho^8 + F_1\rho^9$$
$$F_{25} = 11F\rho^{10} + F_1\rho^{11}$$
$$F_{26} = 13F\rho^{12} + F_1\rho^{13}$$

*The Isochore Derivative*

The isochore derivative of the equation of state (6) may be written as:

$$(\partial P/\partial T)_\rho = \rho R + \sum_{i=1}^{32} N_i X_i,$$

where the $N_i$ are given in table 3 and the $X_i$ are as follows:

| | | |
|---|---|---|
| $X_1 = \rho^2$ | $X_{12} = -\rho^4/T^2$ | $X_{23} = -4\rho^5 F/T^5$ |
| $X_2 = \rho^2/(2T^{1/2})$ | $X_{13} = 0.0$ | $X_{24} = -2\rho^7 F/T^3$ |
| $X_3 = 0.0$ | $X_{14} = -\rho^6/T^2$ | $X_{25} = -3\rho^7 F/T^4$ |
| $X_4 = -\rho^2/T^2$ | $X_{15} = -2\rho^6/T^3$ | $X_{26} = -2\rho^9 F/T^3$ |
| $X_5 = -2\rho^2/T^3$ | $X_{16} = -\rho^7/T^2$ | $X_{27} = -4\rho^9 F/T^5$ |
| $X_6 = \rho^3$ | $X_{17} = -\rho^8/T^2$ | $X_{28} = -2\rho^{11} F/T^3$ |
| $X_7 = 0.0$ | $X_{18} = -2\rho^8/T^3$ | $X_{29} = -3\rho^{11} F/T^4$ |
| $X_8 = -\rho^3/T^2$ | $X_{19} = -2\rho^9/T^3$ | $X_{30} = -2\rho^{13} F/T^3$ |
| $X_9 = -2\rho^3/T^3$ | $X_{20} = -2\rho^3 F/T^3$ | $X_{31} = -3\rho^{13} F/T^4$ |
| $X_{10} = \rho^4$ | $X_{21} = -3\rho^9 F/T^4$ | $X_{32} = -4\rho^{15} F/T^5$ |
| $X_{11} = 0.0$ | $X_{22} = -2\rho^5 F/T^3$ | |
| $F = \exp(-0.0056\,\rho^2)$ | | |

*The Evaluation of Integrals*

The integral, $\int [R/\rho - (1/\rho^2)(\partial P/\partial T)_\rho]_T \, d\rho$ may be written as:

$$\sum_{i=1}^{32} N_i Y_i,$$

where the $N_i$ are listed in table 3 and the $Y_i$ are listed below:

| | | |
|---|---|---|
| $Y_1 = -\rho$ | $Y_{12} = \rho^3/(3T^2)$ | $Y_{23} = 4G_2/T^5$ |
| $Y_2 = -\rho/(2T^{1/2})$ | $Y_{13} = 0.0$ | $Y_{24} = 2G_3/T^3$ |
| $Y_3 = 0.0$ | $Y_{14} = \rho^5/(5T^2)$ | $Y_{25} = 3G_3/T^4$ |
| $Y_4 = \rho/T^2$ | $Y_{15} = 2\rho^5/(5T^3)$ | $Y_{26} = 2G_4/T^3$ |
| $Y_5 = 2\rho/T^3$ | $Y_{16} = \rho^6/(6T^2)$ | $Y_{27} = 4G_4/T^5$ |
| $Y_6 = -\rho^2/2$ | $Y_{17} = \rho^7/(7T^2)$ | $Y_{28} = 2G_5/T^3$ |
| $Y_7 = 0.0$ | $Y_{18} = 2\rho^7/(7T^3)$ | $Y_{29} = 3G_5/T^4$ |
| $Y_8 = \rho^2/(2T^2)$ | $Y_{19} = \rho^8/(4T^3)$ | $Y_{30} = 2G_6/T^3$ |
| $Y_9 = \rho^2/T^3$ | $Y_{20} = 2G_1/T^3$ | $Y_{31} = 3G_6/T^4$ |
| $Y_{10} = -\rho^3/3$ | $Y_{21} = 3G_1/T^4$ | $Y_{32} = 4G_6/T^5$ |
| $Y_{11} = 0.0$ | $Y_{22} = 2G_2/T^3$ | |

where the $G_i$ and $F$ are listed in table 15.

The integral $\int [(P/\rho^2) - (RT/\rho)]_T \, d\rho$ may be written as:

$$\sum_{i=1}^{32} N_i Y_i,$$

where the $N_i$ are listed in table 3 and the $Y_i$ are listed below:

| | | |
|---|---|---|
| $Y_1 = \rho T$ | $Y_{12} = \rho^3/(3T)$ | $Y_{23} = G_2/T^4$ |
| $Y_2 = \rho T^{1/2}$ | $Y_{13} = \rho^4/4$ | $Y_{24} = G_3/T^2$ |
| $Y_3 = \rho$ | $Y_{14} = \rho^5/(5T)$ | $Y_{25} = G_3/T^3$ |
| $Y_4 = \rho/T$ | $Y_{15} = \rho^5/(5T^2)$ | $Y_{26} = G_4/T^2$ |
| $Y_5 = \rho/T^2$ | $Y_{16} = \rho^6/(6T)$ | $Y_{27} = G_4/T^4$ |
| $Y_6 = \rho^2 T/2$ | $Y_{17} = \rho^7/(7T)$ | $Y_{28} = G_5/T^2$ |
| $Y_7 = \rho^2/2$ | $Y_{18} = \rho^7/(7T^2)$ | $Y_{29} = G_5/T^3$ |
| $Y_8 = \rho^2/(2T)$ | $Y_{19} = \rho^8/(8T^2)$ | $Y_{30} = G_6/T^2$ |
| $Y_9 = \rho^2/(2T^2)$ | $Y_{20} = G_1/T^2$ | $Y_{31} = G_6/T^3$ |
| $Y_{10} = \rho^3 T/3$ | $Y_{21} = G_1/T^3$ | $Y_{32} = G_6/T^4$ |
| $Y_{11} = \rho^3/3$ | $Y_{22} = G_2/T^2$ | |

where the $G_i$ and $F$ are listed in table 15.

The integral, $\int [(T/\rho^2)(\partial^2 P/\partial T^2)_\rho]_T \, d\rho$ may be written as:

$$\sum_{i=1}^{32} N_i Y_i,$$

where the $N_i$ are listed in table 3 and the $Y_i$ are listed below:

| | | |
|---|---|---|
| $Y_1 = 0.0$ | $Y_{12} = (2\rho^3)/(3T^2)$ | $Y_{23} = 20G_2/T^5$ |
| $Y_2 = \rho/(4T^{1/2})$ | $Y_{13} = 0.0$ | $Y_{24} = 6G_3/T^3$ |
| $Y_3 = 0.0$ | $Y_{14} = (2\rho^5)/(5T^2)$ | $Y_{25} = 12G_3/T^4$ |
| $Y_4 = 2\rho/T^2$ | $Y_{15} = (6\rho^5)/(5T^3)$ | $Y_{26} = 6G_4/T^3$ |
| $Y_5 = 6\rho/T^3$ | $Y_{16} = \rho^6/(3T^2)$ | $Y_{27} = 20G_4/T^5$ |
| $Y_6 = 0.0$ | $Y_{17} = (2\rho^7)/(7T^2)$ | $Y_{28} = 6G_5/T^3$ |
| $Y_7 = 0.0$ | $Y_{18} = (6\rho^7)/(7T^3)$ | $Y_{29} = 12G_5/T^4$ |
| $Y_8 = \rho^2/T^2$ | $Y_{19} = (3\rho^8)/(4T^3)$ | $Y_{30} = 6G_6/T^3$ |
| $Y_9 = 3\rho^2/T^3$ | $Y_{20} = 6G_1/T^3$ | $Y_{31} = 12G_6/T^4$ |
| $Y_{10} = 0.0$ | $Y_{21} = 12G_1/T^4$ | $Y_{32} = 20G_6/T^5$ |
| $Y_{11} = 0.0$ | $Y_{22} = 6G_2/T^3$ | |

where the $G_i$ and $F$ are listed in table 15.

TABLE 15. Functions for derivatives of the equation of State

| |
|---|
| $F = \exp(-0.0056\rho^2)$ |
| $G_1 = F/[2(-0.0056)]$ |
| $G_2 = (F\rho^2 - 2G_1)/[2(-0.0056)]$ |
| $G_3 = (F\rho^4 - 4G_2)/[2(-0.0056)]$ |
| $G_4 = (F\rho^6 - 6G_3)/[2(-0.0056)]$ |
| $G_5 = (F\rho^8 - 8G_4)/[2(-0.0056)]$ |
| $G_6 = (F\rho^{10} - 10G_5)/[2(-0.0056)]$ |

The integral $\int C_p^0\,dT$ may be written as:

$$R\sum_{i=1}^{8} N_i Y_i,$$

where the $N_i$ are listed in table 8 and the $Y_i$ are listed below:

| | |
|---|---|
| $Y_1=-1/(2T^2)$ | $Y_5=T^2/2$ |
| $Y_2=-1/T$ | $Y_6=T^3/3$ |
| $Y_3=\ln(T)$ | $Y_7=T^4/4$ |
| $Y_4=T$ | $Y_8=UT/[\exp(U)-1]$ |

where $U=N_9/T$, and $N_9$ is listed in table 8.

The integral $\int (C_p^0/T)\,dT$ may be written as:

$$R\sum_{i=1}^{8} N_i Y_i.$$

where the $N_i$ are listed in table 8 and the $Y_i$, are given below:

| | |
|---|---|
| $Y_1=-1/(3T^3)$ | $Y_5=T$ |
| $Y_2=-1/(2T^2)$ | $Y_6=T^2/2$ |
| $Y_3=-1/T$ | $Y_7=T^3/3$ |
| $Y_4=\ln(T)$ | $Y_8=U/(EU-1)-\ln[1-(1/EU)]$ |

where $U=N_9/T$, and $N_9$ is listed in table 8; $[EU=\exp(U)]$.

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Thermodynamic properties of saturated nitrogen

| Temperature kelvin | Pressure bar | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar/K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|---|
| 63.148 | 0.1253 | 30.977 | 240.266 | 31.959 | −4212.15 | −4211.75 | 68.01 | | | |
| | | 0.02410 | 5.151 | 0.0020 | 1296.31 | 1816.40 | 163.56 | 21.00 | 29.64 | 161. |
| 64 | 0.1462 | 30.863 | 228.739 | 30.875 | −4165.36 | −4164.88 | 68.74 | | | |
| | | 0.02777 | 5.209 | 0.0023 | 1312.69 | 1839.19 | 162.65 | 21.02 | 29.70 | 162. |
| 65 | 0.1742 | 30.727 | 216.221 | 29.688 | −4109.87 | −4109.31 | 69.60 | | | |
| | | 0.03262 | 5.274 | 0.0027 | 1331.75 | 1865.68 | 161.62 | 21.05 | 29.78 | 163. |
| 66 | 0.2064 | 30.589 | 204.690 | 28.581 | −4053.91 | −4053.24 | 70.46 | | | |
| | | 0.03813 | 5.338 | 0.0032 | 1350.61 | 1891.88 | 160.63 | 21.08 | 29.87 | 164. |
| 67 | 0.2432 | 30.448 | 194.047 | 27.546 | −3997.57 | −3996.78 | 71.31 | | | |
| | | 0.04433 | 5.399 | 0.0037 | 1369.27 | 1917.76 | 159.67 | 21.11 | 29.96 | 165. |
| 68 | 0.2850 | 30.306 | 184.204 | 26.574 | −3940.94 | −3940.00 | 72.15 | | | |
| | | 0.05130 | 5.458 | 0.0043 | 1387.72 | 1943.33 | 158.75 | 21.15 | 30.06 | 166. |
| 69 | 0.3324 | 30.160 | 175.080 | 25.659 | −3884.08 | −3882.97 | 72.98 | | | |
| | | 0.05908 | 5.515 | 0.0050 | 1405.95 | 1968.54 | 157.87 | 21.19 | 30.17 | 167. |
| 70 | 0.3858 | 30.013 | 166.604 | 24.795 | −3827.04 | −3825.75 | 73.80 | | | |
| | | 0.06774 | 5.569 | 0.0058 | 1423.93 | 1993.39 | 157.01 | 21.23 | 30.29 | 168. |
| 71 | 0.4457 | 29.863 | 158.712 | 23.976 | −3769.86 | −3768.37 | 74.61 | | | |
| | | 0.07735 | 5.620 | 0.0066 | 1441.67 | 2017.86 | 156.18 | 21.27 | 30.42 | 169. |
| 72 | 0.5126 | 29.712 | 151.345 | 23.198 | −3712.58 | −3710.86 | 75.41 | 28.42 | 57.42 | 1045. |
| | | 0.08796 | 5.669 | 0.0075 | 1459.14 | 2041.93 | 155.39 | 21.31 | 30.55 | 170. |
| 73 | 0.5871 | 29.558 | 144.453 | 22.457 | −3655.22 | −3653.23 | 76.20 | 28.34 | 57.51 | 1023. |
| | | 0.09964 | 5.715 | 0.0085 | 1476.34 | 2065.57 | 154.62 | 21.36 | 30.70 | 171. |
| 74 | 0.6698 | 29.402 | 137.989 | 21.750 | −3597.80 | −3595.52 | 76.98 | 28.23 | 57.58 | 1002. |
| | | 0.1125 | 5.758 | 0.0096 | 1493.25 | 2088.77 | 153.87 | 21.41 | 30.86 | 172. |
| 75 | 0.7612 | 29.244 | 131.910 | 21.074 | −3540.32 | −3537.72 | 77.75 | 28.12 | 57.65 | 983. |
| | | 0.1265 | 5.797 | 0.0109 | 1509.86 | 2111.51 | 153.15 | 21.46 | 31.02 | 173. |
| 76 | 0.8619 | 29.084 | 126.179 | 20.427 | −3482.80 | −3479.84 | 78.52 | 28.00 | 57.71 | 964. |
| | | 0.1418 | 5.833 | 0.0122 | 1526.15 | 2133.78 | 152.45 | 21.51 | 31.20 | 174. |
| 77 | 0.9725 | 28.922 | 120.764 | 19.807 | −3425.24 | −3421.88 | 79.27 | 27.87 | 57.78 | 945. |
| | | 0.1585 | 5.866 | 0.0137 | 1542.12 | 2155.54 | 151.77 | 21.57 | 31.39 | 175. |
| 77.347 | 1.01325 | 28.865 | 118.953 | 19.597 | −3405.26 | −3401.75 | 79.53 | 27.83 | 57.80 | 939. |
| | | 0.1647 | 5.877 | 0.0143 | 1547.58 | 2162.97 | 151.54 | 21.59 | 31.45 | 175. |
| 78 | 1.094 | 28.758 | 115.634 | 19.211 | −3367.64 | −3363.84 | 80.01 | 27.74 | 57.85 | 928. |
| | | 0.1767 | 5.895 | 0.0153 | 1557.75 | 2176.79 | 151.11 | 21.63 | 31.59 | 175. |
| 79 | 1.226 | 28.592 | 110.762 | 18.637 | −3309.99 | −3305.70 | 80.75 | 27.62 | 57.92 | 911. |
| | | 0.1963 | 5.921 | 0.0171 | 1573.03 | 2197.49 | 150.47 | 21.69 | 31.80 | 176. |
| 80 | 1.370 | 28.424 | 106.126 | 18.085 | −3252.29 | −3247.47 | 81.47 | 27.50 | 58.01 | 894. |
| | | 0.2176 | 5.942 | 0.0190 | 1587.93 | 2217.63 | 149.85 | 21.75 | 32.03 | 177. |
| 81 | 1.526 | 28.254 | 101.703 | 17.552 | −3194.53 | −3189.12 | 82.19 | 27.38 | 58.12 | 878. |
| | | 0.2405 | 5.960 | 0.0211 | 1602.46 | 2237.19 | 149.24 | 21.81 | 32.27 | 177. |

Thermodynamic properties of saturated nitrogen—Continued

| Temperature kelvin | Pressure bar | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar/K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|---|
| 82 | 1.696 | 28.082 | 97.476 | 17.038 | −3136.69 | −3130.65 | 82.90 | 27.26 | 58.23 | 862. |
| | | 0.2652 | 5.974 | 0.0233 | 1616.58 | 2256.15 | 148.65 | 21.88 | 32.52 | 178. |
| 83 | 1.880 | 27.908 | 93.427 | 16.542 | −3078.77 | −3072.04 | 83.60 | 27.16 | 58.37 | 847. |
| | | 0.2918 | 5.983 | 0.0258 | 1630.29 | 2274.48 | 148.07 | 21.95 | 32.79 | 179. |
| 84 | 2.077 | 27.732 | 89.543 | 16.061 | −3020.75 | −3013.26 | 84.30 | 27.05 | 58.52 | 832. |
| | | 0.3203 | 5.988 | 0.0284 | 1643.58 | 2292.17 | 147.51 | 22.02 | 33.08 | 179. |
| 85 | 2.291 | 27.554 | 85.810 | 15.596 | −2962.63 | −2954.31 | 84.99 | 26.96 | 58.69 | 817. |
| | | 0.3509 | 5.989 | 0.0313 | 1656.41 | 2309.18 | 146.96 | 22.10 | 33.39 | 180. |
| 86 | 2.519 | 27.373 | 82.217 | 15.145 | −2904.37 | −2895.16 | 85.67 | 26.87 | 58.89 | 802. |
| | | 0.3837 | 5.985 | 0.0344 | 1668.79 | 2325.50 | 146.42 | 22.18 | 33.71 | 180. |
| 87 | 2.765 | 27.191 | 78.754 | 14.708 | −2845.97 | −2835.80 | 86.34 | 26.79 | 59.11 | 788. |
| | | 0.4187 | 5.977 | 0.0377 | 1680.68 | 2341.09 | 145.89 | 22.26 | 34.05 | 181. |
| 88 | 3.028 | 27.006 | 75.412 | 14.283 | −2787.40 | −2776.19 | 87.01 | 26.71 | 59.35 | 773. |
| | | 0.4561 | 5.964 | 0.0413 | 1692.08 | 2355.94 | 145.37 | 22.34 | 34.42 | 181. |
| 89 | 3.308 | 26.819 | 72.183 | 13.871 | −2728.65 | −2716.32 | 87.68 | 26.64 | 59.62 | 759. |
| | | 0.4960 | 5.945 | 0.0451 | 1702.96 | 2370.02 | 144.87 | 22.43 | 34.81 | 181. |
| 90 | 3.608 | 26.630 | 69.060 | 13.469 | −2669.71 | −2656.16 | 88.34 | 26.57 | 59.91 | 746. |
| | | 0.5385 | 5.922 | 0.0492 | 1713.30 | 2383.30 | 144.37 | 22.52 | 35.22 | 182. |
| 91 | 3.927 | 26.438 | 66.038 | 13.079 | −2610.54 | −2595.69 | 88.99 | 26.51 | 60.24 | 732. |
| | | 0.5837 | 5.894 | 0.0537 | 1723.08 | 2395.75 | 143.88 | 22.61 | 35.66 | 182. |
| 92 | 4.266 | 26.244 | 63.111 | 12.699 | −2551.14 | −2534.89 | 89.64 | 26.46 | 60.59 | 718. |
| | | 0.6319 | 5.860 | 0.0584 | 1732.28 | 2407.35 | 143.39 | 22.70 | 36.13 | 182. |
| 93 | 4.626 | 26.047 | 60.273 | 12.328 | −2491.48 | −2473.72 | 90.29 | 26.41 | 60.98 | 705. |
| | | 0.6831 | 5.821 | 0.0636 | 1740.87 | 2418.05 | 142.92 | 22.80 | 36.63 | 183. |
| 94 | 5.007 | 25.847 | 57.521 | 11.966 | −2431.53 | −2412.16 | 90.93 | 26.37 | 61.39 | 691. |
| | | 0.7374 | 5.777 | 0.0690 | 1748.83 | 2427.83 | 142.45 | 22.90 | 37.17 | 183. |
| 95 | 5.411 | 25.644 | 54.850 | 11.613 | −2371.28 | −2350.18 | 91.57 | 26.33 | 61.85 | 678. |
| | | 0.7951 | 5.726 | 0.0749 | 1756.14 | 2436.65 | 141.98 | 23.01 | 37.74 | 183. |
| 96 | 5.838 | 25.439 | 52.258 | 11.268 | −2310.71 | −2287.76 | 92.21 | 26.29 | 62.34 | 665. |
| | | 0.8563 | 5.670 | 0.0812 | 1762.76 | 2444.48 | 141.52 | 23.12 | 38.35 | 183. |
| 97 | 6.288 | 25.230 | 49.740 | 10.931 | −2249.78 | −2224.86 | 92.84 | 26.26 | 62.87 | 652. |
| | | 0.9212 | 5.608 | 0.0880 | 1768.66 | 2451.26 | 141.07 | 23.23 | 39.01 | 183. |
| 98 | 6.763 | 25.018 | 47.295 | 10.601 | −2188.48 | −2161.45 | 93.47 | 26.23 | 63.44 | 639. |
| | | 0.9900 | 5.540 | 0.0952 | 1773.82 | 2456.97 | 140.62 | 23.34 | 39.71 | 183. |
| 99 | 7.264 | 24.802 | 44.918 | 10.277 | −2126.78 | −2097.49 | 94.10 | 26.21 | 64.06 | 626. |
| | | 1.063 | 5.466 | 0.1030 | 1778.18 | 2461.54 | 140.17 | 23.46 | 40.48 | 183. |
| 100 | 7.790 | 24.583 | 42.607 | 9.961 | −2064.65 | −2032.96 | 94.73 | 26.19 | 64.73 | 613. |
| | | 1.140 | 5.385 | 0.1114 | 1781.72 | 2464.92 | 139.72 | 23.59 | 41.30 | 183. |
| 101 | 8.344 | 24.360 | 40.360 | 9.650 | −2002.07 | −1967.81 | 95.36 | 26.18 | 65.45 | 600. |
| | | 1.222 | 5.298 | 0.1203 | 1784.38 | 2467.07 | 139.28 | 23.71 | 42.19 | 183. |

Thermodynamic properties of saturated nitrogen—Continued

| Temperature kelvin | Pressure bar | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar/K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|---|
| 102 | 8.925 | 24.133 | 38.174 | 9.345 | −1938.99 | −1902.01 | 95.98 | 26.17 | 66.24 | 587. |
| | | 1.309 | 5.204 | 0.1299 | 1786.13 | 2467.91 | 138.83 | 23.85 | 43.15 | 183. |
| 103 | 9.535 | 23.901 | 36.048 | 9.046 | −1875.39 | −1835.50 | 96.60 | 26.16 | 67.09 | 574. |
| | | 1.401 | 5.103 | 0.1403 | 1786.90 | 2467.38 | 138.39 | 23.99 | 44.21 | 183. |
| 104 | 10.174 | 23.665 | 33.977 | 8.752 | −1811.22 | −1768.23 | 97.23 | 26.15 | 68.02 | 562. |
| | | 1.499 | 4.995 | 0.1514 | 1786.63 | 2465.40 | 137.94 | 24.13 | 45.36 | 183. |
| 105 | 10.843 | 23.424 | 31.962 | 8.463 | −1746.46 | −1700.17 | 97.85 | 26.15 | 69.03 | 549. |
| | | 1.603 | 4.880 | 0.1633 | 1785.27 | 2461.88 | 137.49 | 24.28 | 46.62 | 183. |
| 106 | 11.543 | 23.178 | 29.998 | 8.178 | −1681.04 | −1631.24 | 98.48 | 26.16 | 70.14 | 536. |
| | | 1.713 | 4.757 | 0.1762 | 1782.72 | 2456.72 | 137.05 | 24.43 | 48.01 | 183. |
| 107 | 12.275 | 22.927 | 28.084 | 7.897 | −1614.92 | −1561.38 | 99.10 | 26.16 | 71.37 | 523. |
| | | 1.830 | 4.627 | 0.1901 | 1778.92 | 2449.82 | 136.59 | 24.59 | 49.55 | 182. |
| 108 | 13.040 | 22.669 | 26.218 | 7.620 | −1548.04 | −1490.51 | 99.73 | 26.17 | 72.72 | 510. |
| | | 1.954 | 4.488 | 0.2051 | 1773.75 | 2441.05 | 136.13 | 24.76 | 51.26 | 182. |
| 109 | 13.839 | 22.405 | 24.399 | 7.347 | −1480.33 | −1418.56 | 100.36 | 26.19 | 74.23 | 497. |
| | | 2.087 | 4.341 | 0.2213 | 1767.13 | 2430.27 | 135.67 | 24.94 | 53.17 | 182. |
| 110 | 14.673 | 22.134 | 22.623 | 7.077 | −1411.70 | −1345.41 | 101.00 | 26.21 | 75.92 | 484. |
| | | 2.229 | 4.185 | 0.2389 | 1758.90 | 2417.32 | 135.20 | 25.12 | 55.32 | 181. |
| 111 | 15.542 | 21.854 | 20.890 | 6.809 | −1342.07 | −1270.95 | 101.63 | 26.23 | 77.82 | 470. |
| | | 2.380 | 4.021 | 0.2580 | 1748.94 | 2402.01 | 134.72 | 25.32 | 57.77 | 181. |
| 112 | 16.448 | 21.566 | 19.198 | 6.544 | −1271.31 | −1195.05 | 102.28 | 26.27 | 79.98 | 457. |
| | | 2.542 | 3.847 | 0.2788 | 1737.08 | 2384.14 | 134.23 | 25.52 | 60.56 | 181. |
| 113 | 17.391 | 21.269 | 17.546 | 6.280 | −1199.31 | −1117.54 | 102.93 | 26.30 | 82.46 | 443. |
| | | 2.716 | 3.663 | 0.3016 | 1723.11 | 2363.45 | 133.73 | 25.73 | 63.78 | 180. |
| 114 | 18.373 | 20.960 | 15.932 | 6.018 | −1125.88 | −1038.22 | 103.58 | 26.35 | 85.34 | 429. |
| | | 2.903 | 3.469 | 0.3266 | 1706.80 | 2339.63 | 133.21 | 25.96 | 67.53 | 179. |
| 115 | 19.395 | 20.638 | 14.356 | 5.756 | −1050.83 | −956.86 | 104.25 | 26.40 | 88.72 | 415. |
| | | 3.106 | 3.265 | 0.3540 | 1687.86 | 2312.33 | 132.67 | 26.20 | 71.97 | 179. |
| 116 | 20.457 | 20.302 | 12.818 | 5.495 | −973.90 | −873.14 | 104.93 | 26.46 | 92.75 | 400. |
| | | 3.325 | 3.049 | 0.3844 | 1665.95 | 2281.12 | 132.12 | 26.45 | 77.28 | 178. |
| 117 | 21.561 | 19.949 | 11.316 | 5.232 | −894.76 | −786.67 | 105.63 | 26.54 | 97.65 | 386. |
| | | 3.565 | 2.822 | 0.4181 | 1640.62 | 2245.43 | 131.53 | 26.72 | 83.76 | 178. |
| 118 | 22.708 | 19.575 | 9.852 | 4.967 | −812.96 | −696.96 | 106.34 | 26.62 | 103.73 | 370. |
| | | 3.828 | 2.583 | 0.4559 | 1611.32 | 2204.55 | 130.92 | 27.01 | 91.82 | 177. |
| 119 | 23.899 | 19.176 | 8.428 | 4.698 | −727.92 | −603.29 | 107.08 | 26.73 | 111.49 | 354. |
| | | 4.119 | 2.331 | 0.4985 | 1577.29 | 2157.56 | 130.27 | 27.33 | 102.13 | 176. |
| 120 | 25.135 | 18.745 | 7.044 | 4.424 | −638.80 | −504.72 | 107.85 | 26.86 | 121.75 | 338. |
| | | 4.443 | 2.065 | 0.5471 | 1537.51 | 2103.16 | 129.57 | 27.66 | 115.78 | 176. |
| 121 | 26.417 | 18.274 | 5.704 | 4.142 | −544.36 | −399.80 | 108.66 | 27.02 | 135.98 | 320. |
| | | 4.812 | 1.784 | 0.6034 | 1490.47 | 2039.47 | 128.82 | 28.03 | 134.70 | 175. |

Thermodynamic properties of saturated nitrogen—Continued

| Temperature kelvin | Pressure bar | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar/K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|---|
| 122 | 27.749 | 17.745 | 4.415 | 3.847 | −442.66 | −286.28 | 109.54 | 27.23 | 157.08 | 302. |
| | | 5.238 | 1.486 | 0.6699 | 1433.85 | 1963.58 | 127.97 | 28.43 | 162.66 | 174. |
| 123 | 29.133 | 17.134 | 3.184 | 3.533 | −330.28 | −160.25 | 110.50 | 27.49 | 191.72 | 282. |
| | | 5.748 | 1.170 | 0.7509 | 1363.65 | 1870.50 | 127.01 | 28.89 | 208.24 | 174. |
| 124 | 30.574 | 16.388 | 2.026 | 3.186 | −200.41 | −13.85 | 111.62 | 27.86 | 259.26 | 259. |
| | | 6.391 | 0.833 | 0.8551 | 1271.92 | 1750.33 | 125.84 | 29.40 | 295.94 | 173. |
| 125 | 32.079 | 15.367 | 0.971 | 2.775 | −35.02 | 173.74 | 113.05 | 28.44 | 448.21 | 234. |
| | | 7.299 | 0.469 | 1.005 | 1138.08 | 1577.61 | 124.28 | 30.02 | 534.94 | 173. |
| 126 | 33.668 | 13.270 | 0.111 | 2.128 | 271.93 | 525.65 | 115.76 | | | |
| | | 9.235 | 0.077 | 1.329 | 846.89 | 1211.46 | 121.20 | | | |
| 126.200 | 34.000 | 11.210 | 0.000 | 1.679 | 559.26 | 862.56 | 118.41 | | | |

Thermodynamic properties of nitrogen

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.10 bar Isobar | | | | | |
| * 63.151 | 0.01919 | 5.17 | 0.0016 | 1298.4 | 1819.5 | 165.47 | 20.95 | 29.53 | 161. |
| 64 | 0.01893 | 5.24 | 0.0016 | 1316.3 | 1844.6 | 165.86 | 20.95 | 29.51 | 162. |
| 66 | 0.01834 | 5.42 | 0.0015 | 1358.4 | 1903.6 | 166.77 | 20.93 | 29.46 | 165. |
| 68 | 0.01779 | 5.59 | 0.0015 | 1400.5 | 1962.5 | 167.65 | 20.91 | 29.43 | 168. |
| 70 | 0.01728 | 5.76 | 0.0014 | 1442.5 | 2021.3 | 168.50 | 20.90 | 29.39 | 170. |
| 72 | 0.01679 | 5.93 | 0.0014 | 1484.4 | 2080.0 | 169.33 | 20.88 | 29.36 | 172. |
| 74 | 0.01633 | 6.10 | 0.0014 | 1526.3 | 2138.8 | 170.13 | 20.87 | 29.34 | 175. |
| 76 | 0.01589 | 6.26 | 0.0013 | 1568.2 | 2197.4 | 170.92 | 20.86 | 29.32 | 177. |
| 78 | 0.01548 | 6.43 | 0.0013 | 1610.1 | 2256.0 | 171.68 | 20.85 | 29.30 | 180. |
| 80 | 0.01509 | 6.60 | 0.0013 | 1651.9 | 2314.6 | 172.42 | 20.85 | 29.28 | 182. |
| 82 | 0.01472 | 6.77 | 0.0012 | 1693.7 | 2373.2 | 173.14 | 20.84 | 29.27 | 184. |
| 84 | 0.01436 | 6.94 | 0.0012 | 1735.5 | 2431.7 | 173.85 | 20.84 | 29.25 | 186. |
| 86 | 0.01403 | 7.11 | 0.0012 | 1777.3 | 2490.2 | 174.54 | 20.83 | 29.24 | 189. |
| 88 | 0.01371 | 7.28 | 0.0011 | 1819.0 | 2548.7 | 175.21 | 20.83 | 29.23 | 191. |
| 90 | 0.01340 | 7.44 | 0.0011 | 1860.7 | 2607.1 | 175.86 | 20.82 | 29.22 | 193. |
| 92 | 0.01310 | 7.61 | 0.0011 | 1902.5 | 2665.6 | 176.51 | 20.82 | 29.21 | 195. |
| 94 | 0.01282 | 7.78 | 0.0011 | 1944.2 | 2723.9 | 177.13 | 20.82 | 29.20 | 197. |
| 96 | 0.01256 | 7.95 | 0.0010 | 1985.9 | 2782.3 | 177.75 | 20.81 | 29.20 | 199. |
| 98 | 0.01230 | 8.11 | 0.0010 | 2027.6 | 2840.7 | 178.35 | 20.81 | 29.19 | 202. |
| 100 | 0.01205 | 8.28 | 0.0010 | 2069.3 | 2899.1 | 178.94 | 20.81 | 29.18 | 204. |
| 102 | 0.01181 | 8.45 | 0.0010 | 2110.9 | 2957.4 | 179.52 | 20.81 | 29.18 | 206. |
| 104 | 0.01158 | 8.62 | 0.0010 | 2152.6 | 3015.8 | 180.09 | 20.80 | 29.17 | 208. |
| 106 | 0.01137 | 8.78 | 0.0009 | 2194.3 | 3074.1 | 180.64 | 20.80 | 29.17 | 210. |
| 108 | 0.01115 | 8.95 | 0.0009 | 2235.9 | 3132.5 | 181.19 | 20.80 | 29.16 | 212. |
| 110 | 0.01095 | 9.12 | 0.0009 | 2277.6 | 3190.8 | 181.72 | 20.80 | 29.16 | 214. |
| 112 | 0.01075 | 9.29 | 0.0009 | 2319.2 | 3249.1 | 182.25 | 20.80 | 29.16 | 216. |
| 114 | 0.01056 | 9.45 | 0.0009 | 2360.8 | 3307.4 | 182.76 | 20.80 | 29.15 | 217. |
| 116 | 0.01038 | 9.62 | 0.0009 | 2402.5 | 3365.7 | 183.27 | 20.80 | 29.15 | 219. |
| 118 | 0.01020 | 9.79 | 0.0008 | 2444.1 | 3424.0 | 183.77 | 20.80 | 29.15 | 221. |
| 120 | 0.01003 | 9.95 | 0.0008 | 2485.7 | 3482.3 | 184.26 | 20.79 | 29.15 | 223. |
| 122 | 0.00987 | 10.12 | 0.0008 | 2527.4 | 3540.6 | 184.74 | 20.79 | 29.14 | 225. |
| 124 | 0.00971 | 10.29 | 0.0008 | 2569.0 | 3598.9 | 185.21 | 20.79 | 29.14 | 227. |
| 126 | 0.00955 | 10.46 | 0.0008 | 2610.6 | 3657.2 | 185.68 | 20.79 | 29.14 | 229. |
| 128 | 0.00941 | 10.62 | 0.0008 | 2652.2 | 3715.5 | 186.14 | 20.79 | 29.14 | 231. |
| 130 | 0.00926 | 10.79 | 0.0008 | 2693.8 | 3773.7 | 186.59 | 20.79 | 29.13 | 232. |
| 132 | 0.00912 | 10.96 | 0.0008 | 2735.4 | 3832.0 | 187.04 | 20.79 | 29.13 | 234. |
| 134 | 0.00898 | 11.12 | 0.0007 | 2777.0 | 3890.3 | 187.47 | 20.79 | 29.13 | 236. |
| 136 | 0.00885 | 11.29 | 0.0007 | 2818.6 | 3948.5 | 187.90 | 20.79 | 29.13 | 238. |
| 138 | 0.00872 | 11.46 | 0.0007 | 2860.3 | 4006.8 | 188.33 | 20.79 | 29.13 | 239. |
| 140 | 0.00860 | 11.62 | 0.0007 | 2901.9 | 4065.0 | 188.75 | 20.79 | 29.13 | 241. |
| 142 | 0.00848 | 11.79 | 0.0007 | 2943.5 | 4123.3 | 189.16 | 20.79 | 29.13 | 243. |
| 144 | 0.00836 | 11.96 | 0.0007 | 2985.1 | 4181.5 | 189.57 | 20.79 | 29.12 | 245. |
| 146 | 0.00824 | 12.12 | 0.0007 | 3026.6 | 4239.8 | 189.97 | 20.79 | 29.12 | 246. |
| 148 | 0.00813 | 12.29 | 0.0007 | 3068.2 | 4298.0 | 190.37 | 20.79 | 29.12 | 248. |
| 150 | 0.00802 | 12.46 | 0.0007 | 3109.8 | 4356.3 | 190.76 | 20.79 | 29.12 | 250. |
| 155 | 0.00776 | 12.87 | 0.0006 | 3213.8 | 4501.9 | 191.71 | 20.79 | 29.12 | 254. |
| 160 | 0.00752 | 13.29 | 0.0006 | 3317.8 | 4647.5 | 192.64 | 20.78 | 29.12 | 258. |
| 165 | 0.00729 | 13.71 | 0.0006 | 3421.8 | 4793.0 | 193.53 | 20.78 | 29.11 | 262. |
| 170 | 0.00708 | 14.12 | 0.0006 | 3525.7 | 4938.6 | 194.40 | 20.78 | 29.11 | 266. |
| 175 | 0.00688 | 14.54 | 0.0006 | 3629.7 | 5084.2 | 195.25 | 20.78 | 29.11 | 270. |
| 180 | 0.00668 | 14.96 | 0.0006 | 3733.6 | 5229.7 | 196.07 | 20.78 | 29.11 | 273. |
| 185 | 0.00650 | 15.37 | 0.0005 | 3837.6 | 5375.3 | 196.86 | 20.78 | 29.11 | 277. |
| 190 | 0.00633 | 15.79 | 0.0005 | 3941.5 | 5520.8 | 197.64 | 20.78 | 29.11 | 281. |
| 195 | 0.00617 | 16.21 | 0.0005 | 4045.4 | 5666.4 | 198.40 | 20.78 | 29.11 | 285. |
| 200 | 0.00602 | 16.62 | 0.0005 | 4149.4 | 5811.9 | 199.13 | 20.78 | 29.11 | 288. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 210 | 0.00573 | 17.45 | 0.0005 | 4357.2 | 6102.9 | 200.55 | 20.78 | 29.10 | 295. |
| 220 | 0.00547 | 18.29 | 0.0005 | 4565.1 | 6394.0 | 201.91 | 20.78 | 29.10 | 302. |
| 230 | 0.00523 | 19.12 | 0.0004 | 4772.9 | 6685.0 | 203.20 | 20.78 | 29.10 | 309. |
| 240 | 0.00501 | 19.95 | 0.0004 | 4980.8 | 6976.2 | 204.44 | 20.78 | 29.10 | 316. |
| 250 | 0.00481 | 20.78 | 0.0004 | 5188.6 | 7267.2 | 205.63 | 20.78 | 29.10 | 322. |
| 260 | 0.00463 | 21.61 | 0.0004 | 5396.5 | 7558.2 | 206.77 | 20.78 | 29.10 | 329. |
| 270 | 0.00445 | 22.45 | 0.0004 | 5604.3 | 7849.2 | 207.87 | 20.78 | 29.10 | 335. |
| 280 | 0.00430 | 23.28 | 0.0004 | 5812.2 | 8140.2 | 208.93 | 20.78 | 29.10 | 341. |
| 290 | 0.00415 | 24.11 | 0.0003 | 6020.0 | 8431.2 | 209.95 | 20.79 | 29.11 | 347. |
| 300 | 0.00401 | 24.94 | 0.0003 | 6228.0 | 8722.3 | 210.93 | 20.79 | 29.11 | 353. |
| 310 | 0.00388 | 25.77 | 0.0003 | 6435.9 | 9013.4 | 211.89 | 20.80 | 29.11 | 359. |
| 320 | 0.00376 | 26.61 | 0.0003 | 6643.9 | 9304.5 | 212.81 | 20.80 | 29.12 | 365. |
| 330 | 0.00364 | 27.44 | 0.0003 | 6852.0 | 9595.8 | 213.71 | 20.81 | 29.13 | 370. |
| 340 | 0.00354 | 28.27 | 0.0003 | 7060.1 | 9887.0 | 214.58 | 20.82 | 29.13 | 376. |
| 350 | 0.00344 | 29.10 | 0.0003 | 7268.4 | 10178.4 | 215.42 | 20.83 | 29.14 | 381. |
| 360 | 0.00334 | 29.93 | 0.0003 | 7476.7 | 10469.9 | 216.24 | 20.84 | 29.16 | 387. |
| 370 | 0.00325 | 30.76 | 0.0003 | 7685.2 | 10761.6 | 217.04 | 20.85 | 29.17 | 392. |
| 380 | 0.00317 | 31.60 | 0.0003 | 7893.8 | 11053.3 | 217.82 | 20.87 | 29.19 | 397. |
| 390 | 0.00308 | 32.43 | 0.0003 | 8102.6 | 11345.3 | 218.58 | 20.89 | 29.20 | 402. |
| 400 | 0.00301 | 33.26 | 0.0003 | 8311.6 | 11637.4 | 219.32 | 20.91 | 29.22 | 407. |
| 420 | 0.00286 | 34.92 | 0.0002 | 8730.3 | 12222.3 | 220.75 | 20.95 | 29.27 | 417. |
| 440 | 0.00273 | 36.59 | 0.0002 | 9149.9 | 12808.3 | 222.11 | 21.01 | 29.33 | 427. |
| 460 | 0.00261 | 38.25 | 0.0002 | 9570.8 | 13395.4 | 223.41 | 21.08 | 29.39 | 436. |
| 480 | 0.00251 | 39.91 | 0.0002 | 9993.0 | 13984.0 | 224.67 | 21.15 | 29.47 | 446. |
| 500 | 0.00241 | 41.58 | 0.0002 | 10416.9 | 14574.1 | 225.87 | 21.23 | 29.55 | 454. |
| 520 | 0.00231 | 43.24 | 0.0002 | 10842.4 | 15165.9 | 227.03 | 21.32 | 29.64 | 463. |
| 540 | 0.00223 | 44.90 | 0.0002 | 11269.9 | 15759.7 | 228.15 | 21.42 | 29.74 | 472. |
| 560 | 0.00215 | 46.56 | 0.0002 | 11699.4 | 16355.5 | 229.24 | 21.53 | 29.84 | 480. |
| 580 | 0.00207 | 48.23 | 0.0002 | 12131.0 | 16953.4 | 230.29 | 21.64 | 29.95 | 488. |
| 600 | 0.00200 | 49.89 | 0.0002 | 12565.0 | 17553.7 | 231.30 | 21.76 | 30.07 | 496. |
| 620 | 0.00194 | 51.55 | 0.0002 | 13001.3 | 18156.3 | 232.29 | 21.88 | 30.19 | 504. |
| 640 | 0.00188 | 53.22 | 0.0002 | 13440.1 | 18761.4 | 233.25 | 22.00 | 30.32 | 512. |
| 660 | 0.00182 | 54.88 | 0.0002 | 13881.4 | 19369.0 | 234.19 | 22.13 | 30.45 | 519. |
| 680 | 0.00177 | 56.54 | 0.0001 | 14325.4 | 19979.2 | 235.10 | 22.26 | 30.58 | 527. |
| 700 | 0.00172 | 58.21 | 0.0001 | 14771.9 | 20592.0 | 235.98 | 22.39 | 30.71 | 534. |
| 720 | 0.00167 | 59.87 | 0.0001 | 15221.1 | 21207.5 | 236.85 | 22.53 | 30.84 | 541. |
| 740 | 0.00163 | 61.53 | 0.0001 | 15673.1 | 21825.7 | 237.70 | 22.66 | 30.98 | 548. |
| 760 | 0.00158 | 63.19 | 0.0001 | 16127.7 | 22446.6 | 238.53 | 22.80 | 31.11 | 555. |
| 780 | 0.00154 | 64.86 | 0.0001 | 16585.0 | 23070.2 | 239.34 | 22.93 | 31.25 | 562. |
| 800 | 0.00150 | 66.52 | 0.0001 | 17045.0 | 23696.5 | 240.13 | 23.07 | 31.38 | 568. |
| 850 | 0.00141 | 70.68 | 0.0001 | 18206.6 | 25273.8 | 242.04 | 23.40 | 31.71 | 585. |
| 900 | 0.00134 | 74.83 | 0.0001 | 19384.4 | 26867.4 | 243.86 | 23.72 | 32.03 | 601. |
| 950 | 0.00127 | 78.99 | 0.0001 | 20578.0 | 28476.7 | 245.60 | 24.02 | 32.34 | 616. |
| 1000 | 0.00120 | 83.15 | 0.0001 | 21786.5 | 30100.9 | 247.27 | 24.32 | 32.63 | 631. |
| 1050 | 0.00115 | 87.31 | 0.0001 | 23009.3 | 31739.6 | 248.87 | 24.59 | 32.91 | 646. |
| 1100 | 0.00109 | 91.46 | 0.0001 | 24245.5 | 33391.6 | 250.41 | 24.85 | 33.17 | 660. |
| 1150 | 0.00105 | 95.62 | 0.0001 | 25494.4 | 35056.2 | 251.89 | 25.10 | 33.41 | 674. |
| 1200 | 0.00100 | 99.78 | 0.0001 | 26755.2 | 36732.7 | 253.31 | 25.33 | 33.64 | 688. |
| 1250 | 0.00096 | 103.94 | 0.0001 | 28027.1 | 38420.3 | 254.69 | 25.54 | 33.86 | 701. |
| 1300 | 0.00093 | 108.09 | 0.0001 | 29309.4 | 40118.3 | 256.02 | 25.75 | 34.06 | 714. |
| 1350 | 0.00089 | 112.25 | 0.0001 | 30601.4 | 41826.1 | 257.31 | 25.93 | 34.25 | 727. |
| 1400 | 0.00086 | 116.41 | 0.0001 | 31902.6 | 43542.9 | 258.56 | 26.11 | 34.42 | 740. |
| 1450 | 0.00083 | 120.56 | 0.0001 | 33212.2 | 45268.3 | 259.77 | 26.27 | 34.59 | 753. |
| 1500 | 0.00080 | 124.72 | 0.0001 | 34529.8 | 47001.6 | 260.95 | 26.43 | 34.74 | 765. |
| 1550 | 0.00078 | 128.88 | 0.0001 | 35854.8 | 48742.3 | 262.09 | 26.57 | 34.89 | 777. |
| 1600 | 0.00075 | 133.04 | 0.0001 | 37186.8 | 50490.0 | 263.20 | 26.71 | 35.02 | 789. |
| 1650 | 0.00073 | 137.19 | 0.0001 | 38525.3 | 52244.3 | 264.28 | 26.83 | 35.15 | 801. |
| 1700 | 0.00071 | 141.35 | 0.0001 | 39869.9 | 54004.6 | 265.33 | 26.95 | 35.26 | 813. |
| 1750 | 0.00069 | 145.51 | 0.0001 | 41220.2 | 55770.6 | 266.35 | 27.06 | 35.38 | 824. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1800 | 0.00067 | 149.66 | 0.0001 | 42575.9 | 57541.9 | 267.35 | 27.16 | 35.48 | 835. |
| 1850 | 0.00065 | 153.82 | 0.0001 | 43936.5 | 59318.3 | 268.32 | 27.26 | 35.58 | 847. |
| 1900 | 0.00063 | 157.98 | 0.0001 | 45301.9 | 61099.5 | 269.27 | 27.35 | 35.67 | 858. |
| 1950 | 0.00062 | 162.14 | 0.0001 | 46671.8 | 62885.0 | 270.20 | 27.44 | 35.75 | 868. |
| 2000 | 0.00060 | 166.29 | 0.0001 | 48045.8 | 64674.8 | 271.11 | 27.52 | 35.83 | 879. |
| | | | | 0.50 bar Isobar | | | | | |
| * 63.160 | 30.97747 | 240.23 | 31.94 | −4211.8 | −4210.2 | 68.01 | | | |
| 64 | 30.86492 | 228.86 | 30.87 | −4165.7 | −4164.1 | 68.74 | | | |
| 66 | 30.59048 | 204.79 | 28.58 | −4054.2 | −4052.6 | 70.45 | | | |
| 68 | 30.30671 | 184.27 | 26.57 | −3941.2 | −3939.5 | 72.14 | | | |
| 70 | 30.01370 | 166.64 | 24.79 | −3827.2 | −3825.5 | 73.79 | | | |
| * 71.820 | 29.73919 | 152.64 | 23.33 | −3722.9 | −3721.2 | 75.27 | | | |
| * 71.820 | 0.08597 | 5.66 | 0.0073 | 1456.0 | 2037.6 | 155.53 | | | |
| 72 | 0.08574 | 5.68 | 0.0073 | 1459.9 | 2043.1 | 155.61 | 21.30 | 30.51 | 170. |
| 74 | 0.08324 | 5.86 | 0.0071 | 1503.3 | 2104.0 | 156.44 | 21.24 | 30.38 | 173. |
| 76 | 0.08090 | 6.04 | 0.0069 | 1546.6 | 2164.6 | 157.25 | 21.19 | 30.26 | 175. |
| 78 | 0.07869 | 6.22 | 0.0067 | 1589.6 | 2225.0 | 158.03 | 21.15 | 30.15 | 178. |
| 80 | 0.07661 | 6.40 | 0.0065 | 1632.6 | 2285.2 | 158.79 | 21.11 | 30.06 | 180. |
| 82 | 0.07464 | 6.58 | 0.0063 | 1675.4 | 2345.3 | 159.54 | 21.08 | 29.98 | 183. |
| 84 | 0.07277 | 6.76 | 0.0061 | 1718.1 | 2405.2 | 160.26 | 21.05 | 29.90 | 185. |
| 86 | 0.07100 | 6.93 | 0.0060 | 1760.7 | 2464.9 | 160.96 | 21.03 | 29.84 | 187. |
| 88 | 0.06932 | 7.11 | 0.0058 | 1803.2 | 2524.5 | 161.65 | 21.01 | 29.78 | 190. |
| 90 | 0.06771 | 7.28 | 0.0057 | 1845.6 | 2584.0 | 162.31 | 20.99 | 29.73 | 192. |
| 92 | 0.06619 | 7.46 | 0.0056 | 1888.0 | 2643.4 | 162.97 | 20.97 | 29.69 | 194. |
| 94 | 0.06473 | 7.63 | 0.0054 | 1930.3 | 2702.8 | 163.61 | 20.95 | 29.64 | 196. |
| 96 | 0.06334 | 7.81 | 0.0053 | 1972.6 | 2762.0 | 164.23 | 20.94 | 29.61 | 199. |
| 98 | 0.06200 | 7.98 | 0.0052 | 2014.8 | 2821.2 | 164.84 | 20.93 | 29.57 | 201. |
| 100 | 0.06073 | 8.15 | 0.0051 | 2057.0 | 2880.3 | 165.44 | 20.91 | 29.54 | 203. |
| 102 | 0.05950 | 8.33 | 0.0050 | 2099.1 | 2939.4 | 166.02 | 20.90 | 29.51 | 205. |
| 104 | 0.05833 | 8.50 | 0.0049 | 2141.2 | 2998.4 | 166.59 | 20.89 | 29.49 | 207. |
| 106 | 0.05720 | 8.67 | 0.0048 | 2183.2 | 3057.3 | 167.16 | 20.89 | 29.46 | 209. |
| 108 | 0.05612 | 8.84 | 0.0047 | 2225.3 | 3116.2 | 167.71 | 20.88 | 29.44 | 211. |
| 110 | 0.05507 | 9.01 | 0.0046 | 2267.2 | 3175.1 | 168.25 | 20.87 | 29.42 | 213. |
| 112 | 0.05407 | 9.18 | 0.0045 | 2309.2 | 3233.9 | 168.78 | 20.87 | 29.41 | 215. |
| 114 | 0.05310 | 9.35 | 0.0044 | 2351.2 | 3292.7 | 169.30 | 20.86 | 29.39 | 217. |
| 116 | 0.05217 | 9.52 | 0.0044 | 2393.1 | 3351.5 | 169.81 | 20.85 | 29.37 | 219. |
| 118 | 0.05127 | 9.69 | 0.0043 | 2435.0 | 3410.2 | 170.31 | 20.85 | 29.36 | 221. |
| 120 | 0.05040 | 9.86 | 0.0042 | 2476.9 | 3468.9 | 170.80 | 20.85 | 29.35 | 223. |
| 122 | 0.04956 | 10.03 | 0.0041 | 2518.7 | 3527.6 | 171.29 | 20.84 | 29.33 | 225. |
| 124 | 0.04875 | 10.20 | 0.0041 | 2560.6 | 3586.3 | 171.76 | 20.84 | 29.32 | 226. |
| 126 | 0.04796 | 10.37 | 0.0040 | 2602.4 | 3644.9 | 172.23 | 20.83 | 29.31 | 228. |
| 128 | 0.04720 | 10.54 | 0.0039 | 2644.3 | 3703.5 | 172.70 | 20.83 | 29.30 | 230. |
| 130 | 0.04647 | 10.71 | 0.0039 | 2686.1 | 3762.1 | 173.15 | 20.83 | 29.29 | 232. |
| 132 | 0.04575 | 10.88 | 0.0038 | 2727.9 | 3820.7 | 173.60 | 20.83 | 29.28 | 234. |
| 134 | 0.04506 | 11.05 | 0.0038 | 2769.7 | 3879.2 | 174.04 | 20.82 | 29.28 | 235. |
| 136 | 0.04439 | 11.22 | 0.0037 | 2811.5 | 3937.8 | 174.47 | 20.82 | 29.27 | 237. |
| 138 | 0.04374 | 11.39 | 0.0037 | 2853.2 | 3996.3 | 174.90 | 20.82 | 29.26 | 239. |
| 140 | 0.04311 | 11.56 | 0.0036 | 2895.0 | 4054.8 | 175.32 | 20.82 | 29.25 | 241. |
| 142 | 0.04250 | 11.73 | 0.0035 | 2936.7 | 4113.3 | 175.73 | 20.81 | 29.25 | 243. |
| 144 | 0.04190 | 11.89 | 0.0035 | 2978.5 | 4171.8 | 176.14 | 20.81 | 29.24 | 244. |
| 146 | 0.04132 | 12.06 | 0.0034 | 3020.2 | 4230.3 | 176.55 | 20.81 | 29.24 | 246. |
| 148 | 0.04076 | 12.23 | 0.0034 | 3061.9 | 4288.8 | 176.94 | 20.81 | 29.23 | 248. |
| 150 | 0.04021 | 12.40 | 0.0034 | 3103.7 | 4347.2 | 177.34 | 20.81 | 29.23 | 249. |
| 155 | 0.03890 | 12.82 | 0.0032 | 3207.9 | 4493.3 | 178.29 | 20.80 | 29.21 | 254. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 160 | 0.03767 | 13.24 | 0.0031 | 3312.2 | 4639.4 | 179.22 | 20.80 | 29.20 | 258. |
| 165 | 0.03652 | 13.66 | 0.0030 | 3416.4 | 4785.4 | 180.12 | 20.80 | 29.20 | 262. |
| 170 | 0.03544 | 14.08 | 0.0030 | 3520.6 | 4931.3 | 180.99 | 20.80 | 29.19 | 266. |
| 175 | 0.03442 | 14.50 | 0.0029 | 3624.8 | 5077.2 | 181.84 | 20.80 | 29.18 | 269. |
| 180 | 0.03346 | 14.92 | 0.0028 | 3728.9 | 5223.1 | 182.66 | 20.79 | 29.17 | 273. |
| 185 | 0.03255 | 15.34 | 0.0027 | 3833.0 | 5369.0 | 183.46 | 20.79 | 29.17 | 277. |
| 190 | 0.03169 | 15.76 | 0.0026 | 3937.2 | 5514.8 | 184.24 | 20.79 | 29.16 | 281. |
| 195 | 0.03088 | 16.17 | 0.0026 | 4041.2 | 5660.6 | 184.99 | 20.79 | 29.16 | 285. |
| 200 | 0.03010 | 16.59 | 0.0025 | 4145.3 | 5806.4 | 185.73 | 20.79 | 29.15 | 288. |
| 210 | 0.02866 | 17.43 | 0.0024 | 4353.5 | 6097.9 | 187.15 | 20.79 | 29.15 | 295. |
| 220 | 0.02736 | 18.26 | 0.0023 | 4561.5 | 6389.4 | 188.51 | 20.79 | 29.14 | 302. |
| 230 | 0.02616 | 19.10 | 0.0022 | 4769.6 | 6680.7 | 189.81 | 20.79 | 29.14 | 309. |
| 240 | 0.02507 | 19.93 | 0.0021 | 4977.6 | 6972.1 | 191.05 | 20.79 | 29.13 | 316. |
| 250 | 0.02406 | 20.77 | 0.0020 | 5185.6 | 7263.4 | 192.23 | 20.79 | 29.13 | 322. |
| 260 | 0.02314 | 21.60 | 0.0019 | 5393.6 | 7554.7 | 193.38 | 20.79 | 29.13 | 329. |
| 270 | 0.02228 | 22.44 | 0.0019 | 5601.6 | 7845.9 | 194.48 | 20.79 | 29.13 | 335. |
| 280 | 0.02148 | 23.27 | 0.0018 | 5809.6 | 8137.2 | 195.54 | 20.79 | 29.13 | 341. |
| 290 | 0.02074 | 24.11 | 0.0017 | 6017.6 | 8428.5 | 196.56 | 20.79 | 29.13 | 347. |
| 300 | 0.02005 | 24.94 | 0.0017 | 6225.6 | 8719.7 | 197.54 | 20.79 | 29.13 | 353. |
| 310 | 0.01940 | 25.77 | 0.0016 | 6433.7 | 9011.0 | 198.50 | 20.80 | 29.13 | 359. |
| 320 | 0.01879 | 26.61 | 0.0016 | 6641.8 | 9302.3 | 199.42 | 20.80 | 29.14 | 365. |
| 330 | 0.01822 | 27.44 | 0.0015 | 6850.0 | 9593.7 | 200.32 | 20.81 | 29.14 | 370. |
| 340 | 0.01769 | 28.27 | 0.0015 | 7058.2 | 9885.2 | 201.19 | 20.82 | 29.15 | 376. |
| 350 | 0.01718 | 29.10 | 0.0014 | 7266.5 | 10176.7 | 202.04 | 20.83 | 29.16 | 381. |
| 360 | 0.01670 | 29.94 | 0.0014 | 7474.9 | 10468.3 | 202.86 | 20.84 | 29.17 | 387. |
| 370 | 0.01625 | 30.77 | 0.0014 | 7683.5 | 10760.1 | 203.66 | 20.86 | 29.18 | 392. |
| 380 | 0.01582 | 31.60 | 0.0013 | 7892.2 | 11052.0 | 204.44 | 20.87 | 29.20 | 397. |
| 390 | 0.01542 | 32.43 | 0.0013 | 8101.0 | 11344.0 | 205.19 | 20.89 | 29.21 | 402. |
| 400 | 0.01503 | 33.27 | 0.0013 | 8310.1 | 11636.3 | 205.93 | 20.91 | 29.23 | 407. |
| 420 | 0.01432 | 34.93 | 0.0012 | 8728.8 | 12221.4 | 207.36 | 20.96 | 29.28 | 417. |
| 440 | 0.01367 | 36.60 | 0.0011 | 9148.6 | 12807.5 | 208.73 | 21.01 | 29.33 | 427. |
| 460 | 0.01307 | 38.26 | 0.0011 | 9569.5 | 13394.8 | 210.03 | 21.08 | 29.40 | 436. |
| 480 | 0.01253 | 39.92 | 0.0010 | 9991.8 | 13983.5 | 211.28 | 21.15 | 29.47 | 446. |
| 500 | 0.01202 | 41.59 | 0.0010 | 10415.7 | 14573.7 | 212.49 | 21.23 | 29.55 | 455. |
| 520 | 0.01156 | 43.25 | 0.0010 | 10841.4 | 15165.7 | 213.65 | 21.32 | 29.64 | 463. |
| 540 | 0.01113 | 44.92 | 0.0009 | 11268.9 | 15759.6 | 214.77 | 21.42 | 29.74 | 472. |
| 560 | 0.01074 | 46.58 | 0.0009 | 11698.4 | 16355.4 | 215.85 | 21.53 | 29.85 | 480. |
| 580 | 0.01037 | 48.24 | 0.0009 | 12130.1 | 16953.5 | 216.90 | 21.64 | 29.96 | 488. |
| 600 | 0.01002 | 49.91 | 0.0008 | 12564.1 | 17553.8 | 217.92 | 21.76 | 30.07 | 496. |
| 620 | 0.00970 | 51.57 | 0.0008 | 13000.5 | 18156.5 | 218.91 | 21.88 | 30.20 | 504. |
| 640 | 0.00939 | 53.23 | 0.0008 | 13439.3 | 18761.6 | 219.87 | 22.00 | 30.32 | 512. |
| 660 | 0.00911 | 54.90 | 0.0008 | 13880.7 | 19369.3 | 220.80 | 22.13 | 30.45 | 519. |
| 680 | 0.00884 | 56.56 | 0.0007 | 14324.7 | 19979.6 | 221.71 | 22.26 | 30.58 | 527. |
| 700 | 0.00859 | 58.22 | 0.0007 | 14771.3 | 20592.5 | 222.60 | 22.39 | 30.71 | 534. |
| 720 | 0.00835 | 59.89 | 0.0007 | 15220.5 | 21208.1 | 223.47 | 22.53 | 30.85 | 541. |
| 740 | 0.00812 | 61.55 | 0.0007 | 15672.5 | 21826.3 | 224.32 | 22.66 | 30.98 | 548. |
| 760 | 0.00791 | 63.21 | 0.0007 | 16127.1 | 22447.3 | 225.14 | 22.80 | 31.11 | 555. |
| 780 | 0.00771 | 64.88 | 0.0006 | 16584.4 | 23070.9 | 225.95 | 22.93 | 31.25 | 562. |
| 800 | 0.00752 | 66.54 | 0.0006 | 17044.4 | 23697.2 | 226.75 | 23.07 | 31.38 | 568. |
| 850 | 0.00707 | 70.70 | 0.0006 | 18206.1 | 25274.6 | 228.66 | 23.40 | 31.71 | 585. |
| 900 | 0.00668 | 74.86 | 0.0006 | 19384.0 | 26868.3 | 230.48 | 23.72 | 32.03 | 601. |
| 950 | 0.00633 | 79.01 | 0.0005 | 20577.6 | 28477.6 | 232.22 | 24.02 | 32.34 | 616. |
| 1000 | 0.00601 | 83.17 | 0.0005 | 21786.2 | 30101.9 | 233.89 | 24.32 | 32.63 | 631. |
| 1050 | 0.00573 | 87.33 | 0.0005 | 23009.0 | 31740.3 | 235.49 | 24.59 | 32.91 | 646. |
| 1100 | 0.00547 | 91.49 | 0.0005 | 24245.3 | 33392.3 | 237.02 | 24.85 | 33.17 | 660. |
| 1150 | 0.00523 | 95.64 | 0.0004 | 25494.2 | 35057.0 | 238.50 | 25.10 | 33.41 | 674. |
| 1200 | 0.00501 | 99.80 | 0.0004 | 26755.0 | 36733.5 | 239.93 | 25.33 | 33.64 | 688. |
| 1250 | 0.00481 | 103.96 | 0.0004 | 28026.9 | 38421.1 | 241.31 | 25.54 | 33.86 | 701. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1300 | 0.00463 | 108.12 | 0.0004 | 29309.2 | 40119.2 | 242.64 | 25.75 | 34.06 | 715. |
| 1350 | 0.00445 | 112.27 | 0.0004 | 30601.3 | 41827.0 | 243.93 | 25.93 | 34.25 | 728. |
| 1400 | 0.00430 | 116.43 | 0.0004 | 31902.4 | 43543.9 | 245.18 | 26.11 | 34.42 | 740. |
| 1450 | 0.00415 | 120.59 | 0.0003 | 33212.1 | 45269.2 | 246.39 | 26.27 | 34.59 | 753. |
| 1500 | 0.00401 | 124.75 | 0.0003 | 34529.7 | 47002.6 | 247.56 | 26.43 | 34.74 | 765. |
| 1550 | 0.00388 | 128.90 | 0.0003 | 35854.8 | 48743.3 | 248.71 | 26.57 | 34.89 | 777. |
| 1600 | 0.00376 | 133.06 | 0.0003 | 37186.8 | 50491.1 | 249.82 | 26.71 | 35.02 | 789. |
| 1650 | 0.00364 | 137.22 | 0.0003 | 38525.3 | 52245.3 | 250.90 | 26.83 | 35.15 | 801. |
| 1700 | 0.00354 | 141.37 | 0.0003 | 39869.8 | 54005.6 | 251.95 | 26.95 | 35.26 | 813. |
| 1750 | 0.00344 | 145.53 | 0.0003 | 41220.2 | 55771.6 | 252.97 | 27.06 | 35.38 | 824. |
| 1800 | 0.00334 | 149.69 | 0.0003 | 42575.8 | 57543.0 | 253.97 | 27.16 | 35.48 | 835. |
| 1850 | 0.00325 | 153.85 | 0.0003 | 43936.5 | 59319.4 | 254.94 | 27.26 | 35.58 | 847. |
| 1900 | 0.00316 | 158.00 | 0.0003 | 45301.9 | 61100.5 | 255.89 | 27.35 | 35.67 | 858. |
| 1950 | 0.00308 | 162.16 | 0.0003 | 46671.8 | 62886.1 | 256.82 | 27.44 | 35.75 | 868. |
| 2000 | 0.00301 | 166.32 | 0.0003 | 48045.8 | 64675.9 | 257.73 | 27.52 | 35.83 | 879. |
| | | | | 1 bar Isobar | | | | | |
| * 63.171 | 30.97809 | 240.24 | 31.92 | −4211.7 | −4208.5 | 68.02 | | | |
| 64 | 30.86710 | 229.02 | 30.86 | −4166.1 | −4162.9 | 68.73 | | | |
| 66 | 30.59292 | 204.95 | 28.57 | −4054.7 | −4051.4 | 70.45 | | | |
| 68 | 30.30942 | 184.44 | 26.57 | −3941.7 | −3938.4 | 72.13 | | | |
| 70 | 30.01670 | 166.80 | 24.79 | −3827.7 | −3824.4 | 73.79 | | | |
| 72 | 29.71491 | 151.50 | 23.20 | −3713.2 | −3709.8 | 75.40 | 28.44 | 57.41 | 1045. |
| 74 | 29.40426 | 138.09 | 21.75 | −3598.2 | −3594.8 | 76.98 | 28.25 | 57.57 | 1002. |
| 76 | 29.08490 | 126.22 | 20.43 | −3483.0 | −3479.6 | 78.51 | 28.00 | 57.70 | 964. |
| * 77.235 | 28.88331 | 119.53 | 19.66 | −3411.7 | −3408.2 | 79.44 | 27.84 | 57.79 | 941. |
| * 77.235 | 0.16267 | 5.87 | 0.0141 | 1545.8 | 2160.6 | 151.61 | 21.58 | 31.43 | 175. |
| 78 | 0.16086 | 5.95 | 0.0139 | 1562.9 | 2184.6 | 151.92 | 21.55 | 31.35 | 176. |
| 80 | 0.15633 | 6.14 | 0.0135 | 1607.4 | 2247.1 | 152.71 | 21.47 | 31.14 | 178. |
| 82 | 0.15208 | 6.33 | 0.0131 | 1651.6 | 2309.2 | 153.48 | 21.40 | 30.95 | 181. |
| 84 | 0.14807 | 6.52 | 0.0127 | 1695.5 | 2370.9 | 154.22 | 21.34 | 30.79 | 183. |
| 86 | 0.14429 | 6.71 | 0.0123 | 1739.3 | 2432.3 | 154.95 | 21.29 | 30.65 | 186. |
| 88 | 0.14071 | 6.90 | 0.0120 | 1782.8 | 2493.5 | 155.65 | 21.24 | 30.53 | 188. |
| 90 | 0.13732 | 7.08 | 0.0117 | 1826.2 | 2554.5 | 156.33 | 21.20 | 30.42 | 190. |
| 92 | 0.13410 | 7.27 | 0.0114 | 1869.5 | 2615.2 | 157.00 | 21.16 | 30.32 | 193. |
| 94 | 0.13104 | 7.45 | 0.0111 | 1912.6 | 2675.7 | 157.65 | 21.13 | 30.23 | 195. |
| 96 | 0.12812 | 7.63 | 0.0109 | 1955.6 | 2736.1 | 158.29 | 21.10 | 30.15 | 197. |
| 98 | 0.12534 | 7.81 | 0.0106 | 1998.5 | 2796.4 | 158.91 | 21.07 | 30.08 | 199. |
| 100 | 0.12268 | 7.99 | 0.0104 | 2041.3 | 2856.4 | 159.52 | 21.05 | 30.01 | 202. |
| 102 | 0.12014 | 8.17 | 0.0102 | 2084.0 | 2916.4 | 160.11 | 21.03 | 29.95 | 204. |
| 104 | 0.11770 | 8.35 | 0.0099 | 2126.7 | 2976.3 | 160.69 | 21.01 | 29.90 | 206. |
| 106 | 0.11537 | 8.52 | 0.0097 | 2169.2 | 3036.0 | 161.26 | 20.99 | 29.85 | 208. |
| 108 | 0.11313 | 8.70 | 0.0095 | 2211.7 | 3095.7 | 161.82 | 20.98 | 29.81 | 210. |
| 110 | 0.11098 | 8.88 | 0.0094 | 2254.2 | 3155.2 | 162.36 | 20.96 | 29.77 | 212. |
| 112 | 0.10891 | 9.05 | 0.0092 | 2296.6 | 3214.7 | 162.90 | 20.95 | 29.73 | 214. |
| 114 | 0.10693 | 9.23 | 0.0090 | 2338.9 | 3274.1 | 163.43 | 20.94 | 29.69 | 216. |
| 116 | 0.10501 | 9.40 | 0.0088 | 2381.2 | 3333.5 | 163.94 | 20.93 | 29.66 | 218. |
| 118 | 0.10317 | 9.58 | 0.0087 | 2423.5 | 3392.8 | 164.45 | 20.92 | 29.63 | 220. |
| 120 | 0.10139 | 9.75 | 0.0085 | 2465.7 | 3452.0 | 164.95 | 20.91 | 29.60 | 222. |
| 122 | 0.09967 | 9.92 | 0.0084 | 2507.9 | 3511.2 | 165.44 | 20.90 | 29.58 | 224. |
| 124 | 0.09801 | 10.10 | 0.0082 | 2550.0 | 3570.3 | 165.92 | 20.89 | 29.56 | 226. |
| 126 | 0.09641 | 10.27 | 0.0081 | 2592.2 | 3629.4 | 166.39 | 20.89 | 29.53 | 228. |
| 128 | 0.09486 | 10.44 | 0.0080 | 2634.3 | 3688.5 | 166.85 | 20.88 | 29.51 | 230. |
| 130 | 0.09336 | 10.61 | 0.0078 | 2676.3 | 3747.5 | 167.31 | 20.88 | 29.49 | 231. |
| 132 | 0.09190 | 10.79 | 0.0077 | 2718.4 | 3806.5 | 167.76 | 20.87 | 29.48 | 233. |
| 134 | 0.09050 | 10.96 | 0.0076 | 2760.4 | 3865.4 | 168.20 | 20.86 | 29.46 | 235. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 136 | 0.08913 | 11.13 | 0.0075 | 2802.4 | 3924.3 | 168.64 | 20.86 | 29.44 | 237. |
| 138 | 0.08781 | 11.30 | 0.0074 | 2844.4 | 3983.2 | 169.07 | 20.86 | 29.43 | 239. |
| 140 | 0.08653 | 11.47 | 0.0072 | 2886.3 | 4042.0 | 169.49 | 20.85 | 29.42 | 240. |
| 142 | 0.08528 | 11.64 | 0.0071 | 2928.3 | 4100.8 | 169.91 | 20.85 | 29.40 | 242. |
| 144 | 0.08408 | 11.82 | 0.0070 | 2970.2 | 4159.6 | 170.32 | 20.84 | 29.39 | 244. |
| 146 | 0.08290 | 11.99 | 0.0069 | 3012.1 | 4218.4 | 170.73 | 20.84 | 29.38 | 246. |
| 148 | 0.08176 | 12.16 | 0.0068 | 3054.0 | 4277.1 | 171.13 | 20.84 | 29.37 | 247. |
| 150 | 0.08065 | 12.33 | 0.0067 | 3095.9 | 4335.9 | 171.52 | 20.84 | 29.36 | 249. |
| 155 | 0.07800 | 12.75 | 0.0065 | 3200.6 | 4482.6 | 172.48 | 20.83 | 29.34 | 253. |
| 160 | 0.07553 | 13.18 | 0.0063 | 3305.2 | 4629.2 | 173.41 | 20.82 | 29.31 | 257. |
| 165 | 0.07320 | 13.60 | 0.0061 | 3409.7 | 4775.8 | 174.32 | 20.82 | 29.30 | 261. |
| 170 | 0.07102 | 14.03 | 0.0059 | 3514.2 | 4922.2 | 175.19 | 20.82 | 29.28 | 265. |
| 175 | 0.06897 | 14.45 | 0.0058 | 3618.6 | 5068.6 | 176.04 | 20.81 | 29.27 | 269. |
| 180 | 0.06703 | 14.87 | 0.0056 | 3723.0 | 5214.9 | 176.86 | 20.81 | 29.25 | 273. |
| 185 | 0.06520 | 15.29 | 0.0054 | 3827.4 | 5361.1 | 177.66 | 20.81 | 29.24 | 277. |
| 190 | 0.06347 | 15.71 | 0.0053 | 3931.7 | 5507.3 | 178.44 | 20.80 | 29.23 | 281. |
| 195 | 0.06183 | 16.14 | 0.0052 | 4036.0 | 5653.5 | 179.20 | 20.80 | 29.22 | 284. |
| 200 | 0.06027 | 16.56 | 0.0050 | 4140.3 | 5799.6 | 179.94 | 20.80 | 29.22 | 288. |
| 210 | 0.05738 | 17.40 | 0.0048 | 4348.7 | 6091.6 | 181.37 | 20.80 | 29.20 | 295. |
| 220 | 0.05475 | 18.24 | 0.0046 | 4557.1 | 6383.6 | 182.73 | 20.79 | 29.19 | 302. |
| 230 | 0.05236 | 19.08 | 0.0044 | 4765.4 | 6675.4 | 184.02 | 20.79 | 29.18 | 309. |
| 240 | 0.05016 | 19.92 | 0.0042 | 4973.7 | 6967.2 | 185.27 | 20.79 | 29.17 | 316. |
| 250 | 0.04815 | 20.75 | 0.0040 | 5181.9 | 7258.9 | 186.46 | 20.79 | 29.16 | 322. |
| 260 | 0.04629 | 21.59 | 0.0039 | 5390.1 | 7550.5 | 187.60 | 20.79 | 29.16 | 329. |
| 270 | 0.04457 | 22.43 | 0.0037 | 5598.3 | 7842.1 | 188.70 | 20.79 | 29.16 | 335. |
| 280 | 0.04297 | 23.26 | 0.0036 | 5806.4 | 8133.6 | 189.76 | 20.79 | 29.15 | 341. |
| 290 | 0.04148 | 24.10 | 0.0035 | 6014.6 | 8425.1 | 190.78 | 20.79 | 29.15 | 347. |
| 300 | 0.04010 | 24.93 | 0.0033 | 6222.7 | 8716.6 | 191.77 | 20.80 | 29.15 | 353. |
| 310 | 0.03880 | 25.77 | 0.0032 | 6430.9 | 9008.1 | 192.73 | 20.80 | 29.15 | 359. |
| 320 | 0.03759 | 26.60 | 0.0031 | 6639.1 | 9299.7 | 193.65 | 20.81 | 29.15 | 365. |
| 330 | 0.03645 | 27.44 | 0.0030 | 6847.4 | 9591.2 | 194.55 | 20.81 | 29.16 | 370. |
| 340 | 0.03537 | 28.27 | 0.0029 | 7055.7 | 9882.8 | 195.42 | 20.82 | 29.17 | 376. |
| 350 | 0.03436 | 29.11 | 0.0029 | 7264.2 | 10174.5 | 196.27 | 20.83 | 29.17 | 381. |
| 360 | 0.03340 | 29.94 | 0.0028 | 7472.7 | 10466.3 | 197.09 | 20.84 | 29.18 | 387. |
| 370 | 0.03250 | 30.78 | 0.0027 | 7681.3 | 10758.2 | 197.89 | 20.86 | 29.20 | 392. |
| 380 | 0.03164 | 31.61 | 0.0026 | 7890.1 | 11050.2 | 198.67 | 20.87 | 29.21 | 397. |
| 390 | 0.03083 | 32.44 | 0.0026 | 8099.0 | 11342.4 | 199.43 | 20.89 | 29.23 | 403. |
| 400 | 0.03006 | 33.28 | 0.0025 | 8308.1 | 11634.8 | 200.17 | 20.91 | 29.25 | 408. |
| 420 | 0.02863 | 34.94 | 0.0024 | 8727.0 | 12220.1 | 201.59 | 20.96 | 29.29 | 418. |
| 440 | 0.02733 | 36.61 | 0.0023 | 9146.9 | 12806.4 | 202.96 | 21.01 | 29.34 | 427. |
| 460 | 0.02614 | 38.27 | 0.0022 | 9567.9 | 13393.9 | 204.26 | 21.08 | 29.41 | 437. |
| 480 | 0.02505 | 39.94 | 0.0021 | 9990.3 | 13982.8 | 205.52 | 21.15 | 29.48 | 446. |
| 500 | 0.02405 | 41.61 | 0.0020 | 10414.3 | 14573.2 | 206.72 | 21.24 | 29.56 | 455. |
| 520 | 0.02312 | 43.27 | 0.0019 | 10840.0 | 15165.3 | 207.88 | 21.33 | 29.65 | 463. |
| 540 | 0.02226 | 44.94 | 0.0019 | 11267.6 | 15759.3 | 209.00 | 21.42 | 29.75 | 472. |
| 560 | 0.02147 | 46.60 | 0.0018 | 11697.2 | 16355.2 | 210.09 | 21.53 | 29.85 | 480. |
| 580 | 0.02073 | 48.26 | 0.0017 | 12129.0 | 16953.4 | 211.14 | 21.64 | 29.96 | 488. |
| 600 | 0.02004 | 49.93 | 0.0017 | 12563.1 | 17553.8 | 212.16 | 21.76 | 30.08 | 496. |
| 620 | 0.01939 | 51.59 | 0.0016 | 12999.5 | 18156.6 | 213.14 | 21.88 | 30.20 | 504. |
| 640 | 0.01878 | 53.26 | 0.0016 | 13438.4 | 18761.8 | 214.10 | 22.00 | 30.32 | 512. |
| 660 | 0.01822 | 54.92 | 0.0015 | 13879.8 | 19369.6 | 215.04 | 22.13 | 30.45 | 519. |
| 680 | 0.01768 | 56.58 | 0.0015 | 14323.8 | 19979.9 | 215.95 | 22.26 | 30.58 | 527. |
| 700 | 0.01717 | 58.25 | 0.0014 | 14770.4 | 20592.9 | 216.84 | 22.40 | 30.71 | 534. |
| 720 | 0.01670 | 59.91 | 0.0014 | 15219.7 | 21208.5 | 217.71 | 22.53 | 30.85 | 541. |
| 740 | 0.01625 | 61.58 | 0.0014 | 15671.7 | 21826.8 | 218.55 | 22.66 | 30.98 | 548. |
| 760 | 0.01582 | 63.24 | 0.0013 | 16126.4 | 22447.8 | 219.38 | 22.80 | 31.12 | 555. |
| 780 | 0.01541 | 64.90 | 0.0013 | 16583.7 | 23071.5 | 220.19 | 22.93 | 31.25 | 562. |
| 800 | 0.01503 | 66.57 | 0.0013 | 17043.8 | 23697.9 | 220.98 | 23.07 | 31.38 | 569. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 850 | 0.01414 | 70.73 | 0.0012 | 18205.5 | 25275.4 | 222.90 | 23.40 | 31.71 | 585. |
| 900 | 0.01336 | 74.88 | 0.0011 | 19383.5 | 26869.1 | 224.72 | 23.72 | 32.03 | 601. |
| 950 | 0.01266 | 79.04 | 0.0011 | 20577.1 | 28478.6 | 226.46 | 24.02 | 32.34 | 616. |
| 1000 | 0.01202 | 83.20 | 0.0010 | 21785.8 | 30102.9 | 228.12 | 24.32 | 32.63 | 631. |
| 1050 | 0.01145 | 87.36 | 0.0010 | 23008.6 | 31741.6 | 229.72 | 24.59 | 32.91 | 646. |
| 1100 | 0.01093 | 91.52 | 0.0009 | 24244.9 | 33393.6 | 231.26 | 24.85 | 33.17 | 660. |
| 1150 | 0.01046 | 95.67 | 0.0009 | 25493.9 | 35058.3 | 232.74 | 25.10 | 33.42 | 674. |
| 1200 | 0.01002 | 99.83 | 0.0008 | 26754.7 | 36734.9 | 234.17 | 25.33 | 33.64 | 688. |
| 1250 | 0.00962 | 103.99 | 0.0008 | 28026.6 | 38422.6 | 235.55 | 25.54 | 33.86 | 701. |
| 1300 | 0.00925 | 108.15 | 0.0008 | 29309.0 | 40120.6 | 236.88 | 25.75 | 34.06 | 715. |
| 1350 | 0.00891 | 112.30 | 0.0007 | 30601.1 | 41828.5 | 238.17 | 25.93 | 34.25 | 728. |
| 1400 | 0.00859 | 116.46 | 0.0007 | 31902.3 | 43545.4 | 239.42 | 26.11 | 34.43 | 740. |
| 1450 | 0.00829 | 120.62 | 0.0007 | 33212.0 | 45270.8 | 240.63 | 26.27 | 34.59 | 753. |
| 1500 | 0.00802 | 124.78 | 0.0007 | 34529.6 | 47004.2 | 241.80 | 26.43 | 34.74 | 765. |
| 1550 | 0.00776 | 128.93 | 0.0006 | 35854.6 | 48744.9 | 242.94 | 26.57 | 34.89 | 777. |
| 1600 | 0.00752 | 133.09 | 0.0006 | 37186.7 | 50492.7 | 244.05 | 26.71 | 35.02 | 789. |
| 1650 | 0.00729 | 137.25 | 0.0006 | 38525.2 | 52246.9 | 245.13 | 26.83 | 35.15 | 801. |
| 1700 | 0.00707 | 141.41 | 0.0006 | 39869.8 | 54007.2 | 246.18 | 26.95 | 35.26 | 813. |
| 1750 | 0.00687 | 145.56 | 0.0006 | 41220.1 | 55773.3 | 247.21 | 27.06 | 35.38 | 824. |
| 1800 | 0.00668 | 149.72 | 0.0006 | 42575.8 | 57544.7 | 248.21 | 27.16 | 35.48 | 835. |
| 1850 | 0.00650 | 153.88 | 0.0005 | 43936.5 | 59321.1 | 249.18 | 27.26 | 35.58 | 847. |
| 1900 | 0.00633 | 158.03 | 0.0005 | 45301.9 | 61102.2 | 250.13 | 27.35 | 35.67 | 858. |
| 1950 | 0.00617 | 162.19 | 0.0005 | 46671.8 | 62887.8 | 251.06 | 27.44 | 35.75 | 869. |
| 2000 | 0.00601 | 166.35 | 0.0005 | 48045.8 | 64677.6 | 251.96 | 27.52 | 35.84 | 879. |

1.01325 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 63.171 | 30.97811 | 240.24 | 31.92 | −4211.7 | −4208.4 | 68.02 | | | |
| 64 | 30.86716 | 229.03 | 30.86 | −4166.1 | −4162.9 | 68.73 | | | |
| 66 | 30.59298 | 204.96 | 28.57 | −4054.7 | −4051.4 | 70.45 | | | |
| 68 | 30.30949 | 184.44 | 26.57 | −3941.7 | −3938.4 | 72.13 | | | |
| 70 | 30.01678 | 166.80 | 24.79 | −3827.8 | −3824.4 | 73.79 | | | |
| 72 | 29.71500 | 151.50 | 23.20 | −3713.2 | −3709.8 | 75.40 | 28.44 | 57.41 | 1045. |
| 74 | 29.40436 | 138.10 | 21.75 | −3598.3 | −3594.8 | 76.98 | 28.25 | 57.57 | 1002. |
| 76 | 29.08501 | 126.23 | 20.43 | −3483.0 | −3479.5 | 78.51 | 28.00 | 57.70 | 964. |
| * 77.347 | 28.86506 | 118.95 | 19.60 | −3405.3 | −3401.8 | 79.53 | 27.83 | 57.80 | 939. |
| * 77.347 | 0.16465 | 5.88 | 0.0143 | 1547.6 | 2163.0 | 151.54 | 21.59 | 31.45 | 175. |
| 78 | 0.16308 | 5.94 | 0.0141 | 1562.2 | 2183.5 | 151.80 | 21.56 | 31.38 | 176. |
| 80 | 0.15849 | 6.13 | 0.0137 | 1606.7 | 2246.0 | 152.59 | 21.48 | 31.17 | 178. |
| 82 | 0.15417 | 6.33 | 0.0133 | 1650.9 | 2308.2 | 153.36 | 21.41 | 30.98 | 181. |
| 84 | 0.15010 | 6.52 | 0.0129 | 1694.9 | 2370.0 | 154.11 | 21.35 | 30.82 | 183. |
| 86 | 0.14626 | 6.71 | 0.0125 | 1738.7 | 2431.5 | 154.83 | 21.29 | 30.68 | 186. |
| 88 | 0.14263 | 6.89 | 0.0122 | 1782.3 | 2492.7 | 155.53 | 21.25 | 30.55 | 188. |
| 90 | 0.13919 | 7.08 | 0.0119 | 1825.7 | 2553.7 | 156.22 | 21.20 | 30.44 | 190. |
| 92 | 0.13592 | 7.26 | 0.0116 | 1869.0 | 2614.4 | 156.89 | 21.17 | 30.34 | 193. |
| 94 | 0.13282 | 7.44 | 0.0113 | 1912.1 | 2675.0 | 157.54 | 21.13 | 30.25 | 195. |
| 96 | 0.12986 | 7.62 | 0.0110 | 1955.2 | 2735.4 | 158.17 | 21.10 | 30.16 | 197. |
| 98 | 0.12703 | 7.80 | 0.0108 | 1998.1 | 2795.7 | 158.79 | 21.08 | 30.09 | 199. |
| 100 | 0.12434 | 7.98 | 0.0105 | 2040.9 | 2855.8 | 159.40 | 21.05 | 30.03 | 202. |
| 102 | 0.12176 | 8.16 | 0.0103 | 2083.6 | 2915.8 | 160.00 | 21.03 | 29.97 | 204. |
| 104 | 0.11929 | 8.34 | 0.0101 | 2126.3 | 2975.7 | 160.58 | 21.01 | 29.91 | 206. |
| 106 | 0.11692 | 8.52 | 0.0099 | 2168.9 | 3035.4 | 161.15 | 21.00 | 29.86 | 208. |
| 108 | 0.11465 | 8.70 | 0.0097 | 2211.4 | 3095.1 | 161.70 | 20.98 | 29.82 | 210. |
| 110 | 0.11247 | 8.87 | 0.0095 | 2253.8 | 3154.7 | 162.25 | 20.97 | 29.77 | 212. |
| 112 | 0.11038 | 9.05 | 0.0093 | 2296.2 | 3214.2 | 162.79 | 20.95 | 29.74 | 214. |
| 114 | 0.10836 | 9.22 | 0.0091 | 2338.6 | 3273.7 | 163.31 | 20.94 | 29.70 | 216. |
| 116 | 0.10642 | 9.40 | 0.0090 | 2380.9 | 3333.0 | 163.83 | 20.93 | 29.67 | 218. |

Thermodynamic properties of nitrogen–Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 118 | 0.10455 | 9.57 | 0.0088 | 2423.2 | 3392.3 | 164.34 | 20.92 | 29.64 | 220. |
| 120 | 0.10275 | 9.75 | 0.0086 | 2465.4 | 3451.6 | 164.83 | 20.91 | 29.61 | 222. |
| 122 | 0.10100 | 9.92 | 0.0085 | 2507.6 | 3510.8 | 165.32 | 20.90 | 29.59 | 224. |
| 124 | 0.09932 | 10.09 | 0.0083 | 2549.8 | 3569.9 | 165.80 | 20.90 | 29.56 | 226. |
| 126 | 0.09770 | 10.27 | 0.0082 | 2591.9 | 3629.0 | 166.28 | 20.89 | 29.54 | 228. |
| 128 | 0.09613 | 10.44 | 0.0081 | 2634.0 | 3688.1 | 166.74 | 20.88 | 29.52 | 230. |
| 130 | 0.09461 | 10.61 | 0.0079 | 2676.1 | 3747.1 | 167.20 | 20.88 | 29.50 | 231. |
| 132 | 0.09313 | 10.78 | 0.0078 | 2718.1 | 3806.1 | 167.65 | 20.87 | 29.48 | 233. |
| 134 | 0.09171 | 10.96 | 0.0077 | 2760.2 | 3865.0 | 168.09 | 20.87 | 29.46 | 235. |
| 136 | 0.09033 | 11.13 | 0.0076 | 2802.2 | 3923.9 | 168.53 | 20.86 | 29.45 | 237. |
| 138 | 0.08899 | 11.30 | 0.0075 | 2844.1 | 3982.8 | 168.96 | 20.86 | 29.43 | 239. |
| 140 | 0.08769 | 11.47 | 0.0073 | 2886.1 | 4041.7 | 169.38 | 20.85 | 29.42 | 240. |
| 142 | 0.08642 | 11.64 | 0.0072 | 2928.1 | 4100.5 | 169.80 | 20.85 | 29.41 | 242. |
| 144 | 0.08520 | 11.81 | 0.0071 | 2970.0 | 4159.3 | 170.21 | 20.85 | 29.39 | 244. |
| 146 | 0.08401 | 11.98 | 0.0070 | 3011.9 | 4218.1 | 170.62 | 20.84 | 29.38 | 246. |
| 148 | 0.08285 | 12.16 | 0.0069 | 3053.8 | 4276.8 | 171.02 | 20.84 | 29.37 | 247. |
| 150 | 0.08172 | 12.33 | 0.0068 | 3095.7 | 4335.6 | 171.41 | 20.84 | 29.36 | 249. |
| 155 | 0.07904 | 12.75 | 0.0066 | 3200.4 | 4482.3 | 172.37 | 20.83 | 29.34 | 253. |
| 160 | 0.07653 | 13.18 | 0.0064 | 3305.0 | 4629.0 | 173.30 | 20.82 | 29.32 | 257. |
| 165 | 0.07418 | 13.60 | 0.0062 | 3409.5 | 4775.5 | 174.21 | 20.82 | 29.30 | 261. |
| 170 | 0.07197 | 14.02 | 0.0060 | 3514.0 | 4922.0 | 175.08 | 20.82 | 29.28 | 265. |
| 175 | 0.06989 | 14.45 | 0.0058 | 3618.5 | 5068.3 | 175.93 | 20.81 | 29.27 | 269. |
| 180 | 0.06792 | 14.87 | 0.0057 | 3722.9 | 5214.7 | 176.75 | 20.81 | 29.26 | 273. |
| 185 | 0.06607 | 15.29 | 0.0055 | 3827.2 | 5360.9 | 177.55 | 20.81 | 29.25 | 277. |
| 190 | 0.06431 | 15.71 | 0.0054 | 3931.6 | 5507.1 | 178.33 | 20.80 | 29.24 | 281. |
| 195 | 0.06265 | 16.14 | 0.0052 | 4035.9 | 5653.3 | 179.09 | 20.80 | 29.23 | 284. |
| 200 | 0.06107 | 16.56 | 0.0051 | 4140.1 | 5799.4 | 179.83 | 20.80 | 29.22 | 288. |
| 210 | 0.05814 | 17.40 | 0.0049 | 4348.6 | 6091.5 | 181.26 | 20.80 | 29.20 | 295. |
| 220 | 0.05548 | 18.24 | 0.0046 | 4557.0 | 6383.4 | 182.62 | 20.79 | 29.19 | 302. |
| 230 | 0.05305 | 19.08 | 0.0044 | 4765.3 | 6675.3 | 183.91 | 20.79 | 29.18 | 309. |
| 240 | 0.05083 | 19.91 | 0.0042 | 4973.6 | 6967.1 | 185.16 | 20.79 | 29.17 | 316. |
| 250 | 0.04879 | 20.75 | 0.0041 | 5181.8 | 7258.7 | 186.35 | 20.79 | 29.17 | 322. |
| 260 | 0.04690 | 21.59 | 0.0039 | 5390.0 | 7550.4 | 187.49 | 20.79 | 29.16 | 329. |
| 270 | 0.04516 | 22.43 | 0.0038 | 5598.2 | 7842.0 | 188.59 | 20.79 | 29.16 | 335. |
| 280 | 0.04354 | 23.26 | 0.0036 | 5806.4 | 8133.5 | 189.65 | 20.79 | 29.15 | 341. |
| 290 | 0.04203 | 24.10 | 0.0035 | 6014.5 | 8425.0 | 190.67 | 20.79 | 29.15 | 347. |
| 300 | 0.04063 | 24.93 | 0.0034 | 6222.7 | 8716.5 | 191.66 | 20.80 | 29.15 | 353. |
| 310 | 0.03932 | 25.77 | 0.0033 | 6430.9 | 9008.0 | 192.62 | 20.80 | 29.15 | 359. |
| 320 | 0.03808 | 26.60 | 0.0032 | 6639.1 | 9299.6 | 193.54 | 20.81 | 29.16 | 365. |
| 330 | 0.03693 | 27.44 | 0.0031 | 6847.3 | 9591.2 | 194.44 | 20.81 | 29.16 | 370. |
| 340 | 0.03584 | 28.27 | 0.0030 | 7055.7 | 9882.8 | 195.31 | 20.82 | 29.17 | 376. |
| 350 | 0.03482 | 29.11 | 0.0029 | 7264.1 | 10174.5 | 196.16 | 20.83 | 29.17 | 381. |
| 360 | 0.03385 | 29.94 | 0.0028 | 7472.6 | 10466.3 | 196.98 | 20.84 | 29.18 | 387. |
| 370 | 0.03293 | 30.78 | 0.0027 | 7681.2 | 10758.2 | 197.78 | 20.86 | 29.20 | 392. |
| 380 | 0.03206 | 31.61 | 0.0027 | 7890.0 | 11050.2 | 198.56 | 20.87 | 29.21 | 397. |
| 390 | 0.03124 | 32.44 | 0.0026 | 8098.9 | 11342.4 | 199.32 | 20.89 | 29.23 | 403. |
| 400 | 0.03046 | 33.28 | 0.0025 | 8308.1 | 11634.7 | 200.06 | 20.91 | 29.25 | 408. |
| 420 | 0.02901 | 34.94 | 0.0024 | 8726.9 | 12220.1 | 201.48 | 20.96 | 29.29 | 418. |
| 440 | 0.02769 | 36.61 | 0.0023 | 9146.8 | 12806.4 | 202.85 | 21.01 | 29.34 | 427. |
| 460 | 0.02648 | 38.27 | 0.0022 | 9567.9 | 13393.9 | 204.15 | 21.08 | 29.41 | 437. |
| 480 | 0.02538 | 39.94 | 0.0021 | 9990.3 | 13982.8 | 205.41 | 21.15 | 29.48 | 446. |
| 500 | 0.02436 | 41.61 | 0.0020 | 10414.3 | 14573.2 | 206.61 | 21.24 | 29.56 | 455. |
| 520 | 0.02343 | 43.27 | 0.0019 | 10840.0 | 15165.3 | 207.77 | 21.33 | 29.65 | 463. |
| 540 | 0.02256 | 44.94 | 0.0019 | 11267.6 | 15759.2 | 208.89 | 21.42 | 29.75 | 472. |
| 560 | 0.02175 | 46.60 | 0.0018 | 11697.2 | 16355.2 | 209.98 | 21.53 | 29.85 | 480. |
| 580 | 0.02100 | 48.26 | 0.0017 | 12129.0 | 16953.4 | 211.03 | 21.64 | 29.96 | 488. |
| 600 | 0.02030 | 49.93 | 0.0017 | 12563.0 | 17553.8 | 212.05 | 21.76 | 30.08 | 496. |
| 620 | 0.01965 | 51.59 | 0.0016 | 12999.5 | 18156.6 | 213.03 | 21.88 | 30.20 | 504. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 640 | 0.01903 | 53.26 | 0.0016 | 13438.4 | 18761.8 | 213.99 | 22.00 | 30.32 | 512. |
| 660 | 0.01846 | 54.92 | 0.0015 | 13879.8 | 19369.6 | 214.93 | 22.13 | 30.45 | 519. |
| 680 | 0.01791 | 56.59 | 0.0015 | 14323.8 | 19979.9 | 215.84 | 22.26 | 30.58 | 527. |
| 700 | 0.01740 | 58.25 | 0.0014 | 14770.4 | 20592.9 | 216.73 | 22.40 | 30.71 | 534. |
| 720 | 0.01692 | 59.91 | 0.0014 | 15219.7 | 21208.5 | 217.60 | 22.53 | 30.85 | 541. |
| 740 | 0.01646 | 61.58 | 0.0014 | 15671.7 | 21826.8 | 218.44 | 22.66 | 30.98 | 548. |
| 760 | 0.01603 | 63.24 | 0.0013 | 16126.4 | 22447.8 | 219.27 | 22.80 | 31.12 | 555. |
| 780 | 0.01562 | 64.90 | 0.0013 | 16583.7 | 23071.5 | 220.08 | 22.93 | 31.25 | 562. |
| 800 | 0.01523 | 66.57 | 0.0013 | 17043.8 | 23697.9 | 220.87 | 23.07 | 31.38 | 569. |
| 850 | 0.01433 | 70.73 | 0.0012 | 18205.5 | 25275.4 | 222.79 | 23.40 | 31.71 | 585. |
| 900 | 0.01354 | 74.88 | 0.0011 | 19383.5 | 26869.2 | 224.61 | 23.72 | 32.03 | 601. |
| 950 | 0.01282 | 79.04 | 0.0011 | 20577.1 | 28478.6 | 226.35 | 24.02 | 32.34 | 616. |
| 1000 | 0.01218 | 83.20 | 0.0010 | 21785.7 | 30103.0 | 228.02 | 24.32 | 32.63 | 631. |
| 1050 | 0.01160 | 87.36 | 0.0010 | 23008.6 | 31741.6 | 229.61 | 24.59 | 32.91 | 646. |
| 1100 | 0.01108 | 91.52 | 0.0009 | 24244.9 | 33393.6 | 231.15 | 24.85 | 33.17 | 660. |
| 1150 | 0.01059 | 95.67 | 0.0009 | 25493.9 | 35058.3 | 232.63 | 25.10 | 33.42 | 674. |
| 1200 | 0.01015 | 99.83 | 0.0008 | 26754.7 | 36734.9 | 234.06 | 25.33 | 33.64 | 688. |
| 1250 | 0.00975 | 103.99 | 0.0008 | 28026.6 | 38422.6 | 235.44 | 25.54 | 33.86 | 701. |
| 1300 | 0.00937 | 108.15 | 0.0008 | 29309.0 | 40120.7 | 236.77 | 25.75 | 34.06 | 715. |
| 1350 | 0.00902 | 112.30 | 0.0008 | 30601.1 | 41828.5 | 238.06 | 25.93 | 34.25 | 728. |
| 1400 | 0.00870 | 116.46 | 0.0007 | 31902.3 | 43545.4 | 239.31 | 26.11 | 34.43 | 740. |
| 1450 | 0.00840 | 120.62 | 0.0007 | 33211.9 | 45270.8 | 240.52 | 26.27 | 34.59 | 753. |
| 1500 | 0.00812 | 124.78 | 0.0007 | 34529.6 | 47004.2 | 241.69 | 26.43 | 34.74 | 765. |
| 1550 | 0.00786 | 128.93 | 0.0007 | 35854.6 | 48745.0 | 242.83 | 26.57 | 34.89 | 777. |
| 1600 | 0.00761 | 133.09 | 0.0006 | 37186.6 | 50492.7 | 243.94 | 26.71 | 35.02 | 789. |
| 1650 | 0.00738 | 137.25 | 0.0006 | 38525.2 | 52246.9 | 245.02 | 26.83 | 35.15 | 801. |
| 1700 | 0.00717 | 141.41 | 0.0006 | 39869.8 | 54007.3 | 246.07 | 26.95 | 35.26 | 813. |
| 1750 | 0.00696 | 145.56 | 0.0006 | 41220.1 | 55773.3 | 247.10 | 27.06 | 35.38 | 824. |
| 1800 | 0.00677 | 149.72 | 0.0006 | 42575.8 | 57544.7 | 248.10 | 27.16 | 35.48 | 835. |
| 1850 | 0.00659 | 153.88 | 0.0005 | 43936.5 | 59321.1 | 249.07 | 27.26 | 35.58 | 847. |
| 1900 | 0.00641 | 158.04 | 0.0005 | 45301.9 | 61102.3 | 250.02 | 27.35 | 35.67 | 858. |
| 1950 | 0.00625 | 162.19 | 0.0005 | 46671.8 | 62887.9 | 250.95 | 27.44 | 35.75 | 869. |
| 2000 | 0.00609 | 166.35 | 0.0005 | 48045.8 | 64677.6 | 251.85 | 27.52 | 35.84 | 879. |
| | | | | 2 bar Isobar | | | | | |
| * 63.193 | 30.97933 | 240.27 | 31.87 | −4211.4 | −4204.9 | 68.02 | | | |
| 64 | 30.87146 | 229.36 | 30.85 | −4167.0 | −4160.6 | 68.72 | | | |
| 66 | 30.59779 | 205.28 | 28.57 | −4055.7 | −4049.1 | 70.43 | | | |
| 68 | 30.31484 | 184.76 | 26.57 | −3942.8 | −3936.2 | 72.12 | | | |
| 70 | 30.02269 | 167.12 | 24.79 | −3828.9 | −3822.2 | 73.77 | | | |
| 72 | 29.72151 | 151.82 | 23.20 | −3714.4 | −3707.7 | 75.38 | 28.48 | 57.37 | 1045. |
| 74 | 29.41150 | 138.41 | 21.76 | −3599.6 | −3592.8 | 76.96 | 28.28 | 57.54 | 1003. |
| 76 | 29.09281 | 126.54 | 20.44 | −3484.5 | −3477.6 | 78.49 | 28.04 | 57.67 | 964. |
| 78 | 28.76553 | 115.92 | 19.22 | −3369.1 | −3362.1 | 79.99 | 27.77 | 57.81 | 928. |
| 80 | 28.42960 | 106.33 | 18.09 | −3253.4 | −3246.3 | 81.46 | 27.52 | 57.99 | 894. |
| 82 | 28.08482 | 97.57 | 17.04 | −3137.2 | −3130.1 | 82.89 | 27.27 | 58.22 | 862. |
| * 83.617 | 27.79926 | 91.01 | 16.24 | −3043.0 | −3035.8 | 84.03 | 27.09 | 58.46 | 837. |
| * 83.617 | 0.30915 | 5.99 | 0.0274 | 1638.5 | 2285.5 | 147.72 | 22.00 | 32.97 | 179. |
| 84 | 0.30741 | 6.03 | 0.0272 | 1647.5 | 2298.1 | 147.87 | 21.97 | 32.90 | 179. |
| 86 | 0.29869 | 6.24 | 0.0263 | 1693.9 | 2363.5 | 148.64 | 21.85 | 32.55 | 182. |
| 88 | 0.29053 | 6.45 | 0.0255 | 1739.9 | 2428.3 | 149.39 | 21.75 | 32.25 | 185. |
| 90 | 0.28287 | 6.66 | 0.0247 | 1785.5 | 2492.5 | 150.11 | 21.66 | 31.98 | 187. |
| 92 | 0.27566 | 6.86 | 0.0240 | 1830.7 | 2556.2 | 150.81 | 21.58 | 31.75 | 190. |
| 94 | 0.26886 | 7.06 | 0.0233 | 1875.6 | 2619.5 | 151.49 | 21.51 | 31.54 | 192. |
| 96 | 0.26243 | 7.26 | 0.0227 | 1920.3 | 2682.4 | 152.15 | 21.44 | 31.35 | 195. |
| 98 | 0.25634 | 7.46 | 0.0221 | 1964.7 | 2745.0 | 152.80 | 21.39 | 31.19 | 197. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 100 | 0.25055 | 7.65 | 0.0216 | 2008.9 | 2807.2 | 153.42 | 21.34 | 31.04 | 199. |
| 102 | 0.24504 | 7.84 | 0.0211 | 2053.0 | 2869.1 | 154.04 | 21.29 | 30.91 | 202. |
| 104 | 0.23980 | 8.04 | 0.0206 | 2096.8 | 2930.8 | 154.64 | 21.25 | 30.79 | 204. |
| 106 | 0.23479 | 8.23 | 0.0201 | 2140.5 | 2992.3 | 155.22 | 21.22 | 30.68 | 206. |
| 108 | 0.23001 | 8.41 | 0.0197 | 2184.0 | 3053.6 | 155.79 | 21.18 | 30.58 | 208. |
| 110 | 0.22543 | 8.60 | 0.0193 | 2227.4 | 3114.6 | 156.36 | 21.15 | 30.49 | 210. |
| 112 | 0.22104 | 8.79 | 0.0189 | 2270.7 | 3175.5 | 156.90 | 21.13 | 30.41 | 212. |
| 114 | 0.21684 | 8.97 | 0.0185 | 2313.9 | 3236.3 | 157.44 | 21.10 | 30.34 | 215. |
| 116 | 0.21280 | 9.15 | 0.0181 | 2357.0 | 3296.9 | 157.97 | 21.08 | 30.27 | 217. |
| 118 | 0.20892 | 9.34 | 0.0178 | 2400.0 | 3357.4 | 158.49 | 21.06 | 30.20 | 219. |
| 120 | 0.20518 | 9.52 | 0.0174 | 2443.0 | 3417.7 | 158.99 | 21.04 | 30.14 | 221. |
| 122 | 0.20159 | 9.70 | 0.0171 | 2485.8 | 3477.9 | 159.49 | 21.03 | 30.09 | 223. |
| 124 | 0.19812 | 9.88 | 0.0168 | 2528.6 | 3538.1 | 159.98 | 21.01 | 30.04 | 225. |
| 126 | 0.19478 | 10.06 | 0.0165 | 2571.3 | 3598.1 | 160.46 | 21.00 | 29.99 | 227. |
| 128 | 0.19156 | 10.24 | 0.0162 | 2614.0 | 3658.1 | 160.93 | 20.98 | 29.95 | 228. |
| 130 | 0.18844 | 10.42 | 0.0160 | 2656.6 | 3717.9 | 161.40 | 20.97 | 29.91 | 230. |
| 132 | 0.18543 | 10.60 | 0.0157 | 2699.1 | 3777.7 | 161.85 | 20.96 | 29.87 | 232. |
| 134 | 0.18252 | 10.78 | 0.0154 | 2741.6 | 3837.4 | 162.30 | 20.95 | 29.84 | 234. |
| 136 | 0.17970 | 10.95 | 0.0152 | 2784.1 | 3897.1 | 162.74 | 20.94 | 29.81 | 236. |
| 138 | 0.17697 | 11.13 | 0.0149 | 2826.5 | 3956.6 | 163.18 | 20.93 | 29.78 | 238. |
| 140 | 0.17433 | 11.31 | 0.0147 | 2868.9 | 4016.2 | 163.61 | 20.92 | 29.75 | 240. |
| 142 | 0.17176 | 11.48 | 0.0145 | 2911.3 | 4075.6 | 164.03 | 20.92 | 29.72 | 241. |
| 144 | 0.16928 | 11.66 | 0.0143 | 2953.6 | 4135.1 | 164.44 | 20.91 | 29.70 | 243. |
| 146 | 0.16686 | 11.83 | 0.0141 | 2995.8 | 4194.4 | 164.85 | 20.90 | 29.67 | 245. |
| 148 | 0.16452 | 12.01 | 0.0139 | 3038.1 | 4253.7 | 165.26 | 20.90 | 29.65 | 247. |
| 150 | 0.16225 | 12.18 | 0.0137 | 3080.3 | 4313.0 | 165.65 | 20.89 | 29.63 | 248. |
| 155 | 0.15683 | 12.62 | 0.0132 | 3185.8 | 4461.0 | 166.62 | 20.88 | 29.58 | 253. |
| 160 | 0.15177 | 13.05 | 0.0128 | 3291.1 | 4608.8 | 167.56 | 20.87 | 29.54 | 257. |
| 165 | 0.14704 | 13.49 | 0.0124 | 3396.3 | 4756.5 | 168.47 | 20.86 | 29.50 | 261. |
| 170 | 0.14260 | 13.92 | 0.0120 | 3501.3 | 4903.9 | 169.35 | 20.85 | 29.47 | 265. |
| 175 | 0.13842 | 14.35 | 0.0116 | 3606.3 | 5051.2 | 170.21 | 20.84 | 29.44 | 269. |
| 180 | 0.13449 | 14.78 | 0.0113 | 3711.2 | 5198.3 | 171.03 | 20.84 | 29.42 | 273. |
| 185 | 0.13078 | 15.21 | 0.0110 | 3816.0 | 5345.3 | 171.84 | 20.83 | 29.39 | 277. |
| 190 | 0.12727 | 15.63 | 0.0107 | 3920.8 | 5492.3 | 172.62 | 20.83 | 29.37 | 281. |
| 195 | 0.12395 | 16.06 | 0.0104 | 4025.5 | 5639.1 | 173.39 | 20.82 | 29.36 | 284. |
| 200 | 0.12079 | 16.49 | 0.0101 | 4130.1 | 5785.8 | 174.13 | 20.82 | 29.34 | 288. |
| 210 | 0.11495 | 17.34 | 0.0096 | 4339.3 | 6079.1 | 175.56 | 20.81 | 29.31 | 295. |
| 220 | 0.10966 | 18.19 | 0.0092 | 4548.2 | 6372.1 | 176.92 | 20.81 | 29.29 | 302. |
| 230 | 0.10484 | 19.03 | 0.0088 | 4757.1 | 6664.8 | 178.22 | 20.81 | 29.27 | 309. |
| 240 | 0.10042 | 19.88 | 0.0084 | 4965.8 | 6957.4 | 179.47 | 20.80 | 29.25 | 316. |
| 250 | 0.09637 | 20.72 | 0.0081 | 5174.5 | 7249.8 | 180.66 | 20.80 | 29.24 | 322. |
| 260 | 0.09263 | 21.56 | 0.0077 | 5383.1 | 7542.1 | 181.81 | 20.80 | 29.22 | 329. |
| 270 | 0.08918 | 22.41 | 0.0075 | 5591.6 | 7834.3 | 182.91 | 20.80 | 29.21 | 335. |
| 280 | 0.08597 | 23.25 | 0.0072 | 5800.1 | 8126.4 | 183.98 | 20.80 | 29.21 | 341. |
| 290 | 0.08299 | 24.09 | 0.0069 | 6008.5 | 8418.4 | 185.00 | 20.80 | 29.20 | 347. |
| 300 | 0.08021 | 24.93 | 0.0067 | 6217.0 | 8710.4 | 185.99 | 20.80 | 29.20 | 353. |
| 310 | 0.07761 | 25.76 | 0.0065 | 6425.4 | 9002.3 | 186.95 | 20.81 | 29.19 | 359. |
| 320 | 0.07518 | 26.60 | 0.0063 | 6633.8 | 9294.3 | 187.87 | 20.81 | 29.19 | 365. |
| 330 | 0.07289 | 27.44 | 0.0061 | 6842.3 | 9586.2 | 188.77 | 20.82 | 29.20 | 371. |
| 340 | 0.07074 | 28.28 | 0.0059 | 7050.9 | 9878.2 | 189.64 | 20.83 | 29.20 | 376. |
| 350 | 0.06871 | 29.11 | 0.0057 | 7259.5 | 10170.2 | 190.49 | 20.84 | 29.21 | 382. |
| 360 | 0.06680 | 29.95 | 0.0056 | 7468.2 | 10462.3 | 191.31 | 20.85 | 29.21 | 387. |
| 370 | 0.06499 | 30.79 | 0.0054 | 7677.0 | 10754.5 | 192.11 | 20.86 | 29.22 | 392. |
| 380 | 0.06327 | 31.62 | 0.0053 | 7885.9 | 11046.8 | 192.89 | 20.88 | 29.24 | 398. |
| 390 | 0.06165 | 32.46 | 0.0051 | 8095.0 | 11339.2 | 193.65 | 20.90 | 29.25 | 403. |
| 400 | 0.06010 | 33.29 | 0.0050 | 8304.2 | 11631.8 | 194.39 | 20.92 | 29.27 | 408. |
| 420 | 0.05724 | 34.97 | 0.0048 | 8723.4 | 12217.6 | 195.82 | 20.96 | 29.31 | 418. |
| 440 | 0.05463 | 36.63 | 0.0046 | 9143.5 | 12804.3 | 197.19 | 21.02 | 29.36 | 427. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 460 | 0.05225 | 38.30 | 0.0044 | 9564.7 | 13392.2 | 198.49 | 21.08 | 29.42 | 437. |
| 480 | 0.05008 | 39.97 | 0.0042 | 9987.4 | 13981.4 | 199.75 | 21.16 | 29.49 | 446. |
| 500 | 0.04807 | 41.64 | 0.0040 | 10411.5 | 14572.0 | 200.95 | 21.24 | 29.57 | 455. |
| 520 | 0.04622 | 43.31 | 0.0039 | 10837.4 | 15164.4 | 202.12 | 21.33 | 29.66 | 464. |
| 540 | 0.04451 | 44.97 | 0.0037 | 11265.1 | 15758.6 | 203.24 | 21.43 | 29.76 | 472. |
| 560 | 0.04292 | 46.64 | 0.0036 | 11694.9 | 16354.8 | 204.32 | 21.53 | 29.86 | 481. |
| 580 | 0.04144 | 48.31 | 0.0035 | 12126.8 | 16953.2 | 205.37 | 21.64 | 29.97 | 489. |
| 600 | 0.04006 | 49.97 | 0.0033 | 12560.9 | 17553.8 | 206.39 | 21.76 | 30.09 | 497. |
| 620 | 0.03877 | 51.64 | 0.0032 | 12997.5 | 18156.7 | 207.38 | 21.88 | 30.21 | 504. |
| 640 | 0.03755 | 53.30 | 0.0031 | 13436.5 | 18762.1 | 208.34 | 22.01 | 30.33 | 512. |
| 660 | 0.03642 | 54.97 | 0.0030 | 13878.0 | 19370.1 | 209.27 | 22.13 | 30.46 | 520. |
| 680 | 0.03535 | 56.63 | 0.0029 | 14322.1 | 19980.5 | 210.18 | 22.26 | 30.59 | 527. |
| 700 | 0.03434 | 58.30 | 0.0029 | 14768.8 | 20593.6 | 211.07 | 22.40 | 30.72 | 534. |
| 720 | 0.03338 | 59.96 | 0.0028 | 15218.1 | 21209.4 | 211.94 | 22.53 | 30.85 | 541. |
| 740 | 0.03248 | 61.63 | 0.0027 | 15670.2 | 21827.8 | 212.79 | 22.67 | 30.99 | 548. |
| 760 | 0.03163 | 63.29 | 0.0026 | 16124.9 | 22448.9 | 213.62 | 22.80 | 31.12 | 555. |
| 780 | 0.03082 | 64.95 | 0.0026 | 16582.4 | 23072.7 | 214.43 | 22.93 | 31.26 | 562. |
| 800 | 0.03004 | 66.62 | 0.0025 | 17042.5 | 23699.2 | 215.22 | 23.07 | 31.39 | 569. |
| 850 | 0.02828 | 70.78 | 0.0024 | 18204.3 | 25276.9 | 217.13 | 23.40 | 31.72 | 585. |
| 900 | 0.02671 | 74.94 | 0.0022 | 19382.4 | 26870.8 | 218.95 | 23.72 | 32.04 | 601. |
| 950 | 0.02530 | 79.10 | 0.0021 | 20576.2 | 28480.4 | 220.69 | 24.03 | 32.34 | 617. |
| 1000 | 0.02404 | 83.26 | 0.0020 | 21784.9 | 30105.0 | 222.36 | 24.32 | 32.64 | 632. |
| 1050 | 0.02289 | 87.42 | 0.0019 | 23007.9 | 31743.7 | 223.96 | 24.59 | 32.91 | 646. |
| 1100 | 0.02185 | 91.57 | 0.0018 | 24244.2 | 33395.9 | 225.50 | 24.86 | 33.17 | 661. |
| 1150 | 0.02090 | 95.73 | 0.0017 | 25493.3 | 35060.6 | 226.98 | 25.10 | 33.42 | 675. |
| 1200 | 0.02003 | 99.89 | 0.0017 | 26754.1 | 36737.3 | 228.40 | 25.33 | 33.65 | 688. |
| 1250 | 0.01923 | 104.05 | 0.0016 | 28026.2 | 38425.1 | 229.78 | 25.55 | 33.86 | 702. |
| 1300 | 0.01849 | 108.21 | 0.0015 | 29308.6 | 40123.2 | 231.11 | 25.75 | 34.06 | 715. |
| 1350 | 0.01781 | 112.36 | 0.0015 | 30600.7 | 41831.1 | 232.40 | 25.94 | 34.25 | 728. |
| 1400 | 0.01717 | 116.52 | 0.0014 | 31901.9 | 43548.1 | 233.65 | 26.11 | 34.43 | 741. |
| 1450 | 0.01658 | 120.68 | 0.0014 | 33211.6 | 45273.5 | 234.86 | 26.28 | 34.59 | 753. |
| 1500 | 0.01603 | 124.84 | 0.0013 | 34529.3 | 47006.9 | 236.04 | 26.43 | 34.74 | 765. |
| 1550 | 0.01551 | 129.00 | 0.0013 | 35854.4 | 48747.8 | 237.18 | 26.57 | 34.89 | 778. |
| 1600 | 0.01503 | 133.15 | 0.0013 | 37186.5 | 50495.6 | 238.29 | 26.71 | 35.02 | 789. |
| 1650 | 0.01457 | 137.31 | 0.0012 | 38525.0 | 52249.8 | 239.37 | 26.83 | 35.15 | 801. |
| 1700 | 0.01414 | 141.47 | 0.0012 | 39869.6 | 54010.2 | 240.42 | 26.95 | 35.27 | 813. |
| 1750 | 0.01374 | 145.62 | 0.0011 | 41220.0 | 55776.3 | 241.44 | 27.06 | 35.38 | 824. |
| 1800 | 0.01336 | 149.78 | 0.0011 | 42575.7 | 57547.7 | 242.44 | 27.17 | 35.48 | 836. |
| 1850 | 0.01300 | 153.94 | 0.0011 | 43936.4 | 59324.1 | 243.42 | 27.26 | 35.58 | 847. |
| 1900 | 0.01266 | 158.10 | 0.0011 | 45301.9 | 61105.3 | 244.37 | 27.35 | 35.67 | 858. |
| 1950 | 0.01233 | 162.25 | 0.0010 | 46671.7 | 62890.9 | 245.29 | 27.44 | 35.75 | 869. |
| 2000 | 0.01202 | 166.41 | 0.0010 | 48045.8 | 64680.7 | 246.20 | 27.52 | 35.84 | 879. |

4 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 63.236 | 30.98184 | 240.33 | 31.79 | −4210.7 | −4197.8 | 68.03 | | | |
| 64 | 30.88017 | 230.02 | 30.83 | −4168.8 | −4155.9 | 68.69 | | | |
| 66 | 30.60752 | 205.93 | 28.55 | −4057.6 | −4044.6 | 70.40 | | | |
| 68 | 30.32565 | 185.41 | 26.56 | −3944.9 | −3931.7 | 72.09 | | | |
| 70 | 30.03463 | 167.76 | 24.79 | −3831.2 | −3817.9 | 73.74 | | | |
| 72 | 29.73465 | 152.45 | 23.20 | −3716.9 | −3703.5 | 75.35 | 28.56 | 57.31 | 1045. |
| 74 | 29.42591 | 139.04 | 21.76 | −3602.3 | −3588.7 | 76.92 | 28.36 | 57.47 | 1003. |
| 76 | 29.10858 | 127.17 | 20.45 | −3487.3 | −3473.6 | 78.46 | 28.11 | 57.60 | 965. |
| 78 | 28.78274 | 116.55 | 19.24 | −3372.2 | −3358.3 | 79.95 | 27.84 | 57.73 | 929. |
| 80 | 28.44836 | 106.96 | 18.11 | −3256.7 | −3242.6 | 81.42 | 27.58 | 57.90 | 895. |
| 82 | 28.10525 | 98.22 | 17.07 | −3140.9 | −3126.6 | 82.85 | 27.33 | 58.13 | 863. |
| 84 | 27.75306 | 90.17 | 16.09 | −3024.5 | −3010.1 | 84.25 | 27.11 | 58.42 | 833. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 86 | 27.39126 | 82.70 | 15.17 | −2907.5 | −2892.9 | 85.63 | 26.91 | 58.80 | 803. |
| 88 | 27.01909 | 75.74 | 14.30 | −2789.6 | −2774.8 | 86.99 | 26.73 | 59.29 | 774. |
| 90 | 26.63559 | 69.19 | 13.48 | −2670.7 | −2655.7 | 88.33 | 26.58 | 59.88 | 746. |
| * 91.221 | 26.39532 | 65.38 | 12.99 | −2597.4 | −2582.3 | 89.14 | 26.50 | 60.31 | 729. |
| + 91.221 | 0.59415 | 5.89 | 0.0547 | 1725.2 | 2398.4 | 143.77 | 22.63 | 35.76 | 182. |
| 92 | 0.58703 | 5.99 | 0.0539 | 1744.7 | 2426.1 | 144.07 | 22.56 | 35.50 | 183. |
| 94 | 0.56971 | 6.23 | 0.0519 | 1794.4 | 2496.5 | 144.83 | 22.38 | 34.91 | 186. |
| 96 | 0.55366 | 6.48 | 0.0501 | 1843.4 | 2565.8 | 145.56 | 22.23 | 34.39 | 189. |
| 98 | 0.53869 | 6.71 | 0.0485 | 1891.6 | 2634.1 | 146.26 | 22.10 | 33.94 | 192. |
| 100 | 0.52470 | 6.94 | 0.0470 | 1939.3 | 2701.6 | 146.94 | 21.99 | 33.55 | 194. |
| 102 | 0.51157 | 7.17 | 0.0456 | 1986.5 | 2768.4 | 147.61 | 21.88 | 33.21 | 197. |
| 104 | 0.49920 | 7.39 | 0.0443 | 2033.2 | 2834.5 | 148.25 | 21.79 | 32.90 | 200. |
| 106 | 0.48753 | 7.60 | 0.0431 | 2079.6 | 2900.0 | 148.87 | 21.71 | 32.63 | 202. |
| 108 | 0.47648 | 7.82 | 0.0420 | 2125.5 | 2965.0 | 149.48 | 21.64 | 32.38 | 204. |
| 110 | 0.46601 | 8.03 | 0.0410 | 2171.2 | 3029.6 | 150.07 | 21.57 | 32.16 | 207. |
| 112 | 0.45605 | 8.24 | 0.0400 | 2216.6 | 3093.7 | 150.65 | 21.51 | 31.97 | 209. |
| 114 | 0.44657 | 8.44 | 0.0391 | 2261.7 | 3157.4 | 151.21 | 21.46 | 31.79 | 211. |
| 116 | 0.43753 | 8.65 | 0.0382 | 2306.6 | 3220.9 | 151.76 | 21.41 | 31.63 | 214. |
| 118 | 0.42890 | 8.85 | 0.0373 | 2351.3 | 3284.0 | 152.30 | 21.37 | 31.48 | 216. |
| 120 | 0.42064 | 9.05 | 0.0366 | 2395.8 | 3346.8 | 152.83 | 21.33 | 31.34 | 218. |
| 122 | 0.41273 | 9.25 | 0.0358 | 2440.2 | 3409.3 | 153.35 | 21.29 | 31.22 | 220. |
| 124 | 0.40514 | 9.44 | 0.0351 | 2484.3 | 3471.7 | 153.86 | 21.26 | 31.10 | 222. |
| 126 | 0.39786 | 9.64 | 0.0344 | 2528.4 | 3533.8 | 154.35 | 21.23 | 31.00 | 224. |
| 128 | 0.39086 | 9.83 | 0.0337 | 2572.3 | 3595.7 | 154.84 | 21.20 | 30.90 | 226. |
| 130 | 0.38413 | 10.02 | 0.0331 | 2616.0 | 3657.4 | 155.32 | 21.17 | 30.81 | 228. |
| 132 | 0.37764 | 10.21 | 0.0325 | 2659.7 | 3718.9 | 155.79 | 21.15 | 30.73 | 230. |
| 134 | 0.37139 | 10.40 | 0.0319 | 2703.2 | 3780.3 | 156.25 | 21.13 | 30.65 | 232. |
| 136 | 0.36536 | 10.59 | 0.0314 | 2746.7 | 3841.5 | 156.70 | 21.11 | 30.58 | 234. |
| 138 | 0.35953 | 10.78 | 0.0309 | 2790.1 | 3902.6 | 157.15 | 21.09 | 30.51 | 236. |
| 140 | 0.35391 | 10.97 | 0.0303 | 2833.3 | 3963.6 | 157.59 | 21.07 | 30.45 | 238. |
| 142 | 0.34847 | 11.16 | 0.0298 | 2876.5 | 4024.4 | 158.02 | 21.06 | 30.39 | 240. |
| 144 | 0.34320 | 11.34 | 0.0294 | 2919.7 | 4085.2 | 158.44 | 21.04 | 30.34 | 242. |
| 146 | 0.33811 | 11.53 | 0.0289 | 2962.7 | 4145.8 | 158.86 | 21.03 | 30.29 | 243. |
| 148 | 0.33317 | 11.71 | 0.0285 | 3005.7 | 4206.3 | 159.27 | 21.02 | 30.24 | 245. |
| 150 | 0.32838 | 11.89 | 0.0280 | 3048.6 | 4266.7 | 159.68 | 21.00 | 30.20 | 247. |
| 155 | 0.31703 | 12.35 | 0.0270 | 3155.7 | 4417.5 | 160.67 | 20.98 | 30.09 | 251. |
| 160 | 0.30647 | 12.80 | 0.0261 | 3262.5 | 4567.7 | 161.62 | 20.96 | 30.01 | 256. |
| 165 | 0.29663 | 13.25 | 0.0252 | 3369.1 | 4717.5 | 162.54 | 20.94 | 29.93 | 260. |
| 170 | 0.28743 | 13.70 | 0.0244 | 3475.4 | 4867.0 | 163.44 | 20.92 | 29.86 | 264. |
| 175 | 0.27880 | 14.15 | 0.0236 | 3581.5 | 5016.2 | 164.30 | 20.91 | 29.80 | 268. |
| 180 | 0.27070 | 14.59 | 0.0229 | 3687.4 | 5165.1 | 165.14 | 20.90 | 29.75 | 272. |
| 185 | 0.26307 | 15.03 | 0.0223 | 3793.2 | 5313.7 | 165.95 | 20.89 | 29.70 | 276. |
| 190 | 0.25587 | 15.47 | 0.0216 | 3898.8 | 5462.1 | 166.75 | 20.88 | 29.66 | 280. |
| 195 | 0.24907 | 15.91 | 0.0210 | 4004.3 | 5610.3 | 167.52 | 20.87 | 29.62 | 284. |
| 200 | 0.24263 | 16.35 | 0.0205 | 4109.7 | 5758.3 | 168.27 | 20.86 | 29.59 | 288. |
| 210 | 0.23073 | 17.21 | 0.0195 | 4320.3 | 6053.9 | 169.71 | 20.85 | 29.53 | 295. |
| 220 | 0.21996 | 18.08 | 0.0185 | 4530.5 | 6349.0 | 171.08 | 20.84 | 29.48 | 302. |
| 230 | 0.21017 | 18.94 | 0.0177 | 4740.4 | 6643.6 | 172.39 | 20.83 | 29.44 | 309. |
| 240 | 0.20124 | 19.80 | 0.0169 | 4950.1 | 6937.8 | 173.64 | 20.83 | 29.41 | 316. |
| 250 | 0.19304 | 20.66 | 0.0162 | 5159.6 | 7231.7 | 174.84 | 20.82 | 29.38 | 323. |
| 260 | 0.18550 | 21.51 | 0.0156 | 5369.0 | 7525.4 | 175.99 | 20.82 | 29.35 | 329. |
| 270 | 0.17853 | 22.36 | 0.0150 | 5578.2 | 7818.8 | 177.10 | 20.82 | 29.33 | 335. |
| 280 | 0.17207 | 23.21 | 0.0144 | 5787.3 | 8112.0 | 178.17 | 20.82 | 29.31 | 342. |
| 290 | 0.16607 | 24.06 | 0.0139 | 5996.4 | 8405.0 | 179.20 | 20.82 | 29.30 | 348. |
| 300 | 0.16048 | 24.91 | 0.0135 | 6205.4 | 8698.0 | 180.19 | 20.82 | 29.29 | 354. |
| 310 | 0.15525 | 25.76 | 0.0130 | 6414.3 | 8990.8 | 181.15 | 20.82 | 29.28 | 360. |
| 320 | 0.15036 | 26.60 | 0.0126 | 6623.3 | 9283.6 | 182.08 | 20.83 | 29.27 | 365. |
| 330 | 0.14577 | 27.45 | 0.0122 | 6832.2 | 9576.3 | 182.98 | 20.83 | 29.27 | 371. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 340 | 0.14145 | 28.29 | 0.0118 | 7041.1 | 9868.9 | 183.85 | 20.84 | 29.27 | 377. |
| 350 | 0.13739 | 29.13 | 0.0115 | 7250.1 | 10161.6 | 184.70 | 20.85 | 29.27 | 382. |
| 360 | 0.13355 | 29.97 | 0.0112 | 7459.2 | 10454.3 | 185.53 | 20.86 | 29.27 | 387. |
| 370 | 0.12992 | 30.81 | 0.0109 | 7668.3 | 10747.1 | 186.33 | 20.87 | 29.28 | 393. |
| 380 | 0.12649 | 31.65 | 0.0106 | 7877.5 | 11039.9 | 187.11 | 20.89 | 29.29 | 398. |
| 390 | 0.12323 | 32.49 | 0.0103 | 8086.9 | 11332.9 | 187.87 | 20.90 | 29.30 | 403. |
| 400 | 0.12014 | 33.33 | 0.0100 | 8296.5 | 11626.0 | 188.61 | 20.92 | 29.32 | 408. |
| 420 | 0.11440 | 35.01 | 0.0096 | 8716.1 | 12212.6 | 190.04 | 20.97 | 29.35 | 418. |
| 440 | 0.10919 | 36.69 | 0.0091 | 9136.7 | 12800.1 | 191.41 | 21.02 | 29.40 | 428. |
| 460 | 0.10443 | 38.36 | 0.0087 | 9558.4 | 13388.7 | 192.72 | 21.09 | 29.46 | 437. |
| 480 | 0.10007 | 40.03 | 0.0084 | 9981.4 | 13978.5 | 193.97 | 21.16 | 29.53 | 447. |
| 500 | 0.09606 | 41.71 | 0.0080 | 10405.9 | 14569.8 | 195.18 | 21.24 | 29.60 | 455. |
| 520 | 0.09237 | 43.38 | 0.0077 | 10832.1 | 15162.7 | 196.34 | 21.33 | 29.69 | 464. |
| 540 | 0.08894 | 45.05 | 0.0074 | 11260.1 | 15757.4 | 197.46 | 21.43 | 29.78 | 473. |
| 560 | 0.08576 | 46.72 | 0.0072 | 11690.1 | 16354.1 | 198.55 | 21.54 | 29.88 | 481. |
| 580 | 0.08281 | 48.39 | 0.0069 | 12122.3 | 16952.8 | 199.60 | 21.65 | 29.99 | 489. |
| 600 | 0.08005 | 50.06 | 0.0067 | 12556.7 | 17553.8 | 200.62 | 21.76 | 30.11 | 497. |
| 620 | 0.07746 | 51.72 | 0.0065 | 12993.4 | 18157.1 | 201.61 | 21.88 | 30.23 | 505. |
| 640 | 0.07504 | 53.39 | 0.0063 | 13432.6 | 18762.8 | 202.57 | 22.01 | 30.35 | 513. |
| 660 | 0.07277 | 55.06 | 0.0061 | 13874.3 | 19371.0 | 203.50 | 22.14 | 30.47 | 520. |
| 680 | 0.07063 | 56.73 | 0.0059 | 14318.6 | 19981.8 | 204.42 | 22.27 | 30.60 | 528. |
| 700 | 0.06861 | 58.39 | 0.0057 | 14765.5 | 20595.2 | 205.31 | 22.40 | 30.73 | 535. |
| 720 | 0.06671 | 60.06 | 0.0056 | 15215.0 | 21211.2 | 206.17 | 22.53 | 30.87 | 542. |
| 740 | 0.06491 | 61.73 | 0.0054 | 15667.2 | 21829.8 | 207.02 | 22.67 | 31.00 | 549. |
| 760 | 0.06320 | 63.39 | 0.0053 | 16122.1 | 22451.1 | 207.85 | 22.80 | 31.13 | 556. |
| 780 | 0.06158 | 65.06 | 0.0051 | 16579.6 | 23075.1 | 208.66 | 22.94 | 31.27 | 563. |
| 800 | 0.06004 | 66.72 | 0.0050 | 17039.8 | 23701.8 | 209.45 | 23.07 | 31.40 | 569. |
| 850 | 0.05651 | 70.89 | 0.0047 | 18202.0 | 25279.9 | 211.37 | 23.40 | 31.73 | 586. |
| 900 | 0.05338 | 75.05 | 0.0044 | 19380.3 | 26874.2 | 213.19 | 23.72 | 32.04 | 602. |
| 950 | 0.05057 | 79.21 | 0.0042 | 20574.3 | 28484.1 | 214.93 | 24.03 | 32.35 | 617. |
| 1000 | 0.04804 | 83.37 | 0.0040 | 21783.2 | 30109.0 | 216.60 | 24.32 | 32.64 | 632. |
| 1050 | 0.04576 | 87.53 | 0.0038 | 23006.4 | 31748.0 | 218.20 | 24.60 | 32.92 | 647. |
| 1100 | 0.04368 | 91.69 | 0.0036 | 24242.9 | 33400.3 | 219.73 | 24.86 | 33.18 | 661. |
| 1150 | 0.04178 | 95.85 | 0.0035 | 25492.0 | 35065.3 | 221.21 | 25.10 | 33.42 | 675. |
| 1200 | 0.04004 | 100.01 | 0.0033 | 26753.1 | 36742.2 | 222.64 | 25.33 | 33.65 | 689. |
| 1250 | 0.03844 | 104.17 | 0.0032 | 28025.2 | 38430.1 | 224.02 | 25.55 | 33.86 | 702. |
| 1300 | 0.03697 | 108.33 | 0.0031 | 29307.7 | 40128.4 | 225.35 | 25.75 | 34.07 | 715. |
| 1350 | 0.03560 | 112.49 | 0.0030 | 30599.9 | 41836.4 | 226.64 | 25.94 | 34.25 | 728. |
| 1400 | 0.03433 | 116.64 | 0.0029 | 31901.2 | 43553.5 | 227.89 | 26.11 | 34.43 | 741. |
| 1450 | 0.03315 | 120.80 | 0.0028 | 33211.0 | 45279.0 | 229.10 | 26.28 | 34.59 | 753. |
| 1500 | 0.03204 | 124.96 | 0.0027 | 34528.8 | 47012.5 | 230.27 | 26.43 | 34.75 | 766. |
| 1550 | 0.03101 | 129.12 | 0.0026 | 35853.9 | 48753.5 | 231.42 | 26.57 | 34.89 | 778. |
| 1600 | 0.03004 | 133.28 | 0.0025 | 37186.1 | 50501.3 | 232.53 | 26.71 | 35.02 | 790. |
| 1650 | 0.02913 | 137.43 | 0.0024 | 38524.7 | 52255.7 | 233.61 | 26.83 | 35.15 | 802. |
| 1700 | 0.02828 | 141.59 | 0.0024 | 39869.4 | 54016.1 | 234.66 | 26.95 | 35.27 | 813. |
| 1750 | 0.02747 | 145.75 | 0.0023 | 41219.8 | 55782.2 | 235.68 | 27.06 | 35.38 | 825. |
| 1800 | 0.02671 | 149.91 | 0.0022 | 42575.5 | 57553.7 | 236.68 | 27.17 | 35.48 | 836. |
| 1850 | 0.02598 | 154.06 | 0.0022 | 43936.3 | 59330.2 | 237.65 | 27.26 | 35.58 | 847. |
| 1900 | 0.02530 | 158.22 | 0.0021 | 45301.8 | 61111.4 | 238.60 | 27.35 | 35.67 | 858. |
| 1950 | 0.02465 | 162.38 | 0.0021 | 46671.7 | 62897.0 | 239.53 | 27.44 | 35.76 | 869. |
| 2000 | 0.02404 | 166.53 | 0.0020 | 48045.8 | 64686.9 | 240.44 | 27.52 | 35.84 | 880. |

