Thermochemical Data for Gaseous Monoxides

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Values for standard enthalpies of formation and dissociation energies for gaseous diatomic monoxides have been selected by critical assessment of experimental data from the literature. Gibbs energy functions, $-(G^\circ_T - H^\circ_{298})/T$), and enthalpy functions, $(H^\circ_T - H^\circ_{298})$, have been calculated from literature values for molecular parameters. Computer methods of storage, processing and retrieval are described and the resulting data are given in tables 4 to 11.

Key words: computer methods; critically evaluated data; dissociation energies; enthalpy functions; free energy functions; gaseous diatomic monoxides; molecular parameters; standard enthalpies of formation.

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1. Introduction

The work described here concerns the production of tables of accurate self-consistent thermochemical data for simple inorganic high temperature species, at present specifically gaseous monoxides, over the temperature range 0 - 4000 K. This has been achieved by critical assessment of experimental data, published in the literature between 1960 and 1980. A few earlier papers have been included where there is insufficient reliable data for a given monoxide post-1960. Computer techniques have been used for storage, processing and presentation of data.

Data for gaseous monoxides were last assessed in 1969 [1][1] but since that date many new measurements have been made, some of which have involved use of novel techniques such as molecular beams and laser fluorescence, and reassessment is therefore timely. The present compilation is a full coverage of data on all gaseous monoxides. It will be shown later that a comprehensive study is essential because of the direct relationship between data for many of the monoxides. In addition, an overall survey within the Periodic Table can be used to estimate values of dissociation energies where experimental data are lacking or unreliable.

Experimental data involving gaseous monoxides have been collected and assembled in a computer file. The data included in the file are as close as possible to the original experimental measurements and are processed using subsidiary data as described in section 3.1 to give values for the standard enthalpy changes for the processes. Values for the standard enthalpies of formation and dissociation energies of the gaseous monoxides are then derived using subsidiary data from well-established compilations. The derived values are assessed, and the most reliable values selected. Errors are assigned reflecting our degree of confidence in the choice, and take into account the spread of values for a given monoxide, the number of values, and our assessment of their reliability. Since very little of the data extracted from the literature is in SI units, the data in the files and their processing have involved non-SI units and the discussion is therefore in terms of calories. The selected values for thermochemical data, presented in tables 4 to 11, are, however, given in calories and in joules.

Although restricted to data on gaseous monoxides, the techniques which have been devised for organisation, processing and assessment are applicable to data on other oxides and high temperature species generally. Tables of values for dissociation energies, standard enthalpies of formation and thermal functions over a wide temperature range can be produced automatically from computer files. It is intended that, as far as possible, the tabulated data will be consistent with those of other groups active in the field of thermochemical data compilation. Some of these tables have already been jointly agreed upon with the group responsible for the JANAF tables [2].

2. Computer Storage of Data

2.1. Experimental Data File

Material extracted from the literature is inserted in chronological and alphabetic (under authors) order into the Experimental Data File, which at present contains over 5000 lines of information extracted from more than 200 papers. An example of a paper in the file is shown in table 1. Each article starts with a reference code giving the year of publication and three letter contractions of the names of the first two authors. A number at the end of the code is sometimes necessary to distinguish between two papers by the same authors in a given year e.g. 71ACK/RAU1 and 71ACK/RAU2. The code is followed by the full reference, a very brief description of the experimental techniques used, the authors' derived values for the standard enthalpy of formation and/or the dissociation energy of the gaseous monoxide(s), and their choice of subsidiary data. Also given are comments on the work from later papers (and our own comments labelled 81PED/MAR) and the precise position in the paper where the experimental data are to be found.

The equation for the first process in table 1 is preceded by a code indicating the type of measurement on that process, in this case 'LKC' denoting $\log_{10} K$ in parametric form. At present, only capital letters can be used in the files so it is necessary in some cases to separate element symbols in the equations by a number '1'. On the line following the equation is a code indicating the technique used (here 'WL' denotes 'Weight Loss'), preceded by symbols * and/or ? to denote the extent to which this measurement has been considered in the final selection of standard enthalpies of formation. Also shown is the overall uncertainty on the standard enthalpy change for the process, which is either that quoted by the authors or a value estimated by us. Full details of the codes and symbols are given in the key to the Process Catalogue, Appendix I.

The experimental data are stored in a form which is as close as possible to the actual measurements, the

[1] Figures in brackets indicate literature references in section 8. References denoted by codes, e.g., 73ACK/RAU1 are given in appendix IV.

most fundamental information being partial pressures of gaseous species at specified temperatures. Authors do not always give this basic information, in which case their calculated value for the equilibrium constant, Gibbs energy change for the reaction or even standard enthalpy change for the reaction has to be accepted, although the less basic the data, the greater is the danger of introducing inconsistencies, since choice of subsidiary data can vary considerably from one study to another. For the processes shown in table 1, individual partial pressures were not given by the authors and equilibrium constants as a function of temperature over the indicated temperature range were taken from the sections of the paper shown under 'EXTRACTED DATA'. If values of measurements are given at different specified temperatures, these temperatures and values are listed on separate lines after the technique code.

TABLE 1. Specimen paper from experimental data file

```
1     71ACK/RAU1   R.J.ACKERMANN, E.G RAUH,
2   J.CHEM.THERMODYNAMICS 3, 445 (1971).
3   ''A HIGH TEMPERATURE STUDY OF THE STOICHIOMETRY, PHASE BEHAVIOUR,
4   VAPORIZATION CHARACTERISTICS AND THERMODYNAMIC PROPERTIES OF THE
5   LANTHANUM + OXYGEN SYSTEM.''
6   MASS SPECTROMETRY.   KNUDSEN EFFUSION, W AND RE CELLS, MASS LOSS.
7   DO(LAO) = 189.9 +/- 1.0 KCAL MOL-1.   DHFO(LAO) = -28.6 +/- 1 KCAL MOL-1.
8   USING DATA FOR YO FROM 64ACK/RAU.
9      COMMENTS FROM LATER PAPERS:
10  73ACK/RAU1 CONFIRM K(Y+)/K(YO+) = 1.5
11  74LIU/WAH  CONFIRM CONSISTENCY OF DATA IN THIS PAPER.
12  81PED/MAR  PRECISE ANALYSIS OF HIGH-TEMPERATURE SUBSTOICHIOMETRIC SOLID
13             PHASE AND ITS PROCESS OF VAPORIZATION.  WEIGHT-LOSS AND MASS-
14             SPECTROMETRIC MEASUREMENTS GIVING ACCURATE VAPOUR PRESSURES
15             OVER A WIDE TEMPERATURE RANGE AND A DEFINITIVE EXPRESSION FOR
16             THE LOGARITHM OF K FOR THE FIRST PROCESS.
17             FOR THE SECOND (METATHETICAL) PROCESS, RELATIVE INSTRUMENTAL
18             SENSITIVITIES ESTIMATED AS K(LA+)/K(LAO+)=1.7 AND K(Y+)/K(YO+)
19             =1.5.  QUITE GOOD AGREEMENT BETWEEN 2ND AND 3RD LAW VALUES.
20     EXTRACTED DATA:
21  P.451 EQUATION 7 USING P(0)=0.161 x P(LAO) FROM P.450
22  METATHETICAL REACTION FROM CAPTION TO FIG. 3
23  ^^^^
24  LKC LA203(C)-2LA1O(G)+O(G)
25  **WL  2.0
26  1600 2400 0 23.09 3.0 -1 -90270. 10000.
27  LKC LA(G)+Y1O(G)=LA1O(G)+Y(G)
28  **MS  1.0
29  1783 2184 0 -0.506 0.047 -1 5260. 90.

KEY

Line
1-5     Reference code, reference and title
6       Brief description of methods used
7-8     Authors' calculated values
9-19    Comments by other authors
20-22   Position of data in paper
23      End of textual material
24      Code for type of measurement and equation for process
25      Weight attached to measurement, code for technique used
        (see key to Appendix I for more details), and overall
        uncertainty on the standard enthalpy change for the
        process at 298 K in kcal mol-1
26      Temperature range (in this example 1600-2400 K)
        Experimental values.      In this example:-
        log10K = T^0(23.09±3.0) + T^-1(-90270.0±10000.0)
27-29   As for lines 24-26
```

TABLE 2. Example of data for subsidiary species

```
1   LA(G)
2   73HUL/DES     103.000  1.000 1.509 138.906
3   73HUL/DES       298  11  11   0
4   1500 48.718  8.319
5   1600 49.080  9.084
6   1700 49.428  9.850
7   1800 49.762 10.616
8   1900 50.083 11.381
9   2000 50.393 12.146
10  2200 50.978 13.675
11  2400 51.524 15.203
12  2600 52.036 16.732
13  2800 52.516 18.265
14  3000 52.969 19.805
15
16  LA203(C)
17  69BRE/ROS   -428.600  0.200 4.742 325.809
18  80IVTAN       298   7   7   2
19  1500 54.229 37.253
20  1600 55.850 40.635
21  1700 57.405 44.054
22  1800 58.900 47.508
23  1900 60.339 50.998
24  2000 61.727 54.524
25  2500 68.177 72.088
26  VALUE FOR (H(298)-H(0)) FROM 63JUS/WES
27  THERMAL FUNCTIONS AT 2500K FROM 59GOL/NEI
```

KEY

Line	
1	Formula
2	Reference code, standard enthalpy of formation and its uncertainty, enthalpy function ($H_{298}-H_0^\circ$), and molecular weight.
3	Reference code for thermal functions, reference temperature, number of free energy function values, number of enthalpy function values and number of comment lines.
4–14	Temperature, free energy function ($-(G_T^\circ-H_{298})/T$), and enthalpy function ($H_T^\circ-H_{298}$)
16–25	As above for lines 1–14
26–27	Comments

2.2. Subsidiary Data Files

Processing the Experimental Data File to produce standard enthalpies of formation and dissociation energies usually requires thermal functions for the gaseous monoxides and for other, subsidiary, species. Standard enthalpies of formation of the latter are also needed.

Thermal functions for the gaseous monoxides are calculated at the required temperatures from the computer file of molecular parameters given in Appendix II (taken from reference [3] unless otherwise indicated). Thermal functions for other, subsidiary, species are interpolated from values stored in another file, a section of which is illustrated in table 2 for La(g) and La_2O_3(c). This file also contains standard enthalpies of formation and the references from which the data were taken. Thermal functions are usually tabulated at 100 K intervals but, for a particular species, the temperature range for the thermal functions has been limited to that required to cover the temperatures of the measurements which include that species in the Experimental Data File, i.e. for La(g) 1500 – 3000 K and for La_2O_3(c) 1500 – 2500 K. In spite of the above restriction, the complete file is too large to be presented in this paper, but reference codes for the sources of the thermal functions are given in Appendix III, which also contains values for the standard enthalpies of formation of the subsidiary species.

3. Data Processing

3.1. Reduction to Standard Temperature

Computer programs convert the basic experimental data into values for standard enthalpy changes for the processes. For example, processing the data from the paper shown in table 1 gives the information shown in table 3 (below and to the right of the dashed line for each process).

If values for partial pressures of gaseous species are present in the Experimental Data File they are converted into a value for the equilibrium constant and then into the standard Gibbs energy change for the process. Third law treatment, using values of the Gibbs energy function ($-(G_T^\circ-H_{298}^\circ)/T$), gives values for the standard enthalpy change for the process at each of the specified temperatures. The experimental data in tables 1 and 3 take the form of $\log_{10} K_p$ as a function of temperature over the ranges 1600 – 2400 K and 1783 – 2184 K. In this case the calculations described above are carried out at the two extremes of the temperature ranges. Other forms of data are converted into values of standard enthalpy changes for the reactions in a similar way. The column on the extreme right hand side in table 3 headed 'HBAR-H' shows the differences between the average value of the standard enthalpy change and the values derived at individual temperatures. A least squares average second law value of the standard enthalpy change for the process is also calculated if the temperature range of the measurements is greater than 100 K.

Thermal functions are calculated at the temperature of each individual measurement, but only the value at the average reciprocal temperature is quoted to indicate the order of magnitude. The order of presentation of the thermal functions is the same as that of the species in the equation. For species other than gaseous monoxides, thermal functions are obtained by quadratic interpolation of data from the subsidiary data file, illustrated in table 2 for La(g) and La_2O_3. Thermal functions for the gaseous monoxides (with reference 81PED/MAR) are calculated each time they are needed, from partition functions derived from the molecular parameters in Appendix II. Many of the parameters have been estimated as described in the footnotes to Appendix II.

Contributions to the partition function (and its

TABLE 3. Results of processing the data in table 1

71ACK/RAU1

LA2O3(C)=2LAIO(G)+O(G)

T/K	LOG EQUILIBRIUM CONSTANT	DG	DH298	HBAR-H
1600	-0.3333E+02	244.02	429.62	0.29
2400	-0.1452E+02	159.49	430.21	-0.29

THERMAL FUNCTIONS AT 1920K

(H-H298)/KCAL	51.703	14.575	8.138
(-(G-H298)/T)/CAL	60.619	65.826	43.631
REFERENCES	80IVTAN	81PED/MAR	81IVTAN

AVERAGE THIRD LAW DH298 429.91 +/- 2.0
SECOND LAW DH298 427.50

CALCULATION FOR LAIO(G):-

CURRENT ENTHALPIES OF FORMATION		REFERENCES
LA2O3(C)	-428.60+/- 0.20	69BRE/ROS
O(G)	59.55+/- 0.02	77CODATA

DERIVED ENTHALPY OF FORMATION AT 298K OF LAIO(G) -29.12 +/- 1.0
DISSOCIATION ENERGY AT OK 190.68

CURRENT SELECTED VALUES:
ENTHALPY OF FORMATION AT 298K -29.0 +/- 2.5
DISSOCIATION ENERGY AT OK 190.6

LA(G)+YIO(G)=LAIO(G)+Y(G)

T/K	LOG EQUILIBRIUM CONSTANT	DG	DH298	HBAR-H
1783	0.2444E+01	-19.94	-19.76	0.22
2184	0.1902E+01	-19.01	-19.32	-0.22

THERMAL FUNCTIONS AT 1963K

(H-H298)/KCAL	11.863	14.410	15.002	8.918
(-(G-H298)/T)/CAL	50.280	64.477	65.995	48.747
REFERENCES	73HUL/DES	81PED/MAR	81PED/MAR	73HUL/DES

AVERAGE THIRD LAW DH298 -19.54 +/- 1.0
SECOND LAW DH298 -21.72

CALCULATION FOR YIO(G):-

CURRENT ENTHALPIES OF FORMATION		REFERENCES
LA(G)	103.00+/- 1.00	73HUL/DES
LAIO(G)	-29.00+/- 2.50	81PED/MAR
Y(G)	101.50+/- 1.00	73HUL/DES

DERIVED ENTHALPY OF FORMATION AT 298K OF YIO(G) -10.96 +/- 3.0
DISSOCIATION ENERGY AT OK 170.88

CURRENT SELECTED VALUES:
ENTHALPY OF FORMATION AT 298K -11.0 +/- 2.5
DISSOCIATION ENERGY AT OK 170.9

CALCULATION FOR LAIO(G):-

CURRENT ENTHALPIES OF FORMATION		REFERENCES
LA(G)	103.00+/- 1.00	73HUL/DES
YIO(G)	-11.00+/- 2.50	81PED/MAR
Y(G)	101.50+/- 1.00	73HUL/DES

DERIVED ENTHALPY OF FORMATION AT 298K OF LAIO(G) -29.04 +/- 3.0
DISSOCIATION ENERGY AT OK 190.60

CURRENT SELECTED VALUES:
ENTHALPY OF FORMATION AT 298K -29.0 +/- 2.5
DISSOCIATION ENERGY AT OK 190.6

derivative with respect to temperature) from electronic and vibrational energy levels are calculated by direct summation up to an energy level equal to 10 kT. The contribution from rotational levels within a given vibrational level in a given electronic state is obtained by integration, ignoring the centrifugal distortion constant. The electronic states used are those having term values less than 10000 cm^{-1}. Comparison with the JANAF tables [2] and with selected calculations using direct summation of all levels, and including states higher than 10000 cm^{-1}, indicates that the above approximations introduce errors of less than 0.1 cal mol^{-1} K^{-1} in the Gibbs energy function at the highest temperatures present in the Experimental Data File. For some monoxides, with term values just above 10000 cm^{-1}, errors of order 1 kcal mol^{-1} may start to occur in the enthalpy functions for temperatures approaching 4000 K. Thermal functions for the gaseous monoxides, calculated from the stored molecular parameters, are listed at intervals of 100 K in the temperature range 0 - 4000 K in tables 8 to 11.

3.2. Calculation of Standard Enthalpies of Formation

Standard enthalpies of formation of the gaseous monoxides are calculated from the values for standard enthalpy changes for the processes, using the current selected values for standard enthalpies of formation for the other species present (see table 3). For reactions involving two gaseous monoxides (e.g. the second equation in table 3), separate calculations are carried out for each of the monoxides using the current selected value for the standard enthalpy of formation of the other (reference 81PED/MAR) from table 4. Values of standard enthalpies of formation for species other than gaseous monoxides are taken from Appendix III. In almost all cases the third law value for the standard enthalpy change for the reaction is used, the second law value, where present, being taken only as a check of the general reliability of the measurements and the thermal functions used in the third law treatment.

Dissociation energies for the gaseous monoxides are also calculated using standard enthalpies of formation of the gaseous atoms from Appendix III. Finally, in table 3, the calculated values of the standard enthalpies of formation and dissociation energies for the gaseous monoxides are compared with the currently selected values from table 4. Summaries of the above calculations are given in the Process Catalogue, Appendix I, under each monoxide present in the process.

4. Assessment of Experimental Techniques

4.1. Introduction

Data are available for about 70 gaseous monoxides, but the number of different measurements in which a species is involved varies considerably, from only one measurement for some monoxides, to 29 measurements involving AlO(g). Values for the standard enthalpy of formation of AlO(g) calculated from these measurements vary from -6 to 32 kcal mol^{-1}.

Selection of 'best' values for standard enthalpies of formation for the gaseous monoxides involves a critical assessment of the various techniques used. No specific technique is intrinsically better than any other, but some general advantages and disadvantages can be identified for each one. The techniques concerned can be discussed under four main headings: spectroscopy, weight loss, mass spectrometry and flame studies. Three possible general sources of error can be identified, namely:

(a) Failure to identify the process correctly.

(b) Limitations in accuracy of measurements.

(c) Uncertainties in values of thermal functions and standard enthalpies of formation for subsidiary species.

The following summary of the above possible sources of error associated with each type of experimental method serves to clarify the broad principles underlying the choice of selected values for standard enthalpies of formation of the gaseous monoxides.

4.2. Spectroscopy and Collision Processes

Included in this category are spectroscopic dissociation energies, crossed beam, chemiluminescence, laser fluorescence and electron impact studies.

In each of these processes there may be considerable doubt concerning the states of the reactants and products, particularly in cases where there is significant electronic excitation. This uncertainty is the major source of error in the derived values since the measurements themselves can be made with a high degree of accuracy, and, as the measurements yield values for the standard enthalpy change for the process at 0 K, conversion to 298 K introduces less error than does the reduction of high temperature data. Subsidiary species are either gaseous atoms or small molecules such as O_2, NO, NO_2, etc., for which standard enthalpies of formation are well-established. Provided the states of the species involved can be identified, spectroscopy and collision processes give very accurate values for derived enthalpies of formation.

4.3. Weight Loss

Measurement of the weight lost from a surface or from a Knudsen cell gives no information about the process of vaporization. Additional measurements are therefore necessary to identify the composition both of the condensed phase(s) and of the gaseous phase.

Although the weight loss can be measured accurately, errors in the calculation of vapour pressures can arise due to vaporization of the container material or reaction between the container and the sample.

Reduction of high temperature weight loss data to the standard enthalpy change for the reaction is a potential source of considerable error since, for many of the condensed oxides, values of the Gibbs energy function, $(-(G^\circ_T - H^\circ_{298})/T)$, derived from heat capacity data, are of doubtful accuracy. Enthalpies of formation of the condensed oxides may also be suspect since many solid and liquid oxides exist at high temperatures in ill-defined non-stoichiometric forms. For gaseous species, thermal functions are derived from partition functions based on molecular parameters. These are, in many cases, uncertain, particularly for transition, lanthanide and actinide element oxides, where the low-lying electronic states are often ill-defined.

4.4. Mass Spectrometry

In gas phase equilibria, mass spectrometry can identify the reactants and products unambiguously (unless the energy of the ionizing electrons is sufficiently high to cause dissociation of the molecules), but where condensed phases are present other methods of analysis are necessary to confirm their composition at equilibrium.

The relationship between measured ion intensities and absolute vapour pressures is largely dependent on ionization cross-sections (defined as the probability of an ionizing collision occurring). Values of ionization cross-sections have been measured for only a few atoms. For other atoms reasonable estimates can be based on the size of the atom, its ionization potential and the energy of the ionizing electrons, but for molecules, values are largely speculative. In metathetical reactions of the form:

$$M(g) + M'O(g) = M'(g) + MO(g)$$

cross-sections may be assumed to cancel, but in other gas phase equilibria e.g. $TiO_2(g) = TiO(g) + O(g)$, or where a condensed phase is present, incorrect choice of cross-sections may cause significant errors in calculations of equilibrium constants.

Problems with subsidiary data for mass spectrometric measurements are similar to those for weight loss experiments, since most of the measurements for both methods are at temperatures in the range 1500 - 2500 K.

4.5. Flame Equilibria

In flame studies it is often assumed that the decrease in the concentration of the element detected in the flame, compared with its initial concentration, is due solely to the formation of the monoxide. It has, however, been shown that hydroxides and other oxides may be formed and must be taken into account.

Partial pressures of species in the flame are rarely measured directly, but are estimated from the total amount of material injected into the flame. Difficulties are experienced in measuring accurately the temperature of the flame, and errors may also arise in converting observed spectroscopic intensities into concentrations of the species.

Conversion of the data from high temperatures to 298 K introduces the same type of error as described for the gas phase reactions in the sections above on weight loss and mass spectrometry.

4.6. Kinetic Measurements

Kinetic experiments involve the measurement of rate constants as a function of temperature, giving activation energies which are assumed to be upper bounds for enthalpies of reaction; in all cases they have been found to give values for dissociation energies which are very inconsistent with other measurements, and have therefore been discounted.

4.7. Order of Preference of Experimental Techniques

Inspection of the Process Catalogue, Appendix I, shows that about 67% of the listed processes are from mass spectrometry. It is thus inevitable that many of the selected values are based on mass spectrometric measurements, but where values derived from other methods are available, the following order of priority has, in general, been assumed.

Spectroscopic techniques and collision processes are considered to be the most reliable, provided the states of the reactants and products are precisely defined. These methods often give accurate upper or lower limits for standard enthalpies of formation, but these have been accepted only when confirmed by other techniques.

Weight loss measurements give more accurate absolute vapour pressures than mass spectrometric or flame studies, but suffer from the limitation that the vaporization process may not be well defined. Sesquioxide vaporization processes, particularly of lanthanides, appear to be unreliable. Weight loss measurements are therefore accepted as definitive only if supported by accurate analytical techniques, i.e. mass spectrometric study of the gas phase, and chemical analysis of the condensed phase(s).

Mass spectrometric measurements involving only gas phase species are preferred to those where condensed phases are present since it is often difficult to define the composition of the condensed phase. In gas phase equilibria, metathetical processes are preferred to other reactions since, in the former, errors in converting ion intensity measurements to partial pressures tend to cancel.

In general, older flame measurements have been discounted because of difficulties in calculating the partial

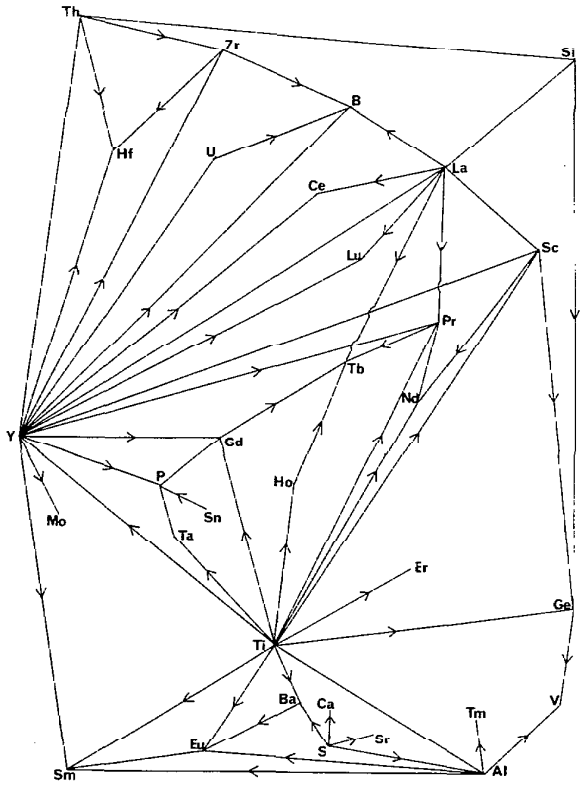

FIGURE 1. Main network of metathetical processes, M(g) + M'O(g) = M'(g) + MO(g).

pressures of species present in the flame.

From the above review of experimental methods and their deficiencies it is evident that enthalpies of formation and dissociation energies cannot be defined very precisely. Even the most reliable values are probably not accurate to better than 1 kcal mol^{-1}, therefore, in all cases, the selected values for standard enthalpies of formation for the gaseous monoxides have been rounded to the nearest 0.5 kcal mol^{-1}.

5. Selection of Values for Standard Enthalpies of Formation for Gaseous Monoxides

5.1. Introduction

For the purpose of selecting recommended values for standard enthalpies of formation, the gaseous monoxides have been divided into six classes.

Monoxides in classes 1, 2 and 3 are present in the metathetical (isomolecular exchange) equations represented in Figure 1, the lines joining two element symbols indicating the two monoxides present in the equation. In the early stages of the assessment work, a number of computer analyses were applied to this set of data to assist in identifying inconsistencies. These techniques were least sums, least squares and loops

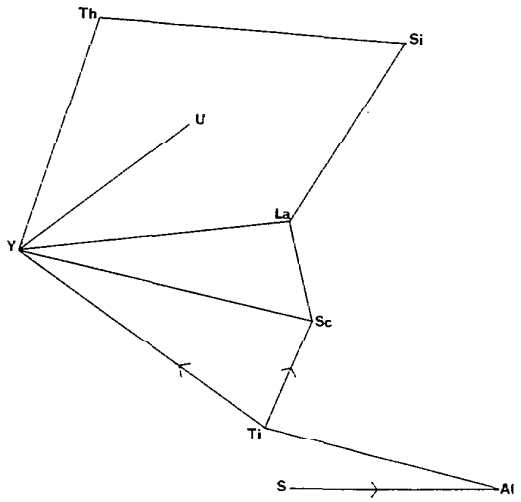

FIGURE 2. Network of metathetical processes for key monoxides.

analysis. In the latter technique, the algebraic sum of the enthalpies of reaction is calculated for a closed loop of equations. These combined enthalpy changes, or residuals, should be zero, but if several loops having large residuals are found to contain one equation in common, the value for the standard enthalpy change for that equation may be suspect.

If there is no arrow on the line joining two element symbols, the values for the standard enthalpies of formation of their monoxides are considered to be equally well defined. If the standard enthalpy of formation of one of the monoxides is considered to be more reliable than the other, the element symbol for the former is at the starting point of the arrow on the line.

Monoxides in classes 1 and 2 are considered to have the most well-established values for standard enthalpies of formation, and the metathetical equations for this sub-section of figure 1 are shown in figure 2.

Class 3 comprises the remainder of the monoxides shown in figure 1; in general the values of their standard enthalpies of formation are considered to be less reliable than those in classes 1 and 2.

Classes 4 and 5 are small sets of interrelated monoxides as shown in figures 3 and 4.

Class 6 contains all other monoxides, i.e. those not involved in metathetical reactions.

A summary of the measurements upon which assessments are based is given in the Process Catalogue, Appendix I. In most cases the selected value for the standard enthalpy of formation and the error assigned to it are based on the general critical assessment of experimental techniques discussed in detail in section 4, in particular on the order of preference in section 4.7. Exceptions to this procedure are specifically mentioned in sections 5.2 to 5.7. A metathetical reaction is considered in the assessment of the standard enthalpy of formation of only the monoxide with the less well-established

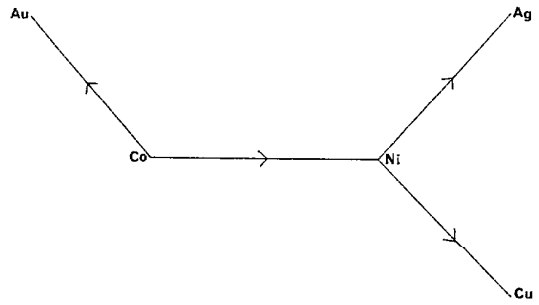

FIGURE 3. Network of metathetical processes for monoxides of Ag, Au, Co, Cu, and Ni.

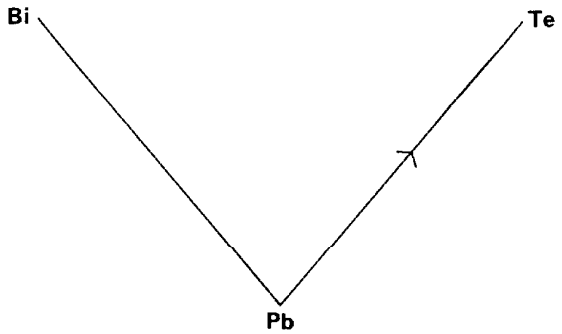

FIGURE 4. Network of metathetical processes for monoxides of Bi, Pb, and Te.

value, as indicated by the arrows in Figures 1 – 4.

The values selected for the standard enthalpies of formation and dissociation energies are given in table 4 (in kcal mol^{-1}) and in table 5 (in kJ mol^{-1}), with the number of the class to which each monoxide belongs.

Table 6 (in kcal mol^{-1}) and table 7 (in kJ mol^{-1}) show the selected values for dissociation energies in Periodic Table order, some of these values (in curved brackets) have been estimated by considering the following trends in the Periodic Table. Within each group, Groups IA to VIA show an increase in the dissociation energy of the gaseous monoxide with increasing atomic number. In the cobalt and nickel columns of Group VIII the increase is less marked, and in Groups IB to VIIB a decrease is seen. Estimated values have been based on consideration of the above trends in conjunction with the observed pattern across the rows of the Periodic Table.

Standard enthalpies of formation for some monoxides are based purely on spectroscopic dissociation energies. These values have been thoroughly assessed in reference [3] and have not been reconsidered in this work. Dissociation energies for these species are included in tables 6 and 7 indicated by either [a] or [b]. For completeness their molecular parameters have been included in Appendix II and the thermal functions derived therefrom are given in tables 8 to 11.

5.2. Class 1

AlO(g) The value for the standard enthalpy of formation of AlO(g) is defined mainly by chemiluminescence and laser fluorescence studies (see 75DAG/CRU and 77PAS/DAG under AL1O(G) in Appendix I), strongly supported by spectroscopic and thermochemical measurements. An assessment by Drowart [4] suggests that several of the earlier mass spectrometric measurements are consistent with the selected value if corrections are made for ionization cross-sections.

TiO(g) The selected value for the standard enthalpy of formation of TiO(g) is based on a large number of consistent mass spectrometric measurements, confirmed by weight loss and chemiluminescence studies. The second measurement of 72BAL/DEM has been included but is queried because of the inconsistency of their first measurement.

SO(g) The standard enthalpy of formation of SO(g) has not been assessed in this work since the value chosen for the dissociation energy by Huber and Herzberg [3], based on two independent spectroscopic measurements, appears to be well defined. Inconsistencies in some metathetical equations involving SO(g) are probably caused by incorrect choice of ionization cross-sections.

An error of $\pm$ 2 kcal mol^{-1} has been assigned to the standard enthalpies of formation of AlO(g) and TiO(g), and of 1 kcal mol^{-1} to that of SO(g).

5.3. Class 2

Values for standard enthalpies of formation of the species in this class are considered to be of similar degrees of reliability but are less well established than those of AlO(g) and TiO(g).

LaO(g) The data of 60WAL/GOL and 61GOL/WAL are suspect because of possible reactions with cell materials. The selected value for LaO(g) is based primarily on the meticulous weight loss study of 71ACK/RAU1, who clearly defined the vaporization process, and is supported by a consistent set of metathetical reactions connecting LaO(g) to SiO(g), and to TiO(g) via ScO(g) and YO(g) (see Figure 2). The chemiluminescence study of 76GOL/CHA also supports the selected value.

ScO(g) The value for ScO(g) is based entirely on metathetical reactions, particularly the two with TiO(g). Values derived from sesquioxide vaporization measurements have been discounted since they are, in general, considered to be unreliable. The chemiluminescence study of 77CHA/GOL has also been disregarded since the results from this paper are inconsistent with other work for ScO(g) and also for YO(g).

SiO(g) The weight loss experiment of 74KUB/CHA, in which the composition of the condensed phase was confirmed, gives a definitive value for the standard enthalpy of formation of SiO(g). The value is supported, within the limits of the assigned error, by the vaporization work of 73ZMB/AME, although they did not define the composition of the solid phase. The selected value is also supported by a metathetical reaction with LaO(g) (67COP/SMO) and is consistent with the selected value for ThO(g) via reference 74HIL/MUR. The work of 73NAG/NIW assumed congruent vaporization, but there is some doubt about the process. The most recent vaporization work (76KVA/WAH) defines the solid phase but yields only a second law analysis and is therefore considered less reliable.

ThO(g) The selected value for ThO(g) depends on the weight loss experiments of 63ACK/RAU and 73ACK/RAU1, supported by the metathetical reaction with YO(g) from the latter paper, and is consistent with the selected value for SiO(g) via reference 74HIL/MUR. There is a discrepancy of about 1.5 kcal mol^{-1} between the average value derived from vaporization measurements and from metathetical reactions. This may reflect possible errors in values for the standard enthalpy of formation and the thermal functions for Th(g), since the vaporization process is thought to be well established [5].

UO(g) The value for the standard enthalpy of formation of UO(g) is an average based on a number of consistent mass spectrometric measurements. The data from 60DEM/BUR are doubtful due to a misprint in their data table. Data from 68COP/SMO have been discounted because of doubts about ionization cross sections. 75STE/CAT select a value of 181 kcal mol^{-1} for the dissociation energy of UO(g), an average of their second and third law values, rather than the third law derivation given here.

YO(g) The selected value for the standard enthalpy of formation of YO(g) is based on several compatible vaporization and metathetical reactions. Data from 76YUD/MOG have been discounted since errors were found in the paper and the chemiluminescence study of 77CHA/GOL is also ignored as their lower limits on dissociation energies for both ScO(g) and YO(g) are inconsistent with other work. Several metathetical equations with monoxides having less well defined standard enthalpies of formation show large inconsistencies, but data from these reactions are not used to define the value for YO(g).

An uncertainty of $\pm$ 2.5 kcal mol^{-1} has been assigned to the value of the standard enthalpy of formation for each of the species in class 2.

5.4. Class 3

This class comprises the monoxides, connected by metathetical processes as shown in Figure 1, for which values of standard enthalpies of formation are less well established than those for species in classes 1 and 2.

BO(g) The value for the standard enthalpy of formation of BO(g) is not well-defined. As shown in Appendix I, values derived from mass spectrometric measurements range from about −4 to +5 kcal mol^{-1}, and an early spectroscopic measurement gives an estimated value of 0.9 kcal mol^{-1} with a large uncertainty. Data for reactions with uranium compounds from 68COP/SMO have been discounted because of doubts about ionization cross-sections, and the value derived from the work of 75MUR/HIL is inconsistent with metathetical reactions for several other monoxides. The values indicated by ** are considered to be the most reliable.

BaO(g) Mass spectrometric investigations of the vaporization of BaO(c) yield values for the standard enthalpy of formation of BaO(g) around −29

kcal mol^{-1}. Dr. A. Syverud [6] has, however, drawn attention to inadequacies in C_p data, and hence thermal functions, for BaO(c) (see reference [2]). An error of 2 cal mol^{-1} K^{-1} in the Gibbs energy function at 1600 K leads to an uncertainty of approximately 3 kcal mol in the value for the standard enthalpy of formation of BaO(g), and vaporization processes have therefore been discounted in the assessment for BaO(g). The selected value has been based mainly on chemiluminescence and laser fluorescence studies, including the process labelled 76ENG/SAN, which is queried because other measurements in this paper appear to be suspect (see CaO(g) and SrO(g)).

CaO(g) The early vaporization work (63BAB) is discounted since it is a second law analysis over a temperature range of less than 100 K. Early flame work (65KAL/HOL and 73KAL/ALK) is considered unreliable because the composition of the material in the flame is not identified. The flame study of 77STA/RYA is also suspect as it is a second law analysis only. The chemiluminescence work of 76ENG/SAN and the mass spectrometric study of 64DRO/EXS yield values which are inconsistent with other work. The selected value for the standard enthalpy of formation of CaO(g) has therefore been based on a metathetical reaction with SO(g), for which the dissociation energy is well-defined, and a chemiluminescence study by 80IRV/DAG, said to be reliable [6]. It is supported by the gas-phase equilibrium of 76FAR/SRI1 which is in agreement within the bounds of the assigned error.

CeO(g) The selected value for the standard enthalpy of formation of CeO(g) is the average of values derived from four very consistent metathetical reactions.

ErO(g) The metathetical reaction of 80MUR/HIL is preferred to the sesquioxide vaporization experiment of 67AME/WAL since similar results from the latter have been found to be inconsistent with other work.

EuO(g) The metathetical reaction with SmO(g) reported by 67AME/WAL has been discounted by 76MUR/HIL on the grounds that the high ionizing voltage (25 eV) may have caused fragmentation of EuO, and that only five scattered measurements were recorded. They also question the sesquioxide vaporization process from the same work. The spectra from the chemiluminescence study of 75DIC/ZAR are considered to be too indeterminate to yield reliable results. In particular the short wave-length cut-offs are difficult to identify. The crossed beam work of 76DIR/MIC is preferred, and is in reasonable agreement with mass spectrometric work, although there are doubts concerning the data in 76MUR/HIL because of the inconsistency of the metathetical reaction with Al. The error shown for 77BAL/GIG is compounded from absolute errors on $WO_2(g)$ and $WO_3(g)$, and is therefore misleading in this context.

GdO(g) The selected value for the standard enthalpy of formation of GdO(g) is based on the consistency of the values from metathetical reactions. The vaporization experiments of 67AME/WAL and 67MES provide less reliable information since the process of vaporization of $Gd_2O_3(c)$ is not well-defined.

GeO(g) Since standard enthalpies of formation for ScO(g), SiO(g) and TiO(g) are well-established, values derived for GeO(g) from metathetical reactions with these species are considered to be reliable. The selected value in consistent with data from the vaporization experiment of 65DRO/DEG, where the weight loss measurements were supported by mass spectrometric evidence.

HfO(g) The selected value for the standard enthalpy of formation for HfO(g) is based mainly on metathetical reactions with YO(g) and ThO(g), for which values are reasonably well-established, and is supported by the results of an early weight loss experiment (63PAN/REI) although this work may be doubtful because the oxygen pressure was not measured. The chosen value is consistent with the selected value for ZrO(g) via a metathetical reaction.

HoO(g) The metathetical reaction with TiO(g), for which the standard enthalpy of formation is well-established, is used to define a value for HoO(g). It is supported, via a metathetical reaction, by consistency with the value selected for TbO(g). The sesquioxide vaporization, reported by 67AME/WAL, has been discounted since similar work from this source has been found to produce unreliable results.

LuO(g) The standard enthalpy of formation of LuO(g) is defined by the metathetical reaction with YO(g) reported by 80MUR/HIL, and is supported by an earlier metathetical reaction with LaO(g). The sesquioxide vaporization is considered unreliable.

MoO(g) The value derived from the work of 60DEM/BUR may be unreliable since there is doubt about the nature of the Mo(c) solid

phase. From the data given in 75CHO/GIN it is possible to extract only a value for the enthalpy of reaction at 298 K. The selected value is based on the metathetical reaction with YO(g) reported by 77EME/GUS.

NdO(g) The data of 60WAL/GOL and 61GOL/WAL are suspect because of possible reactions with cell materials. The selected value for the standard enthalpy of formation of NdO(g) is an average of values derived from metathetical reactions. Two results from the vaporization of Nd_2O_3(c) are in good agreement; that of 75TET contained computational errors which have been corrected.

PO(g) The value selected for the standard enthalpy of formation of PO(g) relies on the consistency of results from metathetical reactions with YO(g), GdO(g) and SnO(g), for which acceptable values have been established, and is consistent with the value selected for TaO(g). The early spectroscopic work is considered less reliable.

PrO(g) The metathetical reactions with LaO(g) and TiO(g) define the selected value for the standard enthalpy of formation of PrO(g), which is consistent with the selected value for NdO(g). The result of 70FRI from a metathetical reaction of PrO(g) with YO(g) is less consistent, and lack of detail in the paper prevents full assessment of the work.

SmO(g) The value for the standard enthalpy of formation of SmO(g) is not well-defined. A value and an uncertainty have been selected to cover the range indicated by * in Appendix I. Although the value derived from the chemiluminescent study of 75DIC/ZAR is in agreement with the selected value, it is queried because of difficulties in interpreting the spectra (see under EuO(g)).

SnO(g) Three independent measurements on the vaporization of SnO_2(c) and the reaction between PO_2(g) and Sn(g) define the standard enthalpy of formation of SnO(g). The weight loss experiment of 79KOS/GRE on SnO(c) is in agreement within the range of the assigned uncertainty, but the value given by 72TUM/BAI for the standard enthalpy of formation of SnO(g) is grossly inconsistent with other work.

SrO(g) The standard enthalpy of formation of SrO(g) is based on the mass spectrometric measurements, except that of 72ASA/YAM, whose assumption that the partial pressure of O(g) was equal to 0.4273 that of Sr(g) is said by 75JANAF to be in error. The early flame work of 65KAL/HOL is discounted due to the possibility of the presence of hydroxides in the flame, and the later flame study of 73KAL/ALK reports a value for the dissociation energy of SrO(g) which is even less consistent with other work. In a review paper 76SRI has, however, corrected the latter value, using currently accepted ground electronic states, to give a value for the dissociation energy of 99 kcal mol^{-1}. The crossed beam work of 72BAT/MIC and the chemiluminescence study of 76ENG/SAN give grossly inconsistent results.

TaO(g) The selected value for the standard enthalpy of formation of TaO(g) is the average of the four values derived from the mass spectrometric work of 76SMO/DRO. The sesquioxide vaporizations are considered unreliable. 65KRI/CAR assume that Ta_2O_5 forms an ideal solution with Ta(c) and give insufficient detail to enable checking of their derived values.

TbO(g) The value selected for the standard enthalpy of formation of TbO(g) is the average of the values derived from metathetical reactions.

TmO(g) The selected value is based on the metathetical reaction with AlO(g) since the sesquioxide vaporization work of 67AME/WAL is considered to be unreliable.

VO(g) Two values derived from metathetical reactions define the selected value for the standard enthalpy of formation of VO(g).

ZrO(g) The selected value for the standard enthalpy of formation of ZrO(g) is based mainly on metathetical reactions with YO(g) and ThO(g) reported by 74ACK/RAU since values for these monoxides are better defined than that for HfO(g). The selected value is supported by the work of 75MUR/HIL other than the metathetical with BO(g).

5.5. Class 4

The monoxides in this class are represented in Figure 3.

AgO(g) The selected value for the standard enthalpy of formation of AgO(g) is derived from the metathetical reaction with NiO(g) reported by 72SMO/MAN. It is consistent with the value for the dissociation energy of 50 ± 20 kcal mol^{-1} selected by 69BRE/ROS, based on earlier spectroscopic and thermochemical work.

AuO(g) The metathetical reaction with CoO(g), reported by 72SMO/MAN, defines the selected value for the standard enthalpy of formation of AuO(g).

CoO(g) The value for the standard enthalpy of formation of CoO(g) is defined by the mass spectrometric study of the gas phase equilibrium $2CoO(g) = 2Co(g) + O_2(g)$ by 66GRI/BUR. A similar study (61GRI/BUR2) yields a value for NiO(g) which is consistent with a metathetical reaction between the two monoxides reported by 72SMO/MAN.

CuO(g) The selected value for the standard enthalpy of formation of CuO(g) is dependent on a metathetical reaction with NiO(g), which is, in turn, partially dependent on a similar reaction with CoO(g).

NiO(g) The value derived from the metathetical reaction with CoO(c) defines the selected value for the standard enthalpy of formation of NiO(g), and is consistent with the value from the gas phase equilibrium of 61GRI/BUR2.

5.6. Class 5

The metatheticals connecting the three monoxides in this class are shown in figure 4.

BiO(g) Mass spectrometric investigations of gas phase equilibria are considered to provide the most reliable data for defining the standard enthalpy of formation of BiO(g). The selected value is based on the work of 72KAZ/CHI and 80SID/MIN, and is consistent, within the limits of the assigned error, with the selected value for PbO(g), via the metathetical reaction of 69UY/DRO.

PbO(g) The chemiluminescence study of 78SRI/DIG is considered to give the most reliable information for establishing a value for the standard enthalpy of formation of PbO(g). The selected value is supported, within the error limits, by results from PbO(c) vaporization measurements by 65DRO/COL and 69CHI/KAZ, and a flame study of 72FRI/JEN. It is consistent, via the metathetical reaction from 69UY/DRO, with the selected value for BiO(g), and with the lower limit on the dissociation energy from 75OLD/DIC.

TcO(g) The selected value is the average of the four measurements indicated by ** in Appendix I. The data of 70STA is discounted since only a derived second law enthalpy of reaction is given.

5.7. Class 6

This class contains all the remaining monoxides other than those for which standard enthalpies of formation are based purely on spectroscopic dissociation energies (see the last paragraph of section 5.1). For CdO(g), OsO(g), PdO(g) and ReO(g), the available experimental data yield values for dissociation energies which appear to be highly unlikely when considered in the context of the Periodic Table, and for RbO(g), TlO(g), TcO(g), HgO(g), PmO(g) and PaO(g) no experimental data are available. Dissociation energies have been estimated for these species by consideration of trends in the Periodic Table, as described in the penultimate paragraph of section 5.1, and are included in tables 6 and 7.

BeO(g) The selected value for the standard enthalpy of formation of BeO(g) is an average of the values derived from 64THE/HIL. This study is preferred since the partial pressure calculations appear to involve fewer approximations about ionization cross-sections than the work of 59CHU/BER.

CdO(g) The values derived from 78GRA/HIR are inconsistent with the upper limit on the dissociation energy derived by Brewer and Rosenblatt [1] from the data of 63GLE/STO. A value for the dissociation energy has therefore been estimated to correlate with trends in the Periodic Table.

CrO(g) Four measurements by 61GRI/BUR1 yield values for the standard enthalpy of formation of CrO(g). The gas phase equilibria are preferred since the authors express doubts about the composition of the solid phase, $Cr_2O_3(c)$.

CsO(g) The only available experimental data for CsO(g) are those of 67GUS/GOR giving an approximate value for the dissociation energy based on an estimated dimerization energy. The selected value for the standard enthalpy of formation is therefore assigned a large error.

DyO(g) The selected value for the standard enthalpy of formation of DyO(g) is based on a vaporization measurement by 67AME/WAL. Since many vaporization results from this paper show large inconsistencies with selected values, a large uncertainty has been assigned.