6 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 63.280 | 30.98436 | 240.39 | 31.71 | −4210.0 | −4190.7 | 68.04 | | | |
| 64 | 30.88885 | 230.69 | 30.80 | −4170.6 | −4151.2 | 68.66 | | | |
| 66 | 30.61722 | 206.59 | 28.53 | −4059.6 | −4040.0 | 70.37 | | | |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 68 | 30.33641 | 186.05 | 26.55 | −3947.0 | −3927.2 | 72.06 | | | |
| 70 | 30.04653 | 168.40 | 24.79 | −3833.5 | −3813.5 | 73.70 | | | |
| 72 | 29.74775 | 153.09 | 23.21 | −3719.4 | −3699.2 | 75.31 | 28.63 | 57.25 | 1045. |
| 74 | 29.44026 | 139.67 | 21.77 | −3604.9 | −3584.5 | 76.89 | 28.43 | 57.41 | 1003. |
| 76 | 29.12427 | 127.80 | 20.46 | −3490.2 | −3469.6 | 78.42 | 28.18 | 57.53 | 965. |
| 78 | 28.79985 | 117.19 | 19.25 | −3375.3 | −3354.4 | 79.91 | 27.91 | 57.66 | 930. |
| 80 | 28.46700 | 107.60 | 18.14 | −3260.0 | −3239.0 | 81.38 | 27.64 | 57.82 | 896. |
| 82 | 28.12555 | 98.86 | 17.09 | −3144.4 | −3123.1 | 82.81 | 27.39 | 58.04 | 865. |
| 84 | 27.77517 | 90.82 | 16.12 | −3028.4 | −3006.8 | 84.21 | 27.16 | 58.32 | 834. |
| 86 | 27.41534 | 83.36 | 15.20 | −2911.7 | −2889.8 | 85.58 | 26.96 | 58.69 | 805. |
| 88 | 27.04538 | 76.40 | 14.34 | −2794.1 | −2771.9 | 86.94 | 26.78 | 59.16 | 776. |
| 90 | 26.66435 | 69.87 | 13.52 | −2675.6 | −2653.1 | 88.27 | 26.63 | 59.73 | 748. |
| 92 | 26.27109 | 63.71 | 12.74 | −2555.8 | −2532.9 | 89.59 | 26.50 | 60.44 | 720. |
| 94 | 25.86414 | 57.87 | 11.99 | −2434.4 | −2411.2 | 90.90 | 26.39 | 61.29 | 693. |
| 96 | 25.44168 | 52.32 | 11.27 | −2311.2 | −2287.6 | 92.20 | 26.30 | 62.32 | 665. |
| * 96.367 | 25.36234 | 51.33 | 11.14 | −2288.4 | −2264.7 | 92.44 | 26.28 | 62.53 | 660. |
| * 96.367 | 0.87966 | 5.65 | 0.0837 | 1765.0 | 2447.1 | 141.36 | 23.16 | 38.59 | 183. |
| 98 | 0.85638 | 5.88 | 0.0808 | 1808.8 | 2509.4 | 142.00 | 22.96 | 37.79 | 186. |
| 100 | 0.83007 | 6.16 | 0.0776 | 1861.3 | 2584.2 | 142.75 | 22.76 | 36.95 | 189. |
| 102 | 0.80586 | 6.43 | 0.0748 | 1912.8 | 2657.3 | 143.48 | 22.57 | 36.24 | 192. |
| 104 | 0.78345 | 6.69 | 0.0722 | 1963.3 | 2729.2 | 144.17 | 22.41 | 35.63 | 195. |
| 106 | 0.76260 | 6.94 | 0.0699 | 2013.1 | 2799.9 | 144.85 | 22.27 | 35.09 | 198. |
| 108 | 0.74313 | 7.19 | 0.0677 | 2062.2 | 2869.6 | 145.50 | 22.15 | 34.62 | 200. |
| 110 | 0.72486 | 7.43 | 0.0657 | 2110.7 | 2938.4 | 146.13 | 22.04 | 34.21 | 203. |
| 112 | 0.70769 | 7.66 | 0.0639 | 2158.7 | 3006.5 | 146.74 | 21.94 | 33.84 | 205. |
| 114 | 0.69148 | 7.89 | 0.0621 | 2206.1 | 3073.8 | 147.34 | 21.85 | 33.52 | 208. |
| 116 | 0.67616 | 8.12 | 0.0605 | 2253.2 | 3140.6 | 147.92 | 21.77 | 33.22 | 210. |
| 118 | 0.66163 | 8.34 | 0.0590 | 2299.9 | 3206.8 | 148.49 | 21.70 | 32.96 | 213. |
| 120 | 0.64783 | 8.56 | 0.0576 | 2346.3 | 3272.4 | 149.04 | 21.63 | 32.72 | 215. |
| 122 | 0.63469 | 8.78 | 0.0563 | 2392.3 | 3337.7 | 149.58 | 21.57 | 32.51 | 217. |
| 124 | 0.62216 | 8.99 | 0.0550 | 2438.1 | 3402.5 | 150.10 | 21.52 | 32.31 | 220. |
| 126 | 0.61019 | 9.20 | 0.0538 | 2483.6 | 3466.9 | 150.62 | 21.47 | 32.13 | 222. |
| 128 | 0.59874 | 9.41 | 0.0527 | 2528.9 | 3531.0 | 151.12 | 21.43 | 31.96 | 224. |
| 130 | 0.58778 | 9.62 | 0.0516 | 2574.0 | 3594.8 | 151.62 | 21.39 | 31.81 | 226. |
| 132 | 0.57726 | 9.82 | 0.0506 | 2618.9 | 3658.3 | 152.10 | 21.35 | 31.67 | 228. |
| 134 | 0.56716 | 10.03 | 0.0496 | 2663.6 | 3721.5 | 152.58 | 21.31 | 31.55 | 230. |
| 136 | 0.55746 | 10.23 | 0.0487 | 2708.1 | 3784.5 | 153.04 | 21.28 | 31.43 | 232. |
| 138 | 0.54812 | 10.43 | 0.0478 | 2752.5 | 3847.2 | 153.50 | 21.25 | 31.32 | 234. |
| 140 | 0.53912 | 10.63 | 0.0469 | 2796.8 | 3909.7 | 153.95 | 21.23 | 31.21 | 236. |
| 142 | 0.53044 | 10.83 | 0.0461 | 2840.9 | 3972.1 | 154.39 | 21.20 | 31.12 | 238. |
| 144 | 0.52207 | 11.02 | 0.0453 | 2884.9 | 4034.2 | 154.83 | 21.18 | 31.03 | 240. |
| 146 | 0.51398 | 11.22 | 0.0446 | 2928.8 | 4096.2 | 155.26 | 21.16 | 30.95 | 242. |
| 148 | 0.50617 | 11.41 | 0.0438 | 2972.6 | 4158.0 | 155.68 | 21.14 | 30.87 | 244. |
| 150 | 0.49861 | 11.60 | 0.0431 | 3016.3 | 4219.7 | 156.09 | 21.12 | 30.80 | 246. |
| 155 | 0.48075 | 12.08 | 0.0415 | 3125.2 | 4373.2 | 157.10 | 21.08 | 30.63 | 250. |
| 160 | 0.46422 | 12.55 | 0.0400 | 3233.5 | 4526.0 | 158.07 | 21.05 | 30.49 | 255. |
| 165 | 0.44886 | 13.02 | 0.0386 | 3341.5 | 4678.2 | 159.00 | 21.02 | 30.37 | 259. |
| 170 | 0.43456 | 13.49 | 0.0373 | 3449.1 | 4829.8 | 159.91 | 20.99 | 30.27 | 263. |
| 175 | 0.42119 | 13.95 | 0.0361 | 3556.4 | 4980.9 | 160.79 | 20.97 | 30.17 | 268. |
| 180 | 0.40867 | 14.40 | 0.0349 | 3663.4 | 5131.6 | 161.63 | 20.95 | 30.09 | 272. |
| 185 | 0.39690 | 14.86 | 0.0339 | 3770.1 | 5281.8 | 162.46 | 20.94 | 30.02 | 276. |
| 190 | 0.38583 | 15.31 | 0.0329 | 3876.7 | 5431.8 | 163.26 | 20.92 | 29.95 | 280. |
| 195 | 0.37539 | 15.76 | 0.0320 | 3983.1 | 5581.4 | 164.04 | 20.91 | 29.90 | 284. |
| 200 | 0.36552 | 16.21 | 0.0311 | 4089.2 | 5730.7 | 164.79 | 20.90 | 29.84 | 287. |
| 210 | 0.34731 | 17.09 | 0.0295 | 4301.2 | 6028.7 | 166.25 | 20.88 | 29.75 | 295. |
| 220 | 0.33090 | 17.98 | 0.0281 | 4512.6 | 6325.9 | 167.63 | 20.87 | 29.68 | 302. |
| 230 | 0.31601 | 18.85 | 0.0268 | 4723.6 | 6622.3 | 168.95 | 20.86 | 29.62 | 309. |
| 240 | 0.30248 | 19.73 | 0.0256 | 4934.3 | 6918.2 | 170.20 | 20.85 | 29.56 | 316. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 250 | 0.29001 | 20.60 | 0.0245 | 5144.7 | 7213.6 | 171.41 | 20.84 | 29.52 | 323. |
| 260 | 0.27858 | 21.46 | 0.0235 | 5354.9 | 7508.6 | 172.57 | 20.84 | 29.48 | 329. |
| 270 | 0.26804 | 22.32 | 0.0226 | 5564.8 | 7803.3 | 173.68 | 20.84 | 29.45 | 336. |
| 280 | 0.25828 | 23.18 | 0.0218 | 5774.6 | 8097.6 | 174.75 | 20.83 | 29.42 | 342. |
| 290 | 0.24923 | 24.04 | 0.0210 | 5984.3 | 8391.7 | 175.78 | 20.83 | 29.40 | 348. |
| 300 | 0.24079 | 24.89 | 0.0203 | 6193.8 | 8685.6 | 176.78 | 20.83 | 29.38 | 354. |
| 310 | 0.23291 | 25.75 | 0.0196 | 6403.3 | 8979.3 | 177.74 | 20.83 | 29.36 | 360. |
| 320 | 0.22555 | 26.60 | 0.0190 | 6612.7 | 9272.9 | 178.67 | 20.84 | 29.35 | 366. |
| 330 | 0.21863 | 27.45 | 0.0184 | 6822.0 | 9566.3 | 179.58 | 20.84 | 29.34 | 371. |
| 340 | 0.21214 | 28.30 | 0.0178 | 7031.4 | 9859.7 | 180.45 | 20.85 | 29.34 | 377. |
| 350 | 0.20602 | 29.15 | 0.0173 | 7240.8 | 10153.1 | 181.30 | 20.86 | 29.33 | 383. |
| 360 | 0.20025 | 29.99 | 0.0168 | 7450.2 | 10446.4 | 182.13 | 20.87 | 29.33 | 388. |
| 370 | 0.19480 | 30.84 | 0.0164 | 7659.6 | 10739.7 | 182.93 | 20.88 | 29.34 | 393. |
| 380 | 0.18964 | 31.68 | 0.0159 | 7869.2 | 11033.1 | 183.72 | 20.90 | 29.34 | 399. |
| 390 | 0.18475 | 32.53 | 0.0155 | 8078.9 | 11326.6 | 184.48 | 20.91 | 29.35 | 404. |
| 400 | 0.18010 | 33.37 | 0.0151 | 8288.7 | 11620.1 | 185.22 | 20.93 | 29.36 | 409. |
| 420 | 0.17149 | 35.06 | 0.0144 | 8708.9 | 12207.7 | 186.65 | 20.98 | 29.39 | 419. |
| 440 | 0.16366 | 36.74 | 0.0137 | 9129.9 | 12796.0 | 188.02 | 21.03 | 29.44 | 428. |
| 460 | 0.15653 | 38.42 | 0.0131 | 9552.0 | 13385.2 | 189.33 | 21.09 | 29.49 | 438. |
| 480 | 0.14999 | 40.10 | 0.0126 | 9975.4 | 13975.7 | 190.59 | 21.17 | 29.56 | 447. |
| 500 | 0.14398 | 41.77 | 0.0120 | 10400.3 | 14567.5 | 191.80 | 21.25 | 29.63 | 456. |
| 520 | 0.13843 | 43.45 | 0.0116 | 10826.8 | 15161.0 | 192.96 | 21.34 | 29.71 | 465. |
| 540 | 0.13330 | 45.12 | 0.0111 | 11255.1 | 15756.2 | 194.08 | 21.44 | 29.81 | 473. |
| 560 | 0.12854 | 46.80 | 0.0107 | 11685.4 | 16353.3 | 195.17 | 21.54 | 29.91 | 482. |
| 580 | 0.12410 | 48.47 | 0.0104 | 12117.8 | 16952.5 | 196.22 | 21.65 | 30.01 | 490. |
| 600 | 0.11997 | 50.14 | 0.0100 | 12552.4 | 17553.8 | 197.24 | 21.77 | 30.12 | 498. |
| 620 | 0.11610 | 51.81 | 0.0097 | 12989.4 | 18157.5 | 198.23 | 21.89 | 30.24 | 506. |
| 640 | 0.11247 | 53.48 | 0.0094 | 13428.8 | 18763.5 | 199.19 | 22.01 | 30.36 | 513. |
| 660 | 0.10906 | 55.15 | 0.0091 | 13870.7 | 19372.0 | 200.13 | 22.14 | 30.49 | 521. |
| 680 | 0.10586 | 56.82 | 0.0088 | 14315.1 | 19983.1 | 201.04 | 22.27 | 30.62 | 528. |
| 700 | 0.10284 | 58.49 | 0.0086 | 14762.2 | 20596.7 | 201.93 | 22.40 | 30.75 | 535. |
| 720 | 0.09998 | 60.16 | 0.0083 | 15211.9 | 21213.0 | 202.80 | 22.54 | 30.88 | 542. |
| 740 | 0.09728 | 61.83 | 0.0081 | 15664.2 | 21831.8 | 203.65 | 22.67 | 31.01 | 549. |
| 760 | 0.09472 | 63.49 | 0.0079 | 16119.2 | 22453.4 | 204.47 | 22.81 | 31.14 | 556. |
| 780 | 0.09230 | 65.16 | 0.0077 | 16576.9 | 23077.6 | 205.28 | 22.94 | 31.28 | 563. |
| 800 | 0.08999 | 66.83 | 0.0075 | 17037.2 | 23704.4 | 206.08 | 23.07 | 31.41 | 570. |
| 850 | 0.08471 | 71.00 | 0.0071 | 18199.7 | 25283.0 | 207.99 | 23.40 | 31.73 | 586. |
| 900 | 0.08001 | 75.16 | 0.0067 | 19378.2 | 26877.7 | 209.82 | 23.72 | 32.05 | 602. |
| 950 | 0.07580 | 79.32 | 0.0063 | 20572.4 | 28487.9 | 211.56 | 24.03 | 32.36 | 617. |
| 1000 | 0.07202 | 83.49 | 0.0060 | 21781.6 | 30113.0 | 213.22 | 24.32 | 32.65 | 632. |
| 1050 | 0.06859 | 87.65 | 0.0057 | 23004.8 | 31752.2 | 214.82 | 24.60 | 32.92 | 647. |
| 1100 | 0.06548 | 91.81 | 0.0055 | 24241.5 | 33404.8 | 216.36 | 24.86 | 33.18 | 661. |
| 1150 | 0.06264 | 95.97 | 0.0052 | 25490.8 | 35070.0 | 217.84 | 25.10 | 33.42 | 675. |
| 1200 | 0.06003 | 100.13 | 0.0050 | 26752.0 | 36747.0 | 219.27 | 25.33 | 33.65 | 689. |
| 1250 | 0.05763 | 104.29 | 0.0048 | 28024.2 | 38435.1 | 220.65 | 25.55 | 33.87 | 702. |
| 1300 | 0.05542 | 108.45 | 0.0046 | 29306.8 | 40133.5 | 221.98 | 25.75 | 34.07 | 716. |
| 1350 | 0.05337 | 112.61 | 0.0044 | 30599.1 | 41841.7 | 223.27 | 25.94 | 34.26 | 729. |
| 1400 | 0.05147 | 116.77 | 0.0043 | 31900.5 | 43558.9 | 224.52 | 26.11 | 34.43 | 741. |
| 1450 | 0.04969 | 120.92 | 0.0041 | 33210.4 | 45284.5 | 225.73 | 26.28 | 34.59 | 754. |
| 1500 | 0.04804 | 125.08 | 0.0040 | 34528.3 | 47018.1 | 226.90 | 26.43 | 34.75 | 766. |
| 1550 | 0.04649 | 129.24 | 0.0039 | 35853.5 | 48759.1 | 228.05 | 26.57 | 34.89 | 778. |
| 1600 | 0.04504 | 133.40 | 0.0038 | 37185.7 | 50507.1 | 229.15 | 26.71 | 35.02 | 790. |
| 1650 | 0.04368 | 137.56 | 0.0036 | 38524.3 | 52261.5 | 230.23 | 26.83 | 35.15 | 802. |
| 1700 | 0.04239 | 141.71 | 0.0035 | 39869.1 | 54022.0 | 231.29 | 26.95 | 35.27 | 814. |
| 1750 | 0.04118 | 145.87 | 0.0034 | 41219.5 | 55788.2 | 232.31 | 27.06 | 35.38 | 825. |
| 1800 | 0.04004 | 150.03 | 0.0033 | 42575.3 | 57559.7 | 233.31 | 27.17 | 35.48 | 836. |
| 1850 | 0.03896 | 154.19 | 0.0032 | 43936.1 | 59336.2 | 234.28 | 27.26 | 35.58 | 848. |
| 1900 | 0.03794 | 158.34 | 0.0032 | 45301.7 | 61117.5 | 235.23 | 27.36 | 35.67 | 859. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1950 | 0.03697 | 162.50 | 0.0031 | 46671.6 | 62903.2 | 236.16 | 27.44 | 35.76 | 869. |
| 2000 | 0.03604 | 166.66 | 0.0030 | 48045.8 | 64693.0 | 237.07 | 27.52 | 35.84 | 880. |
| | | | | 8 bar Isobar | | | | | |
| * 63.324 | 30.98689 | 240.45 | 31.62 | −4209.4 | −4183.6 | 68.05 | | | |
| 64 | 30.89751 | 231.36 | 30.78 | −4172.4 | −4146.5 | 68.63 | | | |
| 66 | 30.62688 | 207.25 | 28.52 | −4061.5 | −4035.4 | 70.34 | | | |
| 68 | 30.34715 | 186.70 | 26.54 | −3949.1 | −3922.7 | 72.03 | | | |
| 70 | 30.05839 | 169.04 | 24.78 | −3835.7 | −3809.1 | 73.67 | | | |
| 72 | 29.76078 | 153.72 | 23.21 | −3721.8 | −3695.0 | 75.28 | 28.71 | 57.19 | 1046. |
| 74 | 29.45455 | 140.30 | 21.78 | −3607.6 | −3580.4 | 76.85 | 28.50 | 57.34 | 1004. |
| 76 | 29.13988 | 128.43 | 20.47 | −3493.1 | −3465.6 | 78.38 | 28.24 | 57.46 | 966. |
| 78 | 28.81687 | 117.82 | 19.27 | −3378.3 | −3350.6 | 79.87 | 27.97 | 57.58 | 930. |
| 80 | 28.48553 | 108.23 | 18.16 | −3263.3 | −3235.2 | 81.33 | 27.70 | 57.74 | 897. |
| 82 | 28.14571 | 99.50 | 17.12 | −3148.0 | −3119.6 | 82.76 | 27.45 | 57.95 | 866. |
| 84 | 27.79711 | 91.46 | 16.15 | −3032.2 | −3003.4 | 84.16 | 27.22 | 58.22 | 836. |
| 86 | 27.43924 | 84.02 | 15.24 | −2915.8 | −2886.6 | 85.54 | 27.01 | 58.58 | 806. |
| 88 | 27.07144 | 77.07 | 14.37 | −2798.6 | −2769.0 | 86.89 | 26.83 | 59.03 | 778. |
| 90 | 26.69284 | 70.54 | 13.56 | −2680.4 | −2650.5 | 88.22 | 26.68 | 59.59 | 750. |
| 92 | 26.30231 | 64.39 | 12.78 | −2561.0 | −2530.6 | 89.54 | 26.54 | 60.27 | 722. |
| 94 | 25.89849 | 58.57 | 12.04 | −2440.2 | −2409.3 | 90.84 | 26.43 | 61.09 | 695. |
| 96 | 25.47965 | 53.03 | 11.32 | −2317.5 | −2286.1 | 92.14 | 26.33 | 62.08 | 668. |
| 98 | 25.04364 | 47.74 | 10.63 | −2192.8 | −2160.8 | 93.43 | 26.26 | 63.26 | 641. |
| 100 | 24.58772 | 42.69 | 9.97 | −2065.5 | −2032.9 | 94.72 | 26.20 | 64.69 | 613. |
| * 100.385 | 24.49749 | 41.74 | 9.84 | −2040.6 | −2008.0 | 94.97 | 26.19 | 65.00 | 608. |
| * 100.385 | 1.17121 | 5.35 | 0.1147 | 1782.8 | 2465.9 | 139.55 | 23.63 | 41.63 | 183. |
| 102 | 1.13806 | 5.62 | 0.1104 | 1829.3 | 2532.2 | 140.20 | 23.40 | 40.50 | 186. |
| 104 | 1.10062 | 5.93 | 0.1057 | 1885.2 | 2612.0 | 140.98 | 23.15 | 39.33 | 190. |
| 106 | 1.06652 | 6.22 | 0.1015 | 1939.6 | 2689.7 | 141.72 | 22.93 | 38.35 | 193. |
| 108 | 1.03525 | 6.51 | 0.0977 | 1992.7 | 2765.5 | 142.43 | 22.74 | 37.51 | 196. |
| 110 | 1.00637 | 6.79 | 0.0943 | 2044.8 | 2839.8 | 143.11 | 22.57 | 36.79 | 199. |
| 112 | 0.97958 | 7.05 | 0.0912 | 2096.1 | 2912.7 | 143.77 | 22.42 | 36.17 | 202. |
| 114 | 0.95460 | 7.31 | 0.0883 | 2146.5 | 2984.5 | 144.40 | 22.29 | 35.62 | 204. |
| 116 | 0.93122 | 7.57 | 0.0857 | 2196.2 | 3055.3 | 145.02 | 22.17 | 35.14 | 207. |
| 118 | 0.90925 | 7.81 | 0.0832 | 2245.3 | 3125.1 | 145.61 | 22.06 | 34.72 | 210. |
| 120 | 0.88856 | 8.06 | 0.0810 | 2293.8 | 3194.2 | 146.19 | 21.97 | 34.34 | 212. |
| 122 | 0.86901 | 8.29 | 0.0789 | 2341.9 | 3262.5 | 146.76 | 21.88 | 34.00 | 214. |
| 124 | 0.85049 | 8.53 | 0.0769 | 2389.5 | 3330.2 | 147.31 | 21.80 | 33.69 | 217. |
| 126 | 0.83291 | 8.76 | 0.0750 | 2436.8 | 3397.3 | 147.85 | 21.73 | 33.41 | 219. |
| 128 | 0.81619 | 8.98 | 0.0733 | 2483.7 | 3463.9 | 148.37 | 21.67 | 33.16 | 222. |
| 130 | 0.80025 | 9.21 | 0.0717 | 2530.3 | 3529.9 | 148.88 | 21.61 | 32.93 | 224. |
| 132 | 0.78504 | 9.43 | 0.0701 | 2576.5 | 3595.6 | 149.38 | 21.56 | 32.72 | 226. |
| 134 | 0.77049 | 9.65 | 0.0686 | 2622.6 | 3660.8 | 149.87 | 21.51 | 32.53 | 228. |
| 136 | 0.75656 | 9.86 | 0.0672 | 2668.3 | 3725.7 | 150.36 | 21.47 | 32.36 | 230. |
| 138 | 0.74321 | 10.07 | 0.0659 | 2713.9 | 3790.3 | 150.83 | 21.43 | 32.19 | 232. |
| 140 | 0.73039 | 10.28 | 0.0646 | 2759.2 | 3854.5 | 151.29 | 21.39 | 32.04 | 235. |
| 142 | 0.71807 | 10.49 | 0.0634 | 2804.4 | 3918.5 | 151.74 | 21.35 | 31.90 | 237. |
| 144 | 0.70621 | 10.70 | 0.0622 | 2849.3 | 3982.1 | 152.19 | 21.32 | 31.77 | 239. |
| 146 | 0.69479 | 10.91 | 0.0611 | 2894.1 | 4045.6 | 152.62 | 21.29 | 31.65 | 241. |
| 148 | 0.68378 | 11.11 | 0.0601 | 2938.8 | 4108.8 | 153.05 | 21.27 | 31.54 | 243. |
| 150 | 0.67316 | 11.31 | 0.0590 | 2983.3 | 4171.7 | 153.48 | 21.24 | 31.44 | 244. |
| 155 | 0.64815 | 11.81 | 0.0566 | 3094.0 | 4328.3 | 154.50 | 21.18 | 31.21 | 249. |
| 160 | 0.62512 | 12.31 | 0.0545 | 3204.1 | 4483.8 | 155.49 | 21.14 | 31.01 | 254. |
| 165 | 0.60382 | 12.79 | 0.0525 | 3313.5 | 4638.4 | 156.44 | 21.10 | 30.84 | 258. |
| 170 | 0.58405 | 13.27 | 0.0506 | 3422.5 | 4792.2 | 157.36 | 21.07 | 30.69 | 263. |
| 175 | 0.56563 | 13.75 | 0.0489 | 3531.0 | 4945.4 | 158.25 | 21.04 | 30.56 | 267. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 180 | 0.54842 | 14.22 | 0.0473 | 3639.1 | 5097.9 | 159.11 | 21.01 | 30.45 | 271. |
| 185 | 0.53230 | 14.69 | 0.0459 | 3746.9 | 5249.8 | 159.94 | 20.99 | 30.34 | 275. |
| 190 | 0.51716 | 15.15 | 0.0445 | 3854.4 | 5401.3 | 160.75 | 20.97 | 30.26 | 279. |
| 195 | 0.50290 | 15.61 | 0.0432 | 3961.6 | 5552.4 | 161.53 | 20.96 | 30.18 | 283. |
| 200 | 0.48946 | 16.07 | 0.0420 | 4068.6 | 5703.1 | 162.30 | 20.94 | 30.10 | 287. |
| 210 | 0.46472 | 16.98 | 0.0398 | 4282.0 | 6003.5 | 163.76 | 20.92 | 29.98 | 295. |
| 220 | 0.44246 | 17.88 | 0.0378 | 4494.7 | 6302.8 | 165.15 | 20.90 | 29.88 | 302. |
| 230 | 0.42233 | 18.77 | 0.0360 | 4706.9 | 6601.1 | 166.48 | 20.89 | 29.79 | 309. |
| 240 | 0.40401 | 19.65 | 0.0344 | 4918.5 | 6898.7 | 167.75 | 20.87 | 29.72 | 316. |
| 250 | 0.38726 | 20.54 | 0.0329 | 5129.8 | 7195.6 | 168.96 | 20.87 | 29.66 | 323. |
| 260 | 0.37188 | 21.41 | 0.0316 | 5340.8 | 7492.0 | 170.12 | 20.86 | 29.61 | 329. |
| 270 | 0.35772 | 22.28 | 0.0303 | 5551.4 | 7787.9 | 171.24 | 20.85 | 29.57 | 336. |
| 280 | 0.34461 | 23.15 | 0.0292 | 5761.9 | 8083.3 | 172.31 | 20.85 | 29.53 | 342. |
| 290 | 0.33246 | 24.02 | 0.0281 | 5972.2 | 8378.5 | 173.35 | 20.85 | 29.50 | 348. |
| 300 | 0.32115 | 24.88 | 0.0272 | 6182.3 | 8673.3 | 174.35 | 20.85 | 29.47 | 354. |
| 310 | 0.31060 | 25.74 | 0.0262 | 6392.2 | 8967.9 | 175.31 | 20.85 | 29.45 | 360. |
| 320 | 0.30073 | 26.60 | 0.0254 | 6602.1 | 9262.3 | 176.25 | 20.85 | 29.43 | 366. |
| 330 | 0.29148 | 27.46 | 0.0246 | 6811.9 | 9556.5 | 177.15 | 20.85 | 29.41 | 372. |
| 340 | 0.28280 | 28.31 | 0.0239 | 7021.7 | 9850.6 | 178.03 | 20.86 | 29.40 | 377. |
| 350 | 0.27462 | 29.17 | 0.0232 | 7231.4 | 10144.6 | 178.88 | 20.87 | 29.40 | 383. |
| 360 | 0.26691 | 30.02 | 0.0225 | 7441.2 | 10438.5 | 179.71 | 20.88 | 29.39 | 388. |
| 370 | 0.25962 | 30.87 | 0.0219 | 7651.0 | 10732.4 | 180.52 | 20.89 | 29.39 | 394. |
| 380 | 0.25273 | 31.72 | 0.0213 | 7860.9 | 11026.3 | 181.30 | 20.90 | 29.39 | 399. |
| 390 | 0.24620 | 32.57 | 0.0207 | 8070.9 | 11320.3 | 182.07 | 20.92 | 29.40 | 404. |
| 400 | 0.24000 | 33.41 | 0.0202 | 8281.0 | 11614.3 | 182.81 | 20.94 | 29.41 | 409. |
| 420 | 0.22850 | 35.10 | 0.0192 | 8701.6 | 12202.8 | 184.25 | 20.98 | 29.44 | 419. |
| 440 | 0.21806 | 36.79 | 0.0183 | 9123.2 | 12791.8 | 185.62 | 21.04 | 29.47 | 429. |
| 460 | 0.20854 | 38.48 | 0.0175 | 9545.7 | 13381.8 | 186.93 | 21.10 | 29.53 | 438. |
| 480 | 0.19983 | 40.16 | 0.0168 | 9969.5 | 13972.9 | 188.18 | 21.17 | 29.59 | 448. |
| 500 | 0.19182 | 41.84 | 0.0161 | 10394.7 | 14565.3 | 189.39 | 21.25 | 29.66 | 457. |
| 520 | 0.18442 | 43.52 | 0.0155 | 10821.5 | 15159.3 | 190.56 | 21.34 | 29.74 | 465. |
| 540 | 0.17759 | 45.20 | 0.0149 | 11250.1 | 15755.0 | 191.68 | 21.44 | 29.83 | 474. |
| 560 | 0.17124 | 46.88 | 0.0143 | 11680.7 | 16352.5 | 192.77 | 21.55 | 29.93 | 482. |
| 580 | 0.16533 | 48.55 | 0.0138 | 12113.3 | 16952.1 | 193.82 | 21.66 | 30.03 | 490. |
| 600 | 0.15982 | 50.23 | 0.0134 | 12548.2 | 17553.9 | 194.84 | 21.77 | 30.14 | 498. |
| 620 | 0.15466 | 51.90 | 0.0129 | 12985.4 | 18157.9 | 195.83 | 21.89 | 30.26 | 506. |
| 640 | 0.14983 | 53.57 | 0.0125 | 13425.0 | 18764.2 | 196.79 | 22.02 | 30.38 | 514. |
| 660 | 0.14530 | 55.25 | 0.0122 | 13867.0 | 19373.0 | 197.73 | 22.14 | 30.50 | 521. |
| 680 | 0.14103 | 56.92 | 0.0118 | 14311.7 | 19984.4 | 198.64 | 22.28 | 30.63 | 529. |
| 700 | 0.13700 | 58.59 | 0.0115 | 14758.9 | 20598.3 | 199.53 | 22.41 | 30.76 | 536. |
| 720 | 0.13320 | 60.26 | 0.0111 | 15208.7 | 21214.7 | 200.40 | 22.54 | 30.89 | 543. |
| 740 | 0.12960 | 61.93 | 0.0108 | 15661.2 | 21833.9 | 201.25 | 22.67 | 31.02 | 550. |
| 760 | 0.12620 | 63.60 | 0.0105 | 16116.3 | 22455.6 | 202.08 | 22.81 | 31.15 | 557. |
| 780 | 0.12297 | 65.27 | 0.0103 | 16574.2 | 23080.0 | 202.89 | 22.94 | 31.29 | 564. |
| 800 | 0.11990 | 66.93 | 0.0100 | 17034.6 | 23707.0 | 203.68 | 23.08 | 31.42 | 570. |
| 850 | 0.11286 | 71.10 | 0.0094 | 18197.3 | 25286.0 | 205.60 | 23.41 | 31.74 | 587. |
| 900 | 0.10660 | 75.27 | 0.0089 | 19376.2 | 26881.1 | 207.42 | 23.73 | 32.06 | 603. |
| 950 | 0.10100 | 79.44 | 0.0084 | 20570.6 | 28491.6 | 209.16 | 24.03 | 32.36 | 618. |
| 1000 | 0.09596 | 83.60 | 0.0080 | 21779.9 | 30117.0 | 210.83 | 24.32 | 32.65 | 633. |
| 1050 | 0.09140 | 87.76 | 0.0076 | 23003.3 | 31756.5 | 212.43 | 24.60 | 32.93 | 648. |
| 1100 | 0.08725 | 91.93 | 0.0073 | 24240.2 | 33409.3 | 213.97 | 24.86 | 33.18 | 662. |
| 1150 | 0.08346 | 96.09 | 0.0070 | 25489.6 | 35074.7 | 215.45 | 25.11 | 33.43 | 676. |
| 1200 | 0.07999 | 100.25 | 0.0067 | 26750.9 | 36751.9 | 216.88 | 25.33 | 33.66 | 689. |
| 1250 | 0.07680 | 104.41 | 0.0064 | 28023.2 | 38440.1 | 218.25 | 25.55 | 33.87 | 703. |
| 1300 | 0.07385 | 108.57 | 0.0062 | 29305.9 | 40138.7 | 219.59 | 25.75 | 34.07 | 716. |
| 1350 | 0.07112 | 112.73 | 0.0059 | 30598.4 | 41847.0 | 220.88 | 25.94 | 34.26 | 729. |
| 1400 | 0.06858 | 116.89 | 0.0057 | 31899.9 | 43564.3 | 222.12 | 26.11 | 34.43 | 742. |
| 1450 | 0.06622 | 121.05 | 0.0055 | 33209.8 | 45290.1 | 223.34 | 26.28 | 34.60 | 754. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1500 | 0.06402 | 125.21 | 0.0053 | 34527.7 | 47023.7 | 224.51 | 26.43 | 34.75 | 767. |
| 1550 | 0.06196 | 129.36 | 0.0052 | 35853.0 | 48764.8 | 225.65 | 26.58 | 34.89 | 779. |
| 1600 | 0.06003 | 133.52 | 0.0050 | 37185.3 | 50512.8 | 226.76 | 26.71 | 35.03 | 791. |
| 1650 | 0.05821 | 137.68 | 0.0048 | 38524.0 | 52267.3 | 227.84 | 26.84 | 35.15 | 802. |
| 1700 | 0.05650 | 141.84 | 0.0047 | 39868.8 | 54027.9 | 228.89 | 26.95 | 35.27 | 814. |
| 1750 | 0.05489 | 146.00 | 0.0046 | 41219.3 | 55794.1 | 229.92 | 27.06 | 35.38 | 825. |
| 1800 | 0.05337 | 150.15 | 0.0044 | 42575.1 | 57565.7 | 230.92 | 27.17 | 35.48 | 837. |
| 1850 | 0.05193 | 154.31 | 0.0043 | 43936.0 | 59342.3 | 231.89 | 27.27 | 35.58 | 848. |
| 1900 | 0.05056 | 158.47 | 0.0042 | 45301.6 | 61123.6 | 232.84 | 27.36 | 35.67 | 859. |
| 1950 | 0.04927 | 162.63 | 0.0041 | 46671.6 | 62909.3 | 233.77 | 27.44 | 35.76 | 870. |
| 2000 | 0.04804 | 166.78 | 0.0040 | 48045.7 | 64699.2 | 234.67 | 27.52 | 35.84 | 880. |
| | | | | 10 bar Isobar | | | | | |
| * 63.368 | 30.98945 | 240.51 | 31.54 | −4208.7 | −4176.4 | 68.06 | | | |
| 64 | 30.90614 | 232.02 | 30.76 | −4174.2 | −4141.8 | 68.61 | | | |
| 66 | 30.63652 | 207.90 | 28.50 | −4063.4 | −4030.8 | 70.31 | | | |
| 68 | 30.35784 | 187.34 | 26.53 | −3951.2 | −3918.2 | 71.99 | | | |
| 70 | 30.07019 | 169.68 | 24.78 | −3838.0 | −3804.7 | 73.64 | | | |
| 72 | 29.77377 | 154.35 | 23.21 | −3724.3 | −3690.7 | 75.25 | 28.79 | 57.13 | 1046. |
| 74 | 29.46877 | 140.93 | 21.79 | −3610.2 | −3576.3 | 76.81 | 28.57 | 57.28 | 1004. |
| 76 | 29.15541 | 129.06 | 20.49 | −3495.9 | −3461.6 | 78.34 | 28.31 | 57.39 | 966. |
| 78 | 28.83380 | 118.45 | 19.29 | −3381.4 | −3346.7 | 79.83 | 28.04 | 57.51 | 931. |
| 80 | 28.50396 | 108.87 | 18.18 | −3266.6 | −3231.5 | 81.29 | 27.76 | 57.66 | 898. |
| 82 | 28.16575 | 100.14 | 17.15 | −3151.5 | −3116.0 | 82.72 | 27.51 | 57.86 | 867. |
| 84 | 27.81890 | 92.11 | 16.18 | −3036.0 | −3000.1 | 84.12 | 27.28 | 58.12 | 837. |
| 86 | 27.46296 | 84.67 | 15.27 | −2919.9 | −2883.5 | 85.49 | 27.07 | 58.47 | 808. |
| 88 | 27.09728 | 77.73 | 14.41 | −2803.0 | −2766.1 | 86.84 | 26.88 | 58.90 | 780. |
| 90 | 26.72105 | 71.22 | 13.60 | −2685.2 | −2647.8 | 88.17 | 26.72 | 59.44 | 752. |
| 92 | 26.33321 | 65.08 | 12.82 | −2566.2 | −2528.3 | 89.48 | 26.59 | 60.10 | 725. |
| 94 | 25.93244 | 59.26 | 12.08 | −2445.9 | −2407.3 | 90.78 | 26.47 | 60.90 | 698. |
| 96 | 25.51712 | 53.74 | 11.37 | −2323.8 | −2284.6 | 92.07 | 26.37 | 61.85 | 671. |
| 98 | 25.08522 | 48.47 | 10.69 | −2199.6 | −2159.8 | 93.36 | 26.29 | 62.99 | 644. |
| 100 | 24.63417 | 43.43 | 10.02 | −2073.1 | −2032.5 | 94.64 | 26.23 | 64.36 | 617. |
| 102 | 24.16064 | 38.58 | 9.38 | −1943.5 | −1902.1 | 95.93 | 26.18 | 66.02 | 589. |
| * 103.733 | 23.72881 | 34.53 | 8.83 | −1828.4 | −1786.3 | 97.06 | 26.16 | 67.76 | 565. |
| * 103.733 | 1.47217 | 5.02 | 0.1483 | 1786.8 | 2466.1 | 138.06 | 24.09 | 45.04 | 183. |
| 104 | 1.46435 | 5.07 | 0.1472 | 1795.2 | 2478.1 | 138.18 | 24.04 | 44.76 | 184. |
| 106 | 1.40973 | 5.43 | 0.1399 | 1856.3 | 2565.7 | 139.01 | 23.71 | 42.91 | 187. |
| 108 | 1.36098 | 5.77 | 0.1335 | 1915.2 | 2649.9 | 139.80 | 23.43 | 41.41 | 191. |
| 110 | 1.31696 | 6.10 | 0.1278 | 1972.2 | 2731.5 | 140.55 | 23.18 | 40.18 | 194. |
| 112 | 1.27688 | 6.40 | 0.1228 | 2027.6 | 2810.8 | 141.26 | 22.97 | 39.14 | 197. |
| 114 | 1.24009 | 6.70 | 0.1183 | 2081.8 | 2888.1 | 141.95 | 22.78 | 38.26 | 200. |
| 116 | 1.20613 | 6.99 | 0.1142 | 2134.8 | 2963.9 | 142.60 | 22.61 | 37.50 | 203. |
| 118 | 1.17459 | 7.26 | 0.1105 | 2186.8 | 3038.2 | 143.24 | 22.47 | 36.84 | 206. |
| 120 | 1.14519 | 7.53 | 0.1071 | 2238.1 | 3111.3 | 143.85 | 22.33 | 36.26 | 209. |
| 122 | 1.11766 | 7.79 | 0.1039 | 2288.5 | 3183.3 | 144.45 | 22.22 | 35.75 | 212. |
| 124 | 1.09180 | 8.05 | 0.1010 | 2338.4 | 3254.3 | 145.03 | 22.11 | 35.29 | 214. |
| 126 | 1.06742 | 8.30 | 0.0983 | 2387.6 | 3324.5 | 145.59 | 22.02 | 34.89 | 217. |
| 128 | 1.04439 | 8.55 | 0.0958 | 2436.4 | 3393.9 | 146.13 | 21.93 | 34.52 | 219. |
| 130 | 1.02256 | 8.79 | 0.0934 | 2484.7 | 3462.6 | 146.67 | 21.85 | 34.19 | 222. |
| 132 | 1.00184 | 9.02 | 0.0912 | 2532.5 | 3530.7 | 147.19 | 21.78 | 33.90 | 224. |
| 134 | 0.98212 | 9.26 | 0.0891 | 2580.0 | 3598.2 | 147.69 | 21.72 | 33.63 | 226. |
| 136 | 0.96332 | 9.49 | 0.0871 | 2627.1 | 3665.2 | 148.19 | 21.66 | 33.38 | 228. |
| 138 | 0.94537 | 9.71 | 0.0852 | 2673.9 | 3731.7 | 148.68 | 21.61 | 33.15 | 231. |
| 140 | 0.92820 | 9.94 | 0.0835 | 2720.5 | 3797.8 | 149.15 | 21.56 | 32.95 | 233. |
| 142 | 0.91176 | 10.16 | 0.0818 | 2766.7 | 3863.5 | 149.62 | 21.51 | 32.75 | 235. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 144 | 0.89599 | 10.38 | 0.0802 | 2812.8 | 3928.9 | 150.07 | 21.47 | 32.58 | 237. |
| 146 | 0.88085 | 10.59 | 0.0786 | 2858.6 | 3993.8 | 150.52 | 21.43 | 32.41 | 239. |
| 148 | 0.86629 | 10.81 | 0.0772 | 2904.2 | 4058.5 | 150.96 | 21.40 | 32.26 | 241. |
| 150 | 0.85228 | 11.02 | 0.0758 | 2949.6 | 4122.9 | 151.39 | 21.36 | 32.12 | 243. |
| 155 | 0.81942 | 11.54 | 0.0725 | 3062.3 | 4282.7 | 152.44 | 21.29 | 31.81 | 248. |
| 160 | 0.78931 | 12.06 | 0.0696 | 3174.2 | 4441.1 | 153.45 | 21.23 | 31.55 | 253. |
| 165 | 0.76159 | 12.56 | 0.0669 | 3285.2 | 4598.2 | 154.42 | 21.18 | 31.32 | 257. |
| 170 | 0.73596 | 13.06 | 0.0645 | 3395.6 | 4754.3 | 155.35 | 21.14 | 31.13 | 262. |
| 175 | 0.71216 | 13.55 | 0.0622 | 3505.4 | 4909.5 | 156.25 | 21.10 | 30.96 | 266. |
| 180 | 0.68999 | 14.04 | 0.0601 | 3614.6 | 5063.9 | 157.12 | 21.07 | 30.81 | 271. |
| 185 | 0.66927 | 14.52 | 0.0582 | 3723.5 | 5217.7 | 157.96 | 21.05 | 30.68 | 275. |
| 190 | 0.64986 | 14.99 | 0.0564 | 3832.0 | 5370.8 | 158.78 | 21.02 | 30.56 | 279. |
| 195 | 0.63162 | 15.46 | 0.0547 | 3940.1 | 5523.3 | 159.57 | 21.00 | 30.46 | 283. |
| 200 | 0.61445 | 15.93 | 0.0531 | 4047.9 | 5675.4 | 160.34 | 20.98 | 30.37 | 287. |
| 210 | 0.58293 | 16.86 | 0.0502 | 4262.8 | 5978.2 | 161.82 | 20.95 | 30.21 | 295. |
| 220 | 0.55466 | 17.78 | 0.0477 | 4476.8 | 6279.7 | 163.22 | 20.93 | 30.08 | 302. |
| 230 | 0.52913 | 18.68 | 0.0454 | 4690.0 | 6579.9 | 164.55 | 20.91 | 29.97 | 309. |
| 240 | 0.50595 | 19.58 | 0.0433 | 4902.7 | 6879.2 | 165.83 | 20.90 | 29.88 | 316. |
| 250 | 0.48479 | 20.48 | 0.0414 | 5114.9 | 7177.6 | 167.05 | 20.89 | 29.81 | 323. |
| 260 | 0.46540 | 21.36 | 0.0397 | 5326.7 | 7475.4 | 168.21 | 20.88 | 29.74 | 330. |
| 270 | 0.44754 | 22.25 | 0.0381 | 5538.1 | 7772.5 | 169.33 | 20.87 | 29.69 | 336. |
| 280 | 0.43105 | 23.12 | 0.0367 | 5749.2 | 8069.1 | 170.41 | 20.86 | 29.64 | 342. |
| 290 | 0.41576 | 24.00 | 0.0353 | 5960.0 | 8365.3 | 171.45 | 20.86 | 29.60 | 349. |
| 300 | 0.40155 | 24.87 | 0.0341 | 6170.7 | 8661.0 | 172.46 | 20.86 | 29.56 | 355. |
| 310 | 0.38830 | 25.74 | 0.0329 | 6381.2 | 8956.5 | 173.42 | 20.86 | 29.53 | 361. |
| 320 | 0.37592 | 26.60 | 0.0319 | 6591.5 | 9251.7 | 174.36 | 20.86 | 29.51 | 366. |
| 330 | 0.36431 | 27.47 | 0.0309 | 6801.8 | 9546.7 | 175.27 | 20.86 | 29.49 | 372. |
| 340 | 0.35342 | 28.33 | 0.0299 | 7012.0 | 9841.5 | 176.15 | 20.87 | 29.47 | 378. |
| 350 | 0.34317 | 29.18 | 0.0290 | 7222.1 | 10136.1 | 177.00 | 20.88 | 29.46 | 383. |
| 360 | 0.33351 | 30.04 | 0.0282 | 7432.2 | 10430.7 | 177.83 | 20.89 | 29.45 | 389. |
| 370 | 0.32438 | 30.90 | 0.0274 | 7642.4 | 10725.1 | 178.64 | 20.90 | 29.45 | 394. |
| 380 | 0.31575 | 31.75 | 0.0267 | 7852.6 | 11019.6 | 179.42 | 20.91 | 29.45 | 399. |
| 390 | 0.30758 | 32.60 | 0.0260 | 8062.9 | 11314.1 | 180.19 | 20.93 | 29.45 | 405. |
| 400 | 0.29982 | 33.45 | 0.0253 | 8273.2 | 11608.6 | 180.94 | 20.95 | 29.45 | 410. |
| 420 | 0.28543 | 35.15 | 0.0241 | 8694.4 | 12197.9 | 182.37 | 20.99 | 29.48 | 420. |
| 440 | 0.27238 | 36.85 | 0.0229 | 9116.4 | 12787.7 | 183.74 | 21.04 | 29.51 | 429. |
| 460 | 0.26048 | 38.54 | 0.0219 | 9539.4 | 13378.4 | 185.06 | 21.11 | 29.56 | 439. |
| 480 | 0.24959 | 40.23 | 0.0210 | 9963.5 | 13970.2 | 186.32 | 21.18 | 29.62 | 448. |
| 500 | 0.23957 | 41.91 | 0.0201 | 10389.1 | 14563.2 | 187.53 | 21.26 | 29.69 | 457. |
| 520 | 0.23034 | 43.60 | 0.0193 | 10816.2 | 15157.7 | 188.69 | 21.35 | 29.76 | 466. |
| 540 | 0.22179 | 45.28 | 0.0186 | 11245.1 | 15753.8 | 189.82 | 21.45 | 29.85 | 474. |
| 560 | 0.21387 | 46.96 | 0.0179 | 11676.0 | 16351.8 | 190.91 | 21.55 | 29.95 | 483. |
| 580 | 0.20649 | 48.64 | 0.0173 | 12108.9 | 16951.8 | 191.96 | 21.66 | 30.05 | 491. |
| 600 | 0.19960 | 50.32 | 0.0167 | 12544.0 | 17553.9 | 192.98 | 21.78 | 30.16 | 499. |
| 620 | 0.19317 | 51.99 | 0.0162 | 12981.4 | 18158.3 | 193.97 | 21.90 | 30.28 | 507. |
| 640 | 0.18713 | 53.67 | 0.0157 | 13421.2 | 18765.0 | 194.93 | 22.02 | 30.39 | 514. |
| 660 | 0.18147 | 55.34 | 0.0152 | 13863.4 | 19374.1 | 195.87 | 22.15 | 30.52 | 522. |
| 680 | 0.17613 | 57.01 | 0.0148 | 14308.2 | 19985.7 | 196.78 | 22.28 | 30.64 | 529. |
| 700 | 0.17111 | 58.69 | 0.0143 | 14755.6 | 20599.8 | 197.67 | 22.41 | 30.77 | 536. |
| 720 | 0.16636 | 60.36 | 0.0139 | 15205.6 | 21216.6 | 198.54 | 22.54 | 30.90 | 543. |
| 740 | 0.16187 | 62.03 | 0.0135 | 15658.2 | 21835.9 | 199.39 | 22.68 | 31.03 | 550. |
| 760 | 0.15762 | 63.70 | 0.0132 | 16113.5 | 22457.9 | 200.22 | 22.81 | 31.16 | 557. |
| 780 | 0.15359 | 65.37 | 0.0128 | 16571.4 | 23082.4 | 201.03 | 22.95 | 31.30 | 564. |
| 800 | 0.14975 | 67.04 | 0.0125 | 17032.0 | 23709.7 | 201.82 | 23.08 | 31.43 | 571. |
| 850 | 0.14096 | 71.21 | 0.0118 | 18195.0 | 25289.1 | 203.74 | 23.41 | 31.75 | 587. |
| 900 | 0.13315 | 75.38 | 0.0111 | 19374.1 | 26884.5 | 205.56 | 23.73 | 32.06 | 603. |
| 950 | 0.12616 | 79.55 | 0.0105 | 20568.7 | 28495.4 | 207.31 | 24.03 | 32.37 | 618. |
| 1000 | 0.11986 | 83.72 | 0.0100 | 21778.2 | 30121.1 | 208.97 | 24.33 | 32.66 | 633. |

Thermodynamic properties of nitrogen–Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1050 | 0.11417 | 87.88 | 0.0095 | 23001.8 | 31760.8 | 210.57 | 24.60 | 32.93 | 648. |
| 1100 | 0.10899 | 92.04 | 0.0091 | 24238.8 | 33413.8 | 212.11 | 24.86 | 33.19 | 662. |
| 1150 | 0.10426 | 96.21 | 0.0087 | 25488.4 | 35079.4 | 213.59 | 25.11 | 33.43 | 676. |
| 1200 | 0.09993 | 100.37 | 0.0083 | 26749.8 | 36756.8 | 215.02 | 25.34 | 33.66 | 690. |
| 1250 | 0.09594 | 104.53 | 0.0080 | 28022.3 | 38445.1 | 216.40 | 25.55 | 33.87 | 703. |
| 1300 | 0.09226 | 108.69 | 0.0077 | 29305.1 | 40143.9 | 217.73 | 25.75 | 34.07 | 716. |
| 1350 | 0.08885 | 112.85 | 0.0074 | 30597.6 | 41852.3 | 219.02 | 25.94 | 34.26 | 729. |
| 1400 | 0.08569 | 117.01 | 0.0071 | 31899.2 | 43569.7 | 220.27 | 26.12 | 34.43 | 742. |
| 1450 | 0.08274 | 121.17 | 0.0069 | 33209.2 | 45295.6 | 221.48 | 26.28 | 34.60 | 755. |
| 1500 | 0.07999 | 125.33 | 0.0067 | 34527.2 | 47029.3 | 222.66 | 26.43 | 34.75 | 767. |
| 1550 | 0.07741 | 129.49 | 0.0065 | 35852.6 | 48770.5 | 223.80 | 26.58 | 34.89 | 779. |
| 1600 | 0.07500 | 133.65 | 0.0063 | 37184.9 | 50518.6 | 224.91 | 26.71 | 35.03 | 791. |
| 1650 | 0.07273 | 137.80 | 0.0061 | 38523.6 | 52273.1 | 225.99 | 26.84 | 35.15 | 803. |
| 1700 | 0.07060 | 141.96 | 0.0059 | 39868.5 | 54033.8 | 227.04 | 26.95 | 35.27 | 814. |
| 1750 | 0.06858 | 146.12 | 0.0057 | 41219.1 | 55800.1 | 228.06 | 27.06 | 35.38 | 826. |
| 1800 | 0.06668 | 150.28 | 0.0056 | 42575.0 | 57571.7 | 229.06 | 27.17 | 35.48 | 837. |
| 1850 | 0.06488 | 154.44 | 0.0054 | 43935.9 | 59348.4 | 230.03 | 27.27 | 35.58 | 848. |
| 1900 | 0.06318 | 158.59 | 0.0053 | 45301.5 | 61129.7 | 230.98 | 27.36 | 35.67 | 859. |
| 1950 | 0.06156 | 162.75 | 0.0051 | 46671.5 | 62915.5 | 231.91 | 27.44 | 35.76 | 870. |
| 2000 | 0.06003 | 166.91 | 0.0050 | 48045.7 | 64705.4 | 232.82 | 27.52 | 35.84 | 881. |
| | | | | 15 bar Isobar | | | | | |
| * 63.478 | 30.99592 | 240.68 | 31.33 | −4207.0 | −4158.6 | 68.09 | | | |
| 64 | 30.92761 | 233.69 | 30.69 | −4178.6 | −4130.1 | 68.54 | | | |
| 66 | 30.66047 | 209.54 | 28.46 | −4068.2 | −4019.3 | 70.24 | | | |
| 68 | 30.38441 | 188.96 | 26.50 | −3956.3 | −3907.0 | 71.92 | | | |
| 70 | 30.09952 | 171.27 | 24.77 | −3843.6 | −3793.7 | 73.56 | | | |
| 72 | 29.80600 | 155.93 | 23.22 | −3730.3 | −3680.0 | 75.16 | 28.97 | 56.99 | 1046. |
| 74 | 29.50406 | 142.50 | 21.81 | −3616.7 | −3565.8 | 76.73 | 28.75 | 57.12 | 1005. |
| 76 | 29.19392 | 130.63 | 20.52 | −3502.9 | −3451.5 | 78.25 | 28.48 | 57.23 | 968. |
| 78 | 28.87574 | 120.02 | 19.33 | −3388.9 | −3336.9 | 79.74 | 28.20 | 57.33 | 933. |
| 80 | 28.54956 | 110.44 | 18.23 | −3274.7 | −3222.2 | 81.19 | 27.92 | 57.46 | 901. |
| 82 | 28.21529 | 101.72 | 17.21 | −3160.2 | −3107.1 | 82.61 | 27.65 | 57.64 | 870. |
| 84 | 27.87272 | 93.71 | 16.25 | −3045.4 | −2991.5 | 84.00 | 27.41 | 57.88 | 840. |
| 86 | 27.52145 | 86.29 | 15.35 | −2930.0 | −2875.5 | 85.37 | 27.19 | 58.20 | 812. |
| 88 | 27.16094 | 79.37 | 14.50 | −2813.9 | −2758.7 | 86.71 | 27.00 | 58.60 | 784. |
| 90 | 26.79045 | 72.88 | 13.69 | −2697.0 | −2641.0 | 88.03 | 26.84 | 59.10 | 757. |
| 92 | 26.40906 | 66.77 | 12.93 | −2579.0 | −2522.2 | 89.34 | 26.69 | 59.71 | 730. |
| 94 | 26.01560 | 60.98 | 12.19 | −2459.8 | −2402.1 | 90.63 | 26.57 | 60.44 | 704. |
| 96 | 25.60867 | 55.49 | 11.49 | −2339.0 | −2280.4 | 91.91 | 26.47 | 61.31 | 677. |
| 98 | 25.18652 | 50.26 | 10.82 | −2216.3 | −2156.8 | 93.19 | 26.38 | 62.34 | 651. |
| 100 | 24.74695 | 45.26 | 10.16 | −2091.5 | −2030.9 | 94.46 | 26.31 | 63.58 | 625. |
| 102 | 24.28717 | 40.46 | 9.53 | −1964.1 | −1902.3 | 95.73 | 26.25 | 65.06 | 598. |
| 104 | 23.80354 | 35.84 | 8.91 | −1833.5 | −1770.4 | 97.01 | 26.21 | 66.85 | 571. |
| 106 | 23.29108 | 31.38 | 8.30 | −1699.0 | −1634.6 | 98.31 | 26.19 | 69.08 | 544. |
| 108 | 22.74277 | 27.03 | 7.70 | −1559.6 | −1493.7 | 99.62 | 26.19 | 71.93 | 515. |
| 110 | 22.14800 | 22.77 | 7.09 | −1413.9 | −1346.2 | 100.97 | 26.21 | 75.74 | 485. |
| * 110.381 | 22.02806 | 21.96 | 6.97 | −1385.3 | −1317.2 | 101.24 | 26.22 | 76.61 | 479. |
| * 110.381 | 2.28501 | 4.12 | 0.2460 | 1755.3 | 2411.8 | 135.02 | 25.20 | 56.22 | 181. |
| 112 | 2.19534 | 4.51 | 0.2326 | 1816.5 | 2499.8 | 135.81 | 24.79 | 52.66 | 185. |
| 114 | 2.09999 | 4.95 | 0.2188 | 1887.3 | 2601.6 | 136.71 | 24.37 | 49.35 | 189. |
| 116 | 2.01743 | 5.36 | 0.2072 | 1954.2 | 2697.7 | 137.55 | 24.01 | 46.83 | 193. |
| 118 | 1.94462 | 5.74 | 0.1972 | 2017.9 | 2789.3 | 138.33 | 23.71 | 44.83 | 197. |
| 120 | 1.87954 | 6.10 | 0.1885 | 2079.2 | 2877.3 | 139.07 | 23.44 | 43.21 | 200. |
| 122 | 1.82071 | 6.45 | 0.1807 | 2138.4 | 2962.3 | 139.77 | 23.21 | 41.86 | 204. |
| 124 | 1.76708 | 6.77 | 0.1738 | 2196.0 | 3044.9 | 140.44 | 23.01 | 40.73 | 207. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 126 | 1.71782 | 7.09 | 0.1676 | 2252.1 | 3125.3 | 141.09 | 22.83 | 39.76 | 210. |
| 128 | 1.67230 | 7.39 | 0.1620 | 2307.0 | 3204.0 | 141.70 | 22.68 | 38.92 | 213. |
| 130 | 1.63002 | 7.69 | 0.1568 | 2360.8 | 3281.1 | 142.30 | 22.54 | 38.19 | 216. |
| 132 | 1.59057 | 7.97 | 0.1521 | 2413.8 | 3356.8 | 142.88 | 22.41 | 37.55 | 218. |
| 134 | 1.55361 | 8.25 | 0.1477 | 2465.8 | 3431.3 | 143.44 | 22.30 | 36.98 | 221. |
| 136 | 1.51887 | 8.52 | 0.1437 | 2517.2 | 3504.8 | 143.99 | 22.19 | 36.47 | 224. |
| 138 | 1.48611 | 8.79 | 0.1399 | 2567.9 | 3577.3 | 144.51 | 22.10 | 36.02 | 226. |
| 140 | 1.45514 | 9.05 | 0.1364 | 2618.0 | 3648.9 | 145.03 | 22.02 | 35.61 | 229. |
| 142 | 1.42578 | 9.31 | 0.1331 | 2667.7 | 3719.7 | 145.53 | 21.94 | 35.24 | 231. |
| 144 | 1.39788 | 9.56 | 0.1300 | 2716.8 | 3789.8 | 146.02 | 21.87 | 34.90 | 233. |
| 146 | 1.37133 | 9.80 | 0.1271 | 2765.5 | 3859.3 | 146.50 | 21.80 | 34.59 | 236. |
| 148 | 1.34600 | 10.05 | 0.1243 | 2813.8 | 3928.2 | 146.97 | 21.75 | 34.31 | 238. |
| 150 | 1.32180 | 10.28 | 0.1217 | 2861.8 | 3996.6 | 147.43 | 21.69 | 34.05 | 240. |
| 155 | 1.26571 | 10.87 | 0.1157 | 2980.3 | 4165.4 | 148.54 | 21.57 | 33.49 | 245. |
| 160 | 1.21505 | 11.44 | 0.1104 | 3097.1 | 4331.6 | 149.59 | 21.48 | 33.02 | 251. |
| 165 | 1.16896 | 11.99 | 0.1056 | 3212.5 | 4495.7 | 150.60 | 21.40 | 32.63 | 255. |
| 170 | 1.12678 | 12.53 | 0.1013 | 3326.7 | 4658.0 | 151.57 | 21.33 | 32.30 | 260. |
| 175 | 1.08796 | 13.06 | 0.0974 | 3440.0 | 4818.7 | 152.50 | 21.27 | 32.01 | 265. |
| 180 | 1.05207 | 13.59 | 0.0939 | 3552.4 | 4978.2 | 153.40 | 21.22 | 31.77 | 269. |
| 185 | 1.01877 | 14.10 | 0.0906 | 3664.1 | 5136.5 | 154.27 | 21.18 | 31.55 | 274. |
| 190 | 0.98774 | 14.61 | 0.0875 | 3775.1 | 5293.7 | 155.11 | 21.15 | 31.36 | 278. |
| 195 | 0.95876 | 15.11 | 0.0847 | 3885.6 | 5450.1 | 155.92 | 21.11 | 31.20 | 282. |
| 200 | 0.93159 | 15.60 | 0.0821 | 3995.6 | 5605.8 | 156.71 | 21.09 | 31.05 | 286. |
| 210 | 0.88202 | 16.58 | 0.0774 | 4214.3 | 5915.0 | 158.22 | 21.04 | 30.80 | 294. |
| 220 | 0.83786 | 17.54 | 0.0733 | 4431.6 | 6221.9 | 159.64 | 21.01 | 30.60 | 302. |
| 230 | 0.79822 | 18.48 | 0.0696 | 4647.8 | 6527.0 | 161.00 | 20.98 | 30.43 | 309. |
| 240 | 0.76239 | 19.41 | 0.0662 | 4863.0 | 6830.6 | 162.29 | 20.96 | 30.29 | 316. |
| 250 | 0.72982 | 20.34 | 0.0632 | 5077.5 | 7132.8 | 163.53 | 20.94 | 30.17 | 323. |
| 260 | 0.70006 | 21.25 | 0.0605 | 5291.3 | 7434.0 | 164.71 | 20.92 | 30.07 | 330. |
| 270 | 0.67275 | 22.16 | 0.0580 | 5504.6 | 7734.2 | 165.84 | 20.91 | 29.98 | 337. |
| 280 | 0.64758 | 23.06 | 0.0558 | 5717.4 | 8033.7 | 166.93 | 20.90 | 29.91 | 343. |
| 290 | 0.62430 | 23.95 | 0.0537 | 5929.8 | 8332.5 | 167.98 | 20.90 | 29.84 | 349. |
| 300 | 0.60271 | 24.84 | 0.0517 | 6141.8 | 8630.6 | 168.99 | 20.89 | 29.79 | 356. |
| 310 | 0.58260 | 25.73 | 0.0499 | 6353.6 | 8928.3 | 169.96 | 20.89 | 29.74 | 362. |
| 320 | 0.56384 | 26.61 | 0.0483 | 6565.2 | 9225.5 | 170.91 | 20.89 | 29.70 | 368. |
| 330 | 0.54629 | 27.49 | 0.0467 | 6776.5 | 9522.3 | 171.82 | 20.89 | 29.67 | 373. |
| 340 | 0.52982 | 28.36 | 0.0452 | 6987.7 | 9818.9 | 172.71 | 20.90 | 29.64 | 379. |
| 350 | 0.51435 | 29.24 | 0.0439 | 7198.8 | 10115.2 | 173.57 | 20.90 | 29.62 | 385. |
| 360 | 0.49978 | 30.10 | 0.0426 | 7409.9 | 10411.2 | 174.40 | 20.91 | 29.60 | 390. |
| 370 | 0.48602 | 30.97 | 0.0414 | 7620.9 | 10707.1 | 175.21 | 20.92 | 29.58 | 395. |
| 380 | 0.47303 | 31.84 | 0.0402 | 7831.9 | 11002.9 | 176.00 | 20.93 | 29.58 | 401. |
| 390 | 0.46072 | 32.70 | 0.0392 | 8042.9 | 11298.7 | 176.77 | 20.95 | 29.57 | 406. |
| 400 | 0.44905 | 33.56 | 0.0382 | 8254.0 | 11594.4 | 177.52 | 20.97 | 29.57 | 411. |
| 420 | 0.42743 | 35.27 | 0.0363 | 8676.5 | 12185.8 | 178.96 | 21.01 | 29.58 | 421. |
| 440 | 0.40783 | 36.98 | 0.0346 | 9099.6 | 12777.6 | 180.34 | 21.06 | 29.60 | 431. |
| 460 | 0.38997 | 38.69 | 0.0330 | 9523.6 | 13370.1 | 181.65 | 21.12 | 29.64 | 440. |
| 480 | 0.37363 | 40.39 | 0.0316 | 9948.7 | 13963.4 | 182.92 | 21.19 | 29.69 | 449. |
| 500 | 0.35862 | 42.09 | 0.0303 | 10375.1 | 14557.8 | 184.13 | 21.27 | 29.75 | 458. |
| 520 | 0.34478 | 43.78 | 0.0291 | 10803.1 | 15153.6 | 185.30 | 21.36 | 29.83 | 467. |
| 540 | 0.33198 | 45.47 | 0.0280 | 11232.7 | 15751.0 | 186.42 | 21.46 | 29.91 | 476. |
| 560 | 0.32011 | 47.16 | 0.0270 | 11664.2 | 16350.1 | 187.51 | 21.56 | 30.00 | 484. |
| 580 | 0.30907 | 48.85 | 0.0260 | 12097.7 | 16951.1 | 188.57 | 21.67 | 30.10 | 492. |
| 600 | 0.29876 | 50.53 | 0.0252 | 12533.4 | 17554.1 | 189.59 | 21.79 | 30.21 | 500. |
| 620 | 0.28913 | 52.22 | 0.0243 | 12971.3 | 18159.4 | 190.58 | 21.91 | 30.32 | 508. |
| 640 | 0.28010 | 53.90 | 0.0236 | 13411.6 | 18766.8 | 191.55 | 22.03 | 30.43 | 516. |
| 660 | 0.27162 | 55.58 | 0.0228 | 13854.4 | 19376.7 | 192.49 | 22.16 | 30.55 | 523. |
| 680 | 0.26365 | 57.26 | 0.0222 | 14299.6 | 19989.0 | 193.40 | 22.29 | 30.68 | 530. |
| 700 | 0.25613 | 58.93 | 0.0215 | 14747.4 | 20603.8 | 194.29 | 22.42 | 30.80 | 538. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 720 | 0.24903 | 60.61 | 0.0209 | 15197.8 | 21221.1 | 195.16 | 22.55 | 30.93 | 545. |
| 740 | 0.24231 | 62.28 | 0.0203 | 15650.7 | 21841.0 | 196.01 | 22.69 | 31.06 | 552. |
| 760 | 0.23595 | 63.96 | 0.0198 | 16106.4 | 22463.5 | 196.84 | 22.82 | 31.19 | 559. |
| 780 | 0.22992 | 65.63 | 0.0193 | 16564.6 | 23088.6 | 197.65 | 22.95 | 31.32 | 565. |
| 800 | 0.22419 | 67.30 | 0.0188 | 17025.5 | 23716.3 | 198.45 | 23.09 | 31.45 | 572. |
| 850 | 0.21104 | 71.48 | 0.0177 | 18189.2 | 25296.8 | 200.36 | 23.41 | 31.77 | 588. |
| 900 | 0.19936 | 75.66 | 0.0167 | 19368.9 | 26893.1 | 202.19 | 23.73 | 32.08 | 604. |
| 950 | 0.18890 | 79.83 | 0.0158 | 20564.0 | 28504.8 | 203.93 | 24.04 | 32.38 | 620. |
| 1000 | 0.17949 | 84.00 | 0.0150 | 21774.0 | 30131.2 | 205.60 | 24.33 | 32.67 | 635. |
| 1050 | 0.17097 | 88.17 | 0.0143 | 22998.1 | 31771.5 | 207.20 | 24.61 | 32.94 | 649. |
| 1100 | 0.16323 | 92.34 | 0.0137 | 24235.5 | 33425.1 | 208.74 | 24.87 | 33.20 | 663. |
| 1150 | 0.15616 | 96.50 | 0.0131 | 25485.4 | 35091.2 | 210.22 | 25.11 | 33.44 | 677. |
| 1200 | 0.14967 | 100.67 | 0.0125 | 26747.1 | 36768.9 | 211.65 | 25.34 | 33.67 | 691. |
| 1250 | 0.14371 | 104.83 | 0.0120 | 28019.8 | 38457.7 | 213.02 | 25.55 | 33.88 | 704. |
| 1300 | 0.13820 | 108.99 | 0.0115 | 29302.9 | 40156.8 | 214.36 | 25.76 | 34.08 | 718. |
| 1350 | 0.13310 | 113.16 | 0.0111 | 30595.7 | 41865.5 | 215.65 | 25.94 | 34.27 | 730. |
| 1400 | 0.12836 | 117.32 | 0.0107 | 31897.5 | 43583.2 | 216.90 | 26.12 | 34.44 | 743. |
| 1450 | 0.12395 | 121.48 | 0.0103 | 33207.7 | 45309.3 | 218.11 | 26.28 | 34.60 | 756. |
| 1500 | 0.11983 | 125.64 | 0.0100 | 34525.9 | 47043.4 | 219.28 | 26.44 | 34.76 | 768. |
| 1550 | 0.11598 | 129.80 | 0.0097 | 35851.4 | 48784.7 | 220.43 | 26.58 | 34.90 | 780. |
| 1600 | 0.11237 | 133.96 | 0.0094 | 37183.9 | 50533.0 | 221.54 | 26.71 | 35.03 | 792. |
| 1650 | 0.10897 | 138.11 | 0.0091 | 38522.8 | 52287.7 | 222.62 | 26.84 | 35.16 | 804. |
| 1700 | 0.10578 | 142.27 | 0.0088 | 39867.8 | 54048.5 | 223.67 | 26.96 | 35.27 | 815. |
| 1750 | 0.10276 | 146.43 | 0.0086 | 41218.5 | 55815.0 | 224.69 | 27.07 | 35.38 | 827. |
| 1800 | 0.09992 | 150.59 | 0.0083 | 42574.5 | 57586.7 | 225.69 | 27.17 | 35.49 | 838. |
| 1850 | 0.09723 | 154.75 | 0.0081 | 43935.5 | 59363.5 | 226.66 | 27.27 | 35.58 | 849. |
| 1900 | 0.09467 | 158.90 | 0.0079 | 45301.2 | 61145.0 | 227.61 | 27.36 | 35.67 | 860. |
| 1950 | 0.09225 | 163.06 | 0.0077 | 46671.4 | 62930.8 | 228.54 | 27.45 | 35.76 | 871. |
| 2000 | 0.08995 | 167.22 | 0.0075 | 48045.7 | 64720.9 | 229.45 | 27.53 | 35.84 | 882. |