FeO(g) The data of 63WAS were based on an assumed ratio of partial pressures FeO/Fe = 0.2, whilst in 71DAL/DEM there is poor agreement between second and third law values. The measurements of Hildenbrand and Murad are therefore preferred. 80MUR corrects the value of 75HIL for ionization cross-sections to give a

value for the dissociation energy of FeO(g) = 93.6 ± 3.0 kcal mol^{-1}, and suggests a ratio of ionization cross-sections $H_2O:H_2 = 0.5$, giving a value as low as 91 kcal mol^{-1} from his own measurements.

GaO(g) The standard enthalpy of formation of GaO(g) is not well-defined. The result of 65GUR/NOV relies on a Birge-Sponer extrapolation and may therefore be doubtful. The data from 66BUR are also suspect since the value derived from this paper for the dissociation energy of AlO(g) is 5.7 kcal mol^{-1} lower than the well established selected value. A large uncertainty is therefore assigned to the selected value for GaO(g).

HgO(g) No experimental data are available; a value for the dissociation energy has been estimated.

InO(g) The value for the dissociation energy of InO(g) derived by 63BUR/DEM from mass spectrometric measurements on the vaporization of In2O3(c) is reported as an upper limit since fragmentation of higher oxides may have accounted for part of the recorded InO+ intensity.

IrO(g) The value reported by 65NOR/STA1 for the standard enthalpy of formation of IrO(g) is based on measured partial pressures of O_2(g) and IrO_2(g), and the assumption of a ratio of 50:1 for the partial pressures IrO_2:IrO. The selected value for the dissociation energy of IrO(g) appears to be reasonable in the context of other values for dissociation energies shown in table 6.

KO(g) The value for the dissociation energy of KO(g) reported by 67GUS/GOR is derived from estimated dimerization energies. The selected value is based on mass spectrometric investigation of potassium oxides by 77EHL.

LiO(g) The selected value for the standard enthalpy of formation for LiO(g) is the average of four gas phase mass spectrometric values, which are in good agreement, and is supported by the vaporization result of 72HIL2, whilst that of 78KUD/WU is in disagreement for unidentified reasons.

MgO(g) The transpiration study of 63ALE/OGD may produce ambiguous results because of the presence of hydroxide vapour, and there are doubts concerning the process of vaporization in the work of 63ALT. The flame work of 69COT/JEN is discounted since hydroxides may have been present. 77STA/BEL gives insufficient details for extraction of data other than the dissociation energy of MgO(g), and the transpiration study of 78MAE/SAS gives values which are grossly inconsistent with other work. The selected value for the standard enthalpy of formation of MgO(g) is based on the mass spectrometric work of 76FAR/SRI3, supported by the 64DRO/EXS value from the reaction with tungsten oxides. We are unable to reproduce the results of 64DRO/EXS for the reaction with oxygen from their published data, but their selected value for the dissociation energy of MgO(g) = 86 ± 5 kcal mol^{-1} is in good agreement with our choice.

MnO(g) The selected value for MnO(g) is the average of two doubtful measurements, a Birge–Sponer extrapolation to give an estimated dissociation energy (59DAS) and a flame photometric study of the emission bands of MnO(g). A large uncertainty has therefore been assigned.

NaO(g) The selected value is taken from a study by 70HIL/MUR on the vaporization of Na_2O(c).

NbO(g) The selected value is taken from vaporization studies by 66SHC/SEM.

NpO(g) The value estimated by 66ACK/FAI1 for the dissociation energy of NpO(g) is based on the doubtful assumption that the dissociation energy of NpO(g) is greater than half the dissociation energy of NpO_2(g) and the uncertainty has therefore been increased.

OsO(g) 60GRI/BUR failed to observe OsO(g) in a mass spectrometric study of the osmium/oxygen system, hence Brewer and Rosenblatt [1] estimated a lower limit of 106 kcal mol^{-1} for the standard enthalpy of formation. We have been unable to reproduce their result but it is in agreement with our estimate, based on trends in the Periodic Table.

PaO(g) No experimental data are available; a value for the dissociation energy has been estimated.

PdO(g) The dissociation energies of the gaseous monoxides of Co, Rh, Ir, Ni and Pt lie in the range 90 – 98 kcal mol^{-1} (see table 6). The data of 65NOR/STA2 therefore appears to be anomalous and a value has been estimated.

PmO(g) No experimental data are available; a value for the dissociation energy has been estimated.

PtO(g) The data of 67NOR/STA is accepted with an increased uncertainty.

PuO(g) The selected value for the standard enthalpy of formation of PuO(g) is the average of results from two vaporization measurements.

RbO(g) No experimental data are available; a value for the dissociation energy has been estimated.

ReO(g) The data of 74FAR/HAR appear to be anomalous and a value for the dissociation energy has therefore been selected which is consistent with trends in the Periodic Table.

RhO(g) The experimental result extracted from the paper of 64NOR/STA is a second law enthalpy of reaction at 2000 K for the formation process for RhO(g), and an error larger than that given by the authors has therefore been assigned to our selected value.

RuO(g) In the study by 60ALC/HOO of the volatility of ruthenium in oxygen, measurements were made at only three temperatures and it was assumed that the volatile species was RuO(g). 65RAZ/MAC is a Birge-Sponer extrapolation of data from an emission spectrum. The selected value for the standard enthalpy of formation of RuO(g) is based on the mass spectrometric work of 68NOR/STA, but a larger error has been assigned since only a second law value for the enthalpy of reaction at 1900 K is given.

SbO(g) The selected value is based on the flame measurements of 75FAR/SRI2 but a larger error has been assigned.

SeO(g) The selected value relies on a measurement by 67DEM for which basic experimental data were not given. The assigned error is therefore greater than that given by the author.

TcO(g) No experimental data are available; a value for the dissociation energy has been estimated.

TlO(g) No experimental data are available; a value for the dissociation energy has been estimated.

WO(g) The mass spectrometric measurement of 60DEM/BUR yields a value for the standard enthalpy of formation of WO(g).

YbO(g) The selected value is taken from the work of 77COS/D'A and is consistent with the lower limit on the dissociation energy of 76YOK/MEN.

ZnO(g) The selected value is taken from a mass spectrometric measurement by 64ANT/SEA.

6. Updating, Retrieval and Dissemination of Information

A primary feature of this work is the facility for updating the computer files as new data become available, and reassessment can then be carried out if necessary. Data on a specific compound can be retrieved by computer search of the equations in the Experimental Data File. Similarly individual articles (of which an example is shown in table 3), are extracted by searching for the relevant code, or a set of articles by a particular author can be collected by searching for his name in the reference. Extracted material can then be reprocessed as described in detail in section 3.

The authors are willing to provide selected extracts from the computer files on request, and further details of assessment procedures will be available shortly [7].

7. Acknowledgments

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TABLE 4. Selected values for standard enthalpies of formation and dissociation energies of gaseous monoxides in kcal mol^{-1}

Formula	$\Delta_f H^\circ_{298}$(MO)[a]		D°_0(MO)[b]		Class[c]
AgO	75.0	5.0	51.9	5.0	4
AlO	16.0	2.0	121.2	2.2	1
AuO	94.5	5.0	52.3	5.0	4
BO	0.0	4.0	192.3	5.0	3
BaO	-32.0	3.0	133.4	3.2	3
BeO	33.0	3.0	102.9	3.2	6
BiO	29.0	3.0	79.7	3.0	5
CaO	6.0	4.0	95.1	4.0	3
CdO	(30.0	20.0	55.4	20.0)	6
CeO	-32.0	3.0	191.5	3.2	3
CoO	70.0	3.0	90.9	3.2	4
CrO	52.0	7.0	101.6	7.0	6
CsO	7.0	15.0	70.0	15.0	6
CuO	76.0	5.0	63.5	5.0	4
DyO	-18.0	10.0	146.0	10.0	6
ErO	-10.0	5.0	144.4	5.1	3
EuO	-14.0	4.0	114.5	4.0	3
FeO	65.5	4.0	92.2	4.1	6
GaO	40.0	10.0	83.5	10.0	6
GdO	-16.5	3.0	169.7	3.0	3
GeO	-8.5	3.0	156.3	3.0	3
HfO	16.0	3.0	190.6	3.2	3
HoO	-14.5	6.0	145.0	6.0	3
InO	>41.0	10.0	<75.6	10.0	6
IrO	120.5	10.0	98.1	10.1	6
KO	14.5	5.0	65.8	5.0	6
LaO	-29.0	2.5	190.6	2.7	2
LiO	18.0	2.0	78.7	2.0	6
LuO	0.5	4.0	160.3	4.0	3
MgO	8.0	3.0	85.8	3.0	6
MnO	31.0	10.0	95.3	10.0	6
MoO	83.0	5.0	132.9	5.0	3
NaO	24.0	4.0	60.3	4.0	6
NbO	47.5	6.0	182.9	6.0	6
NdO	-30.0	3.0	166.9	3.0	3
NiO	71.0	4.0	90.2	4.0	4
NpO	-1.0	10.0	170.7	10.0	6
OsO	(105.0	20.0	142.0	20.0)	6
PO	-8.0	3.0	142.4	3.0	3
PbO	15.0	3.0	90.3	3.0	5
PdO	(58.5	20.0	90.0	20.0)	6
PrO	-34.0	4.0	177.6	4.0	3
PtO	101.0	10.0	92.5	10.0	6
PuO	-29.0	8.0	170.1	8.1	6
ReO	(95.0	20.0	148.8	20.0)	6
RhO	95.0	10.0	95.8	10.0	6
RuO	89.0	10.0	125.3	10.0	6
SO	1.0	1.0	123.6	1.0	1
SbO	19.0	10.0	102.8	10.0	6
ScO	-13.0	2.5	161.7	2.7	2
SeO	2.0	5.0	111.1	5.1	6
SiO	-24.0	2.5	189.8	3.2	2
SmO	-28.0	4.0	135.5	4.0	3
SnO	4.5	3.0	126.1	3.0	3
SrO	-3.0	4.0	100.8	4.0	3
TaO	55.5	3.0	190.0	3.0	3
TbO	-17.0	4.0	168.2	4.0	3
TeO	16.5	5.0	89.1	5.0	5
ThO	-7.5	2.5	209.0	2.9	2
TiO	12.0	2.0	159.6	2.2	1
TmO	-7.0	5.0	121.1	5.1	3
UO	6.0	2.5	180.5	3.2	2
VO	33.0	4.0	148.4	4.5	3
WO	102.0	10.0	159.6	10.0	6
YO	-11.0	2.5	170.9	2.7	2
YbO	-4.0	2.0	98.9	2.0	6
ZnO	>26.0	10.0	<63.8	10.0	6
ZrO	19.5	3.0	184.4	3.2	3

[a] $\Delta_f H^\circ_{298}$(MO) = Standard enthalpy of formation and uncertainty.
[b] D°_0(MO) = Dissociation energy and uncertainty.
[c] Class = Assessment class for monoxide (see text, section 5).
Values in brackets are estimated (see text, section 5.7).

The above table lists only those species for which experimental data have been assessed. See table 6 for full coverage of the Periodic Table.

TABLE 5. Selected values for standard enthalpies of formation and dissociation energies of gaseous monoxides in kJ mol^{-1}

Formula	$\Delta_f H^\circ_{298}$(MO)[a]	D°_0(MO)[b]	Class[c]
AgO	314 21	217 21	4
AlO	67 8	507 9	1
AuO	395 21	219 21	4
BO	0 17	805 21	3
BaO	−134 13	558 13	3
BeO	138 13	431 13	6
BiO	121 13	333 13	5
CaO	25 17	398 17	3
CdO	(126 84	232 84)	6
CeO	−134 13	801 13	3
CoO	293 13	380 13	4
CrO	218 29	425 29	6
CsO	29 63	293 63	6
CuO	318 21	266 21	4
DyO	−75 42	611 42	6
ErO	−42 21	604 21	3
EuO	−59 17	479 17	3
FeO	274 17	38 617	6
GaO	167 42	349 42	6
GdO	−69 13	710 13	3
GeO	−36 13	654 13	3
HfO	67 13	797 13	3
HoO	−61 25	607 25	3
InO	>172 42	<316 42	6
IrO	504 42	410 42	6
KO	61 21	275 21	6
LaO	−121 10	797 11	2
LiO	75 8	329 8	6
LuO	2 17	671 17	3
MgO	33 13	359 13	6
MnO	130 42	399 42	6
MoO	347 21	556 21	3
NaO	100 17	252 17	6
NbO	199 25	765 25	6
NdO	−126 13	698 13	3
NiO	297 17	377 17	4
NpO	−4 42	714 42	6
OsO	(439 84	594 84)	6
PO	−33 13	596 13	3
PbO	63 13	378 13	5
PdO	(245 84	377 84)	6
PrO	−142 17	743 17	3
PtO	423 42	387 42	6
PuO	−121 33	712 34	6
ReO	(397 84	623 84)	6
RhO	397 42	401 42	6
RuO	372 42	524 42	6
SO	4 4	517 4	1
SbO	79 42	430 42	6
ScO	−54 10	677 11	2
SeO	8 21	465 21	6
SiO	−100 10	794 13	2
SmO	−117 17	567 17	3
SnO	19 13	528 13	3
SrO	−13 17	422 17	3
TaO	232 13	795 13	3
TbO	−71 17	704 17	3
TeO	69 21	373 21	5
ThO	−31 10	874 12	2
TiO	50 8	668 9	1
TmO	−29 21	507 21	3
UO	25 10	755 13	2
VO	138 17	621 19	3
WO	427 42	668 42	6
YO	−46 10	715 11	2
YbO	−17 8	414 8	6
ZnO	>109 42	<267 42	6
ZrO	82 13	772 13	3

[a] $\Delta_f H^\circ_{298}$(MO) = Standard enthalpy of formation and uncertainty.
[b] D°_0(MO) = Dissociation energy and uncertainty.
[c] Class = Assessment class for monoxide (see text, section 5).

Values in brackets are estimated (see text, section 5.7). The above table lists only those species for which experimental data have been assessed. See table 7 for full coverage of Periodic Table.

TABLE 6. Dissociation energies of gaseous monoxides in periodic table order in kcal mol^{-1}

Main Group Elements

Li	Be	B	C	N	O	F	Ne
78.7	102.9	192.3	255.8	149.8	118.0	51.4	-
[2]	[3]	[5]	[a]	[a]	[a]	[a]	
Na	Mg	Al	Si	P	S	Cl	Ar
60.3	85.8	121.2	189.8	142.4	123.6	63.4	-
[4]	[3]	[2]	[3]	[3]	[a]	[a]	
K	Ca	Ga	Ge	As	Se	Br	Kr
65.8	95.1	83.5	156.3	114.8	111.1	55.3	-
[5]	[4]	[10]	[3]	[b]	[5]	[a]	
Rb	Sr	In	Sn	Sb	Te	I	Xe
(70)	100.8	<75.6	126.1	102.8	89.1	41.5	-
[10]	[4]	[10]	[3]	[10]	[5]	[a]	
Cs	Ba	Tl	Pb	Bi	Po	At	Rn
70.0	133.4	(50)	90.3	79.7	-	-	-
[15]	[3]	[20]	[3]	[3]			

Transition Elements

Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
161.7	159.6	148.4	101.6	95.3	92.2	90.9	90.2	63.5	<63.8
[2.5]	[2]	[5]	[7]	[10]	[4]	[3]	[4]	[5]	[10]
Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd
170.9	184.4	182.9	132.9	(130)	125.3	95.8	(90)	51.9	(55)
[2.5]	[3]	[6]	[5]	[20]	[10]	[10]	[20]	[5]	[20]
La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
190.6	190.6	190.0	159.6	(149)	(142)	98.1	92.5	52.3	(50)
[2.5]	[3]	[3]	[10]	[20]	[20]	[10]	[10]	[5]	[20]

Lanthanides

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
191.5	177.6	166.9	(150)	135.5	114.5	169.7	168.2	146.0	145.0	144.4	121.1	98.9	160.3
[3]	[4]	[3]	[10]	[4]	[4]	[3]	[4]	[10]	[6]	[5]	[5]	[2]	[4]

Actinides

Th	Pa	U	Np	Pu
209.0	(190)	180.5	170.7	170.1
[3]	[20]	[3]	[10]	[8]

Uncertainties are given in square brackets below values for dissociation energies.
Values in parenthesis are estimated by the authors.
[a] Value from Huber and Herzberg, reference [3].
[b] Upper limit from Huber and Herzberg, reference [3].

TABLE 7. Dissociation energies of gaseous monoxides in periodic table order in kJ mol^{-1}

Main Group Elements

Li	Be	B	C	N	O	F	Ne
329	431	805	1070	627	494	215	-
[8]	[13]	[21]	[a]	[a]	[a]	[a]	
Na	Mg	Al	Si	P	S	Cl	Ar
252	359	507	794	596	517	265	-
[17]	[13]	[9]	[13]	[13]	[a]	[a]	
K	Ca	Ga	Ge	As	Se	Br	Kr
275	398	349	654	480	465	231	-
[21]	[17]	[42]	[13]	[b]	[21]	[a]	
Rb	Sr	In	Sn	Sb	Te	I	Xe
(293)	422	<316	528	430	373	174	-
[42]	[17]	[42]	[13]	[42]	[21]	[a]	
Cs	Ba	Tl	Pb	Bi	Po	At	Rn
293	558	(209)	378	333	-	-	-
[63]	[13]	[84]	[13]	[13]			

Transition Elements

Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
677	668	621	425	399	386	380	377	266	<267
[11]	[9]	[19]	[29]	[42]	[17]	[13]	[17]	[21]	[42]
Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd
715	772	765	556	(544)	524	401	(377)	217	(232)
[11]	[13]	[25]	[21]	[84]	[42]	[42]	[84]	[21]	[84]
La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
797	797	795	668	(623)	(594)	410	387	219	(209)
[11]	[13]	[13]	[42]	[84]	[84]	[42]	[42]	[21]	[84]

Lanthanides

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
801	743	698	(628)	567	479	710	704	611	607	604	507	414	671
[13]	[17]	[13]	[42]	[17]	[17]	[13]	[17]	[42]	[25]	[21]	[21]	[8]	[17]

Actinides

Th	Pa	U	Np	Pu
874	(795)	755	714	712
[12]	[84]	[13]	[42]	[34]

Uncertainties are given in square brackets below values for dissociation energies.
Values in curved brackets are estimated by the authors.
[a] Value from Huber and Herzberg, reference [3].
[b] Upper limit from Huber and Herzberg, reference [3].

TABLE 8. Gibbs energy functions, $(-(G^{\circ}_T-H^{\circ}_{298})/T)$, for gaseous monoxides in cal mol^{-1} K^{-1}

T/K	AgO	AlO	AsO	AuO	BO	BaO	BeO	BiO	BrO	CO
100	65.975	58.503	61.504	67.731	54.806	62.877	53.405	65.413	62.320	53.394
200	59.448	52.825	55.720	60.992	49.256	56.945	47.841	59.502	56.337	47.847
298	58.685	52.162	55.036	60.203	48.619	56.242	47.200	58.802	55.619	47.211
300	58.685	52.163	55.036	60.203	48.619	56.243	47.200	58.803	55.619	47.211
400	59.020	52.457	55.348	60.546	48.894	56.556	47.479	59.115	55.948	47.484
500	59.657	53.025	55.958	61.197	49.416	57.159	48.012	59.716	56.589	48.003
600	60.377	53.673	56.662	61.928	50.006	57.843	48.619	60.399	57.325	48.587
700	61.102	54.334	57.383	62.662	50.605	58.538	49.237	61.093	58.074	49.178
800	61.806	54.981	58.090	63.372	51.191	59.214	49.843	61.769	58.805	49.755
900	62.478	55.604	58.770	64.049	51.756	59.862	50.428	62.417	59.505	50.310
1000	63.116	56.199	59.419	64.689	52.296	60.479	50.988	63.033	60.170	50.840
1100	63.720	56.768	60.034	65.295	52.812	61.064	51.523	63.618	60.800	51.346
1200	64.292	57.310	60.618	65.867	53.304	61.618	52.033	64.174	61.397	51.828
1300	64.834	57.827	61.172	66.408	53.773	62.145	52.520	64.701	61.961	52.289
1400	65.348	58.323	61.698	66.921	54.222	62.645	52.986	65.203	62.497	52.729
1500	65.838	58.798	62.198	67.409	54.652	63.121	53.432	65.680	63.005	53.150
1600	66.304	59.255	62.675	67.872	55.063	63.575	53.861	66.136	63.489	53.554
1700	66.749	59.696	63.129	68.314	55.457	64.008	54.274	66.572	63.951	53.941
1800	67.175	60.120	63.563	68.736	55.836	64.423	54.672	66.989	64.391	54.313
1900	67.583	60.531	63.978	69.140	56.200	64.820	55.058	67.389	64.813	54.671
2000	67.974	60.928	64.376	69.527	56.551	65.201	55.433	67.773	65.216	55.016
2100	68.351	61.313	64.758	69.898	56.889	65.568	55.797	68.143	65.604	55.348
2200	68.713	61.687	65.125	70.255	57.216	65.920	56.153	68.500	65.977	55.669
2300	69.062	62.049	65.479	70.599	57.531	66.260	56.500	68.844	66.335	55.980
2400	69.399	62.402	65.819	70.930	57.836	66.588	56.839	69.177	66.681	56.280
2500	69.724	62.745	66.148	71.249	58.132	66.904	57.172	69.499	67.015	56.571
2600	70.040	63.078	66.466	71.558	58.418	67.211	57.499	69.811	67.337	56.853
2700	70.345	63.403	66.773	71.857	58.696	67.507	57.820	70.114	67.649	57.127
2800	70.641	63.720	67.071	72.146	58.965	67.794	58.135	70.408	67.952	57.393
2900	70.929	64.028	67.359	72.426	59.227	68.073	58.446	70.694	68.245	57.651
3000	71.209	64.329	67.638	72.698	59.482	68.343	58.751	70.972	68.529	57.902
3100	71.480	64.622	67.910	72.962	59.730	68.606	59.051	71.243	68.806	58.147
3200	71.745	64.908	68.174	73.218	59.971	68.861	59.347	71.506	69.076	58.385
3300	72.003	65.188	68.430	73.467	60.207	69.110	59.638	71.764	69.339	58.617
3400	72.254	65.461	68.680	73.710	60.436	69.352	59.924	72.015	69.594	58.844
3500	72.499	65.727	68.923	73.946	60.660	69.588	60.206	72.260	69.844	59.065
3600	72.739	65.988	69.160	74.176	60.878	69.818	60.484	72.500	70.087	59.281
3700	72.973	66.243	69.391	74.401	61.092	70.042	60.756	72.734	70.324	59.492
3800	73.202	66.492	69.616	74.620	61.300	70.262	61.025	72.964	70.556	59.698
3900	73.426	66.736	69.836	74.834	61.504	70.476	61.289	73.189	70.784	59.900
4000	73.645	66.974	70.051	75.043	61.704	70.685	61.549	73.409	71.006	60.097

T/K	CaO	CdO	CeO	ClO	CoO	CrO	CsO	CuO	DyO	ErO
100	59.038	62.498	65.877	60.886	62.202	63.544	67.160	63.404	67.938	67.343
200	53.173	56.394	60.083	54.498	56.453	57.819	60.442	56.813	62.181	61.589
298	52.480	55.669	59.406	53.752	55.778	57.148	59.654	56.041	61.505	60.913
300	52.480	55.669	59.406	53.752	55.778	57.148	59.654	56.041	61.505	60.913
400	52.789	55.991	59.707	54.078	56.079	57.447	59.997	56.378	61.806	61.214
500	53.385	56.608	60.287	54.698	56.659	58.023	60.649	57.019	62.387	61.794
600	54.063	57.306	60.949	55.398	57.320	58.681	61.383	57.741	63.049	62.456
700	54.752	58.013	61.621	56.106	57.993	59.351	62.120	58.469	63.723	63.129
800	55.424	58.699	62.278	56.794	58.650	60.006	62.835	59.175	64.380	63.787
900	56.069	59.355	62.909	57.451	59.281	60.636	63.516	59.848	65.012	64.418
1000	56.682	59.979	63.510	58.075	59.883	61.236	64.161	60.487	65.613	65.019
1100	57.265	60.569	64.082	58.667	60.455	61.808	64.772	61.091	66.185	65.590
1200	57.818	61.128	64.624	59.228	60.998	62.351	65.349	61.663	66.728	66.133
1300	58.345	61.658	65.140	59.760	61.514	62.867	65.896	62.206	67.243	66.648
1400	58.847	62.161	65.630	60.265	62.005	63.358	66.416	62.720	67.733	67.138
1500	59.327	62.640	66.097	60.746	62.473	63.827	66.909	63.210	68.200	67.605
1600	59.786	63.096	66.543	61.204	62.919	64.274	67.379	63.676	68.646	68.051
1700	60.228	63.531	66.969	61.641	63.346	64.702	67.828	64.121	69.072	68.476
1800	60.654	63.946	67.377	62.060	63.754	65.112	68.257	64.546	69.479	68.884
1900	61.067	64.344	67.768	62.461	64.145	65.504	68.667	64.954	69.869	69.274
2000	61.467	64.726	68.143	62.845	64.521	65.882	69.061	65.345	70.244	69.649

TABLE 8. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in cal mol^{-1} K^{-1} — Continued

T/K	CaO	CdO	CeO	ClO	CoO	CrO	CsO	CuO	DyO	ErO
2100	61.856	65.093	68.504	63.215	64.882	66.245	69.440	65.720	70.604	70.009
2200	62.235	65.445	68.851	63.571	65.230	66.595	69.805	66.082	70.951	70.355
2300	62.606	65.785	69.186	63.913	65.565	66.932	70.156	66.430	71.285	70.689
2400	62.969	66.112	69.509	64.244	65.889	67.258	70.495	66.766	71.607	71.012
2500	63.325	66.428	69.821	64.564	66.202	67.573	70.823	67.091	71.919	71.323
2600	63.674	66.734	70.123	64.873	66.504	67.877	71.140	67.405	72.220	71.624
2700	64.016	67.029	70.415	65.172	66.797	68.173	71.447	67.709	72.512	71.916
2800	64.353	67.315	70.698	65.462	67.081	68.459	71.744	68.004	72.794	72.198
2900	64.684	67.593	70.973	65.743	67.356	68.737	72.033	68.291	73.068	72.472
3000	65.009	67.862	71.240	66.016	67.623	69.007	72.314	68.569	73.334	72.738
3100	65.329	68.124	71.499	66.282	67.883	69.270	72.586	68.839	73.593	72.997
3200	65.644	68.378	71.751	66.540	68.136	69.525	72.852	69.102	73.844	73.248
3300	65.953	68.625	71.996	66.791	68.382	69.774	73.110	69.359	74.089	73.492
3400	66.258	68.866	72.235	67.036	68.621	70.016	73.362	69.609	74.327	73.730
3500	66.557	69.100	72.468	67.275	68.855	70.253	73.608	69.852	74.559	73.962
3600	66.850	69.329	72.695	67.508	69.082	70.483	73.848	70.090	74.785	74.188
3700	67.139	69.552	72.916	67.735	69.304	70.709	74.082	70.322	75.005	74.409
3800	67.423	69.769	73.132	67.957	69.521	70.929	74.310	70.549	75.221	74.624
3900	67.702	69.982	73.344	68.174	69.733	71.144	74.534	70.771	75.431	74.835
4000	67.976	70.189	73.550	68.386	69.940	71.355	74.752	70.988	75.637	75.040

T/K	EuO	FO	FeO	GaO	GdO	GeO	HO	HfO	HoO	IO
100	68.029	58.139	62.412	61.674	66.975	59.819	50.376	62.624	67.669	63.864
200	62.268	52.485	56.679	55.846	61.216	54.147	44.526	56.947	61.914	57.939
298	61.592	51.827	56.007	55.158	60.539	53.485	43.867	56.285	61.238	57.237
300	61.592	51.827	56.007	55.158	60.540	53.486	43.867	56.285	61.238	57.237
400	61.893	52.119	56.306	55.465	60.841	53.779	44.146	56.579	61.539	57.551
500	62.475	52.681	56.884	56.056	61.422	54.345	44.672	57.146	62.119	58.155
600	63.137	53.323	57.543	56.730	62.084	54.992	45.259	57.794	62.781	58.845
700	63.811	53.979	58.214	57.414	62.758	55.651	45.846	58.453	63.455	59.549
800	64.469	54.620	58.870	58.081	63.416	56.296	46.413	59.099	64.112	60.240
900	65.101	55.237	59.500	58.722	64.047	56.917	46.954	59.720	64.743	60.906
1000	65.703	55.827	60.101	59.332	64.649	57.509	47.466	60.312	65.345	61.545
1100	66.275	56.388	60.672	59.911	65.221	58.072	47.952	60.876	65.916	62.155
1200	66.818	56.922	61.215	60.461	65.764	58.608	48.413	61.412	66.459	62.737
1300	67.333	57.430	61.731	60.983	66.279	59.118	48.852	61.922	66.974	63.292
1400	67.824	57.914	62.222	61.480	66.770	59.604	49.269	62.408	67.464	63.822
1500	68.291	58.375	62.690	61.953	67.237	60.067	49.668	62.870	67.931	64.329
1600	68.737	58.816	63.137	62.405	67.682	60.509	50.049	63.312	68.377	64.813
1700	69.162	59.238	63.564	62.836	68.108	60.931	50.415	63.735	68.802	65.277
1800	69.570	59.642	63.973	63.249	68.516	61.336	50.767	64.140	69.209	65.721
1900	69.960	60.029	64.365	63.645	68.906	61.725	51.105	64.528	69.600	66.148
2000	70.335	60.402	64.742	64.025	69.281	62.098	51.430	64.900	69.974	66.558
2100	70.696	60.760	65.104	64.390	69.641	62.457	51.745	65.259	70.335	66.953
2200	71.042	61.105	65.453	64.742	69.988	62.802	52.048	65.604	70.681	67.332
2300	71.377	61.438	65.789	65.081	70.322	63.136	52.342	65.937	71.015	67.699
2400	71.699	61.760	66.114	65.408	70.644	63.458	52.627	66.259	71.338	68.052
2500	72.011	62.070	66.428	65.724	70.956	63.769	52.903	66.569	71.649	68.394
2600	72.312	62.371	66.732	66.030	71.257	64.070	53.171	66.870	71.950	68.724
2700	72.603	62.663	67.026	66.327	71.549	64.361	53.431	67.161	72.242	69.044
2800	72.886	62.945	67.311	66.614	71.831	64.644	53.684	67.444	72.524	69.354
2900	73.160	63.220	67.588	66.893	72.105	64.918	53.931	67.717	72.798	69.655
3000	73.426	63.486	67.856	67.164	72.371	65.185	54.170	67.983	73.064	69.947
3100	73.685	63.745	68.118	67.427	72.630	65.444	54.404	68.242	73.323	70.230
3200	73.936	63.997	68.372	67.683	72.881	65.696	54.632	68.493	73.574	70.506
3300	74.181	64.243	68.619	67.933	73.126	65.941	54.855	68.738	73.819	70.774
3400	74.419	64.482	68.860	68.184	73.364	66.180	55.072	68.976	74.057	71.036
3500	74.651	64.715	69.095	68.422	73.596	66.413	55.285	69.209	74.289	71.290
3600	74.877	64.942	69.324	68.655	73.822	66.640	55.492	69.436	74.515	71.538
3700	75.097	65.164	69.548	68.883	74.043	66.862	55.695	69.657	74.735	71.780
3800	75.313	65.381	69.766	69.106	74.258	67.079	55.894	69.873	74.951	72.017
3900	75.523	65.593	69.980	69.323	74.468	67.290	56.089	70.084	75.161	72.248
4000	75.729	65.800	70.188	69.537	74.674	67.497	56.279	70.290	75.366	72.474

TABLE 8. Gibbs energy functions, $-(G_T^\circ - H_{298}^\circ)/T$, for gaseous monoxides in cal mol^{-1} K^{-1} — Continued

T/K	InO	IrO	KO	LaO	LiO	LuO	MgO	MnO	MoO	NO
100	63.420	65.670	64.972	63.721	56.952	64.268	57.438	63.116	65.444	56.795
200	57.528	59.954	57.517	57.941	51.183	58.510	51.623	57.354	59.760	51.007
298	56.831	59.284	56.642	57.261	50.505	57.833	50.937	56.677	59.096	50.353
300	56.831	59.284	56.642	57.261	50.505	57.834	50.938	56.677	59.096	50.353
400	57.142	59.582	57.014	57.564	50.808	58.135	51.246	56.979	59.391	50.632
500	57.740	60.157	57.711	58.148	51.393	58.716	51.849	57.561	59.959	51.161
600	58.420	60.813	58.486	58.815	52.061	59.379	52.557	58.224	60.608	51.759
700	59.110	61.481	59.258	59.492	52.743	60.054	53.306	58.899	61.269	52.363
800	59.781	62.134	60.000	60.154	53.412	60.713	54.071	59.558	61.916	52.954
900	60.425	62.762	60.703	60.790	54.057	61.345	54.835	60.191	62.537	53.522
1000	61.038	63.360	61.366	61.397	54.674	61.948	55.588	60.795	63.130	54.065
1100	61.619	63.930	61.991	61.974	55.263	62.521	56.323	61.368	63.694	54.584
1200	62.170	64.471	62.580	62.524	55.824	63.065	57.034	61.912	64.230	55.078
1300	62.693	64.985	63.136	63.047	56.359	63.583	57.718	62.430	64.739	55.550
1400	63.189	65.475	63.662	63.547	56.869	64.075	58.373	62.922	65.224	56.000
1500	63.662	65.942	64.160	64.024	57.357	64.543	58.999	63.391	65.686	56.431
1600	64.113	66.387	64.634	64.482	57.823	64.991	59.595	63.838	66.127	56.844
1700	64.543	66.813	65.085	64.921	58.270	65.418	60.164	64.266	66.549	57.239
1800	64.955	67.221	65.515	65.342	58.698	65.827	60.707	64.675	66.953	57.619
1900	65.349	67.612	65.926	65.748	59.110	66.219	61.225	65.068	67.340	57.985
2000	65.727	67.988	66.319	66.140	59.506	66.596	61.719	65.444	67.712	58.336
2100	66.091	68.349	66.697	66.517	59.896	66.958	62.191	65.807	68.069	58.675
2200	66.441	68.697	67.059	66.883	60.267	67.307	62.643	66.155	68.414	59.003
2300	66.777	69.033	67.408	67.236	60.626	67.643	63.076	66.491	68.745	59.319
2400	67.102	69.357	67.744	67.578	60.973	67.967	63.492	66.816	69.066	59.625
2500	67.416	69.670	68.068	67.911	61.311	68.281	63.891	67.129	69.375	59.921
2600	67.720	69.973	68.380	68.233	61.639	68.584	64.275	67.433	69.674	60.208
2700	68.013	70.266	68.683	68.546	61.958	68.878	64.644	67.726	69.964	60.486
2800	68.298	70.550	68.975	68.851	62.268	69.162	65.000	68.011	70.245	60.756
2900	68.574	70.826	69.259	69.147	62.570	69.438	65.343	68.287	70.518	61.019
3000	68.841	71.094	69.534	69.435	62.865	69.706	65.675	68.556	70.782	61.274
3100	69.101	71.355	69.800	69.717	63.153	69.967	65.996	68.816	71.039	61.522
3200	69.354	71.608	70.059	69.991	63.434	70.220	66.306	69.070	71.289	61.764
3300	69.600	71.855	70.311	70.258	63.709	70.467	66.607	69.316	71.533	62.000
3400	69.839	72.096	70.556	70.519	63.978	70.707	66.898	69.557	71.770	62.230
3500	70.073	72.330	70.795	70.774	64.241	70.941	67.181	69.791	72.000	62.454
3600	70.300	72.559	71.027	71.023	64.498	71.169	67.456	70.019	72.226	62.673
3700	70.522	72.782	71.254	71.266	64.749	71.392	67.723	70.242	72.445	62.887
3800	70.738	73.000	71.475	71.504	64.996	71.610	67.982	70.460	72.660	63.096
3900	70.950	73.212	71.690	71.737	65.237	71.822	68.235	70.673	72.869	63.301
4000	71.156	73.421	71.901	71.965	65.474	72.030	68.482	70.881	73.074	63.501

T/K	NaO	NbO	NdO	NiO	NpO	O_2	OsO	PO	PbO	PdO
100	61.436	63.415	66.961	61.631	64.274	55.197	63.343	60.030	63.907	63.653
200	55.282	57.745	61.198	55.865	58.504	49.638	57.543	53.908	58.033	57.875
298	54.550	57.084	60.520	55.187	57.826	48.999	56.860	53.213	57.338	57.196
300	54.550	57.084	60.521	55.188	57.826	49.000	56.860	53.213	57.338	57.196
400	54.876	57.378	60.822	55.490	58.129	49.277	57.165	53.512	57.648	57.499
500	55.503	57.944	61.404	56.072	58.711	49.806	57.752	54.081	58.245	58.083
600	56.217	58.590	62.067	56.736	59.375	50.408	58.420	54.726	58.924	58.748
700	56.941	59.248	62.742	57.412	60.051	51.021	59.099	55.382	59.613	59.424
800	57.648	59.892	63.400	58.072	60.710	51.622	59.762	56.021	60.286	60.085
900	58.325	60.512	64.032	58.705	61.343	52.201	60.398	56.636	60.930	60.718
1000	58.970	61.104	64.634	59.309	61.945	52.756	61.004	57.222	61.543	61.322
1100	59.582	61.667	65.206	59.883	62.518	53.285	61.579	57.780	62.126	61.895
1200	60.163	62.202	65.750	60.428	63.062	53.790	62.124	58.310	62.678	62.439
1300	60.714	62.712	66.265	60.946	63.578	54.272	62.643	58.815	63.203	62.956
1400	61.237	63.197	66.756	61.439	64.069	54.733	63.135	59.296	63.702	63.448
1500	61.734	63.659	67.224	61.909	64.537	55.173	63.604	59.754	64.177	63.916
1600	62.208	64.100	67.669	62.357	64.983	55.595	64.052	60.192	64.630	64.362
1700	62.660	64.523	68.095	62.785	65.409	55.999	64.479	60.611	65.063	64.789
1800	63.092	64.927	68.503	63.195	65.817	56.387	64.888	61.012	65.477	65.197
1900	63.506	65.315	68.893	63.588	66.208	56.761	65.280	61.397	65.874	65.588
2000	63.902	65.688	69.268	63.965	66.583	57.120	65.656	61.767	66.255	65.964

TABLE 8. Gibbs energy functions, $-(G_T^\circ - H_{298}^\circ)/T$, for gaseous monoxides in cal mol^{-1} K^{-1} — Continued

T/K	NaO	NbO	NdO	NiO	NpO	O_2	OsO	PO	PbO	PdO
2100	64.283	66.046	69.629	64.328	66.943	57.467	66.017	62.123	66.621	66.324
2200	64.648	66.391	69.976	64.678	67.291	57.802	66.365	62.467	66.974	66.672
2300	65.000	66.724	70.310	65.014	67.625	58.126	66.700	62.797	67.314	67.006
2400	65.339	67.045	70.633	65.339	67.948	58.439	67.024	63.117	67.642	67.329
2500	65.667	67.356	70.944	65.654	68.259	58.743	67.336	63.426	67.959	67.641
2600	65.983	67.657	71.245	65.958	68.561	59.038	67.638	63.725	68.265	67.943
2700	66.289	67.948	71.537	66.252	68.853	59.324	67.930	64.015	68.562	68.235
2800	66.585	68.230	71.820	66.537	69.135	59.601	68.214	64.295	68.850	68.518
2900	66.871	68.504	72.094	66.814	69.410	59.872	68.488	64.568	69.129	68.792
3000	67.149	68.770	72.360	67.083	69.676	60.135	68.755	64.833	69.400	69.058
3100	67.419	69.029	72.619	67.345	69.935	60.391	69.014	65.090	69.664	69.317
3200	67.681	69.280	72.870	67.599	70.186	60.641	69.266	65.341	69.920	69.569
3300	67.936	69.525	73.115	67.846	70.431	60.885	69.511	65.585	70.169	69.813
3400	68.184	69.763	73.353	68.087	70.669	61.123	69.749	65.822	70.412	70.052
3500	68.426	69.996	73.585	68.322	70.901	61.355	69.982	66.054	70.649	70.284
3600	68.661	70.223	73.811	68.551	71.127	61.583	70.208	66.280	70.880	70.510
3700	68.890	70.444	74.032	68.775	71.348	61.805	70.429	66.501	71.105	70.731
3800	69.114	70.660	74.247	68.994	71.564	62.022	70.645	66.716	71.326	70.947
3900	69.332	70.871	74.457	69.207	71.774	62.235	70.856	66.927	71.541	71.157
4000	69.545	71.078	74.663	69.416	71.980	62.443	71.062	67.133	71.751	71.363

T/K	PrO	PtO	PuO	RbO	ReO	RhO	RuO	SO	SbO	ScO
100	66.429	63.056	64.544	66.212	64.443	64.130	64.268	59.278	63.347	59.992
200	60.665	57.301	58.774	59.004	58.730	58.352	58.525	53.664	57.565	54.310
298	59.988	56.625	58.096	58.118	58.061	57.673	57.851	53.013	56.884	53.647
300	59.988	56.625	58.096	58.118	58.061	57.673	57.851	53.013	56.884	53.647
400	60.290	56.927	58.399	58.512	58.359	57.976	58.151	53.300	57.188	53.942
500	60.872	57.508	58.981	59.257	58.933	58.560	58.730	53.852	57.775	54.510
600	61.535	58.170	59.645	60.086	59.587	59.225	59.390	54.482	58.448	55.159
700	62.210	58.845	60.321	60.911	60.253	59.901	60.061	55.126	59.136	55.820
800	62.868	59.504	60.980	61.701	60.905	60.562	60.717	55.756	59.813	56.467
900	63.500	60.137	61.613	62.446	61.530	61.195	61.347	56.363	60.467	57.089
1000	64.102	60.740	62.215	63.147	62.127	61.799	61.947	56.944	61.095	57.683
1100	64.675	61.314	62.788	63.804	62.694	62.372	62.517	57.497	61.696	58.248
1200	65.218	61.859	63.332	64.421	63.233	62.916	63.059	58.024	62.270	58.785
1300	65.734	62.377	63.848	65.003	63.745	63.433	63.573	58.525	62.818	59.296
1400	66.225	62.870	64.339	65.551	64.233	63.925	64.063	59.003	63.341	59.783
1500	66.692	63.340	64.807	66.070	64.697	64.393	64.529	59.459	63.841	60.247
1600	67.138	63.788	65.253	66.562	65.140	64.839	64.974	59.895	64.320	60.690
1700	67.564	64.216	65.679	67.029	65.563	65.266	65.399	60.312	64.778	61.113
1800	67.971	64.627	66.087	67.474	65.969	65.674	65.806	60.712	65.217	61.519
1900	68.362	65.020	66.478	67.898	66.357	66.065	66.195	61.096	65.639	61.908
2000	68.737	65.398	66.853	68.304	66.730	66.441	66.570	61.465	66.044	62.281
2100	69.097	65.761	67.214	68.693	67.089	66.801	66.929	61.820	66.434	62.641
2200	69.444	66.111	67.561	69.066	67.434	67.149	67.276	62.162	66.809	62.987
2300	69.779	66.448	67.895	69.424	67.767	67.483	67.610	62.492	67.171	63.321
2400	70.101	66.774	68.218	69.769	68.088	67.806	67.932	62.811	67.520	63.643
2500	70.413	67.089	68.530	70.101	68.399	68.118	68.243	63.119	67.858	63.955
2600	70.714	67.393	68.831	70.421	68.699	68.420	68.544	63.417	68.184	64.256
2700	71.006	67.688	69.123	70.731	68.990	68.712	68.835	63.706	68.500	64.548
2800	71.289	67.974	69.406	71.030	69.271	68.995	69.117	63.987	68.806	64.831
2900	71.563	68.252	69.680	71.320	69.544	69.269	69.391	64.259	69.103	65.106
3000	71.829	68.521	69.946	71.600	69.810	69.535	69.657	64.523	69.391	65.373
3100	72.087	68.783	70.205	71.873	70.067	69.794	69.915	64.780	69.671	65.632
3200	72.339	69.038	70.456	72.137	70.318	70.046	70.166	65.030	69.943	65.885
3300	72.583	69.286	70.701	72.394	70.562	70.290	70.410	65.274	70.207	66.130
3400	72.822	69.528	70.939	72.643	70.799	70.529	70.648	65.511	70.465	66.369
3500	73.054	69.764	71.171	72.886	71.031	70.761	70.880	65.743	70.716	66.603
3600	73.280	69.994	71.397	73.123	71.256	70.987	71.106	65.969	70.960	66.830
3700	73.501	70.218	71.618	73.353	71.476	71.208	71.326	66.189	71.198	67.052
3800	73.716	70.437	71.834	73.578	71.691	71.424	71.542	66.404	71.431	67.269
3900	73.926	70.651	72.044	73.797	71.901	71.634	71.752	66.615	71.658	67.481
4000	74.132	70.861	72.250	74.011	72.106	71.840	71.957	66.820	71.880	67.688

TABLE 8. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in cal mol^{-1} K^{-1} — Continued

T/K	SeO	SiO	SmO	SnO	SrO	TaO	TbO	TeO	ThO	TiO
100	62.745	56.778	67.737	61.899	61.618	63.907	68.145	63.499	63.736	62.481
200	56.520	51.185	61.976	56.125	55.658	58.255	62.387	57.052	58.016	56.417
298	55.813	50.538	61.299	55.446	54.951	57.597	61.711	56.260	57.346	55.727
300	55.814	50.539	61.299	55.446	54.951	57.597	61.711	56.260	57.346	55.727
400	56.121	50.822	61.601	55.749	55.266	57.888	62.012	56.622	57.645	56.028
500	56.711	51.368	62.182	56.332	55.872	58.450	62.593	57.318	58.220	56.606
600	57.380	51.990	62.845	56.998	56.561	59.092	63.255	58.104	58.876	57.263
700	58.059	52.626	63.519	57.675	57.259	59.747	63.929	58.893	59.544	57.930
800	58.721	53.248	64.177	58.337	57.938	60.390	64.587	59.654	60.197	58.583
900	59.357	53.848	64.809	58.971	58.590	61.010	65.218	60.377	60.825	59.211
1000	59.962	54.422	65.411	59.576	59.209	61.604	65.820	61.059	61.426	59.810
1100	60.537	54.970	65.983	60.151	59.797	62.171	66.391	61.701	61.998	60.380
1200	61.083	55.491	66.526	60.697	60.355	62.714	66.934	62.307	62.544	60.923
1300	61.601	55.987	67.042	61.216	60.884	63.232	67.450	62.878	63.067	61.440
1400	62.094	56.461	67.532	61.710	61.387	63.727	67.940	63.418	63.568	61.934
1500	62.564	56.913	68.000	62.180	61.866	64.202	68.407	63.930	64.049	62.405
1600	63.013	57.345	68.445	62.629	62.322	64.657	68.853	64.416	64.513	62.855
1700	63.441	57.759	68.871	63.058	62.758	65.094	69.278	64.878	64.961	63.286
1800	63.851	58.156	69.279	63.468	63.175	65.514	69.686	65.319	65.395	63.700
1900	64.244	58.537	69.669	63.861	63.575	65.919	70.076	65.741	65.816	64.097
2000	64.622	58.903	70.044	64.239	63.959	66.309	70.451	66.144	66.224	64.479
2100	64.985	59.255	70.404	64.603	64.328	66.684	70.811	66.530	66.622	64.847
2200	65.334	59.595	70.751	64.952	64.683	67.047	71.158	66.902	67.009	65.202
2300	65.671	59.923	71.085	65.289	65.025	67.398	71.492	67.259	67.385	65.545
2400	65.997	60.240	71.408	65.615	65.356	67.738	71.814	67.603	67.753	65.876
2500	66.311	60.546	71.719	65.929	65.675	68.066	72.126	67.934	68.111	66.197
2600	66.615	60.842	72.021	66.234	65.984	68.384	72.427	68.255	68.460	66.507
2700	66.909	61.130	72.312	66.528	66.283	68.693	72.719	68.564	68.800	66.808
2800	67.195	61.408	72.595	66.814	66.573	68.993	73.001	68.864	69.133	67.099
2900	67.472	61.679	72.869	67.091	66.854	69.284	73.275	69.154	69.457	67.383
3000	67.741	61.942	73.135	67.360	67.128	69.567	73.541	69.435	69.774	67.658
3100	68.002	62.197	73.394	67.622	67.393	69.842	73.800	69.709	70.083	67.926
3200	68.256	62.446	73.645	67.876	67.652	70.109	74.051	69.974	70.385	68.187
3300	68.504	62.688	73.889	68.124	67.903	70.370	74.296	70.232	70.680	68.440
3400	68.745	62.924	74.128	68.365	68.149	70.624	74.534	70.483	70.967	68.688
3500	68.980	63.155	74.360	68.600	68.388	70.872	74.766	70.727	71.249	68.929
3600	69.209	63.379	74.586	68.829	68.621	71.113	74.992	70.966	71.524	69.164
3700	69.432	63.598	74.806	69.053	68.849	71.349	75.212	71.198	71.792	69.394
3800	69.651	63.812	75.022	69.271	69.071	71.579	75.428	71.425	72.055	69.618
3900	69.864	64.022	75.232	69.485	69.290	71.804	75.638	71.646	72.312	69.837
4000	70.073	64.226	75.438	69.694	69.503	72.024	75.844	71.862	72.563	70.052