20 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 63.587 | 31.00249 | 240.86 | 31.13 | −4205.4 | −4140.8 | 68.12 | | | |
| 64 | 30.94893 | 235.35 | 30.63 | −4182.9 | −4118.3 | 68.47 | | | |
| 66 | 30.68424 | 211.18 | 28.41 | −4072.9 | −4007.7 | 70.17 | | | |
| 68 | 30.41076 | 190.57 | 26.48 | −3961.4 | −3895.7 | 71.84 | | | |
| 70 | 30.12858 | 172.86 | 24.76 | −3849.1 | −3782.7 | 73.48 | | | |
| 72 | 29.83790 | 157.51 | 23.22 | −3736.2 | −3669.2 | 75.08 | 29.16 | 56.84 | 1047. |
| 74 | 29.53895 | 144.07 | 21.83 | −3623.1 | −3555.4 | 76.64 | 28.93 | 56.97 | 1006. |
| 76 | 29.23197 | 132.19 | 20.55 | −3509.8 | −3441.3 | 78.16 | 28.65 | 57.06 | 970. |
| 78 | 28.91713 | 121.58 | 19.38 | −3396.3 | −3327.1 | 79.64 | 28.35 | 57.16 | 935. |
| 80 | 28.59451 | 112.01 | 18.29 | −3282.6 | −3212.7 | 81.09 | 28.06 | 57.27 | 903. |
| 82 | 28.26406 | 103.30 | 17.27 | −3168.8 | −3098.0 | 82.51 | 27.79 | 57.43 | 873. |
| 84 | 27.92562 | 95.30 | 16.32 | −3054.5 | −2982.9 | 83.89 | 27.54 | 57.65 | 844. |
| 86 | 27.57886 | 87.90 | 15.43 | −2939.9 | −2867.3 | 85.25 | 27.32 | 57.94 | 816. |
| 88 | 27.22329 | 81.00 | 14.59 | −2824.6 | −2751.1 | 86.59 | 27.12 | 58.31 | 788. |
| 90 | 26.85829 | 74.54 | 13.79 | −2708.5 | −2634.0 | 87.90 | 26.95 | 58.77 | 762. |
| 92 | 26.48301 | 68.45 | 13.03 | −2591.5 | −2515.9 | 89.20 | 26.80 | 59.33 | 736. |
| 94 | 26.09647 | 62.69 | 12.30 | −2473.3 | −2396.6 | 90.48 | 26.67 | 60.00 | 710. |
| 96 | 25.69740 | 57.22 | 11.61 | −2353.7 | −2275.8 | 91.76 | 26.56 | 60.80 | 684. |
| 98 | 25.28430 | 52.02 | 10.94 | −2232.4 | −2153.3 | 93.02 | 26.46 | 61.75 | 658. |
| 100 | 24.85529 | 47.05 | 10.30 | −2109.2 | −2028.7 | 94.28 | 26.39 | 62.87 | 633. |
| 102 | 24.40801 | 42.30 | 9.67 | −1983.7 | −1901.7 | 95.54 | 26.32 | 64.19 | 607. |
| 104 | 23.93946 | 37.73 | 9.06 | −1855.3 | −1771.8 | 96.80 | 26.28 | 65.79 | 581. |
| 106 | 23.44565 | 33.33 | 8.47 | −1723.6 | −1638.3 | 98.07 | 26.24 | 67.73 | 554. |
| 108 | 22.92108 | 29.06 | 7.88 | −1587.8 | −1500.6 | 99.36 | 26.23 | 70.15 | 527. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 110 | 22.35789 | 24.90 | 7.29 | −1446.7 | −1357.3 | 100.67 | 26.23 | 73.27 | 498. |
| 112 | 21.74400 | 20.80 | 6.71 | −1298.7 | −1206.8 | 102.03 | 26.26 | 77.49 | 468. |
| 114 | 21.05936 | 16.71 | 6.10 | −1141.0 | −1046.1 | 103.45 | 26.33 | 83.61 | 435. |
| * 115.574 | 20.44721 | 13.47 | 5.61 | −1006.9 | −909.1 | 104.64 | 26.43 | 90.94 | 407. |
| * 115.574 | 3.22968 | 3.14 | 0.3711 | 1675.7 | 2294.9 | 132.35 | 26.34 | 74.90 | 179. |
| 116 | 3.18103 | 3.28 | 0.3633 | 1697.5 | 2326.2 | 132.63 | 26.18 | 72.24 | 180. |
| 118 | 2.98712 | 3.89 | 0.3327 | 1791.3 | 2460.9 | 133.78 | 25.51 | 63.14 | 185. |
| 120 | 2.83274 | 4.42 | 0.3090 | 1874.9 | 2580.9 | 134.79 | 24.98 | 57.29 | 190. |
| 122 | 2.70426 | 4.90 | 0.2899 | 1951.6 | 2691.2 | 135.70 | 24.54 | 53.16 | 195. |
| 124 | 2.59417 | 5.34 | 0.2739 | 2023.3 | 2794.2 | 136.53 | 24.18 | 50.07 | 199. |
| 126 | 2.49787 | 5.75 | 0.2603 | 2091.2 | 2891.9 | 137.32 | 23.87 | 47.65 | 202. |
| 128 | 2.41233 | 6.14 | 0.2484 | 2156.1 | 2985.2 | 138.05 | 23.60 | 45.71 | 206. |
| 130 | 2.33541 | 6.51 | 0.2380 | 2218.6 | 3074.9 | 138.75 | 23.36 | 44.11 | 209. |
| 132 | 2.26557 | 6.86 | 0.2287 | 2279.0 | 3161.8 | 139.41 | 23.16 | 42.77 | 213. |
| 134 | 2.20166 | 7.19 | 0.2203 | 2337.8 | 3246.2 | 140.04 | 22.97 | 41.63 | 216. |
| 136 | 2.14278 | 7.52 | 0.2128 | 2395.1 | 3328.4 | 140.65 | 22.81 | 40.65 | 219. |
| 138 | 2.08828 | 7.83 | 0.2059 | 2451.1 | 3408.8 | 141.24 | 22.67 | 39.80 | 222. |
| 140 | 2.03744 | 8.13 | 0.1996 | 2506.1 | 3487.7 | 141.81 | 22.54 | 39.05 | 224. |
| 142 | 1.98996 | 8.43 | 0.1937 | 2560.0 | 3565.1 | 142.36 | 22.42 | 38.38 | 227. |
| 144 | 1.94540 | 8.72 | 0.1883 | 2613.2 | 3641.3 | 142.89 | 22.31 | 37.79 | 230. |
| 146 | 1.90345 | 9.00 | 0.1833 | 2665.6 | 3716.3 | 143.41 | 22.21 | 37.26 | 232. |
| 148 | 1.86384 | 9.27 | 0.1786 | 2717.3 | 3790.3 | 143.91 | 22.13 | 36.79 | 235. |
| 150 | 1.82633 | 9.54 | 0.1743 | 2768.4 | 3863.5 | 144.40 | 22.05 | 36.36 | 237. |
| 155 | 1.74057 | 10.20 | 0.1644 | 2893.8 | 4042.9 | 145.58 | 21.87 | 35.44 | 243. |
| 160 | 1.66440 | 10.82 | 0.1559 | 3016.5 | 4218.2 | 146.69 | 21.73 | 34.70 | 248. |
| 165 | 1.59605 | 11.43 | 0.1484 | 3137.0 | 4390.1 | 147.75 | 21.62 | 34.09 | 254. |
| 170 | 1.53421 | 12.02 | 0.1417 | 3255.7 | 4559.3 | 148.76 | 21.52 | 33.59 | 259. |
| 175 | 1.47785 | 12.59 | 0.1357 | 3372.8 | 4726.1 | 149.73 | 21.44 | 33.16 | 264. |
| 180 | 1.42618 | 13.15 | 0.1303 | 3488.7 | 4891.0 | 150.66 | 21.38 | 32.80 | 268. |
| 185 | 1.37857 | 13.70 | 0.1254 | 3603.4 | 5054.2 | 151.55 | 21.32 | 32.49 | 273. |
| 190 | 1.33451 | 14.23 | 0.1208 | 3717.3 | 5216.0 | 152.41 | 21.27 | 32.21 | 277. |
| 195 | 1.29356 | 14.76 | 0.1167 | 3830.3 | 5376.4 | 153.25 | 21.23 | 31.97 | 282. |
| 200 | 1.25536 | 15.29 | 0.1129 | 3942.6 | 5535.7 | 154.05 | 21.19 | 31.76 | 286. |
| 210 | 1.18611 | 16.31 | 0.1060 | 4165.4 | 5851.5 | 155.59 | 21.13 | 31.41 | 294. |
| 220 | 1.12486 | 17.31 | 0.1000 | 4386.2 | 6164.2 | 157.05 | 21.08 | 31.12 | 302. |
| 230 | 1.07017 | 18.29 | 0.0947 | 4605.4 | 6474.2 | 158.43 | 21.04 | 30.89 | 310. |
| 240 | 1.02099 | 19.26 | 0.0900 | 4823.2 | 6782.1 | 159.74 | 21.01 | 30.70 | 317. |
| 250 | 0.97645 | 20.21 | 0.0858 | 5040.1 | 7088.3 | 160.99 | 20.99 | 30.54 | 324. |
| 260 | 0.93590 | 21.15 | 0.0820 | 5256.0 | 7392.9 | 162.18 | 20.97 | 30.40 | 331. |
| 270 | 0.89879 | 22.08 | 0.0785 | 5471.1 | 7696.3 | 163.33 | 20.96 | 30.28 | 338. |
| 280 | 0.86467 | 23.01 | 0.0753 | 5685.6 | 7998.6 | 164.43 | 20.94 | 30.18 | 344. |
| 290 | 0.83319 | 23.92 | 0.0724 | 5899.6 | 8300.0 | 165.48 | 20.93 | 30.09 | 350. |
| 300 | 0.80403 | 24.83 | 0.0697 | 6113.1 | 8600.5 | 166.50 | 20.93 | 30.02 | 357. |
| 310 | 0.77693 | 25.73 | 0.0673 | 6326.1 | 8900.4 | 167.49 | 20.92 | 29.95 | 363. |
| 320 | 0.75167 | 26.63 | 0.0650 | 6538.9 | 9199.6 | 168.44 | 20.92 | 29.90 | 369. |
| 330 | 0.72807 | 27.52 | 0.0628 | 6751.4 | 9498.3 | 169.36 | 20.92 | 29.85 | 374. |
| 340 | 0.70597 | 28.41 | 0.0608 | 6963.6 | 9796.6 | 170.25 | 20.92 | 29.81 | 380. |
| 350 | 0.68521 | 29.29 | 0.0590 | 7175.7 | 10094.5 | 171.11 | 20.93 | 29.77 | 386. |
| 360 | 0.66567 | 30.17 | 0.0572 | 7387.6 | 10392.1 | 171.95 | 20.93 | 29.74 | 391. |
| 370 | 0.64726 | 31.05 | 0.0556 | 7599.5 | 10689.4 | 172.76 | 20.94 | 29.72 | 397. |
| 380 | 0.62986 | 31.93 | 0.0540 | 7811.2 | 10986.5 | 173.55 | 20.95 | 29.70 | 402. |
| 390 | 0.61340 | 32.80 | 0.0525 | 8023.0 | 11283.5 | 174.33 | 20.97 | 29.69 | 407. |
| 400 | 0.59780 | 33.67 | 0.0512 | 8234.8 | 11580.4 | 175.08 | 20.99 | 29.68 | 412. |
| 420 | 0.56892 | 35.40 | 0.0486 | 8658.6 | 12174.0 | 176.53 | 21.03 | 29.68 | 422. |
| 440 | 0.54276 | 37.13 | 0.0463 | 9082.9 | 12767.7 | 177.91 | 21.08 | 29.69 | 432. |
| 460 | 0.51894 | 38.85 | 0.0442 | 9507.9 | 13361.9 | 179.23 | 21.14 | 29.72 | 442. |
| 480 | 0.49716 | 40.56 | 0.0423 | 9934.0 | 13956.8 | 180.49 | 21.21 | 29.77 | 451. |
| 500 | 0.47717 | 42.27 | 0.0405 | 10361.3 | 14552.7 | 181.71 | 21.29 | 29.82 | 460. |
| 520 | 0.45874 | 43.97 | 0.0389 | 10790.0 | 15149.8 | 182.88 | 21.37 | 29.89 | 469. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 540 | 0.44170 | 45.67 | 0.0374 | 11220.3 | 15748.3 | 184.01 | 21.47 | 29.97 | 477. |
| 560 | 0.42590 | 47.37 | 0.0361 | 11652.5 | 16348.5 | 185.10 | 21.57 | 30.05 | 485. |
| 580 | 0.41120 | 49.06 | 0.0348 | 12086.7 | 16950.5 | 186.16 | 21.68 | 30.15 | 493. |
| 600 | 0.39749 | 50.75 | 0.0336 | 12522.9 | 17554.5 | 187.18 | 21.80 | 30.25 | 501. |
| 620 | 0.38468 | 52.44 | 0.0325 | 12961.4 | 18160.5 | 188.17 | 21.92 | 30.36 | 509. |
| 640 | 0.37267 | 54.13 | 0.0315 | 13402.2 | 18768.8 | 189.14 | 22.04 | 30.47 | 517. |
| 660 | 0.36140 | 55.82 | 0.0305 | 13845.3 | 19379.4 | 190.08 | 22.17 | 30.59 | 524. |
| 680 | 0.35079 | 57.50 | 0.0296 | 14291.0 | 19992.4 | 190.99 | 22.30 | 30.71 | 532. |
| 700 | 0.34079 | 59.18 | 0.0287 | 14739.2 | 20607.8 | 191.89 | 22.43 | 30.83 | 539. |
| 720 | 0.33136 | 60.86 | 0.0279 | 15190.0 | 21225.8 | 192.76 | 22.56 | 30.96 | 546. |
| 740 | 0.32243 | 62.54 | 0.0272 | 15643.3 | 21846.2 | 193.61 | 22.69 | 31.09 | 553. |
| 760 | 0.31397 | 64.22 | 0.0264 | 16099.3 | 22469.3 | 194.44 | 22.83 | 31.21 | 560. |
| 780 | 0.30595 | 65.89 | 0.0257 | 16557.9 | 23094.8 | 195.25 | 22.96 | 31.34 | 567. |
| 800 | 0.29833 | 67.57 | 0.0251 | 17019.1 | 23723.0 | 196.05 | 23.09 | 31.47 | 573. |
| 850 | 0.28085 | 71.76 | 0.0236 | 18183.4 | 25304.5 | 197.96 | 23.42 | 31.79 | 590. |
| 900 | 0.26532 | 75.94 | 0.0223 | 19363.7 | 26901.8 | 199.79 | 23.74 | 32.10 | 605. |
| 950 | 0.25142 | 80.12 | 0.0211 | 20559.4 | 28514.2 | 201.53 | 24.04 | 32.40 | 621. |
| 1000 | 0.23891 | 84.29 | 0.0200 | 21769.8 | 30141.3 | 203.20 | 24.34 | 32.68 | 636. |
| 1050 | 0.22758 | 88.46 | 0.0191 | 22994.3 | 31782.3 | 204.80 | 24.61 | 32.95 | 650. |
| 1100 | 0.21729 | 92.63 | 0.0182 | 24232.1 | 33436.4 | 206.34 | 24.87 | 33.21 | 664. |
| 1150 | 0.20789 | 96.80 | 0.0174 | 25482.4 | 35102.9 | 207.82 | 25.11 | 33.45 | 678. |
| 1200 | 0.19927 | 100.97 | 0.0167 | 26744.4 | 36781.1 | 209.25 | 25.34 | 33.68 | 692. |
| 1250 | 0.19133 | 105.13 | 0.0160 | 28017.4 | 38470.3 | 210.63 | 25.56 | 33.89 | 705. |
| 1300 | 0.18401 | 109.30 | 0.0154 | 29300.7 | 40169.7 | 211.96 | 25.76 | 34.09 | 719. |
| 1350 | 0.17723 | 113.46 | 0.0148 | 30593.7 | 41878.7 | 213.25 | 25.95 | 34.27 | 731. |
| 1400 | 0.17093 | 117.62 | 0.0143 | 31895.8 | 43596.7 | 214.50 | 26.12 | 34.45 | 744. |
| 1450 | 0.16506 | 121.78 | 0.0138 | 33206.2 | 45323.1 | 215.71 | 26.29 | 34.61 | 757. |
| 1500 | 0.15958 | 125.95 | 0.0133 | 34524.6 | 47057.4 | 216.89 | 26.44 | 34.76 | 769. |
| 1550 | 0.15446 | 130.11 | 0.0129 | 35850.3 | 48799.0 | 218.03 | 26.58 | 34.90 | 781. |
| 1600 | 0.14965 | 134.27 | 0.0125 | 37182.9 | 50547.4 | 219.14 | 26.72 | 35.04 | 793. |
| 1650 | 0.14513 | 138.42 | 0.0121 | 38522.0 | 52302.3 | 220.22 | 26.84 | 35.16 | 805. |
| 1700 | 0.14088 | 142.58 | 0.0118 | 39867.1 | 54063.3 | 221.27 | 26.96 | 35.28 | 816. |
| 1750 | 0.13687 | 146.74 | 0.0114 | 41217.9 | 55829.9 | 222.30 | 27.07 | 35.39 | 828. |
| 1800 | 0.13309 | 150.90 | 0.0111 | 42574.0 | 57601.8 | 223.30 | 27.17 | 35.49 | 839. |
| 1850 | 0.12950 | 155.06 | 0.0108 | 43935.2 | 59378.7 | 224.27 | 27.27 | 35.59 | 850. |
| 1900 | 0.12611 | 159.22 | 0.0105 | 45301.0 | 61160.2 | 225.22 | 27.36 | 35.68 | 861. |
| 1950 | 0.12289 | 163.37 | 0.0103 | 46671.2 | 62946.2 | 226.15 | 27.45 | 35.76 | 872. |
| 2000 | 0.11983 | 167.53 | 0.0100 | 48045.6 | 64736.3 | 227.06 | 27.53 | 35.84 | 882. |
| | | | | 25 bar Isobar | | | | | |
| * 63.696 | 31.00917 | 241.06 | 30.93 | −4203.6 | −4123.0 | 68.14 | | | |
| 64 | 30.97010 | 237.02 | 30.57 | −4187.2 | −4106.5 | 68.40 | | | |
| 66 | 30.70783 | 212.81 | 28.37 | −4077.5 | −3996.1 | 70.10 | | | |
| 68 | 30.43689 | 192.18 | 26.45 | −3966.4 | −3884.3 | 71.77 | | | |
| 70 | 30.15738 | 174.45 | 24.75 | −3854.5 | −3771.6 | 73.40 | | | |
| 72 | 29.86949 | 159.08 | 23.23 | −3742.1 | −3658.4 | 75.00 | 29.34 | 56.70 | 1048. |
| 74 | 29.57347 | 145.63 | 21.84 | −3629.4 | −3544.8 | 76.55 | 29.10 | 56.82 | 1008. |
| 76 | 29.26958 | 133.74 | 20.58 | −3516.5 | −3431.1 | 78.07 | 28.81 | 56.90 | 971. |
| 78 | 28.95799 | 123.14 | 19.42 | −3403.6 | −3317.2 | 79.55 | 28.51 | 56.99 | 937. |
| 80 | 28.63884 | 113.57 | 18.34 | −3290.5 | −3203.2 | 80.99 | 28.21 | 57.09 | 906. |
| 82 | 28.31210 | 104.87 | 17.33 | −3177.1 | −3088.8 | 82.40 | 27.93 | 57.23 | 876. |
| 84 | 27.97766 | 96.89 | 16.39 | −3063.5 | −2974.2 | 83.78 | 27.67 | 57.43 | 847. |
| 86 | 27.63523 | 89.50 | 15.51 | −2949.5 | −2859.1 | 85.14 | 27.44 | 57.70 | 820. |
| 88 | 27.28441 | 82.62 | 14.67 | −2835.0 | −2743.3 | 86.47 | 27.23 | 58.04 | 793. |
| 90 | 26.92464 | 76.17 | 13.88 | −2719.7 | −2626.9 | 87.78 | 27.05 | 58.46 | 767. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 92 | 26.55519 | 70.10 | 13.13 | −2603.6 | −2509.4 | 89.07 | 26.90 | 58.98 | 741. |
| 94 | 26.17518 | 64.37 | 12.41 | −2486.4 | −2390.9 | 90.34 | 26.76 | 59.60 | 715. |
| 96 | 25.78350 | 58.93 | 11.72 | −2367.9 | −2271.0 | 91.60 | 26.64 | 60.33 | 690. |
| 98 | 25.37884 | 53.76 | 11.06 | −2248.0 | −2149.5 | 92.86 | 26.55 | 61.20 | 665. |
| 100 | 24.95959 | 48.82 | 10.43 | −2126.3 | −2026.1 | 94.10 | 26.46 | 62.21 | 640. |
| 102 | 24.52375 | 44.11 | 9.81 | −2002.4 | −1900.5 | 95.35 | 26.39 | 63.41 | 615. |
| 104 | 24.06881 | 39.58 | 9.21 | −1876.2 | −1772.3 | 96.59 | 26.34 | 64.83 | 590. |
| 106 | 23.59152 | 35.23 | 8.63 | −1746.9 | −1641.0 | 97.84 | 26.29 | 66.54 | 564. |
| 108 | 23.08754 | 31.03 | 8.05 | −1614.2 | −1505.9 | 99.10 | 26.27 | 68.62 | 538. |
| 110 | 22.55085 | 26.94 | 7.49 | −1477.0 | −1366.1 | 100.39 | 26.26 | 71.24 | 511. |
| 112 | 21.97268 | 22.95 | 6.92 | −1334.2 | −1220.4 | 101.70 | 26.27 | 74.65 | 483. |
| 114 | 21.33942 | 19.02 | 6.35 | −1183.9 | −1066.7 | 103.06 | 26.31 | 79.31 | 452. |
| 116 | 20.62802 | 15.10 | 5.75 | −1022.9 | −901.7 | 104.49 | 26.40 | 86.20 | 419. |
| 118 | 19.79380 | 11.12 | 5.13 | −845.2 | −718.9 | 106.06 | 26.56 | 97.72 | 382. |
| * 119.893 | 18.79339 | 7.19 | 4.45 | −648.6 | −515.6 | 107.77 | 26.85 | 120.49 | 339. |
| * 119.893 | 4.40675 | 2.09 | 0.5416 | 1542.1 | 2109.4 | 129.65 | 27.63 | 114.11 | 176. |
| 120 | 4.37948 | 2.15 | 0.5370 | 1550.7 | 2121.5 | 129.75 | 27.56 | 111.65 | 176. |
| 122 | 3.98539 | 2.97 | 0.4714 | 1685.6 | 2312.9 | 131.34 | 26.55 | 83.98 | 183. |
| 124 | 3.71363 | 3.64 | 0.4274 | 1793.3 | 2466.5 | 132.59 | 25.82 | 70.94 | 189. |
| 126 | 3.50458 | 4.22 | 0.3945 | 1886.6 | 2600.0 | 133.65 | 25.25 | 63.08 | 194. |
| 128 | 3.33432 | 4.74 | 0.3683 | 1970.7 | 2720.5 | 134.60 | 24.78 | 57.75 | 199. |
| 130 | 3.19062 | 5.21 | 0.3468 | 2048.4 | 2831.9 | 135.47 | 24.40 | 53.86 | 203. |
| 132 | 3.06634 | 5.65 | 0.3286 | 2121.3 | 2936.6 | 136.26 | 24.07 | 50.88 | 207. |
| 134 | 2.95690 | 6.07 | 0.3129 | 2190.4 | 3035.9 | 137.01 | 23.78 | 48.52 | 210. |
| 136 | 2.85918 | 6.46 | 0.2992 | 2256.6 | 3130.9 | 137.72 | 23.54 | 46.60 | 214. |
| 138 | 2.77098 | 6.83 | 0.2870 | 2320.3 | 3222.5 | 138.38 | 23.32 | 45.00 | 217. |
| 140 | 2.69065 | 7.19 | 0.2762 | 2381.9 | 3311.1 | 139.02 | 23.13 | 43.65 | 220. |
| 142 | 2.61695 | 7.53 | 0.2664 | 2441.9 | 3397.2 | 139.63 | 22.96 | 42.49 | 223. |
| 144 | 2.54891 | 7.86 | 0.2574 | 2500.3 | 3481.1 | 140.22 | 22.81 | 41.49 | 226. |
| 146 | 2.48577 | 8.18 | 0.2493 | 2557.5 | 3563.2 | 140.79 | 22.67 | 40.61 | 229. |
| 148 | 2.42689 | 8.50 | 0.2418 | 2613.5 | 3643.7 | 141.33 | 22.55 | 39.84 | 232. |
| 150 | 2.37177 | 8.80 | 0.2349 | 2668.6 | 3722.6 | 141.86 | 22.43 | 39.15 | 234. |
| 155 | 2.24781 | 9.53 | 0.2197 | 2802.5 | 3914.7 | 143.12 | 22.20 | 37.73 | 240. |
| 160 | 2.13985 | 10.22 | 0.2067 | 2932.2 | 4100.5 | 144.30 | 22.01 | 36.63 | 246. |
| 165 | 2.04450 | 10.88 | 0.1956 | 3058.5 | 4281.3 | 145.42 | 21.85 | 35.74 | 252. |
| 170 | 1.95932 | 11.51 | 0.1859 | 3182.2 | 4458.2 | 146.47 | 21.73 | 35.02 | 257. |
| 175 | 1.88252 | 12.13 | 0.1773 | 3303.7 | 4631.7 | 147.48 | 21.62 | 34.42 | 263. |
| 180 | 1.81275 | 12.73 | 0.1696 | 3423.4 | 4802.5 | 148.44 | 21.53 | 33.91 | 267. |
| 185 | 1.74894 | 13.31 | 0.1627 | 3541.5 | 4971.0 | 149.36 | 21.46 | 33.48 | 272. |
| 190 | 1.69027 | 13.88 | 0.1564 | 3658.4 | 5137.4 | 150.25 | 21.39 | 33.11 | 277. |
| 195 | 1.63606 | 14.44 | 0.1506 | 3774.1 | 5302.2 | 151.11 | 21.34 | 32.79 | 281. |
| 200 | 1.58576 | 14.98 | 0.1454 | 3888.9 | 5465.4 | 151.93 | 21.29 | 32.51 | 286. |
| 210 | 1.49513 | 16.05 | 0.1360 | 4116.0 | 5788.1 | 153.51 | 21.22 | 32.04 | 294. |
| 220 | 1.41553 | 17.10 | 0.1279 | 4340.4 | 6106.5 | 154.99 | 21.16 | 31.67 | 302. |
| 230 | 1.34488 | 18.11 | 0.1209 | 4562.7 | 6421.6 | 156.39 | 21.11 | 31.36 | 310. |
| 240 | 1.28163 | 19.11 | 0.1146 | 4783.3 | 6734.0 | 157.72 | 21.07 | 31.12 | 317. |
| 250 | 1.22458 | 20.09 | 0.1090 | 5002.6 | 7044.1 | 158.98 | 21.04 | 30.91 | 325. |
| 260 | 1.17281 | 21.06 | 0.1040 | 5220.6 | 7352.2 | 160.19 | 21.02 | 30.73 | 332. |
| 270 | 1.12556 | 22.02 | 0.0995 | 5437.7 | 7658.8 | 161.35 | 21.00 | 30.58 | 338. |
| 280 | 1.08224 | 22.96 | 0.0954 | 5653.9 | 7963.9 | 162.46 | 20.98 | 30.45 | 345. |
| 290 | 1.04233 | 23.89 | 0.0916 | 5869.4 | 8267.9 | 163.53 | 20.97 | 30.34 | 351. |
| 300 | 1.00544 | 24.82 | 0.0881 | 6084.3 | 8570.8 | 164.55 | 20.96 | 30.25 | 358. |
| 310 | 0.97121 | 25.74 | 0.0849 | 6298.7 | 8872.8 | 165.54 | 20.95 | 30.16 | 364. |
| 320 | 0.93936 | 26.65 | 0.0820 | 6512.7 | 9174.1 | 166.50 | 20.95 | 30.09 | 370. |
| 330 | 0.90963 | 27.56 | 0.0792 | 6726.3 | 9474.7 | 167.43 | 20.95 | 30.03 | 376. |
| 340 | 0.88181 | 28.46 | 0.0767 | 6939.6 | 9774.7 | 168.32 | 20.95 | 29.97 | 381. |
| 350 | 0.85571 | 29.36 | 0.0743 | 7152.6 | 10074.2 | 169.19 | 20.95 | 29.93 | 387. |
| 360 | 0.83117 | 30.25 | 0.0720 | 7365.4 | 10373.2 | 170.03 | 20.96 | 29.89 | 392. |
| 370 | 0.80805 | 31.14 | 0.0699 | 7578.1 | 10672.0 | 170.85 | 20.96 | 29.86 | 398. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 380 | 0.78623 | 32.02 | 0.0679 | 7790.7 | 10970.4 | 171.65 | 20.98 | 29.83 | 403. |
| 390 | 0.76560 | 32.91 | 0.0661 | 8003.2 | 11268.6 | 172.42 | 20.99 | 29.81 | 408. |
| 400 | 0.74605 | 33.78 | 0.0643 | 8215.7 | 11566.7 | 173.18 | 21.00 | 29.80 | 414. |
| 420 | 0.70989 | 35.53 | 0.0610 | 8640.8 | 12162.4 | 174.63 | 21.04 | 29.78 | 424. |
| 440 | 0.67717 | 37.27 | 0.0581 | 9066.2 | 12758.1 | 176.01 | 21.09 | 29.79 | 433. |
| 460 | 0.64739 | 39.01 | 0.0555 | 9492.3 | 13353.9 | 177.34 | 21.15 | 29.81 | 443. |
| 480 | 0.62018 | 40.73 | 0.0530 | 9919.3 | 13950.4 | 178.61 | 21.22 | 29.84 | 452. |
| 500 | 0.59521 | 42.45 | 0.0508 | 10347.4 | 14547.7 | 179.83 | 21.30 | 29.89 | 461. |
| 520 | 0.57220 | 44.16 | 0.0488 | 10777.0 | 15146.0 | 181.00 | 21.39 | 29.95 | 470. |
| 540 | 0.55094 | 45.87 | 0.0469 | 11208.0 | 15745.8 | 182.13 | 21.48 | 30.02 | 478. |
| 560 | 0.53122 | 47.58 | 0.0452 | 11640.9 | 16347.0 | 183.23 | 21.58 | 30.11 | 487. |
| 580 | 0.51289 | 49.28 | 0.0436 | 12075.6 | 16950.0 | 184.28 | 21.69 | 30.20 | 495. |
| 600 | 0.49579 | 50.98 | 0.0421 | 12512.5 | 17554.9 | 185.31 | 21.81 | 30.29 | 503. |
| 620 | 0.47981 | 52.67 | 0.0407 | 12951.4 | 18161.8 | 186.30 | 21.93 | 30.40 | 511. |
| 640 | 0.46484 | 54.37 | 0.0394 | 13392.7 | 18770.9 | 187.27 | 22.05 | 30.51 | 518. |
| 660 | 0.45079 | 56.06 | 0.0382 | 13836.4 | 19382.2 | 188.21 | 22.17 | 30.62 | 526. |
| 680 | 0.43756 | 57.74 | 0.0370 | 14282.5 | 19995.9 | 189.13 | 22.30 | 30.74 | 533. |
| 700 | 0.42510 | 59.43 | 0.0360 | 14731.1 | 20612.0 | 190.02 | 22.43 | 30.86 | 540. |
| 720 | 0.41334 | 61.11 | 0.0349 | 15182.2 | 21230.5 | 190.89 | 22.57 | 30.99 | 547. |
| 740 | 0.40221 | 62.80 | 0.0340 | 15635.9 | 21851.5 | 191.74 | 22.70 | 31.11 | 554. |
| 760 | 0.39167 | 64.48 | 0.0331 | 16092.2 | 22475.1 | 192.57 | 22.83 | 31.24 | 561. |
| 780 | 0.38168 | 66.16 | 0.0322 | 16551.1 | 23101.1 | 193.39 | 22.97 | 31.37 | 568. |
| 800 | 0.37218 | 67.84 | 0.0314 | 17012.6 | 23729.7 | 194.18 | 23.10 | 31.49 | 575. |
| 850 | 0.35040 | 72.03 | 0.0295 | 18177.7 | 25312.3 | 196.10 | 23.43 | 31.81 | 591. |
| 900 | 0.33104 | 76.22 | 0.0279 | 19358.5 | 26910.5 | 197.93 | 23.74 | 32.12 | 607. |
| 950 | 0.31372 | 80.40 | 0.0264 | 20554.8 | 28523.7 | 199.67 | 24.05 | 32.41 | 622. |
| 1000 | 0.29812 | 84.58 | 0.0251 | 21765.7 | 30151.5 | 201.34 | 24.34 | 32.70 | 637. |
| 1050 | 0.28401 | 88.76 | 0.0239 | 22990.6 | 31793.0 | 202.94 | 24.62 | 32.96 | 651. |
| 1100 | 0.27118 | 92.93 | 0.0228 | 24228.7 | 33447.7 | 204.48 | 24.87 | 33.22 | 666. |
| 1150 | 0.25946 | 97.10 | 0.0218 | 25479.3 | 35114.7 | 205.97 | 25.12 | 33.46 | 679. |
| 1200 | 0.24871 | 101.27 | 0.0209 | 26741.7 | 36793.4 | 207.39 | 25.35 | 33.68 | 693. |
| 1250 | 0.23882 | 105.44 | 0.0200 | 28015.0 | 38482.9 | 208.77 | 25.56 | 33.90 | 706. |
| 1300 | 0.22969 | 109.60 | 0.0192 | 29298.6 | 40182.7 | 210.11 | 25.76 | 34.09 | 720. |
| 1350 | 0.22124 | 113.77 | 0.0185 | 30591.8 | 41892.0 | 211.40 | 25.95 | 34.28 | 732. |
| 1400 | 0.21338 | 117.93 | 0.0179 | 31894.1 | 43610.3 | 212.65 | 26.12 | 34.45 | 745. |
| 1450 | 0.20606 | 122.09 | 0.0173 | 33204.7 | 45336.9 | 213.86 | 26.29 | 34.61 | 758. |
| 1500 | 0.19923 | 126.25 | 0.0167 | 34523.2 | 47071.4 | 215.03 | 26.44 | 34.76 | 770. |
| 1550 | 0.19284 | 130.42 | 0.0161 | 35849.1 | 48813.2 | 216.18 | 26.58 | 34.91 | 782. |
| 1600 | 0.18685 | 134.58 | 0.0156 | 37181.9 | 50561.9 | 217.29 | 26.72 | 35.04 | 794. |
| 1650 | 0.18121 | 138.74 | 0.0152 | 38521.1 | 52316.9 | 218.37 | 26.84 | 35.16 | 805. |
| 1700 | 0.17591 | 142.89 | 0.0147 | 39866.4 | 54078.0 | 219.42 | 26.96 | 35.28 | 817. |
| 1750 | 0.17091 | 147.05 | 0.0143 | 41217.3 | 55844.8 | 220.44 | 27.07 | 35.39 | 828. |
| 1800 | 0.16619 | 151.21 | 0.0139 | 42573.6 | 57616.8 | 221.44 | 27.17 | 35.49 | 840. |
| 1850 | 0.16172 | 155.37 | 0.0135 | 43934.8 | 59393.8 | 222.42 | 27.27 | 35.59 | 851. |
| 1900 | 0.15748 | 159.53 | 0.0132 | 45300.8 | 61175.5 | 223.37 | 27.36 | 35.68 | 862. |
| 1950 | 0.15346 | 163.69 | 0.0128 | 46671.1 | 62961.6 | 224.29 | 27.45 | 35.76 | 873. |
| 2000 | 0.14964 | 167.84 | 0.0125 | 48045.6 | 64751.8 | 225.20 | 27.53 | 35.84 | 883. |
| | | | | 30 bar Isobar | | | | | |
| * 63.805 | 31.01595 | 241.26 | 30.74 | −4201.9 | −4105.2 | 68.17 | | | |
| 64 | 30.99113 | 238.68 | 30.51 | −4191.4 | −4094.6 | 68.33 | | | |
| 66 | 30.73123 | 214.45 | 28.32 | −4082.1 | −3984.5 | 70.03 | | | |
| 68 | 30.46280 | 193.79 | 26.42 | −3971.4 | −3872.9 | 71.69 | | | |
| 70 | 30.18591 | 176.04 | 24.74 | −3859.8 | −3760.5 | 73.32 | | | |
| 72 | 29.90076 | 160.65 | 23.23 | −3747.8 | −3647.5 | 74.91 | 29.51 | 56.56 | 1048. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 74 | 29.60762 | 147.19 | 21.86 | −3635.6 | −3534.3 | 76.47 | 29.26 | 56.67 | 1009. |
| 76 | 29.30674 | 135.30 | 20.61 | −3523.2 | −3420.8 | 77.98 | 28.97 | 56.75 | 973. |
| 78 | 28.99835 | 124.69 | 19.46 | −3410.7 | −3307.3 | 79.45 | 28.66 | 56.82 | 939. |
| 80 | 28.68256 | 115.13 | 18.39 | −3298.1 | −3193.5 | 80.89 | 28.35 | 56.91 | 908. |
| 82 | 28.35943 | 106.44 | 17.39 | −3185.4 | −3079.6 | 82.30 | 28.06 | 57.04 | 879. |
| 84 | 28.02885 | 98.46 | 16.46 | −3072.4 | −2965.3 | 83.68 | 27.80 | 57.22 | 851. |
| 86 | 27.69061 | 91.09 | 15.58 | −2959.0 | −2850.7 | 85.03 | 27.56 | 57.46 | 823. |
| 88 | 27.34435 | 84.22 | 14.76 | −2845.2 | −2735.4 | 86.35 | 27.35 | 57.77 | 797. |
| 90 | 26.98959 | 77.80 | 13.97 | −2730.7 | −2619.5 | 87.65 | 27.16 | 58.16 | 771. |
| 92 | 26.62569 | 71.75 | 13.23 | −2615.4 | −2502.7 | 88.94 | 27.00 | 58.64 | 746. |
| 94 | 26.25186 | 66.04 | 12.52 | −2499.2 | −2384.9 | 90.20 | 26.85 | 59.21 | 721. |
| 96 | 25.86715 | 60.62 | 11.84 | −2381.8 | −2265.8 | 91.46 | 26.73 | 59.89 | 696. |
| 98 | 25.47040 | 55.47 | 11.18 | −2263.0 | −2145.2 | 92.70 | 26.62 | 60.69 | 672. |
| 100 | 25.06021 | 50.57 | 10.55 | −2142.7 | −2023.0 | 93.93 | 26.53 | 61.61 | 647. |
| 102 | 24.63488 | 45.88 | 9.95 | −2020.5 | −1898.7 | 95.17 | 26.46 | 62.70 | 623. |
| 104 | 24.19231 | 41.40 | 9.36 | −1896.1 | −1772.1 | 96.39 | 26.40 | 63.97 | 598. |
| 106 | 23.72981 | 37.09 | 8.78 | −1769.1 | −1642.6 | 97.63 | 26.35 | 65.48 | 574. |
| 108 | 23.24390 | 32.94 | 8.22 | −1639.0 | −1509.9 | 98.87 | 26.31 | 67.30 | 548. |
| 110 | 22.72990 | 28.92 | 7.66 | −1505.1 | −1373.2 | 100.12 | 26.29 | 69.54 | 523. |
| 112 | 22.18123 | 25.02 | 7.12 | −1366.6 | −1231.4 | 101.40 | 26.28 | 72.35 | 496. |
| 114 | 21.58824 | 21.19 | 6.57 | −1222.1 | −1083.2 | 102.71 | 26.30 | 76.05 | 468. |
| 116 | 20.93579 | 17.43 | 6.01 | −1069.5 | −926.2 | 104.08 | 26.35 | 81.16 | 438. |
| 118 | 20.19790 | 13.67 | 5.43 | −905.4 | −756.8 | 105.52 | 26.45 | 88.82 | 405. |
| 120 | 19.32330 | 9.88 | 4.81 | −722.7 | −567.5 | 107.11 | 26.63 | 101.90 | 367. |
| 122 | 18.18128 | 5.95 | 4.10 | −504.2 | −339.2 | 109.00 | 27.00 | 131.22 | 321. |
| * 123.607 | 16.70296 | 2.47 | 3.33 | −254.3 | −74.7 | 111.15 | 27.70 | 226.24 | 268. |
| * 123.607 | 6.11671 | 0.97 | 0.8104 | 1311.4 | 1801.8 | 126.33 | 29.19 | 253.26 | 173. |
| 124 | 5.83858 | 1.26 | 0.7625 | 1375.2 | 1889.0 | 127.04 | 28.75 | 196.75 | 175. |
| 126 | 5.05687 | 2.32 | 0.6289 | 1580.6 | 2173.9 | 129.32 | 27.33 | 111.32 | 184. |
| 128 | 4.61994 | 3.10 | 0.5558 | 1718.6 | 2367.9 | 130.85 | 26.43 | 86.10 | 190. |
| 130 | 4.31088 | 3.76 | 0.5053 | 1830.2 | 2526.1 | 132.07 | 25.75 | 73.25 | 195. |
| 132 | 4.07084 | 4.34 | 0.4670 | 1927.1 | 2664.1 | 133.13 | 25.22 | 65.26 | 200. |
| 134 | 3.87448 | 4.86 | 0.4364 | 2014.5 | 2788.8 | 134.06 | 24.78 | 59.75 | 205. |
| 136 | 3.70840 | 5.34 | 0.4111 | 2095.0 | 2904.0 | 134.92 | 24.40 | 55.69 | 209. |
| 138 | 3.56458 | 5.79 | 0.3896 | 2170.5 | 3012.1 | 135.71 | 24.09 | 52.56 | 212. |
| 140 | 3.43787 | 6.21 | 0.3711 | 2242.0 | 3114.7 | 136.44 | 23.81 | 50.06 | 216. |
| 142 | 3.32470 | 6.61 | 0.3548 | 2310.4 | 3212.7 | 137.14 | 23.57 | 48.03 | 219. |
| 144 | 3.22256 | 7.00 | 0.3404 | 2376.1 | 3307.0 | 137.80 | 23.36 | 46.33 | 223. |
| 146 | 3.12953 | 7.36 | 0.3275 | 2439.6 | 3398.2 | 138.43 | 23.17 | 44.89 | 226. |
| 148 | 3.04420 | 7.72 | 0.3159 | 2501.2 | 3486.7 | 139.03 | 23.01 | 43.66 | 229. |
| 150 | 2.96544 | 8.06 | 0.3053 | 2561.3 | 3572.9 | 139.61 | 22.86 | 42.59 | 231. |
| 155 | 2.79184 | 8.86 | 0.2825 | 2705.7 | 3780.2 | 140.97 | 22.54 | 40.45 | 238. |
| 160 | 2.64415 | 9.62 | 0.2637 | 2843.7 | 3978.3 | 142.23 | 22.30 | 38.84 | 245. |
| 165 | 2.51602 | 10.34 | 0.2479 | 2976.9 | 4169.2 | 143.40 | 22.10 | 37.59 | 251. |
| 170 | 2.40318 | 11.02 | 0.2343 | 3106.3 | 4354.6 | 144.51 | 21.94 | 36.60 | 256. |
| 175 | 2.30262 | 11.68 | 0.2224 | 3232.6 | 4535.5 | 145.56 | 21.80 | 35.78 | 262. |
| 180 | 2.21213 | 12.32 | 0.2120 | 3356.5 | 4712.7 | 146.55 | 21.69 | 35.11 | 267. |
| 185 | 2.13005 | 12.94 | 0.2026 | 3478.4 | 4886.8 | 147.51 | 21.60 | 34.54 | 272. |
| 190 | 2.05510 | 13.54 | 0.1942 | 3598.5 | 5058.3 | 148.42 | 21.52 | 34.06 | 277. |
| 195 | 1.98626 | 14.12 | 0.1866 | 3717.1 | 5227.5 | 149.30 | 21.45 | 33.65 | 281. |
| 200 | 1.92270 | 14.70 | 0.1797 | 3834.5 | 5394.8 | 150.15 | 21.40 | 33.28 | 286. |
| 210 | 1.80894 | 15.82 | 0.1675 | 4066.1 | 5724.5 | 151.76 | 21.30 | 32.69 | 294. |
| 220 | 1.70973 | 16.90 | 0.1571 | 4294.3 | 6049.0 | 153.27 | 21.23 | 32.22 | 303. |
| 230 | 1.62218 | 17.95 | 0.1481 | 4519.9 | 6369.3 | 154.69 | 21.17 | 31.84 | 310. |
| 240 | 1.54416 | 18.98 | 0.1401 | 4743.3 | 6686.1 | 156.04 | 21.13 | 31.54 | 318. |
| 250 | 1.47408 | 19.99 | 0.1331 | 4965.0 | 7000.2 | 157.32 | 21.09 | 31.28 | 325. |
| 260 | 1.41067 | 20.98 | 0.1267 | 5185.2 | 7311.9 | 158.55 | 21.06 | 31.06 | 332. |
| 270 | 1.35297 | 21.96 | 0.1211 | 5404.2 | 7621.6 | 159.71 | 21.04 | 30.88 | 339. |
| 280 | 1.30018 | 22.92 | 0.1159 | 5622.2 | 7929.6 | 160.83 | 21.02 | 30.72 | 346. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 290 | 1.25166 | 23.88 | 0.1112 | 5839.3 | 8236.1 | 161.91 | 21.00 | 30.59 | 352. |
| 300 | 1.20688 | 24.82 | 0.1069 | 6055.7 | 8541.4 | 162.94 | 20.99 | 30.47 | 359. |
| 310 | 1.16540 | 25.76 | 0.1029 | 6271.4 | 8845.6 | 163.94 | 20.98 | 30.37 | 365. |
| 320 | 1.12685 | 26.69 | 0.0993 | 6486.6 | 9148.9 | 164.91 | 20.98 | 30.28 | 371. |
| 330 | 1.09090 | 27.61 | 0.0959 | 6701.3 | 9451.3 | 165.84 | 20.97 | 30.21 | 377. |
| 340 | 1.05730 | 28.52 | 0.0927 | 6915.6 | 9753.0 | 166.74 | 20.97 | 30.14 | 383. |
| 350 | 1.02581 | 29.43 | 0.0898 | 7129.6 | 10054.1 | 167.61 | 20.97 | 30.08 | 388. |
| 360 | 0.99623 | 30.33 | 0.0870 | 7343.4 | 10354.7 | 168.46 | 20.98 | 30.03 | 394. |
| 370 | 0.96838 | 31.23 | 0.0844 | 7556.9 | 10654.8 | 169.28 | 20.99 | 29.99 | 399. |
| 380 | 0.94211 | 32.13 | 0.0820 | 7770.2 | 10954.6 | 170.08 | 21.00 | 29.96 | 405. |
| 390 | 0.91729 | 33.02 | 0.0797 | 7983.5 | 11254.0 | 170.86 | 21.01 | 29.93 | 410. |
| 400 | 0.89378 | 33.91 | 0.0776 | 8196.7 | 11553.2 | 171.61 | 21.02 | 29.91 | 415. |
| 420 | 0.85033 | 35.67 | 0.0736 | 8623.0 | 12151.1 | 173.07 | 21.06 | 29.88 | 425. |
| 440 | 0.81104 | 37.43 | 0.0700 | 9049.6 | 12748.6 | 174.46 | 21.11 | 29.87 | 435. |
| 460 | 0.77531 | 39.17 | 0.0668 | 9476.7 | 13346.2 | 175.79 | 21.17 | 29.89 | 444. |
| 480 | 0.74267 | 40.91 | 0.0639 | 9904.7 | 13944.1 | 177.06 | 21.24 | 29.91 | 454. |
| 500 | 0.71273 | 42.64 | 0.0612 | 10333.7 | 14542.8 | 178.28 | 21.31 | 29.96 | 463. |
| 520 | 0.68517 | 44.36 | 0.0587 | 10764.0 | 15142.5 | 179.46 | 21.40 | 30.01 | 471. |
| 540 | 0.65969 | 46.08 | 0.0565 | 11195.8 | 15743.4 | 180.59 | 21.49 | 30.08 | 480. |
| 560 | 0.63608 | 47.79 | 0.0544 | 11629.3 | 16345.7 | 181.69 | 21.59 | 30.16 | 488. |
| 580 | 0.61412 | 49.50 | 0.0524 | 12064.7 | 16949.7 | 182.75 | 21.70 | 30.24 | 496. |
| 600 | 0.59366 | 51.20 | 0.0506 | 12502.0 | 17555.5 | 183.78 | 21.82 | 30.34 | 504. |
| 620 | 0.57453 | 52.90 | 0.0489 | 12941.6 | 18163.2 | 184.77 | 21.93 | 30.44 | 512. |
| 640 | 0.55661 | 54.60 | 0.0474 | 13383.3 | 18773.1 | 185.74 | 22.06 | 30.55 | 520. |
| 660 | 0.53979 | 56.30 | 0.0459 | 13827.4 | 19385.1 | 186.68 | 22.18 | 30.66 | 527. |
| 680 | 0.52397 | 57.99 | 0.0445 | 14274.0 | 19999.5 | 187.60 | 22.31 | 30.78 | 534. |
| 700 | 0.50906 | 59.68 | 0.0432 | 14723.0 | 20616.2 | 188.49 | 22.44 | 30.90 | 542. |
| 720 | 0.49498 | 61.37 | 0.0420 | 15174.5 | 21235.3 | 189.36 | 22.57 | 31.02 | 549. |
| 740 | 0.48167 | 63.06 | 0.0408 | 15628.5 | 21856.9 | 190.22 | 22.71 | 31.14 | 556. |
| 760 | 0.46906 | 64.74 | 0.0397 | 16085.2 | 22480.9 | 191.05 | 22.84 | 31.27 | 562. |
| 780 | 0.45710 | 66.43 | 0.0387 | 16544.4 | 23107.5 | 191.86 | 22.97 | 31.39 | 569. |
| 800 | 0.44574 | 68.11 | 0.0377 | 17006.2 | 23736.5 | 192.66 | 23.11 | 31.52 | 576. |
| 850 | 0.41968 | 72.31 | 0.0355 | 18171.9 | 25320.2 | 194.58 | 23.43 | 31.83 | 592. |
| 900 | 0.39652 | 76.50 | 0.0335 | 19353.4 | 26919.2 | 196.41 | 23.75 | 32.13 | 608. |
| 950 | 0.37579 | 80.69 | 0.0317 | 20550.1 | 28533.2 | 198.15 | 24.05 | 32.43 | 623. |
| 1000 | 0.35714 | 84.87 | 0.0301 | 21761.5 | 30161.7 | 199.82 | 24.34 | 32.71 | 638. |
| 1050 | 0.34025 | 89.05 | 0.0286 | 22986.9 | 31803.8 | 201.42 | 24.62 | 32.98 | 653. |
| 1100 | 0.32490 | 93.23 | 0.0273 | 24225.4 | 33459.0 | 202.96 | 24.88 | 33.23 | 667. |
| 1150 | 0.31087 | 97.40 | 0.0261 | 25476.3 | 35126.5 | 204.45 | 25.12 | 33.47 | 681. |
| 1200 | 0.29801 | 101.57 | 0.0250 | 26739.0 | 36805.6 | 205.88 | 25.35 | 33.69 | 694. |
| 1250 | 0.28618 | 105.74 | 0.0240 | 28012.6 | 38495.5 | 207.26 | 25.57 | 33.90 | 708. |
| 1300 | 0.27525 | 109.91 | 0.0231 | 29296.4 | 40195.7 | 208.59 | 25.77 | 34.10 | 721. |
| 1350 | 0.26513 | 114.07 | 0.0222 | 30589.9 | 41905.3 | 209.88 | 25.95 | 34.28 | 733. |
| 1400 | 0.25572 | 118.24 | 0.0214 | 31892.4 | 43623.8 | 211.13 | 26.13 | 34.46 | 746. |
| 1450 | 0.24696 | 122.40 | 0.0207 | 33203.2 | 45350.7 | 212.34 | 26.29 | 34.62 | 759. |
| 1500 | 0.23879 | 126.56 | 0.0200 | 34521.9 | 47085.5 | 213.52 | 26.44 | 34.77 | 771. |
| 1550 | 0.23113 | 130.73 | 0.0194 | 35848.0 | 48827.5 | 214.66 | 26.59 | 34.91 | 783. |
| 1600 | 0.22396 | 134.89 | 0.0188 | 37180.9 | 50576.3 | 215.77 | 26.72 | 35.04 | 795. |
| 1650 | 0.21721 | 139.05 | 0.0182 | 38520.3 | 52331.6 | 216.85 | 26.85 | 35.17 | 806. |
| 1700 | 0.21086 | 143.21 | 0.0177 | 39865.7 | 54092.8 | 217.90 | 26.96 | 35.28 | 818. |
| 1750 | 0.20488 | 147.37 | 0.0171 | 41216.8 | 55859.7 | 218.93 | 27.07 | 35.39 | 829. |
| 1800 | 0.19922 | 151.52 | 0.0167 | 42573.1 | 57631.9 | 219.93 | 27.18 | 35.49 | 840. |
| 1850 | 0.19387 | 155.68 | 0.0162 | 43934.5 | 59409.0 | 220.90 | 27.27 | 35.59 | 852. |
| 1900 | 0.18879 | 159.84 | 0.0158 | 45300.5 | 61190.8 | 221.85 | 27.36 | 35.68 | 863. |
| 1950 | 0.18398 | 164.00 | 0.0154 | 46670.9 | 62977.0 | 222.78 | 27.45 | 35.77 | 873. |
| 2000 | 0.17941 | 168.16 | 0.0150 | 48045.5 | 64767.3 | 223.68 | 27.53 | 35.85 | 884. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 35 bar Isobar | | | | | |
| 63.914 | 31.02283 | 241.48 | 30.54 | −4200.2 | −4087.4 | 68.20 | | | |
| 64 | 31.01200 | 240.35 | 30.44 | −4195.6 | −4082.7 | 68.27 | | | |
| 66 | 30.75446 | 216.08 | 28.28 | −4086.6 | −3972.8 | 69.96 | | | |
| 68 | 30.48849 | 195.40 | 26.39 | −3976.3 | −3861.5 | 71.62 | | | |
| 70 | 30.21419 | 177.62 | 24.73 | −3865.1 | −3749.3 | 73.25 | | | |
| 72 | 29.93174 | 162.22 | 23.23 | −3753.5 | −3636.6 | 74.83 | 29.69 | 56.43 | 1049. |
| 74 | 29.64141 | 148.74 | 21.88 | −3641.7 | −3523.6 | 76.38 | 29.43 | 56.53 | 1010. |
| 76 | 29.34349 | 136.84 | 20.64 | −3529.8 | −3410.5 | 77.89 | 29.12 | 56.60 | 974. |
| 78 | 29.03820 | 126.23 | 19.50 | −3417.8 | −3297.2 | 79.36 | 28.80 | 56.66 | 942. |
| 80 | 28.72570 | 116.68 | 18.44 | −3305.7 | −3183.8 | 80.80 | 28.49 | 56.74 | 911. |
| 82 | 28.40606 | 107.99 | 17.45 | −3193.5 | −3070.2 | 82.20 | 28.19 | 56.85 | 882. |
| 84 | 28.07923 | 100.02 | 16.53 | −3081.0 | −2956.4 | 83.57 | 27.92 | 57.01 | 854. |
| 86 | 27.74503 | 92.66 | 15.66 | −2968.3 | −2842.1 | 84.92 | 27.67 | 57.24 | 827. |
| 88 | 27.40316 | 85.82 | 14.84 | −2855.1 | −2727.4 | 86.23 | 27.45 | 57.52 | 801. |
| 90 | 27.05320 | 79.41 | 14.06 | −2741.4 | −2612.0 | 87.53 | 27.26 | 57.88 | 776. |
| 92 | 26.69460 | 73.38 | 13.32 | −2626.9 | −2495.8 | 88.81 | 27.09 | 58.32 | 751. |
| 94 | 26.32665 | 67.68 | 12.62 | −2511.6 | −2378.7 | 90.07 | 26.94 | 58.85 | 726. |
| 96 | 25.94851 | 62.29 | 11.95 | −2395.2 | −2260.3 | 91.31 | 26.81 | 59.48 | 702. |
| 98 | 25.55918 | 57.17 | 11.30 | −2277.6 | −2140.7 | 92.55 | 26.70 | 60.21 | 678. |
| 100 | 25.15744 | 52.29 | 10.68 | −2158.6 | −2019.4 | 93.77 | 26.61 | 61.06 | 654. |
| 102 | 24.74182 | 47.63 | 10.08 | −2037.8 | −1896.4 | 94.99 | 26.52 | 62.04 | 631. |
| 104 | 24.31056 | 43.18 | 9.49 | −1915.1 | −1771.1 | 96.21 | 26.45 | 63.19 | 607. |
| 106 | 23.86141 | 38.91 | 8.93 | −1790.1 | −1643.4 | 97.42 | 26.40 | 64.54 | 583. |
| 108 | 23.39155 | 34.80 | 8.38 | −1662.4 | −1512.8 | 98.64 | 26.35 | 66.14 | 558. |
| 110 | 22.89726 | 30.84 | 7.83 | −1531.5 | −1378.6 | 99.87 | 26.32 | 68.07 | 534. |
| 112 | 22.37351 | 27.01 | 7.30 | −1396.6 | −1240.2 | 101.12 | 26.30 | 70.45 | 508. |
| 114 | 21.81322 | 23.27 | 6.77 | −1256.9 | −1096.4 | 102.39 | 26.30 | 73.46 | 482. |
| 116 | 21.20591 | 19.62 | 6.23 | −1110.8 | −945.7 | 103.70 | 26.33 | 77.44 | 454. |
| 118 | 20.53506 | 16.02 | 5.69 | −956.1 | −785.6 | 105.07 | 26.39 | 82.98 | 424. |
| 120 | 19.77218 | 12.45 | 5.13 | −789.0 | −611.9 | 106.53 | 26.50 | 91.34 | 391. |
| 122 | 18.86086 | 8.87 | 4.52 | −601.9 | −416.4 | 108.15 | 26.70 | 105.75 | 354. |
| 124 | 17.65795 | 5.24 | 3.83 | −376.1 | −177.8 | 110.09 | 27.10 | 138.07 | 309. |
| 126 | 15.46510 | 1.47 | 2.83 | −19.9 | 206.4 | 113.16 | 28.21 | 314.88 | 242. |
| 128 | 7.22037 | 1.02 | 0.9812 | 1240.5 | 1725.2 | 125.13 | 29.16 | 261.99 | 180. |
| 130 | 6.06141 | 2.07 | 0.7810 | 1503.1 | 2080.6 | 127.88 | 27.68 | 131.78 | 188. |
| 132 | 5.47053 | 2.88 | 0.6802 | 1665.1 | 2304.9 | 129.60 | 26.72 | 97.56 | 194. |
| 134 | 5.06908 | 3.56 | 0.6130 | 1791.5 | 2481.9 | 130.93 | 26.01 | 81.02 | 199. |
| 136 | 4.76472 | 4.16 | 0.5632 | 1898.7 | 2633.3 | 132.05 | 25.45 | 71.07 | 204. |
| 138 | 4.51980 | 4.71 | 0.5239 | 1993.9 | 2768.3 | 133.03 | 24.99 | 64.35 | 208. |
| 140 | 4.31513 | 5.21 | 0.4918 | 2080.8 | 2891.9 | 133.92 | 24.60 | 59.48 | 212. |
| 142 | 4.13956 | 5.68 | 0.4647 | 2161.5 | 3007.0 | 134.74 | 24.27 | 55.77 | 216. |
| 144 | 3.98602 | 6.12 | 0.4415 | 2237.5 | 3115.5 | 135.50 | 23.98 | 52.85 | 219. |
| 146 | 3.84973 | 6.54 | 0.4213 | 2309.6 | 3218.8 | 136.21 | 23.73 | 50.48 | 223. |
| 148 | 3.72735 | 6.94 | 0.4035 | 2378.7 | 3317.7 | 136.88 | 23.51 | 48.51 | 226. |
| 150 | 3.61639 | 7.32 | 0.3876 | 2445.2 | 3413.0 | 137.52 | 23.32 | 46.86 | 229. |
| 155 | 3.37774 | 8.21 | 0.3543 | 2602.7 | 3638.9 | 139.01 | 22.91 | 43.68 | 236. |
| 160 | 3.18021 | 9.04 | 0.3277 | 2750.7 | 3851.3 | 140.35 | 22.60 | 41.39 | 243. |
| 165 | 3.01231 | 9.82 | 0.3058 | 2891.8 | 4053.7 | 141.60 | 22.35 | 39.67 | 249. |
| 170 | 2.86677 | 10.55 | 0.2874 | 3027.8 | 4248.6 | 142.76 | 22.15 | 38.34 | 255. |
| 175 | 2.73869 | 11.26 | 0.2715 | 3159.6 | 4437.5 | 143.86 | 21.99 | 37.27 | 261. |
| 180 | 2.62461 | 11.93 | 0.2577 | 3288.1 | 4621.6 | 144.90 | 21.85 | 36.39 | 266. |
| 185 | 2.52200 | 12.58 | 0.2455 | 3414.0 | 4801.7 | 145.88 | 21.74 | 35.67 | 271. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 190 | 2.42897 | 13.21 | 0.2346 | 3537.6 | 4978.5 | 146.83 | 21.65 | 35.06 | 276. |
| 195 | 2.34405 | 13.83 | 0.2248 | 3659.3 | 5152.5 | 147.73 | 21.57 | 34.54 | 281. |
| 200 | 2.26606 | 14.43 | 0.2160 | 3779.5 | 5324.0 | 148.60 | 21.50 | 34.09 | 286. |
| 210 | 2.12736 | 15.59 | 0.2006 | 4015.9 | 5661.1 | 150.24 | 21.39 | 33.36 | 295. |
| 220 | 2.00727 | 16.71 | 0.1875 | 4248.0 | 5991.7 | 151.78 | 21.30 | 32.79 | 303. |
| 230 | 1.90190 | 17.80 | 0.1763 | 4477.0 | 6317.2 | 153.23 | 21.23 | 32.33 | 311. |
| 240 | 1.80844 | 18.86 | 0.1665 | 4703.3 | 6638.6 | 154.60 | 21.18 | 31.96 | 319. |
| 250 | 1.72480 | 19.90 | 0.1578 | 4927.4 | 6956.7 | 155.90 | 21.14 | 31.66 | 326. |
| 260 | 1.64937 | 20.91 | 0.1501 | 5149.9 | 7271.9 | 157.13 | 21.11 | 31.40 | 333. |
| 270 | 1.58091 | 21.91 | 0.1432 | 5370.8 | 7584.8 | 158.31 | 21.08 | 31.18 | 340. |
| 280 | 1.51842 | 22.90 | 0.1369 | 5590.6 | 7895.6 | 159.44 | 21.05 | 31.00 | 347. |
| 290 | 1.46109 | 23.87 | 0.1312 | 5809.3 | 8204.8 | 160.53 | 21.04 | 30.84 | 353. |
| 300 | 1.40828 | 24.83 | 0.1260 | 6027.1 | 8512.4 | 161.57 | 21.02 | 30.70 | 360. |
| 310 | 1.35942 | 25.78 | 0.1213 | 6244.2 | 8818.8 | 162.58 | 21.01 | 30.58 | 366. |
| 320 | 1.31408 | 26.73 | 0.1169 | 6460.6 | 9124.0 | 163.54 | 21.00 | 30.47 | 372. |
| 330 | 1.27185 | 27.66 | 0.1128 | 6676.4 | 9428.3 | 164.48 | 21.00 | 30.38 | 378. |
| 340 | 1.23241 | 28.59 | 0.1090 | 6891.8 | 9731.7 | 165.39 | 21.00 | 30.30 | 384. |
| 350 | 1.19549 | 29.51 | 0.1055 | 7106.7 | 10034.4 | 166.26 | 21.00 | 30.24 | 389. |
| 360 | 1.16083 | 30.42 | 0.1022 | 7321.4 | 10336.5 | 167.12 | 21.00 | 30.18 | 395. |
| 370 | 1.12822 | 31.33 | 0.0991 | 7535.7 | 10638.0 | 167.94 | 21.01 | 30.13 | 400. |
| 380 | 1.09748 | 32.24 | 0.0963 | 7749.9 | 10939.0 | 168.74 | 21.02 | 30.08 | 406. |
| 390 | 1.06845 | 33.14 | 0.0935 | 7963.9 | 11239.6 | 169.52 | 21.03 | 30.05 | 411. |
| 400 | 1.04098 | 34.03 | 0.0910 | 8177.8 | 11540.0 | 170.29 | 21.04 | 30.02 | 416. |
| 420 | 0.99023 | 35.81 | 0.0863 | 8605.4 | 12139.9 | 171.75 | 21.08 | 29.98 | 426. |
| 440 | 0.94436 | 37.58 | 0.0821 | 9033.1 | 12739.3 | 173.14 | 21.12 | 29.96 | 436. |
| 460 | 0.90268 | 39.34 | 0.0782 | 9461.3 | 13338.6 | 174.48 | 21.18 | 29.97 | 446. |
| 480 | 0.86464 | 41.09 | 0.0748 | 9890.1 | 13938.1 | 175.75 | 21.25 | 29.99 | 455. |
| 500 | 0.82975 | 42.83 | 0.0716 | 10320.0 | 14538.1 | 176.98 | 21.33 | 30.02 | 464. |
| 520 | 0.79763 | 44.56 | 0.0687 | 10751.1 | 15139.1 | 178.15 | 21.41 | 30.07 | 473. |
| 540 | 0.76796 | 46.28 | 0.0660 | 11183.6 | 15741.1 | 179.29 | 21.50 | 30.13 | 481. |
| 560 | 0.74047 | 48.00 | 0.0636 | 11617.8 | 16344.5 | 180.39 | 21.61 | 30.21 | 489. |
| 580 | 0.71491 | 49.72 | 0.0613 | 12053.7 | 16949.4 | 181.45 | 21.71 | 30.29 | 498. |
| 600 | 0.69109 | 51.43 | 0.0592 | 12491.7 | 17556.1 | 182.48 | 21.83 | 30.38 | 506. |
| 620 | 0.66883 | 53.14 | 0.0572 | 12931.7 | 18164.7 | 183.47 | 21.94 | 30.48 | 513. |
| 640 | 0.64798 | 54.84 | 0.0554 | 13374.0 | 18775.3 | 184.44 | 22.07 | 30.58 | 521. |
| 660 | 0.62841 | 56.54 | 0.0536 | 13818.5 | 19388.1 | 185.39 | 22.19 | 30.69 | 528. |
| 680 | 0.61001 | 58.24 | 0.0520 | 14265.5 | 20003.1 | 186.30 | 22.32 | 30.81 | 536. |
| 700 | 0.59266 | 59.94 | 0.0505 | 14714.9 | 20620.5 | 187.20 | 22.45 | 30.93 | 543. |
| 720 | 0.57628 | 61.63 | 0.0490 | 15166.8 | 21240.2 | 188.07 | 22.58 | 31.05 | 550. |
| 740 | 0.56080 | 63.32 | 0.0477 | 15621.2 | 21862.3 | 188.92 | 22.71 | 31.17 | 557. |
| 760 | 0.54613 | 65.01 | 0.0464 | 16078.2 | 22486.8 | 189.76 | 22.85 | 31.29 | 564. |
| 780 | 0.53222 | 66.69 | 0.0452 | 16537.7 | 23113.9 | 190.57 | 22.98 | 31.41 | 570. |
| 800 | 0.51901 | 68.38 | 0.0440 | 16999.8 | 23743.4 | 191.37 | 23.11 | 31.54 | 577. |
| 850 | 0.48870 | 72.59 | 0.0414 | 18166.2 | 25328.0 | 193.29 | 23.44 | 31.85 | 593. |
| 900 | 0.46176 | 76.78 | 0.0391 | 19348.3 | 26928.0 | 195.12 | 23.76 | 32.15 | 609. |
| 950 | 0.43765 | 80.98 | 0.0370 | 20545.5 | 28542.8 | 196.87 | 24.06 | 32.44 | 624. |
| 1000 | 0.41595 | 85.16 | 0.0351 | 21757.4 | 30171.9 | 198.54 | 24.35 | 32.72 | 639. |
| 1050 | 0.39631 | 89.35 | 0.0334 | 22983.2 | 31814.7 | 200.14 | 24.62 | 32.99 | 654. |
| 1100 | 0.37845 | 93.53 | 0.0319 | 24222.0 | 33470.4 | 201.68 | 24.88 | 33.24 | 668. |
| 1150 | 0.36213 | 97.70 | 0.0305 | 25473.3 | 35138.4 | 203.16 | 25.13 | 33.48 | 682. |
| 1200 | 0.34717 | 101.87 | 0.0292 | 26736.3 | 36817.9 | 204.59 | 25.35 | 33.70 | 695. |
| 1250 | 0.33340 | 106.05 | 0.0280 | 28010.2 | 38508.2 | 205.97 | 25.57 | 33.91 | 709. |
| 1300 | 0.32068 | 110.21 | 0.0270 | 29294.3 | 40208.6 | 207.31 | 25.77 | 34.11 | 722. |
| 1350 | 0.30890 | 114.38 | 0.0260 | 30588.0 | 41918.6 | 208.60 | 25.96 | 34.29 | 734. |
| 1400 | 0.29795 | 118.55 | 0.0250 | 31890.7 | 43637.4 | 209.85 | 26.13 | 34.46 | 747. |
| 1450 | 0.28776 | 122.71 | 0.0242 | 33201.7 | 45364.6 | 211.06 | 26.29 | 34.62 | 759. |
| 1500 | 0.27824 | 126.87 | 0.0234 | 34520.6 | 47099.5 | 212.24 | 26.45 | 34.77 | 772. |
| 1550 | 0.26934 | 131.04 | 0.0226 | 35846.8 | 48841.7 | 213.38 | 26.59 | 34.91 | 784. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1600 | 0.26098 | 135.20 | 0.0219 | 37179.9 | 50590.8 | 214.49 | 26.72 | 35.05 | 796. |
| 1650 | 0.25313 | 139.36 | 0.0212 | 38519.4 | 52346.2 | 215.57 | 26.85 | 35.17 | 807. |
| 1700 | 0.24574 | 143.52 | 0.0206 | 39865.0 | 54107.6 | 216.62 | 26.97 | 35.29 | 819. |
| 1750 | 0.23877 | 147.68 | 0.0200 | 41216.2 | 55874.6 | 217.64 | 27.08 | 35.39 | 830. |
| 1800 | 0.23218 | 151.84 | 0.0194 | 42572.7 | 57646.9 | 218.64 | 27.18 | 35.50 | 841. |
| 1850 | 0.22595 | 156.00 | 0.0189 | 43934.1 | 59424.2 | 219.62 | 27.28 | 35.59 | 852. |
| 1900 | 0.22005 | 160.15 | 0.0184 | 45300.3 | 61206.1 | 220.57 | 27.37 | 35.68 | 863. |
| 1950 | 0.21444 | 164.31 | 0.0179 | 46670.8 | 62992.4 | 221.50 | 27.45 | 35.77 | 874. |
| 2000 | 0.20911 | 168.47 | 0.0175 | 48045.5 | 64782.8 | 222.40 | 27.53 | 35.85 | 885. |
| | | | | 40 bar Isobar | | | | | |
| * 64.023 | 31.02981 | 241.71 | 30.36 | −4198.4 | −4069.5 | 68.22 | | | |
| 66 | 30.77751 | 217.72 | 28.24 | −4091.1 | −3961.1 | 69.89 | | | |
| 68 | 30.51398 | 197.00 | 26.37 | −3981.1 | −3850.0 | 71.55 | | | |
| 70 | 30.24221 | 179.20 | 24.71 | −3870.3 | −3738.0 | 73.17 | | | |
| 72 | 29.96241 | 163.78 | 23.23 | −3759.1 | −3625.6 | 74.75 | 29.86 | 56.29 | 1050. |
| 74 | 29.67486 | 150.29 | 21.89 | −3647.7 | −3512.9 | 76.30 | 29.59 | 56.39 | 1011. |
| 76 | 29.37982 | 138.39 | 20.67 | −3536.2 | −3400.1 | 77.80 | 29.27 | 56.45 | 976. |
| 78 | 29.07757 | 127.77 | 19.54 | −3424.7 | −3287.1 | 79.27 | 28.95 | 56.50 | 944. |
| 80 | 28.76828 | 118.22 | 18.49 | −3313.1 | −3174.0 | 80.70 | 28.62 | 56.57 | 913. |
| 82 | 28.45204 | 109.53 | 17.51 | −3201.4 | −3060.8 | 82.10 | 28.32 | 56.67 | 885. |
| 84 | 28.12883 | 101.58 | 16.59 | −3089.5 | −2947.3 | 83.47 | 28.04 | 56.82 | 857. |
| 86 | 27.79854 | 94.23 | 15.73 | −2977.4 | −2833.5 | 84.81 | 27.79 | 57.02 | 831. |
| 88 | 27.46090 | 87.40 | 14.92 | −2864.9 | −2719.2 | 86.12 | 27.56 | 57.28 | 805. |
| 90 | 27.11555 | 81.00 | 14.15 | −2751.9 | −2604.3 | 87.41 | 27.36 | 57.61 | 780. |
| 92 | 26.76200 | 74.99 | 13.42 | −2638.2 | −2488.7 | 88.68 | 27.18 | 58.02 | 756. |
| 94 | 26.39964 | 69.32 | 12.72 | −2523.7 | −2372.2 | 89.93 | 27.03 | 58.51 | 732. |
| 96 | 26.02773 | 63.94 | 12.05 | −2408.3 | −2254.6 | 91.17 | 26.90 | 59.09 | 708. |
| 98 | 25.64538 | 58.84 | 11.41 | −2291.8 | −2135.8 | 92.40 | 26.78 | 59.76 | 685. |
| 100 | 25.25153 | 53.99 | 10.80 | −2173.9 | −2015.5 | 93.61 | 26.68 | 60.54 | 661. |
| 102 | 24.84493 | 49.36 | 10.20 | −2054.5 | −1893.5 | 94.82 | 26.59 | 61.44 | 638. |
| 104 | 24.42406 | 44.93 | 9.63 | −1933.4 | −1769.6 | 96.02 | 26.51 | 62.49 | 615. |
| 106 | 23.98704 | 40.69 | 9.07 | −1810.2 | −1643.5 | 97.22 | 26.45 | 63.70 | 592. |
| 108 | 23.53156 | 36.63 | 8.53 | −1684.7 | −1514.7 | 98.43 | 26.39 | 65.12 | 568. |
| 110 | 23.05463 | 32.71 | 8.00 | −1556.3 | −1382.8 | 99.64 | 26.35 | 66.80 | 544. |
| 112 | 22.55232 | 28.93 | 7.47 | −1424.6 | −1247.3 | 100.86 | 26.32 | 68.84 | 520. |
| 114 | 22.01929 | 25.27 | 6.96 | −1288.8 | −1107.2 | 102.10 | 26.31 | 71.35 | 495. |
| 116 | 21.44801 | 21.71 | 6.44 | −1147.9 | −961.4 | 103.37 | 26.31 | 74.55 | 469. |
| 118 | 20.82731 | 18.22 | 5.93 | −1000.3 | −808.3 | 104.67 | 26.34 | 78.78 | 441. |
| 120 | 20.13964 | 14.80 | 5.40 | −843.8 | −645.2 | 106.05 | 26.41 | 84.69 | 412. |
| 122 | 19.35487 | 11.43 | 4.85 | −674.2 | −467.5 | 107.51 | 26.53 | 93.61 | 379. |
| 124 | 18.41442 | 8.10 | 4.26 | −483.9 | −266.7 | 109.15 | 26.75 | 108.82 | 343. |
| 126 | 17.17730 | 4.84 | 3.60 | −254.3 | −21.4 | 111.11 | 27.16 | 141.25 | 300. |
| 128 | 15.13180 | 1.83 | 2.72 | 81.3 | 345.6 | 114.00 | 28.12 | 254.45 | 243. |
| 130 | 10.65950 | 0.71 | 1.58 | 753.2 | 1128.5 | 120.06 | 29.78 | 432.23 | 192. |
| 132 | 7.93415 | 1.40 | 1.09 | 1235.3 | 1739.4 | 124.73 | 28.69 | 206.52 | 190. |
| 134 | 6.82938 | 2.23 | 0.8978 | 1478.1 | 2063.8 | 127.17 | 27.56 | 131.19 | 195. |
| 136 | 6.18108 | 2.97 | 0.7856 | 1644.9 | 2292.0 | 128.86 | 26.71 | 100.70 | 200. |
| 138 | 5.72755 | 3.62 | 0.7084 | 1777.3 | 2475.6 | 130.20 | 26.04 | 84.33 | 205. |
| 140 | 5.38064 | 4.21 | 0.6505 | 1889.9 | 2633.3 | 131.33 | 25.50 | 74.08 | 209. |
| 142 | 5.10074 | 4.75 | 0.6047 | 1989.9 | 2774.1 | 132.33 | 25.05 | 67.02 | 213. |
| 144 | 4.86675 | 5.26 | 0.5671 | 2080.8 | 2902.7 | 133.23 | 24.67 | 61.85 | 217. |
| 146 | 4.66614 | 5.73 | 0.5354 | 2165.0 | 3022.2 | 134.06 | 24.34 | 57.89 | 221. |
| 148 | 4.49089 | 6.18 | 0.5083 | 2244.1 | 3134.8 | 134.82 | 24.06 | 54.75 | 224. |
| 150 | 4.33552 | 6.60 | 0.4847 | 2319.0 | 3241.6 | 135.54 | 23.81 | 52.20 | 227. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 155 | 4.01110 | 7.59 | 0.4367 | 2492.9 | 3490.1 | 137.17 | 23.30 | 47.52 | 235. |
| 160 | 3.75105 | 8.49 | 0.3997 | 2652.9 | 3719.3 | 138.62 | 22.91 | 44.32 | 242. |
| 165 | 3.53503 | 9.32 | 0.3700 | 2803.3 | 3934.8 | 139.95 | 22.61 | 42.01 | 249. |
| 170 | 3.35096 | 10.11 | 0.3455 | 2946.6 | 4140.3 | 141.18 | 22.37 | 40.25 | 255. |
| 175 | 3.19114 | 10.85 | 0.3247 | 3084.5 | 4337.9 | 142.32 | 22.18 | 38.87 | 261. |
| 180 | 3.05032 | 11.57 | 0.3068 | 3218.1 | 4529.4 | 143.40 | 22.02 | 37.77 | 266. |
| 185 | 2.92477 | 12.25 | 0.2913 | 3348.3 | 4715.9 | 144.43 | 21.89 | 36.86 | 271. |
| 190 | 2.81178 | 12.91 | 0.2775 | 3475.7 | 4898.3 | 145.40 | 21.77 | 36.11 | 276. |
| 195 | 2.70927 | 13.56 | 0.2653 | 3600.8 | 5077.2 | 146.33 | 21.68 | 35.47 | 281. |
| 200 | 2.61563 | 14.18 | 0.2542 | 3723.9 | 5253.1 | 147.22 | 21.60 | 34.92 | 286. |
| 210 | 2.45019 | 15.39 | 0.2352 | 3965.2 | 5597.8 | 148.90 | 21.47 | 34.04 | 295. |
| 220 | 2.30796 | 16.55 | 0.2192 | 4201.5 | 5934.7 | 150.47 | 21.37 | 33.36 | 304. |
| 230 | 2.18386 | 17.67 | 0.2055 | 4433.9 | 6265.5 | 151.94 | 21.30 | 32.82 | 312. |
| 240 | 2.07429 | 18.76 | 0.1937 | 4663.1 | 6591.5 | 153.33 | 21.24 | 32.39 | 320. |
| 250 | 1.97659 | 19.82 | 0.1833 | 4889.9 | 6913.5 | 154.64 | 21.19 | 32.03 | 327. |
| 260 | 1.88877 | 20.86 | 0.1741 | 5114.5 | 7232.3 | 155.89 | 21.15 | 31.73 | 334. |
| 270 | 1.80925 | 21.88 | 0.1658 | 5337.5 | 7548.4 | 157.08 | 21.12 | 31.48 | 341. |
| 280 | 1.73684 | 22.88 | 0.1584 | 5559.1 | 7862.1 | 158.22 | 21.09 | 31.27 | 348. |
| 290 | 1.67054 | 23.87 | 0.1517 | 5779.4 | 8173.8 | 159.32 | 21.07 | 31.08 | 355. |
| 300 | 1.60955 | 24.85 | 0.1455 | 5998.6 | 8483.8 | 160.37 | 21.05 | 30.92 | 361. |
| 310 | 1.55322 | 25.82 | 0.1399 | 6217.0 | 8792.3 | 161.38 | 21.04 | 30.78 | 367. |
| 320 | 1.50099 | 26.77 | 0.1348 | 6434.6 | 9099.5 | 162.36 | 21.03 | 30.66 | 373. |
| 330 | 1.45242 | 27.72 | 0.1300 | 6651.6 | 9405.6 | 163.30 | 21.02 | 30.56 | 379. |
| 340 | 1.40710 | 28.66 | 0.1256 | 6868.0 | 9710.7 | 164.21 | 21.02 | 30.47 | 385. |
| 350 | 1.36470 | 29.59 | 0.1214 | 7083.9 | 10015.0 | 165.09 | 21.02 | 30.39 | 391. |
| 360 | 1.32493 | 30.52 | 0.1176 | 7299.5 | 10318.5 | 165.95 | 21.02 | 30.32 | 396. |
| 370 | 1.28754 | 31.44 | 0.1140 | 7514.7 | 10621.4 | 166.78 | 21.03 | 30.26 | 402. |
| 380 | 1.25232 | 32.35 | 0.1107 | 7729.6 | 10923.7 | 167.58 | 21.04 | 30.21 | 407. |
| 390 | 1.21907 | 33.26 | 0.1075 | 7944.4 | 11225.5 | 168.37 | 21.05 | 30.16 | 413. |
| 400 | 1.18762 | 34.16 | 0.1045 | 8158.9 | 11527.0 | 169.13 | 21.06 | 30.13 | 418. |
| 420 | 1.12956 | 35.96 | 0.0991 | 8587.8 | 12129.0 | 170.60 | 21.09 | 30.08 | 428. |
| 440 | 1.07713 | 37.74 | 0.0942 | 9016.7 | 12730.3 | 172.00 | 21.14 | 30.05 | 438. |
| 460 | 1.02951 | 39.51 | 0.0898 | 9445.9 | 13331.2 | 173.33 | 21.20 | 30.05 | 447. |
| 480 | 0.98606 | 41.27 | 0.0857 | 9875.7 | 13932.2 | 174.61 | 21.26 | 30.06 | 456. |
| 500 | 0.94624 | 43.02 | 0.0821 | 10306.4 | 14533.6 | 175.84 | 21.34 | 30.09 | 465. |
| 520 | 0.90959 | 44.76 | 0.0787 | 10738.2 | 15135.8 | 177.02 | 21.42 | 30.13 | 474. |
| 540 | 0.87575 | 46.49 | 0.0757 | 11171.5 | 15739.0 | 178.16 | 21.52 | 30.19 | 483. |
| 560 | 0.84439 | 48.22 | 0.0728 | 11606.3 | 16343.4 | 179.26 | 21.62 | 30.26 | 491. |
| 580 | 0.81525 | 49.94 | 0.0702 | 12042.8 | 16949.3 | 180.32 | 21.72 | 30.34 | 499. |
| 600 | 0.78809 | 51.66 | 0.0678 | 12481.3 | 17556.9 | 181.35 | 21.84 | 30.42 | 507. |
| 620 | 0.76272 | 53.37 | 0.0655 | 12921.9 | 18166.3 | 182.35 | 21.95 | 30.52 | 515. |
| 640 | 0.73895 | 55.08 | 0.0634 | 13364.7 | 18777.7 | 183.32 | 22.08 | 30.62 | 522. |
| 660 | 0.71665 | 56.79 | 0.0614 | 13809.7 | 19391.2 | 184.26 | 22.20 | 30.73 | 530. |
| 680 | 0.69567 | 58.49 | 0.0595 | 14257.0 | 20006.9 | 185.18 | 22.33 | 30.84 | 537. |
| 700 | 0.67591 | 60.19 | 0.0578 | 14706.8 | 20624.8 | 186.08 | 22.46 | 30.96 | 544. |
| 720 | 0.65725 | 61.89 | 0.0561 | 15159.1 | 21245.1 | 186.95 | 22.59 | 31.07 | 551. |
| 740 | 0.63960 | 63.58 | 0.0546 | 15613.9 | 21867.8 | 187.80 | 22.72 | 31.19 | 558. |
| 760 | 0.62289 | 65.27 | 0.0531 | 16071.2 | 22492.8 | 188.64 | 22.85 | 31.31 | 565. |
| 780 | 0.60704 | 66.96 | 0.0517 | 16531.0 | 23120.4 | 189.45 | 22.99 | 31.44 | 572. |
| 800 | 0.59199 | 68.65 | 0.0504 | 16993.4 | 23750.3 | 190.25 | 23.12 | 31.56 | 578. |
| 850 | 0.55745 | 72.86 | 0.0474 | 18160.5 | 25336.0 | 192.17 | 23.44 | 31.87 | 595. |
| 900 | 0.52676 | 77.07 | 0.0447 | 19343.1 | 26936.8 | 194.00 | 23.76 | 32.17 | 610. |
| 950 | 0.49929 | 81.27 | 0.0423 | 20541.0 | 28552.4 | 195.75 | 24.06 | 32.46 | 625. |
| 1000 | 0.47456 | 85.46 | 0.0402 | 21753.3 | 30182.2 | 197.42 | 24.35 | 32.73 | 640. |
| 1050 | 0.45218 | 89.64 | 0.0382 | 22979.4 | 31825.5 | 199.03 | 24.63 | 33.00 | 655. |
| 1100 | 0.43182 | 93.82 | 0.0365 | 24218.7 | 33481.8 | 200.57 | 24.89 | 33.25 | 669. |
| 1150 | 0.41323 | 98.00 | 0.0349 | 25470.3 | 35150.2 | 202.05 | 25.13 | 33.49 | 683. |
| 1200 | 0.39617 | 102.18 | 0.0334 | 26733.6 | 36830.2 | 203.48 | 25.36 | 33.71 | 696. |
| 1250 | 0.38048 | 106.35 | 0.0321 | 28007.8 | 38520.9 | 204.86 | 25.57 | 33.92 | 710. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1300 | 0.36598 | 110.52 | 0.0308 | 29292.1 | 40221.6 | 206.19 | 25.77 | 34.11 | 723. |
| 1350 | 0.35255 | 114.69 | 0.0297 | 30586.1 | 41931.9 | 207.48 | 25.96 | 34.30 | 735. |
| 1400 | 0.34008 | 118.86 | 0.0286 | 31889.0 | 43651.0 | 208.74 | 26.13 | 34.47 | 748. |
| 1450 | 0.32846 | 123.02 | 0.0276 | 33200.2 | 45378.4 | 209.95 | 26.30 | 34.63 | 760. |
| 1500 | 0.31760 | 127.19 | 0.0267 | 34519.3 | 47113.6 | 211.12 | 26.45 | 34.78 | 773. |
| 1550 | 0.30745 | 131.35 | 0.0258 | 35845.7 | 48856.0 | 212.27 | 26.59 | 34.92 | 785. |
| 1600 | 0.29792 | 135.51 | 0.0250 | 37178.9 | 50605.2 | 213.38 | 26.73 | 35.05 | 796. |
| 1650 | 0.28897 | 139.67 | 0.0243 | 38518.6 | 52360.8 | 214.46 | 26.85 | 35.17 | 808. |
| 1700 | 0.28054 | 143.83 | 0.0235 | 39864.3 | 54122.4 | 215.51 | 26.97 | 35.29 | 820. |
| 1750 | 0.27259 | 147.99 | 0.0229 | 41215.6 | 55889.6 | 216.53 | 27.08 | 35.40 | 831. |
| 1800 | 0.26508 | 152.15 | 0.0222 | 42572.2 | 57662.0 | 217.53 | 27.18 | 35.50 | 842. |
| 1850 | 0.25797 | 156.31 | 0.0216 | 43933.8 | 59439.4 | 218.51 | 27.28 | 35.59 | 853. |
| 1900 | 0.25123 | 160.47 | 0.0211 | 45300.0 | 61221.4 | 219.46 | 27.37 | 35.68 | 864. |
| 1950 | 0.24484 | 164.62 | 0.0205 | 46670.7 | 63007.8 | 220.39 | 27.45 | 35.77 | 875. |
| 2000 | 0.23877 | 168.78 | 0.0200 | 48045.4 | 64798.3 | 221.29 | 27.53 | 35.85 | 886. |
| | | | | 45 bar Isobar | | | | | |
| * 64.132 | 31.03689 | 241.95 | 30.17 | −4196.6 | −4051.7 | 68.25 | | | |
| 66 | 30.80039 | 219.35 | 28.19 | −4095.4 | −3949.3 | 69.82 | | | |
| 68 | 30.53926 | 198.61 | 26.34 | −3985.8 | −3838.5 | 71.48 | | | |
| 70 | 30.26999 | 180.78 | 24.70 | −3875.4 | −3726.8 | 73.10 | | | |
| 72 | 29.99280 | 165.34 | 23.24 | −3764.6 | −3614.6 | 74.68 | 30.03 | 56.16 | 1051. |
| 74 | 29.70795 | 151.84 | 21.91 | −3653.6 | −3502.2 | 76.22 | 29.75 | 56.25 | 1012. |
| 76 | 29.41576 | 139.92 | 20.69 | −3542.6 | −3389.6 | 77.72 | 29.42 | 56.30 | 978. |
| 78 | 29.11647 | 129.30 | 19.57 | −3431.5 | −3276.9 | 79.18 | 29.09 | 56.35 | 946. |
| 80 | 28.81030 | 119.75 | 18.53 | −3320.4 | −3164.2 | 80.61 | 28.76 | 56.41 | 916. |
| 82 | 28.49737 | 111.07 | 17.57 | −3209.2 | −3051.3 | 82.00 | 28.44 | 56.49 | 887. |
| 84 | 28.17768 | 103.12 | 16.66 | −3097.9 | −2938.2 | 83.36 | 28.16 | 56.63 | 860. |
| 86 | 27.85116 | 95.79 | 15.80 | −2986.3 | −2824.8 | 84.70 | 27.90 | 56.81 | 834. |
| 88 | 27.51760 | 88.97 | 15.00 | −2874.4 | −2710.9 | 86.01 | 27.66 | 57.05 | 809. |
| 90 | 27.17668 | 82.59 | 14.24 | −2762.1 | −2596.5 | 87.29 | 27.46 | 57.36 | 785. |
| 92 | 26.82797 | 76.59 | 13.51 | −2649.2 | −2481.4 | 88.56 | 27.27 | 57.73 | 761. |
| 94 | 26.47094 | 70.94 | 12.82 | −2535.5 | −2365.5 | 89.80 | 27.11 | 58.19 | 737. |
| 96 | 26.10494 | 65.58 | 12.16 | −2421.0 | −2248.6 | 91.03 | 26.97 | 58.72 | 714. |
| 98 | 25.72918 | 60.50 | 11.52 | −2305.5 | −2130.6 | 92.25 | 26.85 | 59.34 | 691. |
| 100 | 25.34274 | 55.66 | 10.91 | −2188.8 | −2011.2 | 93.46 | 26.74 | 60.06 | 668. |
| 102 | 24.94453 | 51.06 | 10.33 | −2070.7 | −1890.3 | 94.65 | 26.65 | 60.89 | 645. |
| 104 | 24.53325 | 46.66 | 9.76 | −1951.0 | −1767.6 | 95.85 | 26.57 | 61.83 | 623. |
| 106 | 24.10733 | 42.45 | 9.21 | −1829.5 | −1642.8 | 97.03 | 26.50 | 62.93 | 600. |
| 108 | 23.66483 | 38.41 | 8.67 | −1705.9 | −1515.7 | 98.22 | 26.44 | 64.20 | 577. |
| 110 | 23.20334 | 34.54 | 8.15 | −1579.8 | −1385.9 | 99.41 | 26.39 | 65.68 | 554. |
| 112 | 22.71974 | 30.81 | 7.64 | −1450.9 | −1252.8 | 100.61 | 26.35 | 67.45 | 531. |
| 114 | 22.20991 | 27.20 | 7.14 | −1318.5 | −1115.9 | 101.82 | 26.32 | 69.58 | 507. |
| 116 | 21.66829 | 23.71 | 6.64 | −1181.9 | −974.2 | 103.06 | 26.31 | 72.22 | 482. |
| 118 | 21.08697 | 20.31 | 6.14 | −1039.9 | −826.5 | 104.32 | 26.32 | 75.58 | 456. |
| 120 | 20.45436 | 17.00 | 5.64 | −891.1 | −671.1 | 105.62 | 26.35 | 80.03 | 429. |
| 122 | 19.75239 | 13.77 | 5.13 | −733.1 | −505.3 | 106.99 | 26.42 | 86.21 | 400. |
| 124 | 18.95069 | 10.61 | 4.60 | −561.8 | −324.3 | 108.47 | 26.55 | 95.43 | 369. |
| 126 | 17.99272 | 7.56 | 4.04 | −369.8 | −119.7 | 110.10 | 26.77 | 110.65 | 334. |
| 128 | 16.75662 | 4.70 | 3.41 | −141.2 | 127.3 | 112.05 | 27.17 | 139.97 | 294. |
| 130 | 14.93972 | 2.34 | 2.68 | 163.3 | 464.5 | 114.66 | 27.92 | 206.06 | 248. |
| 132 | 12.20920 | 1.32 | 1.91 | 592.2 | 960.8 | 118.45 | 28.92 | 273.02 | 211. |
| 134 | 9.74734 | 1.45 | 1.41 | 1006.1 | 1467.8 | 122.26 | 28.82 | 221.87 | 200. |
| 136 | 8.25292 | 2.01 | 1.14 | 1296.6 | 1841.9 | 125.03 | 27.99 | 156.66 | 200. |
| 138 | 7.34344 | 2.66 | 0.9753 | 1500.6 | 2113.4 | 127.01 | 27.17 | 118.66 | 204. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 140 | 6.72408 | 3.30 | 0.8665 | 1658.0 | 2327.2 | 128.55 | 26.47 | 97.01 | 208. |
| 142 | 6.26376 | 3.89 | 0.7869 | 1788.4 | 2506.8 | 129.83 | 25.90 | 83.49 | 212. |
| 144 | 5.90100 | 4.45 | 0.7254 | 1901.5 | 2664.1 | 130.93 | 25.41 | 74.33 | 216. |
| 146 | 5.60339 | 4.97 | 0.6758 | 2002.7 | 2805.8 | 131.90 | 24.99 | 67.74 | 219. |
| 148 | 5.35207 | 5.46 | 0.6346 | 2095.3 | 2936.1 | 132.79 | 24.64 | 62.76 | 223. |
| 150 | 5.13520 | 5.92 | 0.5998 | 2181.3 | 3057.6 | 133.61 | 24.33 | 58.87 | 226. |
| 155 | 4.69768 | 6.99 | 0.5315 | 2375.7 | 3333.6 | 135.42 | 23.71 | 52.07 | 234. |
| 160 | 4.35949 | 7.96 | 0.4807 | 2550.0 | 3582.2 | 137.00 | 23.24 | 47.68 | 241. |
| 165 | 4.08553 | 8.85 | 0.4411 | 2711.1 | 3812.5 | 138.41 | 22.88 | 44.61 | 248. |
| 170 | 3.85637 | 9.69 | 0.4090 | 2862.7 | 4029.6 | 139.71 | 22.60 | 42.34 | 255. |
| 175 | 3.66018 | 10.47 | 0.3824 | 3007.4 | 4236.8 | 140.91 | 22.37 | 40.60 | 261. |
| 180 | 3.48924 | 11.22 | 0.3597 | 3146.6 | 4436.3 | 142.03 | 22.18 | 39.23 | 266. |
| 185 | 3.33821 | 11.94 | 0.3402 | 3281.5 | 4629.5 | 143.09 | 22.03 | 38.12 | 272. |
| 190 | 3.20330 | 12.63 | 0.3231 | 3412.9 | 4817.7 | 144.10 | 21.90 | 37.20 | 277. |
| 195 | 3.08166 | 13.30 | 0.3080 | 3541.5 | 5001.8 | 145.05 | 21.79 | 36.43 | 282. |
| 200 | 2.97115 | 13.95 | 0.2945 | 3667.7 | 5182.3 | 145.97 | 21.70 | 35.78 | 287. |
| 210 | 2.77715 | 15.20 | 0.2713 | 3914.3 | 5534.7 | 147.69 | 21.55 | 34.74 | 296. |
| 220 | 2.61154 | 16.40 | 0.2521 | 4154.8 | 5877.9 | 149.28 | 21.44 | 33.95 | 304. |
| 230 | 2.46785 | 17.55 | 0.2358 | 4390.7 | 6214.2 | 150.78 | 21.36 | 33.32 | 313. |
| 240 | 2.34153 | 18.67 | 0.2217 | 4623.0 | 6544.8 | 152.19 | 21.29 | 32.82 | 321. |
| 250 | 2.22931 | 19.75 | 0.2095 | 4852.3 | 6870.9 | 153.52 | 21.23 | 32.41 | 328. |
| 260 | 2.12873 | 20.82 | 0.1986 | 5079.3 | 7193.2 | 154.78 | 21.19 | 32.07 | 335. |
| 270 | 2.03790 | 21.86 | 0.1890 | 5304.3 | 7512.4 | 155.99 | 21.16 | 31.78 | 342. |
| 280 | 1.95535 | 22.88 | 0.1803 | 5527.6 | 7829.0 | 157.14 | 21.13 | 31.54 | 349. |
| 290 | 1.87991 | 23.89 | 0.1725 | 5749.5 | 8143.3 | 158.24 | 21.10 | 31.33 | 356. |
| 300 | 1.81063 | 24.88 | 0.1654 | 5970.3 | 8455.6 | 159.30 | 21.08 | 31.15 | 362. |
| 310 | 1.74672 | 25.86 | 0.1589 | 6190.0 | 8766.2 | 160.32 | 21.07 | 30.99 | 368. |
| 320 | 1.68755 | 26.83 | 0.1529 | 6408.8 | 9075.4 | 161.30 | 21.06 | 30.85 | 375. |
| 330 | 1.63256 | 27.79 | 0.1474 | 6626.9 | 9383.3 | 162.25 | 21.05 | 30.73 | 381. |
| 340 | 1.58131 | 28.74 | 0.1423 | 6844.4 | 9690.1 | 163.16 | 21.04 | 30.63 | 386. |
| 350 | 1.53340 | 29.68 | 0.1376 | 7061.3 | 9995.9 | 164.05 | 21.04 | 30.54 | 392. |
| 360 | 1.48850 | 30.62 | 0.1332 | 7277.7 | 10300.9 | 164.91 | 21.04 | 30.46 | 398. |
| 370 | 1.44632 | 31.55 | 0.1291 | 7493.7 | 10605.1 | 165.74 | 21.05 | 30.39 | 403. |
| 380 | 1.40659 | 32.47 | 0.1252 | 7709.5 | 10908.7 | 166.55 | 21.05 | 30.33 | 409. |
| 390 | 1.36912 | 33.39 | 0.1216 | 7924.9 | 11211.7 | 167.34 | 21.06 | 30.28 | 414. |
| 400 | 1.33369 | 34.30 | 0.1182 | 8140.2 | 11514.3 | 168.11 | 21.08 | 30.24 | 419. |
| 420 | 1.26832 | 36.11 | 0.1120 | 8570.4 | 12118.4 | 169.58 | 21.11 | 30.17 | 429. |
| 440 | 1.20932 | 37.90 | 0.1064 | 9000.4 | 12721.5 | 170.98 | 21.16 | 30.14 | 439. |
| 460 | 1.15578 | 39.69 | 0.1013 | 9430.6 | 13324.0 | 172.32 | 21.21 | 30.12 | 449. |
| 480 | 1.10695 | 41.46 | 0.0968 | 9861.3 | 13926.5 | 173.60 | 21.28 | 30.13 | 458. |
| 500 | 1.06221 | 43.21 | 0.0926 | 10292.8 | 14529.3 | 174.83 | 21.35 | 30.15 | 467. |
| 520 | 1.02105 | 44.96 | 0.0888 | 10725.4 | 15132.7 | 176.02 | 21.44 | 30.19 | 475. |
| 540 | 0.98305 | 46.71 | 0.0853 | 11159.4 | 15737.0 | 177.16 | 21.53 | 30.24 | 484. |
| 560 | 0.94784 | 48.44 | 0.0821 | 11594.8 | 16342.5 | 178.26 | 21.63 | 30.31 | 492. |
| 580 | 0.91513 | 50.17 | 0.0792 | 12032.0 | 16949.3 | 179.32 | 21.73 | 30.38 | 500. |
| 600 | 0.88466 | 51.89 | 0.0764 | 12471.1 | 17557.8 | 180.35 | 21.85 | 30.47 | 508. |
| 620 | 0.85619 | 53.61 | 0.0738 | 12912.2 | 18168.0 | 181.35 | 21.96 | 30.56 | 516. |
| 640 | 0.82952 | 55.33 | 0.0714 | 13355.4 | 18780.2 | 182.33 | 22.08 | 30.66 | 524. |
| 660 | 0.80450 | 57.04 | 0.0692 | 13800.8 | 19394.4 | 183.27 | 22.21 | 30.76 | 531. |
| 680 | 0.78097 | 58.74 | 0.0671 | 14248.6 | 20010.7 | 184.19 | 22.34 | 30.87 | 538. |
| 700 | 0.75880 | 60.45 | 0.0651 | 14698.8 | 20629.2 | 185.09 | 22.47 | 30.98 | 546. |
| 720 | 0.73787 | 62.15 | 0.0632 | 15151.5 | 21250.1 | 185.96 | 22.60 | 31.10 | 553. |
| 740 | 0.71808 | 63.85 | 0.0615 | 15606.6 | 21873.3 | 186.82 | 22.73 | 31.22 | 560. |
| 760 | 0.69934 | 65.54 | 0.0598 | 16064.2 | 22498.9 | 187.65 | 22.86 | 31.34 | 566. |
| 780 | 0.68156 | 67.23 | 0.0582 | 16524.4 | 23126.9 | 188.47 | 22.99 | 31.46 | 573. |
| 800 | 0.66467 | 68.92 | 0.0567 | 16987.0 | 23757.3 | 189.26 | 23.13 | 31.58 | 580. |
| 850 | 0.62594 | 73.14 | 0.0533 | 18154.8 | 25344.0 | 191.19 | 23.45 | 31.88 | 596. |
| 900 | 0.59151 | 77.35 | 0.0503 | 19338.1 | 26945.6 | 193.02 | 23.77 | 32.18 | 611. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 950 | 0.56071 | 81.56 | 0.0476 | 20536.4 | 28562.0 | 194.77 | 24.07 | 32.47 | 627. |
| 1000 | 0.53297 | 85.75 | 0.0452 | 21749.2 | 30192.4 | 196.44 | 24.36 | 32.75 | 641. |
| 1050 | 0.50786 | 89.94 | 0.0430 | 22975.7 | 31836.4 | 198.04 | 24.63 | 33.01 | 656. |
| 1100 | 0.48503 | 94.12 | 0.0410 | 24215.4 | 33493.2 | 199.58 | 24.89 | 33.26 | 670. |
| 1150 | 0.46417 | 98.31 | 0.0392 | 25467.4 | 35162.1 | 201.07 | 25.13 | 33.49 | 684. |
| 1200 | 0.44504 | 102.48 | 0.0376 | 26730.9 | 36842.5 | 202.50 | 25.36 | 33.72 | 697. |
| 1250 | 0.42742 | 106.66 | 0.0361 | 28005.4 | 38533.5 | 203.88 | 25.58 | 33.92 | 711. |
| 1300 | 0.41116 | 110.83 | 0.0347 | 29290.0 | 40234.7 | 205.21 | 25.78 | 34.12 | 724. |
| 1350 | 0.39609 | 115.00 | 0.0334 | 30584.2 | 41945.2 | 206.50 | 25.96 | 34.30 | 736. |
| 1400 | 0.38209 | 119.17 | 0.0322 | 31887.3 | 43664.6 | 207.75 | 26.14 | 34.47 | 749. |
| 1450 | 0.36905 | 123.33 | 0.0311 | 33198.7 | 45392.3 | 208.97 | 26.30 | 34.63 | 761. |
| 1500 | 0.35687 | 127.50 | 0.0300 | 34518.0 | 47127.7 | 210.14 | 26.45 | 34.78 | 774. |
| 1550 | 0.34547 | 131.66 | 0.0291 | 35844.5 | 48870.3 | 211.29 | 26.59 | 34.92 | 786. |
| 1600 | 0.33478 | 135.82 | 0.0281 | 37177.9 | 50619.7 | 212.40 | 26.73 | 35.05 | 797. |
| 1650 | 0.32473 | 139.99 | 0.0273 | 38517.8 | 52375.5 | 213.48 | 26.85 | 35.18 | 809. |
| 1700 | 0.31527 | 144.15 | 0.0265 | 39863.6 | 54137.2 | 214.53 | 26.97 | 35.29 | 821. |
| 1750 | 0.30634 | 148.31 | 0.0257 | 41215.0 | 55904.5 | 215.55 | 27.08 | 35.40 | 832. |
| 1800 | 0.29791 | 152.46 | 0.0250 | 42571.8 | 57677.1 | 216.55 | 27.18 | 35.50 | 843. |
| 1850 | 0.28993 | 156.62 | 0.0243 | 43933.4 | 59454.6 | 217.53 | 27.28 | 35.60 | 854. |
| 1900 | 0.28236 | 160.78 | 0.0237 | 45299.8 | 61236.7 | 218.48 | 27.37 | 35.69 | 865. |
| 1950 | 0.27518 | 164.94 | 0.0231 | 46670.5 | 63023.2 | 219.41 | 27.46 | 35.77 | 876. |
| 2000 | 0.26836 | 169.10 | 0.0225 | 48045.4 | 64813.8 | 220.31 | 27.54 | 35.85 | 887. |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 64.240 | 31.04406 | 242.20 | 29.98 | −4194.9 | −4033.8 | 68.28 | | | |
| 66 | 30.82310 | 220.98 | 28.14 | −4099.8 | −3937.6 | 69.75 | | | |
| 68 | 30.56433 | 200.21 | 26.31 | −3990.5 | −3826.9 | 71.41 | | | |
| 70 | 30.29753 | 182.36 | 24.69 | −3880.5 | −3715.4 | 73.02 | | | |
| 72 | 30.02290 | 166.90 | 23.24 | −3770.0 | −3603.5 | 74.60 | 30.19 | 56.04 | 1052. |
| 74 | 29.74072 | 153.38 | 21.92 | −3659.5 | −3491.3 | 76.14 | 29.91 | 56.12 | 1014. |
| 76 | 29.45130 | 141.46 | 20.72 | −3548.8 | −3379.1 | 77.63 | 29.57 | 56.16 | 979. |
| 78 | 29.15491 | 130.83 | 19.61 | −3438.2 | −3266.7 | 79.09 | 29.22 | 56.20 | 948. |
| 80 | 28.85179 | 121.28 | 18.58 | −3327.6 | −3154.3 | 80.52 | 28.89 | 56.25 | 918. |
| 82 | 28.54207 | 112.60 | 17.62 | −3216.9 | −3041.7 | 81.90 | 28.57 | 56.32 | 890. |
| 84 | 28.22581 | 104.66 | 16.72 | −3106.1 | −2928.9 | 83.26 | 28.27 | 56.44 | 864. |
| 86 | 27.90295 | 97.33 | 15.88 | −2995.1 | −2815.9 | 84.59 | 28.00 | 56.61 | 838. |
| 88 | 27.57331 | 90.52 | 15.08 | −2883.8 | −2702.5 | 85.90 | 27.76 | 56.83 | 813. |
| 90 | 27.23665 | 84.16 | 14.32 | −2772.1 | −2588.5 | 87.18 | 27.55 | 57.11 | 789. |
| 92 | 26.89258 | 78.18 | 13.60 | −2659.9 | −2474.0 | 88.44 | 27.36 | 57.46 | 766. |
| 94 | 26.54064 | 72.54 | 12.91 | −2547.1 | −2358.7 | 89.68 | 27.20 | 57.88 | 742. |
| 96 | 26.18025 | 67.20 | 12.26 | −2433.4 | −2242.4 | 90.90 | 27.05 | 58.37 | 719. |
| 98 | 25.81072 | 62.14 | 11.63 | −2318.8 | −2125.1 | 92.11 | 26.92 | 58.95 | 697. |
| 100 | 25.43125 | 57.32 | 11.03 | −2203.2 | −2006.6 | 93.31 | 26.81 | 59.61 | 675. |
| 102 | 25.04088 | 52.73 | 10.45 | −2086.3 | −1886.6 | 94.49 | 26.71 | 60.37 | 652. |
| 104 | 24.63850 | 48.36 | 9.88 | −1968.0 | −1765.0 | 95.67 | 26.62 | 61.24 | 630. |
| 106 | 24.22278 | 44.17 | 9.34 | −1848.0 | −1641.6 | 96.85 | 26.54 | 62.23 | 608. |
| 108 | 23.79210 | 40.17 | 8.81 | −1726.2 | −1516.0 | 98.02 | 26.48 | 63.37 | 586. |
| 110 | 23.34446 | 36.33 | 8.30 | −1602.2 | −1388.0 | 99.20 | 26.42 | 64.69 | 563. |
| 112 | 22.87738 | 32.64 | 7.80 | −1475.7 | −1257.1 | 100.38 | 26.37 | 66.23 | 541. |
| 114 | 22.38764 | 29.08 | 7.30 | −1346.2 | −1122.9 | 101.57 | 26.34 | 68.07 | 518. |
| 116 | 21.87098 | 25.64 | 6.82 | −1213.2 | −984.6 | 102.77 | 26.31 | 70.29 | 494. |
| 118 | 21.32167 | 22.31 | 6.34 | −1075.9 | −841.4 | 103.99 | 26.31 | 73.03 | 470. |
| 120 | 20.73165 | 19.09 | 5.86 | −933.1 | −692.0 | 105.25 | 26.32 | 76.52 | 445. |
| 122 | 20.08921 | 15.95 | 5.38 | −783.5 | −534.6 | 106.55 | 26.35 | 81.11 | 419. |
| 124 | 19.37648 | 12.92 | 4.88 | −624.4 | −366.4 | 107.92 | 26.43 | 87.42 | 391. |
| 126 | 18.56461 | 10.00 | 4.38 | −452.3 | −183.0 | 109.38 | 26.56 | 96.60 | 360. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 128 | 17.60369 | 7.24 | 3.84 | −260.6 | 23.4 | 111.01 | 26.77 | 110.95 | 327. |
| 130 | 16.40274 | 4.78 | 3.27 | −37.6 | 267.2 | 112.90 | 27.12 | 135.04 | 291. |
| 132 | 14.81498 | 2.91 | 2.65 | 235.9 | 573.4 | 115.23 | 27.69 | 173.05 | 255. |
| 134 | 12.82891 | 2.02 | 2.07 | 563.7 | 953.4 | 118.09 | 28.29 | 200.80 | 226. |
| 136 | 10.92077 | 1.92 | 1.64 | 889.6 | 1347.5 | 121.01 | 28.40 | 187.73 | 213. |
| 138 | 9.45930 | 2.21 | 1.35 | 1163.5 | 1692.1 | 123.53 | 27.96 | 155.90 | 210. |
| 140 | 8.42562 | 2.68 | 1.16 | 1379.6 | 1973.1 | 125.55 | 27.32 | 126.40 | 210. |
| 142 | 7.68344 | 3.22 | 1.03 | 1552.6 | 2203.3 | 127.18 | 26.69 | 105.19 | 213. |
| 144 | 7.12514 | 3.77 | 0.9260 | 1696.5 | 2398.2 | 128.54 | 26.13 | 90.58 | 216. |
| 146 | 6.68589 | 4.31 | 0.8490 | 1820.7 | 2568.5 | 129.72 | 25.65 | 80.27 | 219. |
| 148 | 6.32760 | 4.82 | 0.7873 | 1930.9 | 2721.1 | 130.76 | 25.22 | 72.72 | 223. |
| 150 | 6.02707 | 5.32 | 0.7365 | 2031.0 | 2860.6 | 131.69 | 24.86 | 66.99 | 226. |
| 155 | 5.44247 | 6.45 | 0.6404 | 2250.6 | 3169.3 | 133.72 | 24.12 | 57.38 | 234. |
| 160 | 5.00771 | 7.48 | 0.5718 | 2442.0 | 3440.4 | 135.44 | 23.57 | 51.47 | 241. |
| 165 | 4.66470 | 8.42 | 0.5198 | 2615.3 | 3687.2 | 136.96 | 23.15 | 47.47 | 248. |
| 170 | 4.38323 | 9.30 | 0.4785 | 2776.3 | 3917.0 | 138.33 | 22.82 | 44.60 | 255. |
| 175 | 4.14573 | 10.13 | 0.4448 | 2928.3 | 4134.4 | 139.59 | 22.56 | 42.45 | 261. |
| 180 | 3.94113 | 10.91 | 0.4165 | 3073.6 | 4342.3 | 140.76 | 22.35 | 40.77 | 267. |
| 185 | 3.76201 | 11.66 | 0.3924 | 3213.6 | 4542.7 | 141.86 | 22.17 | 39.43 | 272. |
| 190 | 3.60318 | 12.38 | 0.3714 | 3349.3 | 4737.0 | 142.90 | 22.03 | 38.34 | 277. |
| 195 | 3.46087 | 13.07 | 0.3531 | 3481.6 | 4926.3 | 143.88 | 21.90 | 37.43 | 282. |
| 200 | 3.33227 | 13.74 | 0.3368 | 3611.1 | 5111.5 | 144.82 | 21.80 | 36.67 | 287. |
| 210 | 3.10794 | 15.03 | 0.3091 | 3863.1 | 5471.8 | 146.58 | 21.64 | 35.45 | 297. |
| 220 | 2.91776 | 16.26 | 0.2863 | 4108.0 | 5821.6 | 148.21 | 21.51 | 34.54 | 305. |
| 230 | 2.75363 | 17.45 | 0.2671 | 4347.5 | 6163.3 | 149.72 | 21.42 | 33.82 | 314. |
| 240 | 2.60997 | 18.59 | 0.2507 | 4582.8 | 6498.5 | 151.15 | 21.34 | 33.25 | 322. |
| 250 | 2.48279 | 19.70 | 0.2364 | 4814.8 | 6828.7 | 152.50 | 21.28 | 32.79 | 329. |
| 260 | 2.36912 | 20.79 | 0.2239 | 5044.1 | 7154.6 | 153.78 | 21.23 | 32.40 | 336. |
| 270 | 2.26672 | 21.85 | 0.2127 | 5271.1 | 7476.9 | 154.99 | 21.19 | 32.08 | 344. |
| 280 | 2.17386 | 22.89 | 0.2028 | 5496.2 | 7796.3 | 156.16 | 21.16 | 31.80 | 350. |
| 290 | 2.08913 | 23.91 | 0.1938 | 5719.8 | 8113.1 | 157.27 | 21.13 | 31.57 | 357. |
| 300 | 2.01144 | 24.92 | 0.1856 | 5942.0 | 8427.8 | 158.33 | 21.11 | 31.37 | 364. |
| 310 | 1.93987 | 25.91 | 0.1782 | 6163.1 | 8740.5 | 159.36 | 21.10 | 31.19 | 370. |
| 320 | 1.87368 | 26.90 | 0.1714 | 6383.1 | 9051.7 | 160.35 | 21.08 | 31.04 | 376. |
| 330 | 1.81224 | 27.87 | 0.1651 | 6602.3 | 9361.4 | 161.30 | 21.07 | 30.90 | 382. |
| 340 | 1.75502 | 28.83 | 0.1593 | 6820.8 | 9669.8 | 162.22 | 21.07 | 30.79 | 388. |
| 350 | 1.70157 | 29.78 | 0.1540 | 7038.7 | 9977.1 | 163.11 | 21.06 | 30.68 | 394. |
| 360 | 1.65151 | 30.73 | 0.1490 | 7256.0 | 10283.5 | 163.98 | 21.06 | 30.60 | 399. |
| 370 | 1.60451 | 31.66 | 0.1443 | 7472.9 | 10589.1 | 164.81 | 21.07 | 30.52 | 405. |
| 380 | 1.56029 | 32.60 | 0.1399 | 7689.4 | 10893.9 | 165.63 | 21.07 | 30.45 | 410. |
| 390 | 1.51858 | 33.52 | 0.1358 | 7905.6 | 11198.2 | 166.42 | 21.08 | 30.39 | 415. |
| 400 | 1.47916 | 34.44 | 0.1320 | 8121.6 | 11501.8 | 167.18 | 21.09 | 30.34 | 421. |
| 420 | 1.40649 | 36.27 | 0.1250 | 8553.0 | 12107.9 | 168.66 | 21.13 | 30.27 | 431. |
| 440 | 1.34094 | 38.07 | 0.1187 | 8984.1 | 12712.8 | 170.07 | 21.17 | 30.22 | 440. |
| 460 | 1.28149 | 39.87 | 0.1130 | 9415.3 | 13317.0 | 171.41 | 21.22 | 30.20 | 450. |
| 480 | 1.22729 | 41.65 | 0.1079 | 9847.0 | 13921.0 | 172.70 | 21.29 | 30.20 | 459. |
| 500 | 1.17764 | 43.41 | 0.1032 | 10279.3 | 14525.1 | 173.93 | 21.36 | 30.22 | 468. |
| 520 | 1.13199 | 45.17 | 0.0990 | 10712.7 | 15129.7 | 175.12 | 21.45 | 30.25 | 477. |
| 540 | 1.08985 | 46.92 | 0.0951 | 11147.3 | 15735.1 | 176.26 | 21.54 | 30.30 | 485. |
| 560 | 1.05082 | 48.66 | 0.0915 | 11583.5 | 16341.6 | 177.36 | 21.64 | 30.36 | 494. |
| 580 | 1.01457 | 50.40 | 0.0881 | 12021.2 | 16949.4 | 178.43 | 21.74 | 30.43 | 502. |
| 600 | 0.98079 | 52.13 | 0.0850 | 12460.8 | 17558.8 | 179.46 | 21.86 | 30.51 | 510. |
| 620 | 0.94924 | 53.85 | 0.0822 | 12902.4 | 18169.8 | 180.46 | 21.97 | 30.60 | 517. |
| 640 | 0.91970 | 55.57 | 0.0795 | 13346.1 | 18782.7 | 181.44 | 22.09 | 30.69 | 525. |
| 660 | 0.89197 | 57.29 | 0.0770 | 13792.1 | 19397.6 | 182.38 | 22.22 | 30.80 | 532. |
| 680 | 0.86590 | 59.00 | 0.0746 | 14240.3 | 20014.6 | 183.30 | 22.34 | 30.90 | 540. |
| 700 | 0.84134 | 60.71 | 0.0724 | 14690.8 | 20633.8 | 184.20 | 22.47 | 31.01 | 547. |
| 720 | 0.81815 | 62.41 | 0.0703 | 15143.8 | 21255.2 | 185.08 | 22.60 | 31.13 | 554. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 740 | 0.79623 | 64.11 | 0.0684 | 15599.3 | 21878.9 | 185.93 | 22.74 | 31.25 | 561. |
| 760 | 0.77547 | 65.81 | 0.0665 | 16057.3 | 22505.0 | 186.77 | 22.87 | 31.36 | 568. |
| 780 | 0.75578 | 67.51 | 0.0648 | 16517.7 | 23133.5 | 187.58 | 23.00 | 31.48 | 574. |
| 800 | 0.73707 | 69.20 | 0.0631 | 16980.7 | 23764.3 | 188.38 | 23.13 | 31.60 | 581. |
| 850 | 0.69417 | 73.43 | 0.0593 | 18149.1 | 25352.0 | 190.30 | 23.46 | 31.90 | 597. |
| 900 | 0.65603 | 77.64 | 0.0559 | 19333.0 | 26954.5 | 192.14 | 23.77 | 32.20 | 613. |
| 950 | 0.62190 | 81.85 | 0.0529 | 20531.8 | 28571.6 | 193.89 | 24.07 | 32.48 | 628. |
| 1000 | 0.59118 | 86.05 | 0.0502 | 21745.1 | 30202.8 | 195.56 | 24.36 | 32.76 | 643. |
| 1050 | 0.56336 | 90.24 | 0.0478 | 22972.1 | 31847.3 | 197.16 | 24.64 | 33.02 | 657. |
| 1100 | 0.53806 | 94.43 | 0.0456 | 24212.1 | 33504.7 | 198.71 | 24.90 | 33.27 | 671. |
| 1150 | 0.51495 | 98.61 | 0.0436 | 25464.4 | 35174.0 | 200.19 | 25.14 | 33.50 | 685. |
| 1200 | 0.49375 | 102.79 | 0.0418 | 26728.3 | 36854.8 | 201.62 | 25.37 | 33.72 | 698. |
| 1250 | 0.47424 | 106.96 | 0.0401 | 28003.0 | 38546.2 | 203.00 | 25.58 | 33.93 | 712. |
| 1300 | 0.45621 | 111.14 | 0.0385 | 29287.9 | 40247.7 | 204.34 | 25.78 | 34.13 | 725. |
| 1350 | 0.43951 | 115.31 | 0.0371 | 30582.3 | 41958.6 | 205.63 | 25.97 | 34.31 | 737. |
| 1400 | 0.42399 | 119.48 | 0.0358 | 31885.6 | 43678.2 | 206.88 | 26.14 | 34.48 | 750. |
| 1450 | 0.40954 | 123.64 | 0.0345 | 33197.2 | 45406.1 | 208.09 | 26.30 | 34.64 | 762. |
| 1500 | 0.39604 | 127.81 | 0.0334 | 34516.7 | 47141.7 | 209.27 | 26.45 | 34.79 | 775. |
| 1550 | 0.38340 | 131.97 | 0.0323 | 35843.4 | 48884.6 | 210.41 | 26.60 | 34.93 | 787. |
| 1600 | 0.37155 | 136.14 | 0.0313 | 37177.0 | 50634.2 | 211.52 | 26.73 | 35.06 | 798. |
| 1650 | 0.36041 | 140.30 | 0.0303 | 38516.9 | 52390.1 | 212.60 | 26.86 | 35.18 | 810. |
| 1700 | 0.34992 | 144.46 | 0.0294 | 39862.9 | 54152.0 | 213.65 | 26.97 | 35.29 | 821. |
| 1750 | 0.34002 | 148.62 | 0.0286 | 41214.4 | 55919.5 | 214.68 | 27.08 | 35.40 | 833. |
| 1800 | 0.33067 | 152.78 | 0.0278 | 42571.3 | 57692.2 | 215.68 | 27.18 | 35.50 | 844. |
| 1850 | 0.32182 | 156.94 | 0.0270 | 43933.1 | 59469.8 | 216.65 | 27.28 | 35.60 | 855. |
| 1900 | 0.31343 | 161.10 | 0.0263 | 45299.5 | 61252.0 | 217.60 | 27.37 | 35.69 | 866. |
| 1950 | 0.30547 | 165.25 | 0.0256 | 46670.4 | 63038.6 | 218.53 | 27.46 | 35.77 | 877. |
| 2000 | 0.29790 | 169.41 | 0.0250 | 48045.3 | 64829.3 | 219.44 | 27.54 | 35.85 | 887. |

60 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 64.457 | 31.05868 | 242.73 | 29.62 | −4191.2 | −3998.0 | 68.33 | | | |
| 66 | 30.86803 | 224.25 | 28.05 | −4108.3 | −3913.9 | 69.62 | | | |
| 68 | 30.61388 | 203.42 | 26.25 | −3999.7 | −3803.7 | 71.27 | | | |
| 70 | 30.35189 | 185.52 | 24.66 | −3890.4 | −3692.7 | 72.88 | | | |
| 72 | 30.08226 | 170.01 | 23.24 | −3780.7 | −3581.2 | 74.45 | 30.52 | 55.79 | 1053. |
| 74 | 29.80527 | 156.46 | 21.95 | −3670.9 | −3469.6 | 75.98 | 30.21 | 55.86 | 1016. |
| 76 | 29.52124 | 144.51 | 20.77 | −3561.1 | −3357.8 | 77.47 | 29.86 | 55.89 | 983. |
| 78 | 29.23047 | 133.87 | 19.68 | −3451.3 | −3246.0 | 78.92 | 29.49 | 55.91 | 952. |
| 80 | 28.93323 | 124.31 | 18.67 | −3341.6 | −3134.2 | 80.33 | 29.14 | 55.94 | 923. |
| 82 | 28.62970 | 115.64 | 17.73 | −3231.8 | −3022.3 | 81.72 | 28.80 | 56.00 | 896. |
| 84 | 28.31999 | 107.71 | 16.85 | −3122.0 | −2910.2 | 83.07 | 28.49 | 56.09 | 870. |
| 86 | 28.00410 | 100.40 | 16.01 | −3012.1 | −2797.9 | 84.39 | 28.21 | 56.22 | 845. |
| 88 | 27.68194 | 93.61 | 15.23 | −2902.0 | −2685.3 | 85.68 | 27.96 | 56.41 | 821. |
| 90 | 27.35332 | 87.27 | 14.48 | −2791.6 | −2572.2 | 86.95 | 27.73 | 56.65 | 798. |
| 92 | 27.01799 | 81.32 | 13.78 | −2680.7 | −2458.6 | 88.20 | 27.53 | 56.95 | 775. |
| 94 | 26.67557 | 75.71 | 13.10 | −2569.3 | −2344.4 | 89.43 | 27.36 | 57.31 | 752. |
| 96 | 26.32562 | 70.40 | 12.46 | −2457.3 | −2229.4 | 90.64 | 27.20 | 57.73 | 730. |
| 98 | 25.96760 | 65.37 | 11.84 | −2344.5 | −2113.4 | 91.83 | 27.06 | 58.23 | 709. |
| 100 | 25.60090 | 60.58 | 11.25 | −2230.8 | −1996.4 | 93.02 | 26.94 | 58.79 | 687. |
| 102 | 25.22480 | 56.03 | 10.68 | −2116.1 | −1878.2 | 94.19 | 26.83 | 59.44 | 666. |
| 104 | 24.83845 | 51.69 | 10.13 | −2000.2 | −1758.6 | 95.35 | 26.73 | 60.17 | 644. |
| 106 | 24.44088 | 47.55 | 9.59 | −1883.0 | −1637.5 | 96.50 | 26.64 | 60.99 | 623. |
| 108 | 24.03095 | 43.59 | 9.08 | −1764.2 | −1514.6 | 97.65 | 26.56 | 61.93 | 602. |
| 110 | 23.60728 | 39.80 | 8.58 | −1643.8 | −1389.7 | 98.80 | 26.49 | 62.99 | 581. |
| 112 | 23.16820 | 36.17 | 8.09 | −1521.5 | −1262.5 | 99.94 | 26.43 | 64.21 | 560. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 114 | 22.71167 | 32.69 | 7.62 | −1396.9 | −1132.7 | 101.09 | 26.38 | 65.61 | 539. |
| 116 | 22.23510 | 29.34 | 7.15 | −1269.8 | −999.9 | 102.25 | 26.33 | 67.25 | 517. |
| 118 | 21.73520 | 26.11 | 6.70 | −1139.6 | −863.5 | 103.41 | 26.30 | 69.19 | 495. |
| 120 | 21.20769 | 23.00 | 6.25 | −1005.8 | −722.9 | 104.59 | 26.28 | 71.52 | 473. |
| 122 | 20.64688 | 20.00 | 5.80 | −867.7 | −577.1 | 105.80 | 26.27 | 74.39 | 450. |
| 124 | 20.04506 | 17.12 | 5.35 | −724.2 | −424.9 | 107.04 | 26.28 | 77.97 | 426. |
| 126 | 19.39162 | 14.36 | 4.91 | −573.9 | −264.5 | 108.32 | 26.32 | 82.56 | 401. |
| 128 | 18.67166 | 11.74 | 4.46 | −415.0 | −93.7 | 109.66 | 26.39 | 88.57 | 375. |
| 130 | 17.86434 | 9.31 | 4.00 | −244.8 | 91.1 | 111.10 | 26.50 | 96.61 | 348. |
| 132 | 16.94186 | 7.15 | 3.54 | −59.6 | 294.5 | 112.65 | 26.68 | 107.31 | 320. |
| 134 | 15.87455 | 5.37 | 3.07 | 144.2 | 522.1 | 114.36 | 26.91 | 120.60 | 293. |
| 136 | 14.65643 | 4.11 | 2.63 | 367.5 | 776.8 | 116.25 | 27.19 | 133.56 | 268. |
| 138 | 13.35255 | 3.42 | 2.23 | 602.6 | 1051.9 | 118.25 | 27.42 | 139.99 | 249. |
| 140 | 12.09003 | 3.17 | 1.91 | 834.2 | 1330.5 | 120.26 | 27.48 | 137.24 | 238. |
| 142 | 10.96879 | 3.20 | 1.65 | 1049.7 | 1596.7 | 122.15 | 27.32 | 128.23 | 231. |
| 144 | 10.02413 | 3.40 | 1.46 | 1243.1 | 1841.6 | 123.86 | 27.00 | 116.47 | 229. |
| 146 | 9.24773 | 3.72 | 1.30 | 1413.7 | 2062.5 | 125.38 | 26.60 | 104.58 | 229. |
| 148 | 8.61237 | 4.11 | 1.18 | 1564.2 | 2260.8 | 126.73 | 26.18 | 94.00 | 230. |
| 150 | 8.08802 | 4.54 | 1.08 | 1697.9 | 2439.7 | 127.93 | 25.77 | 85.15 | 231. |
| 155 | 7.10941 | 5.64 | 0.9066 | 1979.2 | 2823.2 | 130.45 | 24.89 | 69.58 | 237. |
| 160 | 6.42377 | 6.71 | 0.7878 | 2211.5 | 3145.5 | 132.50 | 24.21 | 60.07 | 244. |
| 165 | 5.90777 | 7.72 | 0.7020 | 2413.7 | 3429.3 | 134.24 | 23.68 | 53.87 | 250. |
| 170 | 5.49929 | 8.66 | 0.6365 | 2596.3 | 3687.3 | 135.78 | 23.27 | 49.57 | 257. |
| 175 | 5.16405 | 9.55 | 0.5847 | 2765.1 | 3927.0 | 137.17 | 22.94 | 46.44 | 263. |
| 180 | 4.88146 | 10.39 | 0.5423 | 2923.8 | 4153.0 | 138.45 | 22.67 | 44.06 | 268. |
| 185 | 4.63838 | 11.19 | 0.5069 | 3074.9 | 4368.4 | 139.63 | 22.45 | 42.20 | 274. |
| 190 | 4.42591 | 11.95 | 0.4767 | 3220.0 | 4575.6 | 140.73 | 22.27 | 40.71 | 279. |
| 195 | 4.23780 | 12.69 | 0.4506 | 3360.2 | 4776.0 | 141.77 | 22.12 | 39.50 | 284. |
| 200 | 4.06951 | 13.40 | 0.4278 | 3496.5 | 4970.9 | 142.76 | 22.00 | 38.49 | 289. |
| 210 | 3.77951 | 14.76 | 0.3895 | 3760.0 | 5347.5 | 144.60 | 21.80 | 36.91 | 299. |
| 220 | 3.53688 | 16.05 | 0.3586 | 4014.0 | 5710.4 | 146.29 | 21.65 | 35.73 | 308. |
| 230 | 3.32958 | 17.29 | 0.3329 | 4261.0 | 6063.0 | 147.85 | 21.53 | 34.83 | 316. |
| 240 | 3.14960 | 18.48 | 0.3112 | 4502.6 | 6407.6 | 149.32 | 21.44 | 34.12 | 324. |
| 250 | 2.99130 | 19.64 | 0.2925 | 4740.0 | 6745.8 | 150.70 | 21.37 | 33.54 | 332. |
| 260 | 2.85060 | 20.76 | 0.2761 | 4973.9 | 7078.8 | 152.01 | 21.31 | 33.06 | 339. |
| 270 | 2.72442 | 21.86 | 0.2618 | 5205.1 | 7407.4 | 153.25 | 21.27 | 32.67 | 346. |
| 280 | 2.61042 | 22.93 | 0.2490 | 5433.9 | 7732.3 | 154.43 | 21.23 | 32.33 | 353. |
| 290 | 2.50675 | 23.99 | 0.2375 | 5660.7 | 8054.2 | 155.56 | 21.20 | 32.05 | 360. |
| 300 | 2.41196 | 25.02 | 0.2271 | 5885.8 | 8373.4 | 156.64 | 21.17 | 31.80 | 366. |
| 310 | 2.32486 | 26.04 | 0.2177 | 6109.6 | 8690.4 | 157.68 | 21.15 | 31.59 | 373. |
| 320 | 2.24447 | 27.05 | 0.2091 | 6332.1 | 9005.3 | 158.68 | 21.13 | 31.40 | 379. |
| 330 | 2.16999 | 28.04 | 0.2012 | 6553.5 | 9318.5 | 159.64 | 21.12 | 31.24 | 385. |
| 340 | 2.10074 | 29.03 | 0.1940 | 6774.1 | 9630.2 | 160.58 | 21.11 | 31.10 | 391. |
| 350 | 2.03616 | 30.00 | 0.1873 | 6993.9 | 9940.6 | 161.47 | 21.11 | 30.98 | 396. |
| 360 | 1.97574 | 30.96 | 0.1810 | 7213.0 | 10249.8 | 162.35 | 21.11 | 30.87 | 402. |
| 370 | 1.91909 | 31.92 | 0.1752 | 7431.5 | 10558.0 | 163.19 | 21.11 | 30.77 | 408. |
| 380 | 1.86583 | 32.87 | 0.1698 | 7649.6 | 10865.3 | 164.01 | 21.11 | 30.69 | 413. |
| 390 | 1.81565 | 33.81 | 0.1647 | 7867.2 | 11171.8 | 164.81 | 21.12 | 30.62 | 418. |
| 400 | 1.76828 | 34.74 | 0.1600 | 8084.6 | 11477.7 | 165.58 | 21.13 | 30.56 | 423. |
| 420 | 1.68101 | 36.59 | 0.1513 | 8518.5 | 12087.8 | 167.07 | 21.16 | 30.46 | 434. |
| 440 | 1.60240 | 38.42 | 0.1436 | 8951.9 | 12696.2 | 168.48 | 21.20 | 30.39 | 443. |
| 460 | 1.53118 | 40.24 | 0.1366 | 9385.1 | 13303.6 | 169.83 | 21.25 | 30.35 | 453. |
| 480 | 1.46629 | 42.04 | 0.1303 | 9818.5 | 13910.5 | 171.13 | 21.32 | 30.34 | 462. |
| 500 | 1.40691 | 43.82 | 0.1246 | 10252.6 | 14517.2 | 172.36 | 21.39 | 30.34 | 471. |
| 520 | 1.35233 | 45.60 | 0.1194 | 10687.5 | 15124.2 | 173.55 | 21.47 | 30.36 | 480. |
| 540 | 1.30198 | 47.36 | 0.1146 | 11123.5 | 15731.8 | 174.70 | 21.56 | 30.40 | 488. |
| 560 | 1.25536 | 49.12 | 0.1103 | 11560.9 | 16340.4 | 175.81 | 21.66 | 30.45 | 497. |
| 580 | 1.21207 | 50.87 | 0.1062 | 11999.8 | 16950.0 | 176.88 | 21.76 | 30.52 | 505. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 600 | 1.17175 | 52.61 | 0.1024 | 12440.5 | 17561.1 | 177.91 | 21.87 | 30.59 | 512. |
| 620 | 1.13409 | 54.34 | 0.0989 | 12883.1 | 18173.7 | 178.92 | 21.99 | 30.67 | 520. |
| 640 | 1.09884 | 56.07 | 0.0957 | 13327.8 | 18788.1 | 179.89 | 22.11 | 30.76 | 528. |
| 660 | 1.06576 | 57.80 | 0.0926 | 13774.6 | 19404.4 | 180.84 | 22.23 | 30.86 | 535. |
| 680 | 1.03466 | 59.51 | 0.0898 | 14223.6 | 20022.6 | 181.76 | 22.36 | 30.97 | 542. |
| 700 | 1.00536 | 61.23 | 0.0871 | 14675.0 | 20643.0 | 182.66 | 22.49 | 31.07 | 550. |
| 720 | 0.97771 | 62.94 | 0.0846 | 15128.7 | 21265.5 | 183.54 | 22.62 | 31.18 | 557. |
| 740 | 0.95156 | 64.65 | 0.0822 | 15584.9 | 21890.3 | 184.40 | 22.75 | 31.30 | 563. |
| 760 | 0.92680 | 66.35 | 0.0800 | 16043.5 | 22517.4 | 185.23 | 22.88 | 31.41 | 570. |
| 780 | 0.90331 | 68.06 | 0.0779 | 16504.6 | 23146.8 | 186.05 | 23.01 | 31.53 | 577. |
| 800 | 0.88100 | 69.76 | 0.0758 | 16968.1 | 23778.5 | 186.85 | 23.14 | 31.65 | 583. |
| 850 | 0.82984 | 73.99 | 0.0713 | 18137.9 | 25368.2 | 188.78 | 23.47 | 31.94 | 600. |
| 900 | 0.78436 | 78.22 | 0.0672 | 19322.9 | 26972.4 | 190.61 | 23.78 | 32.23 | 615. |
| 950 | 0.74365 | 82.43 | 0.0636 | 20522.7 | 28591.0 | 192.36 | 24.08 | 32.51 | 630. |
| 1000 | 0.70700 | 86.64 | 0.0604 | 21736.9 | 30223.5 | 194.03 | 24.37 | 32.78 | 645. |
| 1050 | 0.67382 | 90.84 | 0.0574 | 22964.7 | 31869.2 | 195.64 | 24.65 | 33.04 | 659. |
| 1100 | 0.64363 | 95.03 | 0.0548 | 24205.5 | 33527.6 | 197.18 | 24.90 | 33.29 | 673. |
| 1150 | 0.61605 | 99.22 | 0.0524 | 25458.5 | 35197.9 | 198.67 | 25.15 | 33.52 | 687. |
| 1200 | 0.59075 | 103.40 | 0.0502 | 26722.9 | 36879.5 | 200.10 | 25.37 | 33.74 | 701. |
| 1250 | 0.56746 | 107.58 | 0.0481 | 27998.2 | 38571.7 | 201.48 | 25.59 | 33.95 | 714. |
| 1300 | 0.54594 | 111.76 | 0.0463 | 29283.6 | 40273.8 | 202.82 | 25.79 | 34.14 | 727. |
| 1350 | 0.52600 | 115.93 | 0.0445 | 30578.5 | 41985.3 | 204.11 | 25.97 | 34.32 | 739. |
| 1400 | 0.50747 | 120.10 | 0.0429 | 31882.2 | 43705.5 | 205.36 | 26.15 | 34.49 | 752. |
| 1450 | 0.49021 | 124.27 | 0.0414 | 33194.2 | 45433.9 | 206.57 | 26.31 | 34.65 | 764. |
| 1500 | 0.47409 | 128.44 | 0.0401 | 34514.0 | 47170.0 | 207.75 | 26.46 | 34.79 | 776. |
| 1550 | 0.45899 | 132.60 | 0.0388 | 35841.1 | 48913.2 | 208.89 | 26.60 | 34.93 | 788. |
| 1600 | 0.44483 | 136.77 | 0.0375 | 37175.0 | 50663.2 | 210.00 | 26.74 | 35.06 | 800. |
| 1650 | 0.43152 | 140.93 | 0.0364 | 38515.2 | 52419.5 | 211.08 | 26.86 | 35.19 | 812. |
| 1700 | 0.41899 | 145.09 | 0.0353 | 39861.5 | 54181.7 | 212.14 | 26.98 | 35.30 | 823. |
| 1750 | 0.40716 | 149.25 | 0.0343 | 41213.3 | 55949.4 | 213.16 | 27.09 | 35.41 | 835. |
| 1800 | 0.39599 | 153.41 | 0.0333 | 42570.4 | 57722.4 | 214.16 | 27.19 | 35.51 | 846. |
| 1850 | 0.38541 | 157.57 | 0.0324 | 43932.4 | 59500.2 | 215.13 | 27.29 | 35.60 | 857. |
| 1900 | 0.37538 | 161.73 | 0.0316 | 45299.1 | 61282.7 | 216.09 | 27.38 | 35.69 | 868. |
| 1950 | 0.36587 | 165.88 | 0.0308 | 46670.1 | 63069.5 | 217.01 | 27.46 | 35.78 | 878. |
| 2000 | 0.35682 | 170.04 | 0.0300 | 48045.2 | 64860.3 | 217.92 | 27.54 | 35.86 | 889. |

70 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 64.673 | 31.07365 | 243.31 | 29.28 | −4187.5 | −3962.3 | 68.39 | | | |
| 66 | 30.91230 | 227.51 | 27.96 | −4116.6 | −3890.1 | 69.49 | | | |
| 68 | 30.66266 | 206.62 | 26.19 | −4008.6 | −3780.3 | 71.13 | | | |
| 70 | 30.40534 | 188.67 | 24.63 | −3900.0 | −3669.7 | 72.73 | | | |
| 72 | 30.14055 | 173.11 | 23.24 | −3791.0 | −3558.8 | 74.30 | 30.83 | 55.54 | 1055. |
| 74 | 29.86856 | 159.53 | 21.97 | −3682.0 | −3447.6 | 75.82 | 30.50 | 55.61 | 1019. |
| 76 | 29.58972 | 147.55 | 20.82 | −3573.0 | −3336.4 | 77.30 | 30.13 | 55.63 | 986. |
| 78 | 29.30434 | 136.89 | 19.75 | −3464.0 | −3225.1 | 78.75 | 29.75 | 55.63 | 956. |
| 80 | 29.01271 | 127.33 | 18.76 | −3355.1 | −3113.8 | 80.16 | 29.38 | 55.65 | 928. |
| 82 | 28.71507 | 118.66 | 17.83 | −3246.3 | −3002.5 | 81.53 | 29.03 | 55.69 | 901. |
| 84 | 28.41155 | 110.73 | 16.97 | −3137.5 | −2891.1 | 82.87 | 28.70 | 55.75 | 876. |
| 86 | 28.10222 | 103.43 | 16.15 | −3028.6 | −2779.5 | 84.19 | 28.41 | 55.86 | 852. |
| 88 | 27.78705 | 96.66 | 15.37 | −2919.5 | −2667.6 | 85.47 | 28.15 | 56.02 | 829. |
| 90 | 27.46594 | 90.34 | 14.64 | −2810.2 | −2555.4 | 86.73 | 27.91 | 56.22 | 806. |
| 92 | 27.13868 | 84.41 | 13.95 | −2700.6 | −2442.7 | 87.97 | 27.70 | 56.48 | 784. |
| 94 | 26.80500 | 78.82 | 13.28 | −2590.6 | −2329.4 | 89.19 | 27.51 | 56.79 | 762. |
| 96 | 26.46457 | 73.54 | 12.65 | −2480.0 | −2215.5 | 90.39 | 27.34 | 57.15 | 741. |
| 98 | 26.11698 | 68.54 | 12.04 | −2368.8 | −2100.8 | 91.57 | 27.19 | 57.58 | 720. |
| 100 | 25.76174 | 63.78 | 11.46 | −2256.9 | −1985.1 | 92.74 | 27.06 | 58.07 | 699. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 102 | 25.39830 | 59.26 | 10.90 | −2144.1 | −1868.5 | 93.89 | 26.94 | 58.62 | 678. |
| 104 | 25.02603 | 54.95 | 10.36 | −2030.3 | −1750.6 | 95.04 | 26.83 | 59.24 | 658. |
| 106 | 24.64421 | 50.84 | 9.83 | −1915.5 | −1631.5 | 96.17 | 26.73 | 59.93 | 638. |
| 108 | 24.25199 | 46.92 | 9.33 | −1799.5 | −1510.8 | 97.30 | 26.64 | 60.71 | 618. |
| 110 | 23.84841 | 43.17 | 8.84 | −1682.1 | −1388.6 | 98.42 | 26.56 | 61.59 | 598. |
| 112 | 23.43232 | 39.58 | 8.37 | −1563.2 | −1264.4 | 99.54 | 26.49 | 62.57 | 578. |
| 114 | 23.00237 | 36.15 | 7.91 | −1442.5 | −1138.2 | 100.66 | 26.43 | 63.68 | 558. |
| 116 | 22.55690 | 32.85 | 7.46 | −1319.9 | −1009.6 | 101.78 | 26.37 | 64.94 | 537. |
| 118 | 22.09389 | 29.70 | 7.02 | −1195.1 | −878.3 | 102.90 | 26.32 | 66.39 | 517. |
| 120 | 21.61085 | 26.66 | 6.59 | −1067.8 | −743.9 | 104.03 | 26.27 | 68.08 | 497. |
| 122 | 21.10466 | 23.75 | 6.16 | −937.5 | −605.8 | 105.17 | 26.24 | 70.05 | 476. |
| 124 | 20.57138 | 20.96 | 5.75 | −803.7 | −463.4 | 106.33 | 26.22 | 72.39 | 455. |
| 126 | 20.00605 | 18.30 | 5.34 | −665.8 | −315.9 | 107.51 | 26.21 | 75.20 | 433. |
| 128 | 19.40237 | 15.76 | 4.93 | −523.0 | −162.2 | 108.72 | 26.21 | 78.61 | 411. |
| 130 | 18.75256 | 13.39 | 4.52 | −374.3 | −1.0 | 109.97 | 26.24 | 82.76 | 388. |
| 132 | 18.04731 | 11.19 | 4.12 | −218.5 | 169.4 | 111.27 | 26.29 | 87.79 | 365. |
| 134 | 17.27676 | 9.24 | 3.72 | −54.4 | 350.8 | 112.63 | 26.37 | 93.74 | 342. |
| 136 | 16.43350 | 7.57 | 3.33 | 118.9 | 544.8 | 114.07 | 26.48 | 100.35 | 320. |
| 138 | 15.51930 | 6.26 | 2.96 | 301.0 | 752.0 | 115.58 | 26.61 | 106.71 | 299. |
| 140 | 14.55402 | 5.34 | 2.61 | 489.5 | 970.5 | 117.15 | 26.72 | 111.30 | 282. |
| 142 | 13.57756 | 4.78 | 2.31 | 679.6 | 1195.1 | 118.75 | 26.79 | 112.78 | 268. |
| 144 | 12.63647 | 4.51 | 2.05 | 865.5 | 1419.4 | 120.31 | 26.77 | 111.02 | 258. |
| 146 | 11.76618 | 4.44 | 1.84 | 1042.7 | 1637.6 | 121.82 | 26.65 | 106.84 | 252. |
| 148 | 10.98473 | 4.52 | 1.66 | 1208.6 | 1845.8 | 123.24 | 26.44 | 101.22 | 248. |
| 150 | 10.29602 | 4.69 | 1.51 | 1362.2 | 2042.0 | 124.55 | 26.18 | 94.95 | 247. |
| 155 | 8.93680 | 5.43 | 1.23 | 1695.0 | 2478.2 | 127.41 | 25.44 | 79.97 | 247. |
| 160 | 7.96593 | 6.34 | 1.05 | 1969.1 | 2847.8 | 129.76 | 24.74 | 68.52 | 250. |
| 165 | 7.24503 | 7.30 | 0.9185 | 2202.9 | 3169.1 | 131.74 | 24.15 | 60.46 | 255. |
| 170 | 6.68590 | 8.24 | 0.8210 | 2409.4 | 3456.4 | 133.46 | 23.67 | 54.76 | 261. |
| 175 | 6.23593 | 9.15 | 0.7454 | 2596.8 | 3719.3 | 134.98 | 23.29 | 50.61 | 266. |
| 180 | 5.86310 | 10.02 | 0.6849 | 2770.3 | 3964.2 | 136.36 | 22.98 | 47.49 | 272. |
| 185 | 5.54700 | 10.85 | 0.6352 | 2933.4 | 4195.4 | 137.63 | 22.72 | 45.08 | 277. |
| 190 | 5.27409 | 11.65 | 0.5936 | 3088.6 | 4415.8 | 138.80 | 22.51 | 43.16 | 282. |
| 195 | 5.03497 | 12.42 | 0.5580 | 3237.4 | 4627.6 | 139.90 | 22.33 | 41.62 | 287. |
| 200 | 4.82293 | 13.16 | 0.5272 | 3381.0 | 4832.4 | 140.94 | 22.18 | 40.34 | 292. |
| 210 | 4.46148 | 14.58 | 0.4764 | 3656.5 | 5225.5 | 142.86 | 21.95 | 38.37 | 302. |
| 220 | 4.16257 | 15.92 | 0.4360 | 3920.0 | 5601.6 | 144.61 | 21.78 | 36.93 | 310. |
| 230 | 3.90953 | 17.21 | 0.4028 | 4174.7 | 5965.2 | 146.23 | 21.64 | 35.83 | 319. |
| 240 | 3.69141 | 18.44 | 0.3750 | 4422.8 | 6319.1 | 147.73 | 21.54 | 34.97 | 327. |
| 250 | 3.50070 | 19.63 | 0.3513 | 4665.6 | 6665.2 | 149.14 | 21.46 | 34.28 | 335. |
| 260 | 3.33200 | 20.79 | 0.3308 | 4904.3 | 7005.1 | 150.48 | 21.39 | 33.72 | 342. |
| 270 | 3.18134 | 21.92 | 0.3128 | 5139.5 | 7339.9 | 151.74 | 21.34 | 33.25 | 349. |
| 280 | 3.04568 | 23.02 | 0.2969 | 5372.0 | 7670.3 | 152.94 | 21.29 | 32.85 | 356. |
| 290 | 2.92270 | 24.10 | 0.2828 | 5602.1 | 7997.2 | 154.09 | 21.26 | 32.52 | 363. |
| 300 | 2.81052 | 25.16 | 0.2700 | 5830.2 | 8320.9 | 155.19 | 21.23 | 32.23 | 369. |
| 310 | 2.70767 | 26.21 | 0.2585 | 6056.6 | 8641.9 | 156.24 | 21.20 | 31.98 | 376. |
| 320 | 2.61293 | 27.24 | 0.2479 | 6281.6 | 8960.6 | 157.25 | 21.18 | 31.76 | 382. |
| 330 | 2.52530 | 28.25 | 0.2383 | 6505.3 | 9277.2 | 158.23 | 21.17 | 31.57 | 388. |
| 340 | 2.44395 | 29.25 | 0.2295 | 6727.9 | 9592.1 | 159.17 | 21.16 | 31.41 | 394. |
| 350 | 2.36817 | 30.24 | 0.2214 | 6949.6 | 9905.4 | 160.07 | 21.15 | 31.26 | 399. |
| 360 | 2.29738 | 31.22 | 0.2138 | 7170.4 | 10217.4 | 160.95 | 21.15 | 31.13 | 405. |
| 370 | 2.23106 | 32.19 | 0.2068 | 7390.6 | 10528.1 | 161.80 | 21.15 | 31.02 | 411. |
| 380 | 2.16877 | 33.16 | 0.2003 | 7610.2 | 10837.8 | 162.63 | 21.15 | 30.92 | 416. |
| 390 | 2.11014 | 34.11 | 0.1942 | 7829.3 | 11146.6 | 163.43 | 21.15 | 30.84 | 421. |
| 400 | 2.05482 | 35.06 | 0.1885 | 8048.0 | 11454.6 | 164.21 | 21.16 | 30.76 | 427. |
| 420 | 1.95303 | 36.94 | 0.1780 | 8484.4 | 12068.6 | 165.71 | 21.19 | 30.64 | 437. |
| 440 | 1.86144 | 38.79 | 0.1688 | 8919.9 | 12680.5 | 167.13 | 21.23 | 30.56 | 446. |
| 460 | 1.77852 | 40.62 | 0.1605 | 9355.2 | 13291.0 | 168.49 | 21.28 | 30.50 | 456. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 480 | 1.70305 | 42.44 | 0.1530 | 9790.4 | 13900.7 | 169.79 | 21.34 | 30.47 | 465. |
| 500 | 1.63402 | 44.25 | 0.1462 | 10226.1 | 14510.0 | 171.03 | 21.41 | 30.46 | 474. |
| 520 | 1.57060 | 46.04 | 0.1400 | 10662.4 | 15119.3 | 172.23 | 21.49 | 30.47 | 483. |
| 540 | 1.51212 | 47.81 | 0.1344 | 11099.8 | 15729.1 | 173.38 | 21.58 | 30.50 | 491. |
| 560 | 1.45800 | 49.58 | 0.1292 | 11538.5 | 16339.6 | 174.49 | 21.68 | 30.55 | 499. |
| 580 | 1.40775 | 51.34 | 0.1244 | 11978.6 | 16951.1 | 175.56 | 21.78 | 30.60 | 507. |
| 600 | 1.36096 | 53.10 | 0.1200 | 12420.4 | 17563.8 | 176.60 | 21.89 | 30.67 | 515. |
| 620 | 1.31727 | 54.84 | 0.1158 | 12864.0 | 18178.0 | 177.61 | 22.01 | 30.75 | 523. |
| 640 | 1.27638 | 56.58 | 0.1120 | 13309.6 | 18793.8 | 178.58 | 22.13 | 30.83 | 531. |
| 660 | 1.23802 | 58.31 | 0.1084 | 13757.3 | 19411.5 | 179.53 | 22.25 | 30.93 | 538. |
| 680 | 1.20195 | 60.04 | 0.1050 | 14207.1 | 20031.0 | 180.46 | 22.38 | 31.03 | 545. |
| 700 | 1.16798 | 61.76 | 0.1019 | 14659.3 | 20652.5 | 181.36 | 22.50 | 31.13 | 552. |
| 720 | 1.13591 | 63.48 | 0.0989 | 15113.7 | 21276.2 | 182.24 | 22.63 | 31.24 | 559. |
| 740 | 1.10559 | 65.19 | 0.0961 | 15570.6 | 21902.0 | 183.10 | 22.76 | 31.35 | 566. |
| 760 | 1.07688 | 66.90 | 0.0935 | 16029.8 | 22530.0 | 183.93 | 22.90 | 31.46 | 573. |
| 780 | 1.04965 | 68.61 | 0.0910 | 16491.5 | 23160.4 | 184.75 | 23.03 | 31.57 | 579. |
| 800 | 1.02379 | 70.32 | 0.0886 | 16955.6 | 23793.0 | 185.55 | 23.16 | 31.69 | 586. |
| 850 | 0.96447 | 74.56 | 0.0833 | 18126.7 | 25384.5 | 187.48 | 23.48 | 31.98 | 602. |
| 900 | 0.91173 | 78.80 | 0.0785 | 19312.8 | 26990.5 | 189.32 | 23.79 | 32.26 | 618. |
| 950 | 0.86453 | 83.02 | 0.0743 | 20513.7 | 28610.6 | 191.07 | 24.09 | 32.54 | 633. |
| 1000 | 0.82202 | 87.24 | 0.0705 | 21728.8 | 30244.4 | 192.75 | 24.38 | 32.81 | 647. |
| 1050 | 0.78354 | 91.44 | 0.0671 | 22957.4 | 31891.3 | 194.35 | 24.65 | 33.06 | 662. |
| 1100 | 0.74853 | 95.64 | 0.0640 | 24198.9 | 33550.6 | 195.90 | 24.91 | 33.31 | 676. |
| 1150 | 0.71653 | 99.83 | 0.0611 | 25452.6 | 35221.9 | 197.38 | 25.15 | 33.54 | 689. |
| 1200 | 0.68718 | 104.02 | 0.0585 | 26717.6 | 36904.3 | 198.81 | 25.38 | 33.76 | 703. |
| 1250 | 0.66014 | 108.20 | 0.0562 | 27993.5 | 38597.2 | 200.20 | 25.59 | 33.96 | 716. |
| 1300 | 0.63517 | 112.38 | 0.0540 | 29279.4 | 40300.0 | 201.53 | 25.79 | 34.15 | 729. |
| 1350 | 0.61203 | 116.55 | 0.0520 | 30574.7 | 42012.1 | 202.82 | 25.98 | 34.33 | 742. |
| 1400 | 0.59052 | 120.73 | 0.0501 | 31878.8 | 43732.8 | 204.08 | 26.15 | 34.50 | 754. |
| 1450 | 0.57048 | 124.90 | 0.0484 | 33191.3 | 45461.7 | 205.29 | 26.31 | 34.66 | 766. |
| 1500 | 0.55176 | 129.07 | 0.0467 | 34511.4 | 47198.2 | 206.47 | 26.47 | 34.80 | 778. |
| 1550 | 0.53423 | 133.23 | 0.0452 | 35838.8 | 48941.9 | 207.61 | 26.61 | 34.94 | 790. |
| 1600 | 0.51778 | 137.40 | 0.0438 | 37173.0 | 50692.2 | 208.72 | 26.74 | 35.07 | 802. |
| 1650 | 0.50232 | 141.56 | 0.0425 | 38513.6 | 52448.8 | 209.80 | 26.86 | 35.19 | 814. |
| 1700 | 0.48776 | 145.72 | 0.0412 | 39860.1 | 54211.3 | 210.85 | 26.98 | 35.31 | 825. |
| 1750 | 0.47402 | 149.88 | 0.0400 | 41212.1 | 55979.4 | 211.88 | 27.09 | 35.41 | 836. |
| 1800 | 0.46104 | 154.04 | 0.0389 | 42569.5 | 57752.6 | 212.88 | 27.19 | 35.51 | 847. |
| 1850 | 0.44875 | 158.20 | 0.0378 | 43931.7 | 59530.7 | 213.85 | 27.29 | 35.61 | 858. |
| 1900 | 0.43710 | 162.36 | 0.0369 | 45298.6 | 61313.4 | 214.80 | 27.38 | 35.70 | 869. |
| 1950 | 0.42604 | 166.52 | 0.0359 | 46669.8 | 63100.3 | 215.73 | 27.47 | 35.78 | 880. |
| 2000 | 0.41552 | 170.67 | 0.0350 | 48045.1 | 64891.4 | 216.64 | 27.55 | 35.86 | 891. |

80 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 64.889 | 31.08896 | 243.92 | 28.94 | −4183.8 | −3926.5 | 68.44 | | | |
| 66 | 30.95594 | 230.77 | 27.86 | −4124.6 | −3866.2 | 69.36 | | | |
| 68 | 30.71069 | 209.82 | 26.13 | −4017.3 | −3756.8 | 71.00 | | | |
| 70 | 30.45791 | 191.81 | 24.60 | −3909.3 | −3646.7 | 72.59 | | | |
| 72 | 30.19780 | 176.21 | 23.23 | −3801.1 | −3536.2 | 74.15 | 31.13 | 55.31 | 1057. |
| 74 | 29.93066 | 162.58 | 21.99 | −3692.8 | −3425.5 | 75.67 | 30.78 | 55.36 | 1022. |
| 76 | 29.65680 | 150.58 | 20.86 | −3584.5 | −3314.7 | 77.14 | 30.40 | 55.37 | 990. |
| 78 | 29.37659 | 139.90 | 19.82 | −3476.3 | −3204.0 | 78.58 | 30.00 | 55.37 | 960. |
| 80 | 29.09034 | 130.32 | 18.84 | −3368.3 | −3093.3 | 79.98 | 29.61 | 55.37 | 933. |
| 82 | 28.79830 | 121.65 | 17.93 | −3260.3 | −2982.5 | 81.35 | 29.25 | 55.39 | 907. |
| 84 | 28.50065 | 113.73 | 17.08 | −3152.4 | −2871.7 | 82.69 | 28.91 | 55.44 | 882. |
| 86 | 28.19752 | 106.44 | 16.28 | −3044.4 | −2760.7 | 83.99 | 28.60 | 55.53 | 859. |
| 88 | 27.88892 | 99.68 | 15.52 | −2936.4 | −2649.5 | 85.27 | 28.32 | 55.65 | 836. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 90 | 27.57481 | 93.37 | 14.80 | −2828.2 | −2538.1 | 86.52 | 28.07 | 55.82 | 814. |
| 92 | 27.25505 | 87.46 | 14.11 | −2719.7 | −2426.2 | 87.75 | 27.85 | 56.04 | 793. |
| 94 | 26.92945 | 81.90 | 13.46 | −2611.0 | −2313.9 | 88.96 | 27.65 | 56.31 | 772. |
| 96 | 26.59776 | 76.64 | 12.83 | −2501.7 | −2201.0 | 90.15 | 27.48 | 56.63 | 751. |
| 98 | 26.25966 | 71.65 | 12.23 | −2392.0 | −2087.3 | 91.32 | 27.32 | 56.99 | 731. |
| 100 | 25.91478 | 66.92 | 11.66 | −2281.6 | −1972.9 | 92.47 | 27.18 | 57.42 | 710. |
| 102 | 25.56269 | 62.42 | 11.11 | −2170.6 | −1857.6 | 93.62 | 27.05 | 57.89 | 691. |
| 104 | 25.20292 | 58.14 | 10.57 | −2058.8 | −1741.3 | 94.75 | 26.93 | 58.42 | 671. |
| 106 | 24.83492 | 54.05 | 10.06 | −1946.0 | −1623.9 | 95.86 | 26.82 | 59.02 | 652. |
| 108 | 24.45807 | 50.16 | 9.57 | −1832.3 | −1505.2 | 96.97 | 26.73 | 59.67 | 632. |
| 110 | 24.07168 | 46.44 | 9.09 | −1717.5 | −1385.2 | 98.07 | 26.64 | 60.40 | 613. |
| 112 | 23.67494 | 42.88 | 8.62 | −1601.5 | −1263.6 | 99.17 | 26.55 | 61.21 | 594. |
| 114 | 23.26692 | 39.49 | 8.17 | −1484.1 | −1140.3 | 100.26 | 26.48 | 62.11 | 575. |
| 116 | 22.84652 | 36.23 | 7.74 | −1365.2 | −1015.1 | 101.35 | 26.41 | 63.11 | 556. |
| 118 | 22.41246 | 33.12 | 7.31 | −1244.7 | −887.8 | 102.44 | 26.34 | 64.24 | 537. |
| 120 | 21.96320 | 30.14 | 6.89 | −1122.3 | −758.0 | 103.53 | 26.28 | 65.51 | 518. |
| 122 | 21.49688 | 27.29 | 6.49 | −997.7 | −625.6 | 104.62 | 26.23 | 66.96 | 499. |
| 124 | 21.01131 | 24.56 | 6.09 | −870.8 | −490.0 | 105.72 | 26.19 | 68.62 | 479. |
| 126 | 20.50382 | 21.96 | 5.70 | −741.1 | −350.9 | 106.84 | 26.15 | 70.54 | 460. |
| 128 | 19.97129 | 19.48 | 5.32 | −608.3 | −207.7 | 107.97 | 26.12 | 72.75 | 440. |
| 130 | 19.41008 | 17.14 | 4.94 | −471.8 | −59.7 | 109.11 | 26.11 | 75.32 | 420. |
| 132 | 18.81613 | 14.96 | 4.57 | −331.3 | 93.9 | 110.28 | 26.11 | 78.27 | 400. |
| 134 | 18.18533 | 12.95 | 4.21 | −186.2 | 253.7 | 111.49 | 26.12 | 81.63 | 380. |
| 136 | 17.51422 | 11.15 | 3.86 | −36.2 | 420.6 | 112.72 | 26.14 | 85.33 | 360. |
| 138 | 16.80155 | 9.60 | 3.52 | 119.0 | 595.1 | 114.00 | 26.18 | 89.17 | 342. |
| 140 | 16.05042 | 8.31 | 3.19 | 278.7 | 777.1 | 115.31 | 26.23 | 92.77 | 324. |
| 142 | 15.27065 | 7.31 | 2.89 | 441.8 | 965.7 | 116.64 | 26.27 | 95.57 | 308. |
| 144 | 14.47926 | 6.60 | 2.61 | 606.0 | 1158.5 | 117.99 | 26.29 | 97.06 | 295. |
| 146 | 13.69754 | 6.14 | 2.36 | 768.8 | 1352.8 | 119.33 | 26.27 | 96.99 | 284. |
| 148 | 12.94584 | 5.87 | 2.15 | 927.6 | 1545.5 | 120.64 | 26.21 | 95.49 | 276. |
| 150 | 12.23933 | 5.76 | 1.96 | 1080.4 | 1734.1 | 121.91 | 26.09 | 92.88 | 271. |
| 155 | 10.71560 | 5.94 | 1.60 | 1430.0 | 2176.6 | 124.81 | 25.63 | 83.75 | 263. |
| 160 | 9.53248 | 6.52 | 1.35 | 1731.5 | 2570.7 | 127.31 | 25.05 | 74.06 | 262. |
| 165 | 8.62266 | 7.29 | 1.17 | 1992.0 | 2919.7 | 129.46 | 24.49 | 65.84 | 264. |
| 170 | 7.91117 | 8.14 | 1.03 | 2221.0 | 3232.2 | 131.33 | 24.01 | 59.44 | 268. |
| 175 | 7.34053 | 9.00 | 0.9262 | 2426.8 | 3516.7 | 132.98 | 23.59 | 54.55 | 273. |
| 180 | 6.87127 | 9.85 | 0.8440 | 2615.4 | 3779.7 | 134.46 | 23.25 | 50.81 | 277. |
| 185 | 6.47681 | 10.69 | 0.7773 | 2791.0 | 4026.1 | 135.81 | 22.97 | 47.89 | 282. |
| 190 | 6.13905 | 11.50 | 0.7219 | 2956.5 | 4259.6 | 137.06 | 22.73 | 45.58 | 287. |
| 195 | 5.84539 | 12.28 | 0.6752 | 3114.1 | 4482.7 | 138.22 | 22.53 | 43.71 | 292. |
| 200 | 5.58676 | 13.04 | 0.6351 | 3265.3 | 4697.3 | 139.30 | 22.36 | 42.18 | 296. |
| 210 | 5.14970 | 14.50 | 0.5697 | 3553.1 | 5106.6 | 141.30 | 22.10 | 39.82 | 305. |
| 220 | 4.79176 | 15.88 | 0.5183 | 3826.3 | 5495.8 | 143.11 | 21.90 | 38.11 | 314. |
| 230 | 4.49108 | 17.20 | 0.4767 | 4088.9 | 5870.2 | 144.78 | 21.75 | 36.82 | 322. |
| 240 | 4.23352 | 18.46 | 0.4422 | 4343.5 | 6233.1 | 146.32 | 21.63 | 35.81 | 330. |
| 250 | 4.00946 | 19.69 | 0.4129 | 4591.8 | 6587.1 | 147.77 | 21.54 | 35.01 | 338. |
| 260 | 3.81211 | 20.87 | 0.3878 | 4835.3 | 6933.8 | 149.13 | 21.47 | 34.36 | 345. |
| 270 | 3.63648 | 22.03 | 0.3659 | 5074.7 | 7274.6 | 150.41 | 21.41 | 33.81 | 352. |
| 280 | 3.47883 | 23.16 | 0.3466 | 5310.8 | 7610.4 | 151.63 | 21.36 | 33.36 | 359. |
| 290 | 3.33627 | 24.26 | 0.3295 | 5544.2 | 7942.0 | 152.80 | 21.32 | 32.98 | 366. |
| 300 | 3.20653 | 25.35 | 0.3142 | 5775.2 | 8270.1 | 153.91 | 21.28 | 32.64 | 373. |
| 310 | 3.08781 | 26.41 | 0.3003 | 6004.3 | 8595.1 | 154.97 | 21.25 | 32.36 | 379. |
| 320 | 2.97864 | 27.46 | 0.2878 | 6231.6 | 8917.4 | 156.00 | 21.23 | 32.11 | 385. |
| 330 | 2.87781 | 28.49 | 0.2763 | 6457.5 | 9237.4 | 156.98 | 21.21 | 31.89 | 391. |
| 340 | 2.78434 | 29.51 | 0.2659 | 6682.2 | 9555.4 | 157.93 | 21.20 | 31.70 | 397. |
| 350 | 2.69737 | 30.52 | 0.2562 | 6905.7 | 9871.6 | 158.85 | 21.19 | 31.54 | 403. |
| 360 | 2.61621 | 31.51 | 0.2473 | 7128.4 | 10186.2 | 159.73 | 21.19 | 31.39 | 408. |
| 370 | 2.54024 | 32.50 | 0.2390 | 7350.2 | 10499.5 | 160.59 | 21.18 | 31.26 | 414. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 380 | 2.46895 | 33.47 | 0.2313 | 7571.3 | 10811.5 | 161.43 | 21.18 | 31.15 | 419. |
| 390 | 2.40190 | 34.44 | 0.2241 | 7791.8 | 11122.5 | 162.23 | 21.19 | 31.05 | 424. |
| 400 | 2.33868 | 35.40 | 0.2174 | 8011.8 | 11432.5 | 163.02 | 21.20 | 30.96 | 430. |
| 420 | 2.22245 | 37.30 | 0.2052 | 8450.6 | 12050.3 | 164.53 | 21.22 | 30.82 | 440. |
| 440 | 2.11797 | 39.17 | 0.1944 | 8888.4 | 12665.6 | 165.96 | 21.26 | 30.72 | 450. |
| 460 | 2.02347 | 41.03 | 0.1847 | 9325.5 | 13279.1 | 167.32 | 21.31 | 30.65 | 459. |
| 480 | 1.93751 | 42.86 | 0.1759 | 9762.6 | 13891.6 | 168.62 | 21.37 | 30.60 | 468. |
| 500 | 1.85893 | 44.68 | 0.1681 | 10199.8 | 14503.4 | 169.87 | 21.44 | 30.58 | 477. |
| 520 | 1.78677 | 46.49 | 0.1609 | 10637.7 | 15115.0 | 171.07 | 21.52 | 30.58 | 486. |
| 540 | 1.72026 | 48.28 | 0.1543 | 11076.4 | 15726.9 | 172.23 | 21.60 | 30.60 | 494. |
| 560 | 1.65872 | 50.06 | 0.1483 | 11516.3 | 16339.3 | 173.34 | 21.70 | 30.64 | 502. |
| 580 | 1.60160 | 51.83 | 0.1427 | 11957.6 | 16952.6 | 174.42 | 21.80 | 30.69 | 510. |
| 600 | 1.54843 | 53.59 | 0.1376 | 12400.5 | 17567.0 | 175.46 | 21.91 | 30.75 | 518. |
| 620 | 1.49879 | 55.35 | 0.1328 | 12845.1 | 18182.7 | 176.47 | 22.03 | 30.82 | 526. |
| 640 | 1.45233 | 57.09 | 0.1284 | 13291.6 | 18800.0 | 177.45 | 22.14 | 30.90 | 533. |
| 660 | 1.40875 | 58.83 | 0.1242 | 13740.1 | 19418.9 | 178.40 | 22.27 | 30.99 | 541. |
| 680 | 1.36778 | 60.57 | 0.1204 | 14190.8 | 20039.7 | 179.33 | 22.39 | 31.09 | 548. |
| 700 | 1.32919 | 62.30 | 0.1167 | 14643.7 | 20662.4 | 180.23 | 22.52 | 31.19 | 555. |
| 720 | 1.29277 | 64.02 | 0.1133 | 15098.8 | 21287.1 | 181.11 | 22.65 | 31.29 | 562. |
| 740 | 1.25834 | 65.74 | 0.1101 | 15556.4 | 21913.9 | 181.97 | 22.78 | 31.40 | 569. |
| 760 | 1.22573 | 67.46 | 0.1071 | 16016.2 | 22542.9 | 182.81 | 22.91 | 31.50 | 575. |
| 780 | 1.19481 | 69.17 | 0.1042 | 16478.5 | 23174.1 | 183.62 | 23.04 | 31.62 | 582. |
| 800 | 1.16544 | 70.88 | 0.1015 | 16943.2 | 23807.6 | 184.43 | 23.17 | 31.73 | 589. |
| 850 | 1.09806 | 75.14 | 0.0953 | 18115.5 | 25401.1 | 186.36 | 23.49 | 32.01 | 605. |
| 900 | 1.03817 | 79.39 | 0.0898 | 19302.8 | 27008.7 | 188.20 | 23.80 | 32.29 | 620. |
| 950 | 0.98455 | 83.62 | 0.0850 | 20504.7 | 28630.3 | 189.95 | 24.10 | 32.57 | 635. |
| 1000 | 0.93626 | 87.84 | 0.0806 | 21720.7 | 30265.3 | 191.63 | 24.39 | 32.83 | 650. |
| 1050 | 0.89254 | 92.05 | 0.0767 | 22950.2 | 31913.4 | 193.24 | 24.66 | 33.09 | 664. |
| 1100 | 0.85275 | 96.25 | 0.0731 | 24192.4 | 33573.8 | 194.78 | 24.92 | 33.33 | 678. |
| 1150 | 0.81639 | 100.45 | 0.0699 | 25446.7 | 35245.9 | 196.27 | 25.16 | 33.56 | 692. |
| 1200 | 0.78303 | 104.64 | 0.0669 | 26712.4 | 36929.1 | 197.70 | 25.39 | 33.77 | 705. |
| 1250 | 0.75230 | 108.82 | 0.0642 | 27988.7 | 38622.8 | 199.08 | 25.60 | 33.97 | 718. |
| 1300 | 0.72391 | 113.00 | 0.0617 | 29275.1 | 40326.2 | 200.42 | 25.80 | 34.16 | 731. |
| 1350 | 0.69760 | 117.18 | 0.0594 | 30570.9 | 42038.9 | 201.71 | 25.98 | 34.34 | 744. |
| 1400 | 0.67314 | 121.36 | 0.0573 | 31875.5 | 43760.2 | 202.96 | 26.16 | 34.51 | 756. |
| 1450 | 0.65034 | 125.53 | 0.0553 | 33188.3 | 45489.5 | 204.18 | 26.32 | 34.66 | 768. |
| 1500 | 0.62905 | 129.70 | 0.0534 | 34508.8 | 47226.5 | 205.35 | 26.47 | 34.81 | 780. |
| 1550 | 0.60911 | 133.87 | 0.0517 | 35836.6 | 48970.6 | 206.50 | 26.61 | 34.95 | 792. |
| 1600 | 0.59040 | 138.03 | 0.0501 | 37171.1 | 50721.3 | 207.61 | 26.74 | 35.08 | 804. |
| 1650 | 0.57281 | 142.19 | 0.0485 | 38511.9 | 52478.2 | 208.69 | 26.87 | 35.20 | 815. |
| 1700 | 0.55624 | 146.36 | 0.0471 | 39858.7 | 54241.0 | 209.74 | 26.99 | 35.31 | 827. |
| 1750 | 0.54060 | 150.52 | 0.0457 | 41211.0 | 56009.4 | 210.77 | 27.09 | 35.42 | 838. |
| 1800 | 0.52582 | 154.68 | 0.0445 | 42568.6 | 57782.8 | 211.77 | 27.20 | 35.52 | 849. |
| 1850 | 0.51183 | 158.84 | 0.0433 | 43931.0 | 59561.2 | 212.74 | 27.29 | 35.61 | 860. |
| 1900 | 0.49857 | 163.00 | 0.0421 | 45298.1 | 61344.1 | 213.69 | 27.38 | 35.70 | 871. |
| 1950 | 0.48598 | 167.15 | 0.0410 | 46669.5 | 63131.2 | 214.62 | 27.47 | 35.78 | 882. |
| 2000 | 0.47400 | 171.31 | 0.0400 | 48045.0 | 64922.5 | 215.53 | 27.55 | 35.86 | 892. |
| | | | | 90 bar Isobar | | | | | |
| * 65.103 | 31.10459 | 244.58 | 28.61 | −4180.0 | −3890.6 | 68.50 | | | |
| 66 | 30.99897 | 234.03 | 27.76 | −4132.5 | −3842.1 | 69.24 | | | |
| 68 | 30.75799 | 213.01 | 26.06 | −4025.7 | −3733.1 | 70.87 | | | |
| 70 | 30.50962 | 194.95 | 24.56 | −3918.4 | −3623.4 | 72.46 | | | |
| 72 | 30.25406 | 179.29 | 23.22 | −3810.8 | −3513.4 | 74.01 | 31.42 | 55.08 | 1059. |
| 74 | 29.99159 | 165.63 | 22.01 | −3703.2 | −3403.1 | 75.52 | 31.06 | 55.13 | 1024. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 29.72256 | 153.59 | 20.90 | −3595.7 | −3292.9 | 76.99 | 30.65 | 55.13 | 993. |
| 78 | 29.44732 | 142.89 | 19.88 | −3488.3 | −3182.7 | 78.42 | 30.24 | 55.11 | 964. |
| 80 | 29.16621 | 133.29 | 18.92 | −3381.0 | −3072.4 | 79.81 | 29.84 | 55.10 | 937. |
| 82 | 28.87951 | 124.61 | 18.03 | −3273.9 | −2962.2 | 81.18 | 29.46 | 55.11 | 912. |
| 84 | 28.58746 | 116.69 | 17.19 | −3166.8 | −2852.0 | 82.50 | 29.10 | 55.14 | 888. |
| 86 | 28.29018 | 109.41 | 16.40 | −3059.8 | −2741.6 | 83.80 | 28.78 | 55.21 | 866. |
| 88 | 27.98777 | 102.66 | 15.65 | −2952.7 | −2631.1 | 85.07 | 28.49 | 55.31 | 843. |
| 90 | 27.68022 | 96.37 | 14.94 | −2845.5 | −2520.4 | 86.32 | 28.23 | 55.45 | 822. |
| 92 | 27.36746 | 90.47 | 14.27 | −2738.1 | −2409.3 | 87.54 | 28.00 | 55.64 | 801. |
| 94 | 27.04935 | 84.93 | 13.62 | −2630.5 | −2297.8 | 88.74 | 27.79 | 55.87 | 781. |
| 96 | 26.72571 | 79.68 | 13.01 | −2522.5 | −2185.8 | 89.92 | 27.61 | 56.14 | 761. |
| 98 | 26.39631 | 74.72 | 12.42 | −2414.1 | −2073.2 | 91.08 | 27.44 | 56.46 | 741. |
| 100 | 26.06086 | 70.01 | 11.85 | −2305.2 | −1959.9 | 92.22 | 27.29 | 56.83 | 721. |
| 102 | 25.71903 | 65.53 | 11.31 | −2195.8 | −1845.8 | 93.35 | 27.15 | 57.24 | 702. |
| 104 | 25.37046 | 61.26 | 10.78 | −2085.6 | −1730.9 | 94.47 | 27.02 | 57.70 | 683. |
| 106 | 25.01473 | 57.20 | 10.28 | −1974.8 | −1615.0 | 95.57 | 26.91 | 58.21 | 665. |
| 108 | 24.65139 | 53.32 | 9.79 | −1863.1 | −1498.0 | 96.66 | 26.80 | 58.77 | 646. |
| 110 | 24.27993 | 49.62 | 9.32 | −1750.6 | −1379.9 | 97.75 | 26.71 | 59.38 | 628. |
| 112 | 23.89978 | 46.09 | 8.87 | −1637.0 | −1260.5 | 98.82 | 26.62 | 60.06 | 609. |
| 114 | 23.51028 | 42.72 | 8.43 | −1522.4 | −1139.6 | 99.89 | 26.53 | 60.80 | 591. |
| 116 | 23.11070 | 39.50 | 8.00 | −1406.6 | −1017.2 | 100.96 | 26.45 | 61.61 | 573. |
| 118 | 22.70017 | 36.42 | 7.58 | −1289.6 | −893.1 | 102.02 | 26.38 | 62.51 | 555. |
| 120 | 22.27773 | 33.48 | 7.18 | −1171.1 | −767.1 | 103.08 | 26.31 | 63.51 | 537. |
| 122 | 21.84222 | 30.67 | 6.78 | −1051.0 | −639.0 | 104.13 | 26.24 | 64.62 | 519. |
| 124 | 21.39233 | 27.98 | 6.40 | −929.2 | −508.5 | 105.20 | 26.18 | 65.86 | 501. |
| 126 | 20.92653 | 25.41 | 6.03 | −805.5 | −375.4 | 106.26 | 26.13 | 67.25 | 483. |
| 128 | 20.44310 | 22.98 | 5.66 | −679.6 | −239.4 | 107.33 | 26.08 | 68.81 | 465. |
| 130 | 19.94014 | 20.67 | 5.31 | −551.4 | −100.0 | 108.41 | 26.04 | 70.56 | 447. |
| 132 | 19.41562 | 18.50 | 4.96 | −420.5 | 43.0 | 109.50 | 26.00 | 72.52 | 429. |
| 134 | 18.86756 | 16.47 | 4.62 | −286.9 | 190.2 | 110.61 | 25.98 | 74.67 | 411. |
| 136 | 18.29428 | 14.62 | 4.29 | −150.1 | 341.8 | 111.73 | 25.96 | 77.01 | 393. |
| 138 | 17.69492 | 12.95 | 3.96 | −10.4 | 498.3 | 112.88 | 25.95 | 79.45 | 376. |
| 140 | 17.07014 | 11.48 | 3.66 | 132.4 | 659.6 | 114.04 | 25.95 | 81.88 | 360. |
| 142 | 16.42291 | 10.24 | 3.36 | 277.6 | 825.6 | 115.21 | 25.95 | 84.09 | 344. |
| 144 | 15.75926 | 9.23 | 3.09 | 424.6 | 995.7 | 116.40 | 25.94 | 85.84 | 330. |
| 146 | 15.08826 | 8.44 | 2.83 | 572.0 | 1168.5 | 117.59 | 25.93 | 86.90 | 318. |
| 148 | 14.42108 | 7.87 | 2.60 | 718.6 | 1342.7 | 118.78 | 25.90 | 87.13 | 307. |
| 150 | 13.76921 | 7.47 | 2.39 | 862.9 | 1516.5 | 119.95 | 25.84 | 86.53 | 299. |
| 155 | 12.26537 | 7.08 | 1.97 | 1205.8 | 1939.6 | 122.72 | 25.57 | 82.16 | 285. |
| 160 | 10.99584 | 7.24 | 1.66 | 1516.0 | 2334.5 | 125.23 | 25.16 | 75.64 | 279. |
| 165 | 9.96181 | 7.72 | 1.43 | 1792.2 | 2695.6 | 127.45 | 24.69 | 68.86 | 277. |
| 170 | 9.12657 | 8.38 | 1.26 | 2038.3 | 3024.4 | 129.42 | 24.24 | 62.80 | 278. |
| 175 | 8.44664 | 9.13 | 1.12 | 2259.9 | 3325.4 | 131.16 | 23.83 | 57.77 | 281. |
| 180 | 7.88479 | 9.92 | 1.02 | 2462.3 | 3603.7 | 132.73 | 23.48 | 53.71 | 285. |
| 185 | 7.41266 | 10.72 | 0.9318 | 2649.7 | 3863.8 | 134.15 | 23.18 | 50.45 | 289. |
| 190 | 7.00951 | 11.51 | 0.8610 | 2825.3 | 4109.3 | 135.46 | 22.92 | 47.83 | 293. |
| 195 | 6.66031 | 12.29 | 0.8015 | 2991.6 | 4342.9 | 136.68 | 22.71 | 45.69 | 297. |
| 200 | 6.35402 | 13.05 | 0.7509 | 3150.4 | 4566.8 | 137.81 | 22.52 | 43.93 | 301. |
| 210 | 5.83946 | 14.52 | 0.6690 | 3450.5 | 4991.7 | 139.89 | 22.23 | 41.22 | 310. |
| 220 | 5.42106 | 15.92 | 0.6055 | 3733.4 | 5393.6 | 141.76 | 22.01 | 39.25 | 318. |
| 230 | 5.07171 | 17.26 | 0.5545 | 4003.9 | 5778.4 | 143.47 | 21.85 | 37.77 | 326. |
| 240 | 4.77396 | 18.55 | 0.5125 | 4265.0 | 6150.2 | 145.05 | 21.72 | 36.63 | 334. |
| 250 | 4.51605 | 19.80 | 0.4772 | 4518.8 | 6511.7 | 146.52 | 21.62 | 35.71 | 342. |
| 260 | 4.28968 | 21.01 | 0.4470 | 4767.0 | 6865.1 | 147.91 | 21.54 | 34.97 | 349. |
| 270 | 4.08884 | 22.19 | 0.4209 | 5010.5 | 7211.6 | 149.22 | 21.47 | 34.36 | 356. |
| 280 | 3.90903 | 23.34 | 0.3980 | 5250.3 | 7552.7 | 150.46 | 21.42 | 33.85 | 363. |
| 290 | 3.74679 | 24.46 | 0.3777 | 5486.9 | 7888.9 | 151.64 | 21.37 | 33.42 | 370. |
| 300 | 3.59943 | 25.57 | 0.3596 | 5720.8 | 8221.2 | 152.77 | 21.33 | 33.05 | 376. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 310 | 3.46481 | 26.65 | 0.3434 | 5952.5 | 8550.1 | 153.84 | 21.30 | 32.73 | 382. |
| 320 | 3.34120 | 27.71 | 0.3286 | 6182.3 | 8875.9 | 154.88 | 21.28 | 32.45 | 388. |
| 330 | 3.22720 | 28.76 | 0.3153 | 6410.4 | 9199.2 | 155.87 | 21.26 | 32.21 | 394. |
| 340 | 3.12162 | 29.79 | 0.3030 | 6637.0 | 9520.2 | 156.83 | 21.24 | 31.99 | 400. |
| 350 | 3.02350 | 30.82 | 0.2918 | 6862.5 | 9839.1 | 157.76 | 21.23 | 31.81 | 406. |
| 360 | 2.93201 | 31.82 | 0.2814 | 7086.8 | 10156.4 | 158.65 | 21.22 | 31.64 | 412. |
| 370 | 2.84645 | 32.82 | 0.2718 | 7310.2 | 10472.1 | 159.51 | 21.22 | 31.50 | 417. |
| 380 | 2.76622 | 33.81 | 0.2629 | 7532.8 | 10786.4 | 160.35 | 21.22 | 31.37 | 422. |
| 390 | 2.69080 | 34.79 | 0.2546 | 7754.7 | 11099.5 | 161.17 | 21.22 | 31.26 | 428. |
| 400 | 2.61974 | 35.76 | 0.2468 | 7976.1 | 11411.5 | 161.96 | 21.23 | 31.16 | 433. |
| 420 | 2.48919 | 37.68 | 0.2327 | 8417.3 | 12032.9 | 163.47 | 21.25 | 30.99 | 443. |
| 440 | 2.37195 | 39.58 | 0.2202 | 8857.2 | 12651.5 | 164.91 | 21.29 | 30.87 | 453. |
| 460 | 2.26598 | 41.45 | 0.2091 | 9296.3 | 13268.1 | 166.28 | 21.33 | 30.79 | 462. |
| 480 | 2.16965 | 43.30 | 0.1991 | 9735.0 | 13883.2 | 167.59 | 21.39 | 30.73 | 471. |
| 500 | 2.08163 | 45.13 | 0.1901 | 10173.9 | 14497.4 | 168.84 | 21.46 | 30.70 | 480. |
| 520 | 2.00084 | 46.95 | 0.1819 | 10613.2 | 15111.3 | 170.05 | 21.54 | 30.69 | 489. |
| 540 | 1.92639 | 48.75 | 0.1744 | 11053.3 | 15725.2 | 171.21 | 21.63 | 30.70 | 497. |
| 560 | 1.85753 | 50.54 | 0.1675 | 11494.4 | 16339.5 | 172.32 | 21.72 | 30.73 | 505. |
| 580 | 1.79363 | 52.33 | 0.1612 | 11936.8 | 16954.6 | 173.40 | 21.82 | 30.77 | 513. |
| 600 | 1.73415 | 54.10 | 0.1553 | 12380.7 | 17570.6 | 174.45 | 21.93 | 30.83 | 521. |
| 620 | 1.67864 | 55.86 | 0.1499 | 12826.3 | 18187.8 | 175.46 | 22.04 | 30.90 | 529. |
| 640 | 1.62669 | 57.62 | 0.1449 | 13273.7 | 18806.4 | 176.44 | 22.16 | 30.97 | 536. |
| 660 | 1.57796 | 59.36 | 0.1402 | 13723.1 | 19426.7 | 177.39 | 22.28 | 31.05 | 543. |
| 680 | 1.53216 | 61.11 | 0.1358 | 14174.6 | 20048.6 | 178.32 | 22.41 | 31.14 | 551. |
| 700 | 1.48901 | 62.84 | 0.1316 | 14628.2 | 20672.5 | 179.23 | 22.53 | 31.24 | 558. |
| 720 | 1.44830 | 64.57 | 0.1278 | 15084.1 | 21298.3 | 180.11 | 22.66 | 31.34 | 565. |
| 740 | 1.40981 | 66.30 | 0.1241 | 15542.3 | 21926.1 | 180.97 | 22.79 | 31.44 | 571. |
| 760 | 1.37336 | 68.02 | 0.1207 | 16002.8 | 22556.1 | 181.81 | 22.92 | 31.55 | 578. |
| 780 | 1.33879 | 69.74 | 0.1174 | 16465.6 | 23188.1 | 182.63 | 23.05 | 31.66 | 585. |
| 800 | 1.30595 | 71.45 | 0.1144 | 16930.9 | 23822.4 | 183.43 | 23.18 | 31.77 | 591. |
| 850 | 1.23063 | 75.72 | 0.1074 | 18104.5 | 25417.8 | 185.37 | 23.50 | 32.05 | 607. |
| 900 | 1.16367 | 79.98 | 0.1012 | 19292.9 | 27027.1 | 187.21 | 23.81 | 32.32 | 622. |
| 950 | 1.10372 | 84.22 | 0.0957 | 20495.8 | 28650.1 | 188.96 | 24.11 | 32.59 | 637. |
| 1000 | 1.04972 | 88.44 | 0.0908 | 21712.7 | 30286.4 | 190.64 | 24.40 | 32.86 | 652. |
| 1050 | 1.00082 | 92.66 | 0.0864 | 22943.0 | 31935.6 | 192.25 | 24.67 | 33.11 | 666. |
| 1100 | 0.95632 | 96.87 | 0.0823 | 24185.9 | 33597.0 | 193.80 | 24.93 | 33.35 | 680. |
| 1150 | 0.91564 | 101.07 | 0.0787 | 25440.9 | 35270.0 | 195.28 | 25.17 | 33.57 | 694. |
| 1200 | 0.87831 | 105.26 | 0.0754 | 26707.1 | 36954.0 | 196.72 | 25.39 | 33.79 | 707. |
| 1250 | 0.84393 | 109.45 | 0.0723 | 27984.0 | 38648.4 | 198.10 | 25.61 | 33.99 | 720. |
| 1300 | 0.81216 | 113.63 | 0.0695 | 29270.9 | 40352.5 | 199.44 | 25.80 | 34.18 | 733. |
| 1350 | 0.78270 | 117.81 | 0.0669 | 30567.2 | 42065.8 | 200.73 | 25.99 | 34.35 | 746. |
| 1400 | 0.75532 | 121.99 | 0.0645 | 31872.2 | 43787.6 | 201.98 | 26.16 | 34.52 | 758. |
| 1450 | 0.72980 | 126.16 | 0.0622 | 33185.4 | 45517.4 | 203.20 | 26.32 | 34.67 | 770. |
| 1500 | 0.70596 | 130.33 | 0.0601 | 34506.3 | 47254.8 | 204.37 | 26.48 | 34.82 | 782. |
| 1550 | 0.68363 | 134.50 | 0.0582 | 35834.3 | 48999.3 | 205.52 | 26.62 | 34.96 | 794. |
| 1600 | 0.66268 | 138.67 | 0.0563 | 37169.1 | 50750.4 | 206.63 | 26.75 | 35.09 | 806. |
| 1650 | 0.64298 | 142.83 | 0.0546 | 38510.2 | 52507.7 | 207.71 | 26.87 | 35.21 | 817. |
| 1700 | 0.62441 | 146.99 | 0.0530 | 39857.3 | 54270.8 | 208.76 | 26.99 | 35.32 | 829. |
| 1750 | 0.60690 | 151.16 | 0.0515 | 41209.9 | 56039.4 | 209.79 | 27.10 | 35.42 | 840. |
| 1800 | 0.59034 | 155.32 | 0.0500 | 42567.6 | 57813.1 | 210.79 | 27.20 | 35.52 | 851. |
| 1850 | 0.57466 | 159.47 | 0.0487 | 43930.3 | 59591.7 | 211.76 | 27.30 | 35.62 | 862. |
| 1900 | 0.55980 | 163.63 | 0.0474 | 45297.6 | 61374.8 | 212.71 | 27.39 | 35.71 | 873. |
| 1950 | 0.54569 | 167.79 | 0.0462 | 46669.2 | 63162.2 | 213.64 | 27.47 | 35.79 | 883. |
| 2000 | 0.53227 | 171.95 | 0.0450 | 48044.9 | 64953.6 | 214.55 | 27.55 | 35.87 | 894. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 100 bar Isobar | | | | | |
| * 65.318 | 31.12052 | 245.27 | 28.29 | −4176.1 | −3854.8 | 60.56 | | | |
| 66 | 31.04140 | 237.29 | 27.67 | −4140.1 | −3818.0 | 69.12 | | | |
| 68 | 30.80458 | 216.21 | 26.00 | −4034.0 | −3709.4 | 70.74 | | | |
| 70 | 30.56051 | 198.08 | 24.53 | −3927.3 | −3600.1 | 72.32 | | | |
| 72 | 30.30936 | 182.38 | 23.22 | −3820.4 | −3490.4 | 73.87 | 31.70 | 54.86 | 1061. |
| 74 | 30.05142 | 168.66 | 22.03 | −3713.4 | −3380.7 | 75.37 | 31.32 | 54.90 | 1027. |
| 76 | 29.78704 | 156.59 | 20.94 | −3606.6 | −3270.9 | 76.84 | 30.90 | 54.89 | 996. |
| 78 | 29.51659 | 145.86 | 19.94 | −3499.9 | −3161.1 | 78.26 | 30.47 | 54.87 | 968. |
| 80 | 29.24041 | 136.25 | 19.00 | −3393.4 | −3051.4 | 79.65 | 30.05 | 54.85 | 942. |
| 82 | 28.95883 | 127.56 | 18.13 | −3287.0 | −2941.7 | 81.00 | 29.66 | 54.84 | 918. |
| 84 | 28.67209 | 119.64 | 17.30 | −3180.8 | −2832.0 | 82.33 | 29.29 | 54.86 | 894. |
| 86 | 28.38038 | 112.35 | 16.52 | −3074.6 | −2722.2 | 83.62 | 28.96 | 54.91 | 872. |
| 88 | 28.08381 | 105.61 | 15.79 | −2968.4 | −2612.4 | 84.88 | 28.66 | 54.99 | 851. |
| 90 | 27.78242 | 99.33 | 15.09 | −2862.2 | −2502.3 | 86.12 | 28.39 | 55.11 | 830. |
| 92 | 27.47620 | 93.45 | 14.42 | −2755.8 | −2391.9 | 87.33 | 28.14 | 55.27 | 809. |
| 94 | 27.16507 | 87.92 | 13.79 | −2649.3 | −2281.2 | 88.52 | 27.92 | 55.46 | 790. |
| 96 | 26.84889 | 82.69 | 13.18 | −2542.5 | −2170.0 | 89.69 | 27.73 | 55.70 | 770. |
| 98 | 26.52750 | 77.74 | 12.60 | −2435.3 | −2058.3 | 90.84 | 27.55 | 55.98 | 751. |
| 100 | 26.20068 | 73.05 | 12.04 | −2327.7 | −1946.1 | 91.98 | 27.39 | 56.30 | 732. |
| 102 | 25.86818 | 68.58 | 11.50 | −2219.7 | −1833.1 | 93.09 | 27.25 | 56.65 | 713. |
| 104 | 25.52972 | 64.33 | 10.99 | −2111.1 | −1719.4 | 94.20 | 27.12 | 57.05 | 695. |
| 106 | 25.18500 | 60.28 | 10.49 | −2002.0 | −1604.9 | 95.29 | 26.99 | 57.49 | 677. |
| 108 | 24.83366 | 56.42 | 10.01 | −1892.1 | −1489.4 | 96.37 | 26.88 | 57.97 | 659. |
| 110 | 24.47535 | 52.74 | 9.55 | −1781.6 | −1373.0 | 97.44 | 26.78 | 58.50 | 641. |
| 112 | 24.10963 | 49.23 | 9.10 | −1670.2 | −1255.4 | 98.50 | 26.68 | 59.07 | 624. |
| 114 | 23.73607 | 45.88 | 8.66 | −1558.0 | −1136.7 | 99.55 | 26.58 | 59.69 | 606. |
| 116 | 23.35414 | 42.68 | 8.24 | −1444.8 | −1016.7 | 100.59 | 26.50 | 60.36 | 589. |
| 118 | 22.96327 | 39.62 | 7.84 | −1330.7 | −895.2 | 101.63 | 26.41 | 61.09 | 572. |
| 120 | 22.56282 | 36.70 | 7.44 | −1215.4 | −772.2 | 102.66 | 26.33 | 61.89 | 555. |
| 122 | 22.15207 | 33.92 | 7.06 | −1099.0 | −647.6 | 103.69 | 26.26 | 62.77 | 538. |
| 124 | 21.73020 | 31.26 | 6.68 | −981.3 | −521.1 | 104.72 | 26.19 | 63.73 | 521. |
| 126 | 21.29629 | 28.72 | 6.32 | −862.2 | −392.6 | 105.75 | 26.12 | 64.78 | 504. |
| 128 | 20.84934 | 26.31 | 5.97 | −741.5 | −261.9 | 106.78 | 26.06 | 65.94 | 487. |
| 130 | 20.38830 | 24.02 | 5.63 | −619.2 | −128.8 | 107.81 | 26.00 | 67.21 | 471. |
| 132 | 19.91208 | 21.86 | 5.29 | −495.2 | 7.0 | 108.85 | 25.95 | 68.59 | 454. |
| 134 | 19.41963 | 19.83 | 4.97 | −369.2 | 145.7 | 109.89 | 25.90 | 70.09 | 438. |
| 136 | 18.91011 | 17.95 | 4.65 | −241.4 | 287.5 | 110.94 | 25.86 | 71.69 | 421. |
| 138 | 18.38307 | 16.22 | 4.35 | −111.5 | 432.5 | 112.00 | 25.82 | 73.36 | 406. |
| 140 | 17.83872 | 14.66 | 4.05 | 20.3 | 580.9 | 113.06 | 25.79 | 75.03 | 390. |
| 142 | 17.27828 | 13.27 | 3.77 | 153.8 | 732.6 | 114.14 | 25.76 | 76.64 | 376. |
| 144 | 16.70431 | 12.08 | 3.50 | 288.7 | 887.3 | 115.22 | 25.73 | 78.06 | 362. |
| 146 | 16.12090 | 11.08 | 3.25 | 424.3 | 1044.7 | 116.31 | 25.69 | 79.18 | 349. |
| 148 | 15.53361 | 10.26 | 3.01 | 560.0 | 1203.8 | 117.39 | 25.66 | 79.89 | 338. |
| 150 | 14.94906 | 9.62 | 2.80 | 694.9 | 1363.9 | 118.46 | 25.61 | 80.10 | 328. |
| 155 | 13.54356 | 8.68 | 2.33 | 1023.1 | 1761.5 | 121.07 | 25.42 | 78.46 | 309. |
| 160 | 12.28063 | 8.42 | 1.98 | 1330.3 | 2144.6 | 123.51 | 25.13 | 74.54 | 299. |
| 165 | 11.19491 | 8.57 | 1.71 | 1611.9 | 2505.1 | 125.72 | 24.76 | 69.58 | 293. |
| 170 | 10.28200 | 8.99 | 1.50 | 1867.8 | 2840.3 | 127.73 | 24.37 | 64.54 | 292. |
| 175 | 9.51909 | 9.57 | 1.33 | 2100.7 | 3151.2 | 129.53 | 23.99 | 59.91 | 292. |
| 180 | 8.87897 | 10.24 | 1.20 | 2314.3 | 3440.5 | 131.16 | 23.65 | 55.92 | 294. |
| 185 | 8.33681 | 10.96 | 1.10 | 2512.0 | 3711.5 | 132.64 | 23.35 | 52.56 | 297. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 190 | 7.87234 | 11.70 | 1.01 | 2696.8 | 3967.1 | 134.01 | 23.09 | 49.77 | 300. |
| 195 | 7.46975 | 12.45 | 0.9361 | 2871.3 | 4210.0 | 135.27 | 22.86 | 47.46 | 304. |
| 200 | 7.11693 | 13.19 | 0.8739 | 3037.2 | 4442.3 | 136.45 | 22.67 | 45.53 | 308. |
| 210 | 6.52567 | 14.65 | 0.7740 | 3349.3 | 4881.7 | 138.59 | 22.35 | 42.52 | 315. |
| 220 | 6.04691 | 16.05 | 0.6971 | 3641.8 | 5295.5 | 140.52 | 22.12 | 40.34 | 323. |
| 230 | 5.64881 | 17.41 | 0.6359 | 3919.9 | 5690.2 | 142.27 | 21.94 | 38.69 | 331. |
| 240 | 5.31079 | 18.71 | 0.5858 | 4187.5 | 6070.4 | 143.89 | 21.80 | 37.41 | 339. |
| 250 | 5.01894 | 19.98 | 0.5440 | 4446.8 | 6439.2 | 145.39 | 21.69 | 36.39 | 346. |
| 260 | 4.76352 | 21.21 | 0.5084 | 4699.6 | 6798.9 | 146.81 | 21.61 | 35.57 | 353. |
| 270 | 4.53746 | 22.40 | 0.4777 | 4947.2 | 7151.1 | 148.13 | 21.53 | 34.89 | 360. |
| 280 | 4.33549 | 23.57 | 0.4509 | 5190.6 | 7497.1 | 149.39 | 21.47 | 34.33 | 367. |
| 290 | 4.15361 | 24.71 | 0.4273 | 5430.4 | 7837.9 | 150.59 | 21.42 | 33.85 | 373. |
| 300 | 3.98867 | 25.82 | 0.4063 | 5667.2 | 8174.3 | 151.73 | 21.38 | 33.44 | 380. |
| 310 | 3.83821 | 26.92 | 0.3874 | 5901.5 | 8506.9 | 152.82 | 21.35 | 33.08 | 386. |
| 320 | 3.70024 | 28.00 | 0.3704 | 6133.6 | 8836.1 | 153.87 | 21.32 | 32.78 | 392. |
| 330 | 3.57312 | 29.06 | 0.3550 | 6363.8 | 9162.5 | 154.87 | 21.30 | 32.51 | 398. |
| 340 | 3.45552 | 30.11 | 0.3409 | 6592.5 | 9486.4 | 155.84 | 21.28 | 32.27 | 404. |
| 350 | 3.34633 | 31.14 | 0.3280 | 6819.7 | 9808.1 | 156.77 | 21.27 | 32.07 | 409. |
| 360 | 3.24459 | 32.16 | 0.3161 | 7045.8 | 10127.8 | 157.67 | 21.26 | 31.88 | 415. |
| 370 | 3.14951 | 33.17 | 0.3051 | 7270.8 | 10445.9 | 158.54 | 21.26 | 31.72 | 420. |
| 380 | 3.06042 | 34.17 | 0.2949 | 7494.8 | 10762.4 | 159.39 | 21.25 | 31.58 | 426. |
| 390 | 2.97672 | 35.16 | 0.2855 | 7718.1 | 11077.5 | 160.20 | 21.26 | 31.46 | 431. |
| 400 | 2.89789 | 36.14 | 0.2766 | 7940.7 | 11391.5 | 161.00 | 21.26 | 31.34 | 436. |
| 420 | 2.75318 | 38.08 | 0.2606 | 8384.4 | 12016.5 | 162.52 | 21.28 | 31.16 | 446. |
| 440 | 2.62332 | 39.99 | 0.2464 | 8826.4 | 12638.3 | 163.97 | 21.31 | 31.02 | 456. |
| 460 | 2.50601 | 41.88 | 0.2338 | 9267.3 | 13257.7 | 165.35 | 21.36 | 30.92 | 465. |
| 480 | 2.39943 | 43.75 | 0.2225 | 9707.8 | 13875.5 | 166.66 | 21.42 | 30.85 | 474. |
| 500 | 2.30209 | 45.59 | 0.2123 | 10148.2 | 14492.1 | 167.92 | 21.48 | 30.81 | 483. |
| 520 | 2.21278 | 47.42 | 0.2031 | 10589.0 | 15108.2 | 169.13 | 21.56 | 30.80 | 492. |
| 540 | 2.13050 | 49.24 | 0.1946 | 11030.4 | 15724.1 | 170.29 | 21.65 | 30.80 | 500. |
| 560 | 2.05441 | 51.04 | 0.1869 | 11472.7 | 16340.2 | 171.41 | 21.74 | 30.82 | 508. |
| 580 | 1.98382 | 52.83 | 0.1798 | 11916.2 | 16957.0 | 172.49 | 21.84 | 30.86 | 516. |
| 600 | 1.91813 | 54.61 | 0.1732 | 12361.1 | 17574.6 | 173.54 | 21.95 | 30.90 | 524. |
| 620 | 1.85682 | 56.38 | 0.1671 | 12807.7 | 18193.2 | 174.55 | 22.06 | 30.97 | 532. |
| 640 | 1.79946 | 58.15 | 0.1614 | 13256.0 | 18813.3 | 175.54 | 22.18 | 31.04 | 539. |
| 660 | 1.74565 | 59.90 | 0.1562 | 13706.2 | 19434.8 | 176.49 | 22.30 | 31.12 | 546. |
| 680 | 1.69508 | 61.65 | 0.1512 | 14158.5 | 20057.9 | 177.42 | 22.42 | 31.20 | 553. |
| 700 | 1.64745 | 63.39 | 0.1466 | 14612.9 | 20682.9 | 178.33 | 22.55 | 31.29 | 560. |
| 720 | 1.60250 | 65.13 | 0.1423 | 15069.5 | 21309.7 | 179.21 | 22.68 | 31.39 | 567. |
| 740 | 1.56000 | 66.86 | 0.1382 | 15528.3 | 21938.5 | 180.07 | 22.81 | 31.49 | 574. |
| 760 | 1.51976 | 68.59 | 0.1344 | 15989.4 | 22569.4 | 180.92 | 22.94 | 31.60 | 581. |
| 780 | 1.48159 | 70.31 | 0.1307 | 16452.9 | 23202.4 | 181.74 | 23.07 | 31.70 | 587. |
| 800 | 1.44534 | 72.03 | 0.1273 | 16918.7 | 23837.5 | 182.54 | 23.19 | 31.81 | 594. |
| 850 | 1.36218 | 76.31 | 0.1195 | 18093.6 | 25434.7 | 184.48 | 23.51 | 32.08 | 610. |
| 900 | 1.28824 | 80.57 | 0.1126 | 19283.1 | 27045.6 | 186.32 | 23.83 | 32.35 | 625. |
| 950 | 1.22204 | 84.82 | 0.1064 | 20487.0 | 28670.0 | 188.08 | 24.12 | 32.62 | 640. |
| 1000 | 1.16240 | 89.05 | 0.1010 | 21704.7 | 30307.6 | 189.76 | 24.41 | 32.88 | 654. |
| 1050 | 1.10839 | 93.27 | 0.0960 | 22935.8 | 31957.9 | 191.37 | 24.68 | 33.13 | 669. |
| 1100 | 1.05923 | 97.48 | 0.0915 | 24179.4 | 33620.3 | 192.91 | 24.94 | 33.37 | 682. |
| 1150 | 1.01428 | 101.69 | 0.0875 | 25435.0 | 35294.2 | 194.40 | 25.18 | 33.59 | 696. |
| 1200 | 0.97304 | 105.89 | 0.0838 | 26701.9 | 36979.0 | 195.84 | 25.40 | 33.80 | 709. |
| 1250 | 0.93504 | 110.08 | 0.0804 | 27979.3 | 38674.1 | 197.22 | 25.61 | 34.00 | 722. |
| 1300 | 0.89992 | 114.26 | 0.0772 | 29266.7 | 40378.9 | 198.56 | 25.81 | 34.19 | 735. |
| 1350 | 0.86736 | 118.44 | 0.0743 | 30563.4 | 42092.7 | 199.85 | 26.00 | 34.36 | 748. |
| 1400 | 0.83709 | 122.62 | 0.0716 | 31868.8 | 43815.0 | 201.10 | 26.17 | 34.53 | 760. |
| 1450 | 0.80887 | 126.80 | 0.0691 | 33182.4 | 45545.4 | 202.32 | 26.33 | 34.68 | 772. |
| 1500 | 0.78250 | 130.97 | 0.0668 | 34503.7 | 47283.2 | 203.50 | 26.48 | 34.83 | 784. |
| 1550 | 0.75781 | 135.14 | 0.0646 | 35832.1 | 49028.1 | 204.64 | 26.62 | 34.96 | 796. |

Thermodynamic properties of nitrogen–Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1600 | 0.73463 | 139.31 | 0.0626 | 37167.2 | 50779.5 | 205.75 | 26.75 | 35.09 | 808. |
| 1650 | 0.71283 | 143.47 | 0.0607 | 38508.6 | 52537.1 | 206.83 | 26.88 | 35.21 | 819. |
| 1700 | 0.69230 | 147.63 | 0.0589 | 39855.9 | 54300.6 | 207.89 | 26.99 | 35.32 | 830. |
| 1750 | 0.67292 | 151.79 | 0.0572 | 41208.7 | 56069.4 | 208.91 | 27.10 | 35.43 | 842. |
| 1800 | 0.65459 | 155.95 | 0.0556 | 42566.7 | 57843.4 | 209.91 | 27.21 | 35.53 | 853. |
| 1850 | 0.63724 | 160.11 | 0.0541 | 43929.6 | 59622.2 | 210.89 | 27.30 | 35.62 | 864. |
| 1900 | 0.62079 | 164.27 | 0.0526 | 45297.1 | 61405.5 | 211.84 | 27.39 | 35.71 | 874. |
| 1950 | 0.60517 | 168.43 | 0.0513 | 46668.9 | 63193.1 | 212.77 | 27.48 | 35.79 | 885. |
| 2000 | 0.59032 | 172.58 | 0.0500 | 48044.7 | 64984.7 | 213.67 | 27.56 | 35.87 | 896. |
| | | | | 120 bar Isobar | | | | | |
| * 65.745 | 31.15324 | 246.77 | 27.69 | −4168.2 | −3783.0 | 68.67 | | | |
| 66 | 31.12455 | 243.81 | 27.46 | −4154.8 | −3769.3 | 68.88 | | | |
| 68 | 30.89575 | 222.59 | 25.86 | −4049.8 | −3661.4 | 70.49 | | | |
| 70 | 30.65992 | 204.34 | 24.45 | −3944.3 | −3552.9 | 72.06 | | | |
| 72 | 30.41722 | 188.52 | 23.19 | −3838.6 | −3444.1 | 73.60 | 32.24 | 54.44 | 1066. |
| 74 | 30.16793 | 174.71 | 22.06 | −3733.0 | −3335.2 | 75.09 | 31.82 | 54.46 | 1033. |
| 76 | 29.91239 | 162.56 | 21.01 | −3627.5 | −3226.3 | 76.54 | 31.37 | 54.44 | 1004. |
| 78 | 29.65099 | 151.77 | 20.05 | −3522.2 | −3117.5 | 77.95 | 30.90 | 54.40 | 977. |
| 80 | 29.38412 | 142.11 | 19.15 | −3417.1 | −3008.7 | 79.33 | 30.46 | 54.36 | 952. |
| 82 | 29.11213 | 133.39 | 18.30 | −3312.2 | −2900.0 | 80.67 | 30.03 | 54.34 | 928. |
| 84 | 28.83531 | 125.45 | 17.51 | −3207.5 | −2791.3 | 81.98 | 29.64 | 54.33 | 906. |
| 86 | 28.55392 | 118.17 | 16.76 | −3102.9 | −2682.6 | 83.26 | 29.29 | 54.35 | 885. |
| 88 | 28.26813 | 111.43 | 16.04 | −2998.4 | −2573.9 | 84.51 | 28.96 | 54.40 | 864. |
| 90 | 27.97806 | 105.17 | 15.36 | −2893.9 | −2465.0 | 85.73 | 28.67 | 54.48 | 845. |
| 92 | 27.68376 | 99.30 | 14.72 | −2789.4 | −2356.0 | 86.93 | 28.41 | 54.59 | 825. |
| 94 | 27.38525 | 93.79 | 14.10 | −2684.8 | −2246.6 | 88.11 | 28.17 | 54.73 | 807. |
| 96 | 27.08249 | 88.59 | 13.51 | −2580.1 | −2137.0 | 89.26 | 27.96 | 54.91 | 788. |
| 98 | 26.77539 | 83.67 | 12.94 | −2475.1 | −2027.0 | 90.40 | 27.77 | 55.12 | 770. |
| 100 | 26.46385 | 79.00 | 12.39 | −2369.9 | −1916.5 | 91.51 | 27.59 | 55.36 | 752. |
| 102 | 26.14774 | 74.56 | 11.87 | −2264.4 | −1805.5 | 92.61 | 27.43 | 55.63 | 735. |
| 104 | 25.82689 | 70.33 | 11.37 | −2158.6 | −1693.9 | 93.69 | 27.29 | 55.94 | 717. |
| 106 | 25.50115 | 66.30 | 10.88 | −2052.3 | −1581.7 | 94.76 | 27.15 | 56.27 | 700. |
| 108 | 25.17030 | 62.47 | 10.41 | −1945.6 | −1468.8 | 95.82 | 27.03 | 56.63 | 684. |
| 110 | 24.83417 | 58.81 | 9.96 | −1838.4 | −1355.2 | 96.86 | 26.91 | 57.02 | 667. |
| 112 | 24.49253 | 55.32 | 9.53 | −1730.7 | −1240.8 | 97.89 | 26.80 | 57.44 | 651. |
| 114 | 24.14515 | 51.99 | 9.11 | −1622.4 | −1125.4 | 98.91 | 26.69 | 57.88 | 634. |
| 116 | 23.79179 | 48.81 | 8.70 | −1513.6 | −1009.2 | 99.92 | 26.59 | 58.36 | 618. |
| 118 | 23.43220 | 45.78 | 8.30 | −1404.1 | −892.0 | 100.93 | 26.50 | 58.87 | 603. |
| 120 | 23.06609 | 42.89 | 7.92 | −1293.9 | −773.7 | 101.92 | 26.41 | 59.42 | 587. |
| 122 | 22.69315 | 40.13 | 7.55 | −1183.1 | −654.3 | 102.91 | 26.32 | 59.99 | 571. |
| 124 | 22.31308 | 37.50 | 7.19 | −1071.5 | −533.7 | 103.89 | 26.23 | 60.61 | 556. |
| 126 | 21.92552 | 34.99 | 6.85 | −959.1 | −411.8 | 104.86 | 26.15 | 61.27 | 541. |
| 128 | 21.53013 | 32.60 | 6.51 | −845.9 | −288.6 | 105.83 | 26.07 | 61.97 | 526. |
| 130 | 21.12656 | 30.33 | 6.18 | −731.9 | −163.9 | 106.80 | 25.99 | 62.72 | 511. |
| 132 | 20.71447 | 28.18 | 5.87 | −617.0 | −37.7 | 107.76 | 25.91 | 63.51 | 497. |
| 134 | 20.29356 | 26.15 | 5.56 | −501.2 | 90.2 | 108.72 | 25.84 | 64.34 | 482. |
| 136 | 19.86364 | 24.24 | 5.27 | −384.4 | 219.7 | 109.68 | 25.77 | 65.20 | 468. |
| 138 | 19.42464 | 22.46 | 4.98 | −266.8 | 351.0 | 110.64 | 25.70 | 66.09 | 454. |
| 140 | 18.97670 | 20.80 | 4.70 | −148.3 | 484.0 | 111.60 | 25.63 | 66.98 | 440. |
| 142 | 18.52025 | 19.27 | 4.44 | −29.0 | 618.9 | 112.55 | 25.57 | 67.86 | 427. |
| 144 | 18.05608 | 17.88 | 4.18 | 90.9 | 755.5 | 113.51 | 25.51 | 68.70 | 415. |
| 146 | 17.58543 | 16.64 | 3.94 | 211.2 | 893.6 | 114.46 | 25.45 | 69.45 | 403. |
| 148 | 17.11003 | 15.53 | 3.71 | 331.8 | 1033.2 | 115.41 | 25.39 | 70.07 | 391. |
| 150 | 16.63211 | 14.58 | 3.49 | 452.3 | 1173.8 | 116.36 | 25.33 | 70.54 | 381. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 155 | 15.44423 | 12.78 | 3.00 | 750.7 | 1527.7 | 118.68 | 25.16 | 70.78 | 358. |
| 160 | 14.30302 | 11.72 | 2.59 | 1040.2 | 1879.2 | 120.91 | 24.95 | 69.62 | 342. |
| 165 | 13.24688 | 11.22 | 2.26 | 1316.1 | 2222.0 | 123.02 | 24.71 | 67.33 | 330. |
| 170 | 12.29698 | 11.11 | 1.99 | 1575.6 | 2551.4 | 124.99 | 24.43 | 64.38 | 323. |
| 175 | 11.45799 | 11.28 | 1.77 | 1818.1 | 2865.4 | 126.81 | 24.14 | 61.18 | 319. |
| 180 | 10.72386 | 11.63 | 1.59 | 2044.3 | 3163.3 | 128.48 | 23.85 | 58.03 | 318. |
| 185 | 10.08329 | 12.10 | 1.45 | 2255.9 | 3446.0 | 130.03 | 23.57 | 55.08 | 318. |
| 190 | 9.52344 | 12.66 | 1.33 | 2454.6 | 3714.6 | 131.47 | 23.32 | 52.42 | 319. |
| 195 | 9.03196 | 13.28 | 1.22 | 2642.1 | 3970.7 | 132.80 | 23.10 | 50.08 | 321. |
| 200 | 8.59792 | 13.92 | 1.14 | 2820.3 | 4215.9 | 134.04 | 22.90 | 48.04 | 323. |
| 210 | 7.86683 | 15.26 | 0.9986 | 3153.7 | 4679.1 | 136.30 | 22.57 | 44.74 | 329. |
| 220 | 7.27411 | 16.61 | 0.8923 | 3463.7 | 5113.4 | 138.32 | 22.31 | 42.24 | 335. |
| 230 | 6.78225 | 17.94 | 0.8085 | 3756.6 | 5525.9 | 140.15 | 22.11 | 40.33 | 342. |
| 240 | 6.36595 | 19.25 | 0.7406 | 4036.4 | 5921.4 | 141.84 | 21.96 | 38.84 | 349. |
| 250 | 6.00778 | 20.52 | 0.6844 | 4306.2 | 6303.6 | 143.40 | 21.83 | 37.64 | 355. |
| 260 | 5.69538 | 21.76 | 0.6369 | 4568.1 | 6675.0 | 144.85 | 21.73 | 36.68 | 362. |
| 270 | 5.41977 | 22.97 | 0.5963 | 4823.6 | 7037.7 | 146.22 | 21.65 | 35.88 | 369. |
| 280 | 5.17425 | 24.16 | 0.5611 | 5073.9 | 7393.1 | 147.52 | 21.58 | 35.21 | 375. |
| 290 | 4.95372 | 25.32 | 0.5302 | 5319.9 | 7742.3 | 148.74 | 21.53 | 34.65 | 381. |
| 300 | 4.75421 | 26.46 | 0.5029 | 5562.3 | 8086.3 | 149.91 | 21.48 | 34.17 | 388. |
| 310 | 4.57259 | 27.57 | 0.4786 | 5801.6 | 8425.9 | 151.02 | 21.44 | 33.75 | 394. |
| 320 | 4.40635 | 28.67 | 0.4567 | 6038.3 | 8761.6 | 152.09 | 21.41 | 33.39 | 400. |
| 330 | 4.25345 | 29.76 | 0.4369 | 6272.7 | 9094.0 | 153.11 | 21.38 | 33.08 | 405. |
| 340 | 4.11222 | 30.82 | 0.4189 | 6505.2 | 9423.4 | 154.09 | 21.36 | 32.80 | 411. |
| 350 | 3.98125 | 31.88 | 0.4024 | 6736.0 | 9750.2 | 155.04 | 21.34 | 32.56 | 417. |
| 360 | 3.85938 | 32.92 | 0.3873 | 6965.4 | 10074.7 | 155.96 | 21.33 | 32.35 | 422. |
| 370 | 3.74562 | 33.95 | 0.3734 | 7193.4 | 10397.2 | 156.84 | 21.32 | 32.16 | 427. |
| 380 | 3.63912 | 34.96 | 0.3605 | 7420.4 | 10717.9 | 157.69 | 21.32 | 31.99 | 433. |
| 390 | 3.53916 | 35.97 | 0.3486 | 7646.3 | 11037.0 | 158.52 | 21.32 | 31.84 | 438. |
| 400 | 3.44511 | 36.97 | 0.3375 | 7871.5 | 11354.7 | 159.33 | 21.32 | 31.71 | 443. |
| 420 | 3.27260 | 38.94 | 0.3174 | 8319.7 | 11986.5 | 160.87 | 21.34 | 31.49 | 453. |
| 440 | 3.11800 | 40.88 | 0.2997 | 8765.8 | 12614.4 | 162.33 | 21.37 | 31.32 | 462. |
| 460 | 2.97849 | 42.79 | 0.2841 | 9210.5 | 13239.4 | 163.72 | 21.41 | 31.19 | 472. |
| 480 | 2.85183 | 44.68 | 0.2700 | 9654.3 | 13862.1 | 165.04 | 21.46 | 31.09 | 481. |
| 500 | 2.73624 | 46.55 | 0.2574 | 10097.8 | 14483.4 | 166.31 | 21.52 | 31.03 | 489. |
| 520 | 2.63024 | 48.41 | 0.2460 | 10541.3 | 15103.6 | 167.53 | 21.60 | 31.00 | 498. |
| 540 | 2.53263 | 50.24 | 0.2355 | 10985.2 | 15723.4 | 168.70 | 21.69 | 30.98 | 506. |
| 560 | 2.44241 | 52.06 | 0.2260 | 11429.9 | 16343.1 | 169.82 | 21.78 | 30.99 | 514. |
| 580 | 2.35873 | 53.87 | 0.2173 | 11875.6 | 16963.1 | 170.91 | 21.88 | 31.01 | 522. |
| 600 | 2.28087 | 55.67 | 0.2092 | 12322.6 | 17583.8 | 171.96 | 21.98 | 31.05 | 530. |
| 620 | 2.20821 | 57.46 | 0.2018 | 12771.0 | 18205.3 | 172.98 | 22.10 | 31.10 | 537. |
| 640 | 2.14025 | 59.23 | 0.1948 | 13221.1 | 18827.9 | 173.97 | 22.21 | 31.16 | 545. |
| 660 | 2.07651 | 61.00 | 0.1884 | 13673.0 | 19451.9 | 174.93 | 22.33 | 31.24 | 552. |
| 680 | 2.01660 | 62.76 | 0.1824 | 14126.8 | 20077.4 | 175.87 | 22.45 | 31.31 | 559. |
| 700 | 1.96018 | 64.52 | 0.1767 | 14582.6 | 20704.5 | 176.77 | 22.58 | 31.40 | 566. |
| 720 | 1.90693 | 66.27 | 0.1715 | 15040.6 | 21333.4 | 177.66 | 22.71 | 31.49 | 573. |
| 740 | 1.85660 | 68.01 | 0.1665 | 15500.7 | 21964.1 | 178.52 | 22.83 | 31.58 | 579. |
| 760 | 1.80893 | 69.74 | 0.1618 | 15963.0 | 22596.8 | 179.37 | 22.96 | 31.68 | 586. |
| 780 | 1.76372 | 71.48 | 0.1574 | 16427.6 | 23231.4 | 180.19 | 23.09 | 31.78 | 593. |
| 800 | 1.72077 | 73.20 | 0.1532 | 16894.5 | 23868.1 | 181.00 | 23.22 | 31.89 | 599. |
| 850 | 1.62225 | 77.50 | 0.1438 | 18071.9 | 25469.0 | 182.94 | 23.54 | 32.15 | 615. |
| 900 | 1.53463 | 81.78 | 0.1354 | 19263.6 | 27083.1 | 184.78 | 23.85 | 32.41 | 630. |
| 950 | 1.45616 | 86.04 | 0.1280 | 20469.5 | 28710.3 | 186.54 | 24.14 | 32.67 | 645. |
| 1000 | 1.38546 | 90.28 | 0.1214 | 21689.0 | 30350.4 | 188.23 | 24.43 | 32.93 | 659. |
| 1050 | 1.32140 | 94.51 | 0.1154 | 22921.6 | 32002.8 | 189.84 | 24.70 | 33.17 | 673. |
| 1100 | 1.26309 | 98.73 | 0.1100 | 24166.6 | 33667.2 | 191.39 | 24.95 | 33.40 | 687. |
| 1150 | 1.20976 | 102.94 | 0.1051 | 25423.5 | 35342.8 | 192.88 | 25.19 | 33.62 | 700. |
| 1200 | 1.16080 | 107.15 | 0.1006 | 26691.5 | 37029.2 | 194.31 | 25.42 | 33.83 | 714. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 140 bar Isobar | | | | | |
| * 66.170 | 31.18702 | 248.40 | 27.12 | −4160.0 | −3711.1 | 68.79 | | | |
| 68 | 30.98433 | 228.98 | 25.71 | −4064.8 | −3613.0 | 70.25 | | | |
| 70 | 30.75633 | 210.59 | 24.36 | −3960.4 | −3505.3 | 71.81 | | | |
| 72 | 30.52162 | 194.65 | 23.16 | −3855.9 | −3397.2 | 73.34 | 32.74 | 54.04 | 1071. |
| 74 | 30.28047 | 180.73 | 22.07 | −3751.5 | −3289.1 | 74.82 | 32.29 | 54.04 | 1039. |
| 76 | 30.03323 | 168.49 | 21.07 | −3647.2 | −3181.1 | 76.26 | 31.80 | 54.01 | 1011. |
| 78 | 29.78029 | 157.63 | 20.15 | −3543.2 | −3073.1 | 77.66 | 31.31 | 53.96 | 985. |
| 80 | 29.52205 | 147.92 | 19.28 | −3439.5 | −2965.2 | 79.02 | 30.83 | 53.91 | 961. |
| 82 | 29.25891 | 139.16 | 18.47 | −3335.9 | −2857.4 | 80.36 | 30.39 | 53.87 | 938. |
| 84 | 28.99119 | 131.19 | 17.70 | −3232.6 | −2749.7 | 81.65 | 29.97 | 53.85 | 917. |
| 86 | 28.71919 | 123.89 | 16.98 | −3129.5 | −2642.0 | 82.92 | 29.59 | 53.85 | 897. |
| 88 | 28.44314 | 117.15 | 16.28 | −3026.5 | −2534.3 | 84.16 | 29.25 | 53.87 | 878. |
| 90 | 28.16322 | 110.89 | 15.63 | −2923.6 | −2426.5 | 85.37 | 28.93 | 53.92 | 859. |
| 92 | 27.87955 | 105.04 | 15.00 | −2820.8 | −2318.6 | 86.56 | 28.65 | 53.99 | 841. |
| 94 | 27.59219 | 99.54 | 14.39 | −2717.9 | −2210.6 | 87.72 | 28.40 | 54.10 | 823. |
| 96 | 27.30118 | 94.36 | 13.82 | −2615.0 | −2102.2 | 88.86 | 28.17 | 54.23 | 805. |
| 98 | 27.00651 | 89.45 | 13.26 | −2512.0 | −1993.6 | 89.98 | 27.97 | 54.38 | 788. |
| 100 | 26.70814 | 84.79 | 12.73 | −2408.9 | −1884.7 | 91.08 | 27.78 | 54.57 | 771. |
| 102 | 26.40601 | 80.37 | 12.22 | −2305.5 | −1775.3 | 92.16 | 27.61 | 54.78 | 754. |
| 104 | 26.10005 | 76.16 | 11.72 | −2202.0 | −1665.6 | 93.23 | 27.45 | 55.01 | 738. |
| 106 | 25.79017 | 72.15 | 11.25 | −2098.1 | −1555.3 | 94.28 | 27.30 | 55.26 | 722. |
| 108 | 25.47628 | 68.32 | 10.79 | −1994.0 | −1444.5 | 95.31 | 27.17 | 55.53 | 706. |
| 110 | 25.15828 | 64.67 | 10.35 | −1889.6 | −1333.2 | 96.33 | 27.04 | 55.83 | 690. |
| 112 | 24.83605 | 61.19 | 9.92 | −1784.9 | −1221.2 | 97.34 | 26.92 | 56.14 | 675. |
| 114 | 24.50950 | 57.87 | 9.51 | −1679.8 | −1108.6 | 98.34 | 26.80 | 56.48 | 660. |
| 116 | 24.17852 | 54.70 | 9.11 | −1574.3 | −995.3 | 99.32 | 26.69 | 56.83 | 645. |
| 118 | 23.84299 | 51.68 | 8.73 | −1468.4 | −881.2 | 100.30 | 26.59 | 57.19 | 630. |
| 120 | 23.50281 | 48.79 | 8.36 | −1362.1 | −766.5 | 101.26 | 26.49 | 57.58 | 615. |
| 122 | 23.15785 | 46.04 | 8.00 | −1255.5 | −650.9 | 102.22 | 26.39 | 57.99 | 601. |
| 124 | 22.80802 | 43.42 | 7.65 | −1148.3 | −534.5 | 103.16 | 26.29 | 58.41 | 587. |
| 126 | 22.45320 | 40.92 | 7.31 | −1040.8 | −417.3 | 104.10 | 26.20 | 58.85 | 573. |
| 128 | 22.09328 | 38.54 | 6.99 | −932.8 | −299.1 | 105.03 | 26.10 | 59.31 | 559. |
| 130 | 21.72817 | 36.28 | 6.67 | −824.3 | −180.0 | 105.96 | 26.01 | 59.79 | 546. |
| 132 | 21.35779 | 34.13 | 6.37 | −715.5 | −60.0 | 106.87 | 25.93 | 60.28 | 532. |
| 134 | 20.98211 | 32.09 | 6.07 | −606.1 | 61.1 | 107.78 | 25.84 | 60.79 | 519. |
| 136 | 20.60112 | 30.16 | 5.78 | −496.4 | 183.2 | 108.69 | 25.76 | 61.31 | 506. |
| 138 | 20.21488 | 28.34 | 5.51 | −386.2 | 306.4 | 109.59 | 25.67 | 61.84 | 494. |
| 140 | 19.82356 | 26.63 | 5.24 | −275.7 | 430.6 | 110.48 | 25.59 | 62.37 | 481. |
| 142 | 19.42741 | 25.03 | 4.99 | −164.8 | 555.8 | 111.37 | 25.51 | 62.89 | 469. |
| 144 | 19.02686 | 23.55 | 4.74 | −53.7 | 682.1 | 112.25 | 25.43 | 63.39 | 458. |
| 146 | 18.62246 | 22.18 | 4.50 | 57.6 | 809.4 | 113.13 | 25.36 | 63.85 | 446. |
| 148 | 18.21500 | 20.93 | 4.28 | 168.9 | 937.5 | 114.00 | 25.28 | 64.26 | 436. |
| 150 | 17.80544 | 19.79 | 4.06 | 280.1 | 1066.4 | 114.87 | 25.21 | 64.61 | 426. |
| 155 | 16.78041 | 17.46 | 3.56 | 556.5 | 1390.8 | 116.99 | 25.02 | 65.06 | 403. |
| 160 | 15.77219 | 15.80 | 3.13 | 828.1 | 1715.7 | 119.06 | 24.82 | 64.79 | 384. |
| 165 | 14.80474 | 14.72 | 2.77 | 1091.8 | 2037.5 | 121.04 | 24.61 | 63.78 | 369. |
| 170 | 13.89784 | 14.11 | 2.46 | 1345.2 | 2352.5 | 122.92 | 24.39 | 62.15 | 358. |
| 175 | 13.06356 | 13.84 | 2.20 | 1586.6 | 2658.3 | 124.69 | 24.16 | 60.13 | 351. |
| 180 | 12.30626 | 13.83 | 1.99 | 1815.8 | 2953.5 | 126.35 | 23.92 | 57.91 | 346. |
| 185 | 11.62448 | 14.01 | 1.81 | 2033.0 | 3237.4 | 127.91 | 23.68 | 55.65 | 343. |
| 190 | 11.01327 | 14.33 | 1.66 | 2238.9 | 3510.1 | 129.36 | 23.46 | 53.47 | 341. |
| 195 | 10.46589 | 14.75 | 1.53 | 2434.6 | 3772.2 | 130.73 | 23.25 | 51.41 | 341. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 200 | 9.97512 | 15.23 | 1.42 | 2621.0 | 4024.5 | 132.00 | 23.06 | 49.53 | 342. |
| 210 | 9.13589 | 16.35 | 1.24 | 2970.6 | 4503.1 | 134.34 | 22.73 | 46.30 | 345. |
| 220 | 8.44726 | 17.56 | 1.10 | 3295.3 | 4952.6 | 136.43 | 22.47 | 43.72 | 349. |
| 230 | 7.87252 | 18.81 | 0.9920 | 3600.9 | 5379.2 | 138.33 | 22.26 | 41.68 | 355. |
| 240 | 7.38495 | 20.06 | 0.9047 | 3891.8 | 5787.5 | 140.07 | 22.09 | 40.04 | 360. |
| 250 | 6.96523 | 21.31 | 0.8327 | 4171.2 | 6181.2 | 141.67 | 21.96 | 38.73 | 366. |
| 260 | 6.59931 | 22.53 | 0.7723 | 4441.5 | 6562.9 | 143.17 | 21.85 | 37.65 | 372. |
| 270 | 6.27677 | 23.74 | 0.7209 | 4704.4 | 6934.8 | 144.57 | 21.76 | 36.76 | 378. |
| 280 | 5.98975 | 24.93 | 0.6765 | 4961.2 | 7298.5 | 145.90 | 21.68 | 36.01 | 384. |
| 290 | 5.73224 | 26.09 | 0.6378 | 5213.1 | 7655.4 | 147.15 | 21.62 | 35.38 | 390. |
| 300 | 5.49954 | 27.24 | 0.6036 | 5460.7 | 8006.4 | 148.34 | 21.57 | 34.84 | 396. |
| 310 | 5.28796 | 28.37 | 0.5733 | 5704.8 | 8352.4 | 149.47 | 21.52 | 34.37 | 402. |
| 320 | 5.09449 | 29.48 | 0.5461 | 5945.9 | 8694.0 | 150.56 | 21.49 | 33.96 | 408. |
| 330 | 4.91673 | 30.57 | 0.5216 | 6184.3 | 9031.8 | 151.60 | 21.46 | 33.61 | 413. |
| 340 | 4.75267 | 31.65 | 0.4994 | 6420.5 | 9366.2 | 152.60 | 21.43 | 33.29 | 419. |
| 350 | 4.60068 | 32.72 | 0.4792 | 6654.7 | 9697.8 | 153.56 | 21.41 | 33.02 | 424. |
| 360 | 4.45935 | 33.77 | 0.4607 | 6887.2 | 10026.7 | 154.48 | 21.40 | 32.77 | 430. |
| 370 | 4.32751 | 34.81 | 0.4436 | 7118.2 | 10353.4 | 155.38 | 21.39 | 32.56 | 435. |
| 380 | 4.20417 | 35.84 | 0.4279 | 7347.9 | 10678.0 | 156.24 | 21.38 | 32.37 | 440. |
| 390 | 4.08847 | 36.86 | 0.4134 | 7576.5 | 11000.7 | 157.08 | 21.38 | 32.19 | 445. |
| 400 | 3.97967 | 37.87 | 0.3999 | 7804.0 | 11321.9 | 157.90 | 21.38 | 32.04 | 450. |
| 420 | 3.78026 | 39.87 | 0.3755 | 8256.7 | 11960.1 | 159.45 | 21.39 | 31.79 | 460. |
| 440 | 3.60169 | 41.83 | 0.3541 | 8706.7 | 12593.8 | 160.93 | 21.42 | 31.59 | 469. |
| 460 | 3.44067 | 43.77 | 0.3352 | 9155.0 | 13224.0 | 162.33 | 21.46 | 31.44 | 478. |
| 480 | 3.29456 | 45.68 | 0.3183 | 9602.1 | 13851.5 | 163.66 | 21.51 | 31.32 | 487. |
| 500 | 3.16127 | 47.57 | 0.3032 | 10048.5 | 14477.1 | 164.94 | 21.57 | 31.24 | 496. |
| 520 | 3.03910 | 49.44 | 0.2895 | 10494.7 | 15101.3 | 166.16 | 21.65 | 31.19 | 504. |
| 540 | 2.92664 | 51.29 | 0.2770 | 10941.1 | 15724.7 | 167.34 | 21.73 | 31.16 | 512. |
| 560 | 2.82271 | 53.13 | 0.2657 | 11388.1 | 16347.8 | 168.47 | 21.82 | 31.15 | 520. |
| 580 | 2.72633 | 54.95 | 0.2552 | 11835.9 | 16971.0 | 169.57 | 21.91 | 31.17 | 528. |
| 600 | 2.63666 | 56.76 | 0.2456 | 12284.8 | 17594.6 | 170.62 | 22.02 | 31.19 | 536. |
| 620 | 2.55301 | 58.56 | 0.2368 | 12735.1 | 18218.8 | 171.65 | 22.13 | 31.23 | 543. |
| 640 | 2.47476 | 60.35 | 0.2285 | 13186.9 | 18844.0 | 172.64 | 22.24 | 31.29 | 550. |
| 660 | 2.40138 | 62.13 | 0.2209 | 13640.4 | 19470.3 | 173.60 | 22.36 | 31.35 | 558. |
| 680 | 2.33241 | 63.90 | 0.2138 | 14095.7 | 20098.0 | 174.54 | 22.48 | 31.42 | 565. |
| 700 | 2.26745 | 65.67 | 0.2071 | 14552.9 | 20727.2 | 175.45 | 22.61 | 31.50 | 572. |
| 720 | 2.20614 | 67.43 | 0.2009 | 15012.2 | 21358.1 | 176.34 | 22.73 | 31.58 | 578. |
| 740 | 2.14819 | 69.18 | 0.1950 | 15473.5 | 21990.7 | 177.21 | 22.86 | 31.67 | 585. |
| 760 | 2.09331 | 70.92 | 0.1895 | 15937.1 | 22625.1 | 178.05 | 22.99 | 31.77 | 591. |
| 780 | 2.04125 | 72.66 | 0.1843 | 16402.8 | 23261.3 | 178.88 | 23.12 | 31.86 | 598. |
| 800 | 1.99180 | 74.39 | 0.1794 | 16870.8 | 23899.6 | 179.69 | 23.24 | 31.96 | 604. |
| 850 | 1.87832 | 78.71 | 0.1682 | 18050.5 | 25504.0 | 181.63 | 23.56 | 32.22 | 620. |
| 900 | 1.77739 | 83.00 | 0.1583 | 19244.4 | 27121.2 | 183.48 | 23.87 | 32.47 | 635. |
| 950 | 1.68697 | 87.27 | 0.1496 | 20452.2 | 28751.1 | 185.24 | 24.16 | 32.72 | 650. |
| 1000 | 1.60548 | 91.53 | 0.1418 | 21673.4 | 30393.5 | 186.93 | 24.45 | 32.97 | 664. |
| 1050 | 1.53163 | 95.77 | 0.1348 | 22907.5 | 32048.1 | 188.54 | 24.71 | 33.21 | 678. |
| 1100 | 1.46438 | 99.99 | 0.1285 | 24154.0 | 33714.4 | 190.09 | 24.97 | 33.44 | 691. |
| 1150 | 1.40286 | 104.21 | 0.1228 | 25412.1 | 35391.7 | 191.59 | 25.21 | 33.65 | 705. |
| 1200 | 1.34637 | 108.42 | 0.1175 | 26681.3 | 37079.6 | 193.02 | 25.43 | 33.86 | 718. |
| | | | | 160 bar Isobar | | | | | |
| * 66.592 | 31.22173 | 250.15 | 26.58 | −4151.6 | −3639.2 | 68.91 | | | |
| 68 | 31.07048 | 235.36 | 25.56 | −4079.1 | −3564.1 | 70.02 | | | |
| 70 | 30.84992 | 216.83 | 24.27 | −3975.8 | −3457.1 | 71.57 | | | |
| 72 | 30.62279 | 200.76 | 23.12 | −3872.3 | −3349.8 | 73.08 | 33.21 | 53.66 | 1076. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 74 | 30.38933 | 186.73 | 22.08 | −3769.0 | −3242.5 | 74.55 | 32.72 | 53.65 | 1045. |
| 76 | 30.14990 | 174.39 | 21.13 | −3666.0 | −3135.3 | 75.99 | 32.21 | 53.61 | 1018. |
| 78 | 29.90488 | 163.45 | 20.24 | −3563.2 | −3028.1 | 77.38 | 31.69 | 53.55 | 993. |
| 80 | 29.65470 | 153.67 | 19.41 | −3460.6 | −2921.1 | 78.73 | 31.18 | 53.49 | 970. |
| 82 | 29.39975 | 144.86 | 18.63 | −3358.4 | −2814.2 | 80.05 | 30.71 | 53.44 | 949. |
| 84 | 29.14043 | 136.86 | 17.89 | −3256.4 | −2707.3 | 81.34 | 30.27 | 53.40 | 928. |
| 86 | 28.87704 | 129.54 | 17.18 | −3154.6 | −2600.5 | 82.60 | 29.87 | 53.38 | 909. |
| 88 | 28.60987 | 122.79 | 16.51 | −3053.0 | −2493.8 | 83.82 | 29.51 | 53.38 | 891. |
| 90 | 28.33914 | 116.52 | 15.87 | −2951.6 | −2387.0 | 85.02 | 29.18 | 53.41 | 873. |
| 92 | 28.06501 | 110.67 | 15.26 | −2850.2 | −2280.1 | 86.20 | 28.88 | 53.46 | 855. |
| 94 | 27.78762 | 105.18 | 14.67 | −2748.9 | −2173.1 | 87.35 | 28.61 | 53.53 | 838. |
| 96 | 27.50703 | 100.00 | 14.11 | −2647.7 | −2066.0 | 88.48 | 28.37 | 53.62 | 821. |
| 98 | 27.22329 | 95.11 | 13.57 | −2546.4 | −1958.6 | 89.58 | 28.15 | 53.74 | 805. |
| 100 | 26.93643 | 90.46 | 13.05 | −2445.0 | −1851.0 | 90.67 | 27.95 | 53.88 | 789. |
| 102 | 26.64643 | 86.05 | 12.54 | −2343.6 | −1743.1 | 91.74 | 27.77 | 54.04 | 773. |
| 104 | 26.35328 | 81.85 | 12.06 | −2242.0 | −1634.8 | 92.79 | 27.60 | 54.22 | 758. |
| 106 | 26.05695 | 77.84 | 11.60 | −2140.3 | −1526.2 | 93.82 | 27.44 | 54.41 | 742. |
| 108 | 25.75739 | 74.02 | 11.15 | −2038.4 | −1417.2 | 94.84 | 27.30 | 54.62 | 727. |
| 110 | 25.45458 | 70.38 | 10.71 | −1936.3 | −1307.7 | 95.85 | 27.16 | 54.85 | 712. |
| 112 | 25.14848 | 66.90 | 10.29 | −1834.0 | −1197.8 | 96.84 | 27.03 | 55.09 | 698. |
| 114 | 24.83903 | 63.58 | 9.89 | −1731.5 | −1087.4 | 97.81 | 26.91 | 55.34 | 683. |
| 116 | 24.52621 | 60.41 | 9.50 | −1628.8 | −976.4 | 98.78 | 26.79 | 55.60 | 669. |
| 118 | 24.20999 | 57.38 | 9.12 | −1525.8 | −865.0 | 99.73 | 26.68 | 55.87 | 655. |
| 120 | 23.89034 | 54.50 | 8.76 | −1422.7 | −752.9 | 100.67 | 26.57 | 56.15 | 641. |
| 122 | 23.56723 | 51.74 | 8.40 | −1319.3 | −640.3 | 101.60 | 26.46 | 56.45 | 628. |
| 124 | 23.24066 | 49.12 | 8.06 | −1215.6 | −527.2 | 102.52 | 26.36 | 56.74 | 614. |
| 126 | 22.91061 | 46.61 | 7.73 | −1111.7 | −413.4 | 103.43 | 26.26 | 57.05 | 601. |
| 128 | 22.57708 | 44.23 | 7.41 | −1007.6 | −298.9 | 104.34 | 26.16 | 57.37 | 588. |
| 130 | 22.24010 | 41.96 | 7.11 | −903.3 | −183.9 | 105.23 | 26.06 | 57.69 | 576. |
| 132 | 21.89968 | 39.79 | 6.81 | −798.8 | −68.2 | 106.11 | 25.97 | 58.02 | 563. |
| 134 | 21.55588 | 37.74 | 6.52 | −694.1 | 48.2 | 106.99 | 25.87 | 58.35 | 551. |
| 136 | 21.20876 | 35.79 | 6.24 | −589.2 | 165.2 | 107.85 | 25.78 | 58.68 | 539. |
| 138 | 20.85845 | 33.94 | 5.97 | −484.2 | 282.9 | 108.71 | 25.69 | 59.01 | 528. |
| 140 | 20.50510 | 32.20 | 5.71 | −379.0 | 401.3 | 109.56 | 25.60 | 59.34 | 516. |
| 142 | 20.14891 | 30.56 | 5.46 | −273.8 | 520.3 | 110.41 | 25.51 | 59.66 | 505. |
| 144 | 19.79017 | 29.01 | 5.22 | −168.6 | 639.9 | 111.24 | 25.42 | 59.97 | 494. |
| 146 | 19.42921 | 27.57 | 4.99 | −63.4 | 760.1 | 112.07 | 25.34 | 60.26 | 484. |
| 148 | 19.06649 | 26.23 | 4.77 | 41.7 | 880.9 | 112.89 | 25.25 | 60.51 | 474. |
| 150 | 18.70252 | 24.99 | 4.55 | 146.7 | 1002.2 | 113.71 | 25.17 | 60.74 | 464. |
| 155 | 17.79147 | 22.31 | 4.06 | 407.6 | 1306.9 | 115.71 | 24.97 | 61.09 | 441. |
| 160 | 16.88885 | 20.24 | 3.62 | 665.0 | 1612.4 | 117.65 | 24.76 | 61.05 | 422. |
| 165 | 16.00875 | 18.72 | 3.23 | 917.1 | 1916.6 | 119.52 | 24.56 | 60.55 | 406. |
| 170 | 15.16495 | 17.66 | 2.90 | 1162.1 | 2217.1 | 121.31 | 24.36 | 59.62 | 393. |
| 175 | 14.36849 | 17.00 | 2.62 | 1398.6 | 2512.1 | 123.02 | 24.15 | 58.33 | 383. |
| 180 | 13.62637 | 16.64 | 2.37 | 1625.8 | 2800.0 | 124.65 | 23.94 | 56.80 | 375. |
| 185 | 12.94155 | 16.51 | 2.17 | 1843.6 | 3079.9 | 126.18 | 23.74 | 55.13 | 370. |
| 190 | 12.31375 | 16.57 | 1.99 | 2051.9 | 3351.3 | 127.63 | 23.54 | 53.43 | 366. |
| 195 | 11.74051 | 16.76 | 1.83 | 2251.4 | 3614.2 | 128.99 | 23.35 | 51.75 | 364. |
| 200 | 11.21801 | 17.06 | 1.70 | 2442.6 | 3868.9 | 130.28 | 23.17 | 50.13 | 363. |
| 210 | 10.30752 | 17.88 | 1.48 | 2802.9 | 4355.2 | 132.66 | 22.86 | 47.20 | 363. |
| 220 | 9.54687 | 18.89 | 1.32 | 3138.6 | 4814.5 | 134.79 | 22.60 | 44.73 | 365. |
| 230 | 8.90486 | 20.00 | 1.18 | 3454.5 | 5251.3 | 136.73 | 22.39 | 42.69 | 369. |
| 240 | 8.35652 | 21.16 | 1.08 | 3754.8 | 5669.5 | 138.51 | 22.21 | 41.01 | 373. |
| 250 | 7.88261 | 22.34 | 0.9874 | 4042.6 | 6072.4 | 140.16 | 22.07 | 39.63 | 378. |
| 260 | 7.46850 | 23.53 | 0.9134 | 4320.4 | 6462.8 | 141.69 | 21.95 | 38.48 | 384. |
| 270 | 7.10303 | 24.71 | 0.8504 | 4590.1 | 6842.6 | 143.12 | 21.86 | 37.52 | 389. |
| 280 | 6.77762 | 25.88 | 0.7963 | 4853.0 | 7213.7 | 144.47 | 21.78 | 36.71 | 395. |
| 290 | 6.48562 | 27.03 | 0.7492 | 5110.3 | 7577.3 | 145.75 | 21.71 | 36.02 | 400. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 300 | 6.22178 | 28.17 | 0.7078 | 5362.9 | 7934.5 | 146.96 | 21.65 | 35.43 | 406. |
| 310 | 5.98192 | 29.30 | 0.6711 | 5611.5 | 8286.2 | 148.11 | 21.60 | 34.92 | 411. |
| 320 | 5.76267 | 30.41 | 0.6383 | 5856.6 | 8633.1 | 149.22 | 21.56 | 34.48 | 417. |
| 330 | 5.56129 | 31.51 | 0.6089 | 6098.9 | 8975.9 | 150.27 | 21.53 | 34.09 | 422. |
| 340 | 5.37550 | 32.59 | 0.5822 | 6338.5 | 9315.0 | 151.28 | 21.50 | 33.74 | 427. |
| 350 | 5.20343 | 33.66 | 0.5580 | 6576.0 | 9650.9 | 152.26 | 21.48 | 33.44 | 433. |
| 360 | 5.04349 | 34.72 | 0.5359 | 6811.5 | 9983.9 | 153.19 | 21.46 | 33.17 | 438. |
| 370 | 4.89435 | 35.77 | 0.5156 | 7045.3 | 10314.4 | 154.10 | 21.45 | 32.93 | 443. |
| 380 | 4.75486 | 36.81 | 0.4969 | 7277.6 | 10642.6 | 154.98 | 21.44 | 32.72 | 448. |
| 390 | 4.62406 | 37.84 | 0.4796 | 7508.6 | 10968.8 | 155.82 | 21.44 | 32.53 | 453. |
| 400 | 4.50109 | 38.86 | 0.4636 | 7738.5 | 11293.2 | 156.64 | 21.44 | 32.36 | 458. |
| 420 | 4.27580 | 40.87 | 0.4347 | 8195.4 | 11937.3 | 158.22 | 21.45 | 32.07 | 467. |
| 440 | 4.07416 | 42.85 | 0.4095 | 8649.2 | 12576.4 | 159.70 | 21.47 | 31.85 | 476. |
| 460 | 3.89239 | 44.80 | 0.3872 | 9100.9 | 13211.5 | 161.11 | 21.51 | 31.67 | 485. |
| 480 | 3.72751 | 46.72 | 0.3674 | 9551.1 | 13843.5 | 162.46 | 21.56 | 31.54 | 494. |
| 500 | 3.57715 | 48.63 | 0.3496 | 10000.3 | 14473.1 | 163.74 | 21.62 | 31.44 | 502. |
| 520 | 3.43935 | 50.51 | 0.3336 | 10449.1 | 15101.2 | 164.98 | 21.69 | 31.37 | 511. |
| 540 | 3.31252 | 52.38 | 0.3190 | 10897.9 | 15728.1 | 166.16 | 21.77 | 31.33 | 519. |
| 560 | 3.19533 | 54.23 | 0.3057 | 11347.1 | 16354.4 | 167.30 | 21.85 | 31.31 | 527. |
| 580 | 3.08666 | 56.07 | 0.2936 | 11797.0 | 16980.6 | 168.40 | 21.95 | 31.31 | 534. |
| 600 | 2.98558 | 57.89 | 0.2824 | 12247.8 | 17606.9 | 169.46 | 22.05 | 31.33 | 542. |
| 620 | 2.89127 | 59.70 | 0.2721 | 12699.8 | 18233.7 | 170.49 | 22.16 | 31.36 | 549. |
| 640 | 2.80305 | 61.50 | 0.2626 | 13153.3 | 18861.4 | 171.48 | 22.27 | 31.40 | 556. |
| 660 | 2.72032 | 63.29 | 0.2537 | 13608.3 | 19490.0 | 172.45 | 22.39 | 31.46 | 563. |
| 680 | 2.64256 | 65.07 | 0.2454 | 14065.1 | 20119.8 | 173.39 | 22.51 | 31.52 | 570. |
| 700 | 2.56932 | 66.84 | 0.2377 | 14523.7 | 20751.0 | 174.30 | 22.63 | 31.60 | 577. |
| 720 | 2.50020 | 68.61 | 0.2305 | 14984.3 | 21383.8 | 175.20 | 22.76 | 31.68 | 584. |
| 740 | 2.43485 | 70.37 | 0.2237 | 15446.9 | 22018.1 | 176.06 | 22.89 | 31.76 | 590. |
| 760 | 2.37296 | 72.12 | 0.2173 | 15911.5 | 22654.2 | 176.91 | 23.01 | 31.85 | 597. |
| 780 | 2.31425 | 73.87 | 0.2113 | 16378.4 | 23292.1 | 177.74 | 23.14 | 31.94 | 603. |
| 800 | 2.25847 | 75.61 | 0.2056 | 16847.4 | 23931.8 | 178.55 | 23.27 | 32.03 | 610. |
| 850 | 2.13047 | 79.94 | 0.1927 | 18029.5 | 25539.6 | 180.50 | 23.58 | 32.28 | 625. |
| 900 | 2.01657 | 84.24 | 0.1814 | 19225.5 | 27159.8 | 182.35 | 23.89 | 32.53 | 640. |
| 950 | 1.91452 | 88.52 | 0.1713 | 20435.1 | 28792.3 | 184.12 | 24.18 | 32.77 | 654. |
| 1000 | 1.82251 | 92.78 | 0.1624 | 21658.0 | 30437.1 | 185.80 | 24.46 | 33.02 | 669. |
| 1050 | 1.73911 | 97.03 | 0.1543 | 22893.6 | 32093.8 | 187.42 | 24.73 | 33.25 | 682. |
| 1100 | 1.66313 | 101.27 | 0.1470 | 24141.5 | 33761.9 | 188.97 | 24.98 | 33.47 | 696. |
| 1150 | 1.59361 | 105.49 | 0.1404 | 25400.8 | 35440.9 | 190.47 | 25.22 | 33.69 | 709. |
| 1200 | 1.52976 | 109.70 | 0.1344 | 26671.1 | 37130.3 | 191.90 | 25.44 | 33.89 | 722. |
| | | | | 180 bar Isobar | | | | | |
| * 67.013 | 31.25729 | 252.03 | 26.08 | −4143.1 | −3567.2 | 69.03 | | | |
| 68 | 31.15433 | 241.74 | 25.41 | −4092.6 | −3514.9 | 69.80 | | | |
| 70 | 30.94086 | 223.07 | 24.17 | −3990.3 | −3408.5 | 71.34 | | | |
| 72 | 30.72092 | 206.87 | 23.08 | −3887.9 | −3302.0 | 72.84 | 33.65 | 53.29 | 1081. |
| 74 | 30.49476 | 192.72 | 22.08 | −3785.7 | −3195.4 | 74.30 | 33.13 | 53.27 | 1052. |
| 76 | 30.26269 | 180.27 | 21.17 | −3683.7 | −3088.9 | 75.72 | 32.58 | 53.22 | 1025. |
| 78 | 30.02512 | 169.24 | 20.32 | 3582.1 | 2982.6 | 77.11 | 32.04 | 53.15 | 1001. |
| 80 | 29.78248 | 159.39 | 19.53 | −3480.7 | −2876.3 | 78.45 | 31.51 | 53.09 | 979. |
| 82 | 29.53518 | 150.52 | 18.78 | −3379.7 | −2770.2 | 79.76 | 31.01 | 53.03 | 959. |
| 84 | 29.28364 | 142.47 | 18.06 | −3278.9 | −2664.2 | 81.04 | 30.55 | 52.98 | 939. |
| 86 | 29.02819 | 135.12 | 17.38 | −3178.4 | −2558.3 | 82.28 | 30.13 | 52.95 | 921. |
| 88 | 28.76917 | 128.35 | 16.73 | −3078.1 | −2452.4 | 83.50 | 29.75 | 52.94 | 903. |
| 90 | 28.50681 | 122.07 | 16.11 | −2977.9 | −2346.5 | 84.69 | 29.40 | 52.95 | 886. |
| 92 | 28.24134 | 116.21 | 15.51 | −2877.9 | −2240.6 | 85.85 | 29.09 | 52.97 | 869. |
| 94 | 27.97292 | 110.72 | 14.94 | −2778.1 | −2134.6 | 86.99 | 28.81 | 53.02 | 853. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 96 | 27.70166 | 105.54 | 14.39 | −2678.3 | −2028.5 | 88.11 | 28.55 | 53.09 | 837. |
| 98 | 27.42766 | 100.65 | 13.86 | −2578.5 | −1922.2 | 89.21 | 28.32 | 53.17 | 821. |
| 100 | 27.15097 | 96.02 | 13.35 | −2478.7 | −1815.8 | 90.28 | 28.11 | 53.28 | 806. |
| 102 | 26.87163 | 91.61 | 12.86 | −2379.0 | −1709.1 | 91.34 | 27.92 | 53.40 | 791. |
| 104 | 26.58966 | 87.41 | 12.38 | −2279.1 | −1602.2 | 92.38 | 27.74 | 53.53 | 776. |
| 106 | 26.30507 | 83.41 | 11.92 | 2179.2 | −1495.0 | 93.40 | 27.57 | 53.68 | 761. |
| 108 | 26.01786 | 79.59 | 11.48 | −2079.3 | −1387.4 | 94.40 | 27.42 | 53.85 | 747. |
| 110 | 25.72804 | 75.95 | 11.06 | −1979.2 | −1279.6 | 95.39 | 27.28 | 54.02 | 733. |
| 112 | 25.43560 | 72.47 | 10.64 | 1879.0 | 1171.3 | 96.37 | 27.14 | 54.20 | 719. |
| 114 | 25.14054 | 69.14 | 10.25 | −1778.7 | −1062.8 | 97.33 | 27.01 | 54.39 | 705. |
| 116 | 24.84288 | 65.96 | 9.86 | −1678.3 | −953.8 | 98.28 | 26.89 | 54.59 | 691. |
| 118 | 24.54262 | 62.93 | 9.49 | −1577.8 | −844.4 | 99.21 | 26.77 | 54.80 | 678. |
| 120 | 24.23978 | 60.04 | 9.13 | −1477.2 | −734.6 | 100.13 | 26.65 | 55.00 | 665. |
| 122 | 23.93438 | 57.27 | 8.78 | −1376.4 | −624.4 | 101.04 | 26.54 | 55.22 | 652. |
| 124 | 23.62646 | 54.63 | 8.45 | −1275.6 | −513.7 | 101.94 | 26.43 | 55.43 | 640. |
| 126 | 23.31606 | 52.12 | 8.12 | −1174.6 | −402.6 | 102.83 | 26.33 | 55.65 | 627. |
| 128 | 23.00322 | 49.72 | 7.81 | −1073.6 | −291.1 | 103.71 | 26.22 | 55.87 | 615. |
| 130 | 22.68800 | 47.43 | 7.50 | −972.5 | −179.1 | 104.58 | 26.12 | 56.10 | 603. |
| 132 | 22.37049 | 45.25 | 7.21 | −871.3 | −66.7 | 105.44 | 26.02 | 56.32 | 591. |
| 134 | 22.05075 | 43.18 | 6.93 | −770.2 | 46.1 | 106.29 | 25.92 | 56.54 | 580. |
| 136 | 21.72890 | 41.21 | 6.65 | −668.9 | 159.4 | 107.12 | 25.82 | 56.76 | 569. |
| 138 | 21.40506 | 39.34 | 6.39 | −567.8 | 273.2 | 107.96 | 25.73 | 56.97 | 558. |
| 140 | 21.07938 | 37.56 | 6.13 | −466.6 | 387.3 | 108.78 | 25.63 | 57.18 | 547. |
| 142 | 20.75203 | 35.88 | 5.89 | −365.5 | 501.9 | 109.59 | 25.54 | 57.38 | 536. |
| 144 | 20.42322 | 34.29 | 5.65 | −264.5 | 616.9 | 110.39 | 25.45 | 57.57 | 526. |
| 146 | 20.09320 | 32.80 | 5.42 | −163.7 | 732.2 | 111.19 | 25.36 | 57.75 | 516. |
| 148 | 19.76227 | 31.39 | 5.20 | −63.0 | 847.8 | 111.97 | 25.27 | 57.91 | 507. |
| 150 | 19.43077 | 30.08 | 4.99 | 37.4 | 963.8 | 112.75 | 25.18 | 58.04 | 497. |
| 155 | 18.60216 | 27.18 | 4.49 | 287.0 | 1254.6 | 114.66 | 24.96 | 58.26 | 476. |
| 160 | 17.77984 | 24.82 | 4.05 | 533.6 | 1546.0 | 116.51 | 24.75 | 58.24 | 457. |
| 165 | 16.97253 | 22.96 | 3.66 | 776.0 | 1836.5 | 118.30 | 24.55 | 57.94 | 440. |
| 170 | 16.18939 | 21.55 | 3.31 | 1013.0 | 2124.8 | 120.02 | 24.35 | 57.34 | 426. |
| 175 | 15.43874 | 20.54 | 3.01 | 1243.6 | 2409.5 | 121.67 | 24.15 | 56.48 | 414. |
| 180 | 14.72709 | 19.86 | 2.74 | 1467.0 | 2689.3 | 123.25 | 23.96 | 55.40 | 405. |
| 185 | 14.05857 | 19.44 | 2.51 | 1682.9 | 2963.2 | 124.75 | 23.78 | 54.16 | 398. |
| 190 | 13.43502 | 19.24 | 2.31 | 1891.0 | 3230.8 | 126.17 | 23.59 | 52.84 | 392. |
| 195 | 12.85640 | 19.20 | 2.14 | 2091.5 | 3491.6 | 127.53 | 23.42 | 51.49 | 388. |
| 200 | 12.32124 | 19.30 | 1.99 | 2284.8 | 3745.7 | 128.82 | 23.26 | 50.15 | 385. |
| 210 | 11.37144 | 19.80 | 1.73 | 2651.3 | 4234.2 | 131.20 | 22.96 | 47.60 | 383. |
| 220 | 10.56240 | 20.57 | 1.54 | 2994.5 | 4698.6 | 133.36 | 22.71 | 45.33 | 383. |
| 230 | 9.87006 | 21.51 | 1.38 | 3318.3 | 5141.9 | 135.33 | 22.49 | 43.38 | 385. |
| 240 | 9.27307 | 22.54 | 1.25 | 3626.2 | 5567.3 | 137.14 | 22.32 | 41.73 | 388. |
| 250 | 8.75376 | 23.62 | 1.15 | 3921.1 | 5977.4 | 138.82 | 22.17 | 40.33 | 392. |
| 260 | 8.29798 | 24.74 | 1.06 | 4205.5 | 6374.7 | 140.38 | 22.05 | 39.16 | 396. |
| 270 | 7.89454 | 25.87 | 0.9839 | 4481.1 | 6761.1 | 141.83 | 21.95 | 38.16 | 401. |
| 280 | 7.53463 | 27.00 | 0.9197 | 4749.4 | 7138.4 | 143.21 | 21.86 | 37.31 | 406. |
| 290 | 7.21122 | 28.13 | 0.8638 | 5011.7 | 7507.8 | 144.50 | 21.79 | 36.59 | 411. |
| 300 | 6.91874 | 29.25 | 0.8149 | 5268.8 | 7870.5 | 145.73 | 21.73 | 35.96 | 416. |
| 310 | 6.65268 | 30.36 | 0.7716 | 5521.6 | 8227.3 | 146.90 | 21.68 | 35.41 | 421. |
| 320 | 6.40940 | 31.47 | 0.7330 | 5770.6 | 8579.0 | 148.02 | 21.64 | 34.94 | 426. |
| 330 | 6.18588 | 32.56 | 0.6983 | 6016.4 | 8926.2 | 149.09 | 21.60 | 34.52 | 431. |
| 340 | 5.97965 | 33.64 | 0.6671 | 6259.3 | 9269.5 | 150.11 | 21.57 | 34.15 | 436. |
| 350 | 5.78863 | 34.71 | 0.6387 | 6499.8 | 9609.3 | 151.10 | 21.55 | 33.82 | 441. |
| 360 | 5.61108 | 35.77 | 0.6128 | 6738.1 | 9946.1 | 152.05 | 21.53 | 33.53 | 446. |
| 370 | 5.44552 | 36.82 | 0.5891 | 6974.6 | 10280.1 | 152.96 | 21.51 | 33.27 | 451. |
| 380 | 5.29069 | 37.86 | 0.5673 | 7209.4 | 10611.6 | 153.85 | 21.50 | 33.04 | 456. |
| 390 | 5.14550 | 38.89 | 0.5472 | 7442.7 | 10940.9 | 154.70 | 21.49 | 32.83 | 461. |
| 400 | 5.00901 | 39.91 | 0.5285 | 7674.8 | 11268.3 | 155.53 | 21.49 | 32.65 | 465. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 420 | 4.75899 | 41.93 | 0.4950 | 8135.7 | 11918.0 | 157.11 | 21.50 | 32.33 | 474. |
| 440 | 4.53524 | 43.92 | 0.4658 | 8593.2 | 12562.2 | 158.61 | 21.52 | 32.09 | 484. |
| 460 | 4.33356 | 45.88 | 0.4400 | 9048.2 | 13201.8 | 160.03 | 21.55 | 31.89 | 492. |
| 480 | 4.15065 | 47.82 | 0.4171 | 9501.3 | 13838.0 | 161.39 | 21.60 | 31.74 | 501. |
| 500 | 3.98385 | 49.74 | 0.3967 | 9953.3 | 14471.5 | 162.68 | 21.66 | 31.62 | 509. |
| 520 | 3.83100 | 51.63 | 0.3782 | 10404.6 | 15103.1 | 163.92 | 21.73 | 31.54 | 517. |
| 540 | 3.69032 | 53.51 | 0.3615 | 10855.7 | 15733.4 | 165.11 | 21.80 | 31.49 | 525. |
| 560 | 3.56033 | 55.37 | 0.3463 | 11307.0 | 16362.7 | 166.25 | 21.89 | 31.46 | 533. |
| 580 | 3.43980 | 57.22 | 0.3323 | 11758.9 | 16991.7 | 167.36 | 21.98 | 31.45 | 541. |
| 600 | 3.32767 | 59.05 | 0.3195 | 12211.6 | 17620.7 | 168.42 | 22.09 | 31.46 | 548. |
| 620 | 3.22306 | 60.87 | 0.3078 | 12665.3 | 18250.1 | 169.46 | 22.19 | 31.48 | 555. |
| 640 | 3.12519 | 62.68 | 0.2968 | 13120.4 | 18880.0 | 170.46 | 22.30 | 31.52 | 562. |
| 660 | 3.03341 | 64.48 | 0.2867 | 13576.9 | 19510.8 | 171.43 | 22.42 | 31.57 | 569. |
| 680 | 2.94714 | 66.26 | 0.2773 | 14035.1 | 20142.7 | 172.37 | 22.54 | 31.62 | 576. |
| 700 | 2.86588 | 68.04 | 0.2685 | 14495.0 | 20775.8 | 173.29 | 22.66 | 31.69 | 583. |
| 720 | 2.78918 | 69.82 | 0.2602 | 14956.9 | 21410.4 | 174.18 | 22.79 | 31.76 | 589. |
| 740 | 2.71665 | 71.58 | 0.2525 | 15420.6 | 22046.4 | 175.05 | 22.91 | 31.84 | 596. |
| 760 | 2.64796 | 73.34 | 0.2453 | 15886.4 | 22684.1 | 175.90 | 23.04 | 31.93 | 602. |
| 780 | 2.58279 | 75.09 | 0.2384 | 16354.3 | 23323.5 | 176.73 | 23.16 | 32.01 | 609. |
| 800 | 2.52087 | 76.84 | 0.2320 | 16824.3 | 23964.7 | 177.54 | 23.29 | 32.11 | 615. |
| 850 | 2.37874 | 81.18 | 0.2173 | 18008.8 | 25575.8 | 179.50 | 23.60 | 32.34 | 630. |
| 900 | 2.25224 | 85.50 | 0.2045 | 19206.8 | 27198.9 | 181.35 | 23.91 | 32.58 | 645. |
| 950 | 2.13886 | 89.79 | 0.1931 | 20418.3 | 28834.0 | 183.12 | 24.20 | 32.82 | 659. |
| 1000 | 2.03660 | 94.06 | 0.1829 | 21642.8 | 30481.1 | 184.81 | 24.48 | 33.06 | 673. |
| 1050 | 1.94388 | 98.31 | 0.1738 | 22879.9 | 32139.8 | 186.43 | 24.75 | 33.29 | 687. |
| 1100 | 1.85939 | 102.55 | 0.1656 | 24129.1 | 33809.7 | 187.98 | 25.00 | 33.51 | 701. |
| 1150 | 1.78206 | 106.78 | 0.1582 | 25389.7 | 35490.4 | 189.48 | 25.23 | 33.72 | 714. |
| 1200 | 1.71100 | 111.00 | 0.1514 | 26661.1 | 37181.3 | 190.92 | 25.46 | 33.92 | 727. |
| | | | | 200 bar Isobar | | | | | |
| * 67.431 | 31.29360 | 254.01 | 25.61 | −4134.3 | −3495.2 | 69.15 | | | |
| 68 | 31.23599 | 248.13 | 25.25 | −4105.5 | −3465.2 | 69.59 | | | |
| 70 | 31.02928 | 229.31 | 24.07 | −4004.1 | −3359.5 | 71.12 | | | |
| 72 | 30.81620 | 212.97 | 23.02 | −3902.7 | −3253.7 | 72.61 | 34.06 | 52.93 | 1087. |
| 74 | 30.59696 | 198.69 | 22.08 | −3801.5 | −3147.9 | 74.06 | 33.51 | 52.90 | 1058. |
| 76 | 30.37187 | 186.13 | 21.21 | −3700.6 | −3042.1 | 75.47 | 32.94 | 52.85 | 1032. |
| 78 | 30.14133 | 175.00 | 20.40 | −3600.0 | −2936.5 | 76.84 | 32.36 | 52.77 | 1009. |
| 80 | 29.90578 | 165.06 | 19.64 | −3499.8 | −2831.0 | 78.18 | 31.81 | 52.70 | 988. |
| 82 | 29.66564 | 156.13 | 18.91 | −3399.8 | −2725.7 | 79.48 | 31.29 | 52.64 | 968. |
| 84 | 29.42134 | 148.03 | 18.23 | −3300.2 | −2620.4 | 80.75 | 30.81 | 52.59 | 950. |
| 86 | 29.17327 | 140.63 | 17.57 | −3200.9 | −2515.3 | 81.98 | 30.37 | 52.55 | 932. |
| 88 | 28.92175 | 133.83 | 16.94 | −3101.7 | −2410.2 | 83.19 | 29.97 | 52.53 | 915. |
| 90 | 28.66709 | 127.53 | 16.33 | −3002.8 | −2305.2 | 84.37 | 29.61 | 52.52 | 899. |
| 92 | 28.40952 | 121.67 | 15.75 | −2904.1 | −2200.1 | 85.53 | 29.28 | 52.53 | 883. |
| 94 | 28.14924 | 116.17 | 15.19 | −2805.5 | −2095.0 | 86.66 | 28.99 | 52.56 | 867. |
| 96 | 27.88641 | 110.99 | 14.65 | −2707.1 | −1989.9 | 87.76 | 28.72 | 52.61 | 852. |
| 98 | 27.62115 | 106.10 | 14.14 | −2608.7 | −1884.6 | 88.85 | 28.48 | 52.67 | 837. |
| 100 | 27.35355 | 101.47 | 13.63 | −2510.4 | −1779.2 | 89.91 | 28.26 | 52.74 | 822. |
| 102 | 27.08368 | 97.06 | 13.15 | −2412.1 | −1673.6 | 90.96 | 28.06 | 52.83 | 808. |
| 104 | 26.81159 | 92.87 | 12.69 | −2313.8 | −1567.8 | 91.99 | 27.87 | 52.94 | 794. |
| 106 | 26.53731 | 88.87 | 12.23 | −2215.5 | −1461.9 | 93.00 | 27.70 | 53.05 | 780. |
| 108 | 26.26088 | 85.05 | 11.80 | −2117.2 | −1355.6 | 93.99 | 27.54 | 53.18 | 766. |
| 110 | 25.98233 | 81.40 | 11.38 | −2018.9 | −1249.1 | 94.97 | 27.39 | 53.31 | 752. |
| 112 | 25.70168 | 77.91 | 10.97 | −1920.6 | −1142.4 | 95.93 | 27.24 | 53.45 | 739. |
| 114 | 25.41896 | 74.58 | 10.58 | −1822.2 | −1035.4 | 96.87 | 27.11 | 53.59 | 725. |
| 116 | 25.13420 | 71.39 | 10.20 | −1723.7 | −928.0 | 97.81 | 26.98 | 53.74 | 713. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 118 | 24.84744 | 68.35 | 9.83 | −1625.3 | −820.4 | 98.73 | 26.86 | 53.90 | 700. |
| 120 | 24.55871 | 65.44 | 9.48 | −1526.8 | −712.4 | 99.64 | 26.74 | 54.05 | 687. |
| 122 | 24.26807 | 62.66 | 9.14 | −1428.3 | −604.2 | 100.53 | 26.62 | 54.21 | 675. |
| 124 | 23.97557 | 60.01 | 8.80 | −1329.8 | −495.6 | 101.41 | 26.51 | 54.37 | 663. |
| 126 | 23.68127 | 57.47 | 8.48 | −1231.2 | −386.7 | 102.28 | 26.40 | 54.53 | 651. |
| 128 | 23.38524 | 55.05 | 8.17 | −1132.7 | −277.5 | 103.14 | 26.29 | 54.68 | 639. |
| 130 | 23.08757 | 52.75 | 7.87 | −1034.2 | −168.0 | 103.99 | 26.19 | 54.84 | 628. |
| 132 | 22.78834 | 50.55 | 7.58 | −935.8 | −58.1 | 104.83 | 26.08 | 54.99 | 617. |
| 134 | 22.48764 | 48.45 | 7.30 | −837.4 | 52.0 | 105.66 | 25.98 | 55.14 | 606. |
| 136 | 22.18560 | 46.46 | 7.03 | −739.1 | 162.4 | 106.48 | 25.88 | 55.28 | 595. |
| 138 | 21.88233 | 44.56 | 6.77 | −640.9 | 273.1 | 107.28 | 25.78 | 55.42 | 585. |
| 140 | 21.57797 | 42.75 | 6.52 | −542.8 | 384.1 | 108.08 | 25.68 | 55.55 | 575. |
| 142 | 21.27267 | 41.04 | 6.27 | −444.9 | 495.3 | 108.87 | 25.59 | 55.67 | 565. |
| 144 | 20.96662 | 39.41 | 6.04 | −347.1 | 606.8 | 109.65 | 25.49 | 55.79 | 555. |
| 146 | 20.65999 | 37.88 | 5.81 | −249.6 | 718.4 | 110.42 | 25.40 | 55.89 | 545. |
| 148 | 20.35301 | 36.42 | 5.59 | −152.3 | 830.3 | 111.18 | 25.30 | 55.98 | 536. |
| 150 | 20.04592 | 35.05 | 5.38 | −55.4 | 942.3 | 111.93 | 25.21 | 56.06 | 527. |
| 155 | 19.27956 | 31.99 | 4.89 | 185.6 | 1222.9 | 113.77 | 24.99 | 56.16 | 507. |
| 160 | 18.51918 | 29.41 | 4.44 | 423.7 | 1503.7 | 115.56 | 24.78 | 56.11 | 488. |
| 165 | 17.77055 | 27.30 | 4.04 | 658.2 | 1783.7 | 117.28 | 24.57 | 55.88 | 471. |
| 170 | 17.03987 | 25.62 | 3.69 | 888.4 | 2062.1 | 118.94 | 24.37 | 55.44 | 456. |
| 175 | 16.33317 | 24.32 | 3.37 | 1113.3 | 2337.8 | 120.54 | 24.18 | 54.81 | 444. |
| 180 | 15.65566 | 23.35 | 3.09 | 1332.4 | 2609.9 | 122.07 | 23.99 | 54.01 | 433. |
| 185 | 15.01128 | 22.67 | 2.84 | 1545.4 | 2877.7 | 123.54 | 23.81 | 53.07 | 425. |
| 190 | 14.40251 | 22.23 | 2.62 | 1751.8 | 3140.5 | 124.94 | 23.64 | 52.04 | 418. |
| 195 | 13.83044 | 21.97 | 2.43 | 1951.9 | 3398.0 | 126.28 | 23.48 | 50.95 | 413. |
| 200 | 13.29497 | 21.88 | 2.26 | 2145.6 | 3649.9 | 127.56 | 23.32 | 49.83 | 408. |
| 210 | 12.32930 | 22.04 | 1.98 | 2515.1 | 4137.2 | 129.94 | 23.04 | 47.65 | 403. |
| 220 | 11.49162 | 22.55 | 1.76 | 2863.0 | 4603.4 | 132.10 | 22.80 | 45.62 | 401. |
| 230 | 10.76452 | 23.28 | 1.58 | 3192.4 | 5050.4 | 134.09 | 22.59 | 43.81 | 401. |
| 240 | 10.13082 | 24.16 | 1.43 | 3506.2 | 5480.3 | 135.92 | 22.41 | 42.23 | 403. |
| 250 | 9.57521 | 25.12 | 1.31 | 3806.9 | 5895.6 | 137.62 | 22.26 | 40.86 | 406. |
| 260 | 9.08475 | 26.15 | 1.21 | 4096.8 | 6298.3 | 139.20 | 22.14 | 39.69 | 409. |
| 270 | 8.64877 | 27.21 | 1.12 | 4377.6 | 6690.0 | 140.68 | 22.03 | 38.69 | 413. |
| 280 | 8.25862 | 28.29 | 1.05 | 4650.7 | 7072.4 | 142.07 | 21.95 | 37.82 | 417. |
| 290 | 7.90724 | 29.37 | 0.9811 | 4917.5 | 7446.8 | 143.38 | 21.87 | 37.07 | 422. |
| 300 | 7.58893 | 30.47 | 0.9244 | 5178.7 | 7814.1 | 144.63 | 21.81 | 36.42 | 426. |
| 310 | 7.29901 | 31.55 | 0.8743 | 5435.3 | 8175.4 | 145.81 | 21.75 | 35.85 | 431. |
| 320 | 7.03364 | 32.64 | 0.8296 | 5687.8 | 8531.3 | 146.94 | 21.71 | 35.35 | 436. |
| 330 | 6.78966 | 33.72 | 0.7897 | 5936.9 | 8882.5 | 148.02 | 21.67 | 34.91 | 440. |
| 340 | 6.56442 | 34.79 | 0.7536 | 6182.9 | 9229.6 | 149.06 | 21.63 | 34.52 | 445. |
| 350 | 6.35571 | 35.85 | 0.7209 | 6426.2 | 9573.0 | 150.05 | 21.61 | 34.17 | 450. |
| 360 | 6.16165 | 36.90 | 0.6912 | 6667.2 | 9913.1 | 151.01 | 21.59 | 33.86 | 455. |
| 370 | 5.98064 | 37.95 | 0.6639 | 6906.2 | 10250.3 | 151.93 | 21.57 | 33.58 | 459. |
| 380 | 5.81132 | 38.99 | 0.6389 | 7143.3 | 10584.9 | 152.83 | 21.56 | 33.34 | 464. |
| 390 | 5.65253 | 40.02 | 0.6158 | 7378.9 | 10917.1 | 153.69 | 21.55 | 33.12 | 469. |
| 400 | 5.50323 | 41.04 | 0.5945 | 7613.0 | 11247.3 | 154.53 | 21.54 | 32.92 | 473. |
| 420 | 5.22969 | 43.06 | 0.5562 | 8077.8 | 11902.1 | 156.12 | 21.55 | 32.58 | 482. |
| 440 | 4.98486 | 45.06 | 0.5229 | 8538.8 | 12550.9 | 157.63 | 21.57 | 32.31 | 491. |
| 460 | 4.76416 | 47.02 | 0.4935 | 8996.9 | 13194.9 | 159.06 | 21.60 | 32.09 | 499. |
| 480 | 4.56397 | 48.97 | 0.4675 | 9452.9 | 13835.0 | 160.43 | 21.64 | 31.93 | 508. |
| 500 | 4.38141 | 50.89 | 0.4442 | 9907.4 | 14472.2 | 161.73 | 21.70 | 31.80 | 516. |
| 520 | 4.21409 | 52.79 | 0.4233 | 10361.2 | 15107.1 | 162.97 | 21.76 | 31.70 | 524. |
| 540 | 4.06008 | 54.68 | 0.4044 | 10814.5 | 15740.5 | 164.17 | 21.84 | 31.64 | 532. |
| 560 | 3.91777 | 56.55 | 0.3872 | 11267.9 | 16372.8 | 165.32 | 21.93 | 31.60 | 539. |
| 580 | 3.78580 | 58.40 | 0.3714 | 11721.6 | 17004.5 | 166.42 | 22.02 | 31.58 | 547. |
| 600 | 3.66302 | 60.24 | 0.3570 | 12176.1 | 17636.0 | 167.50 | 22.12 | 31.58 | 554. |
| 620 | 3.54846 | 62.07 | 0.3437 | 12631.5 | 18267.7 | 168.53 | 22.22 | 31.59 | 561. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 640 | 3.44127 | 63.88 | 0.3314 | 13088.1 | 18899.9 | 169.53 | 22.33 | 31.62 | 568. |
| 660 | 3.34074 | 65.69 | 0.3200 | 13546.1 | 19532.8 | 170.51 | 22.45 | 31.67 | 575. |
| 680 | 3.24623 | 67.48 | 0.3094 | 14005.7 | 20166.7 | 171.45 | 22.57 | 31.72 | 582. |
| 700 | 3.15719 | 69.27 | 0.2995 | 14466.9 | 20801.6 | 172.37 | 22.69 | 31.78 | 589. |
| 720 | 3.07315 | 71.05 | 0.2902 | 14929.9 | 21437.9 | 173.27 | 22.81 | 31.85 | 595. |
| 740 | 2.99368 | 72.82 | 0.2815 | 15394.9 | 22075.6 | 174.14 | 22.94 | 31.92 | 601. |
| 760 | 2.91839 | 74.58 | 0.2734 | 15861.8 | 22714.9 | 175.00 | 23.06 | 32.00 | 608. |
| 780 | 2.84695 | 76.34 | 0.2657 | 16330.7 | 23355.8 | 175.83 | 23.19 | 32.09 | 614. |
| 800 | 2.77907 | 78.09 | 0.2585 | 16801.7 | 23998.4 | 176.64 | 23.31 | 32.17 | 620. |
| 850 | 2.62322 | 82.44 | 0.2420 | 17988.4 | 25612.7 | 178.60 | 23.62 | 32.40 | 635. |
| 900 | 2.48445 | 86.77 | 0.2277 | 19188.5 | 27238.5 | 180.46 | 23.93 | 32.63 | 650. |
| 950 | 2.36004 | 91.07 | 0.2149 | 20401.7 | 28876.1 | 182.23 | 24.22 | 32.87 | 664. |
| 1000 | 2.24780 | 95.34 | 0.2036 | 21627.8 | 30525.4 | 183.92 | 24.50 | 33.10 | 678. |
| 1050 | 2.14599 | 99.60 | 0.1934 | 22866.4 | 32186.1 | 185.54 | 24.76 | 33.33 | 692. |
| 1100 | 2.05319 | 103.85 | 0.1842 | 24116.9 | 33857.8 | 187.10 | 25.01 | 33.54 | 705. |
| 1150 | 1.96823 | 108.08 | 0.1759 | 25378.7 | 35540.1 | 188.59 | 25.25 | 33.75 | 718. |
| 1200 | 1.89014 | 112.30 | 0.1683 | 26651.2 | 37232.4 | 190.03 | 25.47 | 33.94 | 731. |
| | | | | 250 bar Isobar | | | | | |
| * 68.468 | 31.38709 | 259.39 | 24.56 | −4111.7 | −3315.1 | 69.45 | | | |
| 70 | 31.24023 | 244.92 | 23.78 | −4035.7 | −3235.4 | 70.60 | | | |
| 72 | 31.04296 | 228.21 | 22.86 | −3936.5 | −3131.2 | 72.07 | 34.98 | 52.09 | 1101. |
| 74 | 30.83962 | 213.58 | 22.03 | −3837.7 | −3027.1 | 73.49 | 34.36 | 52.04 | 1075. |
| 76 | 30.63050 | 200.71 | 21.26 | −3739.2 | −2923.1 | 74.88 | 33.72 | 51.97 | 1051. |
| 78 | 30.41596 | 189.30 | 20.55 | −3641.1 | −2819.2 | 76.23 | 33.08 | 51.89 | 1029. |
| 80 | 30.19645 | 179.13 | 19.87 | −3543.4 | −2715.5 | 77.54 | 32.48 | 51.81 | 1010. |
| 82 | 29.97243 | 169.99 | 19.22 | −3446.0 | −2611.9 | 78.82 | 31.91 | 51.74 | 992. |
| 84 | 29.74434 | 161.73 | 18.60 | −3349.0 | −2508.5 | 80.07 | 31.38 | 51.69 | 975. |
| 86 | 29.51262 | 154.20 | 18.00 | −3252.3 | −2405.2 | 81.28 | 30.90 | 51.64 | 959. |
| 88 | 29.27766 | 147.30 | 17.42 | −3155.8 | −2301.9 | 82.47 | 30.47 | 51.60 | 944. |
| 90 | 29.03981 | 140.93 | 16.85 | −3059.6 | −2198.8 | 83.63 | 30.07 | 51.58 | 929. |
| 92 | 28.79938 | 135.00 | 16.31 | −2963.7 | −2095.6 | 84.76 | 29.71 | 51.57 | 915. |
| 94 | 28.55664 | 129.46 | 15.78 | −2867.9 | −1992.5 | 85.87 | 29.39 | 51.57 | 901. |
| 96 | 28.31180 | 124.26 | 15.27 | −2772.4 | −1889.3 | 86.96 | 29.10 | 51.58 | 887. |
| 98 | 28.06505 | 119.36 | 14.78 | −2676.9 | −1786.2 | 88.02 | 28.83 | 51.60 | 873. |
| 100 | 27.81654 | 114.71 | 14.30 | −2581.7 | −1682.9 | 89.06 | 28.59 | 51.63 | 860. |
| 102 | 27.56639 | 110.30 | 13.84 | −2486.5 | −1579.6 | 90.09 | 28.37 | 51.67 | 847. |
| 104 | 27.31472 | 106.09 | 13.39 | −2391.5 | −1476.2 | 91.09 | 28.16 | 51.72 | 834. |
| 106 | 27.06160 | 102.08 | 12.95 | −2296.6 | −1372.8 | 92.08 | 27.98 | 51.77 | 821. |
| 108 | 26.80711 | 98.25 | 12.53 | −2201.7 | −1269.2 | 93.04 | 27.80 | 51.83 | 809. |
| 110 | 26.55133 | 94.59 | 12.13 | −2107.0 | −1165.4 | 94.00 | 27.64 | 51.90 | 796. |
| 112 | 26.29430 | 91.08 | 11.73 | −2012.3 | −1061.6 | 94.93 | 27.48 | 51.96 | 784. |
| 114 | 26.03609 | 87.72 | 11.35 | −1917.8 | −957.6 | 95.85 | 27.34 | 52.04 | 772. |
| 116 | 25.77676 | 84.50 | 10.98 | −1823.3 | −853.4 | 96.76 | 27.20 | 52.11 | 760. |
| 118 | 25.51638 | 81.42 | 10.62 | −1728.9 | −749.1 | 97.65 | 27.07 | 52.18 | 749. |
| 120 | 25.25499 | 78.48 | 10.27 | −1634.6 | −644.7 | 98.53 | 26.94 | 52.25 | 737. |
| 122 | 24.99267 | 75.65 | 9.94 | −1540.4 | −540.1 | 99.39 | 26.82 | 52.32 | 726. |
| 124 | 24.72950 | 72.95 | 9.61 | −1446.4 | −435.4 | 100.24 | 26.70 | 52.39 | 715. |
| 126 | 24.46554 | 70.36 | 9.30 | −1352.4 | −330.6 | 101.08 | 26.58 | 52.45 | 704. |
| 128 | 24.20088 | 67.89 | 8.99 | −1258.6 | −225.6 | 101.91 | 26.47 | 52.51 | 693. |
| 130 | 23.93561 | 65.53 | 8.70 | −1165.0 | −120.5 | 102.72 | 26.36 | 52.57 | 683. |
| 132 | 23.66980 | 63.26 | 8.42 | −1071.5 | −15.3 | 103.53 | 26.25 | 52.62 | 673. |
| 134 | 23.40357 | 61.10 | 8.14 | −978.2 | 90.0 | 104.32 | 26.14 | 52.67 | 663. |
| 136 | 23.13701 | 59.04 | 7.87 | −885.2 | 195.3 | 105.10 | 26.04 | 52.71 | 653. |
| 138 | 22.87022 | 57.07 | 7.62 | −792.3 | 300.8 | 105.87 | 25.94 | 52.74 | 644. |
| 140 | 22.60332 | 55.19 | 7.37 | −699.7 | 406.3 | 106.63 | 25.83 | 52.77 | 634. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 142 | 22.33642 | 53.40 | 7.12 | −607.4 | 511.9 | 107.38 | 25.73 | 52.79 | 625. |
| 144 | 22.06964 | 51.69 | 6.89 | −515.3 | 617.5 | 108.11 | 25.64 | 52.81 | 616. |
| 146 | 21.80311 | 50.06 | 6.67 | −423.5 | 723.1 | 108.84 | 25.54 | 52.81 | 608. |
| 148 | 21.53696 | 48.51 | 6.45 | −332.1 | 828.7 | 109.56 | 25.44 | 52.81 | 600. |
| 150 | 21.27132 | 47.04 | 6.24 | −241.0 | 934.3 | 110.27 | 25.35 | 52.80 | 591. |
| 155 | 20.61045 | 43.67 | 5.75 | −14.8 | 1198.1 | 112.00 | 25.12 | 52.72 | 572. |
| 160 | 19.95613 | 40.74 | 5.30 | 208.7 | 1461.4 | 113.67 | 24.90 | 52.58 | 554. |
| 165 | 19.31100 | 38.21 | 4.89 | 429.2 | 1723.8 | 115.29 | 24.69 | 52.36 | 538. |
| 170 | 18.67785 | 36.05 | 4.52 | 646.3 | 1984.8 | 116.84 | 24.49 | 52.05 | 523. |
| 175 | 18.05949 | 34.24 | 4.18 | 859.8 | 2244.1 | 118.35 | 24.30 | 51.65 | 510. |
| 180 | 17.45862 | 32.74 | 3.87 | 1069.2 | 2501.2 | 119.80 | 24.12 | 51.16 | 498. |
| 185 | 16.87762 | 31.53 | 3.60 | 1274.3 | 2755.6 | 121.19 | 23.95 | 50.59 | 488. |
| 190 | 16.31846 | 30.57 | 3.35 | 1475.0 | 3007.0 | 122.53 | 23.78 | 49.96 | 479. |
| 195 | 15.78259 | 29.83 | 3.13 | 1671.0 | 3255.0 | 123.82 | 23.63 | 49.27 | 471. |
| 200 | 15.27092 | 29.28 | 2.92 | 1862.5 | 3499.6 | 125.06 | 23.49 | 48.54 | 465. |
| 210 | 14.32125 | 28.65 | 2.58 | 2231.8 | 3977.4 | 127.39 | 23.22 | 47.03 | 455. |
| 220 | 13.46762 | 28.49 | 2.30 | 2583.9 | 4440.2 | 129.54 | 22.99 | 45.53 | 449. |
| 230 | 12.70360 | 28.68 | 2.07 | 2920.3 | 4888.2 | 131.54 | 22.79 | 44.10 | 445. |
| 240 | 12.02052 | 29.11 | 1.88 | 3242.7 | 5322.5 | 133.38 | 22.62 | 42.78 | 443. |
| 250 | 11.40909 | 29.72 | 1.72 | 3552.9 | 5744.2 | 135.11 | 22.47 | 41.58 | 443. |
| 260 | 10.86034 | 30.45 | 1.58 | 3852.5 | 6154.5 | 136.71 | 22.34 | 40.50 | 444. |
| 270 | 10.36611 | 31.28 | 1.47 | 4142.9 | 6554.6 | 138.22 | 22.23 | 39.55 | 446. |
| 280 | 9.91919 | 32.16 | 1.37 | 4425.4 | 6945.8 | 139.65 | 22.13 | 38.70 | 448. |
| 290 | 9.51336 | 33.10 | 1.28 | 4701.1 | 7328.9 | 140.99 | 22.05 | 37.95 | 451. |
| 300 | 9.14329 | 34.06 | 1.21 | 4970.7 | 7705.0 | 142.27 | 21.98 | 37.28 | 454. |
| 310 | 8.80444 | 35.05 | 1.14 | 5235.3 | 8074.8 | 143.48 | 21.92 | 36.69 | 458. |
| 320 | 8.49298 | 36.05 | 1.08 | 5495.3 | 8438.9 | 144.64 | 21.87 | 36.16 | 461. |
| 330 | 8.20562 | 37.06 | 1.02 | 5751.4 | 8798.1 | 145.74 | 21.82 | 35.69 | 465. |
| 340 | 7.93957 | 38.08 | 0.9756 | 6004.0 | 9152.8 | 146.80 | 21.78 | 35.27 | 469. |
| 350 | 7.69247 | 39.10 | 0.9318 | 6253.6 | 9503.6 | 147.82 | 21.75 | 34.89 | 473. |
| 360 | 7.46225 | 40.11 | 0.8920 | 6500.5 | 9850.7 | 148.79 | 21.73 | 34.55 | 477. |
| 370 | 7.24716 | 41.13 | 0.8557 | 6745.0 | 10194.7 | 149.74 | 21.70 | 34.24 | 481. |
| 380 | 7.04569 | 42.14 | 0.8223 | 6987.5 | 10535.7 | 150.65 | 21.69 | 33.97 | 485. |
| 390 | 6.85649 | 43.15 | 0.7916 | 7228.0 | 10874.2 | 151.53 | 21.68 | 33.72 | 490. |
| 400 | 6.67843 | 44.16 | 0.7632 | 7466.9 | 11210.3 | 152.38 | 21.67 | 33.50 | 494. |
| 420 | 6.35176 | 46.16 | 0.7125 | 7940.4 | 11876.3 | 154.00 | 21.66 | 33.12 | 502. |
| 440 | 6.05895 | 48.14 | 0.6685 | 8409.2 | 12535.3 | 155.53 | 21.68 | 32.80 | 510. |
| 460 | 5.79469 | 50.10 | 0.6299 | 8874.5 | 13188.8 | 156.99 | 21.70 | 32.55 | 518. |
| 480 | 5.55477 | 52.04 | 0.5957 | 9337.1 | 13837.8 | 158.37 | 21.74 | 32.35 | 526. |
| 500 | 5.33578 | 53.96 | 0.5653 | 9797.8 | 14483.1 | 159.69 | 21.79 | 32.19 | 533. |
| 520 | 5.13494 | 55.87 | 0.5379 | 10257.1 | 15125.7 | 160.95 | 21.86 | 32.07 | 541. |
| 540 | 4.94996 | 57.76 | 0.5133 | 10715.6 | 15766.1 | 162.15 | 21.93 | 31.98 | 548. |
| 560 | 4.77892 | 59.64 | 0.4909 | 11173.7 | 16405.0 | 163.32 | 22.01 | 31.92 | 556. |
| 580 | 4.62023 | 61.50 | 0.4705 | 11632.0 | 17043.0 | 164.44 | 22.10 | 31.88 | 563. |
| 600 | 4.47251 | 63.35 | 0.4518 | 12090.6 | 17680.3 | 165.52 | 22.20 | 31.86 | 570. |
| 620 | 4.33461 | 65.19 | 0.4346 | 12550.0 | 18317.5 | 166.56 | 22.30 | 31.86 | 577. |
| 640 | 4.20553 | 67.01 | 0.4187 | 13010.2 | 18954.8 | 167.57 | 22.41 | 31.87 | 583. |
| 660 | 4.08441 | 68.83 | 0.4040 | 13471.7 | 19592.5 | 168.55 | 22.52 | 31.90 | 590. |
| 680 | 3.97050 | 70.64 | 0.3904 | 13934.5 | 20231.0 | 169.51 | 22.63 | 31.94 | 597. |
| 700 | 3.86313 | 72.43 | 0.3777 | 14398.8 | 20870.2 | 170.43 | 22.75 | 31.99 | 603. |
| 720 | 3.76175 | 74.22 | 0.3658 | 14864.8 | 21510.6 | 171.33 | 22.87 | 32.05 | 609. |
| 740 | 3.66583 | 76.00 | 0.3547 | 15332.4 | 22152.2 | 172.21 | 23.00 | 32.11 | 615. |
| 760 | 3.57493 | 77.77 | 0.3443 | 15802.0 | 22795.1 | 173.07 | 23.12 | 32.18 | 622. |
| 780 | 3.48865 | 79.54 | 0.3344 | 16273.4 | 23439.5 | 173.91 | 23.24 | 32.26 | 628. |
| 800 | 3.40663 | 81.30 | 0.3252 | 16746.7 | 24085.3 | 174.73 | 23.37 | 32.33 | 634. |
| 850 | 3.21818 | 85.67 | 0.3043 | 17938.8 | 25707.2 | 176.69 | 23.67 | 32.54 | 648. |
| 900 | 3.05024 | 90.01 | 0.2860 | 19143.7 | 27339.7 | 178.56 | 23.97 | 32.76 | 663. |
| 950 | 2.89953 | 94.33 | 0.2698 | 20361.2 | 28983.3 | 180.33 | 24.26 | 32.98 | 677. |
| 1000 | 2.76345 | 98.62 | 0.2554 | 21591.2 | 30637.9 | 182.03 | 24.54 | 33.20 | 690. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1050 | 2.63990 | 102.89 | 0.2425 | 22833.3 | 32303.3 | 183.66 | 24.80 | 33.42 | 703. |
| 1100 | 2.52720 | 107.14 | 0.2309 | 24087.0 | 33979.3 | 185.22 | 25.05 | 33.62 | 716. |
| 1150 | 2.42394 | 111.38 | 0.2204 | 25351.6 | 35665.4 | 186.72 | 25.28 | 33.82 | 729. |
| 1200 | 2.32895 | 115.61 | 0.2108 | 26626.8 | 37361.2 | 188.16 | 25.50 | 34.01 | 742. |
| | | | | 300 bar Isobar | | | | | |
| * 69.493 | 31.48354 | 265.30 | 23.67 | −4088.1 | −3135.2 | 69.75 | | | |
| 70 | 31.43812 | 260.58 | 23.45 | −4063.4 | −3109.2 | 70.12 | | | |
| 72 | 31.25505 | 243.47 | 22.66 | −3966.4 | −3006.5 | 71.57 | 35.77 | 51.31 | 1117. |
| 74 | 31.06593 | 228.47 | 21.94 | −3869.7 | −2904.0 | 72.98 | 35.08 | 51.23 | 1091. |
| 76 | 30.87101 | 215.24 | 21.28 | −3773.4 | −2801.6 | 74.34 | 34.37 | 51.15 | 1069. |
| 78 | 30.67064 | 203.52 | 20.65 | −3677.5 | −2699.4 | 75.67 | 33.69 | 51.07 | 1049. |
| 80 | 30.46524 | 193.07 | 20.06 | −3582.0 | −2597.3 | 76.96 | 33.03 | 50.99 | 1031. |
| 82 | 30.25529 | 183.69 | 19.48 | −3487.0 | −2495.4 | 78.22 | 32.42 | 50.92 | 1015. |
| 84 | 30.04125 | 175.23 | 18.92 | −3392.2 | −2393.6 | 79.44 | 31.86 | 50.87 | 999. |
| 86 | 29.82358 | 167.53 | 18.37 | −3297.8 | −2291.9 | 80.64 | 31.34 | 50.83 | 985. |
| 88 | 29.60271 | 160.48 | 17.84 | −3203.7 | −2190.3 | 81.81 | 30.88 | 50.79 | 971. |
| 90 | 29.37905 | 154.00 | 17.32 | −3109.9 | −2088.7 | 82.95 | 30.45 | 50.77 | 957. |
| 92 | 29.15294 | 147.98 | 16.81 | −3016.3 | −1987.2 | 84.07 | 30.07 | 50.75 | 944. |
| 94 | 28.92470 | 142.38 | 16.32 | −2922.9 | −1885.7 | 85.16 | 29.72 | 50.74 | 931. |
| 96 | 28.69459 | 137.12 | 15.83 | −2829.8 | −1784.3 | 86.23 | 29.41 | 50.73 | 919. |
| 98 | 28.46285 | 132.17 | 15.36 | −2736.8 | −1682.8 | 87.27 | 29.13 | 50.73 | 907. |
| 100 | 28.22968 | 127.50 | 14.91 | −2644.1 | −1581.3 | 88.30 | 28.87 | 50.74 | 894. |
| 102 | 27.99523 | 123.06 | 14.46 | −2551.5 | −1479.9 | 89.30 | 28.63 | 50.75 | 882. |
| 104 | 27.75965 | 118.83 | 14.03 | −2459.0 | −1378.3 | 90.29 | 28.42 | 50.77 | 871. |
| 106 | 27.52305 | 114.80 | 13.61 | −2366.8 | −1276.8 | 91.25 | 28.22 | 50.79 | 859. |
| 108 | 27.28554 | 110.95 | 13.20 | −2274.7 | −1175.2 | 92.20 | 28.03 | 50.81 | 847. |
| 110 | 27.04722 | 107.26 | 12.80 | −2182.7 | −1073.5 | 93.14 | 27.86 | 50.84 | 836. |
| 112 | 26.80815 | 103.73 | 12.42 | −2090.9 | −971.8 | 94.05 | 27.70 | 50.86 | 825. |
| 114 | 26.56841 | 100.34 | 12.04 | −1999.2 | −870.1 | 94.95 | 27.55 | 50.89 | 813. |
| 116 | 26.32808 | 97.09 | 11.68 | −1907.7 | −768.3 | 95.84 | 27.40 | 50.92 | 803. |
| 118 | 26.08723 | 93.98 | 11.33 | −1816.4 | −666.4 | 96.71 | 27.26 | 50.94 | 792. |
| 120 | 25.84591 | 90.98 | 10.99 | −1725.2 | −564.5 | 97.57 | 27.13 | 50.97 | 781. |
| 122 | 25.60420 | 88.11 | 10.66 | −1634.2 | −462.5 | 98.41 | 27.01 | 50.99 | 771. |
| 124 | 25.36216 | 85.36 | 10.34 | −1543.4 | −360.5 | 99.24 | 26.88 | 51.01 | 760. |
| 126 | 25.11988 | 82.72 | 10.03 | −1452.8 | −258.5 | 100.05 | 26.76 | 51.02 | 750. |
| 128 | 24.87741 | 80.19 | 9.72 | −1362.3 | −156.4 | 100.86 | 26.65 | 51.04 | 740. |
| 130 | 24.63484 | 77.76 | 9.43 | −1272.1 | −54.4 | 101.65 | 26.53 | 51.04 | 731. |
| 132 | 24.39225 | 75.44 | 9.15 | −1182.2 | 47.7 | 102.43 | 26.42 | 51.04 | 721. |
| 134 | 24.14971 | 73.21 | 8.88 | −1092.4 | 149.8 | 103.20 | 26.32 | 51.04 | 712. |
| 136 | 23.90732 | 71.07 | 8.61 | −1003.0 | 251.9 | 103.95 | 26.21 | 51.03 | 703. |
| 138 | 23.66514 | 69.03 | 8.35 | −913.7 | 353.9 | 104.70 | 26.11 | 51.02 | 694. |
| 140 | 23.42328 | 67.08 | 8.11 | −824.8 | 456.0 | 105.43 | 26.00 | 51.00 | 685. |
| 142 | 23.18182 | 65.21 | 7.87 | −736.2 | 557.9 | 106.15 | 25.90 | 50.97 | 677. |
| 144 | 22.94085 | 63.42 | 7.63 | −647.9 | 659.8 | 106.87 | 25.80 | 50.94 | 669. |
| 146 | 22.70046 | 61.71 | 7.41 | −559.9 | 761.7 | 107.57 | 25.71 | 50.90 | 660. |
| 148 | 22.46075 | 60.08 | 7.19 | −472.2 | 863.4 | 108.26 | 25.61 | 50.85 | 653. |
| 150 | 22.22180 | 58.52 | 6.98 | 385.0 | 965.1 | 108.94 | 25.52 | 50.80 | 645. |
| 155 | 21.62843 | 54.92 | 6.48 | −168.4 | 1218.7 | 110.61 | 25.29 | 50.64 | 627. |
| 160 | 21.04199 | 51.73 | 6.03 | 45.7 | 1471.4 | 112.21 | 25.07 | 50.44 | 610. |
| 165 | 20.46401 | 48.92 | 5.61 | 257.0 | 1723.0 | 113.76 | 24.86 | 50.19 | 594. |
| 170 | 19.89606 | 46.45 | 5.23 | 465.4 | 1973.2 | 115.25 | 24.66 | 49.90 | 579. |
| 175 | 19.33968 | 44.30 | 4.87 | 670.7 | 2221.9 | 116.69 | 24.46 | 49.56 | 566. |
| 180 | 18.79634 | 42.45 | 4.55 | 872.7 | 2468.7 | 118.09 | 24.28 | 49.17 | 554. |
| 185 | 18.26741 | 40.87 | 4.26 | 1071.2 | 2713.5 | 119.43 | 24.11 | 48.74 | 543. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 190 | 17.75410 | 39.53 | 3.99 | 1266.3 | 2956.1 | 120.72 | 23.95 | 48.27 | 533. |
| 195 | 17.25742 | 38.41 | 3.75 | 1457.8 | 3196.2 | 121.97 | 23.80 | 47.77 | 525. |
| 200 | 16.77813 | 37.49 | 3.53 | 1645.6 | 3433.7 | 123.17 | 23.66 | 47.23 | 517. |
| 210 | 15.87361 | 36.17 | 3.14 | 2010.5 | 3900.5 | 125.45 | 23.40 | 46.12 | 504. |
| 220 | 15.04188 | 35.40 | 2.82 | 2361.5 | 4355.9 | 127.57 | 23.17 | 44.97 | 495. |
| 230 | 14.28112 | 35.05 | 2.55 | 2699.2 | 4799.9 | 129.54 | 22.97 | 43.84 | 489. |
| 240 | 13.58733 | 35.03 | 2.32 | 3024.8 | 5232.8 | 131.38 | 22.80 | 42.75 | 484. |
| 250 | 12.95529 | 35.24 | 2.13 | 3339.5 | 5655.2 | 133.11 | 22.65 | 41.74 | 482. |
| 260 | 12.37931 | 35.64 | 1.96 | 3644.4 | 6067.8 | 134.73 | 22.52 | 40.80 | 480. |
| 270 | 11.85371 | 36.19 | 1.82 | 3940.6 | 6471.5 | 136.25 | 22.40 | 39.94 | 480. |
| 280 | 11.37311 | 36.84 | 1.69 | 4229.1 | 6866.9 | 137.69 | 22.30 | 39.16 | 481. |
| 290 | 10.93256 | 37.57 | 1.59 | 4510.8 | 7254.9 | 139.05 | 22.22 | 38.45 | 482. |
| 300 | 10.52763 | 38.36 | 1.49 | 4786.5 | 7636.2 | 140.34 | 22.14 | 37.81 | 484. |
| 310 | 10.15437 | 39.20 | 1.41 | 5057.0 | 8011.4 | 141.57 | 22.07 | 37.23 | 486. |
| 320 | 9.80931 | 40.08 | 1.33 | 5322.7 | 8381.0 | 142.75 | 22.02 | 36.71 | 488. |
| 330 | 9.48941 | 40.99 | 1.26 | 5584.3 | 8745.7 | 143.87 | 21.97 | 36.24 | 491. |
| 340 | 9.19202 | 41.91 | 1.20 | 5842.2 | 9105.9 | 144.94 | 21.92 | 35.81 | 494. |
| 350 | 8.91482 | 42.85 | 1.15 | 6096.8 | 9462.0 | 145.98 | 21.89 | 35.42 | 498. |
| 360 | 8.65578 | 43.80 | 1.10 | 6348.5 | 9814.4 | 146.97 | 21.86 | 35.07 | 501. |
| 370 | 8.41312 | 44.76 | 1.05 | 6597.7 | 10163.5 | 147.93 | 21.83 | 34.75 | 504. |
| 380 | 8.18529 | 45.72 | 1.01 | 6844.5 | 10509.6 | 148.85 | 21.81 | 34.46 | 508. |
| 390 | 7.97092 | 46.69 | 0.9715 | 7089.2 | 10852.9 | 149.74 | 21.79 | 34.20 | 511. |
| 400 | 7.76879 | 47.66 | 0.9359 | 7332.1 | 11193.7 | 150.60 | 21.78 | 33.96 | 515. |
| 420 | 7.39714 | 49.60 | 0.8724 | 7813.1 | 11868.7 | 152.25 | 21.77 | 33.55 | 522. |
| 440 | 7.06314 | 51.54 | 0.8173 | 8288.8 | 12536.2 | 153.80 | 21.78 | 33.21 | 530. |
| 460 | 6.76108 | 53.46 | 0.7691 | 8760.5 | 13197.6 | 155.27 | 21.80 | 32.94 | 537. |
| 480 | 6.48636 | 55.38 | 0.7265 | 9228.9 | 13854.0 | 156.67 | 21.84 | 32.71 | 544. |
| 500 | 6.23523 | 57.29 | 0.6886 | 9694.9 | 14506.3 | 158.00 | 21.88 | 32.53 | 551. |
| 520 | 6.00461 | 59.18 | 0.6547 | 10159.3 | 15155.4 | 159.27 | 21.94 | 32.39 | 558. |
| 540 | 5.79197 | 61.06 | 0.6241 | 10622.4 | 15802.0 | 160.49 | 22.01 | 32.28 | 565. |
| 560 | 5.59516 | 62.93 | 0.5964 | 11085.0 | 16446.7 | 161.67 | 22.09 | 32.20 | 572. |
| 580 | 5.41238 | 64.79 | 0.5711 | 11547.3 | 17090.1 | 162.80 | 22.18 | 32.14 | 579. |
| 600 | 5.24211 | 66.64 | 0.5480 | 12009.7 | 17732.6 | 163.88 | 22.27 | 32.11 | 586. |
| 620 | 5.08304 | 68.48 | 0.5268 | 12472.6 | 18374.6 | 164.94 | 22.37 | 32.10 | 592. |
| 640 | 4.93403 | 70.30 | 0.5073 | 12936.3 | 19016.5 | 165.96 | 22.47 | 32.10 | 599. |
| 660 | 4.79412 | 72.12 | 0.4892 | 13400.9 | 19658.6 | 166.94 | 22.58 | 32.11 | 605. |
| 680 | 4.66245 | 73.93 | 0.4724 | 13866.8 | 20301.1 | 167.90 | 22.70 | 32.14 | 611. |
| 700 | 4.53828 | 75.73 | 0.4568 | 14333.9 | 20944.3 | 168.84 | 22.81 | 32.18 | 617. |
| 720 | 4.42096 | 77.52 | 0.4422 | 14802.5 | 21588.4 | 169.74 | 22.93 | 32.23 | 624. |
| 740 | 4.30991 | 79.30 | 0.4286 | 15272.8 | 22233.5 | 170.63 | 23.05 | 32.28 | 630. |
| 760 | 4.20461 | 81.08 | 0.4158 | 15744.7 | 22879.8 | 171.49 | 23.18 | 32.34 | 636. |
| 780 | 4.10461 | 82.85 | 0.4038 | 16218.4 | 23527.3 | 172.33 | 23.30 | 32.41 | 641. |
| 800 | 4.00950 | 84.61 | 0.3925 | 16694.0 | 24176.2 | 173.15 | 23.42 | 32.48 | 647. |
| 850 | 3.79082 | 89.00 | 0.3670 | 17891.2 | 25805.0 | 175.13 | 23.72 | 32.67 | 661. |
| 900 | 3.59573 | 93.35 | 0.3447 | 19100.6 | 27443.8 | 177.00 | 24.02 | 32.88 | 675. |
| 950 | 3.42047 | 97.67 | 0.3250 | 20322.2 | 29092.9 | 178.78 | 24.30 | 33.09 | 689. |
| 1000 | 3.26207 | 101.97 | 0.3075 | 21555.9 | 30752.5 | 180.48 | 24.58 | 33.30 | 702. |
| 1050 | 3.11814 | 106.24 | 0.2919 | 22801.3 | 32422.4 | 182.11 | 24.84 | 33.50 | 715. |
| 1100 | 2.98672 | 110.50 | 0.2778 | 24058.0 | 34102.4 | 183.68 | 25.08 | 33.70 | 728. |
| 1150 | 2.86622 | 114.75 | 0.2651 | 25325.4 | 35792.2 | 185.18 | 25.32 | 33.89 | 740. |
| 1200 | 2.75528 | 118.98 | 0.2535 | 26603.1 | 37491.3 | 186.63 | 25.53 | 34.07 | 753. |
| | | | | 350 bar Isobar | | | | | |
| * 70.506 | 31.58195 | 271.65 | 22.91 | −4063.7 | −2955.5 | 70.05 | | | |
| 72 | 31.45422 | 258.78 | 22.42 | −3992.7 | −2879.9 | 71.11 | 36.43 | 50.56 | 1132. |
| 74 | 31.27794 | 243.38 | 21.81 | −3897.9 | −2778.9 | 72.50 | 35.68 | 50.47 | 1109. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 31.09579 | 229.78 | 21.25 | −3803.6 | −2678.1 | 73.84 | 34.92 | 50.37 | 1088. |
| 78 | 30.90812 | 217.71 | 20.72 | −3709.8 | −2577.4 | 75.15 | 34.19 | 50.29 | 1069. |
| 80 | 30.71533 | 206.95 | 20.20 | −3616.4 | −2476.9 | 76.42 | 33.50 | 50.21 | 1052. |
| 82 | 30.51787 | 197.29 | 19.69 | −3523.4 | −2376.5 | 77.66 | 32.85 | 50.16 | 1037. |
| 84 | 30.31623 | 188.58 | 19.20 | −3430.8 | −2276.3 | 78.87 | 32.26 | 50.11 | 1023. |
| 86 | 30.11088 | 180.68 | 18.70 | −3338.5 | −2176.1 | 80.05 | 31.71 | 50.08 | 1009. |
| 88 | 29.90229 | 173.46 | 18.22 | −3246.4 | −2076.0 | 81.20 | 31.22 | 50.05 | 996. |
| 90 | 29.69088 | 166.82 | 17.74 | −3154.7 | −1975.9 | 82.32 | 30.78 | 50.04 | 984. |
| 92 | 29.47705 | 160.69 | 17.27 | −3063.2 | −1875.8 | 83.42 | 30.37 | 50.02 | 972. |
| 94 | 29.26114 | 154.99 | 16.80 | −2971.9 | −1775.8 | 84.50 | 30.01 | 50.01 | 960. |
| 96 | 29.04346 | 149.66 | 16.35 | −2880.9 | −1675.8 | 85.55 | 29.68 | 50.00 | 949. |
| 98 | 28.82427 | 144.65 | 15.90 | −2790.0 | −1575.8 | 86.58 | 29.38 | 50.00 | 937. |
| 100 | 28.60382 | 139.92 | 15.46 | −2699.4 | −1475.8 | 87.59 | 29.11 | 50.00 | 926. |
| 102 | 28.38229 | 135.44 | 15.03 | −2608.9 | −1375.8 | 88.58 | 28.87 | 50.00 | 915. |
| 104 | 28.15986 | 131.18 | 14.62 | −2518.7 | −1275.8 | 89.55 | 28.64 | 50.00 | 904. |
| 106 | 27.93667 | 127.12 | 14.21 | −2428.6 | −1175.8 | 90.51 | 28.43 | 50.00 | 893. |
| 108 | 27.71284 | 123.24 | 13.81 | −2338.7 | −1075.8 | 91.44 | 28.24 | 50.00 | 883. |
| 110 | 27.48847 | 119.52 | 13.42 | −2249.0 | −975.8 | 92.36 | 28.06 | 50.00 | 872. |
| 112 | 27.26368 | 115.96 | 13.04 | −2159.5 | −875.8 | 93.26 | 27.89 | 50.01 | 861. |
| 114 | 27.03853 | 112.54 | 12.68 | −2070.2 | −775.7 | 94.14 | 27.74 | 50.01 | 851. |
| 116 | 26.81310 | 109.26 | 12.32 | −1981.1 | −675.7 | 95.01 | 27.59 | 50.01 | 841. |
| 118 | 26.58748 | 106.11 | 11.97 | −1892.1 | −575.7 | 95.87 | 27.45 | 50.01 | 831. |
| 120 | 26.36171 | 103.08 | 11.64 | −1803.4 | −475.7 | 96.71 | 27.31 | 50.00 | 821. |
| 122 | 26.13588 | 100.16 | 11.31 | −1714.9 | −375.7 | 97.54 | 27.18 | 49.99 | 811. |
| 124 | 25.91005 | 97.36 | 10.99 | −1626.6 | −275.7 | 98.35 | 27.06 | 49.98 | 801. |
| 126 | 25.68427 | 94.67 | 10.68 | −1538.5 | −175.8 | 99.15 | 26.94 | 49.97 | 792. |
| 128 | 25.45862 | 92.08 | 10.39 | −1450.6 | −75.9 | 99.93 | 26.82 | 49.95 | 782. |
| 130 | 25.23316 | 89.59 | 10.09 | −1363.0 | 24.0 | 100.71 | 26.71 | 49.93 | 773. |
| 132 | 25.00795 | 87.21 | 9.81 | −1275.7 | 123.9 | 101.47 | 26.60 | 49.90 | 764. |
| 134 | 24.78306 | 84.91 | 9.54 | −1188.6 | 223.6 | 102.22 | 26.49 | 49.87 | 755. |
| 136 | 24.55857 | 82.71 | 9.28 | −1101.8 | 323.3 | 102.96 | 26.38 | 49.84 | 747. |
| 138 | 24.33453 | 80.60 | 9.02 | −1015.3 | 423.0 | 103.69 | 26.28 | 49.80 | 738. |
| 140 | 24.11101 | 78.58 | 8.77 | −929.1 | 522.5 | 104.40 | 26.18 | 49.75 | 730. |
| 142 | 23.88809 | 76.63 | 8.53 | −843.2 | 622.0 | 105.11 | 26.07 | 49.70 | 722. |
| 144 | 23.66584 | 74.77 | 8.30 | −757.6 | 721.3 | 105.80 | 25.98 | 49.64 | 714. |
| 146 | 23.44432 | 72.98 | 8.07 | −672.4 | 820.5 | 106.49 | 25.88 | 49.58 | 706. |
| 148 | 23.22361 | 71.27 | 7.85 | −587.5 | 919.6 | 107.16 | 25.78 | 49.51 | 699. |
| 150 | 23.00377 | 69.63 | 7.64 | −502.9 | 1018.6 | 107.83 | 25.69 | 49.44 | 692. |
| 155 | 22.45847 | 65.83 | 7.14 | −293.2 | 1265.3 | 109.44 | 25.46 | 49.24 | 674. |
| 160 | 21.92014 | 62.43 | 6.67 | −85.8 | 1510.9 | 111.00 | 25.24 | 49.00 | 658. |
| 165 | 21.38983 | 59.39 | 6.25 | 118.9 | 1755.2 | 112.51 | 25.04 | 48.74 | 642. |
| 170 | 20.86855 | 56.69 | 5.85 | 321.0 | 1998.2 | 113.96 | 24.84 | 48.44 | 628. |
| 175 | 20.35726 | 54.28 | 5.49 | 520.3 | 2239.6 | 115.36 | 24.65 | 48.12 | 615. |
| 180 | 19.85687 | 52.17 | 5.16 | 716.7 | 2479.4 | 116.71 | 24.47 | 47.77 | 603. |
| 185 | 19.36822 | 50.31 | 4.85 | 910.2 | 2717.3 | 118.01 | 24.30 | 47.40 | 592. |
| 190 | 18.89204 | 48.68 | 4.57 | 1100.7 | 2953.3 | 119.27 | 24.14 | 47.01 | 582. |
| 195 | 18.42899 | 47.28 | 4.31 | 1288.2 | 3187.4 | 120.49 | 23.98 | 46.59 | 573. |
| 200 | 17.97958 | 46.07 | 4.08 | 1472.6 | 3419.2 | 121.66 | 23.84 | 46.16 | 564. |
| 210 | 17.12318 | 44.18 | 3.66 | 1832.3 | 3876.4 | 123.89 | 23.58 | 45.26 | 550. |
| 220 | 16.32446 | 42.88 | 3.30 | 2180.3 | 4324.3 | 125.98 | 23.35 | 44.33 | 539. |
| 230 | 15.58314 | 42.04 | 3.00 | 2516.9 | 4762.9 | 127.93 | 23.15 | 43.40 | 530. |
| 240 | 14.89735 | 41.58 | 2.74 | 2843.0 | 5192.4 | 129.75 | 22.98 | 42.50 | 524. |
| 250 | 14.26415 | 41.41 | 2.52 | 3159.4 | 5613.1 | 131.47 | 22.82 | 41.64 | 519. |
| 260 | 13.67993 | 41.48 | 2.33 | 3466.8 | 6025.3 | 133.09 | 22.69 | 40.82 | 516. |
| 270 | 13.14084 | 41.73 | 2.16 | 3766.3 | 6429.7 | 134.61 | 22.57 | 40.06 | 514. |
| 280 | 12.64296 | 42.12 | 2.02 | 4058.4 | 6826.8 | 136.06 | 22.46 | 39.36 | 513. |
| 290 | 12.18254 | 42.63 | 1.89 | 4344.1 | 7217.1 | 137.43 | 22.37 | 38.71 | 513. |
| 300 | 11.75605 | 43.22 | 1.77 | 4623.9 | 7601.1 | 138.73 | 22.29 | 38.11 | 514. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 310 | 11.36023 | 43.89 | 1.67 | 4898.5 | 7979.4 | 139.97 | 22.22 | 37.56 | 515. |
| 320 | 10.99213 | 44.62 | 1.58 | 5168.4 | 8352.5 | 141.16 | 22.16 | 37.06 | 516. |
| 330 | 10.64908 | 45.39 | 1.50 | 5434.2 | 8720.8 | 142.29 | 22.10 | 36.60 | 518. |
| 340 | 10.32871 | 46.21 | 1.43 | 5696.2 | 9084.8 | 143.38 | 22.06 | 36.19 | 520. |
| 350 | 10.02887 | 47.04 | 1.37 | 5954.8 | 9444.7 | 144.42 | 22.01 | 35.80 | 523. |
| 360 | 9.74768 | 47.91 | 1.31 | 6210.3 | 9800.9 | 145.42 | 21.98 | 35.45 | 525. |
| 370 | 9.48345 | 48.79 | 1.25 | 6463.2 | 10153.8 | 146.39 | 21.95 | 35.13 | 528. |
| 380 | 9.23467 | 49.68 | 1.20 | 6713.6 | 10503.7 | 147.32 | 21.93 | 34.84 | 531. |
| 390 | 9.00000 | 50.59 | 1.15 | 6961.9 | 10850.7 | 148.22 | 21.91 | 34.57 | 534. |
| 400 | 8.77824 | 51.51 | 1.11 | 7208.1 | 11195.2 | 149.10 | 21.89 | 34.33 | 537. |
| 420 | 8.36931 | 53.36 | 1.03 | 7695.5 | 11877.4 | 150.76 | 21.88 | 33.90 | 543. |
| 440 | 8.00061 | 55.22 | 0.9682 | 8177.2 | 12551.8 | 152.33 | 21.88 | 33.55 | 550. |
| 460 | 7.66626 | 57.09 | 0.9102 | 8654.3 | 13219.8 | 153.81 | 21.90 | 33.25 | 556. |
| 480 | 7.36147 | 58.97 | 0.8591 | 9127.9 | 13882.4 | 155.22 | 21.93 | 33.01 | 563. |
| 500 | 7.08231 | 60.84 | 0.8136 | 9598.7 | 14540.6 | 156.57 | 21.97 | 32.82 | 570. |
| 520 | 6.82552 | 62.70 | 0.7729 | 10067.5 | 15195.3 | 157.85 | 22.02 | 32.66 | 576. |
| 540 | 6.58839 | 64.56 | 0.7363 | 10534.8 | 15847.2 | 159.08 | 22.09 | 32.54 | 583. |
| 560 | 6.36863 | 66.41 | 0.7031 | 11001.3 | 16497.0 | 160.26 | 22.17 | 32.44 | 589. |
| 580 | 6.16431 | 68.26 | 0.6729 | 11467.3 | 17145.1 | 161.40 | 22.25 | 32.38 | 595. |
| 600 | 5.97376 | 70.09 | 0.6454 | 11933.2 | 17792.2 | 162.50 | 22.34 | 32.33 | 602. |
| 620 | 5.79557 | 71.92 | 0.6201 | 12399.4 | 18438.5 | 163.56 | 22.44 | 32.31 | 608. |
| 640 | 5.62851 | 73.74 | 0.5968 | 12866.1 | 19084.5 | 164.58 | 22.54 | 32.30 | 614. |
| 660 | 5.47152 | 75.55 | 0.5752 | 13333.7 | 19730.5 | 165.58 | 22.65 | 32.30 | 620. |
| 680 | 5.32367 | 77.35 | 0.5552 | 13802.3 | 20376.7 | 166.54 | 22.76 | 32.32 | 626. |
| 700 | 5.18414 | 79.15 | 0.5367 | 14272.1 | 21023.4 | 167.48 | 22.87 | 32.35 | 632. |
| 720 | 5.05222 | 80.94 | 0.5194 | 14743.2 | 21670.8 | 168.39 | 22.99 | 32.39 | 638. |
| 740 | 4.92727 | 82.72 | 0.5032 | 15215.8 | 22319.1 | 169.28 | 23.11 | 32.44 | 644. |
| 760 | 4.80872 | 84.49 | 0.4880 | 15690.0 | 22968.5 | 170.14 | 23.23 | 32.49 | 650. |
| 780 | 4.69607 | 86.26 | 0.4738 | 16165.9 | 23618.9 | 170.99 | 23.35 | 32.55 | 655. |
| 800 | 4.58888 | 88.03 | 0.4604 | 16643.5 | 24270.6 | 171.81 | 23.47 | 32.62 | 661. |
| 850 | 4.34219 | 92.41 | 0.4301 | 17845.4 | 25905.9 | 173.80 | 23.77 | 32.80 | 675. |
| 900 | 4.12185 | 96.76 | 0.4038 | 19059.1 | 27550.4 | 175.68 | 24.06 | 32.99 | 688. |
| 950 | 3.92369 | 101.08 | 0.3805 | 20284.5 | 29204.7 | 177.46 | 24.35 | 33.19 | 701. |
| 1000 | 3.74442 | 105.38 | 0.3599 | 21521.7 | 30868.9 | 179.17 | 24.62 | 33.38 | 714. |
| 1050 | 3.58136 | 109.66 | 0.3415 | 22770.3 | 32543.1 | 180.81 | 24.87 | 33.58 | 727. |
| 1100 | 3.43236 | 113.92 | 0.3249 | 24029.9 | 34226.9 | 182.37 | 25.12 | 33.77 | 739. |
| 1150 | 3.29561 | 118.17 | 0.3099 | 25300.0 | 35920.2 | 183.88 | 25.35 | 33.96 | 752. |
| 1200 | 3.16962 | 122.40 | 0.2963 | 26580.1 | 37622.5 | 185.33 | 25.56 | 34.13 | 764. |
| | | | | 400 bar Isobar | | | | | |
| * 71.508 | 31.68151 | 278.36 | 22.28 | −4038.8 | −2776.3 | 70.35 | | | |
| 72 | 31.64192 | 274.16 | 22.15 | −4015.9 | −2751.7 | 70.69 | 36.98 | 49.85 | 1149. |
| 74 | 31.47732 | 258.34 | 21.65 | −3922.9 | −2652.1 | 72.06 | 36.18 | 49.73 | 1126. |
| 76 | 31.30678 | 244.35 | 21.19 | −3830.5 | −2552.8 | 73.38 | 35.38 | 49.63 | 1106. |
| 78 | 31.13061 | 231.91 | 20.74 | −3738.5 | −2453.6 | 74.67 | 34.61 | 49.54 | 1089. |
| 80 | 30.94919 | 220.80 | 20.30 | −3647.1 | −2354.6 | 75.92 | 33.88 | 49.47 | 1073. |
| 82 | 30.76297 | 210.84 | 19.87 | −3556.0 | −2255.7 | 77.14 | 33.20 | 49.43 | 1058. |
| 84 | 30.57244 | 201.86 | 19.43 | −3465.3 | −2156.9 | 78.34 | 32.58 | 49.39 | 1045. |
| 86 | 30.37808 | 193.71 | 18.99 | −3374.9 | −2058.1 | 79.50 | 32.02 | 49.38 | 1033. |
| 88 | 30.18037 | 186.28 | 18.56 | −3284.8 | −1959.4 | 80.63 | 31.51 | 49.37 | 1021. |
| 90 | 29.97976 | 179.47 | 18.12 | −3194.9 | −1860.7 | 81.74 | 31.04 | 49.36 | 1009. |
| 92 | 29.77666 | 173.19 | 17.68 | −3105.3 | −1761.9 | 82.83 | 30.63 | 49.36 | 998. |
| 94 | 29.57147 | 167.37 | 17.25 | −3015.9 | −1663.2 | 83.89 | 30.25 | 49.36 | 987. |
| 96 | 29.36452 | 161.93 | 16.82 | −2926.7 | −1564.5 | 84.93 | 29.91 | 49.36 | 977. |
| 98 | 29.15610 | 156.84 | 16.39 | −2837.7 | −1465.8 | 85.95 | 29.60 | 49.36 | 966. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 100 | 28.94648 | 152.04 | 15.98 | −2748.9 | −1367.1 | 86.94 | 29.32 | 49.36 | 956. |
| 102 | 28.73588 | 147.51 | 15.56 | −2660.3 | −1268.3 | 87.92 | 29.07 | 49.35 | 945. |
| 104 | 28.52449 | 143.20 | 15.16 | −2571.9 | −1169.6 | 88.88 | 28.84 | 49.35 | 935. |
| 106 | 28.31249 | 139.10 | 14.76 | −2483.8 | −1071.0 | 89.82 | 28.62 | 49.34 | 925. |
| 108 | 28.10001 | 135.18 | 14.37 | −2395.8 | −972.3 | 90.74 | 28.43 | 49.33 | 915. |
| 110 | 27.88717 | 131.43 | 14.00 | −2308.0 | −873.6 | 91.65 | 28.24 | 49.32 | 905. |
| 112 | 27.67408 | 127.84 | 13.63 | −2220.4 | −775.0 | 92.53 | 28.07 | 49.31 | 895. |
| 114 | 27.46084 | 124.39 | 13.27 | −2133.0 | −676.4 | 93.41 | 27.91 | 49.30 | 886. |
| 116 | 27.24753 | 121.07 | 12.91 | −2045.8 | −577.8 | 94.26 | 27.76 | 49.28 | 876. |
| 118 | 27.03422 | 117.89 | 12.57 | −1958.8 | −479.2 | 95.11 | 27.62 | 49.26 | 866. |
| 120 | 26.82099 | 114.82 | 12.24 | −1872.1 | −380.7 | 95.93 | 27.48 | 49.24 | 857. |
| 122 | 26.60789 | 111.86 | 11.91 | −1785.6 | −282.3 | 96.75 | 27.35 | 49.22 | 848. |
| 124 | 26.39499 | 109.02 | 11.60 | −1699.3 | −183.9 | 97.55 | 27.23 | 49.19 | 839. |
| 126 | 26.18234 | 106.28 | 11.29 | −1613.3 | −85.5 | 98.33 | 27.11 | 49.16 | 829. |
| 128 | 25.97001 | 103.64 | 10.99 | −1527.5 | 12.8 | 99.11 | 26.99 | 49.12 | 821. |
| 130 | 25.75805 | 101.10 | 10.70 | −1441.9 | 111.0 | 99.87 | 26.87 | 49.08 | 812. |
| 132 | 25.54651 | 98.66 | 10.42 | −1356.7 | 209.1 | 100.62 | 26.76 | 49.04 | 803. |
| 134 | 25.33546 | 96.31 | 10.15 | −1271.7 | 307.1 | 101.36 | 26.66 | 48.99 | 795. |
| 136 | 25.12494 | 94.04 | 9.89 | −1187.0 | 405.0 | 102.08 | 26.55 | 48.94 | 787. |
| 138 | 24.91501 | 91.87 | 9.63 | −1102.6 | 502.9 | 102.80 | 26.45 | 48.88 | 779. |
| 140 | 24.70573 | 89.77 | 9.38 | −1018.5 | 600.6 | 103.50 | 26.35 | 48.82 | 771. |
| 142 | 24.49715 | 87.76 | 9.14 | −934.7 | 698.1 | 104.19 | 26.25 | 48.75 | 763. |
| 144 | 24.28933 | 85.83 | 8.90 | −851.2 | 795.6 | 104.87 | 26.15 | 48.68 | 755. |
| 146 | 24.08231 | 83.97 | 8.67 | −768.1 | 892.9 | 105.54 | 26.05 | 48.61 | 748. |
| 148 | 23.87616 | 82.19 | 8.45 | −685.3 | 990.0 | 106.20 | 25.96 | 48.53 | 741. |
| 150 | 23.67094 | 80.48 | 8.24 | −602.9 | 1087.0 | 106.85 | 25.87 | 48.45 | 734. |
| 155 | 23.16223 | 76.49 | 7.73 | −398.3 | 1328.6 | 108.44 | 25.64 | 48.22 | 717. |
| 160 | 22.66040 | 72.89 | 7.26 | −196.1 | 1569.1 | 109.97 | 25.42 | 47.97 | 701. |
| 165 | 22.16620 | 69.65 | 6.83 | 3.7 | 1808.3 | 111.44 | 25.22 | 47.69 | 686. |
| 170 | 21.68036 | 66.74 | 6.43 | 201.0 | 2046.0 | 112.86 | 25.02 | 47.40 | 672. |
| 175 | 21.20353 | 64.13 | 6.06 | 395.8 | 2282.3 | 114.23 | 24.83 | 47.09 | 659. |
| 180 | 20.73633 | 61.80 | 5.71 | 587.9 | 2516.9 | 115.55 | 24.65 | 46.76 | 647. |
| 185 | 20.27929 | 59.71 | 5.40 | 777.4 | 2749.8 | 116.83 | 24.48 | 46.42 | 636. |
| 190 | 19.83290 | 57.86 | 5.10 | 964.2 | 2981.0 | 118.06 | 24.32 | 46.06 | 625. |
| 195 | 19.39757 | 56.23 | 4.83 | 1148.3 | 3210.4 | 119.25 | 24.17 | 45.69 | 616. |
| 200 | 18.97366 | 54.79 | 4.58 | 1329.7 | 3437.9 | 120.40 | 24.03 | 45.31 | 607. |
| 210 | 18.16107 | 52.43 | 4.14 | 1684.6 | 3887.1 | 122.59 | 23.77 | 44.53 | 592. |
| 220 | 17.39635 | 50.67 | 3.75 | 2029.2 | 4328.5 | 124.65 | 23.53 | 43.74 | 580. |
| 230 | 16.67956 | 49.41 | 3.42 | 2363.8 | 4762.0 | 126.57 | 23.33 | 42.95 | 570. |
| 240 | 16.00970 | 48.55 | 3.14 | 2689.1 | 5187.6 | 128.39 | 23.15 | 42.18 | 562. |
| 250 | 15.38500 | 48.03 | 2.90 | 3005.7 | 5605.6 | 130.09 | 22.99 | 41.43 | 556. |
| 260 | 14.80308 | 47.77 | 2.68 | 3314.1 | 6016.3 | 131.70 | 22.85 | 40.71 | 551. |
| 270 | 14.26126 | 47.72 | 2.49 | 3615.2 | 6420.0 | 133.23 | 22.73 | 40.04 | 548. |
| 280 | 13.75670 | 47.86 | 2.33 | 3909.5 | 6817.1 | 134.67 | 22.62 | 39.40 | 546. |
| 290 | 13.28653 | 48.13 | 2.18 | 4197.6 | 7208.2 | 136.04 | 22.52 | 38.81 | 544. |
| 300 | 12.84799 | 48.52 | 2.06 | 4480.2 | 7593.5 | 137.35 | 22.43 | 38.26 | 544. |
| 310 | 12.43844 | 49.01 | 1.94 | 4757.7 | 7973.5 | 138.60 | 22.36 | 37.75 | 543. |
| 320 | 12.05542 | 49.58 | 1.84 | 5030.6 | 8348.6 | 139.79 | 22.29 | 37.28 | 544. |
| 330 | 11.69667 | 50.20 | 1.74 | 5299.4 | 8719.2 | 140.93 | 22.23 | 36.84 | 545. |
| 340 | 11.36010 | 50.88 | 1.66 | 5564.5 | 9085.6 | 142.02 | 22.18 | 36.44 | 546. |
| 350 | 11.04382 | 51.61 | 1.58 | 5826.2 | 9448.1 | 143.07 | 22.14 | 36.07 | 548. |
| 360 | 10.74613 | 52.37 | 1.51 | 6084.8 | 9807.1 | 144.08 | 22.10 | 35.73 | 550. |
| 370 | 10.46546 | 53.16 | 1.45 | 6340.6 | 10162.7 | 145.06 | 22.07 | 35.41 | 552. |
| 380 | 10.20042 | 53.97 | 1.39 | 6594.0 | 10515.4 | 146.00 | 22.04 | 35.12 | 554. |
| 390 | 9.94975 | 54.80 | 1.34 | 6845.1 | 10865.3 | 146.91 | 22.02 | 34.86 | 557. |
| 400 | 9.71229 | 55.65 | 1.29 | 7094.2 | 11212.7 | 147.79 | 22.00 | 34.61 | 559. |
| 420 | 9.27303 | 57.39 | 1.20 | 7586.9 | 11900.5 | 149.46 | 21.98 | 34.18 | 564. |
| 440 | 8.87551 | 59.16 | 1.12 | 8073.7 | 12580.4 | 151.05 | 21.97 | 33.82 | 570. |
| 460 | 8.51391 | 60.96 | 1.05 | 8555.6 | 13253.8 | 152.54 | 21.99 | 33.52 | 576. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 480 | 8.18342 | 62.77 | 0.9928 | 9033.6 | 13921.5 | 153.96 | 22.01 | 33.27 | 582. |
| 500 | 7.88004 | 64.59 | 0.9397 | 9508.6 | 14584.8 | 155.32 | 22.05 | 33.06 | 588. |
| 520 | 7.60043 | 66.41 | 0.8922 | 9981.4 | 15244.3 | 156.61 | 22.10 | 32.89 | 594. |
| 540 | 7.34178 | 68.23 | 0.8495 | 10452.5 | 15900.8 | 157.85 | 22.17 | 32.76 | 600. |
| 560 | 7.10172 | 70.06 | 0.8108 | 10922.5 | 16554.9 | 159.04 | 22.24 | 32.66 | 606. |
| 580 | 6.87821 | 71.87 | 0.7756 | 11391.8 | 17207.2 | 160.18 | 22.32 | 32.58 | 612. |
| 600 | 6.66952 | 73.69 | 0.7435 | 11860.8 | 17858.3 | 161.29 | 22.41 | 32.53 | 618. |
| 620 | 6.47415 | 75.50 | 0.7141 | 12330.0 | 18508.4 | 162.35 | 22.50 | 32.49 | 624. |
| 640 | 6.29080 | 77.30 | 0.6870 | 12799.6 | 19158.1 | 163.38 | 22.60 | 32.48 | 630. |
| 660 | 6.11834 | 79.10 | 0.6619 | 13269.8 | 19807.6 | 164.38 | 22.71 | 32.47 | 635. |
| 680 | 5.95578 | 80.89 | 0.6387 | 13741.0 | 20457.1 | 165.35 | 22.82 | 32.49 | 641. |
| 700 | 5.80225 | 82.68 | 0.6171 | 14213.2 | 21107.0 | 166.30 | 22.93 | 32.51 | 647. |
| 720 | 5.65697 | 84.46 | 0.5970 | 14686.6 | 21757.5 | 167.21 | 23.05 | 32.54 | 652. |
| 740 | 5.51928 | 86.24 | 0.5783 | 15161.4 | 22408.7 | 168.10 | 23.16 | 32.58 | 658. |
| 760 | 5.38856 | 88.01 | 0.5607 | 15637.7 | 23060.9 | 168.97 | 23.28 | 32.63 | 664. |
| 780 | 5.26427 | 89.77 | 0.5442 | 16115.6 | 23714.0 | 169.82 | 23.40 | 32.68 | 669. |
| 800 | 5.14593 | 91.53 | 0.5287 | 16595.1 | 24368.3 | 170.65 | 23.52 | 32.74 | 674. |
| 850 | 4.87332 | 95.90 | 0.4936 | 17801.5 | 26009.5 | 172.64 | 23.81 | 32.91 | 688. |
| 900 | 4.62952 | 100.25 | 0.4631 | 19019.2 | 27659.4 | 174.53 | 24.10 | 33.09 | 701. |
| 950 | 4.41002 | 104.57 | 0.4363 | 20248.3 | 29318.5 | 176.32 | 24.39 | 33.28 | 714. |
| 1000 | 4.21123 | 108.87 | 0.4125 | 21488.7 | 30987.1 | 178.03 | 24.65 | 33.47 | 726. |
| 1050 | 4.03024 | 113.14 | 0.3913 | 22740.3 | 32665.3 | 179.67 | 24.91 | 33.66 | 739. |
| 1100 | 3.86470 | 117.40 | 0.3722 | 24002.7 | 34352.7 | 181.24 | 25.15 | 33.84 | 751. |
| 1150 | 3.71264 | 121.64 | 0.3549 | 25275.3 | 36049.3 | 182.75 | 25.38 | 34.02 | 763. |
| 1200 | 3.57244 | 125.87 | 0.3392 | 26557.8 | 37754.6 | 184.20 | 25.59 | 34.19 | 775. |
| | | | | 450 bar Isobar | | | | | |
| * 72.498 | 31.78159 | 285.39 | 21.74 | −4013.5 | −2597.6 | 70.64 | 37.24 | 49.13 | 1159. |
| 74 | 31.66544 | 273.38 | 21.45 | −3945.0 | −2523.9 | 71.65 | 36.60 | 49.02 | 1143. |
| 76 | 31.50552 | 258.97 | 21.09 | −3854.3 | −2425.9 | 72.96 | 35.76 | 48.90 | 1124. |
| 78 | 31.33986 | 246.14 | 20.73 | −3764.1 | −2328.2 | 74.23 | 34.95 | 48.81 | 1108. |
| 80 | 31.16881 | 234.67 | 20.37 | −3674.4 | −2230.7 | 75.46 | 34.19 | 48.75 | 1093. |
| 82 | 30.99282 | 224.37 | 20.00 | −3585.2 | −2133.2 | 76.66 | 33.49 | 48.72 | 1079. |
| 84 | 30.81236 | 215.09 | 19.63 | −3496.2 | −2035.8 | 77.84 | 32.85 | 48.70 | 1067. |
| 86 | 30.62792 | 206.67 | 19.25 | −3407.6 | −1938.4 | 78.98 | 32.27 | 48.71 | 1055. |
| 88 | 30.43999 | 199.01 | 18.86 | −3319.3 | −1841.0 | 80.10 | 31.74 | 48.72 | 1044. |
| 90 | 30.24905 | 192.00 | 18.46 | −3231.2 | −1743.5 | 81.20 | 31.27 | 48.73 | 1033. |
| 92 | 30.05552 | 185.54 | 18.06 | −3143.3 | −1646.0 | 82.27 | 30.84 | 48.75 | 1023. |
| 94 | 29.85981 | 179.56 | 17.66 | −3055.6 | −1548.5 | 83.32 | 30.45 | 48.76 | 1013. |
| 96 | 29.66229 | 174.01 | 17.25 | −2968.1 | −1451.0 | 84.34 | 30.11 | 48.77 | 1003. |
| 98 | 29.46329 | 168.81 | 16.85 | −2880.8 | −1353.4 | 85.35 | 29.79 | 48.78 | 993. |
| 100 | 29.26308 | 163.92 | 16.45 | −2793.6 | −1255.9 | 86.34 | 29.51 | 48.79 | 984. |
| 102 | 29.06192 | 159.31 | 16.06 | −2706.7 | −1158.3 | 87.30 | 29.25 | 48.79 | 974. |
| 104 | 28.86003 | 154.95 | 15.67 | −2620.0 | −1060.7 | 88.25 | 29.01 | 48.79 | 964. |
| 106 | 28.65758 | 150.79 | 15.28 | −2533.4 | −963.1 | 89.18 | 28.79 | 48.78 | 955. |
| 108 | 28.45474 | 146.83 | 14.90 | −2447.1 | −865.6 | 90.09 | 28.59 | 48.77 | 946. |
| 110 | 28.25165 | 143.05 | 14.53 | −2360.9 | −768.1 | 90.99 | 28.41 | 48.75 | 936. |
| 112 | 28.04843 | 139.42 | 14.17 | −2275.0 | −670.6 | 91.86 | 28.24 | 48.74 | 927. |
| 114 | 27.84517 | 135.93 | 13.81 | −2189.2 | −573.1 | 92.73 | 28.07 | 48.71 | 918. |
| 116 | 27.64196 | 132.58 | 13.47 | −2103.7 | −475.7 | 93.57 | 27.92 | 48.69 | 908. |
| 118 | 27.43889 | 129.36 | 13.13 | −2018.4 | −378.4 | 94.41 | 27.78 | 48.66 | 899. |
| 120 | 27.23603 | 126.26 | 12.80 | −1933.3 | −281.1 | 95.22 | 27.64 | 48.63 | 890. |
| 122 | 27.03344 | 123.26 | 12.48 | −1848.5 | −183.9 | 96.03 | 27.51 | 48.59 | 882. |
| 124 | 26.83118 | 120.38 | 12.16 | −1763.9 | −86.7 | 96.82 | 27.39 | 48.55 | 873. |
| 126 | 26.62931 | 117.60 | 11.86 | −1679.5 | 10.3 | 97.59 | 27.27 | 48.51 | 864. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 128 | 26.42787 | 114.92 | 11.56 | −1595.4 | 107.3 | 98.36 | 27.15 | 48.46 | 856. |
| 130 | 26.22692 | 112.33 | 11.27 | −1511.6 | 204.2 | 99.11 | 27.04 | 48.41 | 847. |
| 132 | 26.02651 | 109.84 | 10.99 | −1428.0 | 301.0 | 99.85 | 26.93 | 48.36 | 839. |
| 134 | 25.82668 | 107.43 | 10.72 | −1344.8 | 397.6 | 100.57 | 26.82 | 48.30 | 831. |
| 136 | 25.62747 | 105.11 | 10.45 | −1261.8 | 494.2 | 101.29 | 26.71 | 48.24 | 823. |
| 138 | 25.42895 | 102.88 | 10.19 | −1179.1 | 590.6 | 101.99 | 26.61 | 48.17 | 815. |
| 140 | 25.23114 | 100.72 | 9.94 | −1096.7 | 686.8 | 102.68 | 26.51 | 48.10 | 808. |
| 142 | 25.03409 | 98.65 | 9.70 | −1014.6 | 782.9 | 103.37 | 26.41 | 48.02 | 800. |
| 144 | 24.83785 | 96.65 | 9.46 | −932.8 | 878.9 | 104.04 | 26.32 | 47.94 | 793. |
| 146 | 24.64247 | 94.73 | 9.23 | −851.4 | 974.7 | 104.70 | 26.22 | 47.86 | 786. |
| 148 | 24.44797 | 92.88 | 9.01 | −770.3 | 1070.4 | 105.35 | 26.13 | 47.78 | 779. |
| 150 | 24.25441 | 91.10 | 8.79 | −689.5 | 1165.8 | 105.99 | 26.04 | 47.69 | 772. |
| 155 | 23.77487 | 86.93 | 8.28 | −489.1 | 1403.7 | 107.55 | 25.82 | 47.45 | 755. |
| 160 | 23.30204 | 83.16 | 7.80 | −290.9 | 1640.3 | 109.05 | 25.60 | 47.19 | 740. |
| 165 | 22.83650 | 79.74 | 7.36 | −95.0 | 1875.5 | 110.50 | 25.40 | 46.91 | 725. |
| 170 | 22.37879 | 76.64 | 6.95 | 98.5 | 2109.3 | 111.90 | 25.20 | 46.62 | 711. |
| 175 | 21.92939 | 73.84 | 6.57 | 289.6 | 2341.7 | 113.24 | 25.02 | 46.31 | 699. |
| 180 | 21.48873 | 71.32 | 6.22 | 478.3 | 2572.5 | 114.54 | 24.84 | 45.99 | 687. |
| 185 | 21.05719 | 69.05 | 5.89 | 664.6 | 2801.6 | 115.80 | 24.67 | 45.67 | 675. |
| 190 | 20.63510 | 67.01 | 5.59 | 848.4 | 3029.1 | 117.01 | 24.51 | 45.33 | 665. |
| 195 | 20.22274 | 65.18 | 5.31 | 1029.7 | 3254.9 | 118.18 | 24.36 | 44.99 | 656. |
| 200 | 19.82032 | 63.54 | 5.05 | 1208.6 | 3479.0 | 119.32 | 24.21 | 44.65 | 647. |
| 210 | 19.04600 | 60.79 | 4.58 | 1559.3 | 3922.0 | 121.48 | 23.95 | 43.94 | 631. |
| 220 | 18.31291 | 58.64 | 4.18 | 1900.6 | 4357.9 | 123.51 | 23.71 | 43.24 | 618. |
| 230 | 17.62109 | 57.01 | 3.83 | 2233.0 | 4786.7 | 125.42 | 23.50 | 42.54 | 607. |
| 240 | 16.96987 | 55.80 | 3.52 | 2556.9 | 5208.7 | 127.21 | 23.32 | 41.85 | 598. |
| 250 | 16.35803 | 54.94 | 3.26 | 2872.9 | 5623.8 | 128.91 | 23.16 | 41.19 | 591. |
| 260 | 15.78389 | 54.38 | 3.02 | 3181.5 | 6032.5 | 130.51 | 23.01 | 40.55 | 585. |
| 270 | 15.24551 | 54.05 | 2.82 | 3483.2 | 6434.9 | 132.03 | 22.88 | 39.94 | 580. |
| 280 | 14.74074 | 53.93 | 2.64 | 3778.6 | 6831.4 | 133.47 | 22.77 | 39.36 | 577. |
| 290 | 14.26738 | 53.98 | 2.47 | 4068.2 | 7222.3 | 134.84 | 22.66 | 38.82 | 575. |
| 300 | 13.82325 | 54.17 | 2.33 | 4352.6 | 7607.9 | 136.15 | 22.57 | 38.32 | 573. |
| 310 | 13.40620 | 54.47 | 2.20 | 4632.0 | 7988.7 | 137.40 | 22.49 | 37.84 | 572. |
| 320 | 13.01420 | 54.86 | 2.09 | 4907.1 | 8364.9 | 138.59 | 22.42 | 37.40 | 572. |
| 330 | 12.64534 | 55.34 | 1.98 | 5178.2 | 8736.8 | 139.74 | 22.36 | 36.99 | 572. |
| 340 | 12.29783 | 55.88 | 1.89 | 5445.6 | 9104.7 | 140.83 | 22.30 | 36.61 | 572. |
| 350 | 11.97000 | 56.48 | 1.80 | 5709.6 | 9469.0 | 141.89 | 22.26 | 36.25 | 573. |
| 360 | 11.66035 | 57.13 | 1.72 | 5970.6 | 9829.9 | 142.91 | 22.21 | 35.92 | 574. |
| 370 | 11.36747 | 57.82 | 1.65 | 6228.9 | 10187.5 | 143.89 | 22.18 | 35.62 | 576. |
| 380 | 11.09008 | 58.54 | 1.58 | 6484.6 | 10542.3 | 144.83 | 22.15 | 35.34 | 577. |
| 390 | 10.82702 | 59.29 | 1.52 | 6738.0 | 10894.3 | 145.75 | 22.12 | 35.07 | 579. |
| 400 | 10.57722 | 60.06 | 1.46 | 6989.4 | 11243.8 | 146.63 | 22.10 | 34.83 | 581. |
| 420 | 10.11361 | 61.66 | 1.36 | 7486.6 | 11936.1 | 148.32 | 22.08 | 34.41 | 586. |
| 440 | 9.69245 | 63.33 | 1.27 | 7977.7 | 12620.5 | 149.91 | 22.07 | 34.04 | 591. |
| 460 | 9.30810 | 65.03 | 1.20 | 8463.7 | 13298.2 | 151.42 | 22.07 | 33.74 | 596. |
| 480 | 8.95583 | 66.77 | 1.13 | 8945.7 | 13970.3 | 152.85 | 22.10 | 33.48 | 601. |
| 500 | 8.63168 | 68.52 | 1.07 | 9424.4 | 14637.7 | 154.21 | 22.13 | 33.27 | 606. |
| 520 | 8.33229 | 70.29 | 1.01 | 9900.7 | 15301.3 | 155.51 | 22.18 | 33.10 | 612. |
| 540 | 8.05484 | 72.07 | 0.9633 | 10375.1 | 15961.8 | 156.76 | 22.24 | 32.96 | 617. |
| 560 | 7.79689 | 73.85 | 0.9191 | 10848.2 | 16619.7 | 157.96 | 22.31 | 32.85 | 623. |
| 580 | 7.55638 | 75.64 | 0.8789 | 11320.5 | 17275.8 | 159.11 | 22.39 | 32.76 | 629. |
| 600 | 7.33152 | 77.42 | 0.8422 | 11792.4 | 17930.3 | 160.22 | 22.47 | 32.70 | 634. |
| 620 | 7.12075 | 79.21 | 0.8086 | 12264.3 | 18583.9 | 161.29 | 22.56 | 32.66 | 640. |
| 640 | 6.92274 | 80.99 | 0.7777 | 12736.5 | 19236.8 | 162.32 | 22.66 | 32.64 | 645. |
| 660 | 6.73630 | 82.77 | 0.7491 | 13209.2 | 19889.4 | 163.33 | 22.77 | 32.63 | 651. |
| 680 | 6.56039 | 84.54 | 0.7226 | 13682.6 | 20542.0 | 164.30 | 22.87 | 32.63 | 656. |
| 700 | 6.39412 | 86.32 | 0.6980 | 14157.1 | 21194.8 | 165.25 | 22.99 | 32.65 | 662. |
| 720 | 6.23667 | 88.08 | 0.6751 | 14632.7 | 21848.1 | 166.17 | 23.10 | 32.68 | 667. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 740 | 6.08732 | 89.85 | 0.6537 | 15109.5 | 22501.9 | 167.07 | 23.21 | 32.71 | 672. |
| 760 | 5.94543 | 91.61 | 0.6337 | 15587.8 | 23156.6 | 167.94 | 23.33 | 32.76 | 678. |
| 780 | 5.81043 | 93.36 | 0.6149 | 16067.5 | 23812.2 | 168.79 | 23.45 | 32.80 | 683. |
| 800 | 5.68181 | 95.11 | 0.5973 | 16548.8 | 24468.8 | 169.62 | 23.57 | 32.86 | 688. |
| 850 | 5.38524 | 99.47 | 0.5574 | 17759.4 | 26115.6 | 171.62 | 23.86 | 33.01 | 701. |
| 900 | 5.11966 | 103.81 | 0.5227 | 18980.8 | 27770.5 | 173.51 | 24.15 | 33.18 | 714. |
| 950 | 4.88026 | 108.12 | 0.4923 | 20213.3 | 29434.2 | 175.31 | 24.42 | 33.36 | 726. |
| 1000 | 4.66321 | 112.41 | 0.4653 | 21456.9 | 31106.9 | 177.02 | 24.69 | 33.55 | 738. |
| 1050 | 4.46541 | 116.68 | 0.4412 | 22711.4 | 32788.8 | 178.67 | 24.94 | 33.73 | 750. |
| 1100 | 4.28433 | 120.93 | 0.4195 | 23976.3 | 34479.7 | 180.24 | 25.18 | 33.91 | 762. |
| 1150 | 4.11785 | 125.17 | 0.4000 | 25251.4 | 36179.4 | 181.75 | 25.41 | 34.08 | 774. |
| 1200 | 3.96423 | 129.39 | 0.3822 | 26536.1 | 37887.6 | 183.20 | 25.62 | 34.25 | 786. |
| | | | | 500 bar Isobar | | | | | |
| * 73.478 | 31.88166 | 292.67 | 21.30 | −3987.8 | −2419.5 | 70.93 | 37.17 | 48.37 | 1166. |
| 74 | 31.84346 | 288.50 | 21.22 | −3964.5 | −2394.3 | 71.27 | 36.94 | 48.33 | 1161. |
| 76 | 31.69332 | 273.67 | 20.95 | −3875.4 | −2297.8 | 72.56 | 36.06 | 48.20 | 1143. |
| 78 | 31.53732 | 260.43 | 20.68 | −3786.9 | −2201.5 | 73.81 | 35.23 | 48.11 | 1127. |
| 80 | 31.37581 | 248.57 | 20.40 | −3698.9 | −2105.3 | 75.03 | 34.45 | 48.05 | 1113. |
| 82 | 31.20920 | 237.92 | 20.10 | −3611.3 | −2009.2 | 76.22 | 33.73 | 48.03 | 1100. |
| 84 | 31.03796 | 228.31 | 19.79 | −3524.1 | −1913.2 | 77.37 | 33.07 | 48.03 | 1088. |
| 86 | 30.86259 | 219.60 | 19.47 | −3437.2 | −1817.1 | 78.50 | 32.48 | 48.06 | 1077. |
| 88 | 30.68356 | 211.67 | 19.12 | −3350.5 | −1720.9 | 79.61 | 31.94 | 48.09 | 1067. |
| 90 | 30.50138 | 204.43 | 18.77 | −3264.0 | −1624.7 | 80.69 | 31.46 | 48.12 | 1057. |
| 92 | 30.31648 | 197.77 | 18.40 | −3177.7 | −1528.4 | 81.75 | 31.02 | 48.16 | 1047. |
| 94 | 30.12929 | 191.63 | 18.03 | −3091.6 | −1432.1 | 82.78 | 30.63 | 48.20 | 1038. |
| 96 | 29.94021 | 185.92 | 17.65 | −3005.7 | −1335.7 | 83.80 | 30.27 | 48.23 | 1028. |
| 98 | 29.74957 | 180.60 | 17.27 | −2919.9 | −1239.2 | 84.79 | 29.96 | 48.25 | 1019. |
| 100 | 29.55769 | 175.61 | 16.89 | −2834.3 | −1142.7 | 85.77 | 29.67 | 48.27 | 1010. |
| 102 | 29.36484 | 170.91 | 16.51 | −2748.8 | −1046.1 | 86.72 | 29.40 | 48.28 | 1001. |
| 104 | 29.17125 | 166.47 | 16.14 | −2663.6 | −949.5 | 87.66 | 29.17 | 48.29 | 992. |
| 106 | 28.97713 | 162.25 | 15.77 | −2578.5 | −853.0 | 88.58 | 28.95 | 48.28 | 983. |
| 108 | 28.78265 | 158.24 | 15.40 | −2493.6 | −756.4 | 89.48 | 28.75 | 48.28 | 974. |
| 110 | 28.58796 | 154.40 | 15.03 | −2408.8 | −659.9 | 90.37 | 28.56 | 48.26 | 965. |
| 112 | 28.39320 | 150.73 | 14.68 | −2324.3 | −563.4 | 91.24 | 28.39 | 48.24 | 956. |
| 114 | 28.19848 | 147.21 | 14.33 | −2240.0 | −466.9 | 92.09 | 28.22 | 48.22 | 948. |
| 116 | 28.00389 | 143.83 | 13.99 | −2155.9 | −370.5 | 92.93 | 28.07 | 48.19 | 939. |
| 118 | 27.80952 | 140.57 | 13.65 | −2072.1 | −274.1 | 93.76 | 27.93 | 48.16 | 930. |
| 120 | 27.61544 | 137.43 | 13.32 | −1988.4 | −177.8 | 94.56 | 27.79 | 48.12 | 922. |
| 122 | 27.42172 | 134.40 | 13.00 | −1905.0 | −81.6 | 95.36 | 27.66 | 48.08 | 913. |
| 124 | 27.22842 | 131.48 | 12.69 | −1821.8 | 14.5 | 96.14 | 27.54 | 48.03 | 905. |
| 126 | 27.03559 | 128.66 | 12.39 | −1738.9 | 110.5 | 96.91 | 27.42 | 47.98 | 897. |
| 128 | 26.84328 | 125.94 | 12.09 | −1656.3 | 206.4 | 97.66 | 27.30 | 47.93 | 888. |
| 130 | 26.65154 | 123.31 | 11.80 | −1573.9 | 302.2 | 98.41 | 27.19 | 47.87 | 880. |
| 132 | 26.46040 | 120.77 | 11.52 | −1491.7 | 397.9 | 99.14 | 27.08 | 47.81 | 872. |
| 134 | 26.26992 | 118.32 | 11.25 | −1409.9 | 493.4 | 99.86 | 26.98 | 47.74 | 865. |
| 136 | 26.08013 | 115.95 | 10.98 | −1328.3 | 588.8 | 100.56 | 26.87 | 47.67 | 857. |
| 138 | 25.89106 | 113.66 | 10.72 | −1247.0 | 684.1 | 101.26 | 26.77 | 47.60 | 849. |
| 140 | 25.70276 | 111.46 | 10.47 | −1166.1 | 779.2 | 101.94 | 26.67 | 47.52 | 842. |
| 142 | 25.51526 | 109.33 | 10.23 | −1085.4 | 874.2 | 102.62 | 26.58 | 47.44 | 835. |
| 144 | 25.32860 | 107.27 | 9.99 | −1005.0 | 969.0 | 103.28 | 26.48 | 47.36 | 828. |
| 146 | 25.14281 | 105.29 | 9.76 | −925.0 | 1063.6 | 103.93 | 26.39 | 47.27 | 821. |
| 148 | 24.95792 | 103.38 | 9.53 | −845.3 | 1158.1 | 104.57 | 26.30 | 47.18 | 814. |
| 150 | 24.77397 | 101.53 | 9.31 | −765.9 | 1252.4 | 105.21 | 26.21 | 47.09 | 807. |
| 155 | 24.31842 | 97.21 | 8.79 | −568.8 | 1487.2 | 106.75 | 25.99 | 46.84 | 791. |
| 160 | 23.86940 | 93.26 | 8.31 | −374.0 | 1720.8 | 108.23 | 25.78 | 46.58 | 776. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 165 | 23.42738 | 89.67 | 7.86 | −181.3 | 1953.0 | 109.66 | 25.58 | 46.30 | 761. |
| 170 | 22.99276 | 86.41 | 7.44 | 9.2 | 2183.8 | 111.04 | 25.38 | 46.01 | 748. |
| 175 | 22.56589 | 83.44 | 7.06 | 197.3 | 2413.1 | 112.37 | 25.20 | 45.71 | 735. |
| 180 | 22.14711 | 80.75 | 6.70 | 383.2 | 2640.9 | 113.65 | 25.02 | 45.40 | 723. |
| 185 | 21.73668 | 78.30 | 6.36 | 566.8 | 2867.1 | 114.89 | 24.85 | 45.09 | 712. |
| 190 | 21.33483 | 76.09 | 6.05 | 748.1 | 3091.7 | 116.09 | 24.69 | 44.77 | 702. |
| 195 | 20.94175 | 74.09 | 5.76 | 927.1 | 3314.7 | 117.25 | 24.54 | 44.44 | 692. |
| 200 | 20.55760 | 72.28 | 5.49 | 1103.9 | 3536.1 | 118.37 | 24.40 | 44.12 | 683. |
| 210 | 19.81646 | 69.19 | 5.00 | 1450.9 | 3974.0 | 120.50 | 24.13 | 43.46 | 667. |
| 220 | 19.11185 | 66.70 | 4.58 | 1789.2 | 4405.4 | 122.51 | 23.89 | 42.81 | 653. |
| 230 | 18.44369 | 64.74 | 4.21 | 2119.4 | 4830.3 | 124.40 | 23.68 | 42.17 | 642. |
| 240 | 17.81141 | 63.21 | 3.89 | 2441.8 | 5249.0 | 126.18 | 23.49 | 41.55 | 632. |
| 250 | 17.21405 | 62.05 | 3.60 | 2756.8 | 5661.4 | 127.87 | 23.32 | 40.95 | 624. |
| 260 | 16.65033 | 61.21 | 3.35 | 3065.0 | 6068.0 | 129.46 | 23.17 | 40.37 | 617. |
| 270 | 16.11873 | 60.62 | 3.13 | 3366.9 | 6468.8 | 130.97 | 23.03 | 39.81 | 612. |
| 280 | 15.61759 | 60.26 | 2.93 | 3662.8 | 6864.3 | 132.41 | 22.91 | 39.29 | 607. |
| 290 | 15.14518 | 60.09 | 2.76 | 3953.3 | 7254.6 | 133.78 | 22.81 | 38.79 | 604. |
| 300 | 14.69971 | 60.07 | 2.60 | 4238.7 | 7640.1 | 135.09 | 22.71 | 38.32 | 601. |
| 310 | 14.27944 | 60.18 | 2.46 | 4519.5 | 8021.1 | 136.34 | 22.63 | 37.87 | 600. |
| 320 | 13.88268 | 60.41 | 2.33 | 4796.1 | 8397.7 | 137.53 | 22.55 | 37.46 | 599. |
| 330 | 13.50781 | 60.73 | 2.21 | 5068.8 | 8770.4 | 138.68 | 22.48 | 37.07 | 598. |
| 340 | 13.15328 | 61.13 | 2.11 | 5337.9 | 9139.3 | 139.78 | 22.42 | 36.71 | 598. |
| 350 | 12.81765 | 61.60 | 2.01 | 5603.8 | 9504.6 | 140.84 | 22.37 | 36.37 | 598. |
| 360 | 12.49959 | 62.13 | 1.92 | 5866.6 | 9866.8 | 141.86 | 22.32 | 36.06 | 599. |
| 370 | 12.19785 | 62.71 | 1.84 | 6126.8 | 10225.9 | 142.84 | 22.29 | 35.76 | 599. |
| 380 | 11.91127 | 63.34 | 1.77 | 6384.4 | 10582.1 | 143.79 | 22.25 | 35.49 | 601. |
| 390 | 11.63879 | 64.00 | 1.70 | 6639.7 | 10935.7 | 144.71 | 22.22 | 35.24 | 602. |
| 400 | 11.37943 | 64.69 | 1.64 | 6893.0 | 11286.9 | 145.60 | 22.20 | 35.00 | 603. |
| 420 | 10.89652 | 66.15 | 1.52 | 7394.0 | 11982.6 | 147.30 | 22.17 | 34.58 | 607. |
| 440 | 10.45617 | 67.69 | 1.42 | 7888.7 | 12670.6 | 148.90 | 22.15 | 34.22 | 611. |
| 460 | 10.05298 | 69.29 | 1.34 | 8378.2 | 13351.9 | 150.41 | 22.16 | 33.92 | 615. |
| 480 | 9.68238 | 70.94 | 1.26 | 8863.6 | 14027.6 | 151.85 | 22.18 | 33.66 | 620. |
| 500 | 9.34052 | 72.62 | 1.19 | 9345.5 | 14698.6 | 153.22 | 22.21 | 33.45 | 625. |
| 520 | 9.02409 | 74.32 | 1.13 | 9824.9 | 15365.6 | 154.53 | 22.25 | 33.27 | 630. |
| 540 | 8.73026 | 76.05 | 1.08 | 10302.3 | 16029.5 | 155.78 | 22.31 | 33.12 | 635. |
| 560 | 8.45663 | 77.78 | 1.03 | 10778.3 | 16690.8 | 156.98 | 22.38 | 33.01 | 640. |
| 580 | 8.20110 | 79.52 | 0.9825 | 11253.3 | 17350.0 | 158.14 | 22.45 | 32.92 | 645. |
| 600 | 7.96186 | 81.27 | 0.9413 | 11727.8 | 18007.7 | 159.26 | 22.53 | 32.85 | 650. |
| 620 | 7.73733 | 83.03 | 0.9035 | 12202.1 | 18664.3 | 160.33 | 22.63 | 32.81 | 656. |
| 640 | 7.52615 | 84.78 | 0.8687 | 12676.6 | 19320.1 | 161.37 | 22.72 | 32.78 | 661. |
| 660 | 7.32710 | 86.54 | 0.8366 | 13151.6 | 19975.6 | 162.38 | 22.82 | 32.77 | 666. |
| 680 | 7.13912 | 88.29 | 0.8069 | 13627.2 | 20630.9 | 163.36 | 22.93 | 32.77 | 671. |
| 700 | 6.96127 | 90.05 | 0.7792 | 14103.7 | 21286.3 | 164.31 | 23.04 | 32.78 | 676. |
| 720 | 6.79271 | 91.80 | 0.7535 | 14581.2 | 21942.1 | 165.23 | 23.15 | 32.80 | 681. |
| 740 | 6.63270 | 93.55 | 0.7295 | 15060.0 | 22598.4 | 166.13 | 23.26 | 32.83 | 687. |
| 760 | 6.48058 | 95.29 | 0.7070 | 15540.0 | 23255.4 | 167.01 | 23.38 | 32.87 | 692. |
| 780 | 6.33574 | 97.04 | 0.6859 | 16021.5 | 23913.3 | 167.86 | 23.49 | 32.92 | 697. |
| 800 | 6.19766 | 98.78 | 0.6661 | 16504.5 | 24572.1 | 168.70 | 23.61 | 32.97 | 702. |
| 850 | 5.87894 | 103.11 | 0.6214 | 17719.0 | 26223.9 | 170.70 | 23.90 | 33.11 | 714. |
| 900 | 5.59313 | 107.43 | 0.5825 | 18944.0 | 27883.5 | 172.60 | 24.19 | 33.27 | 726. |
| 950 | 5.33519 | 111.73 | 0.5484 | 20179.7 | 29551.4 | 174.40 | 24.46 | 33.45 | 738. |
| 1000 | 5.10107 | 116.00 | 0.5182 | 21426.2 | 31228.1 | 176.12 | 24.73 | 33.62 | 750. |
| 1050 | 4.88751 | 120.26 | 0.4912 | 22683.4 | 32913.6 | 177.77 | 24.98 | 33.80 | 762. |
| 1100 | 4.69181 | 124.51 | 0.4670 | 23950.9 | 34607.8 | 179.34 | 25.22 | 33.97 | 774. |
| 1150 | 4.51174 | 128.74 | 0.4452 | 25228.3 | 36310.5 | 180.86 | 25.44 | 34.14 | 785. |
| 1200 | 4.34545 | 132.95 | 0.4253 | 26515.1 | 38021.4 | 182.31 | 25.65 | 34.30 | 797. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 550 bar Isobar | | | | | |
| * 74.447 | 31.98132 | 300.16 | 20.92 | −3962.0 | −2242.2 | 71.21 | 37.01 | 47.62 | 1174. |
| 76 | 31.87127 | 288.45 | 20.79 | −3894.1 | −2168.4 | 72.19 | 36.31 | 47.51 | 1161. |
| 78 | 31.72421 | 274.79 | 20.60 | −3807.2 | −2073.5 | 73.43 | 35.45 | 47.42 | 1145. |
| 80 | 31.57151 | 262.54 | 20.40 | −3720.8 | −1978.7 | 74.63 | 34.65 | 47.37 | 1132. |
| 82 | 31.41358 | 251.51 | 20.17 | −3634.8 | −1884.0 | 75.80 | 33.91 | 47.36 | 1120. |
| 84 | 31.25085 | 241.55 | 19.92 | −3549.2 | −1789.3 | 76.94 | 33.25 | 47.38 | 1109. |
| 86 | 31.08383 | 232.52 | 19.65 | −3463.9 | −1694.5 | 78.05 | 32.64 | 47.42 | 1098. |
| 88 | 30.91299 | 224.31 | 19.36 | −3378.7 | −1599.6 | 79.14 | 32.10 | 47.48 | 1088. |
| 90 | 30.73883 | 216.81 | 19.04 | −3293.8 | −1504.5 | 80.21 | 31.61 | 47.54 | 1079. |
| 92 | 30.56182 | 209.93 | 18.71 | −3209.0 | −1409.4 | 81.26 | 31.17 | 47.60 | 1070. |
| 94 | 30.38239 | 203.59 | 18.37 | −3124.4 | −1314.1 | 82.28 | 30.77 | 47.66 | 1061. |
| 96 | 30.20094 | 197.72 | 18.02 | −3039.9 | −1218.8 | 83.28 | 30.42 | 47.71 | 1052. |
| 98 | 30.01785 | 192.25 | 17.67 | −2955.6 | −1123.3 | 84.27 | 30.10 | 47.75 | 1044. |
| 100 | 29.83344 | 187.14 | 17.31 | −2871.3 | −1027.8 | 85.23 | 29.81 | 47.79 | 1035. |
| 102 | 29.64801 | 182.33 | 16.94 | −2787.3 | −932.2 | 86.18 | 29.54 | 47.82 | 1026. |
| 104 | 29.46180 | 177.80 | 16.58 | −2703.3 | −836.5 | 87.11 | 29.30 | 47.83 | 1018. |
| 106 | 29.27504 | 173.51 | 16.22 | −2619.6 | −740.8 | 88.02 | 29.08 | 47.84 | 1009. |
| 108 | 29.08792 | 169.43 | 15.86 | −2536.0 | −645.2 | 88.91 | 28.88 | 47.84 | 1001. |
| 110 | 28.90061 | 165.54 | 15.51 | −2452.6 | −549.5 | 89.79 | 28.70 | 47.83 | 992. |
| 112 | 28.71325 | 161.82 | 15.16 | −2369.3 | −453.8 | 90.65 | 28.53 | 47.82 | 984. |
| 114 | 28.52595 | 158.26 | 14.81 | −2286.3 | −358.2 | 91.50 | 28.36 | 47.79 | 976. |
| 116 | 28.33883 | 154.83 | 14.48 | −2203.5 | −262.7 | 92.33 | 28.21 | 47.77 | 967. |
| 118 | 28.15198 | 151.54 | 14.15 | −2120.9 | −167.2 | 93.15 | 28.07 | 47.73 | 959. |
| 120 | 27.96547 | 148.36 | 13.82 | −2038.5 | −71.7 | 93.95 | 27.94 | 47.69 | 951. |
| 122 | 27.77938 | 145.30 | 13.50 | −1956.3 | 23.6 | 94.74 | 27.81 | 47.65 | 943. |
| 124 | 27.59376 | 142.34 | 13.19 | −1874.4 | 118.8 | 95.51 | 27.68 | 47.60 | 935. |
| 126 | 27.40867 | 139.49 | 12.89 | −1792.7 | 214.0 | 96.27 | 27.57 | 47.54 | 927. |
| 128 | 27.22415 | 136.73 | 12.59 | −1711.3 | 309.0 | 97.02 | 27.45 | 47.49 | 919. |
| 130 | 27.04025 | 134.06 | 12.31 | −1630.1 | 403.9 | 97.76 | 27.34 | 47.42 | 911. |
| 132 | 26.85702 | 131.48 | 12.02 | −1549.2 | 498.7 | 98.48 | 27.24 | 47.36 | 903. |
| 134 | 26.67447 | 128.99 | 11.75 | −1468.5 | 593.3 | 99.19 | 27.13 | 47.29 | 896. |
| 136 | 26.49266 | 126.58 | 11.48 | −1388.2 | 687.9 | 99.89 | 27.03 | 47.21 | 888. |
| 138 | 26.31161 | 124.24 | 11.22 | −1308.1 | 782.2 | 100.58 | 26.93 | 47.14 | 881. |
| 140 | 26.13136 | 121.99 | 10.97 | −1228.4 | 876.4 | 101.26 | 26.83 | 47.06 | 874. |
| 142 | 25.95193 | 119.81 | 10.72 | −1148.9 | 970.4 | 101.93 | 26.74 | 46.97 | 867. |
| 144 | 25.77336 | 117.70 | 10.48 | −1069.7 | 1064.3 | 102.58 | 26.64 | 46.89 | 860. |
| 146 | 25.59567 | 115.66 | 10.25 | −990.8 | 1158.0 | 103.23 | 26.55 | 46.80 | 853. |
| 148 | 25.41889 | 113.70 | 10.02 | −912.3 | 1251.5 | 103.86 | 26.46 | 46.70 | 846. |
| 150 | 25.24304 | 111.80 | 9.80 | −834.0 | 1344.8 | 104.49 | 26.37 | 46.61 | 840. |
| 155 | 24.80768 | 107.32 | 9.28 | −639.9 | 1577.2 | 106.01 | 26.16 | 46.36 | 824. |
| 160 | 24.37871 | 103.23 | 8.79 | −447.7 | 1808.3 | 107.48 | 25.95 | 46.09 | 809. |
| 165 | 23.95647 | 99.48 | 8.33 | −257.7 | 2038.1 | 108.90 | 25.75 | 45.81 | 795. |
| 170 | 23.54126 | 96.06 | 7.91 | −69.9 | 2266.5 | 110.26 | 25.56 | 45.53 | 782. |
| 175 | 23.13337 | 92.93 | 7.51 | 115.8 | 2493.4 | 111.57 | 25.38 | 45.23 | 769. |
| 180 | 22.73304 | 90.08 | 7.14 | 299.4 | 2718.8 | 112.84 | 25.20 | 44.93 | 757. |
| 185 | 22.34046 | 87.48 | 6.80 | 480.7 | 2942.6 | 114.07 | 25.03 | 44.62 | 746. |
| 190 | 21.95581 | 85.10 | 6.48 | 659.9 | 3165.0 | 115.26 | 24.87 | 44.31 | 736. |
| 195 | 21.57921 | 82.95 | 6.18 | 837.0 | 3385.8 | 116.40 | 24.72 | 44.00 | 726. |
| 200 | 21.21075 | 80.98 | 5.90 | 1012.0 | 3605.0 | 117.51 | 24.57 | 43.69 | 717. |
| 210 | 20.49853 | 77.58 | 5.40 | 1355.7 | 4038.8 | 119.63 | 24.31 | 43.07 | 701. |
| 220 | 19.81935 | 74.80 | 4.96 | 1691.4 | 4466.5 | 121.62 | 24.06 | 42.46 | 686. |
| 230 | 19.17298 | 72.54 | 4.57 | 2019.5 | 4888.1 | 123.50 | 23.85 | 41.87 | 674. |