T/K	TmO	UO	VO	WO	YO	YbO	ZnO	ZrO
100	66.925	68.737	61.475	65.016	62.293	66.451	60.292	60.720
200	61.171	62.967	55.814	59.374	56.549	60.698	54.380	55.020
298	60.496	62.289	55.154	58.718	55.875	60.023	53.681	54.352
300	60.496	62.289	55.154	58.718	55.875	60.023	53.681	54.352
400	60.797	62.591	55.447	59.008	56.175	60.324	53.993	54.655
500	61.377	63.174	56.011	59.568	56.755	60.904	54.593	55.258
600	62.039	63.838	56.655	60.207	57.415	61.566	55.275	55.975
700	62.712	64.513	57.311	60.859	58.087	62.238	55.966	56.737
800	63.369	65.173	57.954	61.497	58.744	62.896	56.640	57.510
900	64.000	65.805	58.572	62.111	59.375	63.526	57.285	58.273
1000	64.601	66.408	59.163	62.697	59.976	64.128	57.898	59.015
1100	65.173	66.981	59.725	63.256	60.548	64.699	58.480	59.729
1200	65.715	67.524	60.259	63.787	61.091	65.241	59.032	60.412
1300	66.230	68.041	60.768	64.293	61.607	65.757	59.556	61.062
1400	66.721	68.532	61.252	64.775	62.098	66.247	60.053	61.681
1500	67.187	69.000	61.714	65.234	62.566	66.713	60.527	62.268
1600	67.633	69.446	62.155	65.673	63.013	67.159	60.978	62.827
1700	68.058	69.872	62.577	66.093	63.439	67.584	61.409	63.358
1800	68.466	70.280	62.982	66.495	63.848	67.991	61.821	63.864
1900	68.856	70.671	63.369	66.881	64.239	68.382	62.216	64.346
2000	69.230	71.046	63.742	67.251	64.615	68.756	62.594	64.807
2100	69.591	71.406	64.100	67.608	64.977	69.116	62.958	65.247

TABLE 8. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in cal mol^{-1} K^{-1} — Continued

T/K	TmO	UO	VO	WO	YO	YbO	ZnO	ZrO
2200	69.937	71.753	64.445	67.951	65.325	69.463	63.308	65.669
2300	70.271	72.088	64.778	68.283	65.661	69.797	63.645	66.073
2400	70.594	72.410	65.100	68.603	65.985	70.119	63.971	66.461
2500	70.905	72.722	65.411	68.912	66.298	70.431	64.285	66.834
2600	71.206	73.024	65.711	69.211	66.600	70.732	64.588	67.193
2700	71.498	73.315	66.003	69.501	66.894	71.023	64.882	67.539
2800	71.780	73.598	66.285	69.782	67.178	71.306	65.167	67.873
2900	72.054	73.873	66.559	70.055	67.453	71.580	65.443	68.196
3000	72.320	74.139	66.826	70.320	67.721	71.846	65.711	68.508
3100	72.578	74.397	67.084	70.577	67.981	72.104	65.971	68.810
3200	72.830	74.649	67.336	70.828	68.234	72.355	66.224	69.102
3300	73.074	74.893	67.581	71.072	68.481	72.600	66.470	69.386
3400	73.312	75.132	67.820	71.309	68.720	72.838	66.709	69.661
3500	73.544	75.364	68.053	71.541	68.954	73.070	66.943	69.929
3600	73.770	75.590	68.280	71.767	69.182	73.296	67.170	70.189
3700	73.991	75.811	68.502	71.987	69.405	73.516	67.392	70.442
3800	74.206	76.026	68.718	72.202	69.622	73.732	67.609	70.688
3900	74.416	76.237	68.930	72.413	69.834	73.942	67.820	70.928
4000	74.622	76.442	69.137	72.619	70.042	74.147	68.027	71.162

TABLE 9. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in J mol^{-1} K^{-1}

T/K	AgO	AlO	AsO	AuO	BO	BaO	BeO	BiO	BrO	CO
100	276.039	244.778	257.333	283.385	229.308	263.077	223.448	273.687	260.748	223.402
200	248.732	221.020	233.134	255.192	206.087	238.259	200.165	248.958	235.713	200.191
298	245.537	218.248	230.270	251.888	203.422	235.318	197.486	246.030	232.708	197.529
300	245.538	218.248	230.271	251.889	203.423	235.319	197.486	246.030	232.709	197.529
400	246.938	219.480	231.576	253.325	204.571	236.631	198.652	247.337	234.086	198.674
500	249.606	221.855	234.129	256.047	206.755	239.152	200.882	249.851	236.769	200.843
600	252.616	224.567	237.074	259.105	209.225	242.017	203.420	252.710	239.847	203.288
700	255.653	227.333	240.091	262.178	211.732	244.923	206.008	255.612	242.982	205.762
800	258.597	230.040	243.050	265.150	214.184	247.753	208.545	258.440	246.041	208.175
900	261.409	232.647	245.896	267.981	216.545	250.465	210.992	261.151	248.970	210.495
1000	264.078	235.138	248.608	270.661	218.806	253.044	213.334	263.730	251.753	212.713
1100	266.604	237.515	251.184	273.193	220.963	255.491	215.571	266.179	254.389	214.830
1200	268.996	239.783	253.627	275.587	223.022	257.811	217.706	268.503	256.884	216.849
1300	271.264	241.950	255.945	277.852	224.988	260.014	219.743	270.709	259.246	218.776
1400	273.417	244.023	258.145	279.999	226.866	262.107	221.693	272.808	261.486	220.618
1500	275.465	246.013	260.238	282.037	228.662	264.099	223.560	274.806	263.614	222.381
1600	277.416	247.925	262.230	283.977	230.383	265.998	225.354	276.713	265.639	224.069
1700	279.279	249.767	264.131	285.826	232.033	267.811	227.082	278.535	267.569	225.689
1800	281.060	251.544	265.946	287.592	233.618	269.546	228.750	280.281	269.412	227.246
1900	282.767	253.261	267.684	289.281	235.143	271.208	230.365	281.955	271.176	228.744
2000	284.404	254.924	269.349	290.900	236.610	272.803	231.932	283.564	272.865	230.186
2100	285.979	256.535	270.948	292.454	238.025	274.336	233.456	285.112	274.487	231.578
2200	287.494	258.098	272.484	293.947	239.391	275.811	234.943	286.604	276.046	232.921
2300	288.954	259.615	273.963	295.385	240.711	277.232	236.395	288.045	277.547	234.220
2400	290.364	261.090	275.389	296.770	241.987	278.603	237.816	289.438	278.994	235.476
2500	291.727	262.524	276.764	298.107	243.223	279.928	239.209	290.785	280.390	236.694
2600	293.046	263.920	278.093	299.399	244.421	281.209	240.576	292.091	281.739	237.874
2700	294.323	265.279	279.379	300.648	245.582	282.449	241.918	293.358	283.045	239.019
2800	295.564	266.603	280.623	301.858	246.711	283.650	243.238	294.587	284.309	240.131
2900	296.767	267.893	281.829	303.030	247.807	284.816	244.536	295.783	285.536	241.212
3000	297.937	269.151	282.999	304.167	248.873	285.947	245.814	296.946	286.726	242.263
3100	299.074	270.379	284.135	305.271	249.910	287.047	247.070	298.079	287.882	243.287
3200	300.181	271.576	285.238	306.344	250.920	288.115	248.307	299.183	289.013	244.284
3300	301.260	272.746	286.312	307.387	251.904	289.156	249.525	300.259	290.114	245.255
3400	302.311	273.888	287.356	308.402	252.864	290.169	250.723	301.310	291.183	246.203
3500	303.338	275.003	288.373	309.390	253.801	291.156	251.902	302.336	292.226	247.128
3600	304.340	276.094	289.364	310.354	254.715	292.118	253.063	303.339	293.243	248.031
3700	305.319	277.160	290.331	311.293	255.608	293.057	254.205	304.320	294.237	248.914
3800	306.276	278.202	291.274	312.209	256.481	293.974	255.329	305.280	295.208	249.776
3900	307.213	279.222	292.195	313.104	257.334	294.870	256.434	306.221	296.159	250.620
4000	308.130	280.220	293.095	313.978	258.169	295.745	257.521	307.145	297.089	251.446

TABLE 9. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in J mol^{-1} K^{-1} — Continued

T/K	CaO	CdO	CeO	ClO	CoO	CrO	CsO	CuO	DyO	ErO
100	247.015	261.491	275.630	254.748	260.255	265.867	280.999	265.281	284.254	281.765
200	222.476	235.952	251.389	228.018	236.199	241.915	252.890	237.705	260.166	257.686
298	219.575	232.917	248.554	224.899	233.375	239.108	249.591	234.475	257.337	254.859
300	219.576	232.918	248.554	224.900	233.376	239.109	249.591	234.476	257.337	254.859
400	220.871	234.265	249.815	226.261	234.634	240.359	251.028	235.886	258.598	256.119
500	223.364	236.846	252.242	228.856	237.060	242.770	253.757	238.568	261.028	258.548
600	226.202	239.769	255.010	231.787	239.827	245.522	256.825	241.590	263.798	261.317
700	229.084	242.725	257.824	234.748	242.642	248.326	259.912	244.636	266.616	264.133
800	231.895	245.598	260.573	237.625	245.392	251.066	262.900	247.587	269.368	266.883
900	234.591	248.343	263.212	240.375	248.033	253.700	265.750	250.405	272.009	269.524
1000	237.158	250.951	265.727	242.987	250.550	256.213	268.450	253.076	274.526	272.040
1100	239.596	253.421	268.118	245.463	252.943	258.603	271.004	255.606	276.917	274.430
1200	241.912	255.760	270.388	247.810	255.215	260.875	273.421	258.000	279.188	276.700
1300	244.116	257.978	272.545	250.035	257.375	263.035	275.711	260.268	281.345	278.856
1400	246.215	260.084	274.597	252.149	259.429	265.092	277.883	262.422	283.397	280.907
1500	248.223	262.086	276.552	254.161	261.386	267.052	279.948	264.469	285.351	282.861
1600	250.146	263.993	278.417	256.077	263.253	268.923	281.914	266.420	287.215	284.724
1700	251.994	265.812	280.199	257.908	265.038	270.713	283.791	268.281	288.996	286.505
1800	253.778	267.551	281.905	259.658	266.746	272.427	285.586	270.061	290.700	288.209
1900	255.503	269.217	283.540	261.335	268.384	274.071	287.304	271.766	292.333	289.842
2000	257.176	270.814	285.110	262.945	269.956	275.650	288.953	273.402	293.901	291.409
2100	258.805	272.347	286.619	264.491	271.467	277.169	290.537	274.973	295.408	292.916
2200	260.392	273.822	288.072	265.979	272.923	278.632	292.062	276.486	296.859	294.366
2300	261.944	275.243	289.472	267.414	274.326	280.044	293.532	277.943	298.257	295.764
2400	263.462	276.613	290.824	268.798	275.679	281.407	294.951	279.350	299.606	297.113
2500	264.950	277.935	292.130	270.135	276.988	282.724	296.322	280.709	300.909	298.416
2600	266.410	279.213	293.393	271.428	278.253	283.999	297.648	282.023	302.169	299.676
2700	267.844	280.450	294.616	272.680	279.478	285.235	298.932	283.296	303.389	300.896
2800	269.252	281.648	295.801	273.893	280.666	286.433	300.178	284.530	304.571	302.078
2900	270.638	282.809	296.950	275.070	281.818	287.596	301.386	285.728	305.718	303.224
3000	271.999	283.936	298.066	276.213	282.937	288.725	302.560	286.892	306.831	304.337
3100	273.338	285.030	299.151	277.324	284.024	289.824	303.702	288.023	307.912	305.418
3200	274.655	286.094	300.205	278.404	285.081	290.893	304.812	289.125	308.963	306.469
3300	275.949	287.128	301.232	279.455	286.110	291.934	305.894	290.198	309.986	307.492
3400	277.222	288.135	302.231	280.480	287.111	292.948	306.948	291.243	310.982	308.488
3500	278.473	289.116	303.205	281.478	288.088	293.937	307.976	292.262	311.953	309.458
3600	279.702	290.072	304.155	282.452	289.040	294.903	308.979	293.257	312.899	310.404
3700	280.911	291.005	305.082	283.403	289.969	295.846	309.958	294.228	313.822	311.327
3800	282.098	291.915	305.986	284.331	290.877	296.767	310.914	295.178	314.723	312.228
3900	283.265	292.803	306.870	285.238	291.763	297.667	311.849	296.107	315.603	313.108
4000	284.413	293.671	307.734	286.126	292.629	298.548	312.764	297.015	316.464	313.968

T/K	EuO	FO	FeO	GaO	GdO	GeO	HO	HfO	HoO	IO
100	284.632	243.254	261.133	258.046	280.221	250.283	210.773	262.017	283.127	267.207
200	260.531	219.598	237.145	233.658	256.127	226.551	186.297	238.267	259.046	242.417
298	257.700	216.844	234.332	230.781	253.297	223.783	183.539	235.496	256.218	239.480
300	257.700	216.844	234.333	230.782	253.298	223.783	183.539	235.497	256.218	239.481
400	258.962	218.065	235.586	232.066	254.559	225.012	184.709	236.727	257.479	240.793
500	261.394	220.418	238.003	234.539	256.990	227.381	186.907	239.099	259.908	243.321
600	264.167	223.105	240.760	237.356	259.761	230.087	189.362	241.809	262.677	246.208
700	266.986	225.846	243.567	240.219	262.580	232.845	191.820	244.569	265.494	249.153
800	269.739	228.530	246.311	243.012	265.333	235.543	194.193	247.270	268.245	252.043
900	272.382	231.112	248.948	245.692	267.975	238.139	196.454	249.868	270.885	254.831
1000	274.900	233.578	251.462	248.244	270.492	240.617	198.599	252.347	273.402	257.503
1100	277.293	235.926	253.852	250.668	272.884	242.975	200.632	254.706	275.792	260.056
1200	279.565	238.160	256.124	252.969	275.155	245.217	202.561	256.949	278.062	262.491
1300	281.723	240.286	258.283	255.155	277.313	247.351	204.395	259.083	280.219	264.814
1400	283.775	242.310	260.338	257.233	279.365	249.382	206.142	261.114	282.270	267.032
1500	285.730	244.241	262.297	259.213	281.319	251.319	207.811	263.050	284.224	269.151
1600	287.594	246.086	264.166	261.102	283.183	253.168	209.407	264.899	286.088	271.178
1700	289.376	247.850	265.953	262.906	284.965	254.937	210.938	266.667	287.868	273.118
1800	291.081	249.540	267.664	264.634	286.669	256.631	212.408	268.360	289.572	274.978
1900	292.714	251.162	269.305	266.289	288.303	258.256	213.822	269.984	291.205	276.764
2000	294.283	252.720	270.881	267.879	289.871	259.817	215.185	271.543	292.773	278.479

TABLE 9. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in J mol^{-1} K^{-1} — Continued

T/K	EuO	FO	FeO	GaO	GdO	GeO	HO	HfO	HoO	IO
2100	295.790	254.220	272.396	269.408	291.378	261.318	216.500	273.044	294.280	280.129
2200	297.241	255.664	273.856	270.879	292.829	262.765	217.771	274.488	295.730	281.719
2300	298.639	257.057	275.263	272.298	294.227	264.159	219.000	275.882	297.128	283.252
2400	299.989	258.402	276.622	273.667	295.576	265.506	220.191	277.227	298.477	284.731
2500	301.292	259.703	277.935	274.991	296.879	266.808	221.346	278.527	299.780	286.160
2600	302.553	260.962	279.205	276.271	298.140	268.068	222.467	279.784	301.040	287.543
2700	303.773	262.181	280.436	277.511	299.360	269.288	223.556	281.003	302.260	288.881
2800	304.955	263.364	281.629	278.713	300.542	270.471	224.615	282.184	303.442	290.178
2900	306.102	264.511	282.787	279.880	301.689	271.619	225.645	283.330	304.589	291.436
3000	307.215	265.626	283.911	281.013	302.802	272.734	226.649	284.442	305.701	292.657
3100	308.297	266.710	285.004	282.114	303.883	273.817	227.627	285.524	306.783	293.844
3200	309.348	267.764	286.067	283.186	304.935	274.872	228.581	286.576	307.834	294.997
3300	310.371	268.791	287.102	284.230	305.958	275.898	229.512	287.600	308.857	296.120
3400	311.368	269.791	288.110	285.282	306.954	276.898	230.422	288.598	309.853	297.213
3500	312.338	270.766	289.093	286.280	307.925	277.872	231.310	289.570	310.823	298.278
3600	313.285	271.718	290.052	287.254	308.871	278.823	232.179	290.518	311.769	299.316
3700	314.208	272.646	290.988	288.206	309.794	279.751	233.029	291.444	312.692	300.330
3800	315.109	273.553	291.902	289.138	310.695	280.657	233.861	292.347	313.593	301.319
3900	315.989	274.440	292.795	290.049	311.575	281.543	234.675	293.230	314.473	302.287
4000	316.849	275.306	293.668	290.942	312.435	282.408	235.473	294.094	315.333	303.232

T/K	InO	IrO	KO	LaO	LiO	LuO	MgO	MnO	MoO	NO
100	265.351	274.764	271.841	266.608	238.286	268.897	240.321	264.078	273.819	237.631
200	240.698	250.846	240.649	242.423	214.151	244.805	215.992	239.970	250.035	213.413
298	237.782	248.046	236.989	239.578	211.313	241.975	213.122	237.137	247.257	210.675
300	237.782	248.046	236.990	239.579	211.313	241.976	213.123	237.137	247.258	210.676
400	239.083	249.293	238.547	240.848	212.580	243.237	214.413	238.400	248.491	211.845
500	241.585	251.697	241.463	243.293	215.027	245.669	216.937	240.835	250.870	214.059
600	244.429	254.441	244.704	246.081	217.823	248.443	219.899	243.611	253.585	216.558
700	247.315	257.236	247.935	248.916	220.677	251.265	223.034	246.434	256.350	219.088
800	250.126	259.968	251.040	251.686	223.476	254.021	226.231	249.193	259.055	221.559
900	252.819	262.594	253.982	254.346	226.174	256.668	229.429	251.841	261.655	223.936
1000	255.381	265.099	256.757	256.884	228.756	259.191	232.582	254.365	264.135	226.209
1100	257.812	267.481	259.370	259.300	231.218	261.588	235.657	256.763	266.494	228.378
1200	260.118	269.745	261.834	261.599	233.566	263.866	238.632	259.042	268.736	230.446
1300	262.305	271.898	264.159	263.790	235.804	266.029	241.493	261.206	270.868	232.420
1400	264.384	273.947	266.360	265.880	237.940	268.088	244.233	263.266	272.897	234.305
1500	266.363	275.900	268.446	267.878	239.980	270.049	246.851	265.228	274.831	236.108
1600	268.248	277.764	270.428	269.792	241.931	271.921	249.347	267.100	276.677	237.834
1700	270.049	279.546	272.314	271.628	243.800	273.709	251.728	268.889	278.442	239.489
1800	271.771	281.253	274.114	273.392	245.594	275.421	253.998	270.601	280.131	241.079
1900	273.421	282.889	275.834	275.091	247.316	277.062	256.164	272.243	281.751	242.608
2000	275.003	284.461	277.480	276.728	248.974	278.638	258.231	273.819	283.306	244.079
2100	276.524	285.973	279.059	278.309	250.604	280.153	260.208	275.335	284.802	245.498
2200	277.987	287.429	280.576	279.837	252.156	281.612	262.100	276.794	286.242	246.867
2300	279.397	288.832	282.035	281.316	253.657	283.018	263.912	278.200	287.631	248.190
2400	280.756	290.188	283.440	282.748	255.113	284.375	265.650	279.558	288.971	249.469
2500	282.069	291.498	284.795	284.138	256.525	285.687	267.320	280.870	290.265	250.708
2600	283.339	292.765	286.104	285.487	257.896	286.955	268.925	282.139	291.518	251.909
2700	284.567	293.993	287.369	286.797	259.230	288.184	270.470	283.368	292.730	253.073
2800	285.758	295.183	288.593	288.071	260.529	289.374	271.960	284.559	293.906	254.204
2900	286.912	296.338	289.779	289.311	261.794	290.529	273.396	285.714	295.046	255.302
3000	288.032	297.459	290.929	290.518	263.029	291.651	274.784	286.836	296.153	256.370
3100	289.120	298.549	292.045	291.694	264.233	292.741	276.126	287.927	297.229	257.410
3200	290.177	299.610	293.129	292.841	265.410	293.801	277.425	288.987	298.275	258.422
3300	291.206	300.642	294.182	293.960	266.559	294.833	278.683	290.020	299.293	259.409
3400	292.208	301.648	295.207	295.052	267.683	295.838	279.902	291.025	300.284	260.371
3500	293.184	302.628	296.205	296.118	268.782	296.817	281.086	292.005	301.250	261.309
3600	294.135	303.585	297.178	297.160	269.858	297.772	282.235	292.961	302.192	262.225
3700	295.063	304.518	298.126	298.178	270.911	298.705	283.352	293.894	303.111	263.121
3800	295.968	305.430	299.050	299.174	271.943	299.615	284.439	294.804	304.008	263.995
3900	296.853	306.321	299.952	300.148	272.953	300.504	285.496	295.694	304.885	264.851
4000	297.717	307.192	300.834	301.101	273.943	301.373	286.527	296.564	305.741	265.688

TABLE 9. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in J mol^{-1} K^{-1} — Continued