Thermodynamic properties of nitrogen--Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 240 | 16.55890 | 70.73 | 4.23 | 2340.3 | 5303.6 | 125.26 | 23.65 | 41.29 | 664. |
| 250 | 17.97627 | 69.30 | 3.93 | 2654.3 | 5713.9 | 126.94 | 23.48 | 40.73 | 655. |
| 260 | 17.42402 | 68.19 | 3.66 | 2961.9 | 6118.5 | 128.53 | 23.32 | 40.19 | 648. |
| 270 | 16.90092 | 67.36 | 3.43 | 3263.5 | 6517.8 | 130.03 | 23.18 | 39.68 | 642. |
| 280 | 16.40561 | 66.78 | 3.22 | 3559.6 | 6912.1 | 131.47 | 23.06 | 39.19 | 637. |
| 290 | 15.93667 | 66.39 | 3.03 | 3850.5 | 7301.6 | 132.83 | 22.94 | 38.72 | 632. |
| 300 | 15.49263 | 66.17 | 2.86 | 4136.6 | 7686.6 | 134.14 | 22.84 | 38.29 | 629. |
| 310 | 15.07203 | 66.11 | 2.71 | 4418.3 | 8067.4 | 135.39 | 22.75 | 37.87 | 627. |
| 320 | 14.67345 | 66.17 | 2.57 | 4695.9 | 8444.2 | 136.58 | 22.67 | 37.48 | 625. |
| 330 | 14.29550 | 66.34 | 2.44 | 4969.8 | 8817.1 | 137.73 | 22.60 | 37.12 | 624. |
| 340 | 13.93685 | 66.60 | 2.33 | 5240.2 | 9186.5 | 138.83 | 22.54 | 36.77 | 623. |
| 350 | 13.59625 | 66.94 | 2.22 | 5507.4 | 9552.6 | 139.90 | 22.48 | 36.45 | 622. |
| 360 | 13.27252 | 67.35 | 2.13 | 5771.7 | 9915.6 | 140.92 | 22.43 | 36.15 | 622. |
| 370 | 12.96453 | 67.82 | 2.04 | 6033.3 | 10275.7 | 141.90 | 22.39 | 35.87 | 623. |
| 380 | 12.67127 | 68.34 | 1.96 | 6292.5 | 10633.0 | 142.86 | 22.35 | 35.60 | 623. |
| 390 | 12.39176 | 68.90 | 1.88 | 6549.4 | 10987.8 | 143.78 | 22.32 | 35.36 | 624. |
| 400 | 12.12510 | 69.51 | 1.81 | 6804.2 | 11340.2 | 144.67 | 22.30 | 35.13 | 625. |
| 420 | 11.62709 | 70.81 | 1.69 | 7308.3 | 12038.6 | 146.38 | 22.26 | 34.72 | 628. |
| 440 | 11.17128 | 72.22 | 1.58 | 7806.1 | 12729.4 | 147.98 | 22.24 | 34.37 | 631. |
| 460 | 10.75260 | 73.71 | 1.48 | 8298.6 | 13413.7 | 149.50 | 22.24 | 34.07 | 635. |
| 480 | 10.36668 | 75.26 | 1.40 | 8786.9 | 14092.4 | 150.95 | 22.25 | 33.81 | 639. |
| 500 | 10.00979 | 76.86 | 1.32 | 9271.7 | 14766.4 | 152.32 | 22.28 | 33.59 | 643. |
| 520 | 9.67872 | 78.49 | 1.25 | 9753.8 | 15436.4 | 153.64 | 22.32 | 33.42 | 648. |
| 540 | 9.37071 | 80.15 | 1.19 | 10233.9 | 16103.2 | 154.90 | 22.38 | 33.27 | 652. |
| 560 | 9.08336 | 81.83 | 1.14 | 10712.4 | 16767.4 | 156.10 | 22.44 | 33.15 | 657. |
| 580 | 8.81459 | 83.53 | 1.09 | 11189.8 | 17429.5 | 157.26 | 22.51 | 33.06 | 662. |
| 600 | 8.56260 | 85.24 | 1.04 | 11666.6 | 18089.9 | 158.38 | 22.60 | 32.99 | 667. |
| 620 | 8.32580 | 86.95 | 0.9986 | 12143.2 | 18749.2 | 159.46 | 22.68 | 32.94 | 671. |
| 640 | 8.10281 | 88.68 | 0.9599 | 12619.9 | 19407.6 | 160.51 | 22.78 | 32.91 | 676. |
| 660 | 7.89241 | 90.40 | 0.9243 | 13096.9 | 20065.6 | 161.52 | 22.88 | 32.89 | 681. |
| 680 | 7.69350 | 92.13 | 0.8913 | 13574.5 | 20723.4 | 162.50 | 22.98 | 32.89 | 686. |
| 700 | 7.50514 | 93.86 | 0.8606 | 14052.9 | 21381.2 | 163.46 | 23.09 | 32.90 | 691. |
| 720 | 7.32647 | 95.59 | 0.8321 | 14532.2 | 22039.3 | 164.38 | 23.20 | 32.91 | 696. |
| 740 | 7.15672 | 97.32 | 0.8054 | 15012.7 | 22697.8 | 165.29 | 23.31 | 32.94 | 701. |
| 760 | 6.99522 | 99.05 | 0.7805 | 15494.5 | 23357.0 | 166.17 | 23.43 | 32.98 | 706. |
| 780 | 6.84134 | 100.78 | 0.7571 | 15977.6 | 24016.9 | 167.02 | 23.54 | 33.02 | 710. |
| 800 | 6.69455 | 102.51 | 0.7351 | 16462.1 | 24677.8 | 167.86 | 23.65 | 33.07 | 715. |
| 850 | 6.35535 | 106.82 | 0.6856 | 17680.2 | 26334.4 | 169.87 | 23.94 | 33.20 | 727. |
| 900 | 6.05077 | 111.11 | 0.6425 | 18908.5 | 27998.3 | 171.77 | 24.22 | 33.36 | 739. |
| 950 | 5.77555 | 115.39 | 0.6047 | 20147.3 | 29670.2 | 173.58 | 24.50 | 33.52 | 751. |
| 1000 | 5.52547 | 119.65 | 0.5712 | 21396.7 | 31350.6 | 175.30 | 24.76 | 33.69 | 762. |
| 1050 | 5.29712 | 123.90 | 0.5414 | 22656.4 | 33039.4 | 176.95 | 25.01 | 33.86 | 774. |
| 1100 | 5.08767 | 128.13 | 0.5146 | 23926.3 | 34736.7 | 178.53 | 25.25 | 34.03 | 785. |
| 1150 | 4.89479 | 132.35 | 0.4904 | 25205.9 | 36442.3 | 180.05 | 25.47 | 34.19 | 796. |
| 1200 | 4.71652 | 136.56 | 0.4685 | 26494.7 | 38155.9 | 181.50 | 25.68 | 34.35 | 807. |

600 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 75.407 | 32.08026 | 307.82 | 20.62 | −3936.1 | −2065.8 | 71.48 | 36.77 | 46.88 | 1184. |
| 76 | 32.04028 | 303.34 | 20.59 | −3910.6 | −2038.0 | 71.85 | 36.49 | 46.84 | 1179. |
| 78 | 31.90155 | 289.25 | 20.49 | −3825.2 | −1944.4 | 73.07 | 35.61 | 46.74 | 1164. |
| 80 | 31.75705 | 276.57 | 20.36 | −3740.3 | −1851.0 | 74.25 | 34.80 | 46.69 | 1151. |
| 82 | 31.60718 | 265.15 | 20.21 | −3655.9 | −1757.6 | 75.40 | 34.05 | 46.70 | 1139. |
| 84 | 31.45237 | 254.83 | 20.02 | −3571.8 | −1664.2 | 76.53 | 33.38 | 46.73 | 1129. |
| 86 | 31.29309 | 245.46 | 19.80 | −3488.0 | −1570.6 | 77.63 | 32.77 | 46.80 | 1119. |
| 88 | 31.12985 | 236.95 | 19.56 | −3404.4 | −1477.0 | 78.70 | 32.22 | 46.88 | 1109. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 90 | 30.96311 | 229.17 | 19.29 | −3320.9 | −1383.1 | 79.76 | 31.73 | 46.97 | 1100. |
| 92 | 30.79337 | 222.05 | 19.00 | −3237.6 | −1289.1 | 80.79 | 31.29 | 47.05 | 1092. |
| 94 | 30.62107 | 215.49 | 18.69 | −3154.4 | −1194.9 | 81.80 | 30.89 | 47.14 | 1083. |
| 96 | 30.44662 | 209.42 | 18.37 | −3071.2 | −1100.6 | 82.80 | 30.54 | 47.21 | 1075. |
| 98 | 30.27041 | 203.79 | 18.03 | −2988.2 | −1006.1 | 83.77 | 30.22 | 47.28 | 1067. |
| 100 | 30.09279 | 198.54 | 17.69 | −2905.3 | −911.5 | 84.73 | 29.93 | 47.34 | 1059. |
| 102 | 29.91407 | 193.61 | 17.35 | −2822.5 | −816.7 | 85.67 | 29.66 | 47.38 | 1051. |
| 104 | 29.73451 | 188.98 | 17.00 | −2739.8 | −721.9 | 86.59 | 29.43 | 47.41 | 1043. |
| 106 | 29.55436 | 184.60 | 16.65 | −2657.3 | −627.1 | 87.49 | 29.21 | 47.43 | 1034. |
| 108 | 29.37381 | 180.44 | 16.30 | −2574.9 | −532.2 | 88.38 | 29.01 | 47.44 | 1026. |
| 110 | 29.19306 | 176.49 | 15.96 | −2492.6 | −437.3 | 89.25 | 28.83 | 47.44 | 1018. |
| 112 | 29.01225 | 172.71 | 15.61 | −2410.5 | −342.5 | 90.10 | 28.66 | 47.43 | 1010. |
| 114 | 28.83151 | 169.10 | 15.27 | −2328.7 | −247.6 | 90.94 | 28.50 | 47.42 | 1002. |
| 116 | 28.65097 | 165.63 | 14.94 | −2247.0 | −152.8 | 91.77 | 28.35 | 47.39 | 994. |
| 118 | 28.47072 | 162.29 | 14.61 | −2165.5 | −58.0 | 92.58 | 28.21 | 47.36 | 986. |
| 120 | 28.29085 | 159.08 | 14.29 | −2084.2 | 36.6 | 93.37 | 28.07 | 47.32 | 978. |
| 122 | 28.11139 | 155.98 | 13.98 | −2003.1 | 131.2 | 94.15 | 27.95 | 47.28 | 971. |
| 124 | 27.93246 | 152.99 | 13.67 | −1922.3 | 225.8 | 94.92 | 27.83 | 47.23 | 963. |
| 126 | 27.75409 | 150.11 | 13.36 | −1841.7 | 320.2 | 95.68 | 27.71 | 47.17 | 955. |
| 128 | 27.57634 | 147.31 | 13.07 | −1761.3 | 414.4 | 96.42 | 27.60 | 47.11 | 948. |
| 130 | 27.39923 | 144.61 | 12.78 | −1681.2 | 508.6 | 97.15 | 27.49 | 47.05 | 940. |
| 132 | 27.22282 | 141.99 | 12.50 | −1601.4 | 602.6 | 97.87 | 27.38 | 46.98 | 933. |
| 134 | 27.04713 | 139.46 | 12.22 | −1521.8 | 696.5 | 98.57 | 27.28 | 46.91 | 925. |
| 136 | 26.87220 | 137.01 | 11.96 | −1442.5 | 790.3 | 99.27 | 27.18 | 46.83 | 918. |
| 138 | 26.69806 | 134.63 | 11.70 | −1363.5 | 883.9 | 99.95 | 27.08 | 46.75 | 911. |
| 140 | 26.52473 | 132.34 | 11.44 | −1284.8 | 977.3 | 100.62 | 26.99 | 46.67 | 904. |
| 142 | 26.35224 | 130.11 | 11.19 | −1206.3 | 1070.5 | 101.28 | 26.89 | 46.58 | 897. |
| 144 | 26.18062 | 127.96 | 10.95 | −1128.2 | 1163.6 | 101.93 | 26.80 | 46.50 | 890. |
| 146 | 26.00988 | 125.87 | 10.72 | −1050.3 | 1256.5 | 102.58 | 26.71 | 46.40 | 884. |
| 148 | 25.84006 | 123.86 | 10.49 | −972.7 | 1349.2 | 103.21 | 26.62 | 46.31 | 877. |
| 150 | 25.67116 | 121.90 | 10.27 | −895.5 | 1441.8 | 103.83 | 26.54 | 46.21 | 871. |
| 155 | 25.25312 | 117.30 | 9.73 | −703.7 | 1672.2 | 105.34 | 26.32 | 45.96 | 855. |
| 160 | 24.84132 | 113.06 | 9.24 | −514.0 | 1901.3 | 106.79 | 26.12 | 45.69 | 840. |
| 165 | 24.43603 | 109.17 | 8.78 | −326.3 | 2129.1 | 108.20 | 25.92 | 45.42 | 826. |
| 170 | 24.03747 | 105.60 | 8.34 | −140.6 | 2355.5 | 109.55 | 25.73 | 45.13 | 813. |
| 175 | 23.64587 | 102.33 | 7.94 | 43.0 | 2580.5 | 110.85 | 25.55 | 44.84 | 801. |
| 180 | 23.26140 | 99.33 | 7.57 | 224.6 | 2803.9 | 112.11 | 25.38 | 44.55 | 789. |
| 185 | 22.88420 | 96.58 | 7.21 | 404.0 | 3025.9 | 113.33 | 25.21 | 44.25 | 778. |
| 190 | 22.51439 | 94.06 | 6.89 | 581.4 | 3246.4 | 114.50 | 25.05 | 43.95 | 768. |
| 195 | 22.15207 | 91.75 | 6.58 | 756.8 | 3465.4 | 115.64 | 24.90 | 43.65 | 758. |
| 200 | 21.79729 | 89.65 | 6.29 | 930.2 | 3682.9 | 116.74 | 24.75 | 43.35 | 749. |
| 210 | 21.11049 | 85.97 | 5.77 | 1271.1 | 4113.3 | 118.84 | 24.48 | 42.75 | 732. |
| 220 | 20.45400 | 82.91 | 5.32 | 1604.5 | 4537.9 | 120.82 | 24.23 | 42.17 | 718. |
| 230 | 19.82752 | 80.38 | 4.92 | 1930.7 | 4956.8 | 122.68 | 24.01 | 41.60 | 705. |
| 240 | 19.23052 | 78.31 | 4.56 | 2250.0 | 5370.0 | 124.44 | 23.81 | 41.06 | 694. |
| 250 | 18.66220 | 76.63 | 4.25 | 2562.9 | 5777.9 | 126.10 | 23.63 | 40.53 | 685. |
| 260 | 18.12165 | 75.28 | 3.97 | 2869.7 | 6180.7 | 127.68 | 23.47 | 40.03 | 677. |
| 270 | 17.60780 | 74.23 | 3.72 | 3171.0 | 6578.5 | 129.18 | 23.33 | 39.54 | 670. |
| 280 | 17.11950 | 73.43 | 3.49 | 3466.9 | 6971.7 | 130.61 | 23.20 | 39.09 | 665. |
| 290 | 16.65554 | 72.84 | 3.29 | 3757.9 | 7360.3 | 131.98 | 23.08 | 38.65 | 660. |
| 300 | 16.21468 | 72.44 | 3.11 | 4044.4 | 7744.8 | 133.28 | 22.97 | 38.24 | 656. |
| 310 | 15.79568 | 72.19 | 2.95 | 4326.7 | 8125.2 | 134.53 | 22.88 | 37.85 | 653. |
| 320 | 15.39730 | 72.09 | 2.80 | 4605.0 | 8501.8 | 135.72 | 22.80 | 37.48 | 650. |
| 330 | 15.01837 | 72.11 | 2.67 | 4879.7 | 8874.8 | 136.87 | 22.72 | 37.13 | 649. |
| 340 | 14.65772 | 72.23 | 2.54 | 5151.1 | 9244.5 | 137.98 | 22.65 | 36.81 | 647. |
| 350 | 14.31425 | 72.44 | 2.43 | 5419.4 | 9611.0 | 139.04 | 22.59 | 36.50 | 646. |
| 360 | 13.98692 | 72.73 | 2.32 | 5684.8 | 9974.5 | 140.06 | 22.54 | 36.21 | 646. |
| 370 | 13.67472 | 73.08 | 2.23 | 5947.6 | 10335.3 | 141.05 | 22.49 | 35.94 | 646. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 380 | 13.37674 | 73.50 | 2.14 | 6208.0 | 10693.4 | 142.01 | 22.45 | 35.69 | 646. |
| 390 | 13.09210 | 73.97 | 2.06 | 6466.1 | 11049.0 | 142.93 | 22.42 | 35.45 | 646. |
| 400 | 12.81998 | 74.49 | 1.98 | 6722.2 | 11402.4 | 143.82 | 22.39 | 35.23 | 647. |
| 420 | 12.31028 | 75.63 | 1.85 | 7228.9 | 12102.9 | 145.53 | 22.35 | 34.83 | 649. |
| 440 | 11.84216 | 76.91 | 1.73 | 7729.3 | 12796.0 | 147.15 | 22.32 | 34.49 | 651. |
| 460 | 11.41083 | 78.28 | 1.62 | 8224.5 | 13482.6 | 148.67 | 22.32 | 34.19 | 654. |
| 480 | 11.01216 | 79.72 | 1.53 | 8715.3 | 14163.8 | 150.12 | 22.33 | 33.94 | 658. |
| 500 | 10.64258 | 81.23 | 1.45 | 9202.6 | 14840.3 | 151.50 | 22.35 | 33.72 | 661. |
| 520 | 10.29899 | 82.79 | 1.37 | 9687.1 | 15512.9 | 152.82 | 22.39 | 33.54 | 665. |
| 540 | 9.97871 | 84.38 | 1.31 | 10169.5 | 16182.3 | 154.08 | 22.44 | 33.40 | 669. |
| 560 | 9.67939 | 86.00 | 1.24 | 10650.2 | 16849.0 | 155.30 | 22.50 | 33.28 | 674. |
| 580 | 9.39898 | 87.64 | 1.19 | 11129.9 | 17513.5 | 156.46 | 22.57 | 33.18 | 678. |
| 600 | 9.13570 | 89.30 | 1.14 | 11608.8 | 18176.4 | 157.59 | 22.65 | 33.11 | 683. |
| 620 | 8.88797 | 90.97 | 1.09 | 12087.4 | 18838.1 | 158.67 | 22.74 | 33.06 | 687. |
| 640 | 8.65441 | 92.66 | 1.05 | 12566.0 | 19498.9 | 159.72 | 22.83 | 33.02 | 692. |
| 660 | 8.43378 | 94.35 | 1.01 | 13044.9 | 20159.2 | 160.74 | 22.93 | 33.00 | 696. |
| 680 | 8.22501 | 96.05 | 0.9758 | 13524.3 | 20819.1 | 161.72 | 23.03 | 33.00 | 701. |
| 700 | 8.02711 | 97.76 | 0.9421 | 14004.5 | 21479.1 | 162.68 | 23.14 | 33.00 | 706. |
| 720 | 7.83923 | 99.46 | 0.9108 | 14485.5 | 22139.3 | 163.61 | 23.25 | 33.02 | 710. |
| 740 | 7.66060 | 101.17 | 0.8815 | 14967.6 | 22799.9 | 164.51 | 23.36 | 33.04 | 715. |
| 760 | 7.49051 | 102.88 | 0.8541 | 15450.9 | 23461.1 | 165.39 | 23.47 | 33.07 | 719. |
| 780 | 7.32833 | 104.60 | 0.8284 | 15935.5 | 24122.9 | 166.25 | 23.58 | 33.11 | 724. |
| 800 | 7.17352 | 106.31 | 0.8043 | 16421.5 | 24785.6 | 167.09 | 23.70 | 33.16 | 729. |
| 850 | 6.81541 | 110.58 | 0.7499 | 17643.1 | 26446.7 | 169.11 | 23.98 | 33.29 | 740. |
| 900 | 6.49339 | 114.85 | 0.7026 | 18874.5 | 28114.7 | 171.01 | 24.26 | 33.44 | 752. |
| 950 | 6.20206 | 119.10 | 0.6611 | 20116.2 | 29790.4 | 172.83 | 24.53 | 33.59 | 763. |
| 1000 | 5.93705 | 123.34 | 0.6243 | 21368.2 | 31474.2 | 174.55 | 24.79 | 33.76 | 774. |
| 1050 | 5.69482 | 127.57 | 0.5916 | 22630.4 | 33166.3 | 176.20 | 25.04 | 33.92 | 785. |
| 1100 | 5.47243 | 131.79 | 0.5622 | 23902.5 | 34866.5 | 177.79 | 25.28 | 34.09 | 797. |
| 1150 | 5.26747 | 136.00 | 0.5357 | 25184.2 | 36574.8 | 179.30 | 25.50 | 34.25 | 807. |
| 1200 | 5.07789 | 140.19 | 0.5117 | 26475.0 | 38291.0 | 180.77 | 25.71 | 34.40 | 818. |
| | | | | 650 bar Isobar | | | | | |
| * 76.357 | 32.17824 | 315.63 | 20.36 | −3910.1 | −1890.1 | 71.75 | 36.47 | 46.15 | 1194. |
| 78 | 32.07021 | 303.80 | 20.35 | −3841.1 | −1814.3 | 72.73 | 35.74 | 46.07 | 1182. |
| 80 | 31.93337 | 290.70 | 20.30 | −3757.7 | −1722.3 | 73.90 | 34.91 | 46.03 | 1170. |
| 82 | 31.79104 | 278.87 | 20.21 | −3674.8 | −1630.2 | 75.03 | 34.16 | 46.04 | 1158. |
| 84 | 31.64362 | 268.16 | 20.09 | −3592.2 | −1538.1 | 76.14 | 33.48 | 46.10 | 1148. |
| 86 | 31.49159 | 258.45 | 19.92 | −3509.8 | −1445.8 | 77.23 | 32.86 | 46.18 | 1139. |
| 88 | 31.33542 | 249.61 | 19.73 | −3427.6 | −1353.3 | 78.29 | 32.31 | 46.29 | 1130. |
| 90 | 31.17561 | 241.54 | 19.50 | −3345.6 | −1260.6 | 79.33 | 31.82 | 46.40 | 1121. |
| 92 | 31.01263 | 234.14 | 19.25 | −3263.6 | −1167.7 | 80.35 | 31.38 | 46.52 | 1113. |
| 94 | 30.84693 | 227.35 | 18.97 | −3181.7 | −1074.6 | 81.35 | 30.99 | 46.63 | 1105. |
| 96 | 30.67896 | 221.07 | 18.68 | −3099.9 | −981.2 | 82.34 | 30.63 | 46.73 | 1097. |
| 98 | 30.50910 | 215.26 | 18.37 | −3018.2 | −887.6 | 83.30 | 30.32 | 46.82 | 1089. |
| 100 | 30.33772 | 209.84 | 18.05 | −2936.5 | −793.9 | 84.25 | 30.03 | 46.90 | 1082. |
| 102 | 30.16513 | 204.78 | 17.72 | −2854.9 | −700.1 | 85.18 | 29.77 | 46.96 | 1074. |
| 104 | 29.99163 | 200.03 | 17.39 | −2773.3 | −606.1 | 86.09 | 29.54 | 47.01 | 1066. |
| 106 | 29.81747 | 195.55 | 17.05 | −2691.9 | −512.0 | 86.99 | 29.32 | 47.05 | 1058. |
| 108 | 29.64287 | 191.30 | 16.72 | −2610.6 | −417.9 | 87.87 | 29.12 | 47.08 | 1051. |
| 110 | 29.46802 | 187.27 | 16.38 | −2529.5 | −323.7 | 88.73 | 28.94 | 47.09 | 1043. |
| 112 | 29.29310 | 183.43 | 16.04 | −2448.5 | −229.5 | 89.58 | 28.78 | 47.09 | 1035. |
| 114 | 29.11823 | 179.76 | 15.71 | −2367.6 | −135.4 | 90.41 | 28.62 | 47.08 | 1027. |
| 116 | 28.94355 | 176.24 | 15.38 | −2287.0 | −41.2 | 91.23 | 28.47 | 47.06 | 1020. |
| 118 | 28.76916 | 172.86 | 15.06 | −2206.5 | 52.9 | 92.03 | 28.33 | 47.03 | 1012. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 120 | 28.59514 | 169.61 | 14.74 | −2126.2 | 146.9 | 92.83 | 28.20 | 47.00 | 1004. |
| 122 | 28.42159 | 166.48 | 14.43 | −2046.1 | 240.9 | 93.60 | 28.08 | 46.96 | 997. |
| 124 | 28.24856 | 163.45 | 14.12 | −1966.3 | 334.7 | 94.36 | 27.96 | 46.91 | 989. |
| 126 | 28.07611 | 160.53 | 13.82 | −1886.6 | 428.5 | 95.11 | 27.85 | 46.85 | 982. |
| 128 | 27.90429 | 157.70 | 13.52 | −1807.2 | 522.2 | 95.85 | 27.74 | 46.80 | 975. |
| 130 | 27.73314 | 154.96 | 13.23 | −1728.1 | 615.7 | 96.58 | 27.63 | 46.73 | 967. |
| 132 | 27.56270 | 152.31 | 12.95 | −1649.2 | 709.1 | 97.29 | 27.53 | 46.66 | 960. |
| 134 | 27.39301 | 149.75 | 12.68 | −1570.5 | 802.3 | 97.99 | 27.43 | 46.59 | 953. |
| 136 | 27.22410 | 147.26 | 12.41 | −1492.2 | 895.4 | 98.68 | 27.33 | 46.51 | 946. |
| 138 | 27.05598 | 144.85 | 12.15 | −1414.1 | 988.4 | 99.36 | 27.23 | 46.43 | 939. |
| 140 | 26.88870 | 142.51 | 11.89 | −1336.2 | 1081.2 | 100.03 | 27.14 | 46.35 | 932. |
| 142 | 26.72226 | 140.25 | 11.64 | −1258.7 | 1173.8 | 100.68 | 27.05 | 46.26 | 925. |
| 144 | 26.55669 | 138.05 | 11.40 | −1181.4 | 1266.2 | 101.33 | 26.96 | 46.17 | 919. |
| 146 | 26.39201 | 135.92 | 11.16 | −1104.4 | 1358.4 | 101.97 | 26.87 | 46.08 | 912. |
| 148 | 26.22823 | 133.86 | 10.93 | −1027.7 | 1450.5 | 102.59 | 26.78 | 45.98 | 906. |
| 150 | 26.06539 | 131.86 | 10.71 | −951.4 | 1542.4 | 103.21 | 26.69 | 45.89 | 900. |
| 155 | 25.66241 | 127.14 | 10.17 | −761.7 | 1771.2 | 104.71 | 26.48 | 45.63 | 884. |
| 160 | 25.26554 | 122.78 | 9.67 | −574.0 | 1998.7 | 106.15 | 26.28 | 45.37 | 870. |
| 165 | 24.87499 | 118.75 | 9.20 | −388.2 | 2224.8 | 107.55 | 26.09 | 45.09 | 856. |
| 170 | 24.49093 | 115.05 | 8.76 | −204.5 | 2449.6 | 108.89 | 25.90 | 44.81 | 843. |
| 175 | 24.11351 | 111.63 | 8.35 | −22.7 | 2672.9 | 110.18 | 25.72 | 44.52 | 831. |
| 180 | 23.74287 | 108.49 | 7.97 | 157.2 | 2894.8 | 111.43 | 25.55 | 44.23 | 819. |
| 185 | 23.37911 | 105.61 | 7.61 | 335.0 | 3115.2 | 112.64 | 25.38 | 43.94 | 808. |
| 190 | 23.02231 | 102.95 | 7.27 | 510.9 | 3334.2 | 113.81 | 25.22 | 43.65 | 798. |
| 195 | 22.67252 | 100.51 | 6.96 | 684.8 | 3551.7 | 114.94 | 25.07 | 43.35 | 788. |
| 200 | 22.32980 | 98.27 | 6.67 | 856.8 | 3767.7 | 116.03 | 24.92 | 43.06 | 779. |
| 210 | 21.66553 | 94.32 | 6.13 | 1195.3 | 4195.4 | 118.12 | 24.65 | 42.48 | 762. |
| 220 | 21.02940 | 91.01 | 5.66 | 1526.5 | 4617.5 | 120.08 | 24.40 | 41.92 | 747. |
| 230 | 20.42104 | 88.23 | 5.25 | 1851.0 | 5034.0 | 121.93 | 24.17 | 41.38 | 734. |
| 240 | 19.83988 | 85.92 | 4.88 | 2168.9 | 5445.1 | 123.68 | 23.97 | 40.86 | 723. |
| 250 | 19.28520 | 84.01 | 4.55 | 2480.7 | 5851.2 | 125.34 | 23.79 | 40.36 | 713. |
| 260 | 18.75614 | 82.44 | 4.26 | 2786.8 | 6252.3 | 126.92 | 23.62 | 39.88 | 705. |
| 270 | 18.25175 | 81.18 | 4.00 | 3087.5 | 6648.8 | 128.41 | 23.47 | 39.42 | 698. |
| 280 | 17.77102 | 80.18 | 3.76 | 3383.2 | 7040.8 | 129.84 | 23.33 | 38.99 | 692. |
| 290 | 17.31290 | 79.40 | 3.55 | 3674.2 | 7428.6 | 131.20 | 23.21 | 38.57 | 686. |
| 300 | 16.87630 | 78.82 | 3.36 | 3960.9 | 7812.4 | 132.50 | 23.10 | 38.18 | 682. |
| 310 | 16.46015 | 78.41 | 3.19 | 4243.4 | 8192.4 | 133.75 | 23.00 | 37.81 | 678. |
| 320 | 16.06338 | 78.14 | 3.03 | 4522.2 | 8568.7 | 134.94 | 22.92 | 37.46 | 675. |
| 330 | 15.68494 | 78.01 | 2.88 | 4797.6 | 8941.7 | 136.09 | 22.84 | 37.13 | 673. |
| 340 | 15.32382 | 78.00 | 2.75 | 5069.6 | 9311.4 | 137.19 | 22.76 | 36.82 | 671. |
| 350 | 14.97904 | 78.08 | 2.63 | 5338.7 | 9678.1 | 138.26 | 22.70 | 36.53 | 670. |
| 360 | 14.64967 | 78.25 | 2.52 | 5605.0 | 10042.0 | 139.28 | 22.64 | 36.25 | 669. |
| 370 | 14.33483 | 78.49 | 2.42 | 5868.7 | 10403.1 | 140.27 | 22.59 | 35.99 | 668. |
| 380 | 14.03367 | 78.81 | 2.32 | 6130.1 | 10761.8 | 141.23 | 22.55 | 35.75 | 668. |
| 390 | 13.74540 | 79.18 | 2.23 | 6389.3 | 11118.1 | 142.15 | 22.51 | 35.52 | 668. |
| 400 | 13.46927 | 79.60 | 2.15 | 6646.4 | 11472.2 | 143.05 | 22.48 | 35.30 | 668. |
| 420 | 12.95069 | 80.59 | 2.00 | 7155.3 | 12174.3 | 144.76 | 22.43 | 34.92 | 669. |
| 440 | 12.47284 | 81.72 | 1.88 | 7657.9 | 12869.2 | 146.38 | 22.41 | 34.58 | 671. |
| 460 | 12.03125 | 82.97 | 1.76 | 8155.2 | 13557.8 | 147.91 | 22.40 | 34.29 | 673. |
| 480 | 11.62203 | 84.31 | 1.66 | 8648.3 | 14241.1 | 149.36 | 22.40 | 34.04 | 676. |
| 500 | 11.24177 | 85.72 | 1.57 | 9137.8 | 14919.8 | 150.75 | 22.42 | 33.83 | 679. |
| 520 | 10.88751 | 87.19 | 1.49 | 9624.4 | 15594.6 | 152.07 | 22.46 | 33.65 | 683. |
| 540 | 10.55665 | 88.70 | 1.42 | 10108.9 | 16266.1 | 153.34 | 22.51 | 33.51 | 687. |
| 560 | 10.24691 | 90.26 | 1.35 | 10591.6 | 16935.0 | 154.55 | 22.57 | 33.39 | 690. |
| 580 | 9.95628 | 91.84 | 1.29 | 11073.2 | 17601.8 | 155.72 | 22.63 | 33.29 | 694. |
| 600 | 9.68302 | 93.45 | 1.24 | 11554.1 | 18266.9 | 156.85 | 22.71 | 33.22 | 699. |
| 620 | 9.42557 | 95.08 | 1.19 | 12034.5 | 18930.7 | 157.94 | 22.80 | 33.16 | 703. |
| 640 | 9.18255 | 96.73 | 1.14 | 12514.9 | 19593.6 | 158.99 | 22.89 | 33.13 | 707. |
| 660 | 8.95273 | 98.38 | 1.10 | 12995.5 | 20255.9 | 160.01 | 22.98 | 33.11 | 711. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 680 | 8.73504 | 100.05 | 1.06 | 13476.6 | 20917.9 | 161.00 | 23.08 | 33.10 | 716. |
| 700 | 8.52851 | 101.73 | 1.02 | 13958.4 | 21579.9 | 161.96 | 23.19 | 33.10 | 720. |
| 720 | 8.33225 | 103.41 | 0.9895 | 14441.0 | 22242.0 | 162.89 | 23.29 | 33.11 | 724. |
| 740 | 8.14550 | 105.09 | 0.9576 | 14924.6 | 22904.5 | 163.80 | 23.40 | 33.14 | 729. |
| 760 | 7.96754 | 106.78 | 0.9278 | 15409.3 | 23567.4 | 164.68 | 23.51 | 33.16 | 733. |
| 780 | 7.79775 | 108.47 | 0.8998 | 15895.4 | 24231.1 | 165.54 | 23.63 | 33.20 | 738. |
| 800 | 7.63555 | 110.16 | 0.8735 | 16382.7 | 24895.5 | 166.39 | 23.74 | 33.24 | 742. |
| 850 | 7.25996 | 114.40 | 0.8142 | 17607.4 | 26560.7 | 168.40 | 24.02 | 33.37 | 753. |
| 900 | 6.92175 | 118.63 | 0.7627 | 18841.8 | 28232.5 | 170.32 | 24.30 | 33.51 | 764. |
| 950 | 6.61539 | 122.86 | 0.7175 | 20086.2 | 29911.8 | 172.13 | 24.57 | 33.66 | 775. |
| 1000 | 6.33641 | 127.08 | 0.6775 | 21340.7 | 31598.9 | 173.86 | 24.83 | 33.82 | 786. |
| 1050 | 6.08115 | 131.29 | 0.6419 | 22605.2 | 33294.0 | 175.52 | 25.07 | 33.98 | 797. |
| 1100 | 5.84660 | 135.49 | 0.6099 | 23879.5 | 34997.1 | 177.10 | 25.31 | 34.14 | 808. |
| 1150 | 5.63024 | 139.69 | 0.5811 | 25163.2 | 36708.0 | 178.62 | 25.53 | 34.30 | 819. |
| 1200 | 5.42995 | 143.87 | 0.5549 | 26455.9 | 38426.6 | 180.09 | 25.73 | 34.45 | 829. |

700 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 77.298 | 32.27507 | 323.55 | 20.16 | −3884.2 | −1715.3 | 72.00 | 36.12 | 45.44 | 1205. |
| 78 | 32.23095 | 318.46 | 20.18 | −3855.2 | −1683.4 | 72.41 | 35.81 | 45.41 | 1201. |
| 80 | 32.10130 | 304.93 | 20.20 | −3773.2 | −1592.6 | 73.56 | 34.98 | 45.37 | 1188. |
| 82 | 31.96604 | 292.68 | 20.19 | −3691.7 | −1501.9 | 74.68 | 34.22 | 45.40 | 1177. |
| 84 | 31.82557 | 281.58 | 20.12 | −3610.5 | −1411.0 | 75.78 | 33.54 | 45.47 | 1167. |
| 86 | 31.68033 | 271.49 | 20.02 | −3529.6 | −1320.0 | 76.85 | 32.93 | 45.57 | 1158. |
| 88 | 31.53081 | 262.31 | 19.87 | −3448.8 | −1228.7 | 77.90 | 32.38 | 45.70 | 1150. |
| 90 | 31.37749 | 253.92 | 19.69 | −3368.1 | −1137.2 | 78.93 | 31.89 | 45.84 | 1141. |
| 92 | 31.22084 | 246.24 | 19.47 | −3287.4 | −1045.3 | 79.94 | 31.45 | 45.99 | 1134. |
| 94 | 31.06133 | 239.19 | 19.23 | −3206.8 | −953.2 | 80.93 | 31.06 | 46.13 | 1126. |
| 96 | 30.89939 | 232.69 | 18.97 | −3126.2 | −860.8 | 81.90 | 30.71 | 46.26 | 1118. |
| 98 | 30.73543 | 226.67 | 18.68 | −3045.7 | −768.2 | 82.85 | 30.40 | 46.38 | 1111. |
| 100 | 30.56982 | 221.08 | 18.38 | −2965.2 | −675.3 | 83.79 | 30.12 | 46.48 | 1104. |
| 102 | 30.40291 | 215.86 | 18.07 | −2884.7 | −582.3 | 84.71 | 29.86 | 46.57 | 1096. |
| 104 | 30.23499 | 210.98 | 17.76 | −2804.3 | −489.1 | 85.62 | 29.63 | 46.64 | 1089. |
| 106 | 30.06632 | 206.38 | 17.43 | −2723.9 | −395.8 | 86.51 | 29.42 | 46.69 | 1081. |
| 108 | 29.89715 | 202.04 | 17.11 | −2643.7 | −302.3 | 87.38 | 29.23 | 46.73 | 1074. |
| 110 | 29.72769 | 197.92 | 16.78 | −2563.5 | −208.8 | 88.24 | 29.05 | 46.76 | 1066. |
| 112 | 29.55809 | 194.00 | 16.45 | −2483.5 | −115.3 | 89.08 | 28.89 | 46.77 | 1059. |
| 114 | 29.38853 | 190.27 | 16.13 | −2403.6 | −21.8 | 89.91 | 28.73 | 46.77 | 1051. |
| 116 | 29.21914 | 186.69 | 15.80 | −2323.9 | 71.8 | 90.72 | 28.59 | 46.76 | 1044. |
| 118 | 29.05001 | 183.26 | 15.48 | −2244.4 | 165.3 | 91.52 | 28.46 | 46.74 | 1037. |
| 120 | 28.88126 | 179.97 | 15.17 | −2165.0 | 258.7 | 92.31 | 28.33 | 46.71 | 1029. |
| 122 | 28.71297 | 176.79 | 14.85 | −2085.8 | 352.1 | 93.08 | 28.21 | 46.67 | 1022. |
| 124 | 28.54520 | 173.73 | 14.55 | −2006.8 | 445.4 | 93.84 | 28.09 | 46.63 | 1015. |
| 126 | 28.37802 | 170.77 | 14.25 | −1928.1 | 538.6 | 94.58 | 27.98 | 46.58 | 1007. |
| 128 | 28.21148 | 167.91 | 13.95 | −1849.5 | 631.7 | 95.32 | 27.87 | 46.52 | 1000. |
| 130 | 28.04561 | 165.14 | 13.67 | −1771.2 | 724.7 | 96.04 | 27.77 | 46.46 | 993. |
| 132 | 27.88047 | 162.46 | 13.38 | −1693.2 | 817.6 | 96.75 | 27.67 | 46.39 | 986. |
| 134 | 27.71609 | 159.86 | 13.11 | −1615.3 | 910.3 | 97.44 | 27.57 | 46.32 | 979. |
| 136 | 27.55249 | 157.34 | 12.84 | −1537.8 | 1002.8 | 98.13 | 27.47 | 46.24 | 972. |
| 138 | 27.38970 | 154.90 | 12.58 | −1460.5 | 1095.2 | 98.80 | 27.38 | 46.16 | 966. |
| 140 | 27.22774 | 152.52 | 12.32 | −1383.4 | 1187.5 | 99.47 | 27.29 | 46.08 | 959. |
| 142 | 27.06663 | 150.22 | 12.07 | −1306.7 | 1279.5 | 100.12 | 27.20 | 45.99 | 952. |
| 144 | 26.90640 | 147.99 | 11.82 | −1230.2 | 1371.4 | 100.76 | 27.11 | 45.90 | 946. |
| 146 | 26.74705 | 145.82 | 11.59 | −1154.0 | 1463.1 | 101.39 | 27.02 | 45.80 | 939. |
| 148 | 26.58860 | 143.72 | 11.35 | −1078.1 | 1554.6 | 102.02 | 26.93 | 45.71 | 933. |
| 150 | 26.43108 | 141.68 | 11.13 | −1002.4 | 1646.0 | 102.63 | 26.85 | 45.61 | 927. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 155 | 26.04136 | 136.85 | 10.59 | −814.7 | 1873.4 | 104.12 | 26.64 | 45.36 | 912. |
| 160 | 25.65763 | 132.37 | 10.08 | −628.7 | 2099.5 | 105.56 | 26.44 | 45.09 | 898. |
| 165 | 25.28005 | 128.23 | 9.60 | −444.7 | 2324.3 | 106.94 | 26.25 | 44.82 | 884. |
| 170 | 24.90874 | 124.40 | 9.16 | −262.6 | 2547.7 | 108.27 | 26.07 | 44.54 | 871. |
| 175 | 24.54383 | 120.86 | 8.74 | −82.3 | 2769.7 | 109.56 | 25.89 | 44.26 | 859. |
| 180 | 24.18540 | 117.59 | 8.35 | 96.0 | 2990.3 | 110.80 | 25.71 | 43.97 | 847. |
| 185 | 23.83352 | 114.57 | 7.99 | 272.4 | 3209.4 | 112.01 | 25.55 | 43.68 | 836. |
| 190 | 23.48824 | 111.78 | 7.65 | 446.9 | 3427.1 | 113.17 | 25.39 | 43.39 | 826. |
| 195 | 23.14959 | 109.22 | 7.32 | 619.5 | 3643.4 | 114.29 | 25.23 | 43.11 | 816. |
| 200 | 22.81759 | 106.85 | 7.02 | 790.4 | 3858.2 | 115.38 | 25.09 | 42.82 | 807. |
| 210 | 22.17349 | 102.65 | 6.48 | 1126.7 | 4283.6 | 117.45 | 24.81 | 42.26 | 790. |
| 220 | 21.55573 | 99.10 | 5.99 | 1456.1 | 4703.5 | 119.41 | 24.56 | 41.72 | 775. |
| 230 | 20.96390 | 96.09 | 5.56 | 1778.9 | 5118.0 | 121.25 | 24.33 | 41.19 | 762. |
| 240 | 20.39741 | 93.55 | 5.18 | 2095.6 | 5527.4 | 122.99 | 24.12 | 40.69 | 751. |
| 250 | 19.85556 | 91.43 | 4.84 | 2406.4 | 5931.8 | 124.64 | 23.93 | 40.21 | 740. |
| 260 | 19.33756 | 89.65 | 4.54 | 2711.7 | 6331.6 | 126.21 | 23.76 | 39.75 | 732. |
| 270 | 18.84254 | 88.19 | 4.27 | 3011.8 | 6726.8 | 127.70 | 23.61 | 39.31 | 724. |
| 280 | 18.36957 | 87.00 | 4.02 | 3307.2 | 7117.8 | 129.12 | 23.47 | 38.89 | 717. |
| 290 | 17.91772 | 86.04 | 3.80 | 3598.0 | 7504.8 | 130.48 | 23.34 | 38.50 | 712. |
| 300 | 17.48603 | 85.29 | 3.60 | 3884.7 | 7887.9 | 131.78 | 23.23 | 38.13 | 707. |
| 310 | 17.07355 | 84.72 | 3.42 | 4167.5 | 8267.4 | 133.03 | 23.13 | 37.77 | 703. |
| 320 | 16.67931 | 84.30 | 3.25 | 4446.6 | 8643.4 | 134.22 | 23.03 | 37.44 | 699. |
| 330 | 16.30240 | 84.03 | 3.10 | 4722.3 | 9016.2 | 135.37 | 22.95 | 37.12 | 697. |
| 340 | 15.94192 | 83.88 | 2.96 | 4994.9 | 9385.8 | 136.47 | 22.87 | 36.82 | 694. |
| 350 | 15.59699 | 83.83 | 2.83 | 5264.6 | 9752.6 | 137.53 | 22.80 | 36.54 | 692. |
| 360 | 15.26677 | 83.88 | 2.71 | 5531.6 | 10116.7 | 138.56 | 22.74 | 36.27 | 691. |
| 370 | 14.95047 | 84.02 | 2.60 | 5796.0 | 10478.1 | 139.55 | 22.69 | 36.02 | 690. |
| 380 | 14.64732 | 84.23 | 2.50 | 6058.2 | 10837.2 | 140.51 | 22.65 | 35.79 | 689. |
| 390 | 14.35661 | 84.51 | 2.41 | 6318.1 | 11193.9 | 141.43 | 22.60 | 35.57 | 689. |
| 400 | 14.07765 | 84.84 | 2.32 | 6576.2 | 11548.6 | 142.33 | 22.57 | 35.36 | 689. |
| 420 | 13.55245 | 85.66 | 2.16 | 7086.8 | 12251.9 | 144.05 | 22.52 | 34.99 | 689. |
| 440 | 13.06702 | 86.65 | 2.02 | 7591.3 | 12948.3 | 145.67 | 22.49 | 34.66 | 690. |
| 460 | 12.61718 | 87.77 | 1.90 | 8090.6 | 13638.6 | 147.20 | 22.47 | 34.37 | 692. |
| 480 | 12.19927 | 88.99 | 1.79 | 8585.5 | 14323.6 | 148.66 | 22.47 | 34.13 | 695. |
| 500 | 11.81006 | 90.30 | 1.70 | 9076.9 | 15004.1 | 150.05 | 22.49 | 33.92 | 697. |
| 520 | 11.44673 | 91.69 | 1.61 | 9565.5 | 15680.7 | 151.38 | 22.53 | 33.75 | 700. |
| 540 | 11.10676 | 93.13 | 1.53 | 10051.8 | 16354.2 | 152.65 | 22.57 | 33.60 | 704. |
| 560 | 10.78796 | 94.61 | 1.46 | 10536.4 | 17025.1 | 153.87 | 22.63 | 33.48 | 707. |
| 580 | 10.48839 | 96.14 | 1.40 | 11019.7 | 17693.8 | 155.04 | 22.69 | 33.39 | 711. |
| 600 | 10.20631 | 97.69 | 1.34 | 11502.3 | 18360.8 | 156.17 | 22.77 | 33.32 | 714. |
| 620 | 9.94021 | 99.27 | 1.28 | 11984.4 | 19026.5 | 157.26 | 22.85 | 33.26 | 718. |
| 640 | 9.68873 | 100.87 | 1.23 | 12466.4 | 19691.3 | 158.32 | 22.94 | 33.22 | 722. |
| 660 | 9.45067 | 102.49 | 1.19 | 12948.6 | 20355.5 | 159.34 | 23.03 | 33.20 | 726. |
| 680 | 9.22493 | 104.12 | 1.14 | 13431.2 | 21019.4 | 160.33 | 23.13 | 33.19 | 730. |
| 700 | 9.01056 | 105.76 | 1.11 | 13914.5 | 21683.1 | 161.29 | 23.23 | 33.19 | 734. |
| 720 | 8.80668 | 107.41 | 1.07 | 14398.5 | 22347.0 | 162.23 | 23.34 | 33.20 | 739. |
| 740 | 8.61251 | 109.07 | 1.03 | 14883.5 | 23011.2 | 163.14 | 23.45 | 33.22 | 743. |
| 760 | 8.42736 | 110.73 | 1.00 | 15369.6 | 23675.9 | 164.02 | 23.56 | 33.25 | 747. |
| 780 | 8.25057 | 112.40 | 0.9711 | 15856.9 | 24341.2 | 164.89 | 23.67 | 33.28 | 751. |
| 800 | 8.08157 | 114.07 | 0.9427 | 16345.5 | 25007.2 | 165.73 | 23.78 | 33.32 | 755. |
| 850 | 7.68982 | 118.26 | 0.8786 | 17573.3 | 26676.2 | 167.75 | 24.06 | 33.44 | 766. |
| 900 | 7.33658 | 122.46 | 0.8229 | 18810.4 | 28351.6 | 169.67 | 24.33 | 33.58 | 777. |
| 950 | 7.01621 | 126.66 | 0.7740 | 20057.3 | 30034.2 | 171.49 | 24.60 | 33.73 | 787. |
| 1000 | 6.72415 | 130.86 | 0.7307 | 21314.2 | 31724.5 | 173.22 | 24.86 | 33.88 | 798. |
| 1050 | 6.45665 | 135.05 | 0.6922 | 22581.0 | 33422.5 | 174.88 | 25.10 | 34.04 | 809. |
| 1100 | 6.21063 | 139.23 | 0.6577 | 23857.3 | 35128.3 | 176.47 | 25.33 | 34.19 | 819. |
| 1150 | 5.98351 | 143.40 | 0.6265 | 25142.9 | 36841.8 | 177.99 | 25.55 | 34.34 | 829. |
| 1200 | 5.77310 | 147.57 | 0.5982 | 26437.5 | 38562.7 | 179.45 | 25.76 | 34.49 | 840. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 750 bar Isobar | | | | | |
| * 78.229 | 32.37063 | 331.56 | 19.99 | −3858.3 | −1541.4 | 72.25 | 35.75 | 44.76 | 1217. |
| 80 | 32.26154 | 319.26 | 20.08 | −3787.0 | −1462.2 | 73.25 | 35.02 | 44.73 | 1207. |
| 82 | 32.13294 | 306.59 | 20.13 | −3706.8 | −1372.7 | 74.36 | 34.26 | 44.76 | 1196. |
| 84 | 31.99902 | 295.08 | 20.13 | −3627.0 | −1283.1 | 75.44 | 33.58 | 44.84 | 1186. |
| 86 | 31.86019 | 284.61 | 20.08 | −3547.4 | −1193.3 | 76.49 | 32.97 | 44.97 | 1177. |
| 88 | 31.71694 | 275.06 | 19.98 | −3467.9 | −1103.2 | 77.53 | 32.42 | 45.12 | 1169. |
| 90 | 31.56974 | 266.35 | 19.85 | −3388.5 | −1012.8 | 78.54 | 31.94 | 45.29 | 1161. |
| 92 | 31.41905 | 258.37 | 19.67 | −3309.2 | −922.1 | 79.54 | 31.51 | 45.46 | 1154. |
| 94 | 31.26535 | 251.04 | 19.46 | −3229.8 | −831.0 | 80.52 | 31.12 | 45.63 | 1146. |
| 96 | 31.10908 | 244.29 | 19.23 | −3150.4 | −739.6 | 81.48 | 30.78 | 45.79 | 1139. |
| 98 | 30.95065 | 238.06 | 18.97 | −3071.0 | −647.8 | 82.43 | 30.47 | 45.94 | 1132. |
| 100 | 30.79044 | 232.27 | 18.69 | −2991.6 | −555.8 | 83.36 | 30.19 | 46.07 | 1125. |
| 102 | 30.62881 | 226.88 | 18.40 | −2912.3 | −463.6 | 84.27 | 29.94 | 46.18 | 1118. |
| 104 | 30.46607 | 221.85 | 18.10 | −2832.9 | −371.1 | 85.17 | 29.72 | 46.27 | 1110. |
| 106 | 30.30250 | 217.12 | 17.79 | −2753.6 | −278.5 | 86.05 | 29.51 | 46.35 | 1103. |
| 108 | 30.13834 | 212.66 | 17.48 | −2674.3 | −185.8 | 86.92 | 29.32 | 46.40 | 1096. |
| 110 | 29.97381 | 208.45 | 17.16 | −2595.1 | −92.9 | 87.77 | 29.15 | 46.45 | 1089. |
| 112 | 29.80911 | 204.45 | 16.84 | −2516.0 | 0.0 | 88.61 | 28.99 | 46.47 | 1082. |
| 114 | 29.64440 | 200.64 | 16.52 | −2437.0 | 93.0 | 89.43 | 28.84 | 46.49 | 1074. |
| 116 | 29.47981 | 197.00 | 16.20 | −2358.2 | 186.0 | 90.24 | 28.70 | 46.49 | 1067. |
| 118 | 29.31547 | 193.52 | 15.89 | −2279.5 | 278.9 | 91.03 | 28.57 | 46.48 | 1060. |
| 120 | 29.15148 | 190.17 | 15.57 | −2200.9 | 371.9 | 91.81 | 28.45 | 46.45 | 1053. |
| 122 | 28.98794 | 186.95 | 15.26 | −2122.6 | 464.7 | 92.58 | 28.33 | 46.42 | 1046. |
| 124 | 28.82491 | 183.85 | 14.96 | −2044.4 | 557.5 | 93.34 | 28.21 | 46.38 | 1039. |
| 126 | 28.66247 | 180.85 | 14.66 | −1966.4 | 650.3 | 94.08 | 28.11 | 46.33 | 1032. |
| 128 | 28.50066 | 177.96 | 14.37 | −1888.6 | 742.9 | 94.81 | 28.00 | 46.28 | 1025. |
| 130 | 28.33954 | 175.16 | 14.08 | −1811.1 | 835.4 | 95.52 | 27.90 | 46.22 | 1018. |
| 132 | 28.17913 | 172.44 | 13.80 | −1733.8 | 927.7 | 96.23 | 27.80 | 46.15 | 1011. |
| 134 | 28.01949 | 169.81 | 13.52 | −1656.7 | 1020.0 | 96.92 | 27.70 | 46.08 | 1004. |
| 136 | 27.86063 | 167.26 | 13.25 | −1579.9 | 1112.1 | 97.60 | 27.61 | 46.01 | 997. |
| 138 | 27.70258 | 164.78 | 12.99 | −1503.3 | 1204.0 | 98.28 | 27.52 | 45.93 | 991. |
| 140 | 27.54537 | 162.38 | 12.73 | −1427.0 | 1295.8 | 98.94 | 27.43 | 45.84 | 984. |
| 142 | 27.38901 | 160.05 | 12.48 | −1351.0 | 1387.4 | 99.59 | 27.34 | 45.76 | 978. |
| 144 | 27.23352 | 157.78 | 12.23 | −1275.2 | 1478.8 | 100.23 | 27.25 | 45.67 | 971. |
| 146 | 27.07892 | 155.58 | 11.99 | −1199.6 | 1570.0 | 100.85 | 27.17 | 45.57 | 965. |
| 148 | 26.92521 | 153.44 | 11.76 | −1124.4 | 1661.1 | 101.47 | 27.08 | 45.48 | 959. |
| 150 | 26.77241 | 151.37 | 11.53 | −1049.4 | 1751.9 | 102.08 | 27.00 | 45.38 | 953. |
| 155 | 26.39446 | 146.44 | 10.98 | −863.3 | 1978.2 | 103.57 | 26.80 | 45.13 | 938. |
| 160 | 26.02241 | 141.85 | 10.47 | −678.9 | 2203.2 | 105.00 | 26.60 | 44.86 | 924. |
| 165 | 25.65636 | 137.60 | 9.99 | −496.4 | 2426.8 | 106.37 | 26.41 | 44.59 | 911. |
| 170 | 25.29641 | 133.65 | 9.54 | −315.7 | 2649.1 | 107.70 | 26.23 | 44.32 | 898. |
| 175 | 24.94263 | 129.99 | 9.12 | −136.9 | 2870.0 | 108.98 | 26.05 | 44.03 | 886. |
| 180 | 24.59508 | 126.60 | 8.72 | 40.1 | 3089.5 | 110.22 | 25.88 | 43.75 | 874. |
| 185 | 24.25381 | 123.46 | 8.35 | 215.2 | 3307.5 | 111.41 | 25.71 | 43.47 | 863. |
| 190 | 23.91883 | 120.56 | 8.00 | 388.5 | 3524.1 | 112.57 | 25.55 | 43.18 | 853. |
| 195 | 23.59015 | 117.87 | 7.67 | 560.1 | 3739.4 | 113.69 | 25.40 | 42.90 | 843. |
| 200 | 23.26778 | 115.38 | 7.37 | 729.8 | 3953.2 | 114.77 | 25.25 | 42.62 | 834. |
| 210 | 22.64186 | 110.95 | 6.81 | 1064.2 | 4376.6 | 116.83 | 24.97 | 42.07 | 817. |
| 220 | 22.04078 | 107.17 | 6.31 | 1391.9 | 4794.7 | 118.78 | 24.72 | 41.54 | 802. |
| 230 | 21.46407 | 103.94 | 5.87 | 1713.3 | 5207.6 | 120.61 | 24.48 | 41.03 | 789. |
| 240 | 20.91116 | 101.19 | 5.48 | 2028.8 | 5615.4 | 122.35 | 24.27 | 40.54 | 777. |
| 250 | 20.38135 | 98.86 | 5.13 | 2338.6 | 6018.5 | 124.00 | 24.08 | 40.08 | 766. |
| 260 | 19.87389 | 96.90 | 4.81 | 2643.2 | 6417.0 | 125.56 | 23.90 | 39.63 | 757. |
| 270 | 19.38797 | 95.25 | 4.53 | 2942.8 | 6811.2 | 127.05 | 23.75 | 39.21 | 749. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 280 | 18.92274 | 93.87 | 4.27 | 3237.8 | 7201.3 | 128.47 | 23.60 | 38.81 | 742. |
| 290 | 18.47735 | 92.74 | 4.04 | 3528.4 | 7587.4 | 129.82 | 23.47 | 38.43 | 736. |
| 300 | 18.05092 | 91.83 | 3.83 | 3815.0 | 7969.9 | 131.12 | 23.35 | 38.07 | 731. |
| 310 | 17.64260 | 91.10 | 3.64 | 4097.8 | 8348.9 | 132.36 | 23.24 | 37.73 | 727. |
| 320 | 17.25152 | 90.54 | 3.47 | 4377.1 | 8724.6 | 133.55 | 23.15 | 37.41 | 723. |
| 330 | 16.87686 | 90.13 | 3.31 | 4653.1 | 9097.1 | 134.70 | 23.06 | 37.10 | 720. |
| 340 | 16.51781 | 89.85 | 3.16 | 4926.1 | 9466.7 | 135.80 | 22.98 | 36.81 | 717. |
| 350 | 16.17357 | 89.68 | 3.02 | 5196.2 | 9833.4 | 136.87 | 22.91 | 36.54 | 715. |
| 360 | 15.84339 | 89.62 | 2.90 | 5463.7 | 10197.6 | 137.89 | 22.84 | 36.29 | 713. |
| 370 | 15.52654 | 89.64 | 2.78 | 5728.8 | 10559.2 | 138.88 | 22.79 | 36.05 | 711. |
| 380 | 15.22234 | 89.75 | 2.68 | 5991.5 | 10918.5 | 139.84 | 22.74 | 35.82 | 710. |
| 390 | 14.93012 | 89.93 | 2.58 | 6252.2 | 11275.6 | 140.77 | 22.69 | 35.60 | 710. |
| 400 | 14.64926 | 90.18 | 2.48 | 6510.9 | 11630.7 | 141.67 | 22.66 | 35.40 | 709. |
| 420 | 14.11927 | 90.83 | 2.32 | 7023.1 | 12335.0 | 143.39 | 22.60 | 35.04 | 709. |
| 440 | 13.62801 | 91.67 | 2.17 | 7529.2 | 13032.6 | 145.01 | 22.56 | 34.72 | 710. |
| 460 | 13.17160 | 92.66 | 2.04 | 8030.1 | 13724.2 | 146.54 | 22.55 | 34.45 | 711. |
| 480 | 12.74659 | 93.77 | 1.92 | 8526.7 | 14410.6 | 148.01 | 22.54 | 34.21 | 713. |
| 500 | 12.34992 | 94.98 | 1.82 | 9019.8 | 15092.7 | 149.40 | 22.56 | 34.00 | 715. |
| 520 | 11.97890 | 96.27 | 1.73 | 9510.0 | 15771.0 | 150.73 | 22.59 | 33.83 | 717. |
| 540 | 11.63112 | 97.63 | 1.64 | 9997.9 | 16446.2 | 152.00 | 22.63 | 33.69 | 720. |
| 560 | 11.30446 | 99.05 | 1.57 | 10484.2 | 17118.7 | 153.23 | 22.68 | 33.57 | 723. |
| 580 | 10.99704 | 100.50 | 1.50 | 10969.1 | 17789.1 | 154.40 | 22.75 | 33.48 | 727. |
| 600 | 10.70719 | 102.00 | 1.44 | 11453.2 | 18457.9 | 155.53 | 22.82 | 33.40 | 730. |
| 620 | 10.43341 | 103.53 | 1.38 | 11936.9 | 19125.3 | 156.63 | 22.90 | 33.35 | 734. |
| 640 | 10.17438 | 105.08 | 1.32 | 12420.4 | 19791.8 | 157.69 | 22.99 | 33.31 | 737. |
| 660 | 9.92890 | 106.66 | 1.27 | 12904.0 | 20457.7 | 158.71 | 23.08 | 33.28 | 741. |
| 680 | 9.69590 | 108.25 | 1.23 | 13388.0 | 21123.3 | 159.71 | 23.18 | 33.27 | 745. |
| 700 | 9.47443 | 109.85 | 1.19 | 13872.6 | 21788.7 | 160.67 | 23.28 | 33.27 | 749. |
| 720 | 9.26361 | 111.47 | 1.15 | 14358.0 | 22454.2 | 161.61 | 23.38 | 33.28 | 753. |
| 740 | 9.06268 | 113.10 | 1.11 | 14844.3 | 23120.0 | 162.52 | 23.49 | 33.30 | 757. |
| 760 | 8.87093 | 114.74 | 1.08 | 15331.6 | 23786.2 | 163.41 | 23.60 | 33.33 | 761. |
| 780 | 8.68772 | 116.38 | 1.04 | 15820.2 | 24453.1 | 164.27 | 23.71 | 33.36 | 765. |
| 800 | 8.51246 | 118.03 | 1.01 | 16310.0 | 25120.6 | 165.12 | 23.82 | 33.40 | 769. |
| 850 | 8.10578 | 122.18 | 0.9430 | 17540.5 | 26793.2 | 167.15 | 24.10 | 33.51 | 779. |
| 900 | 7.73856 | 126.33 | 0.8830 | 18780.2 | 28472.0 | 169.07 | 24.37 | 33.64 | 789. |
| 950 | 7.40511 | 130.50 | 0.8305 | 20029.6 | 30157.7 | 170.89 | 24.63 | 33.79 | 799. |
| 1000 | 7.10079 | 134.67 | 0.7840 | 21288.7 | 31850.9 | 172.63 | 24.89 | 33.94 | 810. |
| 1050 | 6.82181 | 138.83 | 0.7426 | 22557.6 | 33551.7 | 174.29 | 25.13 | 34.09 | 820. |
| 1100 | 6.56499 | 143.00 | 0.7054 | 23835.9 | 35260.1 | 175.87 | 25.36 | 34.24 | 830. |
| 1150 | 6.32770 | 147.16 | 0.6719 | 25123.3 | 36976.0 | 177.40 | 25.58 | 34.39 | 840. |
| 1200 | 6.10770 | 151.31 | 0.6415 | 26419.6 | 38699.2 | 178.87 | 25.78 | 34.53 | 851. |

800 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 79.152 | 32.46482 | 339.64 | 19.86 | −3832.6 | −1368.4 | 72.49 | 35.37 | 44.09 | 1229. |
| 80 | 32.41472 | 333.70 | 19.93 | −3799.0 | −1331.0 | 72.96 | 35.02 | 44.08 | 1225. |
| 82 | 32.29242 | 320.59 | 20.05 | −3720.2 | −1242.8 | 74.05 | 34.26 | 44.12 | 1214. |
| 84 | 32.16468 | 308.67 | 20.11 | −3641.7 | −1154.5 | 75.11 | 33.58 | 44.22 | 1205. |
| 86 | 32.03193 | 297.80 | 20.12 | −3563.4 | −1065.9 | 76.15 | 32.98 | 44.37 | 1196. |
| 88 | 31.89461 | 287.89 | 20.07 | −3485.3 | −977.0 | 77.18 | 32.44 | 44.55 | 1188. |
| 90 | 31.75320 | 278.83 | 19.98 | −3407.1 | −887.7 | 78.18 | 31.96 | 44.74 | 1180. |
| 92 | 31.60816 | 270.53 | 19.84 | −3329.0 | −798.0 | 79.16 | 31.54 | 44.94 | 1173. |
| 94 | 31.45996 | 262.91 | 19.67 | −3250.9 | −707.9 | 80.13 | 31.16 | 45.14 | 1166. |
| 96 | 31.30904 | 255.90 | 19.47 | −3172.7 | −617.5 | 81.09 | 30.83 | 45.33 | 1159. |
| 98 | 31.15582 | 249.43 | 19.24 | −3094.4 | −526.6 | 82.02 | 30.53 | 45.50 | 1152. |
| 100 | 31.00070 | 243.43 | 18.98 | −3016.1 | −435.5 | 82.94 | 30.26 | 45.66 | 1145. |
| 102 | 30.84402 | 237.86 | 18.71 | −2937.7 | −344.0 | 83.85 | 30.01 | 45.80 | 1138. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 104 | 30.68613 | 232.66 | 18.43 | −2859.4 | −252.3 | 84.74 | 29.79 | 45.91 | 1131. |
| 106 | 30.52730 | 227.78 | 18.13 | −2781.0 | −160.4 | 85.61 | 29.59 | 46.01 | 1124. |
| 108 | 30.36780 | 223.20 | 17.83 | −2702.7 | −68.3 | 86.48 | 29.41 | 46.09 | 1117. |
| 110 | 30.20786 | 218.88 | 17.52 | −2624.4 | 24.0 | 87.32 | 29.24 | 46.15 | 1110. |
| 112 | 30.04768 | 214.79 | 17.21 | −2546.1 | 116.3 | 88.15 | 29.09 | 46.19 | 1103. |
| 114 | 29.88743 | 210.89 | 16.90 | −2468.0 | 208.7 | 88.97 | 28.94 | 46.22 | 1096. |
| 116 | 29.72726 | 207.18 | 16.58 | −2390.0 | 301.2 | 89.78 | 28.81 | 46.23 | 1089. |
| 118 | 29.56730 | 203.64 | 16.27 | −2312.1 | 393.6 | 90.57 | 28.68 | 46.23 | 1082. |
| 120 | 29.40767 | 200.24 | 15.96 | −2234.3 | 486.1 | 91.34 | 28.56 | 46.22 | 1076. |
| 122 | 29.24846 | 196.97 | 15.66 | −2156.7 | 578.5 | 92.11 | 28.44 | 46.19 | 1069. |
| 124 | 29.08974 | 193.82 | 15.35 | −2079.3 | 670.8 | 92.86 | 28.33 | 46.16 | 1062. |
| 126 | 28.93159 | 190.79 | 15.06 | −2002.0 | 763.1 | 93.60 | 28.23 | 46.12 | 1055. |
| 128 | 28.77407 | 187.86 | 14.76 | −1925.0 | 855.3 | 94.32 | 28.13 | 46.07 | 1048. |
| 130 | 28.61723 | 185.02 | 14.48 | −1848.1 | 947.4 | 95.04 | 28.03 | 46.01 | 1041. |
| 132 | 28.46110 | 182.27 | 14.20 | −1771.5 | 1039.3 | 95.74 | 27.93 | 45.95 | 1035. |
| 134 | 28.30573 | 179.61 | 13.92 | −1695.1 | 1131.2 | 96.43 | 27.84 | 45.88 | 1028. |
| 136 | 28.15114 | 177.03 | 13.65 | −1619.0 | 1222.9 | 97.11 | 27.75 | 45.80 | 1021. |
| 138 | 27.99736 | 174.53 | 13.38 | −1543.0 | 1314.4 | 97.77 | 27.66 | 45.73 | 1015. |
| 140 | 27.84441 | 172.09 | 13.12 | −1467.4 | 1405.8 | 98.43 | 27.57 | 45.64 | 1008. |
| 142 | 27.69231 | 169.73 | 12.87 | −1391.9 | 1497.0 | 99.08 | 27.48 | 45.56 | 1002. |
| 144 | 27.54108 | 167.43 | 12.62 | −1316.8 | 1588.0 | 99.72 | 27.40 | 45.47 | 996. |
| 146 | 27.39073 | 165.20 | 12.38 | −1241.9 | 1678.8 | 100.34 | 27.31 | 45.38 | 990. |
| 148 | 27.24127 | 163.03 | 12.15 | −1167.2 | 1769.5 | 100.96 | 27.23 | 45.28 | 984. |
| 150 | 27.09271 | 160.92 | 11.92 | −1092.9 | 1859.9 | 101.57 | 27.15 | 45.18 | 978. |
| 155 | 26.72531 | 155.90 | 11.37 | −908.2 | 2085.2 | 103.04 | 26.95 | 44.93 | 963. |
| 160 | 26.36371 | 151.22 | 10.85 | −725.2 | 2309.2 | 104.47 | 26.76 | 44.67 | 949. |
| 165 | 26.00799 | 146.87 | 10.36 | −544.1 | 2531.9 | 105.84 | 26.57 | 44.40 | 936. |
| 170 | 25.65822 | 142.82 | 9.91 | −364.7 | 2753.2 | 107.16 | 26.39 | 44.13 | 923. |
| 175 | 25.31444 | 139.05 | 9.48 | −187.1 | 2973.2 | 108.43 | 26.21 | 43.85 | 911. |
| 180 | 24.97667 | 135.55 | 9.08 | −11.3 | 3191.7 | 109.66 | 26.04 | 43.57 | 900. |
| 185 | 24.64494 | 132.30 | 8.70 | 162.7 | 3408.8 | 110.85 | 25.87 | 43.29 | 889. |
| 190 | 24.31924 | 129.28 | 8.34 | 335.0 | 3624.6 | 112.00 | 25.71 | 43.01 | 879. |
| 195 | 23.99957 | 126.47 | 8.01 | 505.5 | 3838.9 | 113.12 | 25.56 | 42.73 | 869. |
| 200 | 23.68591 | 123.87 | 7.70 | 674.3 | 4051.9 | 114.20 | 25.41 | 42.45 | 860. |
| 210 | 23.07650 | 119.22 | 7.12 | 1007.0 | 4473.7 | 116.25 | 25.13 | 41.92 | 843. |
| 220 | 22.49063 | 115.22 | 6.62 | 1333.2 | 4890.2 | 118.19 | 24.87 | 41.39 | 827. |
| 230 | 21.92783 | 111.78 | 6.16 | 1653.3 | 5301.7 | 120.02 | 24.63 | 40.90 | 814. |
| 240 | 21.38750 | 108.83 | 5.76 | 1967.7 | 5708.2 | 121.75 | 24.42 | 40.42 | 802. |
| 250 | 20.86897 | 106.31 | 5.40 | 2276.7 | 6110.1 | 123.39 | 24.22 | 39.96 | 791. |
| 260 | 20.37150 | 104.16 | 5.07 | 2580.5 | 6507.6 | 124.95 | 24.04 | 39.53 | 782. |
| 270 | 19.89434 | 102.33 | 4.78 | 2879.6 | 6900.8 | 126.44 | 23.88 | 39.12 | 774. |
| 280 | 19.43669 | 100.79 | 4.52 | 3174.1 | 7290.1 | 127.85 | 23.73 | 38.73 | 766. |
| 290 | 18.99777 | 99.49 | 4.28 | 3464.5 | 7675.5 | 129.20 | 23.59 | 38.37 | 760. |
| 300 | 18.57677 | 98.42 | 4.06 | 3751.0 | 8057.4 | 130.50 | 23.47 | 38.02 | 754. |
| 310 | 18.17290 | 97.55 | 3.86 | 4033.8 | 8435.9 | 131.74 | 23.36 | 37.69 | 750. |
| 320 | 17.78538 | 96.85 | 3.68 | 4313.2 | 8811.2 | 132.93 | 23.26 | 37.38 | 745. |
| 330 | 17.41346 | 96.31 | 3.51 | 4589.4 | 9183.5 | 134.08 | 23.17 | 37.08 | 742. |
| 340 | 17.05640 | 95.90 | 3.36 | 4862.6 | 9552.9 | 135.18 | 23.08 | 36.80 | 739. |
| 350 | 16.71347 | 95.61 | 3.21 | 5133.1 | 9919.6 | 136.24 | 23.01 | 36.54 | 736. |
| 360 | 16.38399 | 95.43 | 3.08 | 5401.0 | 10283.8 | 137.27 | 22.94 | 36.29 | 734. |
| 370 | 16.06730 | 95.35 | 2.96 | 5666.5 | 10645.5 | 138.26 | 22.88 | 36.06 | 732. |
| 380 | 15.76276 | 95.36 | 2.85 | 5929.7 | 11005.0 | 139.22 | 22.83 | 35.84 | 731. |
| 390 | 15.46977 | 95.44 | 2.74 | 6191.0 | 11362.3 | 140.15 | 22.78 | 35.63 | 730. |
| 400 | 15.18774 | 95.60 | 2.65 | 6450.3 | 11717.7 | 141.05 | 22.74 | 35.44 | 729. |
| 420 | 14.65445 | 96.09 | 2.47 | 6963.7 | 12422.8 | 142.77 | 22.68 | 35.08 | 728. |
| 440 | 14.15883 | 96.78 | 2.31 | 7471.1 | 13121.3 | 144.39 | 22.64 | 34.77 | 728. |
| 460 | 13.69725 | 97.64 | 2.18 | 7973.5 | 13814.1 | 145.93 | 22.62 | 34.50 | 729. |
| 480 | 13.26647 | 98.63 | 2.05 | 8471.5 | 14501.8 | 147.39 | 22.61 | 34.27 | 730. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 500 | 12.86361 | 99.74 | 1.94 | 8966.1 | 15185.2 | 148.79 | 22.63 | 34.07 | 732. |
| 520 | 12.48609 | 100.94 | 1.85 | 9457.7 | 15864.9 | 150.12 | 22.65 | 33.90 | 734. |
| 540 | 12.13162 | 102.21 | 1.76 | 9947.2 | 16541.5 | 151.40 | 22.69 | 33.76 | 737. |
| 560 | 11.79816 | 103.55 | 1.68 | 10434.8 | 17215.6 | 152.63 | 22.74 | 33.65 | 740. |
| 580 | 11.48388 | 104.94 | 1.60 | 10921.2 | 17887.5 | 153.80 | 22.80 | 33.55 | 742. |
| 600 | 11.18718 | 106.38 | 1.53 | 11406.8 | 18557.8 | 154.94 | 22.87 | 33.48 | 746. |
| 620 | 10.90658 | 107.85 | 1.47 | 11891.8 | 19226.8 | 156.04 | 22.95 | 33.42 | 749. |
| 640 | 10.64080 | 109.36 | 1.41 | 12376.7 | 19894.9 | 157.10 | 23.04 | 33.39 | 752. |
| 660 | 10.38866 | 110.88 | 1.36 | 12861.6 | 20562.3 | 158.12 | 23.13 | 33.36 | 756. |
| 680 | 10.14911 | 112.44 | 1.31 | 13346.9 | 21229.4 | 159.12 | 23.22 | 33.35 | 759. |
| 700 | 9.92120 | 114.01 | 1.27 | 13832.8 | 21896.3 | 160.09 | 23.32 | 33.35 | 763. |
| 720 | 9.70408 | 115.59 | 1.23 | 14319.4 | 22563.3 | 161.03 | 23.43 | 33.36 | 766. |
| 740 | 9.49698 | 117.19 | 1.19 | 14806.9 | 23230.6 | 161.94 | 23.53 | 33.37 | 770. |
| 760 | 9.29919 | 118.80 | 1.15 | 15295.4 | 23898.3 | 162.83 | 23.64 | 33.40 | 774. |
| 780 | 9.11007 | 120.42 | 1.11 | 15785.0 | 24566.5 | 163.70 | 23.75 | 33.43 | 778. |
| 800 | 8.92905 | 122.04 | 1.08 | 16275.9 | 25235.5 | 164.55 | 23.86 | 33.47 | 782. |
| 850 | 8.50855 | 126.13 | 1.01 | 17509.1 | 26911.4 | 166.58 | 24.13 | 33.58 | 792. |
| 900 | 8.12834 | 130.25 | 0.9432 | 18751.3 | 28593.4 | 168.50 | 24.40 | 33.71 | 801. |
| 950 | 7.78268 | 134.38 | 0.8870 | 20002.9 | 30282.2 | 170.33 | 24.67 | 33.85 | 811. |
| 1000 | 7.46688 | 138.51 | 0.8372 | 21264.2 | 31978.2 | 172.07 | 24.92 | 33.99 | 821. |
| 1050 | 7.17709 | 142.66 | 0.7929 | 22535.0 | 33681.6 | 173.73 | 25.16 | 34.14 | 831. |
| 1100 | 6.91009 | 146.80 | 0.7532 | 23815.2 | 35392.5 | 175.32 | 25.39 | 34.29 | 841. |
| 1150 | 6.66319 | 150.93 | 0.7173 | 25104.4 | 37110.7 | 176.85 | 25.61 | 34.44 | 851. |
| 1200 | 6.43412 | 155.07 | 0.6849 | 26402.3 | 38836.0 | 178.32 | 25.81 | 34.58 | 861. |
| | | | | 850 bar Isobar | | | | | |
| * 80.067 | 32.55759 | 347.78 | 19.76 | −3807.0 | −1196.3 | 72.72 | 34.97 | 43.45 | 1242. |
| 82 | 32.44505 | 334.71 | 19.94 | −3732.1 | −1112.3 | 73.76 | 34.24 | 43.50 | 1232. |
| 84 | 32.32318 | 322.36 | 20.07 | −3654.9 | −1025.2 | 74.81 | 33.57 | 43.61 | 1223. |
| 86 | 32.19619 | 311.09 | 20.13 | −3577.9 | −937.8 | 75.83 | 32.97 | 43.77 | 1214. |
| 88 | 32.06452 | 300.79 | 20.13 | −3501.0 | −850.0 | 76.84 | 32.44 | 43.97 | 1206. |
| 90 | 31.92861 | 291.37 | 20.09 | −3424.1 | −761.9 | 77.83 | 31.97 | 44.19 | 1199. |
| 92 | 31.78894 | 282.74 | 19.99 | −3347.2 | −673.3 | 78.81 | 31.55 | 44.42 | 1192. |
| 94 | 31.64596 | 274.82 | 19.85 | −3270.2 | −584.2 | 79.76 | 31.19 | 44.65 | 1185. |
| 96 | 31.50012 | 267.53 | 19.68 | −3193.1 | −494.7 | 80.71 | 30.86 | 44.87 | 1178. |
| 98 | 31.35184 | 260.81 | 19.48 | −3115.9 | −404.7 | 81.63 | 30.57 | 45.07 | 1172. |
| 100 | 31.20153 | 254.58 | 19.25 | −3038.6 | −314.4 | 82.55 | 30.31 | 45.25 | 1165. |
| 102 | 31.04954 | 248.81 | 19.00 | −2961.3 | −223.7 | 83.44 | 30.07 | 45.42 | 1158. |
| 104 | 30.89621 | 243.43 | 18.73 | −2883.9 | −132.8 | 84.33 | 29.86 | 45.56 | 1152. |
| 106 | 30.74184 | 238.40 | 18.45 | −2806.5 | −41.5 | 85.20 | 29.67 | 45.68 | 1145. |
| 108 | 30.58671 | 233.68 | 18.16 | −2729.0 | 50.0 | 86.05 | 29.49 | 45.78 | 1138. |
| 110 | 30.43106 | 229.23 | 17.86 | −2651.6 | 141.6 | 86.89 | 29.33 | 45.86 | 1131. |
| 112 | 30.27508 | 225.03 | 17.56 | −2574.2 | 233.4 | 87.72 | 29.18 | 45.92 | 1124. |
| 114 | 30.11898 | 221.05 | 17.25 | −2496.9 | 325.3 | 88.53 | 29.04 | 45.96 | 1118. |
| 116 | 29.96290 | 217.26 | 16.95 | −2419.6 | 417.2 | 89.33 | 28.91 | 45.99 | 1111. |
| 118 | 29.80699 | 213.64 | 16.64 | −2342.4 | 509.2 | 90.12 | 28.78 | 46.00 | 1104. |
| 120 | 29.65136 | 210.18 | 16.34 | −2265.4 | 601.2 | 90.89 | 28.67 | 46.00 | 1097. |
| 122 | 29.49612 | 206.86 | 16.03 | −2188.5 | 693.2 | 91.65 | 28.56 | 45.98 | 1090. |
| 124 | 29.34136 | 203.66 | 15.73 | −2111.8 | 785.2 | 92.40 | 28.45 | 45.96 | 1084. |
| 126 | 29.18714 | 200.59 | 15.44 | −2035.2 | 877.0 | 93.13 | 28.35 | 45.92 | 1077. |
| 128 | 29.03353 | 197.62 | 15.15 | −1958.8 | 968.8 | 93.86 | 28.25 | 45.88 | 1070. |
| 130 | 28.88059 | 194.75 | 14.86 | −1882.6 | 1060.5 | 94.57 | 28.15 | 45.82 | 1064. |
| 132 | 28.72835 | 191.97 | 14.58 | −1806.6 | 1152.1 | 95.27 | 28.06 | 45.76 | 1057. |
| 134 | 28.57686 | 189.27 | 14.30 | −1730.8 | 1243.6 | 95.95 | 27.97 | 45.70 | 1051. |
| 136 | 28.42614 | 186.66 | 14.03 | −1655.3 | 1334.9 | 96.63 | 27.88 | 45.63 | 1044. |
| 138 | 28.27623 | 184.13 | 13.76 | −1580.0 | 1426.1 | 97.30 | 27.79 | 45.55 | 1038. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 140 | 28.12714 | 181.66 | 13.50 | −1504.9 | 1517.1 | 97.95 | 27.71 | 45.47 | 1032. |
| 142 | 27.97890 | 179.27 | 13.25 | −1430.0 | 1608.0 | 98.60 | 27.62 | 45.39 | 1025. |
| 144 | 27.83152 | 176.95 | 13.00 | −1355.4 | 1698.7 | 99.23 | 27.54 | 45.30 | 1019. |
| 146 | 27.68501 | 174.68 | 12.76 | −1281.1 | 1789.2 | 99.85 | 27.46 | 45.21 | 1013. |
| 148 | 27.53938 | 172.48 | 12.52 | −1207.0 | 1879.5 | 100.47 | 27.38 | 45.11 | 1007. |
| 150 | 27.39464 | 170.34 | 12.29 | −1133.2 | 1969.6 | 101.07 | 27.30 | 45.02 | 1001. |
| 155 | 27.03676 | 165.24 | 11.73 | −949.8 | 2194.1 | 102.55 | 27.10 | 44.77 | 987. |
| 160 | 26.68460 | 160.48 | 11.21 | −768.1 | 2417.3 | 103.96 | 26.91 | 44.51 | 973. |
| 165 | 26.33821 | 156.04 | 10.72 | −588.1 | 2639.1 | 105.33 | 26.72 | 44.24 | 960. |
| 170 | 25.99763 | 151.89 | 10.26 | −409.9 | 2859.6 | 106.64 | 26.54 | 43.96 | 948. |
| 175 | 25.66288 | 148.02 | 9.82 | −233.4 | 3078.8 | 107.92 | 26.36 | 43.69 | 936. |
| 180 | 25.33396 | 144.42 | 9.42 | −58.7 | 3296.5 | 109.14 | 26.19 | 43.41 | 924. |
| 185 | 25.01087 | 141.06 | 9.03 | 114.3 | 3512.9 | 110.33 | 26.03 | 43.13 | 914. |
| 190 | 24.69359 | 137.93 | 8.67 | 285.7 | 3727.8 | 111.47 | 25.87 | 42.86 | 903. |
| 195 | 24.38211 | 135.02 | 8.33 | 455.3 | 3941.4 | 112.58 | 25.71 | 42.58 | 893. |
| 200 | 24.07638 | 132.31 | 8.01 | 623.2 | 4153.7 | 113.66 | 25.56 | 42.31 | 884. |
| 210 | 23.48204 | 127.45 | 7.43 | 954.3 | 4574.1 | 115.71 | 25.28 | 41.78 | 867. |
| 220 | 22.91014 | 123.24 | 6.91 | 1279.2 | 4989.4 | 117.64 | 25.02 | 41.27 | 852. |
| 230 | 22.36017 | 119.61 | 6.45 | 1598.2 | 5399.6 | 119.47 | 24.78 | 40.78 | 838. |
| 240 | 21.83152 | 116.47 | 6.04 | 1911.6 | 5805.0 | 121.19 | 24.56 | 40.31 | 826. |
| 250 | 21.32355 | 113.76 | 5.66 | 2219.7 | 6205.9 | 122.83 | 24.36 | 39.87 | 815. |
| 260 | 20.83553 | 111.43 | 5.33 | 2522.8 | 6602.4 | 124.38 | 24.18 | 39.44 | 806. |
| 270 | 20.36675 | 109.43 | 5.03 | 2821.4 | 6994.8 | 125.86 | 24.01 | 39.04 | 797. |
| 280 | 19.91647 | 107.73 | 4.75 | 3115.5 | 7383.3 | 127.28 | 23.86 | 38.67 | 789. |
| 290 | 19.48393 | 106.28 | 4.51 | 3405.6 | 7768.2 | 128.63 | 23.72 | 38.31 | 783. |
| 300 | 19.06839 | 105.06 | 4.28 | 3691.9 | 8149.5 | 129.92 | 23.59 | 37.97 | 777. |
| 310 | 18.66913 | 104.04 | 4.07 | 3974.6 | 8527.6 | 131.16 | 23.47 | 37.65 | 772. |
| 320 | 18.28542 | 103.21 | 3.88 | 4254.1 | 8902.6 | 132.35 | 23.37 | 37.35 | 767. |
| 330 | 17.91657 | 102.53 | 3.71 | 4530.4 | 9274.6 | 133.50 | 23.27 | 37.06 | 763. |
| 340 | 17.56189 | 102.00 | 3.55 | 4803.8 | 9643.8 | 134.60 | 23.19 | 36.79 | 760. |
| 350 | 17.22072 | 101.60 | 3.40 | 5074.5 | 10010.4 | 135.66 | 23.11 | 36.53 | 757. |
| 360 | 16.89244 | 101.31 | 3.26 | 5342.7 | 10374.5 | 136.69 | 23.04 | 36.29 | 755. |
| 370 | 16.57643 | 101.13 | 3.14 | 5608.6 | 10736.3 | 137.68 | 22.98 | 36.07 | 753. |
| 380 | 16.27211 | 101.03 | 3.02 | 5872.3 | 11095.9 | 138.64 | 22.92 | 35.85 | 751. |
| 390 | 15.97892 | 101.02 | 2.91 | 6133.9 | 11453.5 | 139.57 | 22.87 | 35.65 | 750. |
| 400 | 15.69633 | 101.09 | 2.80 | 6393.7 | 11809.0 | 140.47 | 22.83 | 35.46 | 749. |
| 420 | 15.16093 | 101.42 | 2.62 | 6908.3 | 12514.8 | 142.19 | 22.76 | 35.12 | 747. |
| 440 | 14.66214 | 101.96 | 2.46 | 7416.8 | 13214.1 | 143.81 | 22.71 | 34.82 | 747. |
| 460 | 14.19656 | 102.69 | 2.31 | 7920.4 | 13907.7 | 145.36 | 22.69 | 34.55 | 747. |
| 480 | 13.76115 | 103.57 | 2.18 | 8419.7 | 14596.5 | 146.82 | 22.68 | 34.33 | 748. |
| 500 | 13.35318 | 104.57 | 2.07 | 8915.5 | 15281.0 | 148.22 | 22.69 | 34.13 | 749. |
| 520 | 12.97019 | 105.67 | 1.96 | 9408.5 | 15962.0 | 149.55 | 22.71 | 33.97 | 751. |
| 540 | 12.61001 | 106.86 | 1.87 | 9899.2 | 16639.9 | 150.83 | 22.75 | 33.83 | 753. |
| 560 | 12.27067 | 108.13 | 1.78 | 10388.2 | 17315.3 | 152.06 | 22.80 | 33.71 | 756. |
| 580 | 11.95041 | 109.45 | 1.70 | 10875.9 | 17988.6 | 153.24 | 22.86 | 33.62 | 758. |
| 600 | 11.64767 | 110.82 | 1.63 | 11362.7 | 18660.3 | 154.38 | 22.93 | 33.55 | 761. |
| 620 | 11.36103 | 112.23 | 1.57 | 11849.0 | 19330.7 | 155.48 | 23.00 | 33.49 | 764. |
| 640 | 11.08922 | 113.69 | 1.51 | 12335.1 | 20000.2 | 156.54 | 23.08 | 33.46 | 767. |
| 660 | 10.83110 | 115.17 | 1.45 | 12821.3 | 20669.0 | 157.57 | 23.17 | 33.43 | 770. |
| 680 | 10.58564 | 116.68 | 1.40 | 13307.8 | 21337.5 | 158.57 | 23.27 | 33.42 | 773. |
| 700 | 10.35190 | 118.21 | 1.35 | 13794.8 | 22005.8 | 159.54 | 23.37 | 33.42 | 777. |
| 720 | 10.12904 | 119.76 | 1.30 | 14282.5 | 22674.2 | 160.48 | 23.47 | 33.42 | 780. |
| 740 | 9.91630 | 121.32 | 1.26 | 14771.1 | 23342.8 | 161.40 | 23.57 | 33.44 | 784. |
| 760 | 9.71297 | 122.90 | 1.22 | 15260.7 | 24011.9 | 162.29 | 23.68 | 33.46 | 787. |
| 780 | 9.51843 | 124.49 | 1.18 | 15751.4 | 24681.5 | 163.16 | 23.79 | 33.49 | 791. |
| 800 | 9.33210 | 126.09 | 1.15 | 16243.4 | 25351.7 | 164.01 | 23.89 | 33.53 | 795. |
| 850 | 8.89882 | 130.13 | 1.07 | 17478.9 | 27030.8 | 166.04 | 24.17 | 33.64 | 804. |
| 900 | 8.50653 | 134.20 | 1.00 | 18723.4 | 28715.8 | 167.97 | 24.43 | 33.76 | 814. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 950 | 8.14946 | 138.29 | 0.9434 | 19977.2 | 30407.4 | 169.80 | 24.70 | 33.90 | 823. |
| 1000 | 7.82290 | 142.39 | 0.8904 | 21240.5 | 32106.1 | 171.54 | 24.95 | 34.05 | 833. |
| 1050 | 7.52294 | 146.51 | 0.8432 | 22513.3 | 33812.0 | 173.20 | 25.19 | 34.19 | 843. |
| 1100 | 7.24634 | 150.62 | 0.8009 | 23795.2 | 35525.3 | 174.80 | 25.42 | 34.34 | 852. |
| 1150 | 6.99036 | 154.74 | 0.7628 | 25086.1 | 37245.7 | 176.33 | 25.63 | 34.48 | 862. |
| 1200 | 6.75269 | 158.86 | 0.7282 | 26385.6 | 38973.1 | 177.80 | 25.83 | 34.62 | 872. |
| | | | | 900 bar Isobar | | | | | |
| * 80.973 | 32.64890 | 355.96 | 19.69 | −3781.7 | −1025.1 | 72.94 | 34.57 | 42.84 | 1255. |
| 82 | 32.59135 | 348.94 | 19.81 | −3742.5 | −981.1 | 73.48 | 34.19 | 42.88 | 1250. |
| 84 | 32.47506 | 336.16 | 20.00 | −3666.5 | −895.2 | 74.52 | 33.53 | 43.00 | 1241. |
| 86 | 32.35356 | 324.48 | 20.11 | −3590.8 | −809.0 | 75.53 | 32.94 | 43.18 | 1232. |
| 88 | 32.22726 | 313.79 | 20.17 | −3515.1 | −722.4 | 76.52 | 32.42 | 43.40 | 1225. |
| 90 | 32.09660 | 304.00 | 20.17 | −3439.4 | −635.4 | 77.50 | 31.96 | 43.65 | 1217. |
| 92 | 31.96205 | 295.02 | 20.11 | −3363.7 | −547.8 | 78.46 | 31.55 | 43.90 | 1210. |
| 94 | 31.82405 | 286.78 | 20.01 | −3287.8 | −459.8 | 79.41 | 31.20 | 44.16 | 1204. |
| 96 | 31.68306 | 279.20 | 19.87 | −3211.8 | −371.2 | 80.34 | 30.88 | 44.41 | 1197. |
| 98 | 31.53949 | 272.21 | 19.70 | −3135.7 | −282.2 | 81.26 | 30.60 | 44.64 | 1191. |
| 100 | 31.39374 | 265.74 | 19.49 | −3059.5 | −192.7 | 82.17 | 30.34 | 44.85 | 1184. |
| 102 | 31.24620 | 259.75 | 19.26 | −2983.1 | −102.8 | 83.06 | 30.12 | 45.04 | 1178. |
| 104 | 31.09720 | 254.18 | 19.02 | −2906.7 | −12.5 | 83.93 | 29.91 | 45.21 | 1171. |
| 106 | 30.94706 | 248.98 | 18.75 | −2830.1 | 78.1 | 84.80 | 29.73 | 45.36 | 1164. |
| 108 | 30.79604 | 244.10 | 18.47 | −2753.5 | 168.9 | 85.64 | 29.56 | 45.48 | 1158. |
| 110 | 30.64441 | 239.53 | 18.19 | −2676.9 | 260.0 | 86.48 | 29.40 | 45.58 | 1151. |
| 112 | 30.49239 | 235.21 | 17.89 | −2600.3 | 351.2 | 87.30 | 29.26 | 45.66 | 1145. |
| 114 | 30.34016 | 231.12 | 17.60 | −2523.8 | 442.6 | 88.11 | 29.13 | 45.72 | 1138. |
| 116 | 30.18790 | 227.24 | 17.30 | −2447.2 | 534.1 | 88.91 | 29.00 | 45.76 | 1131. |
| 118 | 30.03576 | 223.55 | 16.99 | −2370.8 | 625.6 | 89.69 | 28.88 | 45.78 | 1125. |
| 120 | 29.88385 | 220.02 | 16.69 | −2294.5 | 717.2 | 90.46 | 28.77 | 45.79 | 1118. |
| 122 | 29.73229 | 216.63 | 16.39 | −2218.2 | 808.8 | 91.21 | 28.67 | 45.79 | 1111. |
| 124 | 29.58117 | 213.39 | 16.10 | −2142.1 | 900.3 | 91.96 | 28.56 | 45.77 | 1105. |
| 126 | 29.43057 | 210.26 | 15.80 | −2066.2 | 991.9 | 92.69 | 28.46 | 45.74 | 1098. |
| 128 | 29.28056 | 207.25 | 15.51 | −1990.4 | 1083.3 | 93.41 | 28.37 | 45.70 | 1092. |
| 130 | 29.13120 | 204.34 | 15.23 | −1914.8 | 1174.7 | 94.12 | 28.28 | 45.66 | 1085. |
| 132 | 28.98252 | 201.53 | 14.94 | −1839.4 | 1265.9 | 94.82 | 28.19 | 45.60 | 1079. |
| 134 | 28.83458 | 198.80 | 14.67 | −1764.2 | 1357.1 | 95.50 | 28.10 | 45.54 | 1072. |
| 136 | 28.68740 | 196.16 | 14.40 | −1689.2 | 1448.1 | 96.18 | 28.01 | 45.47 | 1066. |
| 138 | 28.54102 | 193.60 | 14.13 | −1614.4 | 1539.0 | 96.84 | 27.93 | 45.40 | 1060. |
| 140 | 28.39545 | 191.10 | 13.87 | −1539.8 | 1629.7 | 97.49 | 27.84 | 45.32 | 1054. |
| 142 | 28.25072 | 188.68 | 13.61 | −1465.5 | 1720.2 | 98.13 | 27.76 | 45.24 | 1048. |
| 144 | 28.10683 | 186.33 | 13.36 | −1391.4 | 1810.6 | 98.77 | 27.68 | 45.15 | 1042. |
| 146 | 27.96382 | 184.04 | 13.12 | −1317.6 | 1900.8 | 99.39 | 27.60 | 45.06 | 1036. |
| 148 | 27.82168 | 181.81 | 12.88 | −1244.0 | 1990.9 | 100.00 | 27.52 | 44.97 | 1030. |
| 150 | 27.68042 | 179.65 | 12.65 | −1170.7 | 2080.7 | 100.60 | 27.44 | 44.87 | 1024. |
| 155 | 27.33118 | 174.47 | 12.09 | −988.5 | 2304.5 | 102.07 | 27.25 | 44.62 | 1010. |
| 160 | 26.98758 | 169.64 | 11.56 | −807.9 | 2526.9 | 103.48 | 27.06 | 44.37 | 996. |
| 165 | 26.64966 | 165.11 | 11.06 | −629.1 | 2748.1 | 104.85 | 26.87 | 44.10 | 983. |
| 170 | 26.31743 | 160.87 | 10.60 | −451.9 | 2967.9 | 106.16 | 26.69 | 43.83 | 971. |
| 175 | 25.99089 | 156.91 | 10.16 | −276.4 | 3186.4 | 107.42 | 26.52 | 43.55 | 959. |
| 180 | 25.67002 | 153.21 | 9.75 | −102.6 | 3403.4 | 108.65 | 26.35 | 43.28 | 948. |
| 185 | 25.35481 | 149.76 | 9.36 | 69.5 | 3619.2 | 109.83 | 26.18 | 43.00 | 937. |
| 190 | 25.04522 | 146.53 | 8.99 | 240.0 | 3833.5 | 110.97 | 26.02 | 42.73 | 927. |
| 195 | 24.74122 | 143.52 | 8.65 | 408.8 | 4046.5 | 112.08 | 25.86 | 42.46 | 917. |
| 200 | 24.44275 | 140.71 | 8.32 | 576.0 | 4258.1 | 113.15 | 25.71 | 42.19 | 908. |
| 210 | 23.86224 | 135.65 | 7.73 | 905.7 | 4677.4 | 115.20 | 25.43 | 41.67 | 891. |
| 220 | 23.30321 | 131.94 | 7.20 | 1229.4 | 5091.5 | 117.12 | 25.17 | 41.16 | 875. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 230 | 22.76512 | 127.41 | 6.73 | 1547.3 | 5500.7 | 118.94 | 24.93 | 40.68 | 862. |
| 240 | 22.24736 | 124.09 | 6.30 | 1859.7 | 5905.1 | 120.66 | 24.70 | 40.22 | 849. |
| 250 | 21.74929 | 121.20 | 5.92 | 2167.1 | 6305.1 | 122.30 | 24.50 | 39.78 | 838. |
| 260 | 21.27021 | 118.71 | 5.58 | 2469.6 | 6700.9 | 123.85 | 24.31 | 39.37 | 828. |
| 270 | 20.80943 | 116.55 | 5.27 | 2767.6 | 7092.6 | 125.33 | 24.14 | 38.98 | 820. |
| 280 | 20.36624 | 114.68 | 4.98 | 3061.4 | 7480.4 | 126.74 | 23.98 | 38.61 | 812. |
| 290 | 19.93994 | 113.09 | 4.73 | 3351.2 | 7864.7 | 128.09 | 23.84 | 38.25 | 805. |
| 300 | 19.52983 | 111.73 | 4.49 | 3637.3 | 8245.6 | 129.38 | 23.71 | 37.92 | 799. |
| 310 | 19.13523 | 110.57 | 4.28 | 3919.9 | 8623.3 | 130.62 | 23.59 | 37.61 | 793. |
| 320 | 18.75546 | 109.61 | 4.08 | 4199.3 | 8997.9 | 131.80 | 23.48 | 37.32 | 789. |
| 330 | 18.38988 | 108.81 | 3.90 | 4475.7 | 9369.7 | 132.95 | 23.38 | 37.04 | 784. |
| 340 | 18.03786 | 108.16 | 3.74 | 4749.2 | 9738.7 | 134.05 | 23.29 | 36.77 | 781. |
| 350 | 17.69879 | 107.64 | 3.58 | 5020.1 | 10105.2 | 135.11 | 23.21 | 36.53 | 778. |
| 360 | 17.37207 | 107.25 | 3.44 | 5288.5 | 10469.3 | 136.14 | 23.13 | 36.29 | 775. |
| 370 | 17.05715 | 106.96 | 3.31 | 5554.7 | 10831.1 | 137.13 | 23.07 | 36.07 | 773. |
| 380 | 16.75348 | 106.77 | 3.18 | 5818.7 | 11190.7 | 138.09 | 23.01 | 35.86 | 771. |
| 390 | 16.46054 | 106.67 | 3.07 | 6080.8 | 11548.4 | 139.02 | 22.96 | 35.67 | 769. |
| 400 | 16.17785 | 106.65 | 2.96 | 6341.0 | 11904.1 | 139.92 | 22.91 | 35.48 | 768. |
| 420 | 15.64130 | 106.81 | 2.77 | 6856.4 | 12610.4 | 141.64 | 22.84 | 35.15 | 766. |
| 440 | 15.14033 | 107.21 | 2.60 | 7365.9 | 13310.3 | 143.27 | 22.79 | 34.85 | 765. |
| 460 | 14.67174 | 107.81 | 2.44 | 7870.5 | 14004.8 | 144.81 | 22.76 | 34.60 | 765. |
| 480 | 14.23266 | 108.57 | 2.31 | 8370.9 | 14694.4 | 146.28 | 22.75 | 34.38 | 765. |
| 500 | 13.82050 | 109.46 | 2.19 | 8867.9 | 15380.0 | 147.68 | 22.75 | 34.18 | 766. |
| 520 | 13.43294 | 110.47 | 2.08 | 9362.1 | 16062.0 | 149.02 | 22.77 | 34.02 | 768. |
| 540 | 13.06790 | 111.57 | 1.98 | 9853.9 | 16741.1 | 150.30 | 22.81 | 33.89 | 769. |
| 560 | 12.72348 | 112.76 | 1.89 | 10344.1 | 17417.6 | 151.53 | 22.85 | 33.77 | 771. |
| 580 | 12.39801 | 114.01 | 1.80 | 10833.0 | 18092.2 | 152.71 | 22.91 | 33.68 | 774. |
| 600 | 12.08996 | 115.32 | 1.73 | 11320.9 | 18765.1 | 153.85 | 22.98 | 33.61 | 776. |
| 620 | 11.79796 | 116.67 | 1.66 | 11808.4 | 19436.8 | 154.95 | 23.05 | 33.56 | 779. |
| 640 | 11.52078 | 118.07 | 1.59 | 12295.6 | 20107.6 | 156.02 | 23.13 | 33.52 | 782. |
| 660 | 11.25729 | 119.50 | 1.54 | 12782.9 | 20777.7 | 157.05 | 23.22 | 33.49 | 784. |
| 680 | 11.00649 | 120.97 | 1.48 | 13270.5 | 21447.4 | 158.05 | 23.31 | 33.48 | 788. |
| 700 | 10.76747 | 122.46 | 1.43 | 13758.5 | 22117.1 | 159.02 | 23.41 | 33.48 | 791. |
| 720 | 10.53939 | 123.97 | 1.38 | 14247.3 | 22786.7 | 159.96 | 23.51 | 33.49 | 794. |
| 740 | 10.32150 | 125.50 | 1.34 | 14737.0 | 23456.6 | 160.88 | 23.61 | 33.50 | 797. |
| 760 | 10.11310 | 127.05 | 1.30 | 15227.6 | 24126.9 | 161.78 | 23.72 | 33.53 | 801. |
| 780 | 9.91358 | 128.61 | 1.26 | 15719.3 | 24797.7 | 162.65 | 23.82 | 33.56 | 804. |
| 800 | 9.72235 | 130.18 | 1.22 | 16212.2 | 25469.2 | 163.50 | 23.93 | 33.59 | 808. |
| 850 | 9.27723 | 134.16 | 1.14 | 17450.1 | 27151.2 | 165.54 | 24.20 | 33.70 | 817. |
| 900 | 8.87370 | 138.18 | 1.06 | 18696.7 | 28839.0 | 167.47 | 24.47 | 33.82 | 826. |
| 950 | 8.50597 | 142.23 | 0.9998 | 19952.6 | 30533.4 | 169.30 | 24.73 | 33.95 | 835. |
| 000 | 8.16931 | 146.30 | 0.9436 | 21217.8 | 32234.6 | 171.04 | 24.98 | 34.10 | 844. |
| 1050 | 7.85979 | 150.38 | 0.8936 | 22492.3 | 33943.0 | 172.71 | 25.21 | 34.24 | 854. |
| 1100 | 7.57412 | 154.48 | 0.8487 | 23776.0 | 35658.5 | 174.31 | 25.44 | 34.38 | 863. |
| 1150 | 7.30955 | 158.57 | 0.8082 | 25068.4 | 37381.1 | 175.84 | 25.65 | 34.52 | 873. |
| 1200 | 7.06373 | 162.67 | 0.7715 | 26369.4 | 39110.6 | 177.31 | 25.86 | 34.66 | 882. |

950 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 81.871 | 32.73873 | 364.17 | 19.63 | −3756.5 | −854.7 | 73.16 | 34.17 | 42.25 | 1268. |
| 82 | 32.73178 | 363.27 | 19.65 | −3751.7 | −849.3 | 73.22 | 34.13 | 42.26 | 1267. |
| 84 | 32.62081 | 350.07 | 19.90 | −3676.9 | −764.6 | 74.24 | 33.47 | 42.40 | 1258. |
| 86 | 32.50454 | 337.96 | 20.07 | −3602.3 | −679.6 | 75.24 | 32.89 | 42.59 | 1250. |
| 88 | 32.38337 | 326.88 | 20.18 | −3527.8 | −594.2 | 76.22 | 32.38 | 42.83 | 1242. |
| 90 | 32.25773 | 316.71 | 20.23 | −3453.3 | −508.3 | 77.19 | 31.93 | 43.10 | 1235. |
| 92 | 32.12808 | 307.37 | 20.21 | −3378.7 | −421.8 | 78.14 | 31.54 | 43.38 | 1229. |
| 94 | 31.99485 | 298.80 | 20.15 | −3304.0 | −334.8 | 79.07 | 31.19 | 43.67 | 1222. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 96 | 31.85849 | 290.91 | 20.04 | −3229.1 | −247.1 | 80.00 | 30.89 | 43.95 | 1216. |
| 98 | 31.71942 | 283.64 | 19.90 | −3154.0 | −159.0 | 80.91 | 30.61 | 44.21 | 1209. |
| 100 | 31.57805 | 276.92 | 19.72 | −3078.7 | −70.3 | 81.80 | 30.37 | 44.45 | 1203. |
| 102 | 31.43475 | 270.70 | 19.51 | −3003.3 | 18.8 | 82.68 | 30.16 | 44.67 | 1196. |
| 104 | 31.28987 | 264.92 | 19.28 | −2927.8 | 108.3 | 83.55 | 29.96 | 44.87 | 1190. |
| 106 | 31.14374 | 259.53 | 19.03 | −2852.1 | 198.3 | 84.41 | 29.78 | 45.04 | 1184. |
| 108 | 30.99663 | 254.50 | 18.77 | −2776.4 | 288.5 | 85.25 | 29.62 | 45.18 | 1177. |
| 110 | 30.84882 | 249.77 | 18.49 | −2700.6 | 379.0 | 86.08 | 29.48 | 45.30 | 1171. |
| 112 | 30.70052 | 245.33 | 18.21 | −2624.7 | 469.7 | 86.90 | 29.34 | 45.40 | 1164. |
| 114 | 30.55194 | 241.13 | 17.92 | −2548.9 | 560.6 | 87.70 | 29.21 | 45.48 | 1158. |
| 116 | 30.40327 | 237.15 | 17.63 | −2473.1 | 651.6 | 88.50 | 29.09 | 45.54 | 1151. |
| 118 | 30.25464 | 233.37 | 17.33 | −2397.3 | 742.7 | 89.28 | 28.98 | 45.58 | 1145. |
| 120 | 30.10621 | 229.76 | 17.04 | −2321.6 | 833.9 | 90.04 | 28.87 | 45.60 | 1138. |
| 122 | 29.95808 | 226.31 | 16.74 | −2246.0 | 925.1 | 90.80 | 28.77 | 45.60 | 1132. |
| 124 | 29.81035 | 223.01 | 16.45 | −2170.5 | 1016.3 | 91.54 | 28.67 | 45.60 | 1125. |
| 126 | 29.66311 | 219.83 | 16.15 | −2095.2 | 1107.5 | 92.27 | 28.58 | 45.58 | 1119. |
| 128 | 29.51643 | 216.77 | 15.87 | −2020.0 | 1198.6 | 92.98 | 28.48 | 45.54 | 1112. |
| 130 | 29.37037 | 213.82 | 15.58 | −1944.9 | 1289.6 | 93.69 | 28.39 | 45.50 | 1106. |
| 132 | 29.22498 | 210.97 | 15.30 | −1870.1 | 1380.6 | 94.38 | 28.31 | 45.45 | 1100. |
| 134 | 29.08031 | 208.21 | 15.02 | −1795.4 | 1471.4 | 95.07 | 28.22 | 45.40 | 1093. |
| 136 | 28.93638 | 205.53 | 14.75 | −1720.9 | 1562.2 | 95.74 | 28.14 | 45.33 | 1087. |
| 138 | 28.79324 | 202.94 | 14.48 | −1646.6 | 1652.8 | 96.40 | 28.06 | 45.26 | 1081. |
| 140 | 28.65089 | 200.42 | 14.22 | −1572.6 | 1743.2 | 97.05 | 27.97 | 45.19 | 1075. |
| 142 | 28.50938 | 197.97 | 13.97 | −1498.7 | 1833.5 | 97.69 | 27.89 | 45.11 | 1069. |
| 144 | 28.36870 | 195.59 | 13.72 | −1425.1 | 1923.7 | 98.32 | 27.81 | 45.02 | 1063. |
| 146 | 28.22888 | 193.28 | 13.47 | −1351.7 | 2013.6 | 98.94 | 27.73 | 44.94 | 1057. |
| 148 | 28.08993 | 191.02 | 13.23 | −1278.6 | 2103.4 | 99.55 | 27.66 | 44.84 | 1052. |
| 150 | 27.95185 | 188.83 | 13.00 | −1205.7 | 2193.0 | 100.15 | 27.58 | 44.75 | 1046. |
| 155 | 27.61051 | 183.59 | 12.43 | −1024.6 | 2416.1 | 101.62 | 27.39 | 44.50 | 1032. |
| 160 | 27.27473 | 178.68 | 11.90 | −845.1 | 2638.0 | 103.03 | 27.20 | 44.25 | 1019. |
| 165 | 26.94454 | 174.08 | 11.40 | −667.2 | 2858.6 | 104.38 | 27.02 | 43.98 | 1006. |
| 170 | 26.61994 | 169.76 | 10.93 | −490.9 | 3077.8 | 105.69 | 26.84 | 43.71 | 993. |
| 175 | 26.30090 | 165.72 | 10.48 | −316.3 | 3295.7 | 106.96 | 26.67 | 43.44 | 982. |
| 180 | 25.98740 | 161.94 | 10.06 | −143.4 | 3512.2 | 108.18 | 26.50 | 43.17 | 970. |
| 185 | 25.67940 | 158.39 | 9.67 | 27.9 | 3727.4 | 109.36 | 26.33 | 42.89 | 960. |
| 190 | 25.37686 | 155.07 | 9.30 | 197.6 | 3941.2 | 110.50 | 26.17 | 42.62 | 950. |
| 195 | 25.07972 | 151.97 | 8.95 | 365.7 | 4153.6 | 111.60 | 26.01 | 42.35 | 940. |
| 200 | 24.78794 | 149.06 | 8.62 | 532.2 | 4364.7 | 112.67 | 25.86 | 42.09 | 931. |
| 210 | 24.22017 | 143.81 | 8.02 | 860.6 | 4783.0 | 114.71 | 25.58 | 41.57 | 913. |
| 220 | 23.67306 | 139.21 | 7.48 | 1183.2 | 5196.2 | 116.63 | 25.31 | 41.07 | 898. |
| 230 | 23.14601 | 135.20 | 6.99 | 1500.1 | 5604.5 | 118.45 | 25.07 | 40.59 | 884. |
| 240 | 22.63842 | 131.70 | 6.56 | 1811.7 | 6008.1 | 120.16 | 24.84 | 40.14 | 872. |
| 250 | 22.14964 | 128.65 | 6.17 | 2118.3 | 6407.3 | 121.79 | 24.63 | 39.71 | 860. |
| 260 | 21.67901 | 125.98 | 5.82 | 2420.3 | 6802.4 | 123.34 | 24.44 | 39.30 | 850. |
| 270 | 21.22585 | 123.67 | 5.50 | 2717.8 | 7193.5 | 124.82 | 24.26 | 38.92 | 841. |
| 280 | 20.78948 | 121.66 | 5.21 | 3011.2 | 7580.8 | 126.23 | 24.10 | 38.55 | 833. |
| 290 | 20.36924 | 119.92 | 4.95 | 3300.7 | 7964.6 | 127.57 | 23.95 | 38.21 | 826. |
| 300 | 19.96447 | 118.42 | 4.70 | 3586.6 | 8345.0 | 128.86 | 23.82 | 37.88 | 820. |
| 310 | 19.57452 | 117.13 | 4.48 | 3869.1 | 8722.3 | 130.10 | 23.70 | 37.58 | 814. |
| 320 | 19.19876 | 116.04 | 4.28 | 4148.4 | 9096.7 | 131.29 | 23.58 | 37.29 | 809. |
| 330 | 18.83658 | 115.12 | 4.09 | 4424.8 | 9468.2 | 132.43 | 23.48 | 37.02 | 805. |
| 340 | 18.48740 | 114.36 | 3.92 | 4698.4 | 9837.0 | 133.53 | 23.39 | 36.76 | 801. |
| 350 | 18.15064 | 113.73 | 3.76 | 4969.4 | 10203.4 | 134.60 | 23.30 | 36.52 | 798. |
| 360 | 17.82575 | 113.23 | 3.61 | 5238.1 | 10567.4 | 135.62 | 23.22 | 36.29 | 795. |
| 370 | 17.51222 | 112.84 | 3.48 | 5504.4 | 10929.2 | 136.61 | 23.16 | 36.07 | 792. |
| 380 | 17.20954 | 112.56 | 3.35 | 5768.7 | 11288.9 | 137.57 | 23.09 | 35.87 | 790. |
| 390 | 16.91721 | 112.36 | 3.23 | 6031.1 | 11646.7 | 138.50 | 23.04 | 35.68 | 788. |
| 400 | 16.63479 | 112.26 | 3.12 | 6291.6 | 12002.5 | 139.40 | 22.99 | 35.50 | 787. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 420 | 16.09789 | 112.26 | 2.91 | 6807.8 | 12709.2 | 141.13 | 22.91 | 35.17 | 784. |
| 440 | 15.59554 | 112.52 | 2.73 | 7318.2 | 13409.7 | 142.76 | 22.86 | 34.88 | 783. |
| 460 | 15.12475 | 112.98 | 2.58 | 7823.7 | 14104.8 | 144.30 | 22.83 | 34.63 | 782. |
| 480 | 14.68281 | 113.62 | 2.43 | 8325.1 | 14795.2 | 145.77 | 22.81 | 34.42 | 782. |
| 500 | 14.26727 | 114.41 | 2.31 | 8823.0 | 15481.6 | 147.17 | 22.81 | 34.23 | 783. |
| 520 | 13.87591 | 115.32 | 2.19 | 9318.2 | 16164.6 | 148.51 | 22.83 | 34.07 | 784. |
| 540 | 13.50675 | 116.34 | 2.09 | 9811.1 | 16844.7 | 149.79 | 22.86 | 33.94 | 785. |
| 560 | 13.15797 | 117.44 | 1.99 | 10302.3 | 17522.3 | 151.03 | 22.91 | 33.83 | 787. |
| 580 | 12.82796 | 118.62 | 1.90 | 10792.3 | 18198.0 | 152.21 | 22.96 | 33.74 | 789. |
| 600 | 12.51524 | 119.86 | 1.83 | 11281.3 | 18872.0 | 153.35 | 23.03 | 33.67 | 791. |
| 620 | 12.21849 | 121.16 | 1.75 | 11769.8 | 19544.9 | 154.46 | 23.10 | 33.62 | 793. |
| 640 | 11.93651 | 122.50 | 1.68 | 12258.0 | 20216.8 | 155.52 | 23.18 | 33.58 | 796. |
| 660 | 11.66821 | 123.89 | 1.62 | 12746.3 | 20888.1 | 156.56 | 23.26 | 33.55 | 799. |
| 680 | 11.41260 | 125.30 | 1.56 | 13234.9 | 21559.0 | 157.56 | 23.36 | 33.54 | 801. |
| 700 | 11.16879 | 126.75 | 1.51 | 13724.0 | 22229.8 | 158.53 | 23.45 | 33.54 | 804. |
| 720 | 10.93596 | 128.22 | 1.46 | 14213.7 | 22900.7 | 159.48 | 23.55 | 33.55 | 807. |
| 740 | 10.71336 | 129.72 | 1.41 | 14704.3 | 23571.8 | 160.40 | 23.65 | 33.56 | 811. |
| 760 | 10.50032 | 131.23 | 1.37 | 15195.9 | 24243.2 | 161.29 | 23.76 | 33.58 | 814. |
| 780 | 10.29621 | 132.77 | 1.33 | 15688.5 | 24915.2 | 162.16 | 23.86 | 33.61 | 817. |
| 800 | 10.10047 | 134.31 | 1.29 | 16182.3 | 25587.8 | 163.01 | 23.97 | 33.65 | 820. |
| 850 | 9.64439 | 138.23 | 1.20 | 17422.3 | 27272.6 | 165.06 | 24.23 | 33.75 | 829. |
| 900 | 9.23039 | 142.20 | 1.12 | 18671.0 | 28963.1 | 166.99 | 24.50 | 33.87 | 838. |
| 950 | 8.85270 | 146.20 | 1.06 | 19928.8 | 30660.0 | 168.82 | 24.76 | 34.00 | 847. |
| 1000 | 8.50656 | 150.24 | 0.9968 | 21195.9 | 32363.7 | 170.57 | 25.00 | 34.14 | 856. |
| 1050 | 8.18803 | 154.29 | 0.9439 | 22472.1 | 34074.4 | 172.24 | 25.24 | 34.28 | 865. |
| 1100 | 7.89381 | 158.35 | 0.8964 | 23757.4 | 35792.1 | 173.84 | 25.47 | 34.42 | 874. |
| 1150 | 7.62110 | 162.42 | 0.8536 | 25051.4 | 37516.8 | 175.37 | 25.68 | 34.56 | 883. |
| 1200 | 7.36754 | 166.50 | 0.8148 | 26353.8 | 39248.2 | 176.85 | 25.88 | 34.69 | 893. |
| | | | | 1000 bar Isobar | | | | | |
| * 82.762 | 32.82707 | 372.39 | 19.59 | −3731.5 | −685.2 | 73.36 | 33.78 | 41.70 | 1281. |
| 84 | 32.76086 | 364.08 | 19.78 | −3685.9 | −633.5 | 73.98 | 33.39 | 41.80 | 1276. |
| 86 | 32.64959 | 351.56 | 20.01 | −3612.6 | −549.7 | 74.97 | 32.82 | 42.01 | 1267. |
| 88 | 32.53333 | 340.06 | 20.17 | −3539.2 | −465.5 | 75.94 | 32.32 | 42.27 | 1260. |
| 90 | 32.41251 | 329.51 | 20.26 | −3465.9 | −380.6 | 76.89 | 31.89 | 42.56 | 1253. |
| 92 | 32.28754 | 319.81 | 20.29 | −3392.4 | −295.2 | 77.83 | 31.51 | 42.87 | 1246. |
| 94 | 32.15889 | 310.89 | 20.26 | −3318.7 | −209.2 | 78.75 | 31.17 | 43.18 | 1240. |
| 96 | 32.02698 | 302.69 | 20.19 | −3244.9 | −122.5 | 79.67 | 30.88 | 43.48 | 1233. |
| 98 | 31.89223 | 295.12 | 20.07 | −3170.8 | −35.2 | 80.56 | 30.62 | 43.78 | 1227. |
| 100 | 31.75505 | 288.13 | 19.92 | −3096.5 | 52.6 | 81.45 | 30.39 | 44.05 | 1221. |
| 102 | 31.61581 | 281.67 | 19.74 | −3022.0 | 140.9 | 82.33 | 30.18 | 44.30 | 1215. |
| 104 | 31.47488 | 275.66 | 19.53 | −2947.4 | 229.8 | 83.19 | 30.00 | 44.52 | 1208. |
| 106 | 31.33258 | 270.08 | 19.30 | −2872.6 | 319.0 | 84.04 | 29.83 | 44.72 | 1202. |
| 108 | 31.18920 | 264.87 | 19.05 | −2797.6 | 408.6 | 84.88 | 29.68 | 44.89 | 1196. |
| 110 | 31.04501 | 259.99 | 18.79 | −2722.6 | 498.5 | 85.70 | 29.54 | 45.03 | 1189. |
| 112 | 30.90025 | 255.40 | 18.51 | −2647.5 | 588.7 | 86.51 | 29.41 | 45.15 | 1183. |
| 114 | 30.75513 | 251.08 | 18.23 | −2572.4 | 679.1 | 87.31 | 29.29 | 45.25 | 1177. |
| 116 | 30.60984 | 246.99 | 17.95 | −2497.2 | 769.7 | 88.10 | 29.18 | 45.32 | 1170. |
| 118 | 30.46454 | 243.11 | 17.66 | −2422.1 | 860.4 | 88.88 | 29.07 | 45.37 | 1164. |
| 120 | 30.31937 | 239.42 | 17.37 | −2347.1 | 951.2 | 89.64 | 28.97 | 45.41 | 1157. |
| 122 | 30.17445 | 235.90 | 17.07 | −2272.1 | 1042.0 | 90.39 | 28.87 | 45.43 | 1151. |
| 124 | 30.02990 | 232.53 | 16.78 | −2197.2 | 1132.9 | 91.13 | 28.78 | 45.43 | 1145. |
| 126 | 29.88579 | 229.30 | 16.49 | −2122.4 | 1223.7 | 91.86 | 28.68 | 45.42 | 1138. |
| 128 | 29.74221 | 226.19 | 16.21 | −2047.7 | 1314.5 | 92.57 | 28.60 | 45.40 | 1132. |
| 130 | 29.59922 | 223.19 | 15.92 | −1973.2 | 1405.3 | 93.27 | 28.51 | 45.36 | 1126. |
| 132 | 29.45688 | 220.30 | 15.64 | −1898.8 | 1496.0 | 93.97 | 28.43 | 45.32 | 1120. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 134 | 29.31523 | 217.50 | 15.37 | −1824.6 | 1586.6 | 94.65 | 28.34 | 45.27 | 1114. |
| 136 | 29.17432 | 214.80 | 15.09 | −1750.6 | 1677.1 | 95.32 | 28.26 | 45.21 | 1107. |
| 138 | 29.03416 | 212.17 | 14.83 | −1676.8 | 1767.4 | 95.98 | 28.18 | 45.14 | 1101. |
| 140 | 28.89480 | 209.62 | 14.56 | −1603.2 | 1857.6 | 96.63 | 28.10 | 45.07 | 1096. |
| 142 | 28.75625 | 207.15 | 14.31 | −1529.8 | 1947.7 | 97.27 | 28.02 | 44.99 | 1090. |
| 144 | 28.61853 | 204.74 | 14.06 | −1456.6 | 2037.6 | 97.89 | 27.95 | 44.91 | 1084. |
| 146 | 28.48165 | 202.40 | 13.81 | −1383.7 | 2127.3 | 98.51 | 27.87 | 44.83 | 1078. |
| 148 | 28.34562 | 200.12 | 13.57 | −1311.0 | 2216.9 | 99.12 | 27.79 | 44.74 | 1072. |
| 150 | 28.21046 | 197.90 | 13.33 | −1238.5 | 2306.3 | 99.72 | 27.72 | 44.64 | 1067. |
| 155 | 27.87637 | 192.60 | 12.76 | −1058.4 | 2528.9 | 101.18 | 27.53 | 44.40 | 1053. |
| 160 | 27.54777 | 187.62 | 12.23 | −879.8 | 2750.3 | 102.59 | 27.35 | 44.15 | 1040. |
| 165 | 27.22467 | 182.95 | 11.72 | −702.8 | 2970.3 | 103.94 | 27.16 | 43.88 | 1027. |
| 170 | 26.90707 | 178.57 | 11.24 | −527.4 | 3189.1 | 105.25 | 26.99 | 43.61 | 1015. |
| 175 | 26.59492 | 174.45 | 10.80 | −353.6 | 3406.5 | 106.51 | 26.81 | 43.34 | 1003. |
| 180 | 26.28820 | 170.58 | 10.37 | −181.5 | 3622.5 | 107.73 | 26.64 | 43.07 | 992. |
| 185 | 25.98684 | 166.95 | 9.97 | −10.9 | 3837.2 | 108.90 | 26.48 | 42.80 | 981. |
| 190 | 25.69078 | 163.55 | 9.60 | 158.1 | 4050.5 | 110.04 | 26.32 | 42.53 | 971. |
| 195 | 25.39998 | 160.35 | 9.24 | 325.5 | 4262.5 | 111.14 | 26.16 | 42.26 | 962. |
| 200 | 25.11436 | 157.36 | 8.91 | 491.4 | 4473.2 | 112.21 | 26.01 | 42.00 | 952. |
| 210 | 24.55840 | 151.93 | 8.29 | 818.7 | 4890.6 | 114.25 | 25.72 | 41.49 | 935. |
| 220 | 24.02234 | 147.15 | 7.74 | 1140.2 | 5303.0 | 116.16 | 25.45 | 40.99 | 920. |
| 230 | 23.50559 | 142.97 | 7.25 | 1456.2 | 5710.5 | 117.98 | 25.21 | 40.52 | 906. |
| 240 | 23.00752 | 139.30 | 6.81 | 1767.1 | 6113.5 | 119.69 | 24.97 | 40.07 | 893. |
| 250 | 22.52749 | 136.08 | 6.41 | 2073.1 | 6512.1 | 121.32 | 24.76 | 39.65 | 882. |
| 260 | 22.06485 | 133.26 | 6.05 | 2374.4 | 6906.5 | 122.86 | 24.57 | 39.25 | 872. |
| 270 | 21.61894 | 130.79 | 5.73 | 2671.5 | 7297.1 | 124.34 | 24.39 | 38.87 | 863. |
| 280 | 21.18912 | 128.63 | 5.43 | 2964.5 | 7683.9 | 125.75 | 24.22 | 38.51 | 854. |
| 290 | 20.77475 | 126.76 | 5.16 | 3253.7 | 8067.3 | 127.09 | 24.07 | 38.17 | 847. |
| 300 | 20.37519 | 125.12 | 4.91 | 3539.4 | 8447.4 | 128.38 | 23.93 | 37.85 | 841. |
| 310 | 19.98983 | 123.71 | 4.68 | 3821.8 | 8824.3 | 129.62 | 23.80 | 37.55 | 835. |
| 320 | 19.61808 | 122.50 | 4.47 | 4101.0 | 9198.4 | 130.80 | 23.69 | 37.27 | 829. |
| 330 | 19.25937 | 121.46 | 4.28 | 4377.4 | 9569.7 | 131.95 | 23.58 | 37.00 | 825. |
| 340 | 18.91314 | 120.58 | 4.10 | 4651.1 | 9938.4 | 133.05 | 23.48 | 36.75 | 821. |
| 350 | 18.57886 | 119.85 | 3.94 | 4922.2 | 10304.6 | 134.11 | 23.39 | 36.51 | 817. |
| 360 | 18.25601 | 119.25 | 3.78 | 5190.9 | 10668.6 | 135.13 | 23.31 | 36.28 | 814. |
| 370 | 17.94410 | 118.76 | 3.64 | 5457.5 | 11030.4 | 136.12 | 23.24 | 36.07 | 811. |
| 380 | 17.64265 | 118.39 | 3.51 | 5722.0 | 11390.1 | 137.08 | 23.18 | 35.87 | 809. |
| 390 | 17.35121 | 118.11 | 3.38 | 5984.6 | 11747.9 | 138.01 | 23.12 | 35.69 | 807. |
| 400 | 17.06936 | 117.91 | 3.27 | 6245.4 | 12103.8 | 138.91 | 23.07 | 35.51 | 805. |
| 420 | 16.53273 | 117.76 | 3.06 | 6762.2 | 12810.8 | 140.64 | 22.99 | 35.19 | 802. |
| 440 | 16.02968 | 117.87 | 2.87 | 7273.3 | 13511.7 | 142.27 | 22.93 | 34.91 | 800. |
| 460 | 15.55738 | 118.21 | 2.71 | 7779.6 | 14207.4 | 143.82 | 22.89 | 34.66 | 799. |
| 480 | 15.11327 | 118.73 | 2.56 | 8281.8 | 14898.5 | 145.29 | 22.88 | 34.45 | 799. |
| 500 | 14.69502 | 119.41 | 2.42 | 8780.7 | 15585.7 | 146.69 | 22.87 | 34.27 | 799. |
| 520 | 14.30053 | 120.23 | 2.30 | 9276.8 | 16269.5 | 148.03 | 22.89 | 34.12 | 800. |
| 540 | 13.92789 | 121.15 | 2.19 | 9770.6 | 16950.5 | 149.32 | 22.92 | 33.98 | 801. |
| 560 | 13.57537 | 122.17 | 2.10 | 10262.8 | 17629.1 | 150.55 | 22.96 | 33.88 | 802. |
| 580 | 13.24142 | 123.28 | 2.00 | 10753.7 | 18305.7 | 151.74 | 23.01 | 33.79 | 804. |
| 600 | 12.92461 | 124.45 | 1.92 | 11243.6 | 18980.8 | 152.88 | 23.07 | 33.72 | 806. |
| 620 | 12.62366 | 125.69 | 1.84 | 11733.1 | 19654.7 | 153.99 | 23.14 | 33.67 | 808. |
| 640 | 12.33740 | 126.98 | 1.77 | 12222.3 | 20327.7 | 155.05 | 23.22 | 33.63 | 810. |
| 660 | 12.06478 | 128.31 | 1.71 | 12711.5 | 21000.1 | 156.09 | 23.31 | 33.61 | 813. |
| 680 | 11.80484 | 129.68 | 1.65 | 13201.0 | 21672.1 | 157.09 | 23.40 | 33.60 | 815. |
| 700 | 11.55668 | 131.08 | 1.59 | 13691.0 | 22344.0 | 158.07 | 23.49 | 33.59 | 818. |
| 720 | 11.31952 | 132.52 | 1.54 | 14181.7 | 23016.0 | 159.01 | 23.59 | 33.60 | 821. |
| 740 | 11.09263 | 133.98 | 1.49 | 14673.2 | 23688.2 | 159.93 | 23.69 | 33.62 | 824. |
| 760 | 10.87532 | 135.46 | 1.44 | 15165.6 | 24360.7 | 160.83 | 23.79 | 33.64 | 827. |
| 780 | 10.66700 | 136.96 | 1.40 | 15659.1 | 25033.8 | 161.70 | 23.90 | 33.67 | 830. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 800 | 10.46709 | 138.47 | 1.36 | 16153.7 | 25707.4 | 162.56 | 24.00 | 33.70 | 833. |
| 850 | 10.00087 | 142.32 | 1.26 | 17395.8 | 27394.9 | 164.60 | 24.27 | 33.80 | 841. |
| 900 | 9.57712 | 146.24 | 1.18 | 18646.4 | 29087.9 | 166.54 | 24.53 | 33.92 | 850. |
| 950 | 9.19010 | 150.20 | 1.11 | 19906.0 | 30787.3 | 168.38 | 24.79 | 34.05 | 858. |
| 1000 | 8.83506 | 154.20 | 1.05 | 21174.7 | 32493.3 | 170.13 | 25.03 | 34.19 | 867. |
| 1050 | 8.50805 | 158.22 | 0.9941 | 22452.6 | 34206.2 | 171.80 | 25.27 | 34.33 | 876. |
| 1100 | 8.20574 | 162.25 | 0.9441 | 23739.4 | 35926.0 | 173.40 | 25.49 | 34.47 | 885. |
| 1150 | 7.92533 | 166.30 | 0.8990 | 25034.9 | 37652.7 | 174.93 | 25.70 | 34.60 | 894. |
| 1200 | 7.66443 | 170.35 | 0.8581 | 26338.7 | 39386.0 | 176.41 | 25.90 | 34.73 | 903. |
| | | | | 1100 bar Isobar | | | | | |
| * 84.520 | 32.99938 | 388.87 | 19.56 | −3682.1 | −348.7 | 73.75 | 33.03 | 40.67 | 1307. |
| 86 | 32.92348 | 379.08 | 19.81 | −3629.5 | −288.4 | 74.46 | 32.63 | 40.85 | 1301. |
| 88 | 32.81646 | 366.75 | 20.07 | −3558.4 | −206.4 | 75.40 | 32.17 | 41.14 | 1294. |
| 90 | 32.70468 | 355.40 | 20.26 | −3487.2 | −123.8 | 76.33 | 31.76 | 41.48 | 1287. |
| 92 | 32.58858 | 344.95 | 20.37 | −3415.9 | −40.5 | 77.25 | 31.41 | 41.83 | 1281. |
| 94 | 32.46856 | 335.32 | 20.43 | −3344.3 | 43.6 | 78.15 | 31.10 | 42.20 | 1274. |
| 96 | 32.34505 | 326.44 | 20.42 | 3272.5 | 128.3 | 79.04 | 30.84 | 42.56 | 1268. |
| 98 | 32.21847 | 318.25 | 20.37 | −3200.4 | 213.8 | 79.92 | 30.60 | 42.91 | 1262. |
| 100 | 32.08921 | 310.69 | 20.27 | −3128.0 | 299.9 | 80.79 | 30.40 | 43.24 | 1256. |
| 102 | 31.95766 | 303.70 | 20.13 | −3055.3 | 386.7 | 81.65 | 30.21 | 43.54 | 1250. |
| 104 | 31.82417 | 297.22 | 19.96 | −2982.4 | 474.1 | 82.50 | 30.05 | 43.82 | 1244. |
| 106 | 31.68908 | 291.20 | 19.77 | −2909.2 | 562.0 | 83.34 | 29.90 | 44.07 | 1238. |
| 108 | 31.55270 | 285.60 | 19.55 | −2835.9 | 650.4 | 84.16 | 29.77 | 44.29 | 1232. |
| 110 | 31.41531 | 280.37 | 19.32 | −2762.3 | 739.1 | 84.98 | 29.65 | 44.49 | 1225. |
| 112 | 31.27716 | 275.47 | 19.07 | −2688.7 | 828.3 | 85.78 | 29.53 | 44.65 | 1219. |
| 114 | 31.13848 | 270.87 | 18.81 | −2614.9 | 917.7 | 86.57 | 29.43 | 44.78 | 1213. |
| 116 | 30.99947 | 266.54 | 18.54 | −2541.1 | 1007.4 | 87.35 | 29.33 | 44.90 | 1207. |
| 118 | 30.86031 | 262.44 | 18.26 | −2467.2 | 1097.3 | 88.12 | 29.23 | 44.98 | 1201. |
| 120 | 30.72116 | 258.56 | 17.98 | −2393.3 | 1187.3 | 88.88 | 29.14 | 45.05 | 1194. |
| 122 | 30.58215 | 254.87 | 17.70 | −2319.4 | 1277.5 | 89.62 | 29.06 | 45.09 | 1188. |
| 124 | 30.44339 | 251.35 | 17.42 | −2245.6 | 1367.7 | 90.36 | 28.97 | 45.12 | 1182. |
| 126 | 30.30500 | 247.98 | 17.13 | −2171.8 | 1457.9 | 91.08 | 28.89 | 45.13 | 1176. |
| 128 | 30.16706 | 244.76 | 16.85 | −2098.2 | 1548.2 | 91.79 | 28.81 | 45.13 | 1170. |
| 130 | 30.02964 | 241.66 | 16.57 | −2024.6 | 1638.4 | 92.49 | 28.73 | 45.11 | 1164. |
| 132 | 29.89281 | 238.67 | 16.29 | −1951.2 | 1728.6 | 93.18 | 28.65 | 45.08 | 1158. |
| 134 | 29.75662 | 235.79 | 16.02 | −1877.9 | 1818.7 | 93.85 | 28.58 | 45.04 | 1152. |
| 136 | 29.62112 | 233.01 | 15.75 | −1804.8 | 1908.8 | 94.52 | 28.50 | 44.99 | 1146. |
| 138 | 29.48634 | 230.32 | 15.48 | −1731.8 | 1998.7 | 95.18 | 28.43 | 44.94 | 1140. |
| 140 | 29.35231 | 227.71 | 15.22 | −1659.0 | 2088.5 | 95.82 | 28.35 | 44.87 | 1134. |
| 142 | 29.21906 | 225.17 | 14.96 | −1586.5 | 2178.2 | 96.46 | 28.28 | 44.80 | 1129. |
| 144 | 29.08661 | 222.71 | 14.70 | −1514.1 | 2267.7 | 97.09 | 28.20 | 44.73 | 1123. |
| 146 | 28.95498 | 220.32 | 14.46 | −1441.9 | 2357.1 | 97.70 | 28.13 | 44.65 | 1117. |
| 148 | 28.82418 | 217.99 | 14.21 | −1369.9 | 2446.3 | 98.31 | 28.06 | 44.56 | 1112. |
| 150 | 28.69421 | 215.72 | 13.97 | −1298.2 | 2535.4 | 98.91 | 27.98 | 44.47 | 1106. |
| 155 | 28.37300 | 210.30 | 13.40 | −1119.8 | 2757.1 | 100.36 | 27.80 | 44.24 | 1093. |
| 160 | 28.05715 | 205.21 | 12.85 | −942.9 | 2977.7 | 101.76 | 27.62 | 43.99 | 1080. |
| 165 | 27.74664 | 200.42 | 12.34 | −767.4 | 3197.0 | 103.11 | 27.45 | 43.73 | 1068. |
| 170 | 27.44146 | 195.90 | 11.85 | −593.5 | 3415.0 | 104.41 | 27.27 | 43.46 | 1056. |
| 175 | 27.14155 | 191.65 | 11.39 | −421.2 | 3631.6 | 105.67 | 27.10 | 43.19 | 1044. |
| 180 | 26.84686 | 187.64 | 10.96 | −250.4 | 3846.9 | 106.88 | 26.93 | 42.93 | 1033. |
| 185 | 26.55730 | 183.86 | 10.55 | −81.1 | 4060.9 | 108.05 | 26.77 | 42.66 | 1023. |
| 190 | 26.27282 | 180.31 | 10.17 | 86.7 | 4273.5 | 109.19 | 26.60 | 42.39 | 1013. |
| 195 | 25.99332 | 176.96 | 9.80 | 252.9 | 4484.8 | 110.29 | 26.45 | 42.13 | 1003. |
| 200 | 25.71872 | 173.80 | 9.46 | 417.7 | 4694.8 | 111.35 | 26.29 | 41.87 | 994. |
| 210 | 25.18394 | 168.04 | 8.83 | 743.0 | 5110.9 | 113.38 | 26.00 | 41.36 | 977. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 220 | 24.66782 | 162.94 | 8.26 | 1062.8 | 5522.0 | 115.29 | 25.73 | 40.87 | 961. |
| 230 | 24.16971 | 158.43 | 7.75 | 1377.2 | 5928.4 | 117.10 | 25.47 | 40.41 | 947. |
| 240 | 23.68898 | 154.44 | 7.29 | 1686.7 | 6330.2 | 118.81 | 25.24 | 39.97 | 934. |
| 250 | 23.22499 | 150.91 | 6.88 | 1991.5 | 6727.8 | 120.43 | 25.02 | 39.55 | 923. |
| 260 | 22.77710 | 147.79 | 6.50 | 2291.9 | 7121.3 | 121.98 | 24.81 | 39.16 | 912. |
| 270 | 22.34469 | 145.03 | 6.16 | 2588.1 | 7511.0 | 123.45 | 24.63 | 38.78 | 903. |
| 280 | 21.92715 | 142.60 | 5.85 | 2880.4 | 7897.1 | 124.85 | 24.45 | 38.43 | 894. |
| 290 | 21.52389 | 140.45 | 5.57 | 3169.1 | 8279.7 | 126.19 | 24.29 | 38.10 | 887. |
| 300 | 21.13432 | 138.57 | 5.31 | 3454.4 | 8659.2 | 127.48 | 24.15 | 37.79 | 880. |
| 310 | 20.75790 | 136.91 | 5.07 | 3736.4 | 9035.6 | 128.71 | 24.01 | 37.50 | 874. |
| 320 | 20.39407 | 135.47 | 4.85 | 4015.5 | 9409.2 | 129.90 | 23.89 | 37.22 | 868. |
| 330 | 20.04233 | 134.21 | 4.64 | 4291.8 | 9780.1 | 131.04 | 23.77 | 36.96 | 863. |
| 340 | 19.70216 | 133.12 | 4.45 | 4565.4 | 10148.6 | 132.14 | 23.67 | 36.72 | 859. |
| 350 | 19.37310 | 132.18 | 4.28 | 4836.6 | 10514.6 | 133.20 | 23.58 | 36.49 | 855. |
| 360 | 19.05468 | 131.38 | 4.12 | 5105.5 | 10878.4 | 134.23 | 23.49 | 36.27 | 851. |
| 370 | 18.74647 | 130.71 | 3.96 | 5372.3 | 11240.1 | 135.22 | 23.41 | 36.07 | 848. |
| 380 | 18.44804 | 130.15 | 3.82 | 5637.1 | 11599.8 | 136.18 | 23.34 | 35.88 | 845. |
| 390 | 18.15898 | 129.69 | 3.69 | 5900.1 | 11957.7 | 137.11 | 23.28 | 35.70 | 843. |
| 400 | 17.87891 | 129.34 | 3.57 | 6161.3 | 12313.8 | 138.01 | 23.23 | 35.53 | 840. |
| 420 | 17.34429 | 128.87 | 3.34 | 6679.1 | 13021.3 | 139.73 | 23.14 | 35.22 | 837. |
| 440 | 16.84140 | 128.71 | 3.14 | 7191.4 | 13722.9 | 141.37 | 23.07 | 34.95 | 834. |
| 460 | 16.36771 | 128.79 | 2.96 | 7699.0 | 14419.5 | 142.92 | 23.02 | 34.72 | 833. |
| 480 | 15.92091 | 129.07 | 2.80 | 8202.6 | 15111.8 | 144.39 | 23.00 | 34.51 | 832. |
| 500 | 15.49892 | 129.54 | 2.66 | 8702.9 | 15800.2 | 145.79 | 22.99 | 34.34 | 831. |
| 520 | 15.09981 | 130.16 | 2.53 | 9200.6 | 16485.4 | 147.14 | 23.00 | 34.19 | 831. |
| 540 | 14.72183 | 130.91 | 2.41 | 9696.0 | 17167.9 | 148.43 | 23.03 | 34.06 | 831. |
| 560 | 14.36341 | 131.77 | 2.30 | 10189.8 | 17848.1 | 149.66 | 23.06 | 33.96 | 832. |
| 580 | 14.02310 | 132.72 | 2.20 | 10682.3 | 18526.5 | 150.85 | 23.11 | 33.88 | 833. |
| 600 | 13.69957 | 133.76 | 2.11 | 11173.9 | 19203.4 | 152.00 | 23.17 | 33.81 | 835. |
| 620 | 13.39163 | 134.87 | 2.03 | 11665.0 | 19879.1 | 153.11 | 23.24 | 33.76 | 836. |
| 640 | 13.09818 | 136.04 | 1.95 | 12155.9 | 20554.0 | 154.18 | 23.31 | 33.73 | 838. |
| 660 | 12.81821 | 137.27 | 1.88 | 12646.8 | 21228.3 | 155.22 | 23.39 | 33.71 | 840. |
| 680 | 12.55083 | 138.54 | 1.81 | 13138.0 | 21902.3 | 156.22 | 23.48 | 33.69 | 842. |
| 700 | 12.29517 | 139.86 | 1.75 | 13629.6 | 22576.2 | 157.20 | 23.57 | 33.69 | 845. |
| 720 | 12.05049 | 141.21 | 1.69 | 14121.8 | 23250.1 | 158.15 | 23.67 | 33.70 | 847. |
| 740 | 11.81608 | 142.59 | 1.64 | 14614.9 | 23924.3 | 159.07 | 23.76 | 33.72 | 850. |
| 760 | 11.59128 | 144.00 | 1.59 | 15108.9 | 24598.8 | 159.97 | 23.86 | 33.74 | 852. |
| 780 | 11.37551 | 145.43 | 1.54 | 15603.9 | 25273.8 | 160.85 | 23.97 | 33.77 | 855. |
| 800 | 11.16821 | 146.89 | 1.49 | 16100.1 | 25949.4 | 161.70 | 24.07 | 33.80 | 858. |
| 850 | 10.68385 | 150.60 | 1.39 | 17345.8 | 27641.7 | 163.76 | 24.33 | 33.90 | 865. |
| 900 | 10.24255 | 154.41 | 1.30 | 18600.0 | 29339.5 | 165.70 | 24.59 | 34.01 | 873. |
| 950 | 9.83863 | 158.27 | 1.22 | 19862.9 | 31043.3 | 167.54 | 24.84 | 34.14 | 881. |
| 1000 | 9.46736 | 162.19 | 1.16 | 21134.9 | 32753.7 | 169.29 | 25.09 | 34.27 | 889. |
| 1050 | 9.12481 | 166.14 | 1.09 | 22415.8 | 34470.8 | 170.97 | 25.32 | 34.41 | 898. |
| 1100 | 8.80763 | 170.11 | 1.04 | 23705.5 | 36194.6 | 172.57 | 25.54 | 34.54 | 906. |
| 1150 | 8.51300 | 174.10 | 0.9896 | 25003.7 | 37925.1 | 174.11 | 25.75 | 34.67 | 915. |
| 1200 | 8.23850 | 178.11 | 0.9445 | 26310.1 | 39662.0 | 175.59 | 25.95 | 34.80 | 923. |

1200 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 86.250 | 33.16599 | 405.33 | 19.57 | −3633.5 | −15.3 | 74.12 | 32.33 | 39.74 | 1334. |
| 88 | 33.07954 | 393.87 | 19.89 | −3573.2 | 54.5 | 74.92 | 31.95 | 40.03 | 1327. |
| 90 | 32.97616 | 381.70 | 20.17 | −3504.1 | 134.9 | 75.82 | 31.58 | 40.40 | 1320. |
| 92 | 32.86828 | 370.47 | 20.37 | −3434.8 | 216.1 | 76.71 | 31.26 | 40.80 | 1314. |
| 94 | 32.75631 | 360.09 | 20.50 | −3365.3 | 298.1 | 77.60 | 30.99 | 41.22 | 1308. |
| 96 | 32.64064 | 350.52 | 20.57 | −3295.4 | 381.0 | 78.47 | 30.75 | 41.63 | 1301. |
| 98 | 32.52169 | 341.67 | 20.58 | −3225.2 | 464.6 | 79.33 | 30.55 | 42.03 | 1295. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 100 | 32.39983 | 333.49 | 20.54 | −3154.7 | 549.1 | 80.18 | 30.37 | 42.42 | 1290. |
| 102 | 32.27545 | 325.93 | 20.45 | −3083.7 | 634.3 | 81.03 | 30.21 | 42.78 | 1284. |
| 104 | 32.14892 | 318.93 | 20.33 | −3012.5 | 720.2 | 81.86 | 30.07 | 43.12 | 1278. |
| 106 | 32.02056 | 312.43 | 20.18 | −2940.9 | 806.7 | 82.68 | 29.95 | 43.42 | 1272. |
| 108 | 31.89069 | 306.39 | 20.00 | −2869.0 | 893.8 | 83.50 | 29.84 | 43.69 | 1266. |
| 110 | 31.75961 | 300.77 | 19.79 | −2796.9 | 981.5 | 84.30 | 29.73 | 43.93 | 1260. |
| 112 | 31.62758 | 295.51 | 19.57 | −2724.6 | 1069.6 | 85.10 | 29.64 | 44.14 | 1253. |
| 114 | 31.49484 | 290.59 | 19.33 | −2652.1 | 1158.0 | 85.88 | 29.55 | 44.32 | 1247. |
| 116 | 31.36160 | 285.97 | 19.08 | −2579.5 | 1246.8 | 86.65 | 29.46 | 44.47 | 1241. |
| 118 | 31.22806 | 281.62 | 18.82 | −2506.8 | 1335.9 | 87.41 | 29.38 | 44.60 | 1235. |
| 120 | 31.09438 | 277.51 | 18.55 | −2434.0 | 1425.2 | 88.16 | 29.31 | 44.70 | 1229. |
| 122 | 30.96072 | 273.62 | 18.28 | −2361.2 | 1514.7 | 88.90 | 29.23 | 44.77 | 1223. |
| 124 | 30.82721 | 269.92 | 18.00 | −2288.4 | 1604.3 | 89.63 | 29.16 | 44.83 | 1217. |
| 126 | 30.69396 | 266.40 | 17.73 | −2215.6 | 1693.9 | 90.35 | 29.08 | 44.86 | 1211. |
| 128 | 30.56106 | 263.03 | 17.45 | −2142.9 | 1783.7 | 91.06 | 29.01 | 44.88 | 1205. |
| 130 | 30.42861 | 259.81 | 17.17 | −2070.2 | 1873.5 | 91.75 | 28.94 | 44.88 | 1199. |
| 132 | 30.29668 | 256.71 | 16.90 | −1997.6 | 1963.2 | 92.44 | 28.87 | 44.87 | 1193. |
| 134 | 30.16532 | 253.74 | 16.63 | −1925.2 | 2052.9 | 93.11 | 28.80 | 44.84 | 1188. |
| 136 | 30.03459 | 250.87 | 16.36 | −1852.8 | 2142.6 | 93.78 | 28.73 | 44.81 | 1182. |
| 138 | 29.90453 | 248.10 | 16.09 | −1780.6 | 2232.2 | 94.43 | 28.66 | 44.76 | 1176. |
| 140 | 29.77518 | 245.41 | 15.83 | −1708.6 | 2321.6 | 95.07 | 28.59 | 44.71 | 1170. |
| 142 | 29.64657 | 242.82 | 15.57 | −1636.7 | 2411.0 | 95.71 | 28.52 | 44.65 | 1165. |
| 144 | 29.51872 | 240.29 | 15.31 | −1565.0 | 2500.2 | 96.33 | 28.45 | 44.58 | 1159. |
| 146 | 29.39166 | 237.85 | 15.06 | −1493.5 | 2589.3 | 96.95 | 28.38 | 44.51 | 1154. |
| 148 | 29.26539 | 235.47 | 14.82 | −1422.2 | 2678.3 | 97.55 | 28.31 | 44.43 | 1148. |
| 150 | 29.13993 | 233.15 | 14.58 | −1351.0 | 2767.0 | 98.15 | 28.24 | 44.34 | 1143. |
| 155 | 28.82989 | 227.61 | 14.00 | −1174.2 | 2988.2 | 99.60 | 28.07 | 44.12 | 1130. |
| 160 | 28.52503 | 222.41 | 13.44 | −998.6 | 3208.2 | 100.99 | 27.89 | 43.88 | 1118. |
| 165 | 28.22539 | 217.51 | 12.92 | −824.6 | 3426.9 | 102.34 | 27.72 | 43.62 | 1105. |
| 170 | 27.93092 | 212.89 | 12.43 | −651.9 | 3644.4 | 103.64 | 27.55 | 43.36 | 1094. |
| 175 | 27.64157 | 208.52 | 11.96 | −480.8 | 3860.5 | 104.89 | 27.38 | 43.09 | 1082. |
| 180 | 27.35726 | 204.39 | 11.52 | −311.1 | 4075.3 | 106.10 | 27.21 | 42.82 | 1072. |
| 185 | 27.07792 | 200.49 | 11.10 | −142.9 | 4288.8 | 107.27 | 27.04 | 42.56 | 1061. |
| 190 | 26.80344 | 196.81 | 10.71 | 23.8 | 4500.9 | 108.40 | 26.88 | 42.29 | 1051. |
| 195 | 26.53375 | 193.32 | 10.34 | 189.1 | 4711.7 | 109.50 | 26.72 | 42.03 | 1042. |
| 200 | 26.26874 | 190.03 | 9.98 | 353.0 | 4921.2 | 110.56 | 26.57 | 41.77 | 1033. |
| 210 | 25.75243 | 183.98 | 9.33 | 676.6 | 5336.4 | 112.58 | 26.27 | 41.27 | 1016. |
| 220 | 25.25380 | 178.58 | 8.75 | 994.9 | 5746.6 | 114.49 | 25.99 | 40.79 | 1000. |
| 230 | 24.77215 | 173.77 | 8.23 | 1308.0 | 6152.2 | 116.30 | 25.73 | 40.33 | 986. |
| 240 | 24.30683 | 169.49 | 7.75 | 1616.4 | 6553.2 | 118.00 | 25.49 | 39.89 | 973. |
| 250 | 23.85718 | 165.67 | 7.32 | 1920.2 | 6950.1 | 119.62 | 25.26 | 39.48 | 961. |
| 260 | 23.42259 | 162.27 | 6.93 | 2219.7 | 7342.9 | 121.16 | 25.05 | 39.09 | 951. |
| 270 | 23.00245 | 159.25 | 6.58 | 2515.1 | 7732.0 | 122.63 | 24.86 | 38.72 | 941. |
| 280 | 22.59619 | 156.55 | 6.25 | 2806.8 | 8117.5 | 124.03 | 24.68 | 38.38 | 932. |
| 290 | 22.20323 | 154.16 | 5.96 | 3095.0 | 8499.6 | 125.37 | 24.51 | 38.05 | 924. |
| 300 | 21.82304 | 152.03 | 5.69 | 3379.9 | 8878.6 | 126.66 | 24.36 | 37.75 | 917. |
| 310 | 21.45511 | 150.15 | 5.44 | 3661.6 | 9254.7 | 127.89 | 24.21 | 37.46 | 911. |
| 320 | 21.09893 | 148.48 | 5.20 | 3940.5 | 9628.0 | 129.08 | 24.08 | 37.19 | 905. |
| 330 | 20.75403 | 147.01 | 4.99 | 4216.6 | 9998.6 | 130.22 | 23.96 | 36.94 | 899. |
| 340 | 20.41996 | 145.71 | 4.79 | 4490.2 | 10366.8 | 131.32 | 23.85 | 36.70 | 895. |
| 350 | 20.09627 | 144.58 | 4.61 | 4761.4 | 10732.6 | 132.38 | 23.75 | 36.48 | 890. |
| 360 | 19.78254 | 143.59 | 4.44 | 5030.4 | 11096.3 | 133.40 | 23.66 | 36.26 | 886. |
| 370 | 19.47838 | 142.74 | 4.28 | 5297.3 | 11458.0 | 134.39 | 23.58 | 36.07 | 883. |
| 380 | 19.18341 | 142.01 | 4.13 | 5562.3 | 11817.7 | 135.35 | 23.51 | 35.88 | 880. |
| 390 | 18.89726 | 141.39 | 3.99 | 5825.5 | 12175.6 | 136.28 | 23.44 | 35.71 | 877. |
| 400 | 18.61958 | 140.87 | 3.85 | 6087.0 | 12531.9 | 137.18 | 23.38 | 35.54 | 874. |
| 420 | 18.08830 | 140.11 | 3.61 | 6605.5 | 13239.6 | 138.91 | 23.28 | 35.24 | 870. |
| 440 | 17.58708 | 139.67 | 3.40 | 7118.6 | 13941.8 | 140.54 | 23.20 | 34.98 | 867. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 460 | 17.11363 | 139.50 | 3.21 | 7627.2 | 14639.2 | 142.09 | 23.15 | 34.76 | 865. |
| 480 | 16.66586 | 139.56 | 3.04 | 8131.9 | 15332.3 | 143.57 | 23.12 | 34.56 | 863. |
| 500 | 16.24185 | 139.81 | 2.89 | 8633.4 | 16021.7 | 144.98 | 23.11 | 34.39 | 862. |
| 520 | 15.83986 | 140.24 | 2.75 | 9132.2 | 16708.1 | 146.32 | 23.11 | 34.25 | 861. |
| 540 | 15.45828 | 140.81 | 2.62 | 9629.0 | 17391.8 | 147.61 | 23.13 | 34.13 | 861. |
| 560 | 15.09566 | 141.50 | 2.50 | 10124.1 | 18073.4 | 148.85 | 23.16 | 34.03 | 862. |
| 580 | 14.75064 | 142.31 | 2.40 | 10617.9 | 18753.2 | 150.04 | 23.21 | 33.95 | 862. |
| 600 | 14.42201 | 143.21 | 2.30 | 11111.0 | 19431.6 | 151.19 | 23.26 | 33.89 | 863. |
| 620 | 14.10864 | 144.19 | 2.21 | 11603.4 | 20108.9 | 152.31 | 23.32 | 33.84 | 864. |
| 640 | 13.80951 | 145.24 | 2.12 | 12095.7 | 20785.4 | 153.38 | 23.40 | 33.81 | 866. |
| 660 | 13.52366 | 146.36 | 2.05 | 12588.0 | 21461.4 | 154.42 | 23.47 | 33.79 | 867. |
| 680 | 13.25023 | 147.53 | 1.97 | 13080.6 | 22137.0 | 155.43 | 23.56 | 33.78 | 869. |
| 700 | 12.98842 | 148.75 | 1.91 | 13573.6 | 22812.6 | 156.41 | 23.65 | 33.78 | 871. |
| 720 | 12.73750 | 150.02 | 1.84 | 14067.2 | 23488.2 | 157.36 | 23.74 | 33.79 | 873. |
| 740 | 12.49680 | 151.32 | 1.78 | 14561.7 | 24164.1 | 158.28 | 23.84 | 33.80 | 875. |
| 760 | 12.26570 | 152.65 | 1.73 | 15057.0 | 24840.4 | 159.19 | 23.93 | 33.83 | 878. |
| 780 | 12.04361 | 154.02 | 1.68 | 15553.4 | 25517.2 | 160.07 | 24.03 | 33.85 | 880. |
| 800 | 11.83002 | 155.41 | 1.63 | 16050.9 | 26194.6 | 160.92 | 24.14 | 33.89 | 883. |
| 850 | 11.33006 | 158.99 | 1.52 | 17299.9 | 27891.2 | 162.98 | 24.39 | 33.98 | 889. |
| 900 | 10.87349 | 162.67 | 1.42 | 18557.1 | 29593.2 | 164.93 | 24.65 | 34.10 | 896. |
| 950 | 10.45472 | 166.44 | 1.34 | 19823.1 | 31301.2 | 166.77 | 24.90 | 34.22 | 904. |
| 1000 | 10.06910 | 170.26 | 1.26 | 21097.9 | 33015.6 | 168.53 | 25.14 | 34.35 | 911. |
| 1050 | 9.71270 | 174.14 | 1.19 | 22381.6 | 34736.5 | 170.21 | 25.37 | 34.49 | 919. |
| 1100 | 9.38220 | 178.04 | 1.13 | 23673.9 | 36464.1 | 171.82 | 25.59 | 34.62 | 927. |
| 1150 | 9.07477 | 181.98 | 1.08 | 24974.6 | 38198.1 | 173.36 | 25.79 | 34.74 | 935. |
| 1200 | 8.78798 | 185.94 | 1.03 | 26283.4 | 39938.4 | 174.84 | 25.99 | 34.87 | 944. |