T/K	NaO	NbO	NdO	NiO	NpO	O_2	OsO	PO	PbO	PdO
100	257.046	265.330	280.165	257.862	268.922	236.707	265.026	251.165	267.385	266.324
200	231.301	241.607	256.051	233.739	244.782	213.448	240.761	225.549	242.809	242.150
298	228.238	238.841	253.218	230.904	241.944	210.775	237.903	222.641	239.903	239.307
300	228.239	238.841	253.218	230.905	241.945	210.776	237.904	222.642	239.904	239.307
400	229.603	240.069	254.481	232.169	243.210	211.935	239.178	223.893	241.201	240.575
500	232.226	242.436	256.915	234.606	245.648	214.150	241.633	226.275	243.697	243.018
600	235.210	245.139	259.690	237.384	248.426	216.669	244.430	228.975	246.538	245.801
700	238.241	247.894	262.511	240.211	251.252	219.233	247.272	231.716	249.422	248.632
800	241.198	250.590	265.266	242.972	254.010	221.747	250.045	234.392	252.235	251.394
900	244.033	253.183	267.910	245.623	256.657	224.170	252.705	236.963	254.931	254.045
1000	246.732	255.658	270.430	248.150	259.179	226.491	255.239	239.416	257.498	256.570
1100	249.293	258.014	272.823	250.551	261.575	228.707	257.645	241.750	259.934	258.969
1200	251.722	260.254	275.096	252.832	263.850	230.820	259.928	243.970	262.247	261.246
1300	254.027	262.385	277.255	255.000	266.010	232.837	262.096	246.081	264.442	263.409
1400	256.215	264.414	279.308	257.062	268.065	234.764	264.158	248.093	266.530	265.466
1500	258.297	266.349	281.263	259.026	270.022	236.606	266.121	250.011	268.517	267.424
1600	260.279	268.196	283.129	260.901	271.888	238.370	267.993	251.843	270.413	269.292
1700	262.171	269.963	284.911	262.693	273.672	240.062	269.781	253.596	272.224	271.077
1800	263.978	271.655	286.616	264.408	275.378	241.686	271.492	255.275	273.957	272.784
1900	265.708	273.278	288.250	266.052	277.013	243.249	273.131	256.887	275.617	274.421
2000	267.366	274.837	289.819	267.631	278.583	244.753	274.705	258.435	277.212	275.992
2100	268.958	276.336	291.327	269.149	280.091	246.204	276.217	259.925	278.744	277.501
2200	270.488	277.781	292.778	270.611	281.544	247.606	277.672	261.360	280.220	278.954
2300	271.961	279.174	294.177	272.020	282.943	248.960	279.074	262.744	281.641	280.354
2400	273.380	280.518	295.527	273.380	284.293	250.272	280.427	264.081	283.014	281.705
2500	274.750	281.818	296.830	274.695	285.597	251.542	281.734	265.374	284.340	283.010
2600	276.073	283.076	298.091	275.967	286.859	252.775	282.998	266.625	285.622	284.272
2700	277.352	284.294	299.311	277.199	288.080	253.971	284.221	267.837	286.864	285.494
2800	278.590	285.475	300.494	278.392	289.263	255.134	285.406	269.012	288.068	286.678
2900	279.790	286.621	301.641	279.551	290.410	256.265	286.555	270.153	289.236	287.826
3000	280.953	287.734	302.754	280.676	291.524	257.366	287.671	271.261	290.370	288.940
3100	282.082	288.816	303.836	281.770	292.606	258.438	288.755	272.338	291.473	290.022
3200	283.179	289.868	304.888	282.833	293.658	259.484	289.808	273.386	292.545	291.075
3300	284.245	290.893	305.911	283.868	294.682	260.504	290.833	274.407	293.588	292.099
3400	285.283	291.890	306.908	284.877	295.678	261.500	291.831	275.401	294.605	293.096
3500	286.293	292.863	307.878	285.860	296.650	262.473	292.804	276.370	295.595	294.068
3600	287.277	293.812	308.825	286.819	297.596	263.423	293.752	277.316	296.562	295.015
3700	288.236	294.738	309.748	287.756	298.520	264.353	294.677	278.239	297.505	295.939
3800	289.171	295.642	310.650	288.670	299.422	265.262	295.580	279.140	298.426	296.841
3900	290.085	296.526	311.530	289.563	300.302	266.153	296.461	280.021	299.326	297.722
4000	290.976	297.389	312.390	290.437	301.163	267.025	297.323	280.883	300.206	298.583

T/K	PrO	PtO	PuO	RbO	ReO	RhO	RuO	SO	SbO	ScO
100	277.941	263.827	270.053	277.029	269.629	268.320	268.898	248.017	265.043	251.008
200	253.824	239.747	245.912	246.873	245.726	244.146	244.869	224.528	240.850	227.234
298	250.990	236.919	243.075	243.164	242.928	241.302	242.049	221.806	238.003	224.458
300	250.990	236.920	243.075	243.165	242.929	241.303	242.049	221.807	238.004	224.459
400	252.254	238.181	244.340	244.814	244.174	242.571	243.306	223.007	239.275	225.692
500	254.688	240.612	246.778	247.931	246.574	245.013	245.727	225.316	241.732	228.070
600	257.463	243.385	249.557	251.401	249.312	247.797	248.488	227.955	244.546	230.785
700	260.285	246.207	252.382	254.852	252.100	250.627	251.297	230.646	247.425	233.552
800	263.040	248.965	255.140	258.156	254.825	253.390	254.040	233.284	250.257	236.259
900	265.685	251.613	257.787	261.275	257.443	256.041	256.675	235.824	252.995	238.862
1000	268.205	254.138	260.309	264.205	259.939	258.566	259.186	238.253	255.623	241.346
1100	270.599	256.538	262.705	266.955	262.313	260.965	261.572	240.567	258.137	243.711
1200	272.872	258.819	264.980	269.539	264.567	263.242	263.838	242.771	260.537	245.958
1300	275.031	260.986	267.141	271.971	266.710	265.405	265.991	244.869	262.829	248.096
1400	277.084	263.048	269.195	274.266	268.749	267.461	268.039	246.869	265.019	250.132
1500	279.040	265.013	271.152	276.437	270.692	269.420	269.990	248.777	267.111	252.073
1600	280.905	266.889	273.019	278.494	272.546	271.288	271.851	250.601	269.113	253.926
1700	282.687	268.682	274.802	280.449	274.318	273.073	273.629	252.346	271.030	255.697
1800	284.393	270.398	276.508	282.311	276.014	274.780	275.331	254.019	272.868	257.394
1900	286.027	272.044	278.144	284.087	277.639	276.417	276.962	255.625	274.632	259.022
2000	287.596	273.625	279.713	285.785	279.200	277.987	278.528	257.168	276.328	260.586

TABLE 9. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in J mol^{-1} K^{-1} — Continued

T/K	PrO	PtO	PuO	RbO	ReO	RhO	RuO	SO	SbO	ScO
2100	289.104	275.145	281.222	287.412	280.701	279.497	280.033	258.653	277.959	262.089
2200	290.555	276.608	282.674	288.972	282.146	280.950	281.482	260.085	279.530	263.538
2300	291.954	278.020	284.073	290.471	283.538	282.350	282.878	261.466	281.044	264.935
2400	293.304	279.382	285.423	291.913	284.882	283.701	284.226	262.799	282.506	266.283
2500	294.608	280.699	286.728	293.302	286.181	285.006	285.528	264.089	283.918	267.587
2600	295.868	281.974	287.989	294.643	287.437	286.268	286.787	265.338	285.283	268.848
2700	297.089	283.208	289.210	295.938	288.652	287.490	288.005	266.547	286.605	270.070
2800	298.272	284.404	290.393	297.190	289.831	288.673	289.186	267.720	287.886	271.255
2900	299.419	285.565	291.540	298.402	290.974	289.821	290.332	268.859	289.128	272.404
3000	300.532	286.693	292.654	299.576	292.084	290.936	291.444	269.965	290.333	273.520
3100	301.614	287.789	293.736	300.715	293.162	292.018	292.524	271.041	291.503	274.605
3200	302.665	288.855	294.788	301.821	294.210	293.071	293.575	272.088	292.641	275.661
3300	303.689	289.894	295.812	302.895	295.230	294.095	294.597	273.107	293.748	276.689
3400	304.685	290.905	296.809	303.939	296.224	295.092	295.592	274.100	294.825	277.690
3500	305.656	291.891	297.780	304.956	297.192	296.064	296.562	275.068	295.874	278.665
3600	306.603	292.853	298.727	305.945	298.135	297.011	297.508	276.012	296.897	279.617
3700	307.526	293.792	299.650	306.910	299.056	297.935	298.430	276.934	297.894	280.546
3800	308.427	294.709	300.552	307.850	299.955	298.837	299.330	277.835	298.867	281.453
3900	309.308	295.605	301.433	308.767	300.833	299.718	300.210	278.715	299.817	282.340
4000	310.168	296.482	302.293	309.663	301.691	300.578	301.069	279.576	300.745	283.206

T/K	SeO	SiO	SmO	SnO	SrO	TaO	TbO	TeO	ThO	TiO
100	262.525	237.560	283.412	258.987	257.810	267.386	285.118	265.679	266.670	261.420
200	236.478	214.158	259.308	234.826	232.872	243.737	261.027	238.705	242.740	236.050
298	233.523	211.453	256.476	231.984	229.915	240.984	258.197	235.391	239.937	233.161
300	233.524	211.453	256.477	231.985	229.916	240.985	258.198	235.392	239.937	233.162
400	234.812	212.641	257.739	233.252	231.234	242.205	259.459	236.907	241.185	234.422
500	237.277	214.923	260.171	235.695	233.769	244.555	261.890	239.819	243.591	236.839
600	240.077	217.527	262.944	238.480	236.649	247.242	264.661	243.106	246.336	239.587
700	242.919	220.185	265.764	241.314	239.570	249.983	267.479	246.409	249.132	242.381
800	245.690	222.791	268.518	244.080	242.415	252.672	270.231	249.594	251.865	245.112
900	248.348	225.301	271.161	246.737	245.139	255.266	272.872	252.618	254.494	247.737
1000	250.880	227.703	273.680	249.268	247.731	257.750	275.390	255.471	257.005	250.244
1100	253.285	229.992	276.073	251.674	250.191	260.125	277.781	258.159	259.400	252.631
1200	255.569	232.173	278.344	253.958	252.524	262.393	280.052	260.691	261.686	254.903
1300	257.739	234.251	280.503	256.129	254.738	264.561	282.210	263.081	263.872	257.067
1400	259.803	236.233	282.555	258.194	256.842	266.635	284.261	265.341	265.967	259.130
1500	261.769	238.124	284.510	260.162	258.845	268.621	286.216	267.482	267.981	261.101
1600	263.645	239.933	286.375	262.039	260.755	270.526	288.080	269.516	269.922	262.985
1700	265.438	241.664	288.157	263.833	262.580	272.354	289.861	271.451	271.797	264.789
1800	267.154	243.324	289.861	265.550	264.326	274.112	291.565	273.296	273.613	266.520
1900	268.799	244.917	291.495	267.196	265.999	275.805	293.199	275.059	275.373	268.182
2000	270.378	246.449	293.064	268.777	267.605	277.435	294.767	276.746	277.083	269.781
2100	271.897	247.924	294.571	270.297	269.148	279.008	296.274	278.363	278.746	271.321
2200	273.359	249.345	296.022	271.760	270.634	280.526	297.724	279.917	280.364	272.806
2300	274.769	250.717	297.421	273.171	272.067	281.994	299.123	281.411	281.941	274.240
2400	276.130	252.042	298.770	274.533	273.449	283.414	300.472	282.850	283.477	275.626
2500	277.445	253.324	300.074	275.849	274.785	284.788	301.775	284.237	284.975	276.966
2600	278.717	254.564	301.334	277.122	276.077	286.120	303.035	285.577	286.436	278.265
2700	279.949	255.767	302.555	278.355	277.329	287.412	304.255	286.872	287.861	279.523
2800	281.143	256.933	303.737	279.549	278.542	288.666	305.437	288.126	289.252	280.744
2900	282.302	258.065	304.884	280.709	279.719	289.883	306.584	289.340	290.609	281.930
3000	283.427	259.165	305.997	281.835	280.862	291.067	307.697	290.517	291.934	283.082
3100	284.520	260.234	307.079	282.929	281.974	292.217	308.778	291.660	293.227	284.202
3200	285.584	261.275	308.130	283.993	283.055	293.337	309.830	292.771	294.490	285.293
3300	286.619	262.288	309.153	285.029	284.108	294.428	310.853	293.850	295.723	286.355
3400	287.628	263.276	310.150	286.038	285.133	295.491	311.849	294.901	296.928	287.389
3500	288.611	264.239	311.120	287.022	286.134	296.527	312.819	295.924	298.105	288.398
3600	289.570	265.178	312.067	287.981	287.110	297.537	313.766	296.920	299.255	289.383
3700	290.505	266.095	312.990	288.917	288.063	298.523	314.689	297.892	300.379	290.344
3800	291.419	266.991	313.891	289.832	288.995	299.487	315.590	298.841	301.478	291.283
3900	292.312	267.867	314.771	290.725	289.910	300.428	316.470	299.766	302.552	292.200
4000	293.185	268.723	315.632	291.599	290.802	301.347	317.330	300.671	303.603	293.097

TABLE 9. Gibbs energy functions, $(-(G_T^\circ - H_{298}^\circ)/T)$, for gaseous monoxides in J mol^{-1} K^{-1} — Continued

T/K	TmO	UO	VO	WO	YO	YbO	ZnO	ZrO
100	280.016	287.595	257.210	272.028	260.634	278.033	252.260	254.051
200	255.941	263.455	233.525	248.421	236.601	253.961	227.527	230.203
298	253.114	260.617	230.766	245.676	233.781	251.135	224.600	227.408
300	253.115	260.617	230.766	245.677	233.781	251.135	224.600	227.408
400	254.375	261.882	231.990	246.891	235.038	252.395	225.906	228.678
500	256.803	264.320	234.349	249.232	237.461	254.822	228.416	231.200
600	259.571	267.099	237.044	251.906	240.225	257.590	231.269	234.200
700	262.387	269.924	239.791	254.633	243.038	260.406	234.162	237.388
800	265.137	272.682	242.480	257.302	245.786	263.155	236.980	240.620
900	267.777	275.330	245.067	259.872	248.425	265.795	239.679	243.814
1000	270.292	277.852	247.537	262.326	250.942	268.310	242.246	246.919
1100	272.682	280.247	249.889	264.663	253.334	270.700	244.681	249.907
1200	274.952	282.522	252.125	266.886	255.606	272.969	246.990	252.763
1300	277.108	284.683	254.253	269.002	257.765	275.125	249.182	255.484
1400	279.159	286.737	256.280	271.017	259.820	277.176	251.263	258.072
1500	281.112	288.694	258.213	272.940	261.777	279.129	253.244	260.530
1600	282.976	290.561	260.058	274.776	263.645	280.992	255.133	262.867
1700	284.756	292.344	261.824	276.532	265.430	282.772	256.935	265.090
1800	286.460	294.050	263.515	278.214	267.139	284.476	258.659	267.207
1900	288.093	295.686	265.137	279.828	268.778	286.109	260.311	269.225
2000	289.660	297.255	266.696	281.379	270.351	287.676	261.895	271.152
2100	291.167	298.764	268.195	282.871	271.864	289.183	263.417	272.994
2200	292.617	300.216	269.639	284.308	273.320	290.633	264.881	274.757
2300	294.015	301.615	271.033	285.695	274.724	292.030	266.292	276.448
2400	295.363	302.965	272.378	287.033	276.079	293.379	267.653	278.072
2500	296.666	304.270	273.678	288.327	277.389	294.682	268.967	279.633
2600	297.926	305.531	274.936	289.579	278.656	295.942	270.237	281.135
2700	299.146	306.752	276.155	290.792	279.883	297.161	271.467	282.583
2800	300.328	307.935	277.337	291.968	281.072	298.343	272.658	283.981
2900	301.474	309.083	278.484	293.109	282.225	299.489	273.813	285.330
3000	302.587	310.196	279.598	294.218	283.345	300.602	274.934	286.636
3100	303.668	311.279	280.681	295.295	284.434	301.683	276.022	287.899
3200	304.719	312.331	281.734	296.343	285.492	302.734	277.081	289.123
3300	305.742	313.354	282.760	297.364	286.523	303.757	278.110	290.310
3400	306.738	314.351	283.759	298.358	287.526	304.753	279.112	291.462
3500	307.708	315.322	284.733	299.327	288.505	305.723	280.089	292.581
3600	308.654	316.269	285.684	300.272	289.459	306.669	281.041	293.669
3700	309.577	317.193	286.611	301.194	290.389	307.592	281.969	294.728
3800	310.478	318.094	287.517	302.095	291.298	308.493	282.875	295.758
3900	311.358	318.975	288.402	302.975	292.186	309.373	283.760	296.762
4000	312.218	319.835	289.267	303.836	293.054	310.233	284.624	297.741

TABLE 10. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kcal mol^{-1}

T/K	AgO	AlO	AsO	AuO	BO	BaO	BeO	BiO	BrO	CO
0	-2.356	-2.100	-2.122	-2.366	-2.074	-2.154	-2.077	-2.149	-2.163	-2.074
100	-1.611	-1.405	-1.426	-1.654	-1.379	-1.458	-1.382	-1.454	-1.468	-1.378
200	-0.815	-0.707	-0.726	-0.844	-0.683	-0.747	-0.686	-0.744	-0.759	-0.683
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.016	0.014	0.014	0.016	0.013	0.015	0.013	0.014	0.015	0.013
400	0.872	0.771	0.823	0.893	0.714	0.820	0.727	0.818	0.867	0.711
500	1.745	1.563	1.689	1.776	1.429	1.655	1.464	1.651	1.771	1.417
600	2.626	2.380	2.592	2.663	2.161	2.508	2.227	2.503	2.701	2.135
700	3.515	3.217	3.515	3.552	2.914	3.372	3.012	3.368	3.642	2.871
800	4.408	4.069	4.447	4.442	3.686	4.244	3.817	4.242	4.587	3.624
900	5.304	4.935	5.383	5.333	4.475	5.122	4.638	5.122	5.531	4.394
1000	6.204	5.816	6.319	6.225	5.278	6.004	5.471	6.007	6.473	5.179
1100	7.107	6.711	7.254	7.117	6.095	6.889	6.317	6.897	7.413	5.977
1200	8.012	7.625	8.187	8.010	6.922	7.778	7.175	7.790	8.352	6.787
1300	8.920	8.556	9.118	8.902	7.757	8.668	8.044	8.686	9.288	7.608
1400	9.830	9.508	10.047	9.795	8.601	9.560	8.931	9.587	10.222	8.437
1500	10.743	10.481	10.975	10.688	9.451	10.454	9.834	10.491	11.156	9.273
1600	11.657	11.475	11.900	11.581	10.307	11.349	10.761	11.400	12.089	10.117
1700	12.574	12.488	12.824	12.475	11.167	12.245	11.715	12.312	13.021	10.965
1800	13.494	13.521	13.747	13.368	12.032	13.143	12.694	13.229	13.953	11.820
1900	14.416	14.571	14.670	14.262	12.901	14.041	13.711	14.152	14.885	12.678
2000	15.341	15.636	15.591	15.155	13.772	14.941	14.764	15.080	15.818	13.540
2100	16.268	16.716	16.512	16.049	14.647	15.841	15.849	16.014	16.751	14.406
2200	17.199	17.807	17.432	16.942	15.524	16.742	16.980	16.952	17.684	15.275
2300	18.132	18.906	18.352	17.836	16.404	17.644	18.149	17.898	18.620	16.147
2400	19.069	20.013	19.271	18.730	17.286	18.548	19.350	18.848	19.556	17.021
2500	20.010	21.125	20.190	19.623	18.169	19.451	20.593	19.805	20.494	17.898
2600	20.955	22.242	21.109	20.517	19.055	20.355	21.870	20.768	21.433	18.776
2700	21.907	23.361	22.028	21.411	19.942	21.261	23.169	21.736	22.374	19.657
2800	22.868	24.480	22.947	22.305	20.831	22.167	24.502	22.710	23.318	20.539
2900	23.829	25.600	23.866	23.199	21.720	23.073	25.858	23.690	24.265	21.423
3000	24.797	26.718	24.786	24.092	22.612	23.981	27.232	24.676	25.215	22.309
3100	25.765	27.836	25.706	24.986	23.504	24.889	28.612	25.667	26.171	23.195
3200	26.739	28.950	26.626	25.880	24.398	25.798	30.011	26.664	27.168	24.084
3300	27.717	30.063	27.546	26.774	25.293	26.707	31.416	27.665	28.174	24.973
3400	28.700	31.171	28.467	27.668	26.189	27.618	32.823	28.672	29.156	25.863
3500	29.687	32.276	29.388	28.561	27.086	28.529	34.224	29.685	30.145	26.755
3600	30.679	33.378	30.310	29.455	27.983	29.441	35.630	30.702	31.141	27.648
3700	31.675	34.476	31.232	30.349	28.883	30.354	37.030	31.725	32.144	28.541
3800	32.675	35.569	32.155	31.243	29.782	31.267	38.424	32.755	33.155	29.436
3900	33.679	36.660	33.079	32.137	30.683	32.181	39.810	33.794	34.172	30.331
4000	34.686	37.747	34.003	33.031	31.584	33.096	41.186	34.858	35.197	31.228

T/K	CaO	CdO	CeO	ClO	CoO	CrO	CsO	CuO	DyO	ErO
0	-2.139	-2.192	-2.154	-2.277	-2.115	-2.110	-2.359	-2.330	-2.117	-2.116
100	-1.444	-1.496	-1.433	-1.572	-1.419	-1.414	-1.648	-1.620	-1.421	-1.421
200	-0.737	-0.771	-0.722	-0.797	-0.719	-0.714	-0.842	-0.824	-0.720	-0.719
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.014	0.015	0.014	0.015	0.014	0.014	0.016	0.016	0.014	0.014
400	0.811	0.842	0.789	0.848	0.788	0.783	0.894	0.878	0.790	0.789
500	1.638	1.691	1.596	1.698	1.595	1.586	1.781	1.753	1.598	1.597
600	2.485	2.554	2.425	2.560	2.425	2.414	2.673	2.635	2.428	2.427
700	3.347	3.425	3.270	3.431	3.271	3.259	3.570	3.524	3.274	3.272
800	4.218	4.302	4.126	4.308	4.129	4.117	4.469	4.417	4.130	4.128
900	5.096	5.182	4.991	5.191	4.994	4.984	5.371	5.313	4.994	4.992
1000	5.979	6.065	5.861	6.078	5.865	5.858	6.276	6.212	5.864	5.862
1100	6.869	6.950	6.735	6.968	6.741	6.737	7.182	7.113	6.738	6.735
1200	7.766	7.837	7.614	7.861	7.621	7.622	8.091	8.017	7.614	7.612
1300	8.677	8.724	8.495	8.757	8.504	8.510	9.002	8.923	8.494	8.491
1400	9.601	9.612	9.378	9.654	9.389	9.401	9.915	9.831	9.375	9.373
1500	10.550	10.502	10.263	10.554	10.275	10.295	10.830	10.740	10.258	10.256
1600	11.521	11.392	11.150	11.455	11.164	11.192	11.748	11.652	11.143	11.140
1700	12.522	12.282	12.038	12.358	12.054	12.091	12.668	12.566	12.028	12.025
1800	13.561	13.172	12.928	13.262	12.946	12.992	13.590	13.482	12.914	12.912
1900	14.638	14.064	13.818	14.168	13.838	13.895	14.515	14.400	13.802	13.799
2000	15.754	14.955	14.709	15.075	14.732	14.801	15.442	15.319	14.690	14.687

TABLE 10. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kcal mol^{-1} — Continued