1300 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 87.953 | 33.32715 | 421.74 | 19.61 | −3585.6 | 315.1 | 74.46 | 31.70 | 38.92 | 1360. |
| 88 | 33.32496 | 421.42 | 19.62 | −3584.1 | 316.9 | 74.48 | 31.69 | 38.93 | 1359. |
| 90 | 33.22940 | 408.43 | 20.00 | −3517.0 | 395.2 | 75.36 | 31.35 | 39.34 | 1352. |
| 92 | 33.12921 | 396.40 | 20.29 | −3449.8 | 474.3 | 76.23 | 31.07 | 39.78 | 1346. |
| 94 | 33.02476 | 385.26 | 20.50 | −3382.2 | 554.3 | 77.09 | 30.83 | 40.23 | 1340. |
| 96 | 32.91646 | 374.95 | 20.64 | −3314.2 | 635.2 | 77.94 | 30.63 | 40.70 | 1334. |
| 98 | 32.80467 | 365.41 | 20.72 | −3245.8 | 717.1 | 78.78 | 30.45 | 41.15 | 1328. |
| 100 | 32.68978 | 356.59 | 20.74 | −3177.0 | 799.8 | 79.62 | 30.31 | 41.59 | 1322. |
| 102 | 32.57217 | 348.42 | 20.71 | −3107.7 | 883.4 | 80.45 | 30.18 | 42.01 | 1316. |
| 104 | 32.45218 | 340.85 | 20.63 | −3038.1 | 967.8 | 81.27 | 30.07 | 42.40 | 1310. |
| 106 | 32.33016 | 333.83 | 20.52 | −2968.0 | 1053.0 | 82.08 | 29.97 | 42.76 | 1304. |
| 108 | 32.20642 | 327.32 | 20.37 | −2897.6 | 1138.8 | 82.88 | 29.88 | 43.08 | 1298. |
| 110 | 32.08127 | 321.25 | 20.20 | −2826.9 | 1225.3 | 83.67 | 29.79 | 43.37 | 1292. |
| 112 | 31.95498 | 315.60 | 20.01 | −2755.9 | 1312.3 | 84.46 | 29.72 | 43.63 | 1286. |
| 114 | 31.82779 | 310.32 | 19.79 | −2684.7 | 1399.8 | 85.23 | 29.65 | 43.85 | 1280. |
| 116 | 31.69993 | 305.38 | 19.56 | −2613.3 | 1487.7 | 85.99 | 29.58 | 44.05 | 1274. |
| 118 | 31.57161 | 300.74 | 19.32 | −2541.7 | 1575.9 | 86.75 | 29.51 | 44.21 | 1268. |
| 120 | 31.44301 | 296.37 | 19.07 | −2470.0 | 1664.5 | 87.49 | 29.45 | 44.34 | 1262. |
| 122 | 31.31428 | 292.24 | 18.81 | −2398.2 | 1753.3 | 88.23 | 29.39 | 44.45 | 1256. |
| 124 | 31.18559 | 288.33 | 18.55 | −2326.3 | 1842.3 | 88.95 | 29.32 | 44.53 | 1250. |
| 126 | 31.05704 | 284.62 | 18.28 | −2254.4 | 1931.4 | 89.66 | 29.26 | 44.60 | 1244. |
| 128 | 30.92874 | 281.09 | 18.01 | −2182.6 | 2020.7 | 90.37 | 29.20 | 44.64 | 1239. |
| 130 | 30.80080 | 277.72 | 17.74 | −2110.7 | 2110.0 | 91.06 | 29.14 | 44.66 | 1233. |
| 132 | 30.67329 | 274.50 | 17.47 | −2038.9 | 2199.3 | 91.74 | 29.08 | 44.67 | 1227. |
| 134 | 30.54628 | 271.40 | 17.20 | −1967.2 | 2288.6 | 92.41 | 29.01 | 44.66 | 1221. |
| 136 | 30.41984 | 268.43 | 16.93 | −1895.6 | 2377.9 | 93.07 | 28.95 | 44.64 | 1216. |
| 138 | 30.29401 | 265.56 | 16.67 | −1824.1 | 2467.2 | 93.73 | 28.89 | 44.61 | 1210. |
| 140 | 30.16883 | 262.80 | 16.40 | −1752.7 | 2556.4 | 94.37 | 28.82 | 44.57 | 1204. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 142 | 30.04435 | 260.13 | 16.14 | −1681.4 | 2645.5 | 95.00 | 28.76 | 44.52 | 1199. |
| 144 | 29.92058 | 257.54 | 15.89 | −1610.4 | 2734.5 | 95.62 | 28.69 | 44.46 | 1194. |
| 146 | 29.79756 | 255.03 | 15.64 | −1539.4 | 2823.3 | 96.23 | 28.63 | 44.40 | 1188. |
| 148 | 29.67530 | 252.59 | 15.39 | −1468.7 | 2912.1 | 96.84 | 28.56 | 44.32 | 1183. |
| 150 | 29.55382 | 250.22 | 15.15 | −1398.1 | 3000.6 | 97.43 | 28.49 | 44.25 | 1178. |
| 155 | 29.25358 | 244.57 | 14.56 | −1222.6 | 3221.3 | 98.88 | 28.32 | 44.03 | 1165. |
| 160 | 28.95837 | 239.26 | 14.01 | −1048.3 | 3440.9 | 100.27 | 28.16 | 43.80 | 1153. |
| 165 | 28.66823 | 234.27 | 13.48 | −875.4 | 3659.3 | 101.62 | 27.98 | 43.55 | 1141. |
| 170 | 28.38312 | 229.54 | 12.97 | −703.8 | 3876.4 | 102.91 | 27.81 | 43.29 | 1129. |
| 175 | 28.10299 | 225.08 | 12.50 | −533.7 | 4092.1 | 104.16 | 27.65 | 43.03 | 1118. |
| 180 | 27.82776 | 220.85 | 12.05 | −365.0 | 4306.6 | 105.37 | 27.48 | 42.76 | 1108. |
| 185 | 27.55734 | 216.84 | 11.62 | −197.7 | 4519.7 | 106.54 | 27.31 | 42.49 | 1097. |
| 190 | 27.29163 | 213.04 | 11.22 | −31.8 | 4731.6 | 107.67 | 27.15 | 42.23 | 1088. |
| 195 | 27.03054 | 209.44 | 10.84 | 132.7 | 4942.1 | 108.76 | 26.99 | 41.97 | 1078. |
| 200 | 26.77395 | 206.02 | 10.48 | 295.8 | 5151.2 | 109.82 | 26.83 | 41.71 | 1069. |
| 210 | 26.27392 | 199.72 | 9.82 | 618.0 | 5565.8 | 111.85 | 26.53 | 41.21 | 1052. |
| 220 | 25.79077 | 194.07 | 9.22 | 934.9 | 5975.5 | 113.75 | 26.25 | 40.73 | 1037. |
| 230 | 25.32377 | 188.99 | 8.68 | 1247.0 | 6380.5 | 115.55 | 25.98 | 40.27 | 1023. |
| 240 | 24.87223 | 184.44 | 8.19 | 1554.3 | 6781.0 | 117.26 | 25.73 | 39.84 | 1010. |
| 250 | 24.43549 | 180.36 | 7.75 | 1857.3 | 7177.4 | 118.88 | 25.50 | 39.43 | 998. |
| 260 | 24.01295 | 176.70 | 7.34 | 2156.0 | 7569.8 | 120.41 | 25.28 | 39.05 | 987. |
| 270 | 23.60400 | 173.42 | 6.98 | 2450.8 | 7958.4 | 121.88 | 25.08 | 38.68 | 977. |
| 280 | 23.20809 | 170.49 | 6.64 | 2742.0 | 8343.5 | 123.28 | 24.89 | 38.34 | 968. |
| 290 | 22.82468 | 167.86 | 6.33 | 3029.7 | 8725.3 | 124.62 | 24.72 | 38.02 | 960. |
| 300 | 22.45327 | 165.50 | 6.05 | 3314.2 | 9104.0 | 125.91 | 24.56 | 37.72 | 953. |
| 310 | 22.09336 | 163.40 | 5.79 | 3595.6 | 9479.8 | 127.14 | 24.41 | 37.44 | 946. |
| 320 | 21.74448 | 161.52 | 5.55 | 3874.3 | 9852.8 | 128.32 | 24.27 | 37.17 | 940. |
| 330 | 21.40620 | 159.84 | 5.32 | 4150.2 | 10223.2 | 129.46 | 24.15 | 36.92 | 934. |
| 340 | 21.07810 | 158.35 | 5.12 | 4423.7 | 10591.3 | 130.56 | 24.03 | 36.69 | 929. |
| 350 | 20.75975 | 157.03 | 4.92 | 4694.9 | 10957.0 | 131.62 | 23.93 | 36.47 | 924. |
| 360 | 20.45080 | 155.87 | 4.74 | 4963.9 | 11320.6 | 132.64 | 23.83 | 36.26 | 920. |
| 370 | 20.15086 | 154.84 | 4.58 | 5230.9 | 11682.2 | 133.64 | 23.74 | 36.06 | 916. |
| 380 | 19.85958 | 153.95 | 4.42 | 5496.0 | 12042.0 | 134.60 | 23.66 | 35.88 | 913. |
| 390 | 19.57663 | 153.17 | 4.27 | 5759.3 | 12399.9 | 135.52 | 23.59 | 35.71 | 910. |
| 400 | 19.30169 | 152.50 | 4.13 | 6021.1 | 12756.2 | 136.43 | 23.52 | 35.55 | 907. |
| 420 | 18.77463 | 151.45 | 3.88 | 6540.1 | 13464.3 | 138.15 | 23.42 | 35.26 | 902. |
| 440 | 18.27612 | 150.74 | 3.66 | 7053.8 | 14166.9 | 139.79 | 23.33 | 35.01 | 899. |
| 460 | 17.80406 | 150.32 | 3.45 | 7563.1 | 14864.8 | 141.34 | 23.27 | 34.79 | 896. |
| 480 | 17.35654 | 150.16 | 3.27 | 8068.7 | 15558.6 | 142.82 | 23.24 | 34.60 | 893. |
| 500 | 16.93181 | 150.20 | 3.11 | 8571.1 | 16248.9 | 144.23 | 23.22 | 34.44 | 892. |
| 520 | 16.52825 | 150.43 | 2.96 | 9070.9 | 16936.2 | 145.57 | 23.22 | 34.30 | 891. |
| 540 | 16.14439 | 150.82 | 2.82 | 9568.7 | 17621.0 | 146.87 | 23.23 | 34.18 | 890. |
| 560 | 15.77888 | 151.36 | 2.70 | 10064.8 | 18303.7 | 148.11 | 23.26 | 34.09 | 890. |
| 580 | 15.43047 | 152.01 | 2.59 | 10559.8 | 18984.7 | 149.30 | 23.30 | 34.01 | 890. |
| 600 | 15.09802 | 152.77 | 2.48 | 11054.0 | 19664.4 | 150.45 | 23.35 | 33.96 | 891. |
| 620 | 14.78048 | 153.62 | 2.38 | 11547.6 | 20343.0 | 151.57 | 23.41 | 33.91 | 891. |
| 640 | 14.47688 | 154.55 | 2.29 | 12041.1 | 21020.9 | 152.64 | 23.48 | 33.88 | 892. |
| 660 | 14.18633 | 155.56 | 2.21 | 12534.6 | 21698.3 | 153.68 | 23.55 | 33.86 | 894. |
| 680 | 13.90800 | 156.63 | 2.13 | 13028.3 | 22375.5 | 154.70 | 23.63 | 33.85 | 895. |
| 700 | 13.64115 | 157.76 | 2.06 | 13522.5 | 23052.5 | 155.68 | 23.72 | 33.85 | 897. |
| 720 | 13.38507 | 158.93 | 1.99 | 14017.4 | 23729.7 | 156.63 | 23.81 | 33.86 | 898. |
| 740 | 13.13912 | 160.15 | 1.93 | 14513.0 | 24407.1 | 157.56 | 23.91 | 33.88 | 900. |
| 760 | 12.90270 | 161.41 | 1.87 | 15009.6 | 25085.0 | 158.46 | 24.00 | 33.90 | 902. |
| 780 | 12.67527 | 162.70 | 1.82 | 15507.1 | 25763.3 | 159.34 | 24.10 | 33.93 | 904. |
| 800 | 12.45630 | 164.03 | 1.76 | 16005.7 | 26442.2 | 160.20 | 24.20 | 33.96 | 907. |
| 850 | 11.94289 | 167.46 | 1.64 | 17257.6 | 28142.8 | 162.26 | 24.45 | 34.06 | 913. |
| 900 | 11.47300 | 171.01 | 1.54 | 18517.7 | 29848.6 | 164.21 | 24.70 | 34.17 | 919. |
| 950 | 11.04118 | 174.67 | 1.45 | 19786.3 | 31560.4 | 166.07 | 24.95 | 34.30 | 926. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1000 | 10.64283 | 178.41 | 1.37 | 21063.7 | 33278.5 | 167.83 | 25.19 | 34.43 | 933. |
| 1050 | 10.27408 | 182.20 | 1.29 | 22349.9 | 35003.1 | 169.51 | 25.41 | 34.56 | 940. |
| 1100 | 9.93162 | 186.04 | 1.23 | 23644.6 | 36734.1 | 171.12 | 25.63 | 34.68 | 948. |
| 1150 | 9.61265 | 189.92 | 1.17 | 24947.6 | 38471.4 | 172.67 | 25.84 | 34.81 | 956. |
| 1200 | 9.31472 | 193.82 | 1.12 | 26258.5 | 40214.9 | 174.15 | 26.03 | 34.93 | 964. |
| | | | | 1400 bar Isobar | | | | | |
| * 89.630 | 33.48316 | 438.06 | 19.67 | −3538.5 | 642.7 | 74.78 | 31.14 | 38.20 | 1385. |
| 90 | 33.46646 | 435.58 | 19.75 | −3526.4 | 656.9 | 74.93 | 31.09 | 38.28 | 1384. |
| 92 | 33.37347 | 422.74 | 20.13 | −3461.0 | 733.9 | 75.78 | 30.84 | 38.76 | 1377. |
| 94 | 33.27610 | 410.82 | 20.42 | −3395.3 | 811.9 | 76.62 | 30.63 | 39.25 | 1371. |
| 96 | 33.17473 | 399.76 | 20.64 | −3329.1 | 890.9 | 77.45 | 30.47 | 39.76 | 1365. |
| 98 | 33.06971 | 389.51 | 20.78 | −3262.5 | 971.0 | 78.28 | 30.33 | 40.27 | 1359. |
| 100 | 32.96141 | 380.01 | 20.86 | −3195.4 | 1052.0 | 79.09 | 30.21 | 40.76 | 1353. |
| 102 | 32.85020 | 371.20 | 20.89 | −3127.8 | 1134.0 | 79.91 | 30.11 | 41.23 | 1347. |
| 104 | 32.73643 | 363.04 | 20.86 | −3059.7 | 1216.9 | 80.71 | 30.03 | 41.67 | 1341. |
| 106 | 32.62042 | 355.46 | 20.80 | −2991.2 | 1300.6 | 81.51 | 29.96 | 42.08 | 1335. |
| 108 | 32.50250 | 348.43 | 20.69 | −2922.2 | 1385.2 | 82.30 | 29.89 | 42.45 | 1329. |
| 110 | 32.38297 | 341.89 | 20.55 | −2852.8 | 1470.4 | 83.08 | 29.83 | 42.80 | 1323. |
| 112 | 32.26211 | 335.81 | 20.39 | −2783.1 | 1556.3 | 83.85 | 29.78 | 43.10 | 1317. |
| 114 | 32.14017 | 330.13 | 20.20 | −2713.1 | 1642.8 | 84.62 | 29.73 | 43.37 | 1311. |
| 116 | 32.01739 | 324.82 | 20.00 | −2642.8 | 1729.8 | 85.38 | 29.68 | 43.61 | 1305. |
| 118 | 31.89399 | 319.85 | 19.78 | −2572.3 | 1817.2 | 86.12 | 29.63 | 43.81 | 1299. |
| 120 | 31.77015 | 315.19 | 19.54 | −2501.6 | 1905.0 | 86.86 | 29.58 | 43.98 | 1293. |
| 122 | 31.64604 | 310.79 | 19.30 | −2430.8 | 1993.1 | 87.59 | 29.53 | 44.13 | 1288. |
| 124 | 31.52183 | 306.65 | 19.05 | −2359.9 | 2081.5 | 88.31 | 29.48 | 44.24 | 1282. |
| 126 | 31.39765 | 302.72 | 18.79 | −2288.9 | 2170.1 | 89.02 | 29.43 | 44.33 | 1276. |
| 128 | 31.27361 | 299.00 | 18.53 | −2217.8 | 2258.8 | 89.71 | 29.38 | 44.40 | 1270. |
| 130 | 31.14983 | 295.46 | 18.26 | −2146.7 | 2347.7 | 90.40 | 29.32 | 44.45 | 1264. |
| 132 | 31.02638 | 292.08 | 18.00 | −2075.7 | 2436.6 | 91.08 | 29.27 | 44.48 | 1259. |
| 134 | 30.90336 | 288.85 | 17.73 | −2004.7 | 2525.6 | 91.75 | 29.22 | 44.49 | 1253. |
| 136 | 30.78083 | 285.75 | 17.47 | −1933.7 | 2614.6 | 92.41 | 29.16 | 44.49 | 1248. |
| 138 | 30.65884 | 282.78 | 17.21 | −1862.9 | 2703.5 | 93.06 | 29.10 | 44.47 | 1242. |
| 140 | 30.53744 | 279.92 | 16.95 | −1792.1 | 2792.4 | 93.70 | 29.04 | 44.45 | 1237. |
| 142 | 30.41669 | 277.16 | 16.69 | −1721.4 | 2881.3 | 94.33 | 28.98 | 44.41 | 1231. |
| 144 | 30.29660 | 274.49 | 16.43 | −1650.9 | 2970.1 | 94.95 | 28.92 | 44.36 | 1226. |
| 146 | 30.17721 | 271.91 | 16.18 | −1580.5 | 3058.7 | 95.56 | 28.86 | 44.30 | 1221. |
| 148 | 30.05854 | 269.41 | 15.94 | −1510.3 | 3147.3 | 96.16 | 28.80 | 44.24 | 1215. |
| 150 | 29.94061 | 266.98 | 15.69 | −1440.3 | 3235.7 | 96.76 | 28.73 | 44.17 | 1210. |
| 155 | 29.64912 | 261.20 | 15.10 | −1265.9 | 3456.0 | 98.20 | 28.57 | 43.97 | 1198. |
| 160 | 29.36248 | 255.79 | 14.54 | −1092.7 | 3675.3 | 99.60 | 28.41 | 43.74 | 1186. |
| 165 | 29.08075 | 250.69 | 14.00 | −920.8 | 3893.4 | 100.94 | 28.24 | 43.50 | 1174. |
| 170 | 28.80392 | 245.88 | 13.49 | −750.2 | 4110.3 | 102.23 | 28.07 | 43.25 | 1163. |
| 175 | 28.53193 | 241.33 | 13.01 | −580.9 | 4325.9 | 103.48 | 27.91 | 42.99 | 1152. |
| 180 | 28.26472 | 237.01 | 12.55 | −413.0 | 4540.1 | 104.69 | 27.74 | 42.72 | 1142. |
| 185 | 28.00218 | 232.90 | 12.12 | −246.5 | 4753.1 | 105.86 | 27.57 | 42.46 | 1131. |
| 190 | 27.74422 | 229.01 | 11.71 | −81.4 | 4964.7 | 106.99 | 27.41 | 42.19 | 1122. |
| 195 | 27.49074 | 225.31 | 11.32 | 82.4 | 5175.0 | 108.08 | 27.25 | 41.93 | 1113. |
| 200 | 27.24161 | 221.79 | 10.96 | 244.9 | 5384.1 | 109.14 | 27.09 | 41.68 | 1104. |
| 210 | 26.75604 | 215.27 | 10.28 | 565.8 | 5798.3 | 111.16 | 26.79 | 41.17 | 1087. |
| 220 | 26.28670 | 209.38 | 9.66 | 881.7 | 6207.6 | 113.06 | 26.50 | 40.70 | 1071. |
| 230 | 25.83282 | 204.07 | 9.11 | 1192.8 | 6612.3 | 114.86 | 26.22 | 40.24 | 1057. |
| 240 | 25.39368 | 199.28 | 8.61 | 1499.3 | 7012.5 | 116.56 | 25.97 | 39.81 | 1044. |
| 250 | 24.96863 | 194.95 | 8.15 | 1801.5 | 7408.5 | 118.18 | 25.73 | 39.40 | 1032. |
| 260 | 24.55704 | 191.06 | 7.74 | 2099.6 | 7800.6 | 119.72 | 25.50 | 39.02 | 1021. |
| 270 | 24.15834 | 187.54 | 7.36 | 2393.9 | 8189.0 | 121.18 | 25.29 | 38.66 | 1012. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 280 | 23.77197 | 184.38 | 7.01 | 2684.6 | 8573.8 | 122.58 | 25.10 | 38.32 | 1002. |
| 290 | 23.39742 | 181.52 | 6.69 | 2971.9 | 8955.4 | 123.92 | 24.92 | 38.00 | 994. |
| 300 | 23.03419 | 178.95 | 6.40 | 3256.0 | 9333.9 | 125.21 | 24.75 | 37.70 | 986. |
| 310 | 22.68182 | 176.64 | 6.13 | 3537.2 | 9709.5 | 126.44 | 24.60 | 37.42 | 979. |
| 320 | 22.33988 | 174.56 | 5.88 | 3815.6 | 10082.4 | 127.62 | 24.46 | 37.16 | 973. |
| 330 | 22.00794 | 172.69 | 5.65 | 4091.4 | 10452.7 | 128.76 | 24.32 | 36.91 | 967. |
| 340 | 21.68562 | 171.02 | 5.43 | 4364.7 | 10820.6 | 129.86 | 24.20 | 36.68 | 962. |
| 350 | 21.37252 | 169.52 | 5.23 | 4635.9 | 11186.3 | 130.92 | 24.09 | 36.46 | 957. |
| 360 | 21.06830 | 168.18 | 5.04 | 4904.8 | 11549.9 | 131.94 | 23.99 | 36.26 | 953. |
| 370 | 20.77261 | 166.99 | 4.87 | 5171.9 | 11911.5 | 132.93 | 23.90 | 36.07 | 949. |
| 380 | 20.48512 | 165.93 | 4.70 | 5437.0 | 12271.2 | 133.89 | 23.81 | 35.89 | 945. |
| 390 | 20.20554 | 165.00 | 4.55 | 5700.5 | 12629.3 | 134.82 | 23.73 | 35.72 | 941. |
| 400 | 19.93355 | 164.18 | 4.40 | 5962.3 | 12985.6 | 135.73 | 23.67 | 35.56 | 938. |
| 420 | 19.41126 | 162.85 | 4.14 | 6481.7 | 13694.0 | 137.45 | 23.55 | 35.28 | 933. |
| 440 | 18.91615 | 161.89 | 3.90 | 6995.9 | 14397.0 | 139.09 | 23.46 | 35.03 | 929. |
| 460 | 18.44629 | 161.23 | 3.69 | 7505.8 | 15095.4 | 140.64 | 23.39 | 34.81 | 926. |
| 480 | 17.99992 | 160.84 | 3.50 | 8011.9 | 15789.8 | 142.12 | 23.35 | 34.63 | 923. |
| 500 | 17.57541 | 160.68 | 3.33 | 8515.1 | 16480.8 | 143.53 | 23.32 | 34.47 | 921. |
| 520 | 17.17128 | 160.72 | 3.17 | 9015.7 | 17168.9 | 144.88 | 23.32 | 34.34 | 919. |
| 540 | 16.78616 | 160.94 | 3.03 | 9514.3 | 17854.5 | 146.17 | 23.33 | 34.23 | 918. |
| 560 | 16.41880 | 161.30 | 2.89 | 10011.4 | 18538.2 | 147.42 | 23.35 | 34.14 | 918. |
| 580 | 16.06803 | 161.81 | 2.77 | 10507.3 | 19220.2 | 148.61 | 23.39 | 34.07 | 917. |
| 600 | 15.73278 | 162.43 | 2.66 | 11002.4 | 19901.0 | 149.77 | 23.43 | 34.01 | 917. |
| 620 | 15.41208 | 163.15 | 2.56 | 11497.0 | 20580.8 | 150.88 | 23.49 | 33.97 | 918. |
| 640 | 15.10500 | 163.96 | 2.46 | 11991.5 | 21259.9 | 151.96 | 23.56 | 33.94 | 918. |
| 660 | 14.81072 | 164.85 | 2.38 | 12486.0 | 21938.6 | 153.00 | 23.63 | 33.93 | 919. |
| 680 | 14.52845 | 165.82 | 2.29 | 12980.7 | 22617.0 | 154.02 | 23.71 | 33.92 | 920. |
| 700 | 14.25747 | 166.85 | 2.22 | 13476.0 | 23295.4 | 155.00 | 23.79 | 33.92 | 922. |
| 720 | 13.99713 | 167.93 | 2.14 | 13971.9 | 23973.9 | 155.96 | 23.88 | 33.93 | 923. |
| 740 | 13.74679 | 169.07 | 2.08 | 14468.5 | 24652.7 | 156.89 | 23.97 | 33.95 | 925. |
| 760 | 13.50590 | 170.25 | 2.01 | 14966.1 | 25331.9 | 157.79 | 24.07 | 33.97 | 926. |
| 780 | 13.27392 | 171.47 | 1.95 | 15464.7 | 26011.7 | 158.67 | 24.16 | 34.00 | 928. |
| 800 | 13.05036 | 172.73 | 1.90 | 15964.3 | 26692.0 | 159.54 | 24.26 | 34.03 | 930. |
| 850 | 12.52535 | 176.00 | 1.77 | 17218.8 | 28396.1 | 161.60 | 24.51 | 34.13 | 935. |
| 900 | 12.04384 | 179.43 | 1.66 | 18481.3 | 30105.5 | 163.56 | 24.76 | 34.25 | 941. |
| 950 | 11.60051 | 182.98 | 1.56 | 19752.4 | 31820.8 | 165.41 | 25.00 | 34.37 | 948. |
| 1000 | 11.19085 | 186.61 | 1.47 | 21032.1 | 33542.3 | 167.18 | 25.23 | 34.49 | 954. |
| 1050 | 10.81105 | 190.33 | 1.39 | 22320.5 | 35270.2 | 168.86 | 25.46 | 34.62 | 961. |
| 1100 | 10.45785 | 194.09 | 1.32 | 23617.4 | 37004.5 | 170.48 | 25.67 | 34.75 | 968. |
| 1150 | 10.12844 | 197.90 | 1.26 | 24922.5 | 38745.0 | 172.02 | 25.88 | 34.87 | 976. |
| 1200 | 9.82040 | 201.75 | 1.20 | 26235.5 | 40491.5 | 173.51 | 26.07 | 34.99 | 983. |
| | | | | 1500 bar Isobar | | | | | |
| * 91.282 | 33.63434 | 454.28 | 19.74 | −3491.9 | 967.8 | 75.07 | 30.64 | 37.56 | 1410. |
| 92 | 33.60286 | 449.49 | 19.90 | −3469.1 | 994.8 | 75.37 | 30.57 | 37.75 | 1408. |
| 94 | 33.51215 | 436.79 | 20.27 | −3405.1 | 1070.9 | 76.19 | 30.40 | 38.28 | 1401. |
| 96 | 33.41732 | 424.97 | 20.56 | −3340.7 | 1148.0 | 77.00 | 30.27 | 38.83 | 1395. |
| 98 | 33.31872 | 413.98 | 20.78 | −3275.8 | 1226.2 | 77.81 | 30.17 | 39.38 | 1389. |
| 100 | 33.21668 | 403.78 | 20.92 | −3210.3 | 1305.5 | 78.61 | 30.09 | 39.91 | 1383. |
| 102 | 33.11156 | 394.31 | 21.01 | −3144.3 | 1385.8 | 79.40 | 30.02 | 40.43 | 1377. |
| 104 | 33.00371 | 385.52 | 21.03 | −3077.8 | 1467.2 | 80.19 | 29.97 | 40.93 | 1371. |
| 106 | 32.89344 | 377.36 | 21.01 | −3010.7 | 1549.5 | 80.98 | 29.92 | 41.39 | 1365. |
| 108 | 32.78107 | 369.78 | 20.95 | −2943.1 | 1632.7 | 81.75 | 29.88 | 41.81 | 1359. |
| 110 | 32.66691 | 362.73 | 20.85 | −2875.1 | 1716.7 | 82.52 | 29.85 | 42.21 | 1353. |
| 112 | 32.55123 | 356.18 | 20.72 | −2806.6 | 1801.5 | 83.29 | 29.82 | 42.56 | 1347. |
| 114 | 32.43430 | 350.07 | 20.56 | −2737.8 | 1886.9 | 84.04 | 29.79 | 42.88 | 1341. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 116 | 32.31636 | 344.37 | 20.38 | −2668.6 | 1973.0 | 84.79 | 29.76 | 43.16 | 1335. |
| 118 | 32.19762 | 339.03 | 20.18 | −2599.2 | 2059.5 | 85.53 | 29.72 | 43.40 | 1329. |
| 120 | 32.07830 | 334.04 | 19.97 | −2529.5 | 2146.6 | 86.26 | 29.69 | 43.61 | 1323. |
| 122 | 31.95857 | 329.35 | 19.74 | −2459.6 | 2234.0 | 86.99 | 29.66 | 43.79 | 1318. |
| 124 | 31.83859 | 324.93 | 19.50 | −2389.6 | 2321.7 | 87.70 | 29.62 | 43.94 | 1312. |
| 126 | 31.71851 | 320.76 | 19.26 | −2319.4 | 2409.7 | 88.40 | 29.58 | 44.06 | 1306. |
| 128 | 31.59847 | 316.82 | 19.01 | −2249.1 | 2497.9 | 89.10 | 29.54 | 44.16 | 1300. |
| 130 | 31.47857 | 313.08 | 18.75 | −2178.8 | 2586.3 | 89.78 | 29.50 | 44.23 | 1295. |
| 132 | 31.35891 | 309.53 | 18.49 | −2108.5 | 2674.9 | 90.46 | 29.45 | 44.29 | 1289. |
| 134 | 31.23958 | 306.14 | 18.24 | −2038.1 | 2763.5 | 91.13 | 29.41 | 44.32 | 1283. |
| 136 | 31.12067 | 302.90 | 17.98 | −1967.8 | 2852.1 | 91.78 | 29.36 | 44.34 | 1278. |
| 138 | 31.00222 | 299.80 | 17.72 | −1897.6 | 2940.8 | 92.43 | 29.31 | 44.34 | 1272. |
| 140 | 30.88430 | 296.82 | 17.46 | −1827.4 | 3029.5 | 93.07 | 29.25 | 44.33 | 1267. |
| 142 | 30.76695 | 293.96 | 17.20 | −1757.3 | 3118.1 | 93.70 | 29.20 | 44.30 | 1262. |
| 144 | 30.65022 | 291.20 | 16.95 | −1687.3 | 3206.7 | 94.31 | 29.14 | 44.27 | 1257. |
| 146 | 30.53414 | 288.54 | 16.70 | −1617.4 | 3295.2 | 94.93 | 29.09 | 44.22 | 1251. |
| 148 | 30.41874 | 285.96 | 16.45 | −1547.6 | 3383.5 | 95.53 | 29.03 | 44.17 | 1246. |
| 150 | 30.30403 | 283.47 | 16.21 | −1478.0 | 3471.8 | 96.12 | 28.97 | 44.10 | 1241. |
| 155 | 30.02043 | 277.55 | 15.61 | −1304.7 | 3691.9 | 97.56 | 28.81 | 43.92 | 1229. |
| 160 | 29.74149 | 272.02 | 15.05 | −1132.5 | 3911.0 | 98.95 | 28.65 | 43.71 | 1217. |
| 165 | 29.46730 | 266.82 | 14.50 | −961.5 | 4128.9 | 100.29 | 28.49 | 43.47 | 1206. |
| 170 | 29.19786 | 261.92 | 13.99 | −791.7 | 4345.7 | 101.59 | 28.32 | 43.23 | 1195. |
| 175 | 28.93315 | 257.28 | 13.50 | −623.2 | 4561.2 | 102.84 | 28.16 | 42.97 | 1184. |
| 180 | 28.67308 | 252.88 | 13.04 | −456.0 | 4775.3 | 104.04 | 27.99 | 42.71 | 1174. |
| 185 | 28.41757 | 248.70 | 12.60 | −290.2 | 4988.2 | 105.21 | 27.83 | 42.44 | 1164. |
| 190 | 28.16653 | 244.72 | 12.18 | −125.7 | 5199.8 | 106.34 | 27.66 | 42.18 | 1154. |
| 195 | 27.91983 | 240.93 | 11.78 | 37.5 | 5410.0 | 107.43 | 27.50 | 41.92 | 1145. |
| 200 | 27.67737 | 237.32 | 11.41 | 199.4 | 5619.0 | 108.49 | 27.34 | 41.66 | 1136. |
| 210 | 27.20473 | 230.61 | 10.72 | 519.3 | 6033.1 | 110.51 | 27.03 | 41.16 | 1120. |
| 220 | 26.74778 | 224.52 | 10.09 | 834.3 | 6442.3 | 112.41 | 26.74 | 40.68 | 1104. |
| 230 | 26.30572 | 219.00 | 9.52 | 1144.6 | 6846.8 | 114.21 | 26.46 | 40.22 | 1090. |
| 240 | 25.87781 | 213.99 | 9.01 | 1450.4 | 7246.8 | 115.92 | 26.20 | 39.79 | 1077. |
| 250 | 25.46338 | 209.44 | 8.54 | 1751.9 | 7642.7 | 117.53 | 25.95 | 39.39 | 1065. |
| 260 | 25.06181 | 205.33 | 8.12 | 2049.5 | 8034.7 | 119.07 | 25.72 | 39.00 | 1054. |
| 270 | 24.67251 | 201.59 | 7.73 | 2343.2 | 8422.9 | 120.53 | 25.50 | 38.64 | 1044. |
| 280 | 24.29494 | 198.21 | 7.37 | 2633.5 | 8807.6 | 121.93 | 25.30 | 38.31 | 1035. |
| 290 | 23.92860 | 195.15 | 7.04 | 2920.4 | 9189.1 | 123.27 | 25.12 | 37.99 | 1026. |
| 300 | 23.57302 | 192.38 | 6.74 | 3204.2 | 9567.4 | 124.55 | 24.94 | 37.69 | 1019. |
| 310 | 23.22775 | 189.86 | 6.46 | 3485.2 | 9943.0 | 125.79 | 24.78 | 37.41 | 1012. |
| 320 | 22.89237 | 187.59 | 6.20 | 3763.3 | 10315.8 | 126.97 | 24.63 | 37.15 | 1005. |
| 330 | 22.56648 | 185.54 | 5.96 | 4039.0 | 10686.0 | 128.11 | 24.50 | 36.91 | 999. |
| 340 | 22.24971 | 183.69 | 5.74 | 4312.2 | 11053.9 | 129.21 | 24.37 | 36.68 | 993. |
| 350 | 21.94170 | 182.02 | 5.53 | 4583.3 | 11419.6 | 130.27 | 24.25 | 36.46 | 988. |
| 360 | 21.64212 | 180.51 | 5.33 | 4852.2 | 11783.1 | 131.29 | 24.14 | 36.26 | 984. |
| 370 | 21.35064 | 179.16 | 5.15 | 5119.2 | 12144.8 | 132.28 | 24.05 | 36.07 | 979. |
| 380 | 21.06696 | 177.95 | 4.98 | 5384.4 | 12504.6 | 133.24 | 23.96 | 35.89 | 976. |
| 390 | 20.79080 | 176.87 | 4.82 | 5647.9 | 12862.6 | 134.17 | 23.88 | 35.73 | 972. |
| 400 | 20.52187 | 175.91 | 4.67 | 5909.8 | 13219.1 | 135.07 | 23.80 | 35.57 | 969. |
| 420 | 20.00469 | 174.31 | 4.39 | 6429.4 | 13927.7 | 136.80 | 23.68 | 35.29 | 963. |
| 440 | 19.51344 | 173.09 | 4.14 | 6944.0 | 14631.0 | 138.44 | 23.58 | 35.05 | 958. |
| 460 | 19.04635 | 172.20 | 3.92 | 7454.3 | 15329.8 | 139.99 | 23.51 | 34.84 | 954. |
| 480 | 18.60177 | 171.59 | 3.72 | 7961.0 | 16024.8 | 141.47 | 23.46 | 34.66 | 951. |
| 500 | 18.17820 | 171.23 | 3.54 | 8464.7 | 16716.4 | 142.88 | 23.43 | 34.51 | 949. |
| 520 | 17.77426 | 171.09 | 3.38 | 8966.0 | 17405.1 | 144.23 | 23.42 | 34.38 | 947. |
| 540 | 17.38867 | 171.13 | 3.22 | 9465.3 | 18091.6 | 145.53 | 23.42 | 34.27 | 945. |
| 560 | 17.02026 | 171.33 | 3.09 | 9963.1 | 18776.1 | 146.77 | 23.44 | 34.18 | 944. |
| 580 | 16.66794 | 171.68 | 2.96 | 10459.7 | 19459.0 | 147.97 | 23.47 | 34.11 | 944. |
| 600 | 16.33072 | 172.16 | 2.84 | 10955.6 | 20140.8 | 149.13 | 23.52 | 34.06 | 943. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 620 | 16.00767 | 172.76 | 2.73 | 11451.1 | 20821.6 | 150.24 | 23.57 | 34.02 | 943. |
| 640 | 15.69794 | 173.45 | 2.63 | 11946.4 | 21501.8 | 151.32 | 23.63 | 34.00 | 944. |
| 660 | 15.40072 | 174.23 | 2.54 | 12441.7 | 22181.5 | 152.37 | 23.70 | 33.98 | 944. |
| 680 | 15.11528 | 175.09 | 2.45 | 12937.4 | 22861.1 | 153.38 | 23.78 | 33.98 | 945. |
| 700 | 14.84095 | 176.02 | 2.37 | 13433.5 | 23540.7 | 154.37 | 23.86 | 33.98 | 946. |
| 720 | 14.57708 | 177.01 | 2.29 | 13930.3 | 24220.4 | 155.33 | 23.95 | 33.99 | 947. |
| 740 | 14.32309 | 178.06 | 2.22 | 14427.9 | 24900.5 | 156.26 | 24.04 | 34.01 | 948. |
| 760 | 14.07843 | 179.16 | 2.15 | 14926.3 | 25580.9 | 157.16 | 24.13 | 34.04 | 950. |
| 780 | 13.84260 | 180.31 | 2.09 | 15425.8 | 26261.9 | 158.05 | 24.22 | 34.07 | 951. |
| 800 | 13.61511 | 181.49 | 2.03 | 15926.4 | 26943.5 | 158.91 | 24.32 | 34.10 | 953. |
| 850 | 13.08009 | 184.61 | 1.89 | 17183.0 | 28650.9 | 160.98 | 24.56 | 34.20 | 958. |
| 900 | 12.58842 | 187.90 | 1.77 | 18447.8 | 30363.5 | 162.94 | 24.81 | 34.31 | 963. |
| 950 | 12.13492 | 191.34 | 1.67 | 19721.0 | 32082.0 | 164.80 | 25.05 | 34.43 | 969. |
| 1000 | 11.71520 | 194.88 | 1.58 | 21002.9 | 33806.8 | 166.57 | 25.28 | 34.56 | 975. |
| 1050 | 11.32550 | 198.50 | 1.49 | 22293.3 | 35537.8 | 168.26 | 25.50 | 34.68 | 982. |
| 1100 | 10.96261 | 202.19 | 1.42 | 23592.2 | 37275.1 | 169.87 | 25.72 | 34.81 | 988. |
| 1150 | 10.62375 | 205.94 | 1.35 | 24899.2 | 39018.5 | 171.42 | 25.92 | 34.93 | 995. |
| 1200 | 10.30653 | 209.73 | 1.29 | 26214.1 | 40767.9 | 172.91 | 26.11 | 35.05 | 1003. |
| | | | | 1600 bar Isobar | | | | | |
| * 92.911 | 33.78097 | 470.38 | 19.81 | −3445.9 | 1290.5 | 75.36 | 30.21 | 37.00 | 1434. |
| 94 | 33.73447 | 463.15 | 20.05 | −3411.9 | 1331.0 | 75.79 | 30.14 | 37.31 | 1431. |
| 96 | 33.64584 | 450.57 | 20.42 | −3349.2 | 1406.2 | 76.58 | 30.05 | 37.90 | 1424. |
| 98 | 33.55332 | 438.84 | 20.70 | −3286.0 | 1482.6 | 77.37 | 29.98 | 38.49 | 1418. |
| 100 | 33.45724 | 427.92 | 20.91 | −3222.1 | 1560.1 | 78.15 | 29.94 | 39.07 | 1412. |
| 102 | 33.35793 | 417.77 | 21.06 | −3157.6 | 1638.8 | 78.93 | 29.90 | 39.63 | 1406. |
| 104 | 33.25573 | 408.33 | 21.14 | −3092.6 | 1718.6 | 79.71 | 29.88 | 40.17 | 1400. |
| 106 | 33.15095 | 399.56 | 21.17 | −3026.9 | 1799.5 | 80.48 | 29.87 | 40.68 | 1394. |
| 108 | 33.04391 | 391.40 | 21.15 | −2960.7 | 1881.4 | 81.24 | 29.85 | 41.16 | 1388. |
| 110 | 32.93489 | 383.82 | 21.09 | −2893.9 | 1964.1 | 82.00 | 29.85 | 41.60 | 1382. |
| 112 | 32.82419 | 376.76 | 21.00 | −2826.7 | 2047.7 | 82.75 | 29.84 | 42.00 | 1376. |
| 114 | 32.71207 | 370.19 | 20.87 | −2759.1 | 2132.1 | 83.50 | 29.83 | 42.36 | 1370. |
| 116 | 32.59876 | 364.05 | 20.72 | −2691.0 | 2217.2 | 84.24 | 29.82 | 42.69 | 1364. |
| 118 | 32.48450 | 358.33 | 20.54 | −2622.6 | 2302.8 | 84.97 | 29.80 | 42.97 | 1358. |
| 120 | 32.36950 | 352.97 | 20.35 | −2553.9 | 2389.0 | 85.70 | 29.79 | 43.23 | 1352. |
| 122 | 32.25394 | 347.95 | 20.14 | −2484.9 | 2475.7 | 86.41 | 29.77 | 43.44 | 1346. |
| 124 | 32.13800 | 343.23 | 19.92 | −2415.8 | 2562.8 | 87.12 | 29.75 | 43.63 | 1341. |
| 126 | 32.02182 | 338.79 | 19.69 | −2346.4 | 2650.2 | 87.82 | 29.72 | 43.78 | 1335. |
| 128 | 31.90556 | 334.60 | 19.45 | −2276.9 | 2737.9 | 88.51 | 29.69 | 43.91 | 1329. |
| 130 | 31.78933 | 330.64 | 19.21 | −2207.3 | 2825.8 | 89.19 | 29.66 | 44.01 | 1323. |
| 132 | 31.67325 | 326.89 | 18.96 | −2137.7 | 2913.9 | 89.87 | 29.62 | 44.09 | 1318. |
| 134 | 31.55739 | 323.32 | 18.70 | −2068.0 | 3002.2 | 90.53 | 29.59 | 44.15 | 1312. |
| 136 | 31.44186 | 319.92 | 18.45 | −1998.3 | 3090.5 | 91.18 | 29.54 | 44.18 | 1307. |
| 138 | 31.32672 | 316.67 | 18.20 | −1928.6 | 3178.9 | 91.83 | 29.50 | 44.20 | 1301. |
| 140 | 31.21203 | 313.56 | 17.94 | −1858.9 | 3267.3 | 92.47 | 29.45 | 44.21 | 1296. |
| 142 | 31.09785 | 310.58 | 17.69 | −1789.4 | 3355.7 | 93.09 | 29.41 | 44.20 | 1291. |
| 144 | 30.98423 | 307.72 | 17.44 | −1719.8 | 3444.1 | 93.71 | 29.35 | 44.18 | 1286. |
| 146 | 30.87120 | 304.96 | 17.19 | −1650.4 | 3532.4 | 94.32 | 29.30 | 44.14 | 1281. |
| 148 | 30.75879 | 302.30 | 16.94 | −1581.1 | 3620.6 | 94.92 | 29.25 | 44.10 | 1276. |
| 150 | 30.64704 | 299.72 | 16.70 | −1511.9 | 3708.8 | 95.51 | 29.19 | 44.05 | 1271. |
| 155 | 30.37065 | 293.64 | 16.10 | −1339.6 | 3928.6 | 96.95 | 29.04 | 43.88 | 1258. |
| 160 | 30.09871 | 287.98 | 15.53 | −1168.3 | 4147.6 | 98.34 | 28.89 | 43.68 | 1247. |
| 165 | 29.83134 | 282.67 | 14.99 | −998.1 | 4365.4 | 99.68 | 28.73 | 43.46 | 1235. |
| 170 | 29.56858 | 277.68 | 14.46 | −829.0 | 4582.1 | 100.98 | 28.57 | 43.22 | 1225. |
| 175 | 29.31041 | 272.96 | 13.97 | −661.2 | 4797.6 | 102.23 | 28.40 | 42.97 | 1214. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 180 | 29.05678 | 268.48 | 13.50 | −494.7 | 5011.8 | 103.43 | 28.24 | 42.71 | 1204. |
| 185 | 28.80758 | 264.22 | 13.05 | −329.4 | 5224.7 | 104.60 | 28.07 | 42.45 | 1194. |
| 190 | 28.56274 | 260.17 | 12.63 | −165.4 | 5436.3 | 105.73 | 27.91 | 42.18 | 1185. |
| 195 | 28.32214 | 256.31 | 12.23 | −2.8 | 5646.5 | 106.82 | 27.74 | 41.92 | 1176. |
| 200 | 28.08568 | 252.62 | 11.84 | 158.6 | 5855.5 | 107.88 | 27.58 | 41.67 | 1167. |
| 210 | 27.62470 | 245.75 | 11.14 | 477.7 | 6269.6 | 109.90 | 27.27 | 41.16 | 1151. |
| 220 | 27.17893 | 239.48 | 10.50 | 791.9 | 6678.8 | 111.80 | 26.97 | 40.68 | 1136. |
| 230 | 26.74758 | 233.77 | 9.92 | 1101.5 | 7083.3 | 113.60 | 26.69 | 40.22 | 1122. |
| 240 | 26.32988 | 228.56 | 9.40 | 1406.6 | 7483.4 | 115.30 | 26.42 | 39.79 | 1109. |
| 250 | 25.92514 | 223.82 | 8.92 | 1707.6 | 7879.2 | 116.92 | 26.17 | 39.38 | 1097. |
| 260 | 25.53275 | 219.50 | 8.48 | 2004.7 | 8271.1 | 118.46 | 25.93 | 39.00 | 1086. |
| 270 | 25.15210 | 215.57 | 8.08 | 2298.0 | 8659.3 | 119.92 | 25.71 | 38.64 | 1075. |
| 280 | 24.78268 | 211.98 | 7.72 | 2587.9 | 9044.0 | 121.32 | 25.50 | 38.30 | 1066. |
| 290 | 24.42398 | 208.73 | 7.38 | 2874.5 | 9425.5 | 122.66 | 25.31 | 37.99 | 1058. |
| 300 | 24.07554 | 205.76 | 7.07 | 3158.1 | 9803.8 | 123.94 | 25.13 | 37.69 | 1050. |
| 310 | 23.73694 | 203.06 | 6.78 | 3438.8 | 10179.3 | 125.17 | 24.96 | 37.41 | 1042. |
| 320 | 23.40775 | 200.61 | 6.51 | 3716.8 | 10552.1 | 126.36 | 24.81 | 37.15 | 1036. |
| 330 | 23.08761 | 198.38 | 6.26 | 3992.2 | 10922.4 | 127.50 | 24.66 | 36.91 | 1029. |
| 340 | 22.77616 | 196.35 | 6.03 | 4265.4 | 11290.3 | 128.60 | 24.53 | 36.68 | 1024. |
| 350 | 22.47306 | 194.52 | 5.82 | 4536.3 | 11656.0 | 129.66 | 24.41 | 36.46 | 1018. |
| 360 | 22.17799 | 192.85 | 5.62 | 4805.2 | 12019.6 | 130.68 | 24.30 | 36.26 | 1014. |
| 370 | 21.89064 | 191.35 | 5.43 | 5072.2 | 12381.2 | 131.67 | 24.19 | 36.07 | 1009. |
| 380 | 21.61073 | 189.99 | 5.25 | 5337.4 | 12741.1 | 132.63 | 24.10 | 35.90 | 1005. |
| 390 | 21.33800 | 188.76 | 5.08 | 5600.9 | 13099.3 | 133.56 | 24.01 | 35.73 | 1001. |
| 400 | 21.07217 | 187.66 | 4.93 | 5862.9 | 13455.8 | 134.46 | 23.94 | 35.58 | 998. |
| 420 | 20.56026 | 185.80 | 4.64 | 6382.6 | 14164.6 | 136.19 | 23.80 | 35.31 | 992. |
| 440 | 20.07318 | 184.34 | 4.38 | 6897.5 | 14868.3 | 137.83 | 23.70 | 35.07 | 987. |
| 460 | 19.60925 | 183.22 | 4.15 | 7408.1 | 15567.5 | 139.38 | 23.62 | 34.86 | 982. |
| 480 | 19.16694 | 182.40 | 3.94 | 7915.2 | 16262.9 | 140.86 | 23.57 | 34.68 | 979. |
| 500 | 18.74483 | 181.84 | 3.75 | 8419.4 | 16955.0 | 142.28 | 23.53 | 34.53 | 976. |
| 520 | 18.34165 | 181.51 | 3.58 | 8921.1 | 17644.4 | 143.63 | 23.51 | 34.41 | 974. |
| 540 | 17.95620 | 181.38 | 3.42 | 9421.0 | 18331.5 | 144.93 | 23.51 | 34.31 | 972. |
| 560 | 17.58738 | 181.43 | 3.27 | 9919.4 | 19016.8 | 146.17 | 23.53 | 34.22 | 971. |
| 580 | 17.23418 | 181.63 | 3.14 | 10416.7 | 19700.5 | 147.37 | 23.56 | 34.16 | 970. |
| 600 | 16.89564 | 181.97 | 3.02 | 10913.2 | 20383.1 | 148.53 | 23.60 | 34.11 | 969. |
| 620 | 16.57091 | 182.43 | 2.90 | 11409.4 | 21064.9 | 149.65 | 23.65 | 34.07 | 969. |
| 640 | 16.25918 | 183.00 | 2.80 | 11905.4 | 21746.0 | 150.73 | 23.71 | 34.05 | 969. |
| 660 | 15.95968 | 183.67 | 2.70 | 12401.5 | 22426.7 | 151.77 | 23.78 | 34.03 | 969. |
| 680 | 15.67173 | 184.42 | 2.60 | 12897.9 | 23107.3 | 152.79 | 23.85 | 34.03 | 969. |
| 700 | 15.39468 | 185.25 | 2.52 | 13394.8 | 23788.0 | 153.78 | 23.93 | 34.04 | 970. |
| 720 | 15.12792 | 186.15 | 2.44 | 13892.3 | 24468.8 | 154.74 | 24.01 | 34.05 | 971. |
| 740 | 14.87089 | 187.12 | 2.36 | 14390.7 | 25149.9 | 155.67 | 24.10 | 34.07 | 972. |
| 760 | 14.62307 | 188.14 | 2.29 | 14889.9 | 25831.5 | 156.58 | 24.19 | 34.09 | 973. |
| 780 | 14.38397 | 189.21 | 2.22 | 15390.2 | 26513.7 | 157.46 | 24.28 | 34.12 | 974. |
| 800 | 14.15313 | 190.32 | 2.16 | 15891.6 | 27196.5 | 158.33 | 24.38 | 34.16 | 976. |
| 850 | 13.60945 | 193.28 | 2.01 | 17150.2 | 28906.8 | 160.40 | 24.62 | 34.26 | 980. |
| 900 | 13.10889 | 196.43 | 1.89 | 18416.9 | 30622.4 | 162.36 | 24.86 | 34.37 | 985. |
| 950 | 12.64641 | 199.75 | 1.78 | 19692.1 | 32343.9 | 164.22 | 25.10 | 34.49 | 990. |
| 1000 | 12.21772 | 203.19 | 1.68 | 20975.9 | 34071.6 | 166.00 | 25.33 | 34.62 | 996. |
| 1050 | 11.81913 | 206.72 | 1.59 | 22268.2 | 35805.6 | 167.69 | 25.55 | 34.74 | 1002. |
| 1100 | 11.44750 | 210.34 | 1.51 | 23568.9 | 37545.8 | 169.31 | 25.76 | 34.86 | 1008. |
| 1150 | 11.10007 | 214.01 | 1.44 | 24877.7 | 39292.0 | 170.86 | 25.96 | 34.98 | 1015. |
| 1200 | 10.77446 | 217.74 | 1.37 | 26194.2 | 41044.2 | 172.35 | 26.14 | 35.10 | 1022. |
| | | | | | 1700 bar Isobar | | | | |
| * 94.518 | 33.92337 | 486.37 | 19.88 | −3400.3 | 1611.0 | 75.63 | 29.84 | 36.51 | 1458. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 96 | 33.86163 | 476.55 | 20.21 | −3354.9 | 1665.5 | 76.20 | 29.80 | 36.97 | 1453. |
| 98 | 33.77489 | 464.08 | 20.56 | −3293.3 | 1740.1 | 76.97 | 29.77 | 37.60 | 1446. |
| 100 | 33.68449 | 452.44 | 20.84 | −3230.9 | 1815.9 | 77.73 | 29.76 | 38.22 | 1440. |
| 102 | 33.59074 | 441.59 | 21.05 | −3168.0 | 1892.9 | 78.50 | 29.76 | 38.83 | 1434. |
| 104 | 33.49395 | 431.49 | 21.19 | −3104.4 | 1971.2 | 79.25 | 29.77 | 39.41 | 1428. |
| 106 | 33.39444 | 422.08 | 21.27 | −3040.1 | 2050.6 | 80.01 | 29.78 | 39.97 | 1422. |
| 108 | 33.29252 | 413.32 | 21.29 | −2975.2 | 2131.0 | 80.76 | 29.80 | 40.49 | 1416. |
| 110 | 33.18846 | 405.18 | 21.28 | −2909.8 | 2212.5 | 81.51 | 29.82 | 40.98 | 1410. |
| 112 | 33.08255 | 397.59 | 21.22 | −2843.7 | 2294.9 | 82.25 | 29.84 | 41.43 | 1404. |
| 114 | 32.97506 | 390.52 | 21.13 | −2777.2 | 2378.2 | 82.99 | 29.85 | 41.83 | 1398. |
| 116 | 32.86622 | 383.93 | 21.01 | −2710.3 | 2462.2 | 83.72 | 29.86 | 42.20 | 1392. |
| 118 | 32.75627 | 377.78 | 20.86 | −2642.9 | 2547.0 | 84.44 | 29.87 | 42.53 | 1386. |
| 120 | 32.64543 | 372.03 | 20.69 | −2575.1 | 2632.3 | 85.16 | 29.87 | 42.82 | 1380. |
| 122 | 32.53389 | 366.65 | 20.50 | −2507.1 | 2718.2 | 85.87 | 29.86 | 43.08 | 1374. |
| 124 | 32.42182 | 361.61 | 20.30 | −2438.8 | 2804.6 | 86.57 | 29.86 | 43.30 | 1368. |
| 126 | 32.30939 | 356.86 | 20.08 | −2370.2 | 2891.4 | 87.27 | 29.85 | 43.49 | 1362. |
| 128 | 32.19675 | 352.40 | 19.86 | −2301.5 | 2978.6 | 87.95 | 29.83 | 43.65 | 1357. |
| 130 | 32.08402 | 348.19 | 19.63 | −2232.6 | 3066.0 | 88.63 | 29.81 | 43.78 | 1351. |
| 132 | 31.97133 | 344.21 | 19.39 | −2163.6 | 3153.7 | 89.30 | 29.78 | 43.88 | 1346. |
| 134 | 31.85877 | 340.43 | 19.14 | −2094.5 | 3241.5 | 89.96 | 29.75 | 43.96 | 1340. |
| 136 | 31.74644 | 336.85 | 18.90 | −2025.4 | 3329.5 | 90.61 | 29.72 | 44.02 | 1335. |
| 138 | 31.63442 | 333.44 | 18.65 | −1956.3 | 3417.6 | 91.26 | 29.69 | 44.06 | 1329. |
| 140 | 31.52278 | 330.18 | 18.40 | −1887.2 | 3505.7 | 91.89 | 29.65 | 44.09 | 1324. |
| 142 | 31.41157 | 327.06 | 18.15 | −1818.1 | 3593.9 | 92.52 | 29.60 | 44.09 | 1319. |
| 144 | 31.30085 | 324.07 | 17.90 | −1749.1 | 3682.1 | 93.13 | 29.56 | 44.09 | 1314. |
| 146 | 31.19066 | 321.21 | 17.65 | −1680.1 | 3770.3 | 93.74 | 29.51 | 44.07 | 1309. |
| 148 | 31.08104 | 318.45 | 17.41 | −1611.2 | 3858.4 | 94.34 | 29.46 | 44.04 | 1304. |
| 150 | 30.97203 | 315.78 | 17.16 | −1542.4 | 3946.4 | 94.93 | 29.41 | 43.99 | 1299. |
| 155 | 30.70230 | 309.51 | 16.57 | −1371.0 | 4166.0 | 96.37 | 29.27 | 43.85 | 1287. |
| 160 | 30.43679 | 303.70 | 16.00 | −1200.5 | 4384.9 | 97.76 | 29.12 | 43.67 | 1275. |
| 165 | 30.17566 | 298.28 | 15.45 | −1031.0 | 4602.7 | 99.10 | 28.97 | 43.46 | 1264. |
| 170 | 29.91899 | 293.19 | 14.92 | −862.6 | 4819.4 | 100.40 | 28.81 | 43.22 | 1253. |
| 175 | 29.66677 | 288.38 | 14.42 | −695.4 | 5034.9 | 101.65 | 28.64 | 42.98 | 1243. |
| 180 | 29.41896 | 283.83 | 13.94 | −529.4 | 5249.2 | 102.85 | 28.48 | 42.72 | 1233. |
| 185 | 29.17549 | 279.50 | 13.49 | −364.7 | 5462.1 | 104.02 | 28.31 | 42.46 | 1223. |
| 190 | 28.93626 | 275.38 | 13.06 | −201.2 | 5673.8 | 105.15 | 28.15 | 42.20 | 1214. |
| 195 | 28.70119 | 271.45 | 12.65 | −38.9 | 5884.2 | 106.24 | 27.98 | 41.94 | 1205. |
| 200 | 28.47014 | 267.69 | 12.26 | 122.0 | 6093.2 | 107.30 | 27.82 | 41.68 | 1197. |
| 210 | 28.01972 | 260.67 | 11.54 | 440.3 | 6507.5 | 109.32 | 27.50 | 41.18 | 1180. |
| 220 | 27.58411 | 254.25 | 10.89 | 753.9 | 6916.8 | 111.23 | 27.20 | 40.70 | 1165. |
| 230 | 27.16250 | 248.37 | 10.30 | 1062.9 | 7321.5 | 113.02 | 26.91 | 40.24 | 1151. |
| 240 | 26.75412 | 242.99 | 9.77 | 1367.5 | 7721.6 | 114.73 | 26.63 | 39.80 | 1139. |
| 250 | 26.35827 | 238.07 | 9.28 | 1668.0 | 8117.6 | 116.34 | 26.38 | 39.39 | 1127. |
| 260 | 25.97431 | 233.57 | 8.83 | 1964.6 | 8509.6 | 117.88 | 26.13 | 39.01 | 1116. |
| 270 | 25.60166 | 229.45 | 8.42 | 2257.6 | 8897.8 | 119.35 | 25.90 | 38.65 | 1105. |
| 280 | 25.23979 | 225.68 | 8.05 | 2547.2 | 9282.6 | 120.75 | 25.69 | 38.31 | 1096. |
| 290 | 24.88820 | 222.24 | 7.70 | 2833.5 | 9664.1 | 122.08 | 25.49 | 37.99 | 1087. |
| 300 | 24.54644 | 219.09 | 7.38 | 3116.8 | 10042.5 | 123.37 | 25.31 | 37.69 | 1079. |
| 310 | 24.21409 | 216.22 | 7.09 | 3397.3 | 10418.0 | 124.60 | 25.13 | 37.42 | 1072. |
| 320 | 23.89076 | 213.59 | 6.81 | 3675.1 | 10790.8 | 125.78 | 24.97 | 37.16 | 1065. |
| 330 | 23.57608 | 211.19 | 6.56 | 3950.5 | 11161.2 | 126.92 | 24.82 | 36.91 | 1059. |
| 340 | 23.26971 | 209.00 | 6.32 | 4223.5 | 11529.1 | 128.02 | 24.69 | 36.68 | 1053. |
| 350 | 22.97132 | 207.01 | 6.10 | 4494.3 | 11894.9 | 129.08 | 24.56 | 36.47 | 1048. |
| 360 | 22.68060 | 205.19 | 5.89 | 4763.2 | 12258.6 | 130.11 | 24.44 | 36.27 | 1043. |
| 370 | 22.39728 | 203.54 | 5.69 | 5030.1 | 12620.3 | 131.10 | 24.34 | 36.08 | 1038. |
| 380 | 22.12107 | 202.03 | 5.51 | 5295.3 | 12980.2 | 132.06 | 24.24 | 35.91 | 1034. |
| 390 | 21.85172 | 200.67 | 5.34 | 5558.8 | 13338.5 | 132.99 | 24.15 | 35.75 | 1030. |
| 400 | 21.58899 | 199.44 | 5.18 | 5820.8 | 13695.2 | 133.89 | 24.07 | 35.59 | 1026. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 420 | 21.08245 | 197.32 | 4.88 | 6340.7 | 14404.3 | 135.62 | 23.93 | 35.32 | 1020. |
| 440 | 20.59971 | 195.62 | 4.61 | 6855.7 | 15108.2 | 137.26 | 23.82 | 35.08 | 1014. |
| 460 | 20.13921 | 194.28 | 4.37 | 7366.6 | 15807.8 | 138.81 | 23.73 | 34.88 | 1010. |
| 480 | 19.69950 | 193.25 | 4.15 | 7874.0 | 16503.6 | 140.29 | 23.67 | 34.71 | 1006. |
| 500 | 19.27926 | 192.50 | 3.96 | 8378.5 | 17196.3 | 141.71 | 23.63 | 34.56 | 1003. |
| 520 | 18.87728 | 191.99 | 3.77 | 8880.7 | 17886.2 | 143.06 | 23.61 | 34.44 | 1000. |
| 540 | 18.49244 | 191.69 | 3.61 | 9381.0 | 18573.9 | 144.36 | 23.60 | 34.34 | 998. |
| 560 | 18.12372 | 191.58 | 3.46 | 9879.8 | 19259.8 | 145.61 | 23.62 | 34.26 | 996. |
| 580 | 17.77014 | 191.63 | 3.32 | 10377.7 | 19944.3 | 146.81 | 23.64 | 34.19 | 995. |
| 600 | 17.43083 | 191.83 | 3.19 | 10874.8 | 20627.6 | 147.96 | 23.68 | 34.14 | 994. |
| 620 | 17.10496 | 192.16 | 3.07 | 11371.5 | 21310.2 | 149.08 | 23.72 | 34.11 | 993. |
| 640 | 16.79177 | 192.61 | 2.96 | 11868.1 | 21992.1 | 150.17 | 23.78 | 34.09 | 993. |
| 660 | 16.49054 | 193.17 | 2.85 | 12364.8 | 22673.8 | 151.21 | 23.85 | 34.08 | 993. |
| 680 | 16.20062 | 193.81 | 2.76 | 12861.9 | 23355.3 | 152.23 | 23.92 | 34.08 | 993. |
| 700 | 15.92139 | 194.55 | 2.67 | 13359.4 | 24036.9 | 153.22 | 23.99 | 34.08 | 993. |
| 720 | 15.65227 | 195.35 | 2.58 | 13857.7 | 24718.7 | 154.18 | 24.08 | 34.10 | 994. |
| 740 | 15.39272 | 196.23 | 2.50 | 14356.7 | 25400.9 | 155.11 | 24.16 | 34.12 | 995. |
| 760 | 15.14225 | 197.17 | 2.43 | 14856.6 | 26083.5 | 156.03 | 24.25 | 34.15 | 995. |
| 780 | 14.90038 | 198.16 | 2.36 | 15357.6 | 26766.7 | 156.91 | 24.34 | 34.18 | 997. |
| 800 | 14.66668 | 199.20 | 2.29 | 15859.7 | 27450.6 | 157.78 | 24.43 | 34.21 | 998. |
| 850 | 14.11552 | 201.99 | 2.14 | 17120.1 | 29163.6 | 159.86 | 24.67 | 34.31 | 1001. |
| 900 | 13.60717 | 205.01 | 2.00 | 18388.6 | 30882.0 | 161.82 | 24.91 | 34.43 | 1006. |
| 950 | 13.13674 | 208.20 | 1.89 | 19665.5 | 32606.3 | 163.68 | 25.14 | 34.55 | 1011. |
| 1000 | 12.70004 | 211.54 | 1.78 | 20951.0 | 34336.8 | 165.46 | 25.37 | 34.67 | 1016. |
| 1050 | 12.29347 | 214.98 | 1.69 | 22245.0 | 36073.5 | 167.15 | 25.59 | 34.80 | 1022. |
| 1100 | 11.91392 | 218.51 | 1.60 | 23547.4 | 37816.4 | 168.78 | 25.80 | 34.92 | 1028. |
| 1150 | 11.55870 | 222.12 | 1.53 | 24857.8 | 39565.3 | 170.33 | 25.99 | 35.04 | 1034. |
| 1200 | 11.22545 | 225.78 | 1.46 | 26175.9 | 41320.1 | 171.82 | 26.18 | 35.15 | 1040. |
| | | | | 1800 bar Isobar | | | | | |
| * 96.103 | 34.06181 | 502.22 | 19.95 | −3355.0 | 1929.5 | 75.88 | 29.52 | 36.09 | 1480. |
| 98 | 33.98465 | 489.69 | 20.36 | −3297.9 | 1998.6 | 76.59 | 29.53 | 36.71 | 1474. |
| 100 | 33.89966 | 477.32 | 20.71 | −3237.1 | 2072.7 | 77.34 | 29.55 | 37.37 | 1468. |
| 102 | 33.81122 | 465.77 | 20.98 | −3175.6 | 2148.0 | 78.09 | 29.59 | 38.02 | 1462. |
| 104 | 33.71963 | 454.99 | 21.17 | −3113.4 | 2224.7 | 78.83 | 29.63 | 38.65 | 1455. |
| 106 | 33.62519 | 444.93 | 21.31 | −3050.5 | 2302.6 | 79.57 | 29.68 | 39.24 | 1449. |
| 108 | 33.52819 | 435.56 | 21.38 | −2986.9 | 2381.7 | 80.31 | 29.73 | 39.81 | 1443. |
| 110 | 33.42891 | 426.83 | 21.41 | −2922.7 | 2461.8 | 81.05 | 29.77 | 40.34 | 1437. |
| 112 | 33.32764 | 418.69 | 21.39 | −2857.9 | 2543.0 | 81.78 | 29.81 | 40.84 | 1431. |
| 114 | 33.22462 | 411.10 | 21.34 | −2792.5 | 2625.2 | 82.51 | 29.85 | 41.29 | 1425. |
| 116 | 33.12011 | 404.03 | 21.25 | −2726.6 | 2708.1 | 83.23 | 29.88 | 41.70 | 1419. |
| 118 | 33.01434 | 397.43 | 21.13 | −2660.3 | 2791.9 | 83.94 | 29.91 | 42.07 | 1413. |
| 120 | 32.90752 | 391.26 | 20.99 | −2593.5 | 2876.4 | 84.65 | 29.93 | 42.40 | 1407. |
| 122 | 32.79986 | 385.49 | 20.82 | −2526.3 | 2961.5 | 85.36 | 29.95 | 42.70 | 1401. |
| 124 | 32.69154 | 380.09 | 20.64 | −2458.8 | 3047.2 | 86.05 | 29.95 | 42.96 | 1395. |
| 126 | 32.58272 | 375.02 | 20.44 | −2391.1 | 3133.3 | 86.74 | 29.96 | 43.18 | 1389. |
| 128 | 32.47357 | 370.26 | 20.23 | −2323.1 | 3219.9 | 87.42 | 29.95 | 43.37 | 1383. |
| 130 | 32.36421 | 365.77 | 20.01 | −2254.9 | 3306.8 | 88.10 | 29.95 | 43.53 | 1378. |
| 132 | 32.25478 | 361.54 | 19.78 | −2186.6 | 3394.0 | 88.76 | 29.93 | 43.66 | 1372. |
| 134 | 32.14538 | 357.54 | 19.55 | −2118.1 | 3481.4 | 89.42 | 29.91 | 43.77 | 1367. |
| 136 | 32.03611 | 353.74 | 19.31 | −2049.6 | 3569.1 | 90.07 | 29.89 | 43.86 | 1361. |
| 138 | 31.92706 | 350.14 | 19.07 | −1981.0 | 3656.8 | 90.71 | 29.86 | 43.92 | 1356. |
| 140 | 31.81830 | 346.72 | 18.82 | −1912.4 | 3744.7 | 91.34 | 29.83 | 43.96 | 1351. |
| 142 | 31.70990 | 343.45 | 18.58 | −1843.8 | 3832.7 | 91.97 | 29.79 | 43.99 | 1345. |
| 144 | 31.60193 | 340.32 | 18.33 | −1775.2 | 3920.6 | 92.58 | 29.75 | 43.99 | 1340. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 146 | 31.49442 | 337.32 | 18.09 | −1706.7 | 4008.6 | 93.19 | 29.71 | 43.99 | 1335. |
| 148 | 31.38742 | 334.45 | 17.85 | −1638.2 | 4096.6 | 93.79 | 29.66 | 43.97 | 1330. |
| 150 | 31.28098 | 331.69 | 17.61 | −1569.8 | 4184.5 | 94.38 | 29.62 | 43.94 | 1325. |
| 155 | 31.01746 | 325.20 | 17.01 | −1399.2 | 4404.0 | 95.82 | 29.49 | 43.83 | 1314. |
| 160 | 30.75791 | 319.22 | 16.44 | −1229.5 | 4622.7 | 97.21 | 29.34 | 43.66 | 1302. |
| 165 | 30.50254 | 313.66 | 15.89 | −1060.6 | 4840.5 | 98.55 | 29.19 | 43.46 | 1291. |
| 170 | 30.25145 | 308.47 | 15.36 | −892.9 | 5057.3 | 99.84 | 29.04 | 43.24 | 1281. |
| 175 | 30.00468 | 303.57 | 14.85 | −726.2 | 5272.9 | 101.09 | 28.87 | 43.00 | 1270. |
| 180 | 29.76220 | 298.94 | 14.37 | −560.7 | 5487.2 | 102.30 | 28.71 | 42.75 | 1261. |
| 185 | 29.52395 | 294.54 | 13.91 | −396.4 | 5700.3 | 103.47 | 28.54 | 42.49 | 1251. |
| 190 | 29.28985 | 290.35 | 13.48 | −233.4 | 5912.1 | 104.60 | 28.38 | 42.23 | 1242. |
| 195 | 29.05980 | 286.35 | 13.06 | −71.5 | 6122.6 | 105.69 | 28.21 | 41.97 | 1233. |
| 200 | 28.83369 | 282.53 | 12.67 | 89.1 | 6331.8 | 106.75 | 28.05 | 41.71 | 1225. |
| 210 | 28.39288 | 275.39 | 11.94 | 406.8 | 6746.4 | 108.77 | 27.73 | 41.21 | 1209. |
| 220 | 27.96654 | 268.83 | 11.27 | 719.7 | 7156.0 | 110.68 | 27.42 | 40.72 | 1194. |
| 230 | 27.55383 | 262.81 | 10.67 | 1028.2 | 7560.9 | 112.48 | 27.12 | 40.26 | 1180. |
| 240 | 27.15399 | 257.27 | 10.13 | 1332.4 | 7961.2 | 114.18 | 26.84 | 39.82 | 1167. |
| 250 | 26.76630 | 252.19 | 9.63 | 1632.5 | 8357.4 | 115.80 | 26.58 | 39.41 | 1155. |
| 260 | 26.39013 | 247.52 | 9.17 | 1928.8 | 8749.5 | 117.34 | 26.33 | 39.02 | 1144. |
| 270 | 26.02488 | 243.23 | 8.76 | 2221.4 | 9137.9 | 118.80 | 26.10 | 38.66 | 1134. |
| 280 | 25.67002 | 239.30 | 8.37 | 2510.7 | 9522.8 | 120.20 | 25.88 | 38.32 | 1125. |
| 290 | 25.32507 | 235.68 | 8.02 | 2796.8 | 9904.4 | 121.54 | 25.67 | 38.00 | 1116. |
| 300 | 24.98957 | 232.37 | 7.69 | 3079.9 | 10282.9 | 122.82 | 25.48 | 37.70 | 1108. |
| 310 | 24.66311 | 229.33 | 7.39 | 3360.2 | 10658.5 | 124.06 | 25.30 | 37.43 | 1100. |
| 320 | 24.34530 | 226.54 | 7.10 | 3637.9 | 11031.5 | 125.24 | 25.14 | 37.16 | 1093. |
| 330 | 24.03580 | 223.98 | 6.84 | 3913.1 | 11401.9 | 126.38 | 24.98 | 36.92 | 1087. |
| 340 | 23.73427 | 221.63 | 6.60 | 4186.0 | 11769.9 | 127.48 | 24.84 | 36.69 | 1081. |
| 350 | 23.44039 | 219.48 | 6.37 | 4456.7 | 12135.8 | 128.54 | 24.71 | 36.48 | 1076. |
| 360 | 23.15387 | 217.52 | 6.15 | 4725.5 | 12499.6 | 129.56 | 24.59 | 36.28 | 1070. |
| 370 | 22.87444 | 215.72 | 5.95 | 4992.4 | 12861.4 | 130.55 | 24.48 | 36.09 | 1066. |
| 380 | 22.60184 | 214.08 | 5.76 | 5257.5 | 13221.5 | 131.51 | 24.37 | 35.92 | 1061. |
| 390 | 22.33582 | 212.58 | 5.59 | 5521.1 | 13579.9 | 132.45 | 24.28 | 35.76 | 1057. |
| 400 | 22.07615 | 211.22 | 5.42 | 5783.1 | 13936.7 | 133.35 | 24.19 | 35.61 | 1053. |
| 420 | 21.57498 | 208.86 | 5.11 | 6303.0 | 14646.0 | 135.08 | 24.05 | 35.33 | 1047. |
| 440 | 21.09669 | 206.92 | 4.84 | 6818.1 | 15350.3 | 136.72 | 23.93 | 35.10 | 1041. |
| 460 | 20.63978 | 205.37 | 4.59 | 7329.2 | 16050.2 | 138.27 | 23.84 | 34.90 | 1036. |
| 480 | 20.20291 | 204.13 | 4.36 | 7836.8 | 16746.5 | 139.76 | 23.77 | 34.73 | 1032. |
| 500 | 19.78483 | 203.19 | 4.16 | 8341.6 | 17439.5 | 141.17 | 23.73 | 34.58 | 1028. |
| 520 | 19.38439 | 202.50 | 3.97 | 8844.1 | 18130.0 | 142.52 | 23.70 | 34.46 | 1025. |
| 540 | 19.00054 | 202.03 | 3.80 | 9344.8 | 18818.2 | 143.82 | 23.69 | 34.37 | 1023. |
| 560 | 18.63230 | 201.77 | 3.64 | 9844.1 | 19504.7 | 145.07 | 23.70 | 34.29 | 1021. |
| 580 | 18.27877 | 201.67 | 3.49 | 10342.4 | 20189.8 | 146.27 | 23.72 | 34.23 | 1019. |
| 600 | 17.93912 | 201.74 | 3.36 | 10839.9 | 20873.9 | 147.43 | 23.75 | 34.18 | 1018. |
| 620 | 17.61255 | 201.94 | 3.23 | 11337.2 | 21557.1 | 148.55 | 23.80 | 34.15 | 1017. |
| 640 | 17.29836 | 202.27 | 3.12 | 11834.3 | 22239.9 | 149.64 | 23.85 | 34.13 | 1016. |
| 660 | 16.99586 | 202.71 | 3.01 | 12331.5 | 22922.3 | 150.69 | 23.91 | 34.12 | 1016. |
| 680 | 16.70442 | 203.25 | 2.91 | 12829.1 | 23604.7 | 151.71 | 23.98 | 34.12 | 1016. |
| 700 | 16.42346 | 203.89 | 2.81 | 13327.3 | 24287.2 | 152.69 | 24.06 | 34.13 | 1016. |
| 720 | 16.15243 | 204.60 | 2.72 | 13826.1 | 24969.9 | 153.66 | 24.14 | 34.14 | 1016. |
| 740 | 15.89081 | 205.39 | 2.64 | 14325.7 | 25653.0 | 154.59 | 24.22 | 34.17 | 1017. |
| 760 | 15.63812 | 206.24 | 2.56 | 14826.2 | 26336.6 | 155.50 | 24.31 | 34.19 | 1018. |
| 780 | 15.39392 | 207.16 | 2.49 | 15327.8 | 27020.7 | 156.39 | 24.40 | 34.22 | 1019. |
| 800 | 15.15777 | 208.13 | 2.42 | 15830.5 | 27705.6 | 157.26 | 24.49 | 34.26 | 1020. |
| 850 | 14.60016 | 210.76 | 2.26 | 17092.5 | 29421.1 | 159.34 | 24.72 | 34.36 | 1023. |
| 900 | 14.08498 | 213.63 | 2.12 | 18362.5 | 31142.1 | 161.31 | 24.96 | 34.48 | 1026. |
| 950 | 13.60750 | 216.70 | 1.99 | 19641.0 | 32869.0 | 163.17 | 25.19 | 34.60 | 1031. |
| 1000 | 13.16364 | 219.93 | 1.88 | 20928.1 | 34602.1 | 164.95 | 25.41 | 34.72 | 1036. |
| 1050 | 12.74988 | 223.28 | 1.79 | 22223.7 | 36341.4 | 166.65 | 25.63 | 34.85 | 1041. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1100 | 12.36317 | 226.73 | 1.70 | 23527.5 | 38086.9 | 168.27 | 25.84 | 34.97 | 1047. |
| 1150 | 12.00086 | 230.26 | 1.62 | 24839.4 | 39838.3 | 169.83 | 26.03 | 35.09 | 1053. |
| 1200 | 11.66062 | 233.86 | 1.54 | 26159.0 | 41595.6 | 171.33 | 26.22 | 35.20 | 1059. |
| | | | | 1900 bar Isobar | | | | | |
| * 97.667 | 34.19656 | 517.94 | 20.02 | −3310.0 | 2246.1 | 76.12 | 29.25 | 35.72 | 1502. |
| 98 | 34.18364 | 515.68 | 20.10 | −3300.2 | 2258.0 | 76.25 | 29.26 | 35.83 | 1501. |
| 100 | 34.10382 | 502.58 | 20.51 | −3240.9 | 2330.3 | 76.98 | 29.33 | 36.52 | 1495. |
| 102 | 34.02047 | 490.31 | 20.85 | −3180.8 | 2404.1 | 77.71 | 29.40 | 37.21 | 1488. |
| 104 | 33.93386 | 478.84 | 21.10 | −3120.0 | 2479.2 | 78.44 | 29.48 | 37.87 | 1482. |
| 106 | 33.84429 | 468.13 | 21.29 | −3058.4 | 2555.6 | 79.16 | 29.55 | 38.51 | 1476. |
| 108 | 33.75204 | 458.12 | 21.42 | −2996.1 | 2633.2 | 79.89 | 29.63 | 39.12 | 1469. |
| 110 | 33.65739 | 448.79 | 21.49 | −2933.1 | 2712.0 | 80.61 | 29.71 | 39.70 | 1463. |
| 112 | 33.56059 | 440.08 | 21.52 | −2869.4 | 2792.0 | 81.33 | 29.77 | 40.23 | 1457. |
| 114 | 33.46191 | 431.95 | 21.50 | −2805.2 | 2872.9 | 82.05 | 29.84 | 40.73 | 1451. |
| 116 | 33.36160 | 424.37 | 21.44 | −2740.3 | 2954.9 | 82.76 | 29.89 | 41.18 | 1445. |
| 118 | 33.25988 | 417.29 | 21.35 | −2674.9 | 3037.6 | 83.47 | 29.94 | 41.60 | 1439. |
| 120 | 33.15697 | 410.68 | 21.24 | −2609.1 | 3121.2 | 84.17 | 29.98 | 41.97 | 1433. |
| 122 | 33.05308 | 404.50 | 21.10 | −2542.8 | 3205.5 | 84.87 | 30.01 | 42.30 | 1427. |
| 124 | 32.94840 | 398.72 | 20.94 | −2476.2 | 3290.4 | 85.56 | 30.04 | 42.60 | 1421. |
| 126 | 32.84309 | 393.30 | 20.76 | −2409.2 | 3375.8 | 86.24 | 30.06 | 42.85 | 1415. |
| 128 | 32.73731 | 388.21 | 20.57 | −2342.0 | 3461.8 | 86.92 | 30.07 | 43.08 | 1409. |
| 130 | 32.63122 | 383.42 | 20.36 | −2274.5 | 3548.1 | 87.59 | 30.07 | 43.27 | 1403. |
| 132 | 32.52494 | 378.92 | 20.15 | −2206.8 | 3634.8 | 88.25 | 30.07 | 43.43 | 1398. |
| 134 | 32.41858 | 374.66 | 19.92 | −2139.0 | 3721.9 | 88.90 | 30.06 | 43.57 | 1392. |
| 136 | 32.31225 | 370.64 | 19.70 | −2071.0 | 3809.1 | 89.55 | 30.04 | 43.68 | 1387. |
| 138 | 32.20606 | 366.83 | 19.46 | −2003.0 | 3896.5 | 90.19 | 30.02 | 43.76 | 1382. |
| 140 | 32.10007 | 363.21 | 19.22 | −1934.9 | 3984.1 | 90.82 | 30.00 | 43.82 | 1376. |
| 142 | 31.99436 | 359.77 | 18.99 | −1866.7 | 4071.8 | 91.44 | 29.97 | 43.87 | 1371. |
| 144 | 31.88900 | 356.49 | 18.75 | −1798.6 | 4159.6 | 92.05 | 29.94 | 43.90 | 1366. |
| 146 | 31.78404 | 353.35 | 18.51 | −1730.4 | 4247.4 | 92.66 | 29.90 | 43.91 | 1361. |
| 148 | 31.67953 | 350.35 | 18.27 | −1662.4 | 4335.2 | 93.26 | 29.86 | 43.90 | 1356. |
| 150 | 31.57551 | 347.47 | 18.03 | −1594.3 | 4423.0 | 93.85 | 29.82 | 43.89 | 1351. |
| 155 | 31.31784 | 340.73 | 17.44 | −1424.6 | 4642.2 | 95.28 | 29.69 | 43.80 | 1339. |
| 160 | 31.06387 | 334.56 | 16.86 | −1255.6 | 4860.9 | 96.67 | 29.56 | 43.65 | 1328. |
| 165 | 30.81386 | 328.85 | 16.31 | −1087.4 | 5078.7 | 98.01 | 29.41 | 43.47 | 1317. |
| 170 | 30.56795 | 323.53 | 15.78 | −920.1 | 5295.5 | 99.31 | 29.26 | 43.26 | 1307. |
| 175 | 30.32622 | 318.54 | 15.27 | −754.0 | 5511.2 | 100.56 | 29.10 | 43.02 | 1297. |
| 180 | 30.08864 | 313.82 | 14.78 | −588.9 | 5725.7 | 101.77 | 28.94 | 42.78 | 1287. |
| 185 | 29.85519 | 309.35 | 14.32 | −425.1 | 5939.0 | 102.94 | 28.77 | 42.52 | 1278. |
| 190 | 29.62578 | 305.10 | 13.88 | −262.3 | 6151.0 | 104.07 | 28.60 | 42.27 | 1269. |
| 195 | 29.40034 | 301.04 | 13.46 | −100.8 | 6361.7 | 105.16 | 28.44 | 42.01 | 1260. |
| 200 | 29.17875 | 297.16 | 13.06 | 59.5 | 6571.1 | 106.22 | 28.27 | 41.75 | 1252. |
| 210 | 28.74674 | 289.90 | 12.31 | 376.6 | 6986.0 | 108.25 | 27.95 | 41.24 | 1236. |
| 220 | 28.32889 | 283.22 | 11.64 | 689.0 | 7396.0 | 110.15 | 27.64 | 40.75 | 1221. |
| 230 | 27.92435 | 277.07 | 11.03 | 997.1 | 7801.2 | 111.95 | 27.33 | 40.29 | 1207. |
| 240 | 27.53237 | 271.40 | 10.47 | 1300.9 | 8201.8 | 113.66 | 27.05 | 39.85 | 1195. |
| 250 | 27.15221 | 266.17 | 9.97 | 1600.6 | 8598.2 | 115.28 | 26.78 | 39.43 | 1183. |
| 260 | 26.78323 | 261.36 | 9.50 | 1896.6 | 8990.6 | 116.82 | 26.52 | 39.05 | 1172. |
| 270 | 26.42485 | 256.91 | 9.08 | 2189.0 | 9379.2 | 118.28 | 26.28 | 38.68 | 1162. |
| 280 | 26.07652 | 252.82 | 8.68 | 2478.0 | 9764.3 | 119.68 | 26.06 | 38.34 | 1152. |
| 290 | 25.73776 | 249.05 | 8.32 | 2763.9 | 10146.1 | 121.02 | 25.85 | 38.02 | 1144. |
| 300 | 25.40812 | 245.58 | 7.99 | 3046.8 | 10524.7 | 122.31 | 25.65 | 37.72 | 1135. |
| 310 | 25.08720 | 242.38 | 7.68 | 3327.0 | 10900.5 | 123.54 | 25.47 | 37.44 | 1128. |
| 320 | 24.77462 | 239.43 | 7.39 | 3604.5 | 11273.6 | 124.72 | 25.30 | 37.18 | 1121. |
| 330 | 24.47003 | 236.72 | 7.12 | 3879.6 | 11644.2 | 125.86 | 25.14 | 36.93 | 1114. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 340 | 24.17310 | 234.23 | 6.87 | 4152.4 | 12012.3 | 126.96 | 24.99 | 36.71 | 1108. |
| 350 | 23.88354 | 231.94 | 6.63 | 4423.1 | 12378.3 | 128.02 | 24.85 | 36.49 | 1103. |
| 360 | 23.60106 | 229.83 | 6.41 | 4691.7 | 12742.2 | 129.05 | 24.73 | 36.29 | 1097. |
| 370 | 23.32539 | 227.89 | 6.21 | 4958.6 | 13104.2 | 130.04 | 24.61 | 36.11 | 1092. |
| 380 | 23.05629 | 226.12 | 6.01 | 5223.7 | 13464.4 | 131.00 | 24.50 | 35.93 | 1088. |
| 390 | 22.79352 | 224.49 | 5.83 | 5487.2 | 13822.9 | 131.93 | 24.41 | 35.77 | 1084. |
| 400 | 22.53686 | 223.00 | 5.66 | 5749.2 | 14179.9 | 132.84 | 24.32 | 35.62 | 1080. |
| 420 | 22.04102 | 220.40 | 5.34 | 6269.2 | 14889.5 | 134.57 | 24.16 | 35.35 | 1073. |
| 440 | 21.56721 | 218.24 | 5.06 | 6784.4 | 15594.1 | 136.21 | 24.04 | 35.12 | 1067. |
| 460 | 21.11402 | 216.47 | 4.80 | 7295.6 | 16294.4 | 137.76 | 23.94 | 34.92 | 1062. |
| 480 | 20.68015 | 215.04 | 4.57 | 7803.4 | 16991.0 | 139.25 | 23.87 | 34.75 | 1057. |
| 500 | 20.26444 | 213.91 | 4.35 | 8308.5 | 17684.5 | 140.66 | 23.82 | 34.61 | 1053. |
| 520 | 19.86579 | 213.05 | 4.16 | 8811.2 | 18375.4 | 142.02 | 23.79 | 34.49 | 1050. |
| 540 | 19.48321 | 212.42 | 3.98 | 9312.2 | 19064.2 | 143.32 | 23.78 | 34.39 | 1047. |
| 560 | 19.11578 | 211.99 | 3.82 | 9811.8 | 19751.2 | 144.56 | 23.78 | 34.32 | 1045. |
| 580 | 18.76263 | 211.76 | 3.67 | 10310.4 | 20436.9 | 145.77 | 23.80 | 34.26 | 1043. |
| 600 | 18.42299 | 211.68 | 3.53 | 10808.4 | 21121.6 | 146.93 | 23.83 | 34.21 | 1042. |
| 620 | 18.09609 | 211.76 | 3.40 | 11306.0 | 21805.5 | 148.05 | 23.87 | 34.18 | 1040. |
| 640 | 17.78127 | 211.97 | 3.28 | 11803.6 | 22489.0 | 149.13 | 23.92 | 34.16 | 1040. |
| 660 | 17.47787 | 212.30 | 3.16 | 12301.3 | 23172.2 | 150.19 | 23.98 | 34.16 | 1039. |
| 680 | 17.18530 | 212.73 | 3.06 | 12799.3 | 23855.3 | 151.21 | 24.05 | 34.16 | 1039. |
| 700 | 16.90299 | 213.27 | 2.96 | 13297.9 | 24538.6 | 152.20 | 24.12 | 34.17 | 1038. |
| 720 | 16.63043 | 213.89 | 2.86 | 13797.3 | 25222.1 | 153.16 | 24.20 | 34.19 | 1039. |
| 740 | 16.36711 | 214.59 | 2.78 | 14297.4 | 25906.0 | 154.10 | 24.28 | 34.21 | 1039. |
| 760 | 16.11258 | 215.36 | 2.69 | 14798.5 | 26590.5 | 155.01 | 24.36 | 34.24 | 1039. |
| 780 | 15.86642 | 216.19 | 2.62 | 15300.6 | 27275.6 | 155.90 | 24.45 | 34.27 | 1040. |
| 800 | 15.62820 | 217.09 | 2.54 | 15803.8 | 27961.3 | 156.77 | 24.54 | 34.31 | 1041. |
| 850 | 15.06501 | 219.55 | 2.38 | 17067.2 | 29679.2 | 158.85 | 24.77 | 34.41 | 1043. |
| 900 | 14.54385 | 222.28 | 2.23 | 18338.6 | 31402.6 | 160.82 | 25.00 | 34.53 | 1047. |
| 950 | 14.06012 | 225.23 | 2.10 | 19618.5 | 33131.9 | 162.69 | 25.23 | 34.65 | 1051. |
| 1000 | 13.60986 | 228.35 | 1.99 | 20907.0 | 34867.5 | 164.47 | 25.45 | 34.77 | 1055. |
| 1050 | 13.18962 | 231.60 | 1.88 | 22204.0 | 36609.3 | 166.17 | 25.67 | 34.90 | 1060. |
| 1100 | 12.79641 | 234.97 | 1.79 | 23509.2 | 38357.2 | 167.80 | 25.87 | 35.02 | 1065. |
| 1150 | 12.42763 | 238.43 | 1.70 | 24822.5 | 40111.0 | 169.35 | 26.07 | 35.14 | 1071. |
| 1200 | 12.08099 | 241.96 | 1.63 | 26143.4 | 41870.6 | 170.85 | 26.25 | 35.25 | 1077. |
| | | | | 2000 bar Isobar | | | | | |
| * 99.212 | 34.32785 | 533.53 | 20.08 | −3265.3 | 2560.9 | 76.36 | 29.03 | 35.40 | 1524. |
| 100 | 34.29791 | 528.19 | 20.26 | −3242.4 | 2588.9 | 76.64 | 29.07 | 35.68 | 1521. |
| 102 | 34.21942 | 515.21 | 20.66 | −3183.7 | 2661.0 | 77.35 | 29.18 | 36.40 | 1515. |
| 104 | 34.13761 | 503.05 | 20.98 | −3124.2 | 2734.5 | 78.07 | 29.30 | 37.10 | 1508. |
| 106 | 34.05273 | 491.66 | 21.22 | −3063.9 | 2809.4 | 78.78 | 29.41 | 37.78 | 1502. |
| 108 | 33.96506 | 481.02 | 21.40 | −3002.8 | 2885.6 | 79.49 | 29.52 | 38.43 | 1495. |
| 110 | 33.87487 | 471.07 | 21.52 | −2941.0 | 2963.0 | 80.20 | 29.62 | 39.04 | 1489. |
| 112 | 33.78241 | 461.77 | 21.59 | −2878.5 | 3041.7 | 80.91 | 29.71 | 39.62 | 1483. |
| 114 | 33.68795 | 453.09 | 21.61 | −2815.4 | 3121.5 | 81.62 | 29.80 | 40.16 | 1476. |
| 116 | 33.59171 | 444.98 | 21.59 | −2751.5 | 3202.3 | 82.32 | 29.88 | 40.65 | 1470. |
| 118 | 33.49393 | 437.41 | 21.54 | −2687.2 | 3284.1 | 83.02 | 29.95 | 41.10 | 1464. |
| 120 | 33.39484 | 430.33 | 21.45 | −2622.3 | 3366.7 | 83.71 | 30.01 | 41.52 | 1458. |
| 122 | 33.29462 | 423.71 | 21.34 | −2556.9 | 3450.1 | 84.40 | 30.06 | 41.89 | 1452. |
| 124 | 33.19348 | 417.52 | 21.20 | −2491.1 | 3534.2 | 85.09 | 30.11 | 42.22 | 1446. |
| 126 | 33.09158 | 411.72 | 21.04 | −2424.9 | 3619.0 | 85.76 | 30.14 | 42.51 | 1440. |
| 128 | 32.98910 | 406.29 | 20.87 | −2358.4 | 3704.2 | 86.43 | 30.16 | 42.77 | 1434. |
| 130 | 32.88618 | 401.18 | 20.68 | −2291.6 | 3790.0 | 87.10 | 30.18 | 42.99 | 1428. |
| 132 | 32.78295 | 396.37 | 20.48 | −2224.5 | 3876.2 | 87.76 | 30.19 | 43.19 | 1423. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 134 | 32.67955 | 391.85 | 20.27 | −2157.3 | 3962.7 | 88.41 | 30.19 | 43.35 | 1417. |
| 136 | 32.57608 | 387.57 | 20.05 | −2089.9 | 4049.6 | 89.05 | 30.19 | 43.48 | 1412. |
| 138 | 32.47264 | 383.53 | 19.83 | −2022.4 | 4136.6 | 89.69 | 30.18 | 43.59 | 1406. |
| 140 | 32.36932 | 379.71 | 19.60 | −1954.8 | 4223.9 | 90.32 | 30.16 | 43.68 | 1401. |
| 142 | 32.26620 | 376.07 | 19.37 | −1887.1 | 4311.3 | 90.94 | 30.14 | 43.74 | 1396. |
| 144 | 32.16335 | 372.61 | 19.13 | −1819.4 | 4398.9 | 91.55 | 30.11 | 43.79 | 1391. |
| 146 | 32.06083 | 369.32 | 18.90 | −1751.7 | 4486.5 | 92.15 | 30.08 | 43.82 | 1386. |
| 148 | 31.95870 | 366.17 | 18.66 | −1683.9 | 4574.1 | 92.75 | 30.05 | 43.83 | 1381. |
| 150 | 31.85699 | 363.16 | 18.43 | −1616.3 | 4661.8 | 93.34 | 30.01 | 43.83 | 1376. |
| 155 | 31.60487 | 356.14 | 17.84 | −1447.3 | 4880.8 | 94.77 | 29.90 | 43.77 | 1364. |
| 160 | 31.35617 | 349.75 | 17.27 | −1279.0 | 5099.3 | 96.16 | 29.77 | 43.64 | 1353. |
| 165 | 31.11119 | 343.88 | 16.72 | −1111.4 | 5317.2 | 97.50 | 29.63 | 43.48 | 1342. |
| 170 | 30.87013 | 338.42 | 16.18 | −944.7 | 5534.1 | 98.80 | 29.48 | 43.28 | 1332. |
| 175 | 30.63307 | 333.31 | 15.67 | −779.0 | 5749.9 | 100.05 | 29.32 | 43.05 | 1322. |
| 180 | 30.40005 | 328.50 | 15.18 | −614.4 | 5964.6 | 101.26 | 29.16 | 42.82 | 1312. |
| 185 | 30.17103 | 323.96 | 14.71 | −450.8 | 6178.0 | 102.43 | 28.99 | 42.57 | 1303. |
| 190 | 29.94596 | 319.64 | 14.26 | −288.5 | 6390.2 | 103.56 | 28.83 | 42.31 | 1294. |
| 195 | 29.72476 | 315.52 | 13.84 | −127.3 | 6601.1 | 104.65 | 28.66 | 42.05 | 1286. |
| 200 | 29.50734 | 311.58 | 13.43 | 32.8 | 6810.8 | 105.72 | 28.49 | 41.79 | 1277. |
| 210 | 29.08343 | 304.21 | 12.68 | 349.4 | 7226.2 | 107.74 | 28.16 | 41.29 | 1262. |
| 220 | 28.67338 | 297.42 | 12.00 | 661.4 | 7636.5 | 109.65 | 27.85 | 40.80 | 1247. |
| 230 | 28.27638 | 291.16 | 11.38 | 969.1 | 8042.1 | 111.45 | 27.54 | 40.33 | 1234. |
| 240 | 27.89164 | 285.37 | 10.81 | 1272.6 | 8443.2 | 113.16 | 27.25 | 39.88 | 1221. |
| 250 | 27.51844 | 280.02 | 10.29 | 1572.1 | 8839.9 | 114.78 | 26.97 | 39.47 | 1209. |
| 260 | 27.15614 | 275.06 | 9.82 | 1867.8 | 9232.6 | 116.32 | 26.71 | 39.07 | 1198. |
| 270 | 26.80414 | 270.48 | 9.39 | 2159.9 | 9621.5 | 117.79 | 26.47 | 38.71 | 1188. |
| 280 | 26.46190 | 266.25 | 8.99 | 2448.8 | 10006.8 | 119.19 | 26.23 | 38.36 | 1179. |
| 290 | 26.12893 | 262.33 | 8.62 | 2734.5 | 10388.8 | 120.53 | 26.02 | 38.04 | 1170. |
| 300 | 25.80480 | 258.71 | 8.27 | 3017.2 | 10767.7 | 121.82 | 25.82 | 37.74 | 1162. |
| 310 | 25.48910 | 255.37 | 7.96 | 3297.2 | 11143.7 | 123.05 | 25.63 | 37.46 | 1154. |
| 320 | 25.18145 | 252.28 | 7.66 | 3574.6 | 11516.9 | 124.23 | 25.45 | 37.20 | 1147. |
| 330 | 24.88152 | 249.42 | 7.39 | 3849.6 | 11887.7 | 125.37 | 25.29 | 36.95 | 1141. |
| 340 | 24.58898 | 246.79 | 7.13 | 4122.3 | 12256.0 | 126.47 | 25.14 | 36.72 | 1134. |
| 350 | 24.30354 | 244.36 | 6.89 | 4392.9 | 12622.1 | 127.53 | 24.99 | 36.51 | 1129. |
| 360 | 24.02493 | 242.11 | 6.67 | 4661.5 | 12986.2 | 128.56 | 24.86 | 36.31 | 1123. |
| 370 | 23.75289 | 240.05 | 6.45 | 4928.3 | 13348.3 | 129.55 | 24.74 | 36.12 | 1118. |
| 380 | 23.48718 | 238.14 | 6.25 | 5193.4 | 13708.7 | 130.51 | 24.63 | 35.95 | 1114. |
| 390 | 23.22757 | 236.39 | 6.07 | 5456.9 | 14067.3 | 131.45 | 24.53 | 35.79 | 1109. |
| 400 | 22.97384 | 234.78 | 5.89 | 5718.9 | 14424.4 | 132.35 | 24.44 | 35.64 | 1105. |
| 420 | 22.48326 | 231.94 | 5.56 | 6238.9 | 15134.4 | 134.08 | 24.28 | 35.37 | 1098. |
| 440 | 22.01393 | 229.56 | 5.27 | 6754.1 | 15839.3 | 135.72 | 24.15 | 35.13 | 1092. |
| 460 | 21.56450 | 227.59 | 5.01 | 7265.4 | 16539.9 | 137.28 | 24.04 | 34.94 | 1086. |
| 480 | 21.13376 | 225.96 | 4.77 | 7773.4 | 17236.9 | 138.76 | 23.97 | 34.77 | 1082. |
| 500 | 20.72057 | 224.65 | 4.55 | 8278.6 | 17930.8 | 140.18 | 23.91 | 34.63 | 1078. |
| 520 | 20.32391 | 223.61 | 4.35 | 8781.5 | 18622.2 | 141.53 | 23.88 | 34.51 | 1074. |
| 540 | 19.94283 | 222.82 | 4.16 | 9282.7 | 19311.4 | 142.83 | 23.86 | 34.42 | 1071. |
| 560 | 19.57644 | 222.25 | 3.99 | 9782.6 | 19999.0 | 144.08 | 23.86 | 34.34 | 1069. |
| 580 | 19.22395 | 221.87 | 3.84 | 10281.5 | 20685.2 | 145.29 | 23.88 | 34.28 | 1066. |
| 600 | 18.88460 | 221.66 | 3.69 | 10779.8 | 21370.5 | 146.45 | 23.90 | 34.24 | 1065. |
| 620 | 18.55768 | 221.61 | 3.56 | 11277.8 | 22055.0 | 147.57 | 23.94 | 34.21 | 1063. |
| 640 | 18.24253 | 221.70 | 3.43 | 11775.7 | 22739.1 | 148.66 | 23.99 | 34.20 | 1062. |
| 660 | 17.93855 | 221.92 | 3.31 | 12273.8 | 23423.0 | 149.71 | 24.05 | 34.19 | 1061. |
| 680 | 17.64516 | 222.25 | 3.20 | 12772.3 | 24106.8 | 150.73 | 24.11 | 34.19 | 1061. |
| 700 | 17.36184 | 222.68 | 3.10 | 13271.3 | 24790.8 | 151.72 | 24.18 | 34.21 | 1060. |
| 720 | 17.08807 | 223.21 | 3.00 | 13771.0 | 25475.1 | 152.69 | 24.26 | 34.22 | 1060. |
| 740 | 16.82338 | 223.82 | 2.91 | 14271.6 | 26159.8 | 153.62 | 24.34 | 34.25 | 1060. |
| 760 | 16.56734 | 224.51 | 2.83 | 14773.2 | 26845.1 | 154.54 | 24.42 | 34.28 | 1061. |
| 780 | 16.31953 | 225.27 | 2.75 | 15275.7 | 27531.0 | 155.43 | 24.51 | 34.31 | 1061. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 800 | 16.07955 | 226.09 | 2.67 | 15779.4 | 28217.6 | 156.30 | 24.59 | 34.35 | 1062. |
| 850 | 15.51156 | 228.38 | 2.50 | 17044.0 | 29937.6 | 158.38 | 24.82 | 34.45 | 1064. |
| 900 | 14.98516 | 230.97 | 2.34 | 18316.8 | 31663.3 | 160.36 | 25.05 | 34.57 | 1067. |
| 950 | 14.49589 | 233.79 | 2.21 | 19597.9 | 33395.0 | 162.23 | 25.27 | 34.70 | 1070. |
| 1000 | 14.03989 | 236.79 | 2.09 | 20887.7 | 35132.8 | 164.01 | 25.50 | 34.82 | 1074. |
| 1050 | 13.61380 | 239.95 | 1.98 | 22186.0 | 36876.9 | 165.71 | 25.71 | 34.94 | 1079. |
| 1100 | 13.21469 | 243.23 | 1.88 | 23492.5 | 38627.1 | 167.34 | 25.91 | 35.06 | 1084. |
| 1150 | 12.84001 | 246.61 | 1.79 | 24807.0 | 40383.3 | 168.90 | 26.10 | 35.18 | 1089. |
| 1200 | 12.48750 | 250.08 | 1.71 | 26129.1 | 42145.2 | 170.40 | 26.28 | 35.29 | 1095. |
| | | | | 2200 bar Isobar | | | | | |
| * 102.246 | 34.58094 | 564.32 | 20.18 | −3176.2 | 3185.7 | 76.80 | 28.71 | 34.89 | 1564. |
| 104 | 34.51692 | 552.49 | 20.57 | −3126.2 | 3247.5 | 77.40 | 28.87 | 35.55 | 1558. |
| 106 | 34.44091 | 539.76 | 20.92 | −3068.4 | 3319.3 | 78.08 | 29.05 | 36.30 | 1552. |
| 108 | 34.36193 | 527.80 | 21.21 | −3009.8 | 3392.6 | 78.77 | 29.22 | 37.02 | 1545. |
| 110 | 34.28024 | 516.59 | 21.43 | −2950.3 | 3467.4 | 79.45 | 29.39 | 37.71 | 1538. |
| 112 | 34.19607 | 506.09 | 21.59 | −2890.0 | 3543.4 | 80.14 | 29.54 | 38.36 | 1532. |
| 114 | 34.10967 | 496.25 | 21.70 | −2829.0 | 3620.8 | 80.82 | 29.68 | 38.97 | 1525. |
| 116 | 34.02127 | 487.04 | 21.76 | −2767.2 | 3699.3 | 81.50 | 29.81 | 39.55 | 1519. |
| 118 | 33.93108 | 478.43 | 21.77 | −2704.8 | 3778.9 | 82.18 | 29.92 | 40.08 | 1512. |
| 120 | 33.83932 | 470.36 | 21.75 | −2641.7 | 3859.6 | 82.86 | 30.03 | 40.56 | 1506. |
| 122 | 33.74619 | 462.82 | 21.69 | −2578.1 | 3941.2 | 83.54 | 30.12 | 41.01 | 1500. |
| 124 | 33.65189 | 455.75 | 21.61 | −2513.9 | 4023.6 | 84.21 | 30.20 | 41.41 | 1494. |
| 126 | 33.55660 | 449.14 | 21.50 | −2449.3 | 4106.8 | 84.87 | 30.26 | 41.78 | 1488. |
| 128 | 33.46048 | 442.93 | 21.37 | −2384.2 | 4190.7 | 85.53 | 30.32 | 42.10 | 1482. |
| 130 | 33.36369 | 437.12 | 21.22 | −2318.8 | 4275.2 | 86.19 | 30.36 | 42.39 | 1476. |
| 132 | 33.26638 | 431.65 | 21.05 | −2253.1 | 4360.2 | 86.84 | 30.40 | 42.64 | 1470. |
| 134 | 33.16867 | 426.51 | 20.87 | −2187.0 | 4445.7 | 87.48 | 30.43 | 42.86 | 1465. |
| 136 | 33.07069 | 421.68 | 20.68 | −2120.8 | 4531.7 | 88.12 | 30.44 | 43.05 | 1459. |
| 138 | 32.97256 | 417.12 | 20.48 | −2054.3 | 4617.9 | 88.75 | 30.45 | 43.21 | 1454. |
| 140 | 32.87436 | 412.81 | 20.27 | −1987.7 | 4704.5 | 89.37 | 30.45 | 43.35 | 1448. |
| 142 | 32.77619 | 408.73 | 20.05 | −1920.9 | 4791.3 | 89.98 | 30.45 | 43.45 | 1443. |
| 144 | 32.67813 | 404.87 | 19.83 | −1854.0 | 4878.3 | 90.59 | 30.44 | 43.54 | 1438. |
| 146 | 32.58026 | 401.21 | 19.61 | −1787.1 | 4965.4 | 91.19 | 30.42 | 43.60 | 1433. |
| 148 | 32.48262 | 397.72 | 19.39 | −1720.2 | 5052.7 | 91.79 | 30.39 | 43.65 | 1428. |
| 150 | 32.38529 | 394.40 | 19.16 | −1653.2 | 5140.0 | 92.37 | 30.37 | 43.68 | 1423. |
| 155 | 32.14360 | 386.72 | 18.59 | −1485.8 | 5358.5 | 93.81 | 30.28 | 43.69 | 1411. |
| 160 | 31.90470 | 379.81 | 18.03 | −1318.8 | 5576.8 | 95.19 | 30.16 | 43.62 | 1400. |
| 165 | 31.66902 | 373.51 | 17.48 | −1152.3 | 5794.5 | 96.53 | 30.04 | 43.49 | 1389. |
| 170 | 31.43684 | 367.73 | 16.94 | −986.6 | 6011.6 | 97.83 | 29.89 | 43.32 | 1379. |
| 175 | 31.20831 | 362.35 | 16.43 | −821.7 | 6227.7 | 99.08 | 29.74 | 43.19 | 1369. |
| 180 | 30.98353 | 357.33 | 15.93 | −657.8 | 6442.8 | 100.29 | 29.58 | 42.90 | 1360. |
| 185 | 30.76250 | 352.61 | 15.45 | −494.9 | 6656.7 | 101.47 | 29.42 | 42.66 | 1351. |
| 190 | 30.54522 | 348.14 | 15.00 | −333.1 | 6869.3 | 102.60 | 29.25 | 42.41 | 1342. |
| 195 | 30.33162 | 343.89 | 14.57 | −172.4 | 7080.8 | 103.70 | 29.08 | 42.16 | 1334. |
| 200 | 30.12164 | 339.85 | 14.15 | −12.8 | 7290.9 | 104.76 | 28.91 | 41.90 | 1326. |
| 210 | 29.71217 | 332.27 | 13.38 | 303.0 | 7707.4 | 106.79 | 28.58 | 41.39 | 1311. |
| 220 | 29.31604 | 325.29 | 12.68 | 614.4 | 8118.8 | 108.71 | 28.25 | 40.90 | 1297. |
| 230 | 28.93246 | 318.83 | 12.04 | 921.5 | 8525.4 | 110.52 | 27.93 | 40.42 | 1283. |
| 240 | 28.56066 | 312.84 | 11.45 | 1224.4 | 8927.3 | 112.23 | 27.63 | 39.97 | 1271. |
| 250 | 28.19992 | 307.27 | 10.92 | 1523.5 | 9324.9 | 113.85 | 27.35 | 39.55 | 1259. |
| 260 | 27.84960 | 302.09 | 10.43 | 1818.8 | 9718.4 | 115.39 | 27.07 | 39.15 | 1249. |
| 270 | 27.50910 | 297.27 | 9.98 | 2110.6 | 10108.0 | 116.86 | 26.82 | 38.77 | 1239. |
| 280 | 27.17787 | 292.78 | 9.57 | 2399.1 | 10493.9 | 118.27 | 26.57 | 38.42 | 1229. |
| 290 | 26.85543 | 288.61 | 9.18 | 2684.5 | 10876.5 | 119.61 | 26.35 | 38.10 | 1221. |
| 300 | 26.54133 | 284.73 | 8.83 | 2967.0 | 11256.0 | 120.90 | 26.14 | 37.79 | 1212. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 310 | 26.23518 | 281.13 | 8.50 | 3246.8 | 11632.5 | 122.13 | 25.94 | 37.51 | 1205. |
| 320 | 25.93661 | 277.77 | 8.19 | 3524.0 | 12006.2 | 123.32 | 25.75 | 37.24 | 1198. |
| 330 | 25.64529 | 274.66 | 7.90 | 3798.8 | 12377.4 | 124.46 | 25.58 | 36.99 | 1191. |
| 340 | 25.36090 | 271.77 | 7.64 | 4071.3 | 12746.1 | 125.56 | 25.42 | 36.76 | 1185. |
| 350 | 25.08317 | 269.08 | 7.39 | 4341.8 | 13112.6 | 126.62 | 25.27 | 36.55 | 1179. |
| 360 | 24.81182 | 266.58 | 7.15 | 4610.3 | 13477.1 | 127.65 | 25.13 | 36.34 | 1173. |
| 370 | 24.54662 | 264.27 | 6.93 | 4877.0 | 13839.6 | 128.64 | 25.00 | 36.16 | 1168. |
| 380 | 24.28734 | 262.12 | 6.72 | 5142.0 | 14200.2 | 129.60 | 24.88 | 35.98 | 1163. |
| 390 | 24.03376 | 260.13 | 6.52 | 5405.4 | 14559.2 | 130.54 | 24.77 | 35.82 | 1159. |
| 400 | 23.78569 | 258.29 | 6.34 | 5667.4 | 14916.7 | 131.44 | 24.67 | 35.67 | 1155. |
| 420 | 23.30530 | 255.01 | 6.00 | 6187.4 | 15627.3 | 133.18 | 24.50 | 35.40 | 1147. |
| 440 | 22.84481 | 252.21 | 5.69 | 6702.7 | 16332.9 | 134.82 | 24.36 | 35.17 | 1140. |
| 460 | 22.40295 | 249.83 | 5.41 | 7214.1 | 17034.2 | 136.38 | 24.24 | 34.97 | 1134. |
| 480 | 21.97861 | 247.83 | 5.15 | 7722.2 | 17731.9 | 137.86 | 24.15 | 34.81 | 1129. |
| 500 | 21.57076 | 246.17 | 4.92 | 8227.6 | 18426.6 | 139.28 | 24.09 | 34.67 | 1125. |
| 520 | 21.17846 | 244.80 | 4.71 | 8730.8 | 19118.8 | 140.64 | 24.05 | 34.55 | 1121. |
| 540 | 20.80084 | 243.69 | 4.51 | 9232.4 | 19808.9 | 141.94 | 24.02 | 34.46 | 1117. |
| 560 | 20.43712 | 242.82 | 4.33 | 9732.6 | 20497.4 | 143.19 | 24.02 | 34.39 | 1114. |
| 580 | 20.08655 | 242.16 | 4.17 | 10232.0 | 21184.6 | 144.40 | 24.02 | 34.34 | 1112. |
| 600 | 19.74844 | 241.69 | 4.01 | 10730.8 | 21870.9 | 145.56 | 24.04 | 34.30 | 1109. |
| 620 | 19.42216 | 241.39 | 3.87 | 11229.3 | 22556.5 | 146.68 | 24.08 | 34.27 | 1107. |
| 640 | 19.10710 | 241.25 | 3.73 | 11727.7 | 23241.8 | 147.77 | 24.12 | 34.26 | 1106. |
| 660 | 18.80272 | 241.24 | 3.61 | 12226.4 | 23926.9 | 148.82 | 24.17 | 34.25 | 1105. |
| 680 | 18.50848 | 241.36 | 3.49 | 12725.5 | 24612.0 | 149.85 | 24.23 | 34.26 | 1104. |
| 700 | 18.22389 | 241.60 | 3.38 | 13225.2 | 25297.3 | 150.84 | 24.30 | 34.27 | 1103. |
| 720 | 17.94850 | 241.94 | 3.28 | 13725.7 | 25983.0 | 151.81 | 24.37 | 34.29 | 1102. |
| 740 | 17.68187 | 242.37 | 3.18 | 14227.0 | 26669.1 | 152.75 | 24.45 | 34.32 | 1102. |
| 760 | 17.42360 | 242.90 | 3.09 | 14729.3 | 27355.8 | 153.66 | 24.53 | 34.35 | 1102. |
| 780 | 17.17330 | 243.50 | 3.00 | 15232.6 | 28043.2 | 154.55 | 24.61 | 34.39 | 1102. |
| 800 | 16.93060 | 244.17 | 2.92 | 15737.1 | 28731.3 | 155.43 | 24.69 | 34.43 | 1102. |
| 850 | 16.35496 | 246.13 | 2.73 | 17003.7 | 30455.3 | 157.52 | 24.91 | 34.54 | 1104. |
| 900 | 15.81995 | 248.42 | 2.56 | 18278.6 | 32185.1 | 159.49 | 25.14 | 34.66 | 1106. |
| 950 | 15.32140 | 250.98 | 2.42 | 19561.9 | 33920.9 | 161.37 | 25.36 | 34.78 | 1109. |
| 1000 | 14.85565 | 253.76 | 2.29 | 20853.9 | 35663.1 | 163.16 | 25.57 | 34.91 | 1112. |
| 1050 | 14.41949 | 256.72 | 2.17 | 22154.4 | 37411.5 | 164.86 | 25.78 | 35.03 | 1116. |
| 1100 | 14.01014 | 259.82 | 2.06 | 23463.1 | 39166.0 | 166.50 | 25.98 | 35.15 | 1120. |
| 1150 | 13.62513 | 263.05 | 1.97 | 24779.8 | 40926.5 | 168.06 | 26.17 | 35.27 | 1125. |
| 1200 | 13.26228 | 266.38 | 1.88 | 26104.2 | 42692.6 | 169.56 | 26.35 | 35.38 | 1130. |
| | | | | 2400 bar Isobar | | | | | |
| * 105.210 | 34.82268 | 594.62 | 20.26 | −3087.4 | 3804.7 | 77.21 | 28.52 | 34.51 | 1603. |
| 106 | 34.79552 | 589.15 | 20.43 | −3065.4 | 3832.1 | 77.47 | 28.62 | 34.82 | 1600. |
| 108 | 34.72465 | 575.89 | 20.83 | −3009.0 | 3902.5 | 78.13 | 28.85 | 35.60 | 1593. |
| 110 | 34.65092 | 563.40 | 21.15 | −2951.8 | 3974.5 | 78.79 | 29.08 | 36.35 | 1586. |
| 112 | 34.57454 | 551.67 | 21.41 | −2893.6 | 4047.9 | 79.45 | 29.29 | 37.07 | 1579. |
| 114 | 34.49575 | 540.64 | 21.61 | −2834.6 | 4122.7 | 80.11 | 29.48 | 37.76 | 1572. |
| 116 | 34.41477 | 530.29 | 21.75 | −2774.9 | 4198.9 | 80.77 | 29.66 | 38.40 | 1565. |
| 118 | 34.33179 | 520.57 | 21.84 | −2714.3 | 4276.3 | 81.43 | 29.83 | 39.00 | 1559. |
| 120 | 34.24703 | 511.47 | 21.89 | −2653.0 | 4354.9 | 82.09 | 29.98 | 39.56 | 1552. |
| 122 | 34.16069 | 502.93 | 21.89 | −2591.1 | 4434.5 | 82.75 | 30.11 | 40.08 | 1546. |
| 124 | 34.07296 | 494.92 | 21.87 | −2528.6 | 4515.1 | 83.41 | 30.23 | 40.55 | 1539. |
| 126 | 33.98400 | 487.42 | 21.81 | −2465.5 | 4596.7 | 84.06 | 30.33 | 40.98 | 1533. |
| 128 | 33.89401 | 480.38 | 21.73 | −2401.9 | 4679.0 | 84.71 | 30.42 | 41.37 | 1527. |
| 130 | 33.80312 | 473.77 | 21.62 | −2337.8 | 4762.1 | 85.35 | 30.50 | 41.72 | 1521. |
| 132 | 33.71150 | 467.57 | 21.50 | −2273.3 | 4845.9 | 85.99 | 30.56 | 42.04 | 1515. |
| 134 | 33.61928 | 461.75 | 21.35 | −2208.5 | 4930.3 | 86.63 | 30.61 | 42.32 | 1509. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 136 | 33.52659 | 456.27 | 21.19 | −2143.3 | 5015.1 | 87.26 | 30.65 | 42.56 | 1504. |
| 138 | 33.43355 | 451.11 | 21.02 | −2077.9 | 5100.5 | 87.88 | 30.68 | 42.77 | 1498. |
| 140 | 33.34026 | 446.25 | 20.83 | −2012.3 | 5186.2 | 88.50 | 30.70 | 42.95 | 1493. |
| 142 | 33.24683 | 441.66 | 20.64 | −1946.4 | 5272.3 | 89.11 | 30.72 | 43.11 | 1488. |
| 144 | 33.15334 | 437.32 | 20.44 | −1880.4 | 5358.6 | 89.71 | 30.72 | 43.24 | 1482. |
| 146 | 33.05988 | 433.22 | 20.24 | −1814.3 | 5445.2 | 90.31 | 30.72 | 43.34 | 1477. |
| 148 | 32.96652 | 429.33 | 20.03 | −1748.1 | 5532.0 | 90.90 | 30.71 | 43.43 | 1472. |
| 150 | 32.87333 | 425.63 | 19.81 | −1681.8 | 5618.9 | 91.48 | 30.69 | 43.49 | 1467. |
| 155 | 32.64142 | 417.15 | 19.27 | −1516.0 | 5836.6 | 92.91 | 30.63 | 43.57 | 1456. |
| 160 | 32.41164 | 409.59 | 18.72 | −1350.2 | 6054.5 | 94.29 | 30.53 | 43.57 | 1444. |
| 165 | 32.18451 | 402.78 | 18.18 | −1184.8 | 6272.2 | 95.63 | 30.42 | 43.49 | 1434. |
| 170 | 31.96040 | 396.57 | 17.65 | −1020.0 | 6489.3 | 96.93 | 30.28 | 43.35 | 1424. |
| 175 | 31.73957 | 390.86 | 17.13 | −855.9 | 6705.6 | 98.18 | 30.14 | 43.18 | 1414. |
| 180 | 31.52215 | 385.57 | 16.63 | −692.6 | 6921.0 | 99.40 | 29.98 | 42.98 | 1405. |
| 185 | 31.30823 | 380.63 | 16.15 | −530.3 | 7135.4 | 100.57 | 29.82 | 42.76 | 1396. |
| 190 | 31.09781 | 375.98 | 15.69 | −369.0 | 7348.6 | 101.71 | 29.65 | 42.52 | 1387. |
| 195 | 30.89089 | 371.58 | 15.25 | −208.7 | 7560.6 | 102.81 | 29.48 | 42.27 | 1379. |
| 200 | 30.68741 | 367.41 | 14.83 | −49.5 | 7771.3 | 103.88 | 29.31 | 42.02 | 1371. |
| 210 | 30.29050 | 359.62 | 14.04 | 265.7 | 8189.0 | 105.91 | 28.97 | 41.51 | 1356. |
| 220 | 29.90644 | 352.47 | 13.32 | 576.6 | 8601.6 | 107.83 | 28.64 | 41.02 | 1342. |
| 230 | 29.53449 | 345.84 | 12.66 | 883.3 | 9009.4 | 109.65 | 28.31 | 40.54 | 1330. |
| 240 | 29.17392 | 339.68 | 12.06 | 1185.9 | 9412.4 | 111.36 | 28.00 | 40.08 | 1317. |
| 250 | 28.82402 | 333.94 | 11.51 | 1484.7 | 9811.1 | 112.99 | 27.70 | 39.65 | 1306. |
| 260 | 28.48414 | 328.57 | 11.01 | 1779.7 | 10205.5 | 114.54 | 27.42 | 39.24 | 1296. |
| 270 | 28.15370 | 323.56 | 10.55 | 2071.3 | 10595.9 | 116.01 | 27.15 | 38.86 | 1286. |
| 280 | 27.83215 | 318.87 | 10.12 | 2359.6 | 10982.7 | 117.42 | 26.90 | 38.50 | 1276. |
| 290 | 27.51900 | 314.49 | 9.72 | 2644.8 | 11366.1 | 118.76 | 26.66 | 38.17 | 1268. |
| 300 | 27.21380 | 310.39 | 9.35 | 2927.1 | 11746.2 | 120.05 | 26.44 | 37.86 | 1260. |
| 310 | 26.91617 | 306.57 | 9.01 | 3206.7 | 12123.3 | 121.29 | 26.23 | 37.57 | 1252. |
| 320 | 26.62574 | 302.99 | 8.69 | 3483.8 | 12497.6 | 122.47 | 26.04 | 37.30 | 1245. |
| 330 | 26.34217 | 299.64 | 8.40 | 3758.5 | 12869.3 | 123.62 | 25.85 | 37.05 | 1238. |
| 340 | 26.06517 | 296.52 | 8.12 | 4030.9 | 13238.6 | 124.72 | 25.68 | 36.81 | 1232. |
| 350 | 25.79445 | 293.60 | 7.86 | 4301.3 | 13605.6 | 125.78 | 25.53 | 36.59 | 1226. |
| 360 | 25.52977 | 290.88 | 7.61 | 4569.7 | 13970.5 | 126.81 | 25.38 | 36.39 | 1220. |
| 370 | 25.27088 | 288.34 | 7.38 | 4836.3 | 14333.4 | 127.81 | 25.24 | 36.20 | 1215. |
| 380 | 25.01757 | 285.98 | 7.17 | 5101.2 | 14694.5 | 128.77 | 25.12 | 36.02 | 1210. |
| 390 | 24.76963 | 283.77 | 6.96 | 5364.6 | 15053.9 | 129.70 | 25.00 | 35.86 | 1205. |
| 400 | 24.52687 | 281.71 | 6.77 | 5626.5 | 15411.7 | 130.61 | 24.90 | 35.71 | 1201. |
| 420 | 24.05619 | 278.01 | 6.41 | 6146.4 | 16123.0 | 132.34 | 24.71 | 35.43 | 1193. |
| 440 | 23.60424 | 274.82 | 6.09 | 6661.7 | 16829.3 | 133.99 | 24.56 | 35.20 | 1186. |
| 460 | 23.16984 | 272.07 | 5.79 | 7173.1 | 17531.4 | 135.55 | 24.43 | 35.01 | 1180. |
| 480 | 22.75195 | 269.71 | 5.53 | 7681.3 | 18229.8 | 137.03 | 24.33 | 34.84 | 1174. |
| 500 | 22.34962 | 267.70 | 5.29 | 8186.8 | 18925.2 | 138.45 | 24.26 | 34.70 | 1169. |
| 520 | 21.96198 | 266.01 | 5.06 | 8690.2 | 19618.1 | 139.81 | 24.21 | 34.59 | 1165. |
| 540 | 21.58825 | 264.60 | 4.86 | 9191.9 | 20309.1 | 141.12 | 24.18 | 34.50 | 1161. |
| 560 | 21.22767 | 263.44 | 4.67 | 9692.4 | 20998.4 | 142.37 | 24.16 | 34.43 | 1158. |
| 580 | 20.87959 | 262.51 | 4.49 | 10192.0 | 21686.5 | 143.58 | 24.16 | 34.38 | 1155. |
| 600 | 20.54336 | 261.78 | 4.33 | 10691.1 | 22373.7 | 144.74 | 24.18 | 34.34 | 1152. |
| 620 | 20.21840 | 261.24 | 4.17 | 11190.0 | 23060.3 | 145.87 | 24.21 | 34.32 | 1150. |
| 640 | 19.90416 | 260.87 | 4.03 | 11688.8 | 23746.6 | 146.96 | 24.25 | 34.31 | 1148. |
| 660 | 19.60013 | 260.64 | 3.90 | 12187.9 | 24432.8 | 148.01 | 24.29 | 34.31 | 1146. |
| 680 | 19.30582 | 260.56 | 3.77 | 12687.5 | 25119.0 | 149.04 | 24.35 | 34.32 | 1145. |
| 700 | 19.02079 | 260.60 | 3.66 | 13187.7 | 25805.5 | 150.03 | 24.41 | 34.33 | 1144. |
| 720 | 18.74460 | 260.76 | 3.54 | 13688.6 | 26492.3 | 151.00 | 24.48 | 34.35 | 1143. |
| 740 | 18.47687 | 261.02 | 3.44 | 14190.5 | 27179.7 | 151.94 | 24.55 | 34.38 | 1142. |
| 760 | 18.21720 | 261.37 | 3.34 | 14693.3 | 27867.7 | 152.86 | 24.63 | 34.42 | 1142. |
| 780 | 17.96525 | 261.82 | 3.25 | 15197.2 | 28556.4 | 153.75 | 24.71 | 34.45 | 1142. |
| 800 | 17.72068 | 262.34 | 3.16 | 15702.3 | 29245.8 | 154.63 | 24.79 | 34.49 | 1142. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 850 | 17.13947 | 263.96 | 2.96 | 16970.6 | 30973.3 | 156.72 | 25.00 | 34.61 | 1142. |
| 900 | 16.59792 | 265.95 | 2.78 | 18247.1 | 32706.7 | 158.70 | 25.22 | 34.73 | 1143. |
| 950 | 16.09207 | 268.25 | 2.62 | 19532.2 | 34446.4 | 160.58 | 25.44 | 34.86 | 1146. |
| 1000 | 15.61847 | 270.80 | 2.48 | 20825.9 | 36192.4 | 162.37 | 25.65 | 34.98 | 1148. |
| 1050 | 15.17409 | 273.56 | 2.36 | 22128.2 | 37944.7 | 164.08 | 25.85 | 35.11 | 1152. |
| 1100 | 14.75624 | 276.48 | 2.24 | 23438.8 | 39703.2 | 165.72 | 26.05 | 35.23 | 1155. |
| 1150 | 14.36255 | 279.55 | 2.14 | 24757.4 | 41467.5 | 167.29 | 26.23 | 35.35 | 1160. |
| 1200 | 13.99094 | 282.74 | 2.04 | 26083.6 | 43237.6 | 168.80 | 26.41 | 35.46 | 1164. |
| | | | | 2600 bar Isobar | | | | | |
| * 108.109 | 35.05439 | 624.43 | 20.29 | −2998.5 | 4418.6 | 77.60 | 28.43 | 34.23 | 1638. |
| 110 | 34.99163 | 611.44 | 20.70 | −2946.3 | 4484.1 | 78.20 | 28.70 | 35.00 | 1631. |
| 112 | 34.92258 | 598.46 | 21.05 | −2890.2 | 4554.8 | 78.84 | 28.97 | 35.77 | 1624. |
| 114 | 34.85098 | 586.23 | 21.34 | −2833.2 | 4627.1 | 79.48 | 29.22 | 36.52 | 1617. |
| 116 | 34.77702 | 574.71 | 21.57 | −2775.3 | 4700.9 | 80.12 | 29.46 | 37.22 | 1610. |
| 118 | 34.70090 | 563.87 | 21.74 | −2716.6 | 4776.0 | 80.76 | 29.67 | 37.89 | 1603. |
| 120 | 34.62283 | 553.68 | 21.87 | −2657.1 | 4852.4 | 81.40 | 29.87 | 38.51 | 1596. |
| 122 | 34.54299 | 544.11 | 21.95 | −2596.9 | 4930.0 | 82.04 | 30.04 | 39.09 | 1590. |
| 124 | 34.46156 | 535.11 | 21.98 | −2535.9 | 5008.7 | 82.68 | 30.20 | 39.63 | 1583. |
| 126 | 34.37871 | 526.66 | 21.99 | −2474.3 | 5088.5 | 83.32 | 30.34 | 40.13 | 1577. |
| 128 | 34.29463 | 518.73 | 21.96 | −2412.2 | 5169.2 | 83.96 | 30.47 | 40.58 | 1571. |
| 130 | 34.20945 | 511.27 | 21.90 | −2349.4 | 5250.8 | 84.59 | 30.57 | 40.99 | 1564. |
| 132 | 34.12334 | 504.27 | 21.82 | −2286.3 | 5333.2 | 85.22 | 30.67 | 41.37 | 1558. |
| 134 | 34.03644 | 497.69 | 21.71 | −2222.6 | 5416.2 | 85.84 | 30.75 | 41.71 | 1552. |
| 136 | 33.94888 | 491.50 | 21.59 | −2158.6 | 5500.0 | 86.46 | 30.81 | 42.01 | 1547. |
| 138 | 33.86078 | 485.68 | 21.45 | −2094.3 | 5584.2 | 87.08 | 30.87 | 42.27 | 1541. |
| 140 | 33.77226 | 480.20 | 21.30 | −2029.6 | 5669.0 | 87.69 | 30.91 | 42.50 | 1535. |
| 142 | 33.68342 | 475.03 | 21.13 | −1964.7 | 5754.2 | 88.29 | 30.94 | 42.71 | 1530. |
| 144 | 33.59436 | 470.15 | 20.95 | −1899.6 | 5839.8 | 88.89 | 30.97 | 42.88 | 1525. |
| 146 | 33.50517 | 465.54 | 20.77 | −1834.2 | 5925.8 | 89.48 | 30.98 | 43.03 | 1519. |
| 148 | 33.41592 | 461.18 | 20.58 | −1768.8 | 6011.9 | 90.07 | 30.98 | 43.15 | 1514. |
| 150 | 33.32670 | 457.06 | 20.38 | −1703.2 | 6098.4 | 90.65 | 30.98 | 43.26 | 1509. |
| 155 | 33.10417 | 447.63 | 19.87 | −1538.9 | 6315.1 | 92.07 | 30.94 | 43.42 | 1497. |
| 160 | 32.88304 | 439.29 | 19.35 | −1374.4 | 6532.4 | 93.45 | 30.87 | 43.48 | 1486. |
| 165 | 32.66395 | 431.84 | 18.82 | −1210.1 | 6749.7 | 94.79 | 30.77 | 43.46 | 1475. |
| 170 | 32.44738 | 425.12 | 18.30 | −1046.2 | 6966.8 | 96.08 | 30.65 | 43.37 | 1465. |
| 175 | 32.23365 | 419.00 | 17.78 | −882.8 | 7183.3 | 97.34 | 30.51 | 43.23 | 1456. |
| 180 | 32.02298 | 413.37 | 17.29 | −720.1 | 7399.0 | 98.55 | 30.36 | 43.05 | 1446. |
| 185 | 31.81550 | 408.15 | 16.80 | −558.3 | 7613.8 | 99.73 | 30.20 | 42.85 | 1438. |
| 190 | 31.61128 | 403.28 | 16.34 | −397.4 | 7827.5 | 100.87 | 30.04 | 42.63 | 1429. |
| 195 | 31.41033 | 398.70 | 15.89 | −237.5 | 8040.0 | 101.97 | 29.87 | 42.39 | 1421. |
| 200 | 31.21265 | 394.37 | 15.46 | −78.6 | 8251.4 | 103.05 | 29.70 | 42.15 | 1414. |
| 210 | 30.82688 | 386.35 | 14.66 | 236.1 | 8670.3 | 105.09 | 29.35 | 41.65 | 1399. |
| 220 | 30.45345 | 379.01 | 13.93 | 546.7 | 9084.3 | 107.02 | 29.01 | 41.15 | 1385. |
| 230 | 30.09171 | 372.23 | 13.26 | 853.1 | 9493.3 | 108.83 | 28.67 | 40.66 | 1373. |
| 240 | 29.74099 | 365.92 | 12.64 | 1155.5 | 9897.6 | 110.55 | 28.35 | 40.20 | 1361. |
| 250 | 29.40060 | 360.04 | 12.08 | 1454.0 | 10297.4 | 112.19 | 28.04 | 39.76 | 1350. |
| 260 | 29.06992 | 354.52 | 11.56 | 1749.0 | 10692.9 | 113.74 | 27.75 | 39.35 | 1340. |
| 270 | 28.74835 | 349.35 | 11.08 | 2040.4 | 11084.4 | 115.22 | 27.47 | 38.96 | 1330. |
| 280 | 28.43535 | 344.50 | 10.64 | 2328.6 | 11472.1 | 116.63 | 27.21 | 38.59 | 1321. |
| 290 | 28.13045 | 339.95 | 10.23 | 2613.7 | 11856.3 | 117.97 | 26.96 | 38.25 | 1312. |
| 300 | 27.83319 | 335.67 | 9.85 | 2895.9 | 12237.2 | 119.26 | 26.73 | 37.94 | 1304. |
| 310 | 27.54318 | 331.65 | 9.50 | 3175.4 | 12615.1 | 120.50 | 26.51 | 37.64 | 1296. |
| 320 | 27.26006 | 327.88 | 9.17 | 3452.3 | 12990.1 | 121.69 | 26.31 | 37.36 | 1289. |
| 330 | 26.98350 | 324.34 | 8.87 | 3726.9 | 13362.4 | 122.84 | 26.12 | 37.11 | 1282. |
| 340 | 26.71320 | 321.02 | 8.58 | 3999.3 | 13732.3 | 123.94 | 25.94 | 36.87 | 1276. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 350 | 26.44888 | 317.90 | 8.31 | 4269.5 | 14099.8 | 125.01 | 25.78 | 36.64 | 1270. |
| 360 | 26.19030 | 314.98 | 8.06 | 4537.9 | 14465.2 | 126.04 | 25.62 | 36.44 | 1265. |
| 370 | 25.93722 | 312.23 | 7.82 | 4804.4 | 14828.6 | 127.03 | 25.48 | 36.25 | 1259. |
| 380 | 25.68943 | 309.67 | 7.59 | 5069.3 | 15190.2 | 128.00 | 25.35 | 36.07 | 1254. |
| 390 | 25.44674 | 307.26 | 7.38 | 5332.6 | 15550.0 | 128.93 | 25.22 | 35.90 | 1249. |
| 400 | 25.20896 | 305.01 | 7.18 | 5594.5 | 15908.3 | 129.84 | 25.11 | 35.75 | 1245. |
| 420 | 24.74745 | 300.93 | 6.81 | 6114.3 | 16620.4 | 131.58 | 24.91 | 35.47 | 1237. |
| 440 | 24.30367 | 297.36 | 6.47 | 6629.5 | 17327.5 | 133.22 | 24.75 | 35.24 | 1229. |
| 460 | 23.87651 | 294.25 | 6.17 | 7140.9 | 18030.2 | 134.78 | 24.61 | 35.04 | 1223. |
| 480 | 23.46498 | 291.56 | 5.89 | 7649.0 | 18729.4 | 136.27 | 24.51 | 34.88 | 1217. |
| 500 | 23.06820 | 289.23 | 5.64 | 8154.6 | 19425.5 | 137.69 | 24.42 | 34.74 | 1212. |
| 520 | 22.68535 | 287.23 | 5.40 | 8658.1 | 20119.2 | 139.05 | 24.36 | 34.63 | 1207. |
| 540 | 22.31571 | 285.52 | 5.19 | 9159.9 | 20810.9 | 140.36 | 24.33 | 34.54 | 1203. |
| 560 | 21.95858 | 284.09 | 4.99 | 9660.5 | 21501.0 | 141.61 | 24.31 | 34.47 | 1199. |
| 580 | 21.61334 | 282.89 | 4.80 | 10160.3 | 22189.9 | 142.82 | 24.30 | 34.42 | 1196. |
| 600 | 21.27941 | 281.91 | 4.63 | 10659.5 | 22877.9 | 143.99 | 24.31 | 34.39 | 1193. |
| 620 | 20.95624 | 281.13 | 4.47 | 11158.6 | 23565.4 | 145.12 | 24.33 | 34.36 | 1190. |
| 640 | 20.64332 | 280.53 | 4.32 | 11657.7 | 24252.6 | 146.21 | 24.37 | 34.36 | 1188. |
| 660 | 20.34018 | 280.10 | 4.18 | 12157.1 | 24939.7 | 147.26 | 24.41 | 34.36 | 1186. |
| 680 | 20.04638 | 279.81 | 4.05 | 12657.0 | 25626.9 | 148.29 | 24.46 | 34.37 | 1185. |
| 700 | 19.76149 | 279.66 | 3.92 | 13157.5 | 26314.4 | 149.29 | 24.52 | 34.38 | 1183. |
| 720 | 19.48513 | 279.63 | 3.81 | 13658.8 | 27002.4 | 150.26 | 24.58 | 34.41 | 1182. |
| 740 | 19.21691 | 279.72 | 3.70 | 14161.1 | 27690.8 | 151.20 | 24.65 | 34.44 | 1181. |
| 760 | 18.95649 | 279.91 | 3.59 | 14664.3 | 28379.9 | 152.12 | 24.73 | 34.47 | 1180. |
| 780 | 18.70353 | 280.20 | 3.49 | 15168.7 | 29069.8 | 153.01 | 24.80 | 34.51 | 1180. |
| 800 | 18.45773 | 280.57 | 3.40 | 15674.2 | 29760.5 | 153.89 | 24.88 | 34.56 | 1179. |
| 850 | 17.87260 | 281.85 | 3.19 | 16943.7 | 31491.1 | 155.99 | 25.09 | 34.67 | 1179. |
| 900 | 17.32611 | 283.55 | 3.00 | 18221.5 | 33227.8 | 157.97 | 25.30 | 34.80 | 1180. |
| 950 | 16.81455 | 285.58 | 2.83 | 19508.0 | 34970.8 | 159.86 | 25.51 | 34.93 | 1181. |
| 1000 | 16.33465 | 287.90 | 2.68 | 20803.2 | 36720.3 | 161.65 | 25.72 | 35.05 | 1184. |
| 1050 | 15.88352 | 290.45 | 2.54 | 22107.0 | 38476.2 | 163.36 | 25.92 | 35.18 | 1186. |
| 1100 | 15.45860 | 293.19 | 2.42 | 23419.2 | 40238.3 | 165.00 | 26.11 | 35.30 | 1190. |
| 1150 | 15.05762 | 296.10 | 2.31 | 24739.3 | 42006.3 | 166.58 | 26.30 | 35.42 | 1193. |
| 1200 | 14.67857 | 299.14 | 2.21 | 26067.1 | 43780.0 | 168.09 | 26.47 | 35.53 | 1197. |
| | | | | 2800 bar Isobar | | | | | |
| * 110.947 | 35.27718 | 653.80 | 20.30 | −2909.2 | 5027.9 | 77.97 | 28.42 | 34.04 | 1672. |
| 112 | 35.24411 | 646.42 | 20.54 | −2880.6 | 5064.0 | 78.29 | 28.59 | 34.47 | 1668. |
| 114 | 35.17927 | 632.98 | 20.92 | −2825.5 | 5133.7 | 78.91 | 28.90 | 35.27 | 1661. |
| 116 | 35.11196 | 620.28 | 21.24 | −2769.5 | 5205.0 | 79.53 | 29.18 | 36.03 | 1653. |
| 118 | 35.04237 | 608.31 | 21.50 | −2712.5 | 5277.8 | 80.15 | 29.45 | 36.75 | 1646. |
| 120 | 34.97067 | 597.01 | 21.70 | −2654.7 | 5352.0 | 80.77 | 29.69 | 37.43 | 1639. |
| 122 | 34.89704 | 586.37 | 21.85 | −2596.1 | 5427.5 | 81.40 | 29.91 | 38.07 | 1632. |
| 124 | 34.82166 | 576.35 | 21.96 | −2536.7 | 5504.2 | 82.02 | 30.11 | 38.67 | 1625. |
| 126 | 34.74471 | 566.92 | 22.02 | −2476.6 | 5582.1 | 82.65 | 30.30 | 39.23 | 1619. |
| 128 | 34.66633 | 558.05 | 22.05 | −2415.9 | 5661.1 | 83.27 | 30.46 | 39.74 | 1612. |
| 130 | 34.58669 | 549.70 | 22.05 | −2354.5 | 5741.1 | 83.89 | 30.60 | 40.21 | 1606. |
| 132 | 34.50593 | 541.84 | 22.02 | −2292.6 | 5821.9 | 84.50 | 30.73 | 40.64 | 1600. |
| 134 | 34.42420 | 534.45 | 21.96 | −2230.2 | 5903.6 | 85.12 | 30.84 | 41.04 | 1593. |
| 136 | 34.34163 | 527.50 | 21.88 | −2167.3 | 5986.1 | 85.73 | 30.93 | 41.39 | 1587. |
| 138 | 34.25835 | 520.96 | 21.77 | −2104.0 | 6069.2 | 86.34 | 31.01 | 41.71 | 1582. |
| 140 | 34.17448 | 514.79 | 21.66 | −2040.4 | 6152.9 | 86.94 | 31.07 | 42.00 | 1576. |
| 142 | 34.09012 | 508.98 | 21.52 | −1976.4 | 6237.1 | 87.54 | 31.13 | 42.25 | 1570. |
| 144 | 34.00538 | 503.50 | 21.37 | −1912.1 | 6321.8 | 88.13 | 31.17 | 42.47 | 1565. |
| 146 | 33.92036 | 498.33 | 21.21 | −1847.7 | 6407.0 | 88.72 | 31.20 | 42.66 | 1560. |
| 148 | 33.83513 | 493.44 | 21.05 | −1783.0 | 6492.5 | 89.30 | 31.22 | 42.83 | 1554. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 150 | 33.74978 | 488.82 | 20.87 | −1718.1 | 6578.3 | 89.87 | 31.23 | 42.97 | 1549. |
| 155 | 33.53635 | 478.31 | 20.40 | −1555.4 | 6793.8 | 91.29 | 31.23 | 43.22 | 1537. |
| 160 | 33.32357 | 469.06 | 19.91 | −1392.2 | 7010.3 | 92.66 | 31.18 | 43.35 | 1526. |
| 165 | 33.11219 | 460.86 | 19.40 | −1228.9 | 7227.2 | 94.00 | 31.10 | 43.39 | 1515. |
| 170 | 32.90278 | 453.53 | 18.89 | −1065.9 | 7444.0 | 95.29 | 30.99 | 43.35 | 1505. |
| 175 | 32.69575 | 446.90 | 18.39 | −903.2 | 7660.6 | 96.55 | 30.87 | 43.25 | 1495. |
| 180 | 32.49138 | 440.86 | 17.90 | −741.2 | 7876.5 | 97.76 | 30.72 | 43.11 | 1486. |
| 185 | 32.28987 | 435.30 | 17.41 | −579.9 | 8091.6 | 98.94 | 30.57 | 42.93 | 1477. |
| 190 | 32.09135 | 430.16 | 16.95 | −419.4 | 8305.7 | 100.08 | 30.40 | 42.72 | 1469. |
| 195 | 31.89587 | 425.35 | 16.50 | −259.8 | 8518.8 | 101.19 | 30.23 | 42.50 | 1461. |
| 200 | 31.70344 | 420.84 | 16.07 | −101.1 | 8730.7 | 102.26 | 30.06 | 42.27 | 1453. |
| 210 | 31.32770 | 412.53 | 15.25 | 213.2 | 9151.0 | 104.31 | 29.71 | 41.78 | 1439. |
| 220 | 30.96378 | 404.99 | 14.51 | 523.5 | 9566.3 | 106.25 | 29.36 | 41.28 | 1426. |
| 230 | 30.61114 | 398.04 | 13.82 | 829.7 | 9976.7 | 108.07 | 29.02 | 40.80 | 1413. |
| 240 | 30.26916 | 391.60 | 13.19 | 1132.0 | 10382.3 | 109.80 | 28.69 | 40.33 | 1402. |
| 250 | 29.93721 | 385.59 | 12.61 | 1430.4 | 10783.3 | 111.43 | 28.37 | 39.88 | 1391. |
| 260 | 29.61468 | 379.95 | 12.08 | 1725.3 | 11180.0 | 112.99 | 28.07 | 39.46 | 1381. |
| 270 | 29.30099 | 374.65 | 11.59 | 2016.6 | 11572.6 | 114.47 | 27.78 | 39.06 | 1371. |
| 280 | 28.99562 | 369.66 | 11.14 | 2304.8 | 11961.4 | 115.89 | 27.51 | 38.69 | 1362. |
| 290 | 28.69807 | 364.97 | 10.72 | 2589.8 | 12346.5 | 117.24 | 27.25 | 38.34 | 1354. |
| 300 | 28.40792 | 360.54 | 10.33 | 2872.0 | 12728.4 | 118.53 | 27.01 | 38.02 | 1346. |
| 310 | 28.12476 | 356.36 | 9.97 | 3151.4 | 13107.0 | 119.77 | 26.79 | 37.72 | 1338. |
| 320 | 27.84824 | 352.43 | 9.63 | 3428.3 | 13482.8 | 120.97 | 26.57 | 37.44 | 1331. |
| 330 | 27.57801 | 348.72 | 9.32 | 3702.8 | 13855.8 | 122.11 | 26.37 | 37.18 | 1325. |
| 340 | 27.31380 | 345.23 | 9.02 | 3975.1 | 14226.4 | 123.22 | 26.19 | 36.93 | 1318. |
| 350 | 27.05532 | 341.93 | 8.74 | 4245.4 | 14594.5 | 124.29 | 26.02 | 36.70 | 1312. |
| 360 | 26.80233 | 338.83 | 8.48 | 4513.7 | 14960.5 | 125.32 | 25.85 | 36.49 | 1307. |
| 370 | 26.55460 | 335.91 | 8.24 | 4780.1 | 15324.5 | 126.32 | 25.70 | 36.30 | 1301. |
| 380 | 26.31192 | 333.17 | 8.00 | 5045.0 | 15686.5 | 127.28 | 25.56 | 36.12 | 1296. |
| 390 | 26.07411 | 330.58 | 7.78 | 5308.2 | 16046.8 | 128.22 | 25.44 | 35.95 | 1291. |
| 400 | 25.84097 | 328.15 | 7.58 | 5570.0 | 16405.5 | 129.13 | 25.32 | 35.79 | 1287. |
| 420 | 25.38808 | 323.72 | 7.19 | 6089.7 | 17118.5 | 130.86 | 25.11 | 35.51 | 1279. |
| 440 | 24.95206 | 319.81 | 6.84 | 6604.9 | 17826.4 | 132.51 | 24.93 | 35.28 | 1271. |
| 460 | 24.53185 | 316.37 | 6.53 | 7116.2 | 18529.9 | 134.07 | 24.79 | 35.08 | 1264. |
| 480 | 24.12651 | 313.35 | 6.24 | 7624.3 | 19229.8 | 135.56 | 24.67 | 34.91 | 1258. |
| 500 | 23.73521 | 310.71 | 5.97 | 8129.8 | 19926.7 | 136.99 | 24.58 | 34.78 | 1253. |
| 520 | 23.35717 | 308.42 | 5.73 | 8633.3 | 20621.0 | 138.35 | 24.52 | 34.67 | 1248. |
| 540 | 22.99171 | 306.43 | 5.51 | 9135.1 | 21313.4 | 139.65 | 24.47 | 34.58 | 1243. |
| 560 | 22.63819 | 304.73 | 5.30 | 9635.8 | 22004.3 | 140.91 | 24.44 | 34.51 | 1239. |
| 580 | 22.29601 | 303.28 | 5.11 | 10135.6 | 22693.9 | 142.12 | 24.43 | 34.46 | 1236. |
| 600 | 21.96465 | 302.06 | 4.93 | 10635.0 | 23382.8 | 143.29 | 24.44 | 34.43 | 1232. |
| 620 | 21.64358 | 301.05 | 4.76 | 11134.2 | 24071.1 | 144.42 | 24.45 | 34.41 | 1230. |
| 640 | 21.33234 | 300.23 | 4.60 | 11633.5 | 24759.1 | 145.51 | 24.48 | 34.40 | 1227. |
| 660 | 21.03049 | 299.58 | 4.45 | 12133.1 | 25447.1 | 146.57 | 24.52 | 34.40 | 1225. |
| 680 | 20.73760 | 299.09 | 4.31 | 12633.1 | 26135.2 | 147.60 | 24.57 | 34.41 | 1223. |
| 700 | 20.45330 | 298.75 | 4.18 | 13133.9 | 26823.6 | 148.59 | 24.62 | 34.43 | 1221. |
| 720 | 20.17721 | 298.55 | 4.06 | 13635.4 | 27512.5 | 149.56 | 24.68 | 34.46 | 1220. |
| 740 | 19.90898 | 298.46 | 3.95 | 14137.9 | 28201.9 | 150.51 | 24.75 | 34.49 | 1218. |
| 760 | 19.64829 | 298.49 | 3.84 | 14641.5 | 28892.1 | 151.43 | 24.82 | 34.53 | 1217. |
| 780 | 19.39483 | 298.62 | 3.73 | 15146.2 | 29583.0 | 152.33 | 24.89 | 34.57 | 1217. |
| 800 | 19.14830 | 298.85 | 3.63 | 15652.0 | 30274.7 | 153.20 | 24.97 | 34.61 | 1216. |
| 850 | 18.56052 | 299.79 | 3.41 | 16922.4 | 32008.2 | 155.30 | 25.17 | 34.73 | 1215. |
| 900 | 18.01039 | 301.19 | 3.21 | 18201.2 | 33747.8 | 157.29 | 25.38 | 34.86 | 1215. |
| 950 | 17.49440 | 302.96 | 3.03 | 19488.9 | 35494.0 | 159.18 | 25.59 | 34.99 | 1216. |
| 1000 | 17.00945 | 305.04 | 2.87 | 20785.3 | 37246.7 | 160.98 | 25.79 | 35.12 | 1218. |
| 1050 | 16.55279 | 307.38 | 2.73 | 22090.3 | 39005.9 | 162.69 | 25.99 | 35.25 | 1220. |
| 1100 | 16.12198 | 309.94 | 2.59 | 23403.7 | 40771.3 | 164.34 | 26.17 | 35.37 | 1223. |
| 1150 | 15.71485 | 312.68 | 2.48 | 24725.2 | 42542.7 | 165.91 | 26.35 | 35.49 | 1226. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1200 | 15.32944 | 315.57 | 2.37 | 26054.3 | 44319.8 | 167.42 | 26.53 | 35.60 | 1230. |
| | | | | 3000 bar Isobar | | | | | |
| * 113.729 | 35.49198 | 682.75 | 20.29 | −2819.5 | 5633.1 | 78.32 | 28.46 | 33.90 | 1704. |
| 114 | 35.48391 | 680.81 | 20.35 | −2812.2 | 5642.3 | 78.41 | 28.51 | 34.01 | 1703. |
| 116 | 35.42288 | 666.95 | 20.76 | −2758.0 | 5711.1 | 79.00 | 28.85 | 34.82 | 1695. |
| 118 | 35.35947 | 653.83 | 21.10 | −2702.7 | 5781.6 | 79.61 | 29.17 | 35.59 | 1688. |
| 120 | 35.29384 | 641.43 | 21.39 | −2646.6 | 5853.5 | 80.21 | 29.46 | 36.33 | 1680. |
| 122 | 35.22615 | 629.71 | 21.62 | −2589.5 | 5926.9 | 80.82 | 29.73 | 37.02 | 1673. |
| 124 | 35.15658 | 618.64 | 21.80 | −2531.7 | 6001.6 | 81.42 | 29.97 | 37.67 | 1666. |
| 126 | 35.08528 | 608.21 | 21.93 | −2473.1 | 6077.5 | 82.03 | 30.19 | 38.29 | 1659. |
| 128 | 35.01242 | 598.36 | 22.02 | −2413.7 | 6154.7 | 82.64 | 30.39 | 38.86 | 1652. |
| 130 | 34.93813 | 589.08 | 22.08 | −2353.7 | 6232.9 | 83.25 | 30.57 | 39.38 | 1646. |
| 132 | 34.86257 | 580.34 | 22.10 | −2293.0 | 6312.2 | 83.85 | 30.73 | 39.87 | 1639. |
| 134 | 34.78587 | 572.10 | 22.09 | −2231.8 | 6392.4 | 84.45 | 30.87 | 40.32 | 1633. |
| 136 | 34.70818 | 564.33 | 22.05 | −2170.1 | 6473.4 | 85.05 | 31.00 | 40.72 | 1627. |
| 138 | 34.62961 | 557.02 | 21.99 | −2107.9 | 6555.2 | 85.65 | 31.10 | 41.10 | 1621. |
| 140 | 34.55028 | 550.12 | 21.91 | −2045.2 | 6637.8 | 86.24 | 31.19 | 41.43 | 1615. |
| 142 | 34.47032 | 543.62 | 21.81 | −1982.2 | 6720.9 | 86.83 | 31.27 | 41.73 | 1609. |
| 144 | 34.38981 | 537.48 | 21.70 | −1918.8 | 6804.7 | 87.42 | 31.33 | 42.00 | 1604. |
| 146 | 34.30887 | 531.70 | 21.57 | −1855.2 | 6888.9 | 88.00 | 31.38 | 42.24 | 1598. |
| 148 | 34.22758 | 526.23 | 21.43 | −1791.3 | 6973.6 | 88.58 | 31.42 | 42.44 | 1593. |
| 150 | 34.14603 | 521.06 | 21.27 | −1727.1 | 7058.7 | 89.15 | 31.45 | 42.62 | 1588. |
| 155 | 33.94151 | 509.33 | 20.85 | −1566.0 | 7272.7 | 90.55 | 31.48 | 42.97 | 1575. |
| 160 | 33.73689 | 499.05 | 20.40 | −1404.2 | 7488.2 | 91.92 | 31.46 | 43.18 | 1564. |
| 165 | 33.53301 | 489.99 | 19.92 | −1242.0 | 7704.4 | 93.25 | 31.40 | 43.29 | 1553. |
| 170 | 33.33051 | 481.93 | 19.43 | −1079.9 | 7920.9 | 94.54 | 31.31 | 43.30 | 1542. |
| 175 | 33.12990 | 474.71 | 18.94 | −918.0 | 8137.3 | 95.80 | 31.19 | 43.25 | 1533. |
| 180 | 32.93153 | 468.17 | 18.46 | −756.5 | 8353.3 | 97.01 | 31.06 | 43.14 | 1524. |
| 185 | 32.73567 | 462.21 | 17.98 | −595.7 | 8568.6 | 98.19 | 30.91 | 42.99 | 1515. |
| 190 | 32.54248 | 456.73 | 17.52 | −435.6 | 8783.1 | 99.34 | 30.75 | 42.81 | 1507. |
| 195 | 32.35208 | 451.65 | 17.07 | −276.3 | 8996.7 | 100.45 | 30.58 | 42.60 | 1499. |
| 200 | 32.16452 | 446.90 | 16.64 | −117.9 | 9209.1 | 101.52 | 30.41 | 42.38 | 1491. |
| 210 | 31.79796 | 438.25 | 15.82 | 196.1 | 9630.6 | 103.58 | 30.06 | 41.91 | 1477. |
| 220 | 31.44267 | 430.46 | 15.06 | 506.1 | 10047.3 | 105.52 | 29.70 | 41.42 | 1464. |
| 230 | 31.09823 | 423.34 | 14.36 | 812.2 | 10459.1 | 107.35 | 29.35 | 40.94 | 1452. |
| 240 | 30.76410 | 416.76 | 13.72 | 1114.4 | 10866.0 | 109.08 | 29.01 | 40.46 | 1440. |
| 250 | 30.43970 | 410.62 | 13.13 | 1412.8 | 11268.4 | 110.72 | 28.69 | 40.01 | 1430. |
| 260 | 30.12447 | 404.87 | 12.59 | 1707.7 | 11666.3 | 112.28 | 28.37 | 39.58 | 1420. |
| 270 | 29.81783 | 399.47 | 12.08 | 1999.0 | 12060.1 | 113.77 | 28.08 | 39.18 | 1411. |
| 280 | 29.51929 | 394.37 | 11.62 | 2287.2 | 12450.0 | 115.19 | 27.80 | 38.80 | 1402. |
| 290 | 29.22835 | 389.55 | 11.19 | 2572.2 | 12836.2 | 116.54 | 27.53 | 38.45 | 1393. |
| 300 | 28.94459 | 385.00 | 10.79 | 2854.4 | 13219.0 | 117.84 | 27.28 | 38.11 | 1386. |
| 310 | 28.66761 | 380.69 | 10.42 | 3133.8 | 13598.6 | 119.09 | 27.05 | 37.81 | 1378. |
| 320 | 28.39705 | 376.62 | 10.07 | 3410.7 | 13975.2 | 120.28 | 26.83 | 37.52 | 1371. |
| 330 | 28.13258 | 372.77 | 9.75 | 3685.2 | 14349.0 | 121.43 | 26.62 | 37.25 | 1365. |
| 340 | 27.87391 | 369.13 | 9.44 | 3957.5 | 14720.2 | 122.54 | 26.43 | 37.00 | 1358. |
| 350 | 27.62077 | 365.69 | 9.16 | 4227.7 | 15089.1 | 123.61 | 26.25 | 36.77 | 1352. |
| 360 | 27.37291 | 362.43 | 8.89 | 4495.9 | 15455.7 | 124.64 | 26.08 | 36.55 | 1347. |
| 370 | 27.13010 | 359.35 | 8.64 | 4762.4 | 15820.2 | 125.64 | 25.92 | 36.36 | 1341. |
| 380 | 26.89215 | 356.45 | 8.40 | 5027.2 | 16182.8 | 126.61 | 25.77 | 36.17 | 1336. |
| 390 | 26.65885 | 353.70 | 8.17 | 5290.4 | 16543.7 | 127.55 | 25.64 | 36.00 | 1331. |
| 400 | 26.43004 | 351.11 | 7.96 | 5552.1 | 16902.9 | 128.46 | 25.51 | 35.84 | 1327. |
| 420 | 25.98523 | 346.36 | 7.56 | 6071.8 | 17616.8 | 130.20 | 25.29 | 35.56 | 1318. |
| 440 | 25.55655 | 342.13 | 7.20 | 6586.8 | 18325.5 | 131.85 | 25.11 | 35.32 | 1311. |
| 460 | 25.14298 | 338.38 | 6.87 | 7098.0 | 19029.8 | 133.41 | 24.96 | 35.12 | 1304. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 480 | 24.74362 | 335.07 | 6.58 | 7606.1 | 19730.4 | 134.90 | 24.83 | 34.95 | 1298. |
| 500 | 24.35766 | 332.14 | 6.30 | 8111.5 | 20428.0 | 136.33 | 24.73 | 34.81 | 1292. |
| 520 | 23.98437 | 329.56 | 6.05 | 8614.9 | 21123.1 | 137.69 | 24.66 | 34.70 | 1287. |
| 540 | 23.62310 | 327.31 | 5.82 | 9116.8 | 21816.2 | 139.00 | 24.61 | 34.61 | 1282. |
| 560 | 23.27325 | 325.35 | 5.60 | 9617.4 | 22507.7 | 140.25 | 24.57 | 34.55 | 1278. |
| 580 | 22.93427 | 323.65 | 5.40 | 10117.2 | 23198.1 | 141.47 | 24.56 | 34.50 | 1274. |
| 600 | 22.60563 | 322.19 | 5.21 | 10616.6 | 23887.7 | 142.63 | 24.56 | 34.46 | 1270. |
| 620 | 22.28688 | 320.96 | 5.04 | 11115.9 | 24576.7 | 143.76 | 24.57 | 34.44 | 1267. |
| 640 | 21.97756 | 319.92 | 4.87 | 11615.2 | 25265.5 | 144.86 | 24.60 | 34.44 | 1265. |
| 660 | 21.67727 | 319.07 | 4.72 | 12114.9 | 25954.3 | 145.92 | 24.63 | 34.44 | 1262. |
| 680 | 21.38560 | 318.39 | 4.58 | 12615.1 | 26643.2 | 146.95 | 24.67 | 34.45 | 1260. |
| 700 | 21.10221 | 317.87 | 4.44 | 13115.9 | 27332.5 | 147.94 | 24.72 | 34.47 | 1258. |
| 720 | 20.82673 | 317.48 | 4.31 | 13617.7 | 28022.2 | 148.92 | 24.78 | 34.50 | 1256. |
| 740 | 20.55886 | 317.23 | 4.19 | 14120.3 | 28712.6 | 149.86 | 24.84 | 34.54 | 1255. |
| 760 | 20.29828 | 317.10 | 4.08 | 14624.1 | 29403.7 | 150.78 | 24.91 | 34.57 | 1253. |
| 780 | 20.04469 | 317.08 | 3.97 | 15129.0 | 30095.5 | 151.68 | 24.98 | 34.61 | 1252. |
| 800 | 19.79784 | 317.16 | 3.86 | 15635.1 | 30788.3 | 152.56 | 25.06 | 34.66 | 1251. |
| 850 | 19.20842 | 317.77 | 3.63 | 16906.1 | 32524.3 | 154.66 | 25.25 | 34.78 | 1250. |
| 900 | 18.65567 | 318.86 | 3.42 | 18185.7 | 34266.6 | 156.66 | 25.45 | 34.91 | 1250. |
| 950 | 18.13628 | 320.37 | 3.23 | 19474.2 | 36015.6 | 158.55 | 25.66 | 35.05 | 1250. |
| 1000 | 17.64731 | 322.21 | 3.06 | 20771.5 | 37771.3 | 160.35 | 25.85 | 35.18 | 1251. |
| 1050 | 17.18614 | 324.34 | 2.91 | 22077.6 | 39533.5 | 162.07 | 26.05 | 35.31 | 1253. |
| 1100 | 16.75042 | 326.71 | 2.77 | 23392.0 | 41302.0 | 163.71 | 26.23 | 35.43 | 1255. |
| 1150 | 16.33809 | 329.28 | 2.64 | 24714.6 | 43076.6 | 165.29 | 26.41 | 35.55 | 1258. |
| 1200 | 15.94725 | 332.02 | 2.53 | 26044.8 | 44856.8 | 166.81 | 26.58 | 35.66 | 1261. |
| | | | | 3200 bar Isobar | | | | | |
| * 116.458 | 35.69959 | 711.31 | 20.24 | −2729.2 | 6234.5 | 78.67 | 28.54 | 33.81 | 1734. |
| 118 | 35.65500 | 700.39 | 20.57 | −2687.8 | 6287.1 | 79.12 | 28.83 | 34.43 | 1728. |
| 120 | 35.59513 | 686.87 | 20.94 | −2633.2 | 6356.8 | 79.70 | 29.17 | 35.21 | 1721. |
| 122 | 35.53311 | 674.07 | 21.25 | −2577.7 | 6428.0 | 80.29 | 29.48 | 35.96 | 1713. |
| 124 | 35.46909 | 661.96 | 21.50 | −2521.3 | 6500.6 | 80.88 | 29.77 | 36.66 | 1706. |
| 126 | 35.40323 | 650.50 | 21.71 | −2464.2 | 6574.6 | 81.47 | 30.04 | 37.32 | 1699. |
| 128 | 35.33567 | 639.67 | 21.86 | −2406.2 | 6649.8 | 82.07 | 30.28 | 37.94 | 1692. |
| 130 | 35.26656 | 629.43 | 21.98 | −2347.5 | 6726.3 | 82.66 | 30.49 | 38.52 | 1685. |
| 132 | 35.19603 | 619.77 | 22.06 | −2288.1 | 6803.9 | 83.25 | 30.69 | 39.05 | 1678. |
| 134 | 35.12423 | 610.65 | 22.10 | −2228.0 | 6882.5 | 83.84 | 30.86 | 39.55 | 1671. |
| 136 | 35.05128 | 602.04 | 22.12 | −2167.4 | 6962.1 | 84.43 | 31.01 | 40.01 | 1665. |
| 138 | 34.97732 | 593.91 | 22.11 | −2106.3 | 7042.5 | 85.02 | 31.15 | 40.43 | 1659. |
| 140 | 34.90244 | 586.24 | 22.07 | −2044.7 | 7123.7 | 85.60 | 31.27 | 40.81 | 1653. |
| 142 | 34.82678 | 579.01 | 22.01 | −1982.6 | 7205.7 | 86.18 | 31.37 | 41.16 | 1647. |
| 144 | 34.75044 | 572.18 | 21.93 | −1920.1 | 7288.4 | 86.76 | 31.45 | 41.48 | 1641. |
| 146 | 34.67352 | 565.73 | 21.83 | −1857.3 | 7371.6 | 87.34 | 31.53 | 41.76 | 1636. |
| 148 | 34.59611 | 559.63 | 21.72 | −1794.2 | 7455.4 | 87.91 | 31.58 | 42.01 | 1630. |
| 150 | 34.51830 | 553.87 | 21.60 | −1730.8 | 7539.6 | 88.47 | 31.63 | 42.23 | 1625. |
| 155 | 34.32256 | 540.80 | 21.24 | −1571.4 | 7751.9 | 89.86 | 31.70 | 42.67 | 1612. |
| 160 | 34.12597 | 529.38 | 20.83 | −1410.9 | 7966.1 | 91.22 | 31.71 | 42.97 | 1600. |
| 165 | 33.92944 | 519.34 | 20.38 | −1249.9 | 8181.4 | 92.55 | 31.67 | 43.14 | 1589. |
| 170 | 33.73370 | 510.46 | 19.92 | −1088.7 | 8397.3 | 93.84 | 31.60 | 43.22 | 1579. |
| 175 | 33.53933 | 502.54 | 19.45 | −927.6 | 8613.4 | 95.09 | 31.50 | 43.21 | 1569. |
| 180 | 33.34676 | 495.42 | 18.98 | −766.8 | 8829.3 | 96.31 | 31.37 | 43.15 | 1559. |
| 185 | 33.15630 | 488.98 | 18.51 | −606.5 | 9044.8 | 97.49 | 31.23 | 43.03 | 1551. |
| 190 | 32.96819 | 483.10 | 18.06 | −446.8 | 9259.6 | 98.63 | 31.08 | 42.87 | 1542. |
| 195 | 32.78259 | 477.68 | 17.61 | −287.8 | 9473.5 | 99.74 | 30.91 | 42.69 | 1535. |
| 200 | 32.59959 | 472.66 | 17.17 | −129.6 | 9686.4 | 100.82 | 30.74 | 42.49 | 1527. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 210 | 32.24159 | 463.59 | 16.35 | 184.0 | 10109.1 | 102.88 | 30.39 | 42.03 | 1513. |
| 220 | 31.89424 | 455.51 | 15.58 | 493.9 | 10527.0 | 104.83 | 30.03 | 41.56 | 1500. |
| 230 | 31.55728 | 448.18 | 14.88 | 799.9 | 10940.2 | 106.67 | 29.67 | 41.07 | 1488. |
| 240 | 31.23028 | 441.44 | 14.22 | 1102.1 | 11348.6 | 108.40 | 29.32 | 40.60 | 1477. |
| 250 | 30.91272 | 435.18 | 13.62 | 1400.5 | 11752.3 | 110.05 | 28.99 | 40.14 | 1467. |
| 260 | 30.60406 | 429.32 | 13.07 | 1695.4 | 12151.5 | 111.62 | 28.67 | 39.71 | 1457. |
| 270 | 30.30379 | 423.82 | 12.56 | 1986.8 | 12546.5 | 113.11 | 28.36 | 39.30 | 1448. |
| 280 | 30.01140 | 418.62 | 12.08 | 2275.0 | 12937.6 | 114.53 | 28.07 | 38.91 | 1439. |
| 290 | 29.72643 | 413.71 | 11.64 | 2560.1 | 13324.9 | 115.89 | 27.80 | 38.55 | 1431. |
| 300 | 29.44845 | 409.05 | 11.23 | 2842.2 | 13708.7 | 117.19 | 27.54 | 38.21 | 1423. |
| 310 | 29.17706 | 404.64 | 10.85 | 3121.7 | 14089.2 | 118.44 | 27.30 | 37.90 | 1416. |
| 320 | 28.91192 | 400.45 | 10.50 | 3398.6 | 14466.7 | 119.64 | 27.07 | 37.60 | 1409. |
| 330 | 28.65269 | 396.48 | 10.16 | 3673.1 | 14841.4 | 120.79 | 26.86 | 37.33 | 1403. |
| 340 | 28.39908 | 392.72 | 9.85 | 3945.4 | 15213.4 | 121.90 | 26.65 | 37.08 | 1396. |
| 350 | 28.15082 | 389.14 | 9.56 | 4215.6 | 15583.0 | 122.97 | 26.47 | 36.84 | 1391. |
| 360 | 27.90767 | 385.76 | 9.28 | 4483.9 | 15950.3 | 124.01 | 26.29 | 36.62 | 1385. |
| 370 | 27.66940 | 382.54 | 9.02 | 4750.3 | 16315.4 | 125.01 | 26.13 | 36.42 | 1380. |
| 380 | 27.43582 | 379.50 | 8.78 | 5015.0 | 16678.6 | 125.98 | 25.98 | 36.23 | 1375. |
| 390 | 27.20672 | 376.61 | 8.55 | 5278.2 | 17040.0 | 126.91 | 25.84 | 36.05 | 1370. |
| 400 | 26.98193 | 373.87 | 8.33 | 5540.0 | 17399.7 | 127.83 | 25.71 | 35.89 | 1365. |
| 420 | 26.54469 | 368.83 | 7.92 | 6059.5 | 18114.6 | 129.57 | 25.47 | 35.60 | 1357. |
| 440 | 26.12293 | 364.32 | 7.55 | 6574.5 | 18824.2 | 131.22 | 25.28 | 35.36 | 1349. |
| 460 | 25.71567 | 360.28 | 7.21 | 7085.6 | 19529.4 | 132.79 | 25.12 | 35.16 | 1342. |
| 480 | 25.32204 | 356.68 | 6.90 | 7593.5 | 20230.8 | 134.28 | 24.99 | 34.99 | 1335. |
| 500 | 24.94125 | 353.48 | 6.62 | 8098.9 | 20929.1 | 135.71 | 24.88 | 34.85 | 1329. |
| 520 | 24.57260 | 350.65 | 6.36 | 8602.2 | 21624.9 | 137.07 | 24.80 | 34.74 | 1324. |
| 540 | 24.21548 | 348.14 | 6.12 | 9103.9 | 22318.6 | 138.38 | 24.74 | 34.65 | 1319. |
| 560 | 23.86931 | 345.93 | 5.90 | 9604.5 | 23010.9 | 139.64 | 24.70 | 34.58 | 1315. |
| 580 | 23.53357 | 343.99 | 5.69 | 10104.3 | 23701.9 | 140.85 | 24.68 | 34.53 | 1311. |
| 600 | 23.20777 | 342.31 | 5.49 | 10603.7 | 24392.2 | 142.02 | 24.68 | 34.50 | 1307. |
| 620 | 22.89146 | 340.86 | 5.31 | 11102.9 | 25081.9 | 143.15 | 24.68 | 34.48 | 1304. |
| 640 | 22.58422 | 339.62 | 5.14 | 11602.3 | 25771.4 | 144.25 | 24.70 | 34.47 | 1301. |
| 660 | 22.28568 | 338.57 | 4.98 | 12101.9 | 26460.9 | 145.31 | 24.73 | 34.48 | 1298. |
| 680 | 21.99545 | 337.70 | 4.83 | 12602.2 | 27150.6 | 146.34 | 24.77 | 34.49 | 1296. |
| 700 | 21.71320 | 336.99 | 4.69 | 13103.1 | 27840.7 | 147.34 | 24.82 | 34.51 | 1293. |
| 720 | 21.43861 | 336.43 | 4.56 | 13604.9 | 28531.2 | 148.31 | 24.88 | 34.54 | 1291. |
| 740 | 21.17136 | 336.01 | 4.43 | 14107.7 | 29222.4 | 149.26 | 24.94 | 34.58 | 1290. |
| 760 | 20.91117 | 335.72 | 4.31 | 14611.5 | 29914.4 | 150.18 | 25.00 | 34.62 | 1288. |
| 780 | 20.65777 | 335.55 | 4.20 | 15116.6 | 30607.1 | 151.08 | 25.07 | 34.66 | 1287. |
| 800 | 20.41089 | 335.49 | 4.09 | 15622.8 | 31300.7 | 151.96 | 25.14 | 34.71 | 1286. |
| 850 | 19.82064 | 335.76 | 3.84 | 16894.3 | 33039.1 | 154.06 | 25.33 | 34.83 | 1284. |
| 900 | 19.26612 | 336.56 | 3.62 | 18174.5 | 34784.0 | 156.06 | 25.53 | 34.96 | 1283. |
| 950 | 18.74418 | 337.80 | 3.42 | 19463.6 | 36535.6 | 157.95 | 25.72 | 35.10 | 1283. |
| 1000 | 18.25203 | 339.41 | 3.25 | 20761.7 | 38294.0 | 159.76 | 25.92 | 35.23 | 1283. |
| 1050 | 17.78717 | 341.32 | 3.09 | 22068.5 | 40059.0 | 161.48 | 26.11 | 35.37 | 1285. |
| 1100 | 17.34738 | 343.50 | 2.94 | 23383.8 | 41830.4 | 163.13 | 26.29 | 35.49 | 1287. |
| 1150 | 16.93064 | 345.90 | 2.81 | 24707.3 | 43607.9 | 164.71 | 26.47 | 35.61 | 1289. |
| 1200 | 16.53516 | 348.49 | 2.69 | 26038.4 | 45391.1 | 166.22 | 26.63 | 35.72 | 1292. |
| | | | | 3400 bar Isobar | | | | | |
| * 119.137 | 35.90068 | 739.50 | 20.17 | −2638.1 | 6832.4 | 79.00 | 28.66 | 33.74 | 1763. |
| 120 | 35.87692 | 733.28 | 20.36 | −2615.1 | 6861.7 | 79.25 | 28.82 | 34.09 | 1760. |
| 122 | 35.82030 | 719.41 | 20.75 | −2561.1 | 6930.7 | 79.82 | 29.19 | 34.88 | 1752. |
| 124 | 35.76159 | 706.24 | 21.08 | −2506.2 | 7001.2 | 80.39 | 29.52 | 35.62 | 1744. |
| 126 | 35.70093 | 693.76 | 21.36 | −2450.4 | 7073.2 | 80.97 | 29.83 | 36.33 | 1737. |
| 128 | 35.63847 | 681.93 | 21.59 | −2393.8 | 7146.5 | 81.54 | 30.11 | 37.00 | 1729. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 130 | 35.57435 | 670.74 | 21.77 | −2336.3 | 7221.1 | 82.12 | 30.36 | 37.62 | 1722. |
| 132 | 35.50870 | 660.14 | 21.91 | −2278.2 | 7296.9 | 82.70 | 30.59 | 38.21 | 1715. |
| 134 | 35.44164 | 650.11 | 22.01 | −2219.3 | 7373.9 | 83.28 | 30.80 | 38.75 | 1709. |
| 136 | 35.37331 | 640.63 | 22.08 | −2159.8 | 7451.9 | 83.86 | 30.99 | 39.26 | 1702. |
| 138 | 35.30383 | 631.67 | 22.11 | −2099.8 | 7530.9 | 84.43 | 31.15 | 39.72 | 1696. |
| 140 | 35.23332 | 623.20 | 22.12 | −2039.2 | 7610.8 | 85.01 | 31.30 | 40.15 | 1689. |
| 142 | 35.16187 | 615.19 | 22.11 | −1978.1 | 7691.5 | 85.58 | 31.42 | 40.55 | 1683. |
| 144 | 35.08962 | 607.63 | 22.07 | −1916.5 | 7772.9 | 86.15 | 31.53 | 40.90 | 1677. |
| 146 | 35.01665 | 600.48 | 22.01 | −1854.6 | 7855.1 | 86.72 | 31.63 | 41.23 | 1672. |
| 148 | 34.94306 | 593.72 | 21.93 | −1792.3 | 7937.8 | 87.28 | 31.71 | 41.52 | 1666. |
| 150 | 34.86894 | 587.32 | 21.83 | −1729.6 | 8021.2 | 87.84 | 31.77 | 41.79 | 1661. |
| 155 | 34.68188 | 572.81 | 21.54 | −1571.9 | 8231.5 | 89.22 | 31.88 | 42.32 | 1648. |
| 160 | 34.49323 | 560.13 | 21.19 | −1412.9 | 8444.1 | 90.57 | 31.93 | 42.70 | 1635. |
| 165 | 34.30396 | 549.01 | 20.78 | −1253.1 | 8658.3 | 91.89 | 31.92 | 42.95 | 1624. |
| 170 | 34.11489 | 539.21 | 20.36 | −1092.9 | 8873.4 | 93.17 | 31.87 | 43.09 | 1613. |
| 175 | 33.92664 | 530.50 | 19.91 | −932.6 | 9089.0 | 94.42 | 31.78 | 43.14 | 1603. |
| 180 | 33.73973 | 522.72 | 19.46 | −772.4 | 9304.7 | 95.64 | 31.67 | 43.12 | 1594. |
| 185 | 33.55453 | 515.72 | 19.00 | −612.6 | 9520.2 | 96.82 | 31.54 | 43.04 | 1585. |
| 190 | 33.37132 | 509.36 | 18.55 | −453.3 | 9735.1 | 97.96 | 31.39 | 42.92 | 1577. |
| 195 | 33.19033 | 503.56 | 18.11 | −294.7 | 9949.3 | 99.07 | 31.23 | 42.76 | 1569. |
| 200 | 33.01168 | 498.21 | 17.68 | −136.8 | 10162.6 | 100.16 | 31.06 | 42.57 | 1561. |
| 210 | 32.66174 | 488.63 | 16.86 | 176.5 | 10586.3 | 102.22 | 30.70 | 42.15 | 1547. |
| 220 | 32.32180 | 480.20 | 16.08 | 486.2 | 11005.5 | 104.17 | 30.34 | 41.69 | 1535. |
| 230 | 31.99176 | 472.62 | 15.37 | 792.2 | 11419.9 | 106.02 | 29.98 | 41.21 | 1523. |
| 240 | 31.67130 | 465.70 | 14.71 | 1094.4 | 11829.7 | 107.76 | 29.62 | 40.74 | 1512. |
| 250 | 31.35998 | 459.30 | 14.10 | 1392.9 | 12234.7 | 109.41 | 29.28 | 40.28 | 1502. |
| 260 | 31.05732 | 453.33 | 13.53 | 1687.8 | 12635.3 | 110.98 | 28.95 | 39.84 | 1492. |
| 270 | 30.76283 | 447.73 | 13.01 | 1979.3 | 13031.6 | 112.48 | 28.64 | 39.42 | 1483. |
| 280 | 30.47603 | 442.44 | 12.53 | 2267.6 | 13423.9 | 113.91 | 28.34 | 39.03 | 1475. |
| 290 | 30.19647 | 437.44 | 12.08 | 2552.7 | 13812.3 | 115.27 | 28.06 | 38.66 | 1467. |
| 300 | 29.92374 | 432.70 | 11.66 | 2835.0 | 14197.2 | 116.57 | 27.79 | 38.32 | 1459. |
| 310 | 29.65744 | 428.20 | 11.27 | 3114.5 | 14578.7 | 117.83 | 27.54 | 38.00 | 1452. |
| 320 | 29.39723 | 423.92 | 10.91 | 3391.5 | 14957.2 | 119.03 | 27.30 | 37.70 | 1445. |
| 330 | 29.14279 | 419.85 | 10.57 | 3666.0 | 15332.7 | 120.18 | 27.08 | 37.42 | 1439. |
| 340 | 28.89381 | 415.98 | 10.25 | 3938.3 | 15705.6 | 121.30 | 26.88 | 37.16 | 1433. |
| 350 | 28.65003 | 412.30 | 9.95 | 4208.5 | 16075.9 | 122.37 | 26.68 | 36.91 | 1427. |
| 360 | 28.41121 | 408.79 | 9.66 | 4476.8 | 16443.9 | 123.41 | 26.50 | 36.69 | 1421. |
| 370 | 28.17713 | 405.46 | 9.40 | 4743.2 | 16809.7 | 124.41 | 26.33 | 36.48 | 1416. |
| 380 | 27.94758 | 402.29 | 9.15 | 5007.9 | 17173.6 | 125.38 | 26.17 | 36.29 | 1411. |
| 390 | 27.72237 | 399.28 | 8.91 | 5271.1 | 17535.6 | 126.32 | 26.03 | 36.11 | 1406. |
| 400 | 27.50134 | 396.42 | 8.68 | 5532.8 | 17895.8 | 127.23 | 25.89 | 35.95 | 1402. |
| 420 | 27.07117 | 391.12 | 8.26 | 6052.3 | 18611.7 | 128.98 | 25.65 | 35.65 | 1393. |
| 440 | 26.65593 | 386.34 | 7.88 | 6567.1 | 19322.3 | 130.63 | 25.44 | 35.41 | 1385. |
| 460 | 26.25465 | 382.05 | 7.54 | 7078.2 | 20028.2 | 132.20 | 25.27 | 35.20 | 1378. |
| 480 | 25.86649 | 378.19 | 7.22 | 7586.0 | 20730.4 | 133.69 | 25.13 | 35.03 | 1372. |
| 500 | 25.49067 | 374.74 | 6.93 | 8091.3 | 21429.5 | 135.12 | 25.02 | 34.88 | 1366. |
| 520 | 25.12654 | 371.65 | 6.66 | 8594.5 | 22126.0 | 136.49 | 24.93 | 34.77 | 1360. |
| 540 | 24.77348 | 368.90 | 6.41 | 9096.1 | 22820.4 | 137.80 | 24.87 | 34.68 | 1355. |
| 560 | 24.43096 | 366.45 | 6.18 | 9596.6 | 23513.3 | 139.06 | 24.83 | 34.61 | 1350. |
| 580 | 24.09846 | 364.29 | 5.97 | 10096.3 | 24205.1 | 140.27 | 24.80 | 34.56 | 1346. |
| 600 | 23.77553 | 362.39 | 5.77 | 10595.6 | 24896.0 | 141.44 | 24.79 | 34.53 | 1342. |
| 620 | 23.46174 | 360.73 | 5.58 | 11094.7 | 25586.4 | 142.57 | 24.79 | 34.51 | 1339. |
| 640 | 23.15670 | 359.28 | 5.40 | 11594.0 | 26276.6 | 143.67 | 24.81 | 34.51 | 1336. |
| 660 | 22.86003 | 358.04 | 5.24 | 12093.7 | 26966.8 | 144.73 | 24.84 | 34.51 | 1333. |
| 680 | 22.57140 | 356.99 | 5.08 | 12593.9 | 27657.2 | 145.76 | 24.87 | 34.53 | 1330. |
| 700 | 22.29047 | 356.10 | 4.94 | 13094.8 | 28348.0 | 146.76 | 24.92 | 34.55 | 1328. |
| 720 | 22.01695 | 355.37 | 4.80 | 13596.6 | 29039.3 | 147.74 | 24.97 | 34.58 | 1326. |
| 740 | 21.75054 | 354.79 | 4.66 | 14099.4 | 29731.2 | 148.68 | 25.02 | 34.62 | 1324. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 760 | 21.49097 | 354.34 | 4.54 | 14603.3 | 30424.0 | 149.61 | 25.09 | 34.66 | 1322. |
| 780 | 21.23797 | 354.02 | 4.42 | 15108.5 | 31117.5 | 150.51 | 25.15 | 34.70 | 1320. |
| 800 | 20.99132 | 353.82 | 4.31 | 15614.8 | 31812.0 | 151.39 | 25.22 | 34.75 | 1319. |
| 850 | 20.40089 | 353.76 | 4.05 | 16886.6 | 33552.5 | 153.50 | 25.40 | 34.88 | 1317. |
| 900 | 19.84526 | 354.27 | 3.82 | 18167.1 | 35299.7 | 155.50 | 25.60 | 35.01 | 1315. |
| 950 | 19.32147 | 355.24 | 3.61 | 19456.7 | 37053.7 | 157.39 | 25.79 | 35.15 | 1315. |
| 1000 | 18.82684 | 356.61 | 3.43 | 20755.3 | 38814.7 | 159.20 | 25.98 | 35.29 | 1315. |
| 1050 | 18.35901 | 358.31 | 3.26 | 22062.8 | 40582.3 | 160.92 | 26.17 | 35.42 | 1316. |
| 1100 | 17.91583 | 360.30 | 3.11 | 23378.8 | 42356.4 | 162.57 | 26.35 | 35.54 | 1317. |
| 1150 | 17.49538 | 362.53 | 2.97 | 24702.9 | 44136.7 | 164.16 | 26.52 | 35.66 | 1319. |
| 1200 | 17.09592 | 364.96 | 2.84 | 26034.9 | 45922.7 | 165.68 | 26.68 | 35.78 | 1322. |
| | | | | 3600 bar Isobar | | | | | |
| * 121.768 | 36.09583 | 767.35 | 20.08 | −2546.4 | 7427.1 | 79.33 | 28.79 | 33.70 | 1791. |
| 122 | 36.08976 | 765.65 | 20.13 | −2540.2 | 7434.9 | 79.39 | 28.84 | 33.80 | 1790. |
| 124 | 36.03611 | 751.45 | 20.55 | −2486.7 | 7503.3 | 79.95 | 29.22 | 34.58 | 1782. |
| 126 | 35.98044 | 737.95 | 20.90 | −2432.2 | 7573.2 | 80.51 | 29.57 | 35.33 | 1774. |
| 128 | 35.92288 | 725.12 | 21.20 | −2376.9 | 7644.6 | 81.07 | 29.89 | 36.03 | 1767. |
| 130 | 35.86356 | 712.95 | 21.44 | −2320.7 | 7717.3 | 81.63 | 30.18 | 36.70 | 1759. |
| 132 | 35.80260 | 701.41 | 21.65 | −2263.8 | 7791.4 | 82.20 | 30.45 | 37.33 | 1752. |
| 134 | 35.74014 | 690.47 | 21.81 | −2206.1 | 7866.6 | 82.76 | 30.69 | 37.92 | 1745. |
| 136 | 35.67630 | 680.10 | 21.93 | −2147.7 | 7943.0 | 83.33 | 30.91 | 38.47 | 1738. |
| 138 | 35.61119 | 670.29 | 22.02 | −2088.7 | 8020.5 | 83.89 | 31.11 | 38.98 | 1732. |
| 140 | 35.54492 | 660.99 | 22.08 | −2029.1 | 8098.9 | 84.46 | 31.28 | 39.45 | 1725. |
| 142 | 35.47761 | 652.19 | 22.11 | −1969.0 | 8178.2 | 85.02 | 31.43 | 39.89 | 1719. |
| 144 | 35.40936 | 643.86 | 22.11 | −1908.4 | 8258.4 | 85.58 | 31.57 | 40.29 | 1713. |
| 146 | 35.34027 | 635.98 | 22.09 | −1847.3 | 8339.4 | 86.14 | 31.69 | 40.66 | 1707. |
| 148 | 35.27045 | 628.52 | 22.05 | −1785.8 | 8421.0 | 86.69 | 31.79 | 40.99 | 1701. |
| 150 | 35.19997 | 621.46 | 21.99 | −1723.9 | 8503.3 | 87.25 | 31.87 | 41.29 | 1695. |
| 155 | 35.02150 | 605.41 | 21.77 | −1567.9 | 8711.5 | 88.61 | 32.03 | 41.92 | 1682. |
| 160 | 34.84071 | 591.39 | 21.48 | −1410.4 | 8922.3 | 89.95 | 32.11 | 42.39 | 1669. |
| 165 | 34.65865 | 579.09 | 21.13 | −1251.9 | 9135.1 | 91.26 | 32.13 | 42.72 | 1658. |
| 170 | 34.47617 | 568.27 | 20.73 | −1092.7 | 9349.3 | 92.54 | 32.10 | 42.92 | 1647. |
| 175 | 34.29398 | 558.69 | 20.32 | −933.3 | 9564.2 | 93.79 | 32.04 | 43.03 | 1637. |
| 180 | 34.11265 | 550.16 | 19.89 | −773.8 | 9779.5 | 95.00 | 31.94 | 43.06 | 1627. |
| 185 | 33.93260 | 542.52 | 19.45 | −614.5 | 9994.7 | 96.18 | 31.82 | 43.02 | 1618. |
| 190 | 33.75419 | 535.62 | 19.02 | −455.7 | 10209.6 | 97.32 | 31.68 | 42.93 | 1610. |
| 195 | 33.57766 | 529.36 | 18.58 | −297.4 | 10424.0 | 98.44 | 31.52 | 42.80 | 1602. |
| 200 | 33.40320 | 523.63 | 18.16 | −139.8 | 10637.6 | 99.52 | 31.36 | 42.64 | 1594. |
| 210 | 33.06098 | 513.45 | 17.34 | 173.2 | 11062.1 | 101.59 | 31.00 | 42.25 | 1580. |
| 220 | 32.72804 | 504.60 | 16.56 | 482.7 | 11482.4 | 103.55 | 30.64 | 41.81 | 1568. |
| 230 | 32.40448 | 496.72 | 15.84 | 788.6 | 11898.2 | 105.39 | 30.27 | 41.34 | 1556. |
| 240 | 32.09008 | 489.58 | 15.17 | 1090.8 | 12309.2 | 107.14 | 29.91 | 40.87 | 1545. |
| 250 | 31.78452 | 483.03 | 14.55 | 1389.4 | 12715.7 | 108.80 | 29.56 | 40.41 | 1535. |
| 260 | 31.48736 | 476.94 | 13.98 | 1684.4 | 13117.6 | 110.38 | 29.23 | 39.97 | 1526. |
| 270 | 31.19816 | 471.23 | 13.45 | 1976.0 | 13515.2 | 111.88 | 28.90 | 39.55 | 1517. |
| 280 | 30.91647 | 465.86 | 12.95 | 2264.4 | 13908.7 | 113.31 | 28.60 | 39.15 | 1509. |
| 290 | 30.64186 | 460.79 | 12.50 | 2549.6 | 14298.3 | 114.68 | 28.31 | 38.78 | 1501. |
| 300 | 30.37392 | 455.97 | 12.07 | 2832.0 | 14684.3 | 115.99 | 28.03 | 38.43 | 1494. |
| 310 | 30.11227 | 451.39 | 11.67 | 3111.6 | 15066.9 | 117.24 | 27.78 | 38.10 | 1487. |
| 320 | 29.85658 | 447.03 | 11.30 | 3388.6 | 15446.3 | 118.45 | 27.53 | 37.79 | 1480. |
| 330 | 29.60651 | 442.87 | 10.95 | 3663.2 | 15822.7 | 119.60 | 27.30 | 37.50 | 1474. |
| 340 | 29.36179 | 438.91 | 10.63 | 3935.6 | 16196.4 | 120.72 | 27.09 | 37.24 | 1468. |
| 350 | 29.12213 | 435.14 | 10.32 | 4205.8 | 16567.6 | 121.80 | 26.89 | 36.99 | 1462. |
| 360 | 28.88731 | 431.54 | 10.03 | 4474.1 | 16936.3 | 122.83 | 26.70 | 36.76 | 1456. |
| 370 | 28.65709 | 428.10 | 9.76 | 4740.5 | 17302.9 | 123.84 | 26.53 | 36.55 | 1451. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 380 | 28.43128 | 424.83 | 9.50 | 5005.3 | 17667.4 | 124.81 | 26.36 | 36.35 | 1446. |
| 390 | 28.20968 | 421.71 | 9.26 | 5268.4 | 18030.0 | 125.75 | 26.21 | 36.17 | 1441. |
| 400 | 27.99214 | 418.74 | 9.03 | 5530.1 | 18390.8 | 126.67 | 26.07 | 36.00 | 1437. |
| 420 | 27.56858 | 413.21 | 8.60 | 6049.5 | 19107.8 | 128.42 | 25.82 | 35.70 | 1428. |
| 440 | 27.15947 | 408.20 | 8.21 | 6564.3 | 19819.3 | 130.07 | 25.60 | 35.45 | 1420. |
| 460 | 26.76386 | 403.66 | 7.85 | 7075.2 | 20526.2 | 131.64 | 25.43 | 35.24 | 1413. |
| 480 | 26.38090 | 399.57 | 7.53 | 7582.9 | 21229.2 | 133.14 | 25.28 | 35.06 | 1407. |
| 500 | 26.00986 | 395.88 | 7.23 | 8088.0 | 21929.0 | 134.57 | 25.16 | 34.92 | 1401. |
| 520 | 25.65008 | 392.56 | 6.96 | 8591.1 | 22626.2 | 135.93 | 25.07 | 34.80 | 1395. |
| 540 | 25.30098 | 389.58 | 6.70 | 9092.6 | 23321.3 | 137.24 | 25.00 | 34.71 | 1390. |
| 560 | 24.96203 | 386.91 | 6.46 | 9593.0 | 24014.9 | 138.51 | 24.95 | 34.65 | 1385. |
| 580 | 24.63275 | 384.53 | 6.24 | 10092.6 | 24707.3 | 139.72 | 24.91 | 34.60 | 1381. |
| 600 | 24.31270 | 382.42 | 6.03 | 10591.8 | 25398.8 | 140.89 | 24.90 | 34.56 | 1377. |
| 620 | 24.00146 | 380.56 | 5.84 | 11090.8 | 26089.9 | 142.03 | 24.90 | 34.55 | 1373. |
| 640 | 23.69868 | 378.92 | 5.66 | 11590.0 | 26780.7 | 143.12 | 24.91 | 34.54 | 1370. |
| 660 | 23.40398 | 377.49 | 5.49 | 12089.6 | 27471.6 | 144.19 | 24.93 | 34.55 | 1366. |
| 680 | 23.11705 | 376.25 | 5.33 | 12589.7 | 28162.7 | 145.22 | 24.97 | 34.56 | 1364. |
| 700 | 22.83757 | 375.19 | 5.17 | 13090.6 | 28854.1 | 146.22 | 25.01 | 34.59 | 1361. |
| 720 | 22.56526 | 374.30 | 5.03 | 13592.4 | 29546.1 | 147.19 | 25.05 | 34.62 | 1359. |
| 740 | 22.29984 | 373.56 | 4.89 | 14095.2 | 30238.8 | 148.14 | 25.11 | 34.65 | 1357. |
| 760 | 22.04106 | 372.96 | 4.77 | 14599.1 | 30932.3 | 149.07 | 25.17 | 34.69 | 1355. |
| 780 | 21.78867 | 372.49 | 4.64 | 15104.2 | 31626.6 | 149.97 | 25.23 | 34.74 | 1353. |
| 800 | 21.54242 | 372.15 | 4.53 | 15610.6 | 32321.8 | 150.85 | 25.30 | 34.79 | 1352. |
| 850 | 20.95232 | 371.76 | 4.26 | 16882.5 | 34064.4 | 152.96 | 25.48 | 34.92 | 1349. |
| 900 | 20.39615 | 371.97 | 4.02 | 18163.3 | 35813.7 | 154.96 | 25.66 | 35.06 | 1347. |
| 950 | 19.87108 | 372.69 | 3.80 | 19453.2 | 37570.0 | 156.86 | 25.85 | 35.20 | 1346. |
| 1000 | 19.37457 | 373.82 | 3.61 | 20752.2 | 39333.3 | 158.67 | 26.04 | 35.33 | 1346. |
| 1050 | 18.90435 | 375.31 | 3.44 | 22060.1 | 41103.4 | 160.40 | 26.22 | 35.47 | 1346. |
| 1100 | 18.45836 | 377.11 | 3.28 | 23376.7 | 42880.0 | 162.05 | 26.40 | 35.60 | 1347. |
| 1150 | 18.03477 | 379.16 | 3.13 | 24701.4 | 44662.9 | 163.64 | 26.57 | 35.72 | 1349. |
| 1200 | 17.63191 | 381.44 | 3.00 | 26034.0 | 46451.5 | 165.16 | 26.73 | 35.83 | 1351. |