T/K	CaO	CdO	CeO	ClO	CoO	CrO	CsO	CuO	DyO	ErO
2100	16.919	15.847	15.601	15.984	15.627	15.708	16.373	16.242	15.578	15.575
2200	18.123	16.738	16.494	16.894	16.522	16.617	17.306	17.166	16.467	16.464
2300	19.374	17.631	17.388	17.805	17.418	17.528	18.244	18.092	17.357	17.354
2400	20.663	18.523	18.282	18.718	18.315	18.440	19.185	19.022	18.246	18.243
2500	21.986	19.415	19.177	19.633	19.213	19.354	20.130	19.954	19.136	19.133
2600	23.345	20.307	20.072	20.548	20.111	20.270	21.079	20.889	20.027	20.024
2700	24.728	21.200	20.968	21.466	21.011	21.188	22.029	21.826	20.918	20.914
2800	26.137	22.093	21.865	22.384	21.910	22.108	22.981	22.767	21.809	21.805
2900	27.565	22.986	22.761	23.304	22.811	23.029	23.937	23.712	22.700	22.697
3000	29.006	23.878	23.659	24.226	23.711	23.953	24.895	24.661	23.591	23.588
3100	30.453	24.772	24.557	25.150	24.613	24.877	25.856	25.616	24.482	24.479
3200	31.907	25.664	25.454	26.074	25.515	25.805	26.819	26.577	25.374	25.371
3300	33.360	26.557	26.353	27.001	26.418	26.734	27.784	27.543	26.266	26.263
3400	34.811	27.450	27.252	27.929	27.321	27.666	28.751	28.508	27.158	27.155
3500	36.256	28.344	28.152	28.860	28.225	28.600	29.720	29.476	28.050	28.046
3600	37.694	29.237	29.051	29.791	29.129	29.536	30.691	30.448	28.942	28.939
3700	39.127	30.130	29.951	30.725	30.034	30.475	31.662	31.424	29.834	29.831
3800	40.545	31.024	30.852	31.662	30.939	31.417	32.634	32.404	30.727	30.724
3900	41.957	31.917	31.752	32.600	31.845	32.363	33.606	33.388	31.619	31.616
4000	43.371	32.810	32.654	33.541	32.752	33.311	34.578	34.375	32.512	32.509

T/K	EuO	FO	FeO	GaO	GdO	GeO	HO	HfO	HoO	IO
0	-2.117	-2.095	-2.112	-2.132	-2.117	-2.099	-2.208	-2.100	-2.116	-2.152
100	-1.422	-1.400	-1.416	-1.436	-1.421	-1.403	-1.465	-1.404	-1.421	-1.457
200	-0.720	-0.702	-0.716	-0.731	-0.720	-0.706	-0.710	-0.706	-0.720	-0.746
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.014	0.014	0.014	0.014	0.014	0.014	0.013	0.014	0.014	0.015
400	0.790	0.764	0.785	0.804	0.790	0.769	0.724	0.770	0.789	0.821
500	1.599	1.548	1.589	1.625	1.598	1.559	1.429	1.561	1.597	1.663
600	2.430	2.359	2.418	2.468	2.429	2.374	2.133	2.377	2.427	2.533
700	3.276	3.189	3.263	3.325	3.275	3.208	2.838	3.211	3.273	3.429
800	4.133	4.033	4.121	4.191	4.131	4.055	3.547	4.058	4.129	4.348
900	4.997	4.888	4.987	5.065	4.996	4.913	4.264	4.916	4.993	5.287
1000	5.867	5.752	5.860	5.944	5.865	5.778	4.989	5.781	5.862	6.242
1100	6.741	6.622	6.738	6.828	6.739	6.649	5.724	6.651	6.736	7.208
1200	7.618	7.497	7.620	7.716	7.616	7.525	6.470	7.526	7.613	8.184
1300	8.497	8.376	8.505	8.606	8.495	8.405	7.227	8.405	8.492	9.165
1400	9.379	9.259	9.394	9.499	9.377	9.288	7.994	9.286	9.373	10.151
1500	10.262	10.144	10.285	10.393	10.260	10.173	8.772	10.171	10.256	11.139
1600	11.146	11.033	11.178	11.290	11.145	11.061	9.560	11.057	11.141	12.128
1700	12.032	11.923	12.073	12.189	12.030	11.951	10.356	11.945	12.026	13.117
1800	12.919	12.816	12.970	13.090	12.917	12.843	11.161	12.835	12.912	14.105
1900	13.806	13.710	13.868	13.992	13.804	13.736	11.974	13.726	13.800	15.093
2000	14.694	14.606	14.768	14.896	14.692	14.631	12.795	14.618	14.688	16.079
2100	15.582	15.504	15.669	15.801	15.580	15.526	13.622	15.511	15.576	17.063
2200	16.471	16.402	16.572	16.708	16.469	16.424	14.456	16.406	16.465	18.047
2300	17.361	17.303	17.476	17.615	17.359	17.322	15.295	17.302	17.355	19.028
2400	18.251	18.204	18.381	18.525	18.249	18.221	16.140	18.198	18.244	20.010
2500	19.140	19.106	19.287	19.437	19.138	19.122	16.991	19.095	19.134	20.989
2600	20.031	20.010	20.195	20.350	20.029	20.023	17.845	19.993	20.025	21.968
2700	20.922	20.915	21.103	21.264	20.920	20.926	18.705	20.892	20.916	22.945
2800	21.813	21.821	22.013	22.180	21.811	21.828	19.569	21.791	21.807	23.923
2900	22.704	22.729	22.924	23.098	22.702	22.733	20.437	22.692	22.698	24.900
3000	23.596	23.637	23.836	24.019	23.593	23.638	21.308	23.593	23.589	25.877
3100	24.487	24.545	24.749	24.941	24.484	24.544	22.183	24.494	24.480	26.854
3200	25.378	25.455	25.664	25.866	25.376	25.450	23.063	25.396	25.372	27.831
3300	26.270	26.366	26.579	26.795	26.268	26.358	23.944	26.298	26.264	28.809
3400	27.162	27.279	27.495	27.902	27.160	27.266	24.829	27.202	27.156	29.788
3500	28.055	28.192	28.413	28.866	28.052	28.175	25.718	28.106	28.048	30.768
3600	28.947	29.106	29.332	29.836	28.945	29.085	26.609	29.010	28.940	31.751
3700	29.839	30.021	30.252	30.811	29.836	29.996	27.503	29.916	29.832	32.736
3800	30.731	30.937	31.173	31.793	30.729	30.907	28.401	30.821	30.725	33.727
3900	31.624	31.855	32.096	32.781	31.622	31.820	29.300	31.727	31.617	34.727
4000	32.516	32.773	33.020	33.775	32.514	32.733	30.202	32.634	32.510	35.720

TABLE 10. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kcal mol^{-1} — Continued

T/K	InO	IrO	KO	LaO	LiO	LuO	MgO	MnO	MoO	NO
0	-2.145	-2.104	-2.525	-2.121	-2.119	-2.117	-2.129	-2.118	-2.101	-2.195
100	-1.450	-1.413	-1.815	-1.426	-1.423	-1.421	-1.433	-1.422	-1.406	-1.449
200	-0.741	-0.713	-0.938	-0.724	-0.722	-0.720	-0.729	-0.721	-0.708	-0.704
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.014	0.014	0.018	0.014	0.014	0.014	0.014	0.014	0.014	0.013
400	0.814	0.781	0.963	0.795	0.794	0.790	0.811	0.791	0.772	0.726
500	1.643	1.582	1.892	1.608	1.610	1.599	1.679	1.601	1.564	1.447
600	2.490	2.407	2.810	2.443	2.455	2.431	2.644	2.433	2.381	2.183
700	3.349	3.249	3.721	3.294	3.323	3.279	3.721	3.281	3.216	2.938
800	4.215	4.104	4.628	4.158	4.210	4.138	4.901	4.141	4.063	3.712
900	5.088	4.968	5.532	5.033	5.112	5.005	6.157	5.008	4.919	4.502
1000	5.965	5.839	6.434	5.918	6.027	5.878	7.452	5.881	5.782	5.307
1100	6.844	6.715	7.334	6.814	6.952	6.756	8.755	6.759	6.650	6.124
1200	7.726	7.595	8.234	7.721	7.886	7.637	10.046	7.640	7.522	6.952
1300	8.610	8.479	9.132	8.639	8.827	8.522	11.311	8.525	8.398	7.788
1400	9.495	9.366	10.030	9.569	9.773	9.409	12.544	9.412	9.276	8.632
1500	10.382	10.256	10.927	10.509	10.724	10.298	13.744	10.301	10.156	9.483
1600	11.269	11.147	11.824	11.462	11.680	11.188	14.911	11.192	11.037	10.340
1700	12.157	12.041	12.720	12.425	12.639	12.080	16.050	12.084	11.921	11.201
1800	13.046	12.936	13.616	13.398	13.602	12.974	17.161	12.978	12.805	12.066
1900	13.935	13.832	14.513	14.381	14.569	13.869	18.250	13.873	13.690	12.936
2000	14.825	14.730	15.408	15.373	15.542	14.765	19.318	14.770	14.576	13.808
2100	15.715	15.630	16.304	16.372	16.633	15.662	20.369	15.667	15.463	14.684
2200	16.606	16.531	17.199	17.380	17.652	16.561	21.405	16.566	16.351	15.563
2300	17.496	17.433	18.094	18.394	18.683	17.460	22.428	17.465	17.239	16.443
2400	18.387	18.336	18.990	19.414	19.726	18.360	23.439	18.366	18.127	17.326
2500	19.279	19.240	19.885	20.440	20.781	19.261	24.441	19.267	19.016	18.211
2600	20.170	20.146	20.780	21.470	21.849	20.162	25.433	20.169	19.906	19.098
2700	21.062	21.052	21.675	22.503	22.927	21.065	26.419	21.072	20.795	19.986
2800	21.954	21.960	22.570	23.540	24.015	21.968	27.398	21.976	21.685	20.877
2900	22.846	22.868	23.464	24.580	25.114	22.872	28.371	22.880	22.576	21.768
3000	23.738	23.778	24.359	25.621	26.220	23.777	29.339	23.787	23.466	22.662
3100	24.630	24.689	25.254	26.665	27.334	24.682	30.304	24.693	24.357	23.556
3200	25.523	25.600	26.148	27.709	28.454	25.588	31.265	25.600	25.248	24.451
3300	26.415	26.513	27.043	28.755	29.577	26.495	32.222	26.508	26.139	25.348
3400	27.308	27.427	27.938	29.800	30.705	27.402	33.177	27.417	27.030	26.246
3500	28.201	28.341	28.832	30.846	31.834	28.311	34.130	28.326	27.922	27.145
3600	29.093	29.257	29.727	31.892	32.964	29.220	35.081	29.237	28.814	28.045
3700	29.986	30.174	30.621	32.937	34.094	30.129	36.030	30.148	29.706	28.947
3800	30.879	31.091	31.516	33.981	35.222	31.040	36.978	31.061	30.597	29.848
3900	31.772	32.010	32.410	35.024	36.347	31.950	37.926	31.974	31.489	30.752
4000	32.665	32.930	33.305	36.067	37.467	32.862	38.872	32.888	32.382	31.656

T/K	NaO	NbO	NdO	NiO	NpO	O_2	OsO	PO	PbO	PdO
0	-2.204	-2.098	-2.118	-2.118	-2.119	-2.076	-2.125	-2.245	-2.141	-2.121
100	-1.508	-1.403	-1.422	-1.423	-1.424	-1.380	-1.430	-1.525	-1.446	-1.425
200	-0.778	-0.705	-0.721	-0.721	-0.722	-0.685	-0.727	-0.747	-0.738	-0.723
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.015	0.014	0.014	0.014	0.014	0.013	0.014	0.014	0.014	0.014
400	0.853	0.769	0.791	0.792	0.792	0.723	0.798	0.778	0.812	0.794
500	1.722	1.557	1.600	1.602	1.603	1.453	1.614	1.561	1.640	1.606
600	2.613	2.372	2.432	2.436	2.435	2.207	2.450	2.363	2.488	2.439
700	3.520	3.205	3.278	3.285	3.282	2.984	3.301	3.184	3.349	3.288
800	4.436	4.051	4.135	4.145	4.140	3.781	4.161	4.018	4.219	4.146
900	5.358	4.908	5.000	5.013	5.005	4.594	5.028	4.864	5.096	5.012
1000	6.284	5.772	5.870	5.887	5.875	5.420	5.901	5.719	5.977	5.883
1100	7.212	6.642	6.744	6.767	6.750	6.258	6.777	6.581	6.863	6.757
1200	8.139	7.517	7.621	7.649	7.627	7.104	7.655	7.449	7.752	7.635
1300	9.067	8.396	8.500	8.535	8.507	7.959	8.536	8.321	8.643	8.516
1400	9.994	9.278	9.382	9.424	9.389	8.821	9.419	9.198	9.537	9.398
1500	10.919	10.162	10.265	10.315	10.272	9.690	10.304	10.078	10.433	10.281
1600	11.843	11.048	11.150	11.207	11.157	10.565	11.189	10.960	11.330	11.166
1700	12.766	11.937	12.036	12.102	12.043	11.446	12.076	11.845	12.230	12.052
1800	13.687	12.827	12.922	12.999	12.930	12.332	12.963	12.733	13.131	12.939
1900	14.607	13.719	13.809	13.896	13.817	13.224	13.851	13.622	14.033	13.827
2000	15.525	14.611	14.697	14.795	14.705	14.121	14.740	14.513	14.936	14.715

TABLE 10. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kcal mol^{-1} — Continued

T/K	NaO	NbO	NdO	NiO	NpO	O_2	OsO	PO	PbO	PdO
2100	16.442	15.506	15.586	15.695	15.594	15.024	15.629	15.406	15.841	15.604
2200	17.358	16.401	16.475	16.596	16.483	15.932	16.518	16.300	16.748	16.493
2300	18.272	17.298	17.365	17.499	17.373	16.845	17.408	17.195	17.655	17.383
2400	19.185	18.195	18.255	18.403	18.263	17.763	18.299	18.092	18.563	18.273
2500	20.098	19.093	19.145	19.308	19.153	18.686	19.189	18.990	19.474	19.163
2600	21.010	19.992	20.035	20.214	20.044	19.613	20.080	19.889	20.385	20.054
2700	21.920	20.892	20.926	21.121	20.934	20.545	20.971	20.788	21.297	20.945
2800	22.829	21.793	21.817	22.030	21.825	21.482	21.862	21.690	22.210	21.836
2900	23.739	22.694	22.708	22.939	22.717	22.423	22.754	22.591	23.125	22.727
3000	24.647	23.597	23.600	23.850	23.608	23.368	23.646	23.494	24.041	23.619
3100	25.554	24.500	24.491	24.762	24.500	24.316	24.537	24.398	24.958	24.511
3200	26.461	25.403	25.383	25.674	25.392	25.268	25.429	25.303	25.877	25.402
3300	27.367	26.307	26.275	26.589	26.283	26.224	26.322	26.208	26.796	26.294
3400	28.273	27.212	27.167	27.504	27.175	27.183	27.214	27.114	27.717	27.187
3500	29.178	28.118	28.059	28.421	28.068	28.145	28.106	28.022	28.640	28.079
3600	30.083	29.024	28.951	29.339	28.960	29.110	28.998	28.930	29.563	28.971
3700	30.987	29.931	29.844	30.259	29.852	30.078	29.891	29.839	30.488	29.863
3800	31.891	30.839	30.736	31.181	30.745	31.048	30.783	30.748	31.415	30.756
3900	32.794	31.747	31.628	32.104	31.637	32.021	31.676	31.659	32.343	31.648
4000	33.697	32.656	32.521	33.029	32.530	32.996	32.569	32.570	33.273	32.541

T/K	PrO	PtO	PuO	RbO	ReO	RhO	RuO	SO	SbO	ScO
0	-2.118	-2.116	-2.119	-2.435	-2.107	-2.121	-2.114	-2.087	-2.122	-2.101
100	-1.423	-1.421	-1.424	-1.736	-1.412	-1.425	-1.418	-1.392	-1.426	-1.406
200	-0.721	-0.719	-0.722	-0.936	-0.712	-0.723	-0.718	-0.695	-0.724	-0.707
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.014	0.014	0.014	0.018	0.014	0.014	0.014	0.013	0.014	0.014
400	0.791	0.790	0.792	1.025	0.780	0.794	0.787	0.750	0.797	0.772
500	1.600	1.599	1.603	2.025	1.579	1.606	1.592	1.519	1.618	1.564
600	2.432	2.431	2.435	3.006	2.401	2.439	2.420	2.316	2.473	2.382
700	3.279	3.280	3.282	3.968	3.241	3.288	3.264	3.133	3.357	3.218
800	4.136	4.140	4.140	4.916	4.092	4.146	4.119	3.966	4.267	4.067
900	5.000	5.009	5.005	5.853	4.952	5.012	4.982	4.812	5.197	4.926
1000	5.870	5.884	5.875	6.782	5.818	5.883	5.850	5.667	6.144	5.793
1100	6.744	6.764	6.750	7.705	6.688	6.757	6.723	6.529	7.103	6.665
1200	7.622	7.648	7.627	8.622	7.563	7.635	7.599	7.398	8.071	7.542
1300	8.501	8.536	8.507	9.537	8.440	8.516	8.478	8.271	9.045	8.423
1400	9.383	9.426	9.389	10.448	9.319	9.398	9.359	9.148	10.022	9.307
1500	10.266	10.319	10.272	11.357	10.201	10.281	10.242	10.029	11.002	10.193
1600	11.151	11.214	11.157	12.264	11.084	11.166	11.126	10.912	11.981	11.082
1700	12.037	12.111	12.043	13.169	11.968	12.052	12.011	11.798	12.961	11.972
1800	12.923	13.010	12.930	14.074	12.853	12.939	12.897	12.686	13.939	12.864
1900	13.810	13.910	13.817	14.977	13.739	13.827	13.784	13.576	14.915	13.758
2000	14.698	14.812	14.705	15.879	14.626	14.715	14.671	14.468	15.890	14.654
2100	15.587	15.716	15.594	16.780	15.514	15.604	15.560	15.361	16.863	15.550
2200	16.476	16.620	16.483	17.681	16.402	16.493	16.448	16.257	17.834	16.448
2300	17.366	17.527	17.373	18.581	17.291	17.383	17.337	17.153	18.803	17.347
2400	18.256	18.434	18.263	19.480	18.180	18.273	18.227	18.050	19.770	18.247
2500	19.146	19.343	19.153	20.380	19.069	19.163	19.117	18.949	20.735	19.148
2600	20.036	20.254	20.044	21.278	19.959	20.054	20.008	19.849	21.699	20.050
2700	20.927	21.165	20.934	22.176	20.849	20.945	20.898	20.750	22.661	20.953
2800	21.818	22.078	21.825	23.074	21.740	21.836	21.789	21.651	23.622	21.857
2900	22.709	22.992	22.717	23.972	22.631	22.727	22.680	22.554	24.580	22.762
3000	23.601	23.907	23.608	24.870	23.522	23.619	23.571	23.458	25.538	23.667
3100	24.493	24.824	24.500	25.767	24.412	24.511	24.462	24.363	26.495	24.574
3200	25.384	25.742	25.392	26.664	25.304	25.402	25.354	25.268	27.451	25.481
3300	26.276	26.661	26.283	27.561	26.195	26.294	26.245	26.175	28.406	26.389
3400	27.168	27.582	27.175	28.458	27.087	27.187	27.137	27.082	29.361	27.298
3500	28.060	28.504	28.068	29.354	27.979	28.079	28.029	27.991	30.315	28.207
3600	28.952	29.428	28.960	30.250	28.870	28.971	28.922	28.899	31.268	29.118
3700	29.845	30.353	29.852	31.147	29.762	29.863	29.814	29.809	32.221	30.029
3800	30.737	31.280	30.745	32.043	30.655	30.756	30.706	30.720	33.174	30.941
3900	31.629	32.208	31.637	32.939	31.547	31.648	31.598	31.632	34.127	31.854
4000	32.522	33.138	32.530	33.835	32.439	32.541	32.491	32.545	35.080	32.768

TABLE 10. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kcal mol^{-1} — Continued

T/K	SeO	SiO	SmO	SnO	SrO	TaO	TbO	TeO	ThO	TiO
0	-2.329	-2.083	-2.117	-2.120	-2.160	-2.095	-2.117	-2.261	-2.109	-2.291
100	-1.562	-1.387	-1.422	-1.425	-1.464	-1.399	-1.421	-1.565	-1.413	-1.518
200	-0.758	-0.691	-0.720	-0.723	-0.751	-0.702	-0.720	-0.833	-0.714	-0.740
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.014	0.013	0.014	0.014	0.015	0.014	0.014	0.017	0.014	0.014
400	0.804	0.742	0.790	0.794	0.825	0.763	0.790	0.949	0.781	0.787
500	1.617	1.501	1.599	1.606	1.664	1.547	1.598	1.907	1.582	1.586
600	2.451	2.286	2.430	2.441	2.520	2.358	2.429	2.864	2.408	2.408
700	3.299	3.094	3.277	3.292	3.389	3.192	3.274	3.813	3.250	3.247
800	4.158	3.919	4.133	4.153	4.265	4.046	4.131	4.754	4.106	4.102
900	5.025	4.757	4.998	5.023	5.147	4.917	4.995	5.688	4.976	4.969
1000	5.898	5.605	5.867	5.898	6.034	5.806	5.865	6.617	5.860	5.846
1100	6.777	6.462	6.741	6.778	6.925	6.710	6.738	7.541	6.763	6.733
1200	7.659	7.324	7.618	7.662	7.819	7.629	7.615	8.463	7.687	7.629
1300	8.544	8.193	8.498	8.549	8.715	8.561	8.495	9.382	8.637	8.532
1400	9.432	9.066	9.379	9.438	9.613	9.503	9.376	10.299	9.615	9.441
1500	10.322	9.942	10.263	10.329	10.514	10.455	10.259	11.215	10.624	10.356
1600	11.215	10.822	11.147	11.223	11.417	11.415	11.144	12.130	11.664	11.276
1700	12.109	11.704	12.033	12.118	12.321	12.381	12.029	13.044	12.735	12.201
1800	13.005	12.589	12.920	13.015	13.227	13.351	12.915	13.958	13.835	13.130
1900	13.902	13.476	13.806	13.913	14.135	14.326	13.803	14.872	14.961	14.062
2000	14.801	14.364	14.695	14.812	15.045	15.304	14.691	15.786	16.111	14.996
2100	15.701	15.255	15.583	15.713	15.956	16.283	15.579	16.700	17.282	15.934
2200	16.603	16.147	16.472	16.615	16.869	17.263	16.468	17.614	18.467	16.873
2300	17.505	17.039	17.362	17.517	17.784	18.244	17.358	18.528	19.667	17.814
2400	18.409	17.934	18.252	18.421	18.700	19.225	18.247	19.443	20.874	18.756
2500	19.313	18.830	19.141	19.326	19.618	20.206	19.137	20.359	22.087	19.700
2600	20.219	19.726	20.032	20.232	20.538	21.185	20.028	21.275	23.303	20.645
2700	21.126	20.624	20.923	21.140	21.460	22.165	20.919	22.192	24.519	21.591
2800	22.033	21.523	21.814	22.048	22.383	23.143	21.810	23.109	25.732	22.537
2900	22.942	22.422	22.705	22.957	23.308	24.120	22.701	24.026	26.941	23.484
3000	23.852	23.323	23.597	23.867	24.236	25.094	23.592	24.945	28.146	24.431
3100	24.763	24.225	24.488	24.778	25.166	26.068	24.483	25.865	29.342	25.379
3200	25.674	25.127	25.379	25.690	26.098	27.041	25.375	26.785	30.532	26.327
3300	26.587	26.030	26.271	26.602	27.032	28.012	26.267	27.706	31.713	27.275
3400	27.500	26.934	27.163	27.517	27.970	28.981	27.159	28.629	32.886	28.223
3500	28.415	27.839	28.056	28.432	28.909	29.949	28.051	29.551	34.050	29.172
3600	29.331	28.744	28.948	29.347	29.853	30.915	28.943	30.475	35.204	30.120
3700	30.247	29.651	29.840	30.265	30.802	31.880	29.835	31.401	36.350	31.069
3800	31.165	30.558	30.732	31.182	31.758	32.844	30.728	32.327	37.487	32.017
3900	32.084	31.465	31.625	32.101	32.755	33.807	31.620	33.254	38.614	32.966
4000	33.004	32.374	32.517	33.022	33.719	34.768	32.513	34.183	39.734	33.915