3800 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 124.356 | 36.20554 | 794.87 | 19.98 | −2453.8 | 8018.7 | 79.64 | 28.94 | 33.68 | 1817. |
| 126 | 36.24353 | 782.99 | 20.32 | −2410.0 | 8074.6 | 80.09 | 29.26 | 34.32 | 1811. |
| 128 | 36.19066 | 769.18 | 20.69 | −2356.0 | 8144.0 | 80.64 | 29.62 | 35.06 | 1803. |
| 130 | 36.13596 | 756.04 | 21.01 | −2301.0 | 8214.8 | 81.18 | 29.96 | 35.77 | 1795. |
| 132 | 36.07953 | 743.56 | 21.28 | −2245.3 | 8287.0 | 81.74 | 30.26 | 36.44 | 1788. |
| 134 | 36.02151 | 731.69 | 21.50 | −2188.7 | 8360.5 | 82.29 | 30.54 | 37.06 | 1781. |
| 136 | 35.96201 | 720.43 | 21.69 | −2131.4 | 8435.3 | 82.84 | 30.79 | 37.65 | 1773. |
| 138 | 35.90114 | 709.75 | 21.83 | −2073.5 | 8511.1 | 83.40 | 31.02 | 38.21 | 1767. |
| 140 | 35.83902 | 699.61 | 21.94 | −2014.9 | 8588.1 | 83.95 | 31.22 | 38.72 | 1760. |
| 142 | 35.77574 | 690.00 | 22.02 | −1955.7 | 8666.0 | 84.50 | 31.40 | 39.20 | 1753. |
| 144 | 35.71141 | 680.89 | 22.07 | −1896.0 | 8744.8 | 85.05 | 31.56 | 39.64 | 1747. |
| 146 | 35.64614 | 672.25 | 22.09 | −1835.8 | 8824.5 | 85.60 | 31.71 | 40.05 | 1741. |
| 148 | 35.58001 | 664.07 | 22.09 | −1775.2 | 8905.0 | 86.15 | 31.83 | 40.42 | 1735. |
| 150 | 35.51312 | 656.32 | 22.07 | −1714.1 | 8986.2 | 86.70 | 31.94 | 40.76 | 1729. |
| 155 | 35.34313 | 638.65 | 21.93 | −1559.9 | 9191.9 | 88.04 | 32.14 | 41.48 | 1715. |
| 160 | 35.17014 | 623.20 | 21.70 | −1403.9 | 9400.7 | 89.37 | 32.26 | 42.04 | 1703. |
| 165 | 34.99524 | 609.64 | 21.40 | −1246.6 | 9612.0 | 90.67 | 32.32 | 42.44 | 1691. |
| 170 | 34.81932 | 597.71 | 21.06 | −1088.5 | 9824.9 | 91.94 | 32.31 | 42.72 | 1679. |
| 175 | 34.64315 | 587.17 | 20.68 | −930.0 | 10039.0 | 93.18 | 32.27 | 42.89 | 1669. |
| 180 | 34.46735 | 577.82 | 20.28 | −771.3 | 10253.7 | 94.39 | 32.19 | 42.97 | 1659. |
| 185 | 34.29240 | 569.46 | 19.86 | −612.6 | 10468.5 | 95.57 | 32.08 | 42.98 | 1650. |
| 190 | 34.11870 | 561.95 | 19.44 | −454.3 | 10683.3 | 96.72 | 31.95 | 42.92 | 1642. |
| 195 | 33.94655 | 555.17 | 19.02 | −296.4 | 10897.7 | 97.83 | 31.80 | 42.82 | 1634. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 200 | 33.77619 | 548.99 | 18.60 | −139.0 | 11111.5 | 98.91 | 31.64 | 42.69 | 1626. |
| 210 | 33.44142 | 538.12 | 17.79 | 173.5 | 11536.7 | 100.99 | 31.29 | 42.34 | 1612. |
| 220 | 33.11518 | 528.77 | 17.02 | 482.9 | 11958.0 | 102.95 | 30.93 | 41.92 | 1599. |
| 230 | 32.79775 | 520.54 | 16.29 | 788.7 | 12374.9 | 104.80 | 30.56 | 41.46 | 1588. |
| 240 | 32.48905 | 513.14 | 15.62 | 1091.0 | 12787.2 | 106.55 | 30.19 | 41.00 | 1577. |
| 250 | 32.18885 | 506.40 | 14.99 | 1389.6 | 13195.0 | 108.22 | 29.83 | 40.55 | 1567. |
| 260 | 31.89679 | 500.17 | 14.41 | 1684.8 | 13598.2 | 109.80 | 29.49 | 40.10 | 1558. |
| 270 | 31.61247 | 494.36 | 13.87 | 1976.5 | 13997.1 | 111.31 | 29.16 | 39.68 | 1550. |
| 280 | 31.33547 | 488.91 | 13.37 | 2265.0 | 14391.8 | 112.74 | 28.85 | 39.27 | 1541. |
| 290 | 31.06540 | 483.75 | 12.90 | 2550.4 | 14782.6 | 114.11 | 28.55 | 38.89 | 1534. |
| 300 | 30.80186 | 478.86 | 12.47 | 2832.8 | 15169.7 | 115.43 | 28.27 | 38.54 | 1527. |
| 310 | 30.54449 | 474.21 | 12.06 | 3112.5 | 15553.4 | 116.68 | 28.00 | 38.20 | 1520. |
| 320 | 30.29294 | 469.78 | 11.69 | 3389.6 | 15933.8 | 117.89 | 27.75 | 37.89 | 1513. |
| 330 | 30.04690 | 465.56 | 11.33 | 3664.3 | 16311.2 | 119.05 | 27.52 | 37.60 | 1507. |
| 340 | 29.80608 | 461.52 | 11.00 | 3936.7 | 16685.8 | 120.17 | 27.30 | 37.33 | 1501. |
| 350 | 29.57023 | 457.67 | 10.68 | 4207.0 | 17057.8 | 121.25 | 27.09 | 37.07 | 1495. |
| 360 | 29.33909 | 453.99 | 10.39 | 4475.3 | 17427.3 | 122.29 | 26.89 | 36.84 | 1490. |
| 370 | 29.11245 | 450.47 | 10.11 | 4741.8 | 17794.6 | 123.30 | 26.71 | 36.62 | 1485. |
| 380 | 28.89010 | 447.10 | 9.85 | 5006.5 | 18159.8 | 124.27 | 26.54 | 36.42 | 1480. |
| 390 | 28.67187 | 443.89 | 9.60 | 5269.7 | 18523.1 | 125.21 | 26.39 | 36.23 | 1475. |
| 400 | 28.45757 | 440.82 | 9.36 | 5531.3 | 18884.5 | 126.13 | 26.24 | 36.06 | 1471. |
| 420 | 28.04019 | 435.09 | 8.92 | 6050.7 | 19602.7 | 127.88 | 25.98 | 35.76 | 1462. |
| 440 | 27.63685 | 429.87 | 8.53 | 6565.4 | 20315.2 | 129.54 | 25.76 | 35.50 | 1454. |
| 460 | 27.24658 | 425.19 | 8.16 | 7076.2 | 21022.9 | 131.11 | 25.57 | 35.28 | 1447. |
| 480 | 26.86857 | 420.81 | 7.83 | 7583.8 | 21726.7 | 132.61 | 25.42 | 35.10 | 1440. |
| 500 | 26.50210 | 416.90 | 7.52 | 8088.8 | 22427.3 | 134.04 | 25.29 | 34.96 | 1434. |
| 520 | 26.14651 | 413.36 | 7.24 | 8591.7 | 23125.2 | 135.41 | 25.19 | 34.84 | 1429. |
| 540 | 25.80124 | 410.17 | 6.98 | 9093.1 | 23821.1 | 136.72 | 25.12 | 34.75 | 1423. |
| 560 | 25.46578 | 407.29 | 6.73 | 9593.3 | 24515.3 | 137.98 | 25.06 | 34.68 | 1418. |
| 580 | 25.13967 | 404.71 | 6.51 | 10092.8 | 25208.3 | 139.20 | 25.03 | 34.63 | 1414. |
| 600 | 24.82247 | 402.40 | 6.29 | 10591.8 | 25900.5 | 140.37 | 25.01 | 34.59 | 1410. |
| 620 | 24.51380 | 400.34 | 6.10 | 11090.7 | 26592.2 | 141.51 | 25.00 | 34.58 | 1406. |
| 640 | 24.21329 | 398.51 | 5.91 | 11589.8 | 27283.7 | 142.60 | 25.01 | 34.57 | 1402. |
| 660 | 23.92062 | 396.90 | 5.73 | 12089.3 | 27975.2 | 143.67 | 25.03 | 34.58 | 1399. |
| 680 | 23.63546 | 395.49 | 5.57 | 12589.3 | 28666.9 | 144.70 | 25.06 | 34.59 | 1396. |
| 700 | 23.35752 | 394.26 | 5.41 | 13090.1 | 29359.0 | 145.70 | 25.09 | 34.62 | 1393. |
| 720 | 23.08653 | 393.21 | 5.26 | 13591.8 | 30051.6 | 146.68 | 25.14 | 34.65 | 1391. |
| 740 | 22.82223 | 392.31 | 5.12 | 14094.6 | 30745.0 | 147.63 | 25.19 | 34.69 | 1389. |
| 760 | 22.56436 | 391.56 | 4.99 | 14598.4 | 31439.1 | 148.55 | 25.25 | 34.73 | 1387. |
| 780 | 22.31271 | 390.95 | 4.86 | 15103.5 | 32134.2 | 149.46 | 25.31 | 34.77 | 1385. |
| 800 | 22.06704 | 390.47 | 4.74 | 15609.9 | 32830.1 | 150.34 | 25.37 | 34.82 | 1383. |
| 850 | 21.47768 | 389.76 | 4.46 | 16881.8 | 34574.6 | 152.45 | 25.55 | 34.96 | 1380. |
| 900 | 20.92142 | 389.68 | 4.21 | 18162.7 | 36325.9 | 154.46 | 25.73 | 35.10 | 1378. |
| 950 | 20.39554 | 390.13 | 3.99 | 19452.8 | 38084.3 | 156.36 | 25.91 | 35.24 | 1376. |
| 1000 | 19.89764 | 391.03 | 3.79 | 20752.1 | 39849.8 | 158.17 | 26.10 | 35.38 | 1376. |
| 1050 | 19.42552 | 392.31 | 3.61 | 22060.3 | 41622.2 | 159.90 | 26.28 | 35.52 | 1376. |
| 1100 | 18.97724 | 393.91 | 3.44 | 23377.2 | 43401.2 | 161.55 | 26.45 | 35.64 | 1376. |
| 1150 | 18.55101 | 395.79 | 3.29 | 24702.5 | 45186.5 | 163.14 | 26.62 | 35.77 | 1378. |
| 1200 | 18.14523 | 397.91 | 3.15 | 26035.5 | 46977.7 | 164.66 | 26.78 | 35.88 | 1380. |
| | | | | 4000 bar Isobar | | | | | |
| * 126.901 | 36.47023 | 822.09 | 19.85 | −2360.5 | 8607.4 | 79.95 | 29.09 | 33.66 | 1843. |
| 128 | 36.44340 | 814.05 | 20.09 | −2331.3 | 8644.6 | 80.24 | 29.31 | 34.09 | 1838. |
| 130 | 36.39312 | 799.95 | 20.48 | −2277.5 | 8713.5 | 80.78 | 29.68 | 34.83 | 1830. |
| 132 | 36.34105 | 786.52 | 20.81 | −2222.9 | 8783.9 | 81.32 | 30.02 | 35.53 | 1823. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 134 | 36.28731 | 773.74 | 21.10 | −2167.5 | 8855.6 | 81.86 | 30.34 | 36.19 | 1815. |
| 136 | 36.23201 | 761.59 | 21.34 | −2111.3 | 8928.7 | 82.40 | 30.62 | 36.82 | 1808. |
| 138 | 36.17525 | 750.03 | 21.54 | −2054.4 | 9002.9 | 82.94 | 30.88 | 37.41 | 1801. |
| 140 | 36.11715 | 739.04 | 21.71 | −1996.8 | 9078.3 | 83.48 | 31.12 | 37.96 | 1794. |
| 142 | 36.05780 | 728.61 | 21.84 | −1938.6 | 9154.7 | 84.02 | 31.33 | 38.48 | 1787. |
| 144 | 35.99731 | 718.70 | 21.93 | −1879.8 | 9232.1 | 84.56 | 31.52 | 38.96 | 1781. |
| 146 | 35.93576 | 709.29 | 22.00 | −1820.5 | 9310.5 | 85.10 | 31.69 | 39.40 | 1774. |
| 148 | 35.87327 | 700.37 | 22.04 | −1760.6 | 9389.7 | 85.64 | 31.83 | 39.81 | 1768. |
| 150 | 35.80991 | 691.90 | 22.06 | −1700.4 | 9469.7 | 86.18 | 31.96 | 40.19 | 1762. |
| 155 | 35.64828 | 672.56 | 22.01 | −1547.9 | 9672.8 | 87.51 | 32.22 | 41.00 | 1748. |
| 160 | 35.48303 | 655.60 | 21.86 | −1393.5 | 9879.5 | 88.82 | 32.38 | 41.64 | 1735. |
| 165 | 35.31524 | 640.71 | 21.62 | −1237.6 | 10089.0 | 90.11 | 32.47 | 42.12 | 1723. |
| 170 | 35.14586 | 627.60 | 21.33 | −1080.7 | 10300.5 | 91.38 | 32.50 | 42.47 | 1711. |
| 175 | 34.97569 | 616.02 | 20.99 | −923.0 | 10513.5 | 92.61 | 32.48 | 42.70 | 1700. |
| 180 | 34.80539 | 605.75 | 20.62 | −765.1 | 10727.4 | 93.82 | 32.41 | 42.84 | 1691. |
| 185 | 34.63550 | 596.61 | 20.23 | −607.1 | 10941.7 | 94.99 | 32.32 | 42.89 | 1681. |
| 190 | 34.46648 | 588.43 | 19.83 | −449.3 | 11156.2 | 96.13 | 32.20 | 42.88 | 1673. |
| 195 | 34.29866 | 581.06 | 19.42 | −291.8 | 11370.5 | 97.25 | 32.06 | 42.82 | 1664. |
| 200 | 34.13232 | 574.38 | 19.02 | −134.8 | 11584.3 | 98.33 | 31.90 | 42.71 | 1657. |
| 210 | 33.80484 | 562.71 | 18.22 | 177.3 | 12010.0 | 100.41 | 31.56 | 42.40 | 1643. |
| 220 | 33.48508 | 552.78 | 17.45 | 486.5 | 12432.1 | 102.37 | 31.20 | 42.01 | 1630. |
| 230 | 33.17350 | 544.13 | 16.73 | 792.2 | 12850.1 | 104.23 | 30.83 | 41.58 | 1619. |
| 240 | 32.87020 | 536.43 | 16.05 | 1094.5 | 13263.6 | 105.99 | 30.46 | 41.13 | 1608. |
| 250 | 32.57504 | 529.47 | 15.42 | 1393.2 | 13672.6 | 107.66 | 30.10 | 40.67 | 1598. |
| 260 | 32.28774 | 523.08 | 14.83 | 1688.5 | 14077.1 | 109.25 | 29.75 | 40.23 | 1589. |
| 270 | 32.00796 | 517.15 | 14.28 | 1980.3 | 14477.2 | 110.76 | 29.41 | 39.80 | 1581. |
| 280 | 31.73532 | 511.59 | 13.77 | 2269.0 | 14873.2 | 112.20 | 29.09 | 39.40 | 1573. |
| 290 | 31.46945 | 506.36 | 13.30 | 2554.5 | 15265.2 | 113.57 | 28.78 | 39.01 | 1565. |
| 300 | 31.20997 | 501.40 | 12.86 | 2837.1 | 15653.5 | 114.89 | 28.50 | 38.65 | 1558. |
| 310 | 30.95653 | 496.69 | 12.44 | 3116.9 | 16038.2 | 116.15 | 28.22 | 38.31 | 1551. |
| 320 | 30.70880 | 492.20 | 12.06 | 3394.1 | 16419.7 | 117.36 | 27.96 | 37.99 | 1545. |
| 330 | 30.46647 | 487.91 | 11.70 | 3668.9 | 16798.1 | 118.52 | 27.72 | 37.69 | 1539. |
| 340 | 30.22927 | 483.81 | 11.36 | 3941.4 | 17173.6 | 119.65 | 27.50 | 37.41 | 1533. |
| 350 | 29.99692 | 479.89 | 11.04 | 4211.7 | 17546.4 | 120.73 | 27.28 | 37.16 | 1527. |
| 360 | 29.76919 | 476.14 | 10.74 | 4480.1 | 17916.8 | 121.77 | 27.08 | 36.92 | 1522. |
| 370 | 29.54587 | 472.55 | 10.45 | 4746.6 | 18284.8 | 122.78 | 26.90 | 36.70 | 1517. |
| 380 | 29.32675 | 469.11 | 10.18 | 5011.3 | 18650.8 | 123.75 | 26.72 | 36.49 | 1512. |
| 390 | 29.11164 | 465.81 | 9.93 | 5274.5 | 19014.7 | 124.70 | 26.56 | 36.30 | 1508. |
| 400 | 28.90037 | 462.66 | 9.69 | 5536.1 | 19376.8 | 125.62 | 26.41 | 36.12 | 1503. |
| 420 | 28.48877 | 456.75 | 9.24 | 6055.5 | 20096.1 | 127.37 | 26.14 | 35.81 | 1495. |
| 440 | 28.09084 | 451.35 | 8.83 | 6570.1 | 20809.6 | 129.03 | 25.91 | 35.55 | 1487. |
| 460 | 27.70563 | 446.40 | 8.46 | 7080.8 | 21518.3 | 130.61 | 25.71 | 35.33 | 1480. |
| 480 | 27.33232 | 441.89 | 8.12 | 7588.3 | 22223.0 | 132.11 | 25.55 | 35.15 | 1473. |
| 500 | 26.97019 | 437.78 | 7.81 | 8093.1 | 22924.3 | 133.54 | 25.42 | 35.00 | 1467. |
| 520 | 26.61862 | 434.04 | 7.52 | 8595.9 | 23623.0 | 134.91 | 25.32 | 34.88 | 1461. |
| 540 | 26.27705 | 430.65 | 7.25 | 9097.1 | 24319.5 | 136.22 | 25.23 | 34.78 | 1456. |
| 560 | 25.94499 | 427.58 | 7.00 | 9597.2 | 25014.4 | 137.49 | 25.17 | 34.71 | 1451. |
| 580 | 25.62197 | 424.80 | 6.77 | 10096.5 | 25708.1 | 138.70 | 25.13 | 34.66 | 1446. |
| 600 | 25.30758 | 422.30 | 6.55 | 10595.3 | 26400.9 | 139.88 | 25.11 | 34.63 | 1442. |
| 620 | 25.00145 | 420.06 | 6.35 | 11094.1 | 27093.2 | 141.01 | 25.10 | 34.61 | 1438. |
| 640 | 24.70324 | 418.05 | 6.15 | 11593.1 | 27785.3 | 142.11 | 25.10 | 34.60 | 1434. |
| 660 | 24.41261 | 416.27 | 5.97 | 12092.4 | 28477.4 | 143.18 | 25.12 | 34.61 | 1431. |
| 680 | 24.12927 | 414.69 | 5.80 | 12592.3 | 29169.7 | 144.21 | 25.15 | 34.62 | 1428. |
| 700 | 23.85293 | 413.30 | 5.64 | 13093.0 | 29862.4 | 145.21 | 25.18 | 34.65 | 1425. |
| 720 | 23.58333 | 412.08 | 5.49 | 13594.6 | 30555.7 | 146.19 | 25.22 | 34.68 | 1422. |
| 740 | 23.32023 | 411.03 | 5.34 | 14097.2 | 31249.7 | 147.14 | 25.27 | 34.72 | 1420. |
| 760 | 23.06339 | 410.14 | 5.20 | 14601.0 | 31944.5 | 148.07 | 25.33 | 34.76 | 1418. |
| 780 | 22.81258 | 409.39 | 5.07 | 15106.0 | 32640.2 | 148.97 | 25.38 | 34.81 | 1416. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 800 | 22.56760 | 408.77 | 4.95 | 15612.3 | 33336.8 | 149.85 | 25.45 | 34.86 | 1414. |
| 850 | 21.97933 | 407.75 | 4.66 | 16884.2 | 35083.1 | 151.97 | 25.61 | 34.99 | 1410. |
| 900 | 21.42335 | 407.38 | 4.41 | 18165.1 | 36836.3 | 153.97 | 25.79 | 35.14 | 1407. |
| 950 | 20.89706 | 407.57 | 4.18 | 19455.2 | 38596.7 | 155.88 | 25.97 | 35.28 | 1406. |
| 1000 | 20.39818 | 408.23 | 3.97 | 20754.6 | 40364.2 | 157.69 | 26.16 | 35.42 | 1405. |
| 1050 | 19.92460 | 409.30 | 3.78 | 22063.1 | 42138.8 | 159.42 | 26.33 | 35.56 | 1405. |
| 1100 | 19.47444 | 410.71 | 3.61 | 23380.3 | 43920.0 | 161.08 | 26.51 | 35.69 | 1405. |
| 1150 | 19.04600 | 412.42 | 3.45 | 24705.9 | 45707.6 | 162.67 | 26.67 | 35.81 | 1406. |
| 1200 | 18.63773 | 414.38 | 3.30 | 26039.4 | 47501.2 | 164.19 | 26.83 | 35.93 | 1407. |
| | | | | 4500 bar Isobar | | | | | |
| * 133.093 | 36.91239 | 888.90 | 19.48 | −2123.6 | 10067.4 | 80.70 | 29.47 | 33.64 | 1903. |
| 134 | 36.89235 | 882.16 | 19.68 | −2099.6 | 10098.0 | 80.93 | 29.65 | 33.97 | 1899. |
| 136 | 36.84690 | 867.79 | 20.08 | −2046.0 | 10166.7 | 81.44 | 30.02 | 34.68 | 1892. |
| 138 | 36.79983 | 854.05 | 20.43 | −1991.6 | 10236.7 | 81.95 | 30.37 | 35.35 | 1884. |
| 140 | 36.75125 | 840.94 | 20.73 | −1936.4 | 10308.1 | 82.46 | 30.68 | 35.98 | 1876. |
| 142 | 36.70124 | 828.44 | 21.00 | −1880.5 | 10380.6 | 82.98 | 30.97 | 36.58 | 1869. |
| 144 | 36.64989 | 816.51 | 21.22 | −1824.0 | 10454.4 | 83.49 | 31.23 | 37.14 | 1862. |
| 146 | 36.59729 | 805.14 | 21.41 | −1766.8 | 10529.2 | 84.01 | 31.46 | 37.67 | 1855. |
| 148 | 36.54353 | 794.30 | 21.57 | −1709.1 | 10605.0 | 84.53 | 31.68 | 38.17 | 1848. |
| 150 | 36.48869 | 783.98 | 21.70 | −1650.8 | 10681.8 | 85.04 | 31.87 | 38.63 | 1842. |
| 155 | 36.34741 | 760.29 | 21.89 | −1502.9 | 10877.6 | 86.33 | 32.26 | 39.65 | 1827. |
| 160 | 36.20110 | 739.35 | 21.95 | −1352.5 | 11078.1 | 87.60 | 32.53 | 40.49 | 1812. |
| 165 | 36.05087 | 720.84 | 21.89 | −1200.1 | 11282.2 | 88.85 | 32.72 | 41.16 | 1799. |
| 170 | 35.89770 | 704.49 | 21.75 | −1046.2 | 11489.4 | 90.09 | 32.83 | 41.69 | 1787. |
| 175 | 35.74246 | 690.02 | 21.53 | −891.2 | 11698.9 | 91.31 | 32.88 | 42.08 | 1776. |
| 180 | 35.58590 | 677.19 | 21.26 | −735.4 | 11910.0 | 92.50 | 32.87 | 42.36 | 1765. |
| 185 | 35.42866 | 665.79 | 20.96 | −579.2 | 12122.3 | 93.66 | 32.82 | 42.55 | 1755. |
| 190 | 35.27127 | 655.62 | 20.63 | −422.9 | 12335.4 | 94.79 | 32.74 | 42.65 | 1746. |
| 195 | 35.11419 | 646.52 | 20.27 | −266.6 | 12548.7 | 95.90 | 32.63 | 42.68 | 1738. |
| 200 | 34.95779 | 638.33 | 19.91 | −110.6 | 12762.1 | 96.98 | 32.49 | 42.66 | 1730. |
| 210 | 34.64813 | 624.23 | 19.17 | 200.2 | 13187.9 | 99.06 | 32.18 | 42.48 | 1715. |
| 220 | 34.34398 | 612.48 | 18.44 | 508.6 | 13611.3 | 101.03 | 31.83 | 42.18 | 1702. |
| 230 | 34.04631 | 602.48 | 17.73 | 814.0 | 14031.3 | 102.90 | 31.46 | 41.81 | 1691. |
| 240 | 33.75561 | 593.79 | 17.05 | 1116.3 | 14447.4 | 104.67 | 31.08 | 41.40 | 1680. |
| 250 | 33.47204 | 586.10 | 16.41 | 1415.1 | 14859.2 | 106.35 | 30.71 | 40.97 | 1671. |
| 260 | 33.19555 | 579.17 | 15.81 | 1710.7 | 15266.7 | 107.95 | 30.35 | 40.53 | 1662. |
| 270 | 32.92597 | 572.84 | 15.25 | 2002.9 | 15669.9 | 109.47 | 30.00 | 40.11 | 1654. |
| 280 | 32.66303 | 566.98 | 14.72 | 2291.8 | 16068.9 | 110.92 | 29.66 | 39.70 | 1646. |
| 290 | 32.40646 | 561.51 | 14.23 | 2577.7 | 16463.9 | 112.31 | 29.34 | 39.30 | 1639. |
| 300 | 32.15593 | 556.36 | 13.78 | 2860.7 | 16855.0 | 113.63 | 29.03 | 38.93 | 1632. |
| 310 | 31.91114 | 551.49 | 13.35 | 3140.9 | 17242.5 | 114.90 | 28.74 | 38.58 | 1625. |
| 320 | 31.67180 | 546.86 | 12.94 | 3418.4 | 17626.6 | 116.12 | 28.47 | 38.25 | 1619. |
| 330 | 31.43763 | 542.44 | 12.57 | 3693.4 | 18007.5 | 117.30 | 28.21 | 37.93 | 1614. |
| 340 | 31.20835 | 538.21 | 12.21 | 3966.2 | 18385.4 | 118.42 | 27.97 | 37.64 | 1608. |
| 350 | 30.98371 | 534.16 | 11.88 | 4236.7 | 18760.5 | 119.51 | 27.74 | 37.37 | 1603. |
| 360 | 30.76349 | 530.27 | 11.56 | 4505.2 | 19132.9 | 120.56 | 27.53 | 37.12 | 1598. |
| 370 | 30.54747 | 526.54 | 11.27 | 4771.8 | 19503.0 | 121.57 | 27.33 | 36.89 | 1593. |
| 380 | 30.33546 | 522.95 | 10.99 | 5036.7 | 19870.8 | 122.55 | 27.14 | 36.67 | 1588. |
| 390 | 30.12727 | 519.50 | 10.72 | 5299.9 | 20236.5 | 123.50 | 26.97 | 36.47 | 1584. |
| 400 | 29.92274 | 516.19 | 10.47 | 5561.5 | 20600.3 | 124.43 | 26.81 | 36.29 | 1579. |
| 420 | 29.52403 | 509.93 | 10.00 | 6080.8 | 21322.6 | 126.19 | 26.51 | 35.96 | 1571. |
| 440 | 29.13825 | 504.15 | 9.57 | 6595.3 | 22038.9 | 127.85 | 26.27 | 35.68 | 1564. |
| 460 | 28.76446 | 498.81 | 9.18 | 7105.8 | 22750.1 | 129.43 | 26.05 | 35.45 | 1556. |
| 480 | 28.40184 | 493.89 | 8.82 | 7613.0 | 23457.0 | 130.94 | 25.87 | 35.25 | 1550. |
| 500 | 28.04971 | 489.35 | 8.49 | 8117.5 | 24160.4 | 132.38 | 25.73 | 35.09 | 1544. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 520 | 27.70745 | 485.18 | 8.19 | 8619.9 | 24861.0 | 133.75 | 25.61 | 34.97 | 1538. |
| 540 | 27.37452 | 481.35 | 7.90 | 9120.6 | 25559.3 | 135.07 | 25.51 | 34.87 | 1532. |
| 560 | 27.05044 | 477.85 | 7.64 | 9620.2 | 26255.8 | 136.33 | 25.44 | 34.79 | 1527. |
| 580 | 26.73478 | 474.64 | 7.39 | 10119.1 | 26951.1 | 137.55 | 25.39 | 34.74 | 1523. |
| 600 | 26.42716 | 471.71 | 7.16 | 10617.5 | 27645.4 | 138.73 | 25.35 | 34.70 | 1518. |
| 620 | 26.12722 | 469.04 | 6.95 | 11115.8 | 28339.2 | 139.87 | 25.34 | 34.68 | 1514. |
| 640 | 25.83464 | 466.62 | 6.74 | 11614.3 | 29032.8 | 140.97 | 25.33 | 34.67 | 1510. |
| 660 | 25.54912 | 464.43 | 6.55 | 12113.2 | 29726.3 | 142.04 | 25.34 | 34.68 | 1506. |
| 680 | 25.27038 | 462.46 | 6.37 | 12612.6 | 30420.1 | 143.07 | 25.36 | 34.70 | 1503. |
| 700 | 24.99817 | 460.68 | 6.20 | 13112.9 | 31114.2 | 144.08 | 25.39 | 34.72 | 1500. |
| 720 | 24.73226 | 459.10 | 6.03 | 13614.1 | 31809.0 | 145.06 | 25.42 | 34.75 | 1497. |
| 740 | 24.47240 | 457.69 | 5.88 | 14116.4 | 32504.5 | 146.01 | 25.46 | 34.79 | 1494. |
| 760 | 24.21840 | 456.44 | 5.73 | 14619.8 | 33200.8 | 146.94 | 25.51 | 34.84 | 1492. |
| 780 | 23.97005 | 455.35 | 5.59 | 15124.5 | 33898.0 | 147.84 | 25.56 | 34.89 | 1489. |
| 800 | 23.72715 | 454.41 | 5.46 | 15630.6 | 34596.2 | 148.73 | 25.62 | 34.94 | 1487. |
| 850 | 23.14265 | 452.62 | 5.15 | 16901.8 | 36346.4 | 150.85 | 25.78 | 35.08 | 1483. |
| 900 | 22.58858 | 451.55 | 4.87 | 18182.3 | 38103.9 | 152.86 | 25.94 | 35.22 | 1479. |
| 950 | 22.06262 | 451.11 | 4.62 | 19472.3 | 39868.8 | 154.77 | 26.12 | 35.37 | 1477. |
| 1000 | 21.56270 | 451.19 | 4.40 | 20771.6 | 41641.0 | 156.58 | 26.29 | 35.52 | 1475. |
| 1050 | 21.08692 | 451.73 | 4.19 | 22080.2 | 43420.5 | 158.32 | 26.46 | 35.66 | 1474. |
| 1100 | 20.63358 | 452.66 | 4.01 | 23397.7 | 45206.8 | 159.98 | 26.63 | 35.79 | 1474. |
| 1150 | 20.20113 | 453.94 | 3.84 | 24723.7 | 46999.7 | 161.58 | 26.79 | 35.92 | 1474. |
| 1200 | 19.78814 | 455.51 | 3.68 | 26057.8 | 48798.7 | 163.11 | 26.94 | 36.04 | 1475. |
| | | | | 5000 bar Isobar | | | | | |
| * 139.065 | 37.33022 | 954.10 | 19.04 | −1882.1 | 11511.8 | 81.42 | 29.82 | 33.61 | 1959. |
| 140 | 37.31139 | 947.08 | 19.25 | −1857.3 | 11543.4 | 81.64 | 30.00 | 33.94 | 1956. |
| 142 | 37.26998 | 932.53 | 19.65 | −1803.6 | 11612.0 | 82.13 | 30.37 | 34.60 | 1948. |
| 144 | 37.22711 | 918.59 | 20.02 | −1749.3 | 11681.8 | 82.62 | 30.70 | 35.23 | 1940. |
| 146 | 37.18285 | 905.26 | 20.34 | −1694.2 | 11752.9 | 83.11 | 31.01 | 35.83 | 1932. |
| 148 | 37.13727 | 892.50 | 20.62 | −1638.4 | 11825.1 | 83.60 | 31.29 | 36.40 | 1925. |
| 150 | 37.09046 | 880.30 | 20.86 | −1582.1 | 11898.5 | 84.09 | 31.54 | 36.93 | 1918. |
| 155 | 36.96852 | 852.12 | 21.33 | −1438.8 | 12086.2 | 85.32 | 32.08 | 38.14 | 1902. |
| 160 | 36.84046 | 827.00 | 21.63 | −1292.5 | 12279.5 | 86.55 | 32.49 | 39.15 | 1886. |
| 165 | 36.70732 | 804.64 | 21.78 | −1143.8 | 12477.5 | 87.77 | 32.78 | 40.00 | 1872. |
| 170 | 36.57010 | 784.75 | 21.81 | −993.1 | 12679.3 | 88.97 | 32.99 | 40.69 | 1859. |
| 175 | 36.42966 | 767.06 | 21.75 | −840.9 | 12884.2 | 90.16 | 33.11 | 41.25 | 1847. |
| 180 | 36.28679 | 751.32 | 21.61 | −687.6 | 13091.5 | 91.33 | 33.18 | 41.68 | 1836. |
| 185 | 36.14220 | 737.30 | 21.42 | −533.5 | 13300.8 | 92.48 | 33.18 | 42.00 | 1825. |
| 190 | 35.99649 | 724.80 | 21.18 | −378.9 | 13511.3 | 93.60 | 33.15 | 42.22 | 1815. |
| 195 | 35.85019 | 713.61 | 20.90 | −224.1 | 13722.8 | 94.70 | 33.07 | 42.36 | 1806. |
| 200 | 35.70373 | 703.59 | 20.60 | −69.3 | 13934.9 | 95.77 | 32.97 | 42.44 | 1798. |
| 210 | 35.41179 | 686.42 | 19.95 | 239.7 | 14359.3 | 97.84 | 32.71 | 42.42 | 1783. |
| 220 | 35.12293 | 672.31 | 19.28 | 547.0 | 14782.7 | 99.81 | 32.38 | 42.24 | 1769. |
| 230 | 34.83864 | 660.51 | 18.60 | 851.8 | 15203.7 | 101.68 | 32.02 | 41.95 | 1758. |
| 240 | 34.55983 | 650.45 | 17.95 | 1153.8 | 15621.5 | 103.46 | 31.65 | 41.60 | 1747. |
| 250 | 34.28697 | 641.73 | 17.31 | 1452.7 | 16035.5 | 105.15 | 31.27 | 41.20 | 1737. |
| 260 | 34.02028 | 634.03 | 16.71 | 1748.4 | 16445.5 | 106.76 | 30.90 | 40.80 | 1729. |
| 270 | 33.75978 | 627.11 | 16.14 | 2040.9 | 16851.4 | 108.29 | 30.54 | 40.38 | 1721. |
| 280 | 33.50535 | 620.81 | 15.61 | 2330.2 | 17253.2 | 109.75 | 30.19 | 39.98 | 1713. |
| 290 | 33.25683 | 615.01 | 15.11 | 2616.5 | 17651.0 | 111.15 | 29.85 | 39.58 | 1706. |
| 300 | 33.01399 | 609.61 | 14.64 | 2899.8 | 18044.9 | 112.49 | 29.53 | 39.20 | 1700. |
| 310 | 32.77658 | 604.54 | 14.19 | 3180.3 | 18435.1 | 113.76 | 29.23 | 38.84 | 1694. |
| 320 | 32.54436 | 599.75 | 13.78 | 3458.2 | 18821.8 | 114.99 | 28.94 | 38.50 | 1688. |
| 330 | 32.31707 | 595.19 | 13.39 | 3733.5 | 19205.3 | 116.17 | 28.67 | 38.18 | 1682. |
| 340 | 32.09447 | 590.85 | 13.02 | 4006.5 | 19585.6 | 117.31 | 28.41 | 37.88 | 1677. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 350 | 31.87633 | 586.69 | 12.67 | 4277.3 | 19962.9 | 118.40 | 28.17 | 37.60 | 1672. |
| 360 | 31.66243 | 582.70 | 12.34 | 4546.0 | 20337.6 | 119.46 | 27.95 | 37.34 | 1667. |
| 370 | 31.45257 | 578.87 | 12.03 | 4812.8 | 20709.7 | 120.48 | 27.73 | 37.09 | 1662. |
| 380 | 31.24657 | 575.18 | 11.74 | 5077.8 | 21079.5 | 121.46 | 27.54 | 36.87 | 1658. |
| 390 | 31.04424 | 571.63 | 11.46 | 5341.1 | 21447.1 | 122.42 | 27.35 | 36.65 | 1654. |
| 400 | 30.84541 | 568.20 | 11.20 | 5602.8 | 21812.7 | 123.34 | 27.18 | 36.46 | 1650. |
| 420 | 30.45771 | 561.71 | 10.71 | 6122.1 | 22538.3 | 125.11 | 26.87 | 36.11 | 1642. |
| 440 | 30.08236 | 555.66 | 10.27 | 6636.5 | 23257.5 | 126.79 | 26.60 | 35.82 | 1634. |
| 460 | 29.71846 | 550.03 | 9.86 | 7146.8 | 23971.3 | 128.37 | 26.37 | 35.57 | 1627. |
| 480 | 29.36519 | 544.80 | 9.48 | 7653.7 | 24680.6 | 129.88 | 26.17 | 35.37 | 1621. |
| 500 | 29.02187 | 539.94 | 9.14 | 8157.8 | 25386.2 | 131.32 | 26.01 | 35.20 | 1615. |
| 520 | 28.68790 | 535.43 | 8.82 | 8659.8 | 26088.8 | 132.70 | 25.88 | 35.06 | 1609. |
| 540 | 28.36273 | 531.25 | 8.52 | 9160.1 | 26788.9 | 134.02 | 25.77 | 34.96 | 1604. |
| 560 | 28.04592 | 527.38 | 8.25 | 9659.3 | 27487.2 | 135.29 | 25.69 | 34.87 | 1599. |
| 580 | 27.73703 | 523.81 | 7.99 | 10157.6 | 28184.0 | 136.51 | 25.63 | 34.82 | 1594. |
| 600 | 27.43570 | 520.52 | 7.75 | 10655.5 | 28879.9 | 137.69 | 25.59 | 34.78 | 1589. |
| 620 | 27.14159 | 517.49 | 7.52 | 11153.3 | 29575.2 | 138.83 | 25.56 | 34.75 | 1585. |
| 640 | 26.85439 | 514.70 | 7.30 | 11651.2 | 30270.2 | 139.94 | 25.54 | 34.75 | 1581. |
| 660 | 26.57382 | 512.16 | 7.10 | 12149.6 | 30965.1 | 141.01 | 25.54 | 34.75 | 1577. |
| 680 | 26.29962 | 509.83 | 6.91 | 12648.5 | 31660.2 | 142.04 | 25.56 | 34.77 | 1573. |
| 700 | 26.03156 | 507.71 | 6.73 | 13148.3 | 32355.7 | 143.05 | 25.58 | 34.79 | 1570. |
| 720 | 25.76940 | 505.78 | 6.56 | 13649.0 | 33051.8 | 144.03 | 25.61 | 34.82 | 1567. |
| 740 | 25.51294 | 504.04 | 6.39 | 14150.8 | 33748.7 | 144.99 | 25.64 | 34.86 | 1564. |
| 760 | 25.26198 | 502.48 | 6.24 | 14653.7 | 34446.3 | 145.92 | 25.68 | 34.91 | 1561. |
| 780 | 25.01635 | 501.07 | 6.09 | 15158.0 | 35144.9 | 146.82 | 25.73 | 34.95 | 1559. |
| 800 | 24.77587 | 499.82 | 5.95 | 15663.6 | 35844.5 | 147.71 | 25.78 | 35.01 | 1556. |
| 850 | 24.19610 | 497.31 | 5.62 | 16933.9 | 37598.4 | 149.84 | 25.93 | 35.15 | 1551. |
| 900 | 23.64513 | 495.57 | 5.33 | 18213.5 | 39359.5 | 151.85 | 26.09 | 35.30 | 1547. |
| 950 | 23.12085 | 494.51 | 5.06 | 19502.8 | 41128.3 | 153.76 | 26.25 | 35.45 | 1544. |
| 1000 | 22.62135 | 494.03 | 4.82 | 20801.7 | 42904.7 | 155.58 | 26.42 | 35.60 | 1542. |
| 1050 | 22.14493 | 494.06 | 4.60 | 22110.0 | 44688.5 | 157.33 | 26.58 | 35.75 | 1540. |
| 1100 | 21.69002 | 494.52 | 4.40 | 23427.3 | 46479.4 | 158.99 | 26.74 | 35.89 | 1539. |
| 1150 | 21.25519 | 495.36 | 4.21 | 24753.2 | 48276.9 | 160.59 | 26.89 | 36.01 | 1539. |
| 1200 | 20.83915 | 496.53 | 4.04 | 26087.4 | 50080.7 | 162.12 | 27.04 | 36.14 | 1539. |

5500 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 144.839 | 37.72730 | 1017.85 | 18.55 | −1636.3 | 12942.0 | 82.11 | 30.12 | 33.56 | 2012. |
| 146 | 37.70589 | 1009.07 | 18.81 | −1605.4 | 12981.2 | 82.38 | 30.34 | 33.94 | 2007. |
| 148 | 37.66791 | 994.42 | 19.22 | −1551.6 | 13049.7 | 82.84 | 30.69 | 34.56 | 2000. |
| 150 | 37.62859 | 980.37 | 19.59 | −1497.2 | 13119.4 | 83.31 | 31.01 | 35.16 | 1992. |
| 155 | 37.52484 | 947.71 | 20.36 | −1358.3 | 13298.6 | 84.49 | 31.70 | 36.51 | 1974. |
| 160 | 37.41413 | 918.35 | 20.91 | −1216.2 | 13484.2 | 85.66 | 32.24 | 37.68 | 1957. |
| 165 | 37.29745 | 892.01 | 21.29 | −1071.2 | 13675.2 | 86.84 | 32.66 | 38.69 | 1942. |
| 170 | 37.17572 | 868.41 | 21.53 | −923.8 | 13870.8 | 88.01 | 32.97 | 39.53 | 1928. |
| 175 | 37.04981 | 847.29 | 21.64 | −774.6 | 14070.3 | 89.16 | 33.19 | 40.24 | 1915. |
| 180 | 36.92052 | 828.40 | 21.66 | −623.9 | 14272.9 | 90.31 | 33.33 | 40.81 | 1903. |
| 185 | 36.78855 | 811.50 | 21.60 | −472.2 | 14478.1 | 91.43 | 33.40 | 41.26 | 1892. |
| 190 | 36.65455 | 796.38 | 21.47 | −319.6 | 14685.4 | 92.54 | 33.42 | 41.61 | 1881. |
| 195 | 36.51909 | 782.83 | 21.30 | −166.5 | 14894.1 | 93.62 | 33.40 | 41.87 | 1872. |
| 200 | 36.38266 | 770.66 | 21.08 | −13.1 | 15103.9 | 94.68 | 33.34 | 42.05 | 1863. |
| 210 | 36.10860 | 749.87 | 20.56 | 293.6 | 15525.4 | 96.74 | 33.13 | 42.21 | 1847. |
| 220 | 35.83510 | 732.89 | 19.97 | 599.4 | 15947.5 | 98.70 | 32.84 | 42.17 | 1833. |
| 230 | 35.56411 | 718.83 | 19.36 | 903.3 | 16368.3 | 100.57 | 32.51 | 41.99 | 1820. |
| 240 | 35.29693 | 707.02 | 18.73 | 1204.8 | 16786.9 | 102.35 | 32.15 | 41.71 | 1810. |
| 250 | 35.03439 | 696.93 | 18.12 | 1503.5 | 17202.3 | 104.05 | 31.78 | 41.37 | 1800. |
| 260 | 34.77697 | 688.18 | 17.53 | 1799.2 | 17614.2 | 105.67 | 31.40 | 41.00 | 1791. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 270 | 34.52491 | 680.46 | 16.97 | 2091.8 | 18022.3 | 107.21 | 31.03 | 40.62 | 1783. |
| 280 | 34.27827 | 673.55 | 16.43 | 2381.4 | 18426.5 | 108.68 | 30.67 | 40.22 | 1776. |
| 290 | 34.03701 | 667.28 | 15.92 | 2667.9 | 18826.8 | 110.08 | 30.33 | 39.84 | 1769. |
| 300 | 33.80101 | 661.52 | 15.44 | 2951.6 | 19223.3 | 111.43 | 30.00 | 39.46 | 1763. |
| 310 | 33.57010 | 656.17 | 14.99 | 3232.5 | 19616.1 | 112.71 | 29.68 | 39.10 | 1757. |
| 320 | 33.34409 | 651.16 | 14.56 | 3510.7 | 20005.3 | 113.95 | 29.38 | 38.75 | 1751. |
| 330 | 33.12276 | 646.44 | 14.16 | 3786.3 | 20391.2 | 115.14 | 29.10 | 38.43 | 1746. |
| 340 | 32.90593 | 641.96 | 13.78 | 4059.6 | 20773.9 | 116.28 | 28.83 | 38.12 | 1741. |
| 350 | 32.69338 | 637.69 | 13.42 | 4330.6 | 21153.6 | 117.38 | 28.58 | 37.83 | 1736. |
| 360 | 32.48491 | 633.60 | 13.08 | 4599.5 | 21530.5 | 118.44 | 28.34 | 37.55 | 1731. |
| 370 | 32.28033 | 629.68 | 12.76 | 4866.5 | 21904.7 | 119.47 | 28.11 | 37.30 | 1727. |
| 380 | 32.07947 | 625.91 | 12.46 | 5131.6 | 22276.5 | 120.46 | 27.90 | 37.06 | 1723. |
| 390 | 31.88216 | 622.28 | 12.17 | 5395.0 | 22646.0 | 121.42 | 27.71 | 36.84 | 1719. |
| 400 | 31.68824 | 618.77 | 11.90 | 5656.8 | 23013.4 | 122.35 | 27.53 | 36.64 | 1715. |
| 420 | 31.30999 | 612.11 | 11.39 | 6176.2 | 23742.5 | 124.13 | 27.20 | 36.27 | 1707. |
| 440 | 30.94367 | 605.88 | 10.93 | 6690.5 | 24464.8 | 125.81 | 26.91 | 35.96 | 1700. |
| 460 | 30.58836 | 600.05 | 10.50 | 7200.7 | 25181.4 | 127.40 | 26.66 | 35.70 | 1694. |
| 480 | 30.24327 | 594.59 | 10.11 | 7707.3 | 25893.2 | 128.91 | 26.46 | 35.49 | 1687. |
| 500 | 29.90771 | 589.49 | 9.76 | 8211.1 | 26601.1 | 130.36 | 26.28 | 35.31 | 1681. |
| 520 | 29.58109 | 584.72 | 9.42 | 8712.7 | 27305.7 | 131.74 | 26.14 | 35.16 | 1676. |
| 540 | 29.26287 | 580.26 | 9.11 | 9212.6 | 28007.8 | 133.07 | 26.02 | 35.05 | 1670. |
| 560 | 28.95261 | 576.11 | 8.83 | 9711.3 | 28707.8 | 134.34 | 25.93 | 34.96 | 1665. |
| 580 | 28.64989 | 572.24 | 8.56 | 10209.1 | 29406.4 | 135.56 | 25.85 | 34.90 | 1660. |
| 600 | 28.35434 | 568.64 | 8.30 | 10706.4 | 30103.8 | 136.75 | 25.80 | 34.85 | 1656. |
| 620 | 28.06564 | 565.31 | 8.07 | 11203.6 | 30800.6 | 137.89 | 25.77 | 34.83 | 1652. |
| 640 | 27.78348 | 562.22 | 7.84 | 11701.0 | 31496.9 | 138.99 | 25.75 | 34.81 | 1647. |
| 660 | 27.50760 | 559.36 | 7.63 | 12198.8 | 32193.2 | 140.07 | 25.74 | 34.82 | 1644. |
| 680 | 27.23775 | 556.72 | 7.43 | 12697.1 | 32889.7 | 141.11 | 25.74 | 34.83 | 1640. |
| 700 | 26.97370 | 554.30 | 7.24 | 13196.3 | 33586.5 | 142.12 | 25.76 | 34.85 | 1636. |
| 720 | 26.71525 | 552.07 | 7.06 | 13696.4 | 34283.9 | 143.10 | 25.78 | 34.89 | 1633. |
| 740 | 26.46218 | 550.03 | 6.89 | 14197.6 | 34982.0 | 144.05 | 25.81 | 34.92 | 1630. |
| 760 | 26.21432 | 548.17 | 6.72 | 14700.0 | 35680.9 | 144.99 | 25.85 | 34.97 | 1627. |
| 780 | 25.97151 | 546.48 | 6.57 | 15203.7 | 36380.8 | 145.89 | 25.89 | 35.02 | 1624. |
| 800 | 25.73356 | 544.95 | 6.42 | 15708.8 | 37081.7 | 146.78 | 25.94 | 35.07 | 1622. |
| 850 | 25.15905 | 541.76 | 6.07 | 16977.8 | 38838.8 | 148.91 | 26.07 | 35.21 | 1616. |
| 900 | 24.61189 | 539.39 | 5.76 | 18256.4 | 40603.3 | 150.93 | 26.22 | 35.37 | 1612. |
| 950 | 24.09014 | 537.74 | 5.48 | 19544.7 | 42375.6 | 152.85 | 26.38 | 35.52 | 1608. |
| 1000 | 23.59205 | 536.72 | 5.23 | 20842.8 | 44155.7 | 154.67 | 26.54 | 35.68 | 1605. |
| 1050 | 23.11604 | 536.24 | 4.99 | 22150.3 | 45943.3 | 156.42 | 26.69 | 35.83 | 1603. |
| 1100 | 22.66069 | 536.24 | 4.78 | 23467.1 | 47738.2 | 158.09 | 26.85 | 35.97 | 1601. |
| 1150 | 22.22467 | 536.65 | 4.58 | 24792.6 | 49539.9 | 159.69 | 27.00 | 36.10 | 1600. |
| 1200 | 21.80678 | 537.44 | 4.40 | 26126.5 | 51348.0 | 161.23 | 27.14 | 36.22 | 1600. |

6000 bar Isobar

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| * 150.436 | 38.10636 | 1080.27 | 18.03 | −1386.7 | 14358.7 | 82.77 | 30.36 | 33.47 | 2062. |
| 155 | 38.02681 | 1046.58 | 18.99 | −1263.8 | 14514.6 | 83.79 | 31.12 | 34.82 | 2044. |
| 160 | 37.93245 | 1013.01 | 19.82 | −1125.6 | 14692.0 | 84.92 | 31.81 | 36.12 | 2026. |
| 165 | 37.83144 | 982.67 | 20.45 | −984.3 | 14875.5 | 86.05 | 32.36 | 37.26 | 2010. |
| 170 | 37.72462 | 955.30 | 20.91 | −840.4 | 15064.4 | 87.18 | 32.78 | 38.25 | 1995. |
| 175 | 37.61284 | 930.64 | 21.22 | −694.3 | 15257.7 | 88.30 | 33.10 | 39.08 | 1981. |
| 180 | 37.49684 | 908.45 | 21.41 | −546.4 | 15455.0 | 89.41 | 33.33 | 39.79 | 1968. |
| 185 | 37.37735 | 888.49 | 21.51 | −397.1 | 15655.4 | 90.51 | 33.48 | 40.37 | 1956. |
| 190 | 37.25501 | 870.54 | 21.51 | −246.7 | 15858.5 | 91.59 | 33.57 | 40.84 | 1945. |
| 195 | 37.13041 | 854.40 | 21.45 | −95.6 | 16063.7 | 92.66 | 33.60 | 41.22 | 1934. |
| 200 | 37.00410 | 839.88 | 21.34 | 56.1 | 16270.5 | 93.70 | 33.59 | 41.50 | 1925. |
| 210 | 36.74813 | 814.99 | 20.98 | 360.2 | 16687.5 | 95.74 | 33.46 | 41.85 | 1908. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 220 | 36.49020 | 794.66 | 20.51 | 664.0 | 17106.8 | 97.69 | 33.22 | 41.97 | 1893. |
| 230 | 36.23265 | 777.91 | 19.97 | 966.7 | 17526.3 | 99.55 | 32.92 | 41.91 | 1880. |
| 240 | 35.97714 | 763.95 | 19.41 | 1267.3 | 17944.6 | 101.33 | 32.58 | 41.73 | 1869. |
| 250 | 35.72483 | 752.17 | 18.84 | 1565.5 | 18360.6 | 103.03 | 32.22 | 41.46 | 1859. |
| 260 | 35.47647 | 742.08 | 18.27 | 1861.0 | 18773.6 | 104.65 | 31.85 | 41.14 | 1850. |
| 270 | 35.23254 | 733.31 | 17.72 | 2153.6 | 19183.4 | 106.20 | 31.48 | 40.79 | 1842. |
| 280 | 34.99329 | 725.58 | 17.19 | 2443.3 | 19589.5 | 107.67 | 31.12 | 40.43 | 1834. |
| 290 | 34.75881 | 718.67 | 16.68 | 2730.1 | 19991.9 | 109.09 | 30.77 | 40.06 | 1828. |
| 300 | 34.52911 | 712.42 | 16.20 | 3014.0 | 20390.7 | 110.44 | 30.43 | 39.69 | 1821. |
| 310 | 34.30410 | 706.69 | 15.74 | 3295.2 | 20785.8 | 111.73 | 30.10 | 39.33 | 1816. |
| 320 | 34.08368 | 701.38 | 15.30 | 3573.6 | 21177.4 | 112.98 | 29.79 | 38.99 | 1810. |
| 330 | 33.86768 | 696.43 | 14.89 | 3849.6 | 21565.6 | 114.17 | 29.50 | 38.66 | 1805. |
| 340 | 33.65595 | 691.77 | 14.50 | 4123.1 | 21950.6 | 115.32 | 29.22 | 38.34 | 1800. |
| 350 | 33.44830 | 687.36 | 14.14 | 4394.4 | 22332.5 | 116.43 | 28.95 | 38.05 | 1796. |
| 360 | 33.24459 | 683.16 | 13.79 | 4663.5 | 22711.6 | 117.50 | 28.70 | 37.77 | 1791. |
| 370 | 33.04462 | 679.14 | 13.46 | 4930.7 | 23088.0 | 118.53 | 28.47 | 37.51 | 1787. |
| 380 | 32.84824 | 675.29 | 13.14 | 5196.0 | 23461.8 | 119.52 | 28.25 | 37.26 | 1783. |
| 390 | 32.65529 | 671.58 | 12.85 | 5459.5 | 23833.2 | 120.49 | 28.05 | 37.03 | 1779. |
| 400 | 32.46563 | 668.00 | 12.56 | 5721.4 | 24202.5 | 121.42 | 27.85 | 36.82 | 1775. |
| 420 | 32.09560 | 661.22 | 12.04 | 6240.8 | 24935.0 | 123.21 | 27.51 | 36.44 | 1768. |
| 440 | 31.73713 | 654.86 | 11.56 | 6755.2 | 25660.5 | 124.90 | 27.20 | 36.12 | 1762. |
| 460 | 31.38932 | 648.88 | 11.12 | 7265.2 | 26379.9 | 126.50 | 26.94 | 35.84 | 1755. |
| 480 | 31.05141 | 643.27 | 10.72 | 7771.6 | 27094.4 | 128.02 | 26.72 | 35.61 | 1749. |
| 500 | 30.72270 | 637.99 | 10.35 | 8275.1 | 27804.7 | 129.47 | 26.54 | 35.42 | 1744. |
| 520 | 30.40260 | 633.02 | 10.00 | 8776.4 | 28511.5 | 130.85 | 26.38 | 35.27 | 1738. |
| 540 | 30.09060 | 628.36 | 9.68 | 9275.8 | 29215.6 | 132.18 | 26.25 | 35.14 | 1733. |
| 560 | 29.78623 | 623.98 | 9.38 | 9774.0 | 29917.5 | 133.46 | 26.15 | 35.05 | 1728. |
| 580 | 29.48909 | 619.88 | 9.10 | 10271.2 | 30617.7 | 134.69 | 26.07 | 34.98 | 1723. |
| 600 | 29.19881 | 616.04 | 8.84 | 10768.0 | 31316.8 | 135.87 | 26.01 | 34.93 | 1719. |
| 620 | 28.91508 | 612.45 | 8.59 | 11264.7 | 32015.1 | 137.02 | 25.96 | 34.90 | 1714. |
| 640 | 28.63760 | 609.10 | 8.36 | 11761.4 | 32712.9 | 138.13 | 25.93 | 34.88 | 1710. |
| 660 | 28.36611 | 605.98 | 8.14 | 12258.6 | 33410.6 | 139.20 | 25.92 | 34.88 | 1706. |
| 680 | 28.10036 | 603.08 | 7.93 | 12756.3 | 34108.3 | 140.24 | 25.92 | 34.90 | 1702. |
| 700 | 27.84014 | 600.39 | 7.73 | 13254.8 | 34806.5 | 141.25 | 25.93 | 34.92 | 1699. |
| 720 | 27.58524 | 597.89 | 7.54 | 13754.3 | 35505.1 | 142.24 | 25.94 | 34.95 | 1696. |
| 740 | 27.33547 | 595.59 | 7.36 | 14254.9 | 36204.4 | 143.19 | 25.97 | 34.99 | 1692. |
| 760 | 27.09067 | 593.46 | 7.19 | 14756.7 | 36904.6 | 144.13 | 26.00 | 35.03 | 1689. |
| 780 | 26.85066 | 591.51 | 7.03 | 15259.8 | 37605.6 | 145.04 | 26.04 | 35.08 | 1687. |
| 800 | 26.61529 | 589.72 | 6.87 | 15764.3 | 38307.7 | 145.93 | 26.08 | 35.13 | 1684. |
| 850 | 26.04625 | 585.91 | 6.51 | 17031.9 | 40067.8 | 148.06 | 26.21 | 35.28 | 1678. |
| 900 | 25.50329 | 582.96 | 6.19 | 18309.1 | 41835.5 | 150.08 | 26.35 | 35.43 | 1673. |
| 950 | 24.98461 | 580.75 | 5.89 | 19596.2 | 43611.0 | 152.00 | 26.50 | 35.59 | 1669. |
| 1000 | 24.48857 | 579.21 | 5.62 | 20893.1 | 45394.4 | 153.83 | 26.65 | 35.75 | 1665. |
| 1050 | 24.01372 | 578.24 | 5.37 | 22199.8 | 47185.5 | 155.58 | 26.80 | 35.90 | 1663. |
| 1100 | 23.55873 | 577.79 | 5.15 | 23515.7 | 48984.0 | 157.25 | 26.95 | 36.04 | 1661. |
| 1150 | 23.12237 | 577.79 | 4.94 | 24840.5 | 50789.4 | 158.86 | 27.09 | 36.18 | 1659. |
| 1200 | 22.70352 | 578.19 | 4.75 | 26173.8 | 52601.4 | 160.40 | 27.23 | 36.30 | 1659. |
| | | | | 6500 bar Isobar | | | | | |
| * 155.871 | 38.46961 | 1141.43 | 17.48 | −1133.8 | 15762.7 | 83.41 | 30.53 | 33.35 | 2110. |
| 160 | 38.40379 | 1110.57 | 18.38 | −1022.6 | 15902.8 | 84.30 | 31.21 | 34.51 | 2094. |
| 165 | 38.31756 | 1076.27 | 19.27 | −885.0 | 16078.5 | 85.38 | 31.88 | 35.76 | 2076. |
| 170 | 38.22497 | 1045.13 | 19.97 | −744.4 | 16260.1 | 86.47 | 32.43 | 36.87 | 2059. |
| 175 | 38.12676 | 1016.89 | 20.49 | −601.5 | 16446.9 | 87.55 | 32.85 | 37.82 | 2044. |
| 180 | 38.02368 | 991.32 | 20.88 | −456.4 | 16638.2 | 88.63 | 33.18 | 38.65 | 2030. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 185 | 37.91640 | 968.20 | 21.14 | −309.8 | 16833.2 | 89.69 | 33.41 | 39.35 | 2018. |
| 190 | 37.80557 | 947.29 | 21.30 | −161.7 | 17031.5 | 90.75 | 33.58 | 39.94 | 2006. |
| 195 | 37.69178 | 928.41 | 21.37 | −12.7 | 17232.5 | 91.80 | 33.67 | 40.43 | 1995. |
| 200 | 37.57557 | 911.35 | 21.37 | 137.1 | 17435.6 | 92.82 | 33.72 | 40.82 | 1984. |
| 210 | 37.33783 | 881.99 | 21.21 | 438.1 | 17846.7 | 94.83 | 33.68 | 41.36 | 1966. |
| 220 | 37.09571 | 857.93 | 20.88 | 739.7 | 18261.9 | 96.76 | 33.51 | 41.64 | 1951. |
| 230 | 36.85182 | 838.10 | 20.45 | 1040.6 | 18678.8 | 98.61 | 33.26 | 41.71 | 1937. |
| 240 | 36.60816 | 821.63 | 19.97 | 1340.1 | 19095.7 | 100.39 | 32.95 | 41.64 | 1925. |
| 250 | 36.36617 | 807.82 | 19.45 | 1637.5 | 19511.3 | 102.09 | 32.61 | 41.46 | 1915. |
| 260 | 36.12688 | 796.10 | 18.92 | 1932.6 | 19924.7 | 103.71 | 32.25 | 41.21 | 1906. |
| 270 | 35.89099 | 786.03 | 18.40 | 2225.0 | 20335.4 | 105.26 | 31.89 | 40.91 | 1897. |
| 280 | 35.65894 | 777.26 | 17.88 | 2514.6 | 20742.9 | 106.74 | 31.53 | 40.58 | 1890. |
| 290 | 35.43100 | 769.53 | 17.38 | 2801.5 | 21147.0 | 108.16 | 31.17 | 40.24 | 1883. |
| 300 | 35.20727 | 762.63 | 16.90 | 3085.5 | 21547.6 | 109.52 | 30.83 | 39.89 | 1877. |
| 310 | 34.98781 | 756.39 | 16.44 | 3366.9 | 21944.8 | 110.82 | 30.49 | 39.54 | 1871. |
| 320 | 34.77255 | 750.68 | 16.00 | 3645.6 | 22338.5 | 112.07 | 30.17 | 39.20 | 1866. |
| 330 | 34.56143 | 745.42 | 15.59 | 3921.7 | 22728.8 | 113.27 | 29.87 | 38.87 | 1861. |
| 340 | 34.35432 | 740.51 | 15.19 | 4195.5 | 23116.0 | 114.42 | 29.58 | 38.56 | 1856. |
| 350 | 34.15111 | 735.90 | 14.82 | 4467.0 | 23500.1 | 115.54 | 29.31 | 38.26 | 1852. |
| 360 | 33.95163 | 731.55 | 14.46 | 4736.4 | 23881.2 | 116.61 | 29.05 | 37.98 | 1848. |
| 370 | 33.75576 | 727.41 | 14.12 | 5003.7 | 24259.7 | 117.65 | 28.81 | 37.71 | 1844. |
| 380 | 33.56335 | 723.46 | 13.80 | 5269.1 | 24635.5 | 118.65 | 28.58 | 37.46 | 1840. |
| 390 | 33.37426 | 719.67 | 13.49 | 5532.8 | 25008.9 | 119.62 | 28.37 | 37.22 | 1836. |
| 400 | 33.18834 | 716.03 | 13.20 | 5794.8 | 25380.0 | 120.56 | 28.16 | 37.00 | 1833. |
| 420 | 32.82554 | 709.13 | 12.66 | 6314.3 | 26116.0 | 122.36 | 27.80 | 36.61 | 1826. |
| 440 | 32.47397 | 702.66 | 12.16 | 6828.6 | 26844.7 | 124.05 | 27.48 | 36.27 | 1819. |
| 460 | 32.13277 | 696.59 | 11.71 | 7338.5 | 27567.1 | 125.66 | 27.21 | 35.98 | 1813. |
| 480 | 31.80118 | 690.86 | 11.30 | 7844.8 | 28284.3 | 127.18 | 26.97 | 35.74 | 1808. |
| 500 | 31.47853 | 685.45 | 10.91 | 8348.0 | 28997.0 | 128.64 | 26.78 | 35.54 | 1802. |
| 520 | 31.16424 | 680.35 | 10.56 | 8848.9 | 29706.1 | 130.03 | 26.61 | 35.38 | 1797. |
| 540 | 30.85778 | 675.53 | 10.22 | 9347.9 | 30412.3 | 131.36 | 26.47 | 35.25 | 1792. |
| 560 | 30.55871 | 670.98 | 9.91 | 9845.6 | 31116.1 | 132.64 | 26.36 | 35.14 | 1787. |
| 580 | 30.26661 | 666.70 | 9.62 | 10342.4 | 31818.2 | 133.87 | 26.27 | 35.07 | 1782. |
| 600 | 29.98113 | 662.67 | 9.35 | 10838.6 | 32518.9 | 135.06 | 26.20 | 35.01 | 1778. |
| 620 | 29.70194 | 658.87 | 9.10 | 11334.6 | 33218.7 | 136.21 | 26.15 | 34.97 | 1774. |
| 640 | 29.42876 | 655.31 | 8.86 | 11830.8 | 33918.0 | 137.32 | 26.11 | 34.96 | 1770. |
| 660 | 29.16134 | 651.97 | 8.63 | 12327.3 | 34617.1 | 138.39 | 26.09 | 34.95 | 1766. |
| 680 | 28.89942 | 648.85 | 8.41 | 12824.4 | 35316.2 | 139.44 | 26.09 | 34.96 | 1762. |
| 700 | 28.64280 | 645.93 | 8.20 | 13322.3 | 36015.6 | 140.45 | 26.09 | 34.98 | 1758. |
| 720 | 28.39128 | 643.21 | 8.01 | 13821.1 | 36715.5 | 141.44 | 26.10 | 35.01 | 1755. |
| 740 | 28.14467 | 640.67 | 7.82 | 14321.0 | 37416.0 | 142.40 | 26.12 | 35.04 | 1752. |
| 760 | 27.90281 | 638.32 | 7.65 | 14822.1 | 38117.3 | 143.33 | 26.15 | 35.09 | 1749. |
| 780 | 27.66553 | 636.13 | 7.48 | 15324.6 | 38819.5 | 144.24 | 26.18 | 35.14 | 1746. |
| 800 | 27.43270 | 634.11 | 7.31 | 15828.4 | 39522.8 | 145.13 | 26.22 | 35.19 | 1743. |
| 850 | 26.86917 | 629.74 | 6.94 | 17094.4 | 41285.7 | 147.27 | 26.34 | 35.33 | 1737. |
| 900 | 26.33061 | 626.24 | 6.60 | 18370.2 | 43056.3 | 149.29 | 26.47 | 35.49 | 1731. |
| 950 | 25.81531 | 623.51 | 6.29 | 19655.9 | 44834.7 | 151.22 | 26.61 | 35.65 | 1727. |
| 1000 | 25.32175 | 621.47 | 6.01 | 20951.6 | 46621.2 | 153.05 | 26.76 | 35.81 | 1723. |
| 1050 | 24.84856 | 620.05 | 5.75 | 22257.0 | 48415.5 | 154.80 | 26.90 | 35.96 | 1720. |
| 1100 | 24.39449 | 619.16 | 5.51 | 23571.9 | 50217.3 | 156.48 | 27.05 | 36.11 | 1718. |
| 1150 | 23.95841 | 618.76 | 5.29 | 24895.8 | 52026.2 | 158.09 | 27.19 | 36.25 | 1716. |
| 1200 | 23.53926 | 618.78 | 5.09 | 26228.3 | 53841.8 | 159.63 | 27.32 | 36.38 | 1715. |
| | | | | 7000 bar Isobar | | | | | |
| * 161.161 | 38.81880 | 1201.41 | 16.92 | −878.0 | 17154.5 | 84.03 | 30.64 | 33.19 | 2155. |
| 165 | 38.76262 | 1172.41 | 17.79 | −774.7 | 17284.0 | 84.82 | 31.25 | 34.22 | 2141. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 170 | 38.68348 | 1137.55 | 18.72 | −637.4 | 17458.1 | 85.86 | 31.92 | 35.42 | 2123. |
| 175 | 38.59824 | 1105.75 | 19.47 | −497.6 | 17638.0 | 86.91 | 32.46 | 36.49 | 2106. |
| 180 | 38.50758 | 1076.79 | 20.06 | −355.5 | 17822.8 | 87.95 | 32.88 | 37.42 | 2091. |
| 185 | 38.41215 | 1050.45 | 20.51 | −211.4 | 18012.0 | 88.98 | 33.21 | 38.23 | 2078. |
| 190 | 38.31258 | 1026.52 | 20.83 | −65.9 | 18204.9 | 90.01 | 33.45 | 38.93 | 2065. |
| 195 | 38.20943 | 1004.79 | 21.05 | 81.0 | 18401.0 | 91.03 | 33.62 | 39.52 | 2053. |
| 200 | 38.10325 | 985.08 | 21.18 | 228.8 | 18599.9 | 92.04 | 33.73 | 40.01 | 2042. |
| 210 | 37.88376 | 950.96 | 21.24 | 526.3 | 19003.9 | 94.01 | 33.80 | 40.74 | 2023. |
| 220 | 37.65760 | 922.65 | 21.09 | 825.2 | 19413.7 | 95.92 | 33.71 | 41.19 | 2006. |
| 230 | 37.42761 | 899.62 | 20.79 | 1124.1 | 19826.9 | 97.75 | 33.52 | 41.41 | 1992. |
| 240 | 37.19601 | 880.32 | 20.40 | 1422.1 | 20241.3 | 99.52 | 33.25 | 41.46 | 1979. |
| 250 | 36.96454 | 864.16 | 19.96 | 1718.5 | 20655.6 | 101.21 | 32.94 | 41.38 | 1968. |
| 260 | 36.73444 | 850.53 | 19.48 | 2012.8 | 21068.5 | 102.83 | 32.60 | 41.20 | 1959. |
| 270 | 36.50664 | 838.90 | 18.99 | 2304.8 | 21479.4 | 104.38 | 32.25 | 40.96 | 1950. |
| 280 | 36.28177 | 828.88 | 18.50 | 2594.2 | 21887.6 | 105.86 | 31.89 | 40.68 | 1943. |
| 290 | 36.06026 | 820.14 | 18.02 | 2880.9 | 22292.9 | 107.29 | 31.54 | 40.37 | 1936. |
| 300 | 35.84237 | 812.42 | 17.55 | 3165.0 | 22694.9 | 108.65 | 31.19 | 40.05 | 1930. |
| 310 | 35.62823 | 805.53 | 17.10 | 3446.4 | 23093.7 | 109.96 | 30.85 | 39.72 | 1924. |
| 320 | 35.41789 | 799.31 | 16.66 | 3725.2 | 23489.3 | 111.21 | 30.53 | 39.39 | 1919. |
| 330 | 35.21135 | 793.63 | 16.24 | 4001.6 | 23881.5 | 112.42 | 30.22 | 39.07 | 1914. |
| 340 | 35.00855 | 788.40 | 15.84 | 4275.5 | 24270.6 | 113.58 | 29.92 | 38.76 | 1909. |
| 350 | 34.80940 | 783.53 | 15.46 | 4547.2 | 24656.7 | 114.70 | 29.64 | 38.46 | 1905. |
| 360 | 34.61381 | 778.97 | 15.10 | 4816.7 | 25039.9 | 115.78 | 29.38 | 38.17 | 1901. |
| 370 | 34.42166 | 774.67 | 14.76 | 5084.2 | 25420.2 | 116.82 | 29.13 | 37.90 | 1897. |
| 380 | 34.23282 | 770.59 | 14.43 | 5349.8 | 25798.0 | 117.83 | 28.89 | 37.65 | 1893. |
| 390 | 34.04719 | 766.70 | 14.11 | 5613.5 | 26173.2 | 118.80 | 28.67 | 37.41 | 1890. |
| 400 | 33.86462 | 762.97 | 13.81 | 5875.6 | 26546.2 | 119.75 | 28.46 | 37.18 | 1886. |
| 420 | 33.50825 | 755.95 | 13.26 | 6395.3 | 27285.7 | 121.55 | 28.08 | 36.78 | 1880. |
| 440 | 33.16280 | 749.39 | 12.75 | 6909.6 | 28017.6 | 123.25 | 27.75 | 36.43 | 1874. |
| 460 | 32.82746 | 743.23 | 12.28 | 7419.4 | 28743.0 | 124.87 | 27.46 | 36.13 | 1868. |
| 480 | 32.50149 | 737.42 | 11.85 | 7925.5 | 29463.0 | 126.40 | 27.21 | 35.87 | 1863. |
| 500 | 32.18423 | 731.93 | 11.46 | 8428.5 | 30178.2 | 127.86 | 27.00 | 35.66 | 1858. |
| 520 | 31.87511 | 726.72 | 11.09 | 8929.0 | 30889.7 | 129.25 | 26.83 | 35.49 | 1853. |
| 540 | 31.57362 | 721.79 | 10.75 | 9427.6 | 31598.0 | 130.59 | 26.68 | 35.35 | 1848. |
| 560 | 31.27930 | 717.12 | 10.43 | 9924.8 | 32303.8 | 131.87 | 26.56 | 35.24 | 1843. |
| 580 | 30.99176 | 712.70 | 10.13 | 10421.1 | 33007.7 | 133.11 | 26.46 | 35.15 | 1839. |
| 600 | 30.71063 | 708.52 | 9.85 | 10916.7 | 33710.2 | 134.30 | 26.38 | 35.09 | 1834. |
| 620 | 30.43559 | 704.57 | 9.59 | 11412.2 | 34411.6 | 135.45 | 26.32 | 35.05 | 1830. |
| 640 | 30.16636 | 700.84 | 9.34 | 11907.7 | 35112.4 | 136.56 | 26.28 | 35.03 | 1826. |
| 660 | 29.90268 | 697.32 | 9.10 | 12403.6 | 35812.9 | 137.64 | 26.26 | 35.02 | 1822. |
| 680 | 29.64432 | 694.01 | 8.88 | 12900.0 | 36513.3 | 138.69 | 26.24 | 35.03 | 1818. |
| 700 | 29.39107 | 690.90 | 8.66 | 13397.3 | 37214.0 | 139.70 | 26.24 | 35.04 | 1815. |
| 720 | 29.14272 | 687.98 | 8.46 | 13895.4 | 37915.1 | 140.69 | 26.25 | 35.07 | 1811. |
| 740 | 28.89910 | 685.25 | 8.27 | 14394.7 | 38616.9 | 141.65 | 26.27 | 35.10 | 1808. |
| 760 | 28.66004 | 682.69 | 8.08 | 14895.1 | 39319.3 | 142.59 | 26.29 | 35.15 | 1805. |
| 780 | 28.42540 | 680.30 | 7.91 | 15396.9 | 40022.7 | 143.50 | 26.32 | 35.19 | 1802. |
| 800 | 28.19503 | 678.08 | 7.74 | 15900.0 | 40727.1 | 144.39 | 26.35 | 35.24 | 1799. |
| 850 | 27.63692 | 673.20 | 7.35 | 17164.4 | 42492.8 | 146.53 | 26.46 | 35.39 | 1793. |
| 900 | 27.10281 | 669.20 | 7.00 | 18438.5 | 44266.1 | 148.56 | 26.58 | 35.54 | 1787. |
| 950 | 26.59106 | 665.99 | 6.67 | 19722.7 | 46047.3 | 150.49 | 26.72 | 35.71 | 1782. |
| 1000 | 26.10023 | 663.49 | 6.38 | 21016.9 | 47836.6 | 152.32 | 26.86 | 35.87 | 1778. |
| 1050 | 25.62904 | 661.62 | 6.11 | 22321.1 | 49633.9 | 154.08 | 27.00 | 36.02 | 1775. |
| 1100 | 25.17630 | 660.33 | 5.86 | 23634.8 | 51438.7 | 155.75 | 27.14 | 36.17 | 1772. |
| 1150 | 24.74094 | 659.53 | 5.63 | 24957.6 | 53250.8 | 157.37 | 27.27 | 36.31 | 1770. |
| 1200 | 24.32199 | 659.19 | 5.42 | 26289.1 | 55069.6 | 158.91 | 27.40 | 36.44 | 1769. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 7500 bar Isobar | | | | | |
| * 166.315 | 39.15539 | 1260.26 | 16.35 | −619.6 | 18534.8 | 84.63 | 30.70 | 33.00 | 2199. |
| 170 | 39.10575 | 1232.21 | 17.20 | −520.6 | 18658.2 | 85.36 | 31.27 | 33.94 | 2185. |
| 175 | 39.03282 | 1196.89 | 18.18 | −383.8 | 18830.8 | 86.36 | 31.92 | 35.10 | 2167. |
| 180 | 38.95404 | 1164.57 | 18.98 | −244.5 | 19008.9 | 87.37 | 32.45 | 36.12 | 2151. |
| 185 | 38.87003 | 1135.01 | 19.62 | −103.2 | 19191.9 | 88.37 | 32.88 | 37.03 | 2136. |
| 190 | 38.78137 | 1108.03 | 20.12 | 39.9 | 19379.0 | 89.37 | 33.21 | 37.82 | 2123. |
| 195 | 38.68862 | 1083.41 | 20.50 | 184.4 | 19569.9 | 90.36 | 33.45 | 38.51 | 2110. |
| 200 | 38.59230 | 1060.96 | 20.78 | 330.0 | 19764.0 | 91.34 | 33.63 | 39.10 | 2098. |
| 210 | 38.39094 | 1021.90 | 21.08 | 623.9 | 20159.8 | 93.27 | 33.81 | 40.01 | 2078. |
| 220 | 38.18081 | 989.49 | 21.12 | 919.8 | 20563.2 | 95.15 | 33.82 | 40.62 | 2060. |
| 230 | 37.96488 | 962.58 | 20.98 | 1216.3 | 20971.4 | 96.96 | 33.69 | 40.99 | 2045. |
| 240 | 37.74558 | 940.17 | 20.71 | 1512.5 | 21382.4 | 98.71 | 33.48 | 41.17 | 2031. |
| 250 | 37.52482 | 921.40 | 20.36 | 1807.5 | 21794.3 | 100.39 | 33.21 | 41.19 | 2020. |
| 260 | 37.30410 | 905.59 | 19.95 | 2100.9 | 22205.9 | 102.01 | 32.90 | 41.11 | 2010. |
| 270 | 37.08452 | 892.17 | 19.51 | 2392.1 | 22616.2 | 103.56 | 32.56 | 40.94 | 2001. |
| 280 | 36.86691 | 880.67 | 19.06 | 2681.1 | 23024.5 | 105.04 | 32.22 | 40.71 | 1993. |
| 290 | 36.65186 | 870.72 | 18.60 | 2967.5 | 23430.4 | 106.47 | 31.87 | 40.45 | 1986. |
| 300 | 36.43975 | 862.03 | 18.15 | 3251.5 | 23833.4 | 107.83 | 31.52 | 40.16 | 1980. |
| 310 | 36.23084 | 854.34 | 17.71 | 3532.9 | 24233.4 | 109.14 | 31.19 | 39.85 | 1974. |
| 320 | 36.02529 | 847.47 | 17.28 | 3811.7 | 24630.4 | 110.40 | 30.86 | 39.54 | 1969. |
| 330 | 35.82315 | 841.27 | 16.86 | 4088.1 | 25024.3 | 111.62 | 30.55 | 39.24 | 1964. |
| 340 | 35.62444 | 835.62 | 16.46 | 4362.2 | 25415.2 | 112.78 | 30.24 | 38.93 | 1960. |
| 350 | 35.42913 | 830.42 | 16.08 | 4634.0 | 25803.0 | 113.91 | 29.96 | 38.64 | 1955. |
| 360 | 35.23716 | 825.59 | 15.71 | 4903.6 | 26188.0 | 114.99 | 29.69 | 38.36 | 1951. |
| 370 | 35.04845 | 821.08 | 15.36 | 5171.2 | 26570.2 | 116.04 | 29.43 | 38.09 | 1948. |
| 380 | 34.86290 | 816.83 | 15.03 | 5436.9 | 26949.7 | 117.05 | 29.18 | 37.83 | 1944. |
| 390 | 34.68042 | 812.80 | 14.71 | 5700.8 | 27326.8 | 118.03 | 28.95 | 37.59 | 1941. |
| 400 | 34.50090 | 808.97 | 14.41 | 5962.9 | 27701.5 | 118.98 | 28.74 | 37.36 | 1938. |
| 420 | 34.15033 | 801.78 | 13.84 | 6482.7 | 28444.4 | 120.79 | 28.34 | 36.94 | 1931. |
| 440 | 33.81038 | 795.12 | 13.31 | 6997.0 | 29179.5 | 122.50 | 28.00 | 36.58 | 1926. |
| 460 | 33.48028 | 788.89 | 12.84 | 7506.7 | 29908.0 | 124.12 | 27.70 | 36.27 | 1920. |
| 480 | 33.15933 | 783.01 | 12.39 | 8012.6 | 30630.7 | 125.66 | 27.44 | 36.01 | 1915. |
| 500 | 32.84689 | 777.45 | 11.99 | 8515.3 | 31348.5 | 127.12 | 27.22 | 35.79 | 1910. |
| 520 | 32.54241 | 772.18 | 11.61 | 9015.5 | 32062.4 | 128.52 | 27.03 | 35.60 | 1905. |
| 540 | 32.24537 | 767.17 | 11.26 | 9513.8 | 32772.9 | 129.86 | 26.88 | 35.45 | 1901. |
| 560 | 31.95534 | 762.41 | 10.93 | 10010.5 | 33480.8 | 131.15 | 26.75 | 35.34 | 1896. |
| 580 | 31.67191 | 757.89 | 10.62 | 10506.3 | 34186.6 | 132.39 | 26.64 | 35.25 | 1892. |
| 600 | 31.39472 | 753.60 | 10.33 | 11001.4 | 34890.8 | 133.58 | 26.56 | 35.18 | 1888. |
| 620 | 31.12347 | 749.52 | 10.06 | 11496.3 | 35593.9 | 134.74 | 26.49 | 35.13 | 1884. |
| 640 | 30.85785 | 745.66 | 9.80 | 11991.2 | 36296.2 | 135.85 | 26.45 | 35.10 | 1880. |
| 660 | 30.59762 | 742.00 | 9.56 | 12486.4 | 36998.2 | 136.93 | 26.41 | 35.09 | 1876. |
| 680 | 30.34255 | 738.54 | 9.33 | 12982.2 | 37700.0 | 137.98 | 26.39 | 35.09 | 1872. |
| 700 | 30.09242 | 735.27 | 9.11 | 13478.8 | 38402.0 | 139.00 | 26.39 | 35.11 | 1869. |
| 720 | 29.84704 | 732.19 | 8.90 | 13976.2 | 39104.4 | 139.99 | 26.39 | 35.13 | 1865. |
| 740 | 29.60623 | 729.29 | 8.70 | 14474.8 | 39807.3 | 140.95 | 26.40 | 35.16 | 1862. |
| 760 | 29.36983 | 726.56 | 8.51 | 14974.5 | 40510.9 | 141.89 | 26.42 | 35.20 | 1859. |
| 780 | 29.13769 | 724.00 | 8.33 | 15475.6 | 41215.5 | 142.80 | 26.45 | 35.25 | 1856. |
| 800 | 28.90967 | 721.60 | 8.15 | 15978.0 | 41920.9 | 143.70 | 26.48 | 35.30 | 1853. |
| 850 | 28.35682 | 716.26 | 7.75 | 17240.7 | 43689.3 | 145.84 | 26.58 | 35.44 | 1847. |
| 900 | 27.82711 | 711.81 | 7.38 | 18513.1 | 45465.2 | 147.87 | 26.69 | 35.60 | 1841. |
| 950 | 27.31898 | 708.16 | 7.05 | 19795.7 | 47249.1 | 149.80 | 26.82 | 35.76 | 1836. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1000 | 26.83104 | 705.23 | 6.75 | 21088.4 | 49041.1 | 151.64 | 26.96 | 35.92 | 1832. |
| 1050 | 26.36207 | 702.96 | 6.47 | 22391.1 | 50841.1 | 153.39 | 27.09 | 36.08 | 1828. |
| 1100 | 25.91093 | 701.27 | 6.21 | 23703.5 | 52648.8 | 155.08 | 27.23 | 36.23 | 1825. |
| 1150 | 25.47663 | 700.10 | 5.97 | 25025.1 | 54463.8 | 156.69 | 27.36 | 36.37 | 1823. |
| 1200 | 25.05823 | 699.41 | 5.75 | 26355.4 | 56285.7 | 158.24 | 27.48 | 36.50 | 1821. |
| | | | | 8000 bar Isobar | | | | | |
| * 171.346 | 39.48060 | 1318.03 | 15.77 | −359.2 | 19903.9 | 85.21 | 30.71 | 32.78 | 2241. |
| 175 | 39.43516 | 1290.02 | 16.64 | −261.1 | 20025.4 | 85.91 | 31.26 | 33.67 | 2227. |
| 180 | 39.36769 | 1254.38 | 17.65 | −124.7 | 20196.5 | 86.87 | 31.90 | 34.78 | 2210. |
| 185 | 39.29461 | 1221.64 | 18.50 | 14.0 | 20373.0 | 87.84 | 32.42 | 35.77 | 2194. |
| 190 | 39.21647 | 1191.60 | 19.18 | 154.5 | 20554.1 | 88.80 | 32.84 | 36.65 | 2179. |
| 195 | 39.13382 | 1164.07 | 19.73 | 296.6 | 20739.3 | 89.77 | 33.17 | 37.43 | 2165. |
| 200 | 39.04714 | 1138.87 | 20.16 | 440.1 | 20928.2 | 90.72 | 33.42 | 38.10 | 2153. |
| 210 | 38.86364 | 1094.73 | 20.73 | 730.1 | 21314.9 | 92.61 | 33.73 | 39.19 | 2131. |
| 220 | 38.66949 | 1057.85 | 20.99 | 1022.7 | 21710.9 | 94.45 | 33.83 | 39.96 | 2112. |
| 230 | 38.46773 | 1027.04 | 21.02 | 1316.6 | 22113.3 | 96.24 | 33.79 | 40.48 | 2096. |
| 240 | 38.26089 | 1001.28 | 20.89 | 1610.7 | 22519.8 | 97.97 | 33.64 | 40.79 | 2082. |
| 250 | 38.05106 | 979.67 | 20.65 | 1904.1 | 22928.4 | 99.64 | 33.41 | 40.93 | 2070. |
| 260 | 37.83991 | 961.45 | 20.32 | 2196.1 | 23337.8 | 101.24 | 33.14 | 40.93 | 2059. |
| 270 | 37.62873 | 946.01 | 19.95 | 2486.5 | 23746.8 | 102.79 | 32.83 | 40.85 | 2050. |
| 280 | 37.41851 | 932.83 | 19.54 | 2774.7 | 24154.5 | 104.27 | 32.50 | 40.68 | 2042. |
| 290 | 37.20999 | 921.48 | 19.12 | 3060.7 | 24560.3 | 105.69 | 32.16 | 40.47 | 2034. |
| 300 | 37.00371 | 911.63 | 18.69 | 3344.3 | 24963.8 | 107.06 | 31.82 | 40.22 | 2028. |
| 310 | 36.80003 | 903.00 | 18.27 | 3625.5 | 25364.6 | 108.38 | 31.49 | 39.95 | 2022. |
| 320 | 36.59920 | 895.36 | 17.85 | 3904.3 | 25762.7 | 109.64 | 31.16 | 39.66 | 2017. |
| 330 | 36.40138 | 888.52 | 17.44 | 4180.7 | 26157.9 | 110.86 | 30.85 | 39.37 | 2012. |
| 340 | 36.20664 | 882.36 | 17.05 | 4454.8 | 26550.1 | 112.03 | 30.54 | 39.08 | 2008. |
| 350 | 36.01502 | 876.74 | 16.66 | 4726.6 | 26939.5 | 113.16 | 30.25 | 38.80 | 2003. |
| 360 | 35.82649 | 871.57 | 16.30 | 4996.3 | 27326.1 | 114.24 | 29.97 | 38.52 | 2000. |
| 370 | 35.64102 | 866.79 | 15.95 | 5264.0 | 27710.0 | 115.30 | 29.71 | 38.25 | 1996. |
| 380 | 35.45855 | 862.32 | 15.61 | 5529.7 | 28091.3 | 116.31 | 29.46 | 38.00 | 1993. |
| 390 | 35.27900 | 858.11 | 15.28 | 5793.6 | 28470.0 | 117.30 | 29.22 | 37.75 | 1989. |
| 400 | 35.10229 | 854.14 | 14.97 | 6055.9 | 28846.4 | 118.25 | 29.00 | 37.52 | 1986. |
| 420 | 34.75703 | 846.75 | 14.39 | 6575.7 | 29592.6 | 120.07 | 28.60 | 37.10 | 1980. |
| 440 | 34.42207 | 839.96 | 13.86 | 7090.0 | 30330.9 | 121.79 | 28.24 | 36.73 | 1975. |
| 460 | 34.09671 | 833.64 | 13.37 | 7599.6 | 31062.3 | 123.41 | 27.93 | 36.41 | 1970. |
| 480 | 33.78028 | 827.70 | 12.92 | 8105.3 | 31787.8 | 124.96 | 27.66 | 36.14 | 1965. |
| 500 | 33.47218 | 822.08 | 12.50 | 8607.8 | 32508.2 | 126.43 | 27.43 | 35.91 | 1960. |
| 520 | 33.17187 | 816.76 | 12.11 | 9107.7 | 33224.5 | 127.83 | 27.23 | 35.72 | 1956. |
| 540 | 32.87885 | 811.70 | 11.75 | 9605.5 | 33937.3 | 129.18 | 27.07 | 35.56 | 1951. |
| 560 | 32.59269 | 806.88 | 11.41 | 10101.8 | 34647.2 | 130.47 | 26.93 | 35.44 | 1947. |
| 580 | 32.31298 | 802.29 | 11.10 | 10597.1 | 35355.0 | 131.71 | 26.82 | 35.34 | 1943. |
| 600 | 32.03938 | 797.91 | 10.80 | 11091.7 | 36061.0 | 132.91 | 26.73 | 35.27 | 1939. |
| 620 | 31.77157 | 793.75 | 10.52 | 11586.0 | 36765.8 | 134.06 | 26.65 | 35.21 | 1935. |
| 640 | 31.50926 | 789.79 | 10.25 | 12080.3 | 37469.7 | 135.18 | 26.60 | 35.18 | 1931. |
| 660 | 31.25220 | 786.02 | 10.00 | 12574.9 | 38173.1 | 136.26 | 26.56 | 35.17 | 1927. |
| 680 | 31.00016 | 782.44 | 9.77 | 13070.1 | 38876.4 | 137.31 | 26.54 | 35.16 | 1924. |
| 700 | 30.75292 | 779.05 | 9.54 | 13565.9 | 39579.7 | 138.33 | 26.53 | 35.17 | 1920. |
| 720 | 30.51030 | 775.83 | 9.32 | 14062.7 | 40283.4 | 139.32 | 26.53 | 35.19 | 1917. |
| 740 | 30.27212 | 772.79 | 9.12 | 14560.6 | 40987.5 | 140.29 | 26.53 | 35.22 | 1914. |
| 760 | 30.03821 | 769.91 | 8.92 | 15059.6 | 41692.4 | 141.23 | 26.55 | 35.26 | 1911. |
| 780 | 29.80844 | 767.20 | 8.74 | 15560.0 | 42398.0 | 142.14 | 26.57 | 35.30 | 1908. |
| 800 | 29.58266 | 764.65 | 8.56 | 16061.7 | 43104.6 | 143.04 | 26.60 | 35.35 | 1905. |
| 850 | 29.03486 | 758.92 | 8.14 | 17322.6 | 44875.6 | 145.19 | 26.69 | 35.49 | 1898. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 900 | 28.50946 | 754.06 | 7.76 | 18593.3 | 46654.1 | 147.22 | 26.80 | 35.65 | 1892. |
| 950 | 28.00493 | 750.01 | 7.42 | 19874.2 | 48440.6 | 149.15 | 26.92 | 35.81 | 1887. |
| 1000 | 27.51995 | 746.69 | 7.10 | 21165.3 | 50235.1 | 150.99 | 27.05 | 35.97 | 1883. |
| 1050 | 27.05332 | 744.03 | 6.81 | 22466.5 | 52037.7 | 152.75 | 27.18 | 36.13 | 1879. |
| 1100 | 26.60399 | 741.97 | 6.54 | 23777.4 | 53848.0 | 154.43 | 27.31 | 36.28 | 1876. |
| 1150 | 26.17098 | 740.45 | 6.30 | 25097.6 | 55665.8 | 156.05 | 27.44 | 36.43 | 1873. |
| 1200 | 25.75340 | 739.42 | 6.07 | 26426.7 | 57490.6 | 157.60 | 27.56 | 36.56 | 1871. |
| | | | | 8500 bar Isobar | | | | | |
| * 176.261 | 39.79547 | 1374.73 | 15.19 | −96.9 | 21262.3 | 85.76 | 30.67 | 32.54 | 2282. |
| 180 | 39.75246 | 1345.94 | 16.09 | 3.3 | 21385.6 | 86.46 | 31.22 | 33.41 | 2268. |
| 185 | 39.68981 | 1310.06 | 17.14 | 139.2 | 21555.3 | 87.39 | 31.84 | 34.47 | 2250. |
| 190 | 39.62177 | 1277.00 | 18.02 | 277.3 | 21730.1 | 88.32 | 32.35 | 35.43 | 2234. |
| 195 | 39.54885 | 1246.58 | 18.75 | 417.0 | 21909.5 | 89.25 | 32.77 | 36.28 | 2220. |
| 200 | 39.47154 | 1218.60 | 19.34 | 558.3 | 22092.8 | 90.18 | 33.10 | 37.04 | 2206. |
| 210 | 39.30554 | 1169.33 | 20.19 | 844.2 | 22469.7 | 92.02 | 33.54 | 38.28 | 2183. |
| 220 | 39.12723 | 1127.85 | 20.69 | 1133.4 | 22857.4 | 93.82 | 33.76 | 39.21 | 2163. |
| 230 | 38.93962 | 1093.00 | 20.91 | 1424.4 | 23253.1 | 95.58 | 33.81 | 39.87 | 2145. |
| 240 | 38.74535 | 1063.69 | 20.94 | 1716.1 | 23654.2 | 97.29 | 33.72 | 40.31 | 2130. |
| 250 | 38.54662 | 1039.03 | 20.82 | 2007.5 | 24058.7 | 98.94 | 33.55 | 40.57 | 2118. |
| 260 | 38.34522 | 1018.20 | 20.59 | 2298.1 | 24465.1 | 100.53 | 33.32 | 40.68 | 2107. |
| 270 | 38.14262 | 1000.54 | 20.29 | 2587.2 | 24872.0 | 102.07 | 33.04 | 40.68 | 2097. |
| 280 | 37.93996 | 985.48 | 19.94 | 2874.5 | 25278.4 | 103.54 | 32.74 | 40.59 | 2088. |
| 290 | 37.73811 | 972.56 | 19.57 | 3159.9 | 25683.5 | 104.97 | 32.42 | 40.43 | 2081. |
| 300 | 37.53774 | 961.40 | 19.18 | 3443.0 | 26086.9 | 106.33 | 32.09 | 40.23 | 2074. |
| 310 | 37.33933 | 951.67 | 18.78 | 3723.8 | 26488.0 | 107.65 | 31.76 | 40.00 | 2068. |
| 320 | 37.14325 | 943.12 | 18.38 | 4002.4 | 26886.7 | 108.92 | 31.44 | 39.74 | 2063. |
| 330 | 36.94972 | 935.54 | 17.98 | 4278.6 | 27282.8 | 110.13 | 31.12 | 39.48 | 2058. |
| 340 | 36.75890 | 928.75 | 17.59 | 4552.6 | 27676.3 | 111.31 | 30.82 | 39.20 | 2054. |
| 350 | 36.57087 | 922.63 | 17.22 | 4824.4 | 28066.9 | 112.44 | 30.52 | 38.93 | 2050. |
| 360 | 36.38568 | 917.05 | 16.85 | 5094.1 | 28454.9 | 113.53 | 30.24 | 38.67 | 2046. |
| 370 | 36.20332 | 911.92 | 16.50 | 5361.8 | 28840.3 | 114.59 | 29.98 | 38.40 | 2042. |
| 380 | 36.02377 | 907.18 | 16.16 | 5627.5 | 29223.1 | 115.61 | 29.72 | 38.15 | 2039. |
| 390 | 35.84699 | 902.75 | 15.84 | 5891.5 | 29603.4 | 116.60 | 29.48 | 37.91 | 2036. |
| 400 | 35.67291 | 898.60 | 15.52 | 6153.7 | 29981.3 | 117.56 | 29.25 | 37.68 | 2033. |
| 420 | 35.33259 | 890.95 | 14.93 | 6673.5 | 30730.7 | 119.38 | 28.84 | 37.26 | 2027. |
| 440 | 35.00222 | 883.99 | 14.39 | 7187.8 | 31472.0 | 121.11 | 28.47 | 36.88 | 2022. |
| 460 | 34.68118 | 877.56 | 13.89 | 7697.3 | 32206.3 | 122.74 | 28.15 | 36.56 | 2017. |
| 480 | 34.36886 | 871.55 | 13.43 | 8202.9 | 32934.6 | 124.29 | 27.87 | 36.28 | 2012. |
| 500 | 34.06469 | 865.88 | 13.00 | 8705.1 | 33657.6 | 125.77 | 27.63 | 36.04 | 2008. |
| 520 | 33.76816 | 860.52 | 12.60 | 9204.7 | 34376.3 | 127.18 | 27.42 | 35.84 | 2004. |
| 540 | 33.47878 | 855.42 | 12.23 | 9702.1 | 35091.4 | 128.52 | 27.25 | 35.67 | 1999. |
| 560 | 33.19612 | 850.56 | 11.88 | 10198.0 | 35803.4 | 129.82 | 27.10 | 35.54 | 1995. |
| 580 | 32.91980 | 845.92 | 11.56 | 10692.8 | 36513.2 | 131.06 | 26.98 | 35.44 | 1991. |
| 600 | 32.64945 | 841.49 | 11.25 | 11186.9 | 37221.0 | 132.26 | 26.89 | 35.36 | 1988. |
| 620 | 32.38478 | 837.26 | 10.97 | 11680.7 | 37927.6 | 133.42 | 26.81 | 35.30 | 1984. |
| 640 | 32.12550 | 833.23 | 10.69 | 12174.4 | 38633.1 | 134.54 | 26.75 | 35.26 | 1980. |
| 660 | 31.87135 | 829.38 | 10.44 | 12668.4 | 39338.1 | 135.63 | 26.71 | 35.24 | 1976. |
| 680 | 31.62210 | 825.71 | 10.19 | 13162.8 | 40042.8 | 136.68 | 26.68 | 35.23 | 1973. |
| 700 | 31.37754 | 822.21 | 9.96 | 13658.0 | 40747.5 | 137.70 | 26.66 | 35.24 | 1970. |
| 720 | 31.13748 | 818.89 | 9.74 | 14154.1 | 41452.4 | 138.69 | 26.66 | 35.26 | 1966. |
| 740 | 30.90175 | 815.73 | 9.53 | 14651.3 | 42157.8 | 139.66 | 26.66 | 35.28 | 1963. |
| 760 | 30.67019 | 812.73 | 9.33 | 15149.6 | 42863.8 | 140.60 | 26.67 | 35.32 | 1960. |
| 780 | 30.44264 | 809.90 | 9.14 | 15649.3 | 43570.6 | 141.52 | 26.69 | 35.36 | 1957. |
| 800 | 30.21897 | 807.21 | 8.95 | 16150.3 | 44278.3 | 142.42 | 26.71 | 35.41 | 1954. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 850 | 29.67599 | 801.14 | 8.52 | 17409.3 | 46052.0 | 144.57 | 26.80 | 35.54 | 1948. |
| 900 | 29.15475 | 795.94 | 8.13 | 18678.3 | 47833.1 | 146.60 | 26.90 | 35.70 | 1942. |
| 950 | 28.65377 | 791.52 | 7.78 | 19957.4 | 49622.0 | 148.54 | 27.02 | 35.86 | 1937. |
| 1000 | 28.17175 | 787.84 | 7.45 | 21246.9 | 51419.0 | 150.38 | 27.14 | 36.02 | 1932. |
| 1050 | 27.70754 | 784.82 | 7.15 | 22546.5 | 53224.0 | 152.14 | 27.27 | 36.18 | 1928. |
| 1100 | 27.26012 | 782.42 | 6.87 | 23855.9 | 55036.9 | 153.83 | 27.39 | 36.33 | 1925. |
| 1150 | 26.82857 | 780.56 | 6.62 | 25174.7 | 56857.3 | 155.45 | 27.52 | 36.48 | 1922. |
| 1200 | 26.41202 | 779.22 | 6.38 | 26502.5 | 58684.8 | 157.00 | 27.63 | 36.62 | 1920. |
| | | | | 9000 bar Isobar | | | | | |
| * 181.071 | 40.10090 | 1430.41 | 14.60 | 166.9 | 22610.3 | 86.30 | 30.59 | 32.27 | 2321. |
| 185 | 40.05896 | 1400.05 | 15.58 | 271.9 | 22738.8 | 87.01 | 31.15 | 33.15 | 2306. |
| 190 | 40.00059 | 1364.01 | 16.65 | 407.5 | 22907.2 | 87.90 | 31.76 | 34.17 | 2289. |
| 195 | 39.93703 | 1330.71 | 17.56 | 544.9 | 23080.4 | 88.80 | 32.26 | 35.09 | 2273. |
| 200 | 39.86876 | 1299.98 | 18.32 | 683.9 | 23257.9 | 89.70 | 32.67 | 35.92 | 2259. |
| 210 | 39.71983 | 1245.55 | 19.48 | 965.7 | 23624.4 | 91.49 | 33.26 | 37.31 | 2233. |
| 220 | 39.55710 | 1199.41 | 20.22 | 1251.3 | 24003.2 | 93.25 | 33.60 | 38.39 | 2212. |
| 230 | 39.38358 | 1160.38 | 20.65 | 1539.1 | 24391.3 | 94.98 | 33.74 | 39.19 | 2194. |
| 240 | 39.20192 | 1127.40 | 20.85 | 1828.2 | 24786.2 | 96.66 | 33.74 | 39.76 | 2178. |
| 250 | 39.01439 | 1099.51 | 20.87 | 2117.4 | 25185.8 | 98.29 | 33.63 | 40.13 | 2164. |
| 260 | 38.82291 | 1075.89 | 20.75 | 2406.2 | 25588.4 | 99.87 | 33.44 | 40.35 | 2153. |
| 270 | 38.62906 | 1055.83 | 20.55 | 2693.9 | 25992.4 | 101.39 | 33.20 | 40.44 | 2142. |
| 280 | 38.43411 | 1038.73 | 20.27 | 2980.1 | 26396.8 | 102.86 | 32.93 | 40.43 | 2134. |
| 290 | 38.23908 | 1024.07 | 19.95 | 3264.5 | 26800.7 | 104.28 | 32.63 | 40.34 | 2126. |
| 300 | 38.04474 | 1011.44 | 19.60 | 3547.0 | 27203.4 | 105.65 | 32.32 | 40.19 | 2119. |
| 310 | 37.85171 | 1000.47 | 19.23 | 3827.3 | 27604.3 | 106.96 | 32.00 | 40.00 | 2113. |
| 320 | 37.66042 | 990.89 | 18.86 | 4105.5 | 28003.3 | 108.23 | 31.69 | 39.78 | 2107. |
| 330 | 37.47120 | 982.44 | 18.48 | 4381.5 | 28399.9 | 109.45 | 31.38 | 39.54 | 2102. |
| 340 | 37.28429 | 974.93 | 18.11 | 4655.3 | 28794.1 | 110.62 | 31.07 | 39.30 | 2098. |
| 350 | 37.09983 | 968.21 | 17.74 | 4926.9 | 29185.8 | 111.76 | 30.78 | 39.04 | 2094. |
| 360 | 36.91791 | 962.14 | 17.38 | 5196.5 | 29574.9 | 112.86 | 30.50 | 38.79 | 2090. |
| 370 | 36.73858 | 956.60 | 17.03 | 5464.2 | 29961.6 | 113.92 | 30.23 | 38.54 | 2087. |
| 380 | 36.56186 | 951.52 | 16.69 | 5729.9 | 30345.7 | 114.94 | 29.97 | 38.29 | 2083. |
| 390 | 36.38773 | 946.82 | 16.37 | 5993.8 | 30727.4 | 115.93 | 29.72 | 38.05 | 2080. |
| 400 | 36.21615 | 942.45 | 16.05 | 6256.0 | 31106.8 | 116.89 | 29.49 | 37.83 | 2077. |
| 420 | 35.88048 | 934.47 | 15.46 | 6775.8 | 31859.1 | 118.73 | 29.06 | 37.40 | 2072. |
| 440 | 35.55439 | 927.29 | 14.91 | 7290.0 | 32603.3 | 120.46 | 28.69 | 37.03 | 2067. |
| 460 | 35.23733 | 920.72 | 14.40 | 7799.3 | 33340.4 | 122.10 | 28.36 | 36.70 | 2062. |
| 480 | 34.92878 | 914.63 | 13.92 | 8304.7 | 34071.4 | 123.65 | 28.07 | 36.41 | 2058. |
| 500 | 34.62821 | 908.91 | 13.49 | 8806.7 | 34797.0 | 125.13 | 27.82 | 36.16 | 2054. |
| 520 | 34.33512 | 903.51 | 13.08 | 9305.9 | 35518.2 | 126.55 | 27.60 | 35.96 | 2050. |
| 540 | 34.04904 | 898.38 | 12.70 | 9803.0 | 36235.5 | 127.90 | 27.42 | 35.78 | 2046. |
| 560 | 33.76957 | 893.49 | 12.34 | 10298.5 | 36949.7 | 129.20 | 27.27 | 35.64 | 2042. |
| 580 | 33.49633 | 888.82 | 12.01 | 10792.8 | 37661.5 | 130.45 | 27.14 | 35.53 | 2038. |
| 600 | 33.22896 | 884.35 | 11.70 | 11286.4 | 38371.2 | 131.65 | 27.04 | 35.45 | 2034. |
| 620 | 32.96716 | 880.08 | 11.40 | 11779.6 | 39079.5 | 132.81 | 26.96 | 35.38 | 2031. |
| 640 | 32.71065 | 875.99 | 11.12 | 12272.7 | 39786.7 | 133.94 | 26.89 | 35.34 | 2027. |
| 660 | 32.45917 | 872.08 | 10.86 | 12766.1 | 40493.3 | 135.02 | 26.84 | 35.32 | 2024. |
| 680 | 32.21249 | 868.34 | 10.61 | 13260.0 | 41199.4 | 136.08 | 26.81 | 35.30 | 2020. |
| 700 | 31.97041 | 864.77 | 10.37 | 13754.5 | 41905.5 | 137.10 | 26.79 | 35.31 | 2017. |
| 720 | 31.73273 | 861.37 | 10.14 | 14249.9 | 42611.8 | 138.09 | 26.78 | 35.32 | 2014. |
| 740 | 31.49927 | 858.12 | 9.93 | 14746.4 | 43318.5 | 139.06 | 26.78 | 35.35 | 2011. |
| 760 | 31.26989 | 855.03 | 9.72 | 15244.0 | 44025.7 | 140.01 | 26.79 | 35.38 | 2008. |
| 780 | 31.04443 | 852.09 | 9.52 | 15742.9 | 44733.6 | 140.93 | 26.80 | 35.42 | 2005. |
| 800 | 30.82275 | 849.29 | 9.33 | 16243.2 | 45442.4 | 141.82 | 26.82 | 35.46 | 2002. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 850 | 30.28434 | 842.93 | 8.89 | 17500.5 | 47218.8 | 143.98 | 26.90 | 35.60 | 1995. |
| 900 | 29.76710 | 837.41 | 8.49 | 18767.6 | 49002.3 | 146.02 | 27.00 | 35.75 | 1990. |
| 950 | 29.26957 | 832.68 | 8.13 | 20045.0 | 50793.7 | 147.95 | 27.11 | 35.91 | 1984. |
| 1000 | 28.79048 | 828.67 | 7.79 | 21332.7 | 52593.1 | 149.80 | 27.23 | 36.07 | 1980. |
| 1050 | 28.32872 | 825.33 | 7.48 | 22630.7 | 54400.6 | 151.56 | 27.35 | 36.23 | 1976. |
| 1100 | 27.88329 | 822.60 | 7.20 | 23938.5 | 56215.9 | 153.25 | 27.47 | 36.38 | 1972. |
| 1150 | 27.45329 | 820.43 | 6.93 | 25255.8 | 58038.7 | 154.87 | 27.59 | 36.53 | 1969. |
| 1200 | 27.03792 | 818.78 | 6.69 | 26582.2 | 59868.7 | 156.43 | 27.71 | 36.67 | 1967. |
| | | | | 9500 bar Isobar | | | | | |
| * 185.780 | 40.39766 | 1485.09 | 14.02 | 432.0 | 23948.2 | 86.82 | 30.47 | 31.98 | 2359. |
| 190 | 40.35579 | 1452.40 | 15.09 | 544.5 | 24085.1 | 87.55 | 31.06 | 32.89 | 2343. |
| 195 | 40.30122 | 1416.28 | 16.18 | 679.5 | 24252.0 | 88.42 | 31.65 | 33.87 | 2326. |
| 200 | 40.24166 | 1382.82 | 17.12 | 816.3 | 24423.7 | 89.29 | 32.15 | 34.77 | 2310. |
| 210 | 40.10927 | 1323.24 | 18.58 | 1093.9 | 24779.2 | 91.02 | 32.89 | 36.29 | 2283. |
| 220 | 39.96181 | 1272.40 | 19.59 | 1375.8 | 25148.5 | 92.74 | 33.35 | 37.50 | 2260. |
| 230 | 39.80223 | 1229.13 | 20.25 | 1660.4 | 25528.4 | 94.43 | 33.59 | 38.44 | 2241. |
| 240 | 39.63315 | 1192.35 | 20.63 | 1946.6 | 25916.4 | 96.08 | 33.68 | 39.13 | 2224. |
| 250 | 39.45689 | 1161.11 | 20.80 | 2233.4 | 26310.3 | 97.69 | 33.64 | 39.62 | 2210. |
| 260 | 39.27545 | 1134.56 | 20.81 | 2520.2 | 26708.3 | 99.25 | 33.51 | 39.95 | 2197. |
| 270 | 39.09050 | 1111.95 | 20.71 | 2806.2 | 27108.8 | 100.76 | 33.32 | 40.13 | 2187. |
| 280 | 38.90342 | 1092.64 | 20.51 | 3091.1 | 27510.5 | 102.22 | 33.07 | 40.20 | 2177. |
| 290 | 38.71535 | 1076.09 | 20.26 | 3374.4 | 27912.5 | 103.63 | 32.80 | 40.18 | 2169. |
| 300 | 38.52718 | 1061.84 | 19.96 | 3656.0 | 28313.9 | 104.99 | 32.51 | 40.09 | 2162. |
| 310 | 38.33962 | 1049.50 | 19.63 | 3935.7 | 28714.2 | 106.31 | 32.21 | 39.96 | 2156. |
| 320 | 38.15321 | 1038.76 | 19.29 | 4213.3 | 29112.9 | 107.57 | 31.91 | 39.78 | 2150. |
| 330 | 37.96837 | 1029.33 | 18.93 | 4488.9 | 29509.7 | 108.79 | 31.60 | 39.57 | 2145. |
| 340 | 37.78539 | 1021.01 | 18.58 | 4762.3 | 29904.3 | 109.97 | 31.30 | 39.35 | 2141. |
| 350 | 37.60450 | 1013.59 | 18.22 | 5033.8 | 30296.7 | 111.11 | 31.01 | 39.12 | 2136. |
| 360 | 37.42584 | 1006.94 | 17.87 | 5303.2 | 30686.7 | 112.21 | 30.73 | 38.88 | 2133. |
| 370 | 37.24951 | 1000.93 | 17.53 | 5570.7 | 31074.4 | 113.27 | 30.46 | 38.65 | 2129. |
| 380 | 37.07555 | 995.45 | 17.20 | 5836.3 | 31459.7 | 114.30 | 30.20 | 38.41 | 2126. |
| 390 | 36.90399 | 990.43 | 16.87 | 6100.1 | 31842.6 | 115.29 | 29.95 | 38.18 | 2123. |
| 400 | 36.73483 | 985.78 | 16.56 | 6362.3 | 32223.3 | 116.26 | 29.71 | 37.96 | 2120. |
| 420 | 36.40360 | 977.39 | 15.96 | 6881.9 | 32978.2 | 118.10 | 29.28 | 37.54 | 2115. |
| 440 | 36.08153 | 969.95 | 15.40 | 7396.0 | 33725.2 | 119.84 | 28.90 | 37.16 | 2110. |
| 460 | 35.76820 | 963.21 | 14.89 | 7905.2 | 34465.1 | 121.48 | 28.56 | 36.83 | 2106. |
| 480 | 35.46314 | 957.00 | 14.41 | 8410.3 | 35198.7 | 123.04 | 28.26 | 36.54 | 2102. |
| 500 | 35.16587 | 951.22 | 13.96 | 8912.0 | 35926.9 | 124.53 | 28.00 | 36.29 | 2098. |
| 520 | 34.87593 | 945.77 | 13.54 | 9411.0 | 36650.4 | 125.95 | 27.78 | 36.07 | 2094. |
| 540 | 34.59288 | 940.61 | 13.16 | 9907.7 | 37370.0 | 127.30 | 27.59 | 35.89 | 2090. |
| 560 | 34.31633 | 935.70 | 12.79 | 10402.8 | 38086.4 | 128.61 | 27.43 | 35.75 | 2086. |
| 580 | 34.04589 | 931.01 | 12.45 | 10896.6 | 38800.2 | 129.86 | 27.30 | 35.63 | 2083. |
| 600 | 33.78124 | 926.53 | 12.13 | 11389.7 | 39511.8 | 131.07 | 27.19 | 35.54 | 2079. |
| 620 | 33.52207 | 922.23 | 11.83 | 11882.4 | 40221.9 | 132.23 | 27.10 | 35.47 | 2076. |
| 640 | 33.26810 | 918.11 | 11.54 | 12374.9 | 40930.8 | 133.36 | 27.03 | 35.42 | 2072. |
| 660 | 33.01907 | 914.16 | 11.27 | 12867.7 | 41638.9 | 134.44 | 26.98 | 35.39 | 2069. |
| 680 | 32.77477 | 910.37 | 11.02 | 13360.9 | 42346.6 | 135.50 | 26.94 | 35.38 | 2066. |
| 700 | 32.53497 | 906.75 | 10.77 | 13854.8 | 43054.1 | 136.53 | 26.91 | 35.38 | 2063. |
| 720 | 32.29949 | 903.28 | 10.54 | 14349.5 | 43761.8 | 137.52 | 26.90 | 35.39 | 2060. |
| 740 | 32.06815 | 899.96 | 10.32 | 14845.3 | 44469.7 | 138.49 | 26.89 | 35.41 | 2057. |
| 760 | 31.84081 | 896.79 | 10.11 | 15342.2 | 45178.2 | 139.44 | 26.90 | 35.44 | 2054. |
| 780 | 31.61730 | 893.76 | 9.90 | 15840.5 | 45887.3 | 140.36 | 26.91 | 35.48 | 2051. |
| 800 | 31.39749 | 890.88 | 9.71 | 16340.0 | 46597.2 | 141.26 | 26.93 | 35.52 | 2048. |
| 850 | 30.86339 | 884.28 | 9.26 | 17595.5 | 48376.3 | 143.41 | 27.00 | 35.65 | 2042. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 900 | 30.34997 | 878.49 | 8.85 | 18860.8 | 50162.3 | 145.46 | 27.09 | 35.80 | 2036. |
| 950 | 29.85577 | 873.47 | 8.47 | 20136.4 | 51956.1 | 147.40 | 27.19 | 35.95 | 2030. |
| 1000 | 29.37956 | 869.17 | 8.13 | 21422.4 | 53757.8 | 149.24 | 27.31 | 36.12 | 2026. |
| 1050 | 28.92023 | 865.53 | 7.81 | 22718.6 | 55567.6 | 151.01 | 27.43 | 36.28 | 2022. |
| 1100 | 28.47682 | 862.51 | 7.52 | 24024.8 | 57385.3 | 152.70 | 27.54 | 36.43 | 2018. |
| 1150 | 28.04845 | 860.05 | 7.24 | 25340.5 | 59210.5 | 154.32 | 27.66 | 36.58 | 2015. |
| 1200 | 27.63435 | 858.12 | 6.99 | 26665.4 | 61042.9 | 155.88 | 27.77 | 36.72 | 2012. |
| | | | | 10000 bar Isobar | | | | | |
| * 190.397 | 40.68642 | 1538.78 | 13.45 | 698.2 | 25276.4 | 87.33 | 30.32 | 31.67 | 2395. |
| 195 | 40.64388 | 1503.07 | 14.63 | 820.5 | 25424.5 | 88.10 | 30.95 | 32.63 | 2378. |
| 200 | 40.59270 | 1466.92 | 15.74 | 955.0 | 25590.0 | 88.94 | 31.53 | 33.58 | 2362. |
| 210 | 40.47631 | 1402.24 | 17.52 | 1228.5 | 25934.3 | 90.62 | 32.42 | 35.23 | 2332. |
| 220 | 40.34376 | 1346.70 | 18.81 | 1506.5 | 26293.5 | 92.29 | 33.01 | 36.56 | 2307. |
| 230 | 40.19789 | 1299.14 | 19.70 | 1787.7 | 26664.6 | 93.94 | 33.37 | 37.62 | 2287. |
| 240 | 40.04130 | 1258.49 | 20.28 | 2070.9 | 27045.1 | 95.56 | 33.55 | 38.44 | 2269. |
| 250 | 39.87632 | 1223.79 | 20.62 | 2355.2 | 27432.7 | 97.14 | 33.59 | 39.05 | 2254. |
| 260 | 39.70499 | 1194.18 | 20.77 | 2639.7 | 27825.4 | 98.68 | 33.52 | 39.48 | 2241. |
| 270 | 39.52905 | 1168.88 | 20.77 | 2923.9 | 28221.7 | 100.17 | 33.37 | 39.75 | 2229. |
| 280 | 39.34999 | 1147.24 | 20.67 | 3207.2 | 28620.1 | 101.62 | 33.17 | 39.91 | 2220. |
| 290 | 39.16902 | 1128.66 | 20.49 | 3489.2 | 29019.6 | 103.02 | 32.93 | 39.97 | 2211. |
| 300 | 38.98715 | 1112.67 | 20.25 | 3769.7 | 29419.2 | 104.38 | 32.67 | 39.95 | 2204. |
| 310 | 38.80519 | 1098.83 | 19.98 | 4048.5 | 29818.3 | 105.69 | 32.39 | 39.86 | 2197. |
| 320 | 38.62376 | 1086.81 | 19.67 | 4325.5 | 30216.3 | 106.95 | 32.09 | 39.73 | 2191. |
| 330 | 38.44337 | 1076.30 | 19.35 | 4600.5 | 30612.8 | 108.17 | 31.80 | 39.57 | 2186. |
| 340 | 38.26439 | 1067.05 | 19.01 | 4873.5 | 31007.5 | 109.35 | 31.51 | 39.38 | 2182. |
| 350 | 38.08709 | 1058.86 | 18.68 | 5144.6 | 31400.2 | 110.49 | 31.22 | 39.17 | 2178. |
| 360 | 37.91170 | 1051.55 | 18.34 | 5413.8 | 31790.8 | 111.59 | 30.94 | 38.95 | 2174. |
| 370 | 37.73835 | 1044.99 | 18.00 | 5681.0 | 32179.3 | 112.65 | 30.67 | 38.73 | 2170. |
| 380 | 37.56713 | 1039.05 | 17.68 | 5946.5 | 32565.5 | 113.68 | 30.41 | 38.51 | 2167. |
| 390 | 37.39811 | 1033.64 | 17.36 | 6210.1 | 32949.5 | 114.68 | 30.16 | 38.29 | 2164. |
| 400 | 37.23130 | 1028.67 | 17.04 | 6472.2 | 33331.3 | 115.65 | 29.93 | 38.08 | 2161. |
| 420 | 36.90435 | 1019.80 | 16.45 | 6991.6 | 34088.7 | 117.49 | 29.49 | 37.67 | 2156. |
| 440 | 36.58612 | 1012.04 | 15.89 | 7505.4 | 34838.2 | 119.24 | 29.09 | 37.29 | 2152. |
| 460 | 36.27630 | 1005.08 | 15.36 | 8014.4 | 35580.6 | 120.89 | 28.75 | 36.96 | 2148. |
| 480 | 35.97450 | 998.73 | 14.88 | 8519.3 | 36316.8 | 122.45 | 28.44 | 36.66 | 2144. |
| 500 | 35.68030 | 992.86 | 14.42 | 9020.8 | 37047.4 | 123.95 | 28.18 | 36.41 | 2140. |
| 520 | 35.39327 | 987.36 | 14.00 | 9519.4 | 37773.3 | 125.37 | 27.95 | 36.19 | 2136. |
| 540 | 35.11301 | 982.17 | 13.60 | 10015.7 | 38495.2 | 126.73 | 27.75 | 36.01 | 2133. |
| 560 | 34.83913 | 977.24 | 13.23 | 10510.4 | 39213.8 | 128.04 | 27.59 | 35.85 | 2129. |
| 580 | 34.57128 | 972.54 | 12.88 | 11003.8 | 39929.5 | 129.29 | 27.45 | 35.73 | 2126. |
| 600 | 34.30912 | 968.04 | 12.56 | 11496.4 | 40643.1 | 130.50 | 27.33 | 35.63 | 2123. |
| 620 | 34.05236 | 963.73 | 12.25 | 11988.5 | 41355.0 | 131.67 | 27.24 | 35.56 | 2119. |
| 640 | 33.80072 | 959.59 | 11.95 | 12480.5 | 42065.7 | 132.80 | 27.16 | 35.51 | 2116. |
| 660 | 33.55396 | 955.62 | 11.68 | 12972.7 | 42775.4 | 133.89 | 27.11 | 35.47 | 2113. |
| 680 | 33.31183 | 951.80 | 11.42 | 13465.2 | 43484.6 | 134.95 | 27.06 | 35.45 | 2110. |
| 700 | 33.07415 | 948.14 | 11.17 | 13958.5 | 44193.6 | 135.98 | 27.03 | 35.45 | 2107. |
| 720 | 32.84071 | 944.62 | 10.93 | 14452.6 | 44902.6 | 136.98 | 27.01 | 35.45 | 2104. |
| 740 | 32.61134 | 941.25 | 10.70 | 14947.7 | 45611.9 | 137.95 | 27.01 | 35.47 | 2101. |
| 760 | 32.38589 | 938.02 | 10.48 | 15443.9 | 46321.6 | 138.89 | 27.01 | 35.50 | 2098. |
| 780 | 32.16420 | 934.93 | 10.28 | 15941.4 | 47031.9 | 139.82 | 27.02 | 35.53 | 2095. |
| 800 | 31.94615 | 931.98 | 10.08 | 16440.3 | 47743.0 | 140.72 | 27.03 | 35.58 | 2092. |
| 850 | 31.41612 | 925.18 | 9.62 | 17693.9 | 49524.7 | 142.88 | 27.09 | 35.70 | 2086. |
| 900 | 30.90632 | 919.16 | 9.19 | 18957.4 | 51313.3 | 144.92 | 27.18 | 35.84 | 2080. |
| 950 | 30.41533 | 913.89 | 8.81 | 20231.2 | 53109.4 | 146.86 | 27.28 | 36.00 | 2075. |
| 1000 | 29.94191 | 909.33 | 8.46 | 21515.4 | 54913.4 | 148.71 | 27.39 | 36.16 | 2070. |

Thermodynamic properties of nitrogen—Continued

| Temperature kelvin | Density mol/l | Isotherm derivative l·bar/mol | Isochore derivative bar·K | Internal energy J/mol | Enthalpy J/mol | Entropy J/mol·K | $C_v$ J/mol·K | $C_p$ J/mol·K | Velocity of sound m/s |
|---|---|---|---|---|---|---|---|---|---|
| 1050 | 29.48497 | 905.43 | 8.13 | 22809.9 | 56725.5 | 150.48 | 27.50 | 36.32 | 2066. |
| 1100 | 29.04358 | 902.13 | 7.83 | 24114.5 | 58545.5 | 152.18 | 27.62 | 36.48 | 2062. |
| 1150 | 28.61689 | 899.41 | 7.55 | 25428.6 | 60373.0 | 153.80 | 27.73 | 36.62 | 2059. |
| 1200 | 28.20413 | 897.21 | 7.29 | 26752.0 | 62207.8 | 155.36 | 27.84 | 36.76 | 2057. |

*Two phase boundary.