T/K	TmO	UO	VO	WO	YO	YbO	ZnO	ZrO
0	-2.116	-2.119	-2.097	-2.093	-2.114	-2.116	-2.149	-2.105
100	-1.420	-1.424	-1.401	-1.397	-1.418	-1.420	-1.454	-1.409
200	-0.719	-0.722	-0.704	-0.700	-0.718	-0.719	-0.744	-0.711
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.014	0.014	0.014	0.013	0.014	0.014	0.014	0.014
400	0.789	0.792	0.766	0.760	0.787	0.789	0.817	0.803
500	1.596	1.603	1.552	1.540	1.593	1.596	1.648	1.691
600	2.426	2.435	2.364	2.346	2.423	2.426	2.497	2.689
700	3.272	3.282	3.196	3.172	3.269	3.271	3.357	3.779
800	4.128	4.140	4.041	4.013	4.126	4.127	4.225	4.930
900	4.992	5.005	4.897	4.865	4.992	4.991	5.099	6.108
1000	5.861	5.875	5.761	5.724	5.864	5.860	5.976	7.288
1100	6.734	6.750	6.631	6.591	6.740	6.734	6.856	8.453
1200	7.611	7.627	7.506	7.462	7.621	7.610	7.739	9.597
1300	8.490	8.507	8.385	8.337	8.504	8.489	8.623	10.717
1400	9.372	9.389	9.267	9.216	9.390	9.371	9.509	11.812
1500	10.255	10.272	10.152	10.098	10.278	10.254	10.395	12.886
1600	11.139	11.157	11.040	10.982	11.168	11.138	11.283	13.939
1700	12.025	12.043	11.929	11.868	12.060	12.024	12.171	14.975
1800	12.911	12.930	12.821	12.756	12.953	12.910	13.060	15.996
1900	13.798	13.817	13.714	13.646	13.847	13.797	13.950	17.004
2000	14.686	14.705	14.609	14.536	14.742	14.685	14.840	18.001
2100	15.574	15.594	15.505	15.428	15.639	15.573	15.730	18.989

TABLE 10. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kcal mol^{-1} — Continued

T/K	TmO	UO	VO	WO	YO	YbO	ZnO	ZrO
2200	16.463	16.483	16.402	16.322	16.536	16.462	16.621	19.968
2300	17.353	17.373	17.301	17.216	17.434	17.352	17.512	20.939
2400	18.242	18.263	18.200	18.111	18.333	18.241	18.403	21.905
2500	19.132	19.153	19.101	19.008	19.233	19.131	19.294	22.866
2600	20.023	20.044	20.002	19.905	20.134	20.022	20.186	23.821
2700	20.913	20.934	20.905	20.803	21.036	20.912	21.078	24.773
2800	21.804	21.825	21.809	21.701	21.938	21.803	21.970	25.722
2900	22.695	22.717	22.714	22.601	22.841	22.694	22.862	26.667
3000	23.587	23.608	23.619	23.501	23.745	23.585	23.754	27.610
3100	24.478	24.500	24.526	24.402	24.649	24.477	24.646	28.551
3200	25.370	25.392	25.433	25.303	25.554	25.369	25.539	29.489
3300	26.262	26.283	26.341	26.205	26.460	26.261	26.431	30.426
3400	27.154	27.175	27.250	27.108	27.366	27.153	27.324	31.362
3500	28.045	28.068	28.160	28.011	28.273	28.044	28.217	32.296
3600	28.938	28.960	29.070	28.915	29.180	28.936	29.110	33.229
3700	29.830	29.852	29.982	29.820	30.089	29.829	30.002	34.161
3800	30.722	30.745	30.894	30.724	30.998	30.721	30.895	35.092
3900	31.615	31.637	31.808	31.630	31.908	31.614	31.788	36.022
4000	32.508	32.530	32.722	32.536	32.818	32.506	32.681	36.953

TABLE 11. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kJ mol^{-1}

T/K	AgO	AlO	AsO	AuO	BO	BaO	BeO	BiO	BrO	CO
0	-9.856	-8.787	-8.877	-9.898	-8.678	-9.012	-8.691	-8.992	-9.050	-8.676
100	-6.739	-5.877	-5.967	-6.920	-5.769	-6.101	-5.781	-6.082	-6.140	-5.767
200	-3.409	-2.956	-3.038	-3.530	-2.859	-3.125	-2.871	-3.112	-3.176	-2.857
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.065	0.057	0.060	0.067	0.054	0.061	0.055	0.061	0.063	0.054
400	3.650	3.226	3.443	3.735	2.989	3.433	3.041	3.422	3.629	2.974
500	7.300	6.538	7.068	7.431	5.977	6.925	6.125	6.908	7.410	5.927
600	10.989	9.959	10.846	11.142	9.042	10.492	9.316	10.473	11.301	8.935
700	14.705	13.460	14.707	14.862	12.191	14.107	12.602	14.092	15.239	12.012
800	18.442	17.026	18.606	18.586	15.421	17.757	15.969	17.747	19.190	15.163
900	22.194	20.650	22.521	22.315	18.722	21.430	19.403	21.430	23.141	18.383
1000	25.959	24.333	26.438	26.046	22.084	25.121	22.892	25.133	27.084	21.668
1100	29.736	28.081	30.350	29.778	25.500	28.826	26.430	28.855	31.017	25.008
1200	33.524	31.901	34.254	33.513	28.960	32.542	30.020	32.592	34.943	28.397
1300	37.322	35.800	38.149	37.248	32.457	36.267	33.657	36.344	38.860	31.830
1400	41.129	39.783	42.037	40.984	35.987	40.000	37.368	40.111	42.770	35.299
1500	44.947	43.853	45.917	44.720	39.543	43.739	41.146	43.894	46.677	38.799
1600	48.774	48.010	49.791	48.457	43.124	47.484	45.025	47.696	50.579	42.328
1700	52.611	52.252	53.658	52.195	46.724	51.234	49.015	51.514	54.480	45.879
1800	56.459	56.572	57.519	55.933	50.342	54.988	53.112	55.352	58.378	49.453
1900	60.316	60.965	61.377	59.671	53.977	58.749	57.367	59.213	62.280	53.045
2000	64.185	65.423	65.232	63.409	57.623	62.512	61.773	63.095	66.181	56.652
2100	68.067	69.939	69.085	67.148	61.284	66.279	66.314	67.002	70.085	60.276
2200	71.959	74.503	72.935	70.887	64.954	70.049	71.045	70.929	73.992	63.911
2300	75.865	79.104	76.783	74.626	68.635	73.823	75.934	74.884	77.905	67.558
2400	79.784	83.734	80.628	78.364	72.323	77.603	80.959	78.860	81.821	71.217
2500	83.722	88.388	84.474	82.104	76.019	81.383	86.163	82.865	85.745	74.884
2600	87.677	93.060	88.320	85.844	79.726	85.167	91.502	86.893	89.676	78.559
2700	91.658	97.742	92.164	89.583	83.436	88.956	96.941	90.945	93.614	82.245
2800	95.680	102.425	96.010	93.323	87.156	92.746	102.518	95.019	97.562	85.935
2900	99.702	107.108	99.857	97.063	90.878	96.539	108.191	99.121	101.524	89.632
3000	103.749	111.790	103.704	100.802	94.609	100.335	113.940	103.243	105.498	93.339
3100	107.802	116.464	107.553	104.542	98.343	104.137	119.714	107.390	109.499	97.049
3200	111.875	121.125	111.402	108.281	102.080	107.939	125.566	111.561	113.671	100.767
3300	115.968	125.783	115.253	112.022	105.826	111.744	131.444	115.749	117.878	104.487
3400	120.080	130.419	119.106	115.762	109.573	115.555	137.332	119.965	121.989	108.211
3500	124.211	135.045	122.961	119.501	113.328	119.366	143.193	124.201	126.127	111.944
3600	128.361	139.653	126.818	123.242	117.083	123.183	149.075	128.456	130.294	115.678
3700	132.528	144.247	130.676	126.982	120.846	127.000	154.933	132.738	134.491	119.415
3800	136.712	148.822	134.538	130.722	124.608	130.820	160.766	137.048	138.718	123.161
3900	140.912	153.385	138.401	134.462	128.379	134.647	166.563	141.396	142.976	126.906
4000	145.126	157.934	142.270	138.202	132.148	138.473	172.320	145.845	147.265	130.659

TABLE 11. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kJ mol^{-1} — Continued

T/K	CaO	CdO	CeO	ClO	CoO	CrO	CsO	CuO	DyO	ErO
0	-8.951	-9.173	-9.014	-9.528	-8.849	-8.827	-9.869	-9.749	-8.856	-8.854
100	-6.041	-6.261	-5.997	-6.579	-5.939	-5.917	-6.896	-6.778	-5.946	-5.944
200	-3.083	-3.226	-3.021	-3.334	-3.006	-2.989	-3.523	-3.449	-3.012	-3.010
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.060	0.063	0.058	0.064	0.058	0.058	0.067	0.066	0.058	0.058
400	3.391	3.522	3.301	3.548	3.297	3.276	3.740	3.673	3.303	3.301
500	6.853	7.076	6.677	7.103	6.675	6.637	7.451	7.333	6.685	6.681
600	10.399	10.687	10.147	10.709	10.148	10.100	11.185	11.027	10.159	10.154
700	14.003	14.331	13.683	14.354	13.688	13.636	14.936	14.745	13.698	13.691
800	17.646	17.999	17.265	18.026	17.275	17.224	18.699	18.480	17.281	17.274
900	21.320	21.682	20.881	21.720	20.895	20.851	22.473	22.230	20.896	20.888
1000	25.018	25.376	24.521	25.431	24.541	24.508	26.257	25.991	24.534	24.525
1100	28.739	29.079	28.181	29.156	28.206	28.189	30.050	29.763	28.190	28.180
1200	32.494	32.788	31.855	32.892	31.887	31.889	33.853	33.544	31.858	31.848
1300	36.304	36.501	35.541	36.639	35.580	35.605	37.664	37.333	35.538	35.527
1400	40.172	40.219	39.237	40.394	39.282	39.334	41.484	41.132	39.226	39.215
1500	44.139	43.939	42.941	44.157	42.992	43.074	45.314	44.938	42.921	42.909
1600	48.204	47.663	46.651	47.927	46.710	46.826	49.153	48.753	46.621	46.610
1700	52.391	51.387	50.368	51.704	50.435	50.588	53.001	52.576	50.326	50.315
1800	56.739	55.114	54.089	55.488	54.165	54.359	56.860	56.408	54.034	54.022
1900	61.244	58.843	57.814	59.278	57.899	58.138	60.730	60.248	57.746	57.734
2000	65.915	62.572	61.543	63.074	61.639	61.928	64.610	64.096	61.462	61.449
2100	70.790	66.302	65.277	66.876	65.382	65.723	68.504	67.955	65.179	65.167
2200	75.826	70.033	69.013	70.683	69.128	69.526	72.410	71.821	68.899	68.886
2300	81.059	73.767	72.752	74.497	72.878	73.336	76.332	75.699	72.621	72.608
2400	86.455	77.499	76.493	78.318	76.631	77.153	80.269	79.586	76.342	76.329
2500	91.991	81.232	80.237	82.143	80.388	80.978	84.225	83.487	80.066	80.054
2600	97.675	84.966	83.983	85.973	84.146	84.809	88.195	87.398	83.792	83.779
2700	103.464	88.702	87.731	89.812	87.908	88.652	92.167	91.320	87.519	87.506
2800	109.356	92.436	91.481	93.657	91.672	92.498	96.153	95.259	91.247	91.234
2900	115.331	96.171	95.234	97.506	95.439	96.352	100.151	99.213	94.976	94.963
3000	121.360	99.907	98.988	101.363	99.208	100.217	104.160	103.182	98.704	98.690
3100	127.417	103.644	102.745	105.226	102.980	104.087	108.180	107.175	102.434	102.421
3200	133.497	107.380	106.501	109.094	106.757	107.968	112.210	111.198	106.165	106.152
3300	139.578	111.116	110.261	112.971	110.533	111.854	116.249	115.241	109.897	109.884
3400	145.650	114.853	114.022	116.855	114.312	115.753	120.296	119.276	113.629	113.616
3500	151.696	118.591	117.786	120.749	118.093	119.662	124.350	123.327	117.362	117.346
3600	157.712	122.328	121.550	124.646	121.876	123.580	128.409	127.395	121.093	121.079
3700	163.706	126.065	125.316	128.555	125.661	127.509	132.473	131.479	124.827	124.813
3800	169.641	129.804	129.083	132.473	129.448	131.449	136.539	135.579	128.561	128.547
3900	175.549	133.541	132.852	136.399	133.241	135.408	140.607	139.695	132.295	132.282
4000	181.462	137.279	136.622	140.335	137.033	139.374	144.676	143.827	136.030	136.016

T/K	EuO	FO	FeO	GaO	GdO	GeO	HO	HfO	HoO	IO
0	-8.858	-8.766	-8.835	-8.919	-8.857	-8.782	-9.239	-8.786	-8.854	-9.005
100	-5.948	-5.857	-5.925	-6.009	-5.947	-5.872	-6.131	-5.876	-5.944	-6.095
200	-3.014	-2.939	-2.995	-3.060	-3.013	-2.952	-2.972	-2.955	-3.011	-3.121
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.059	0.057	0.058	0.060	0.058	0.057	0.055	0.057	0.058	0.061
400	3.306	3.197	3.284	3.364	3.305	3.219	3.029	3.223	3.302	3.437
500	6.690	6.478	6.650	6.800	6.687	6.522	5.980	6.530	6.682	6.958
600	10.167	9.869	10.117	10.325	10.163	9.932	8.924	9.944	10.156	10.599
700	13.707	13.342	13.654	13.910	13.702	13.421	11.874	13.434	13.694	14.349
800	17.291	16.875	17.241	17.536	17.286	16.967	14.842	16.980	17.276	18.194
900	20.907	20.453	20.865	21.192	20.902	20.555	17.839	20.568	20.890	22.122
1000	24.546	24.066	24.517	24.872	24.540	24.175	20.873	24.186	24.528	26.116
1100	28.203	27.705	28.191	28.570	28.196	27.820	23.950	27.828	28.183	30.160
1200	31.872	31.367	31.882	32.282	31.866	31.484	27.071	31.489	31.851	34.241
1300	35.551	35.046	35.586	36.007	35.544	35.165	30.238	35.165	35.531	38.348
1400	39.240	38.740	39.303	39.742	39.233	38.859	33.449	38.854	39.218	42.471
1500	42.936	42.444	43.031	43.486	42.928	42.565	36.703	42.554	42.913	46.607
1600	46.636	46.161	46.768	47.238	46.629	46.279	39.998	46.261	46.614	50.743
1700	50.342	49.888	50.513	51.000	50.334	50.002	43.330	49.977	50.319	54.880
1800	54.051	53.622	54.265	54.767	54.043	53.733	46.699	53.700	54.026	59.016
1900	57.762	57.362	58.024	58.541	57.754	57.471	50.100	57.428	57.738	63.147
2000	61.478	61.111	61.789	62.323	61.470	61.215	53.533	61.162	61.453	67.274

TABLE 11. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kJ mol^{-1} — Continued

T/K	EuO	FO	FeO	GaO	GdO	GeO	HO	HfO	HoO	IO
2100	65.196	64.867	65.560	66.109	65.187	64.962	56.995	64.899	65.171	71.392
2200	68.916	68.628	69.337	69.904	68.907	68.716	60.482	68.642	68.891	75.509
2300	72.637	72.395	73.118	73.703	72.629	72.475	63.994	72.390	72.612	79.615
2400	76.361	76.164	76.905	77.510	76.352	76.239	67.531	76.141	76.333	83.720
2500	80.084	79.941	80.697	81.324	80.075	80.006	71.088	79.895	80.058	87.818
2600	83.810	83.723	84.494	85.143	83.801	83.778	74.665	83.650	83.784	91.915
2700	87.537	87.510	88.295	88.970	87.528	87.554	78.260	87.411	87.511	96.003
2800	91.265	91.301	92.102	92.803	91.256	91.330	81.877	91.175	91.239	100.092
2900	94.994	95.096	95.912	96.643	94.985	95.114	85.507	94.942	94.967	104.180
3000	98.724	98.896	99.728	100.494	98.715	98.900	89.153	98.712	98.695	108.267
3100	102.452	102.696	103.551	104.352	102.443	102.691	92.816	102.484	102.425	112.357
3200	106.183	106.505	107.376	108.223	106.174	106.484	96.494	106.255	106.156	116.445
3300	109.915	110.317	111.206	112.110	109.906	110.281	100.183	110.033	109.888	120.538
3400	113.648	114.134	115.040	116.742	113.639	114.082	103.884	113.813	113.620	124.634
3500	117.380	117.955	118.879	120.774	117.371	117.885	107.606	117.595	117.353	128.735
3600	121.114	121.780	122.726	124.832	121.105	121.692	111.333	121.380	121.084	132.848
3700	124.845	125.609	126.575	128.914	124.836	125.503	115.071	125.167	124.818	136.969
3800	128.579	129.442	130.428	133.022	128.570	129.316	118.830	128.956	128.552	141.115
3900	132.314	133.280	134.291	137.155	132.305	133.133	122.592	132.747	132.286	145.298
4000	136.049	137.122	138.155	141.313	136.039	136.953	126.364	136.541	136.021	149.452

T/K	InO	IrO	KO	LaO	LiO	LuO	MgO	MnO	MoO	NO
0	-8.976	-8.802	-10.564	-8.876	-8.865	-8.856	-8.906	-8.860	-8.793	-9.184
100	-6.066	-5.910	-7.596	-5.966	-5.956	-5.947	-5.996	-5.950	-5.883	-6.062
200	-3.100	-2.983	-3.924	-3.027	-3.020	-3.012	-3.051	-3.015	-2.961	-2.947
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.060	0.058	0.074	0.059	0.059	0.058	0.059	0.059	0.057	0.055
400	3.405	3.267	4.027	3.325	3.321	3.306	3.395	3.309	3.232	3.037
500	6.872	6.617	7.914	6.727	6.737	6.691	7.025	6.697	6.546	6.052
600	10.416	10.070	11.756	10.222	10.272	10.173	11.064	10.181	9.963	9.135
700	14.010	13.595	15.570	13.784	13.904	13.720	15.570	13.729	13.455	12.295
800	17.638	17.171	19.364	17.397	17.614	17.314	20.507	17.324	16.998	15.531
900	21.288	20.786	23.147	21.057	21.389	20.941	25.762	20.952	20.581	18.837
1000	24.956	24.430	26.920	24.760	25.217	24.594	31.178	24.606	24.192	22.204
1100	28.637	28.095	30.687	28.508	29.088	28.267	36.633	28.279	27.825	25.623
1200	32.327	31.779	34.450	32.303	32.996	31.955	42.033	31.967	31.474	29.085
1300	36.025	35.477	38.209	36.146	36.931	35.655	47.325	35.668	35.137	32.585
1400	39.728	39.188	41.965	40.036	40.889	39.366	52.485	39.379	38.810	36.118
1500	43.437	42.909	45.719	43.971	44.870	43.085	57.504	43.099	42.491	39.677
1600	47.149	46.640	49.471	47.955	48.868	46.811	62.389	46.826	46.181	43.261
1700	50.865	50.378	53.221	51.985	52.882	50.544	67.151	50.561	49.876	46.864
1800	54.584	54.123	56.971	56.057	56.910	54.284	71.802	54.301	53.576	50.485
1900	58.304	57.875	60.720	60.170	60.958	58.028	76.358	58.046	57.279	54.124
2000	62.027	61.632	64.468	64.320	65.029	61.778	80.827	61.796	60.987	57.774
2100	65.752	65.396	68.215	68.502	69.593	65.532	85.223	65.551	64.698	61.439
2200	69.477	69.165	71.961	72.718	73.856	69.290	89.558	69.310	68.412	65.114
2300	73.205	72.939	75.707	76.961	78.170	73.052	93.839	73.073	72.126	68.799
2400	76.933	76.718	79.452	81.230	82.534	76.818	98.070	76.843	75.845	72.493
2500	80.662	80.502	83.198	85.520	86.949	80.587	102.259	80.613	79.565	76.195
2600	84.392	84.290	86.943	89.829	91.414	84.359	106.414	84.388	83.287	79.907
2700	88.123	88.083	90.686	94.154	95.926	88.135	110.536	88.166	87.008	83.623
2800	91.855	91.880	94.431	98.492	100.481	91.914	114.632	91.947	90.732	87.349
2900	95.587	95.681	98.174	102.842	105.075	95.696	118.704	95.732	94.458	91.079
3000	99.320	99.488	101.919	107.200	109.706	99.481	122.756	99.523	98.182	94.817
3100	103.053	103.297	105.662	111.565	114.365	103.269	126.792	103.314	101.910	98.558
3200	106.787	107.111	109.405	115.934	119.050	107.060	130.812	107.109	105.638	102.305
3300	110.521	110.931	113.149	120.310	123.752	110.854	134.817	110.910	109.368	106.057
3400	114.256	114.753	116.891	124.684	128.469	114.651	138.812	114.712	113.095	109.812
3500	117.991	118.579	120.635	129.059	133.194	118.454	142.798	118.517	116.826	113.577
3600	121.726	122.410	124.377	133.435	137.922	122.256	146.778	122.328	120.557	117.340
3700	125.462	126.247	128.119	137.807	142.647	126.061	150.748	126.140	124.289	121.113
3800	129.198	130.086	131.861	142.176	147.367	129.870	154.717	129.959	128.018	124.886
3900	132.934	133.932	135.604	146.542	152.074	133.681	158.681	133.781	131.751	128.667
4000	136.670	137.780	139.347	150.903	156.764	137.495	162.642	137.603	135.485	132.447

TABLE 11. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kJ mol^{-1} — Continued

T/K	NaO	NbO	NdO	NiO	NpO	O_2	OsO	PO	PbO	PdO
0	-9.221	-8.780	-8.861	-8.863	-8.867	-8.686	-8.893	-9.395	-8.959	-8.874
100	-6.308	-5.870	-5.951	-5.953	-5.957	-5.776	-5.983	-6.383	-6.049	-5.964
200	-3.255	-2.950	-3.016	-3.017	-3.020	-2.866	-3.040	-3.127	-3.089	-3.026
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.063	0.057	0.059	0.059	0.059	0.054	0.059	0.059	0.060	0.059
400	3.570	3.216	3.309	3.312	3.314	3.023	3.339	3.256	3.397	3.321
500	7.207	6.515	6.695	6.704	6.705	6.080	6.751	6.530	6.861	6.718
600	10.934	9.923	10.174	10.191	10.188	9.236	10.252	9.888	10.408	10.206
700	14.726	13.408	13.715	13.744	13.733	12.487	13.811	13.320	14.011	13.755
800	18.559	16.950	17.301	17.343	17.321	15.820	17.411	16.812	17.651	17.347
900	22.418	20.534	20.918	20.975	20.941	19.221	21.038	20.351	21.320	20.969
1000	26.293	24.151	24.558	24.633	24.582	22.678	24.688	23.928	25.009	24.612
1100	30.174	27.792	28.215	28.311	28.241	26.181	28.353	27.535	28.715	28.273
1200	34.056	31.451	31.886	32.005	31.913	29.725	32.030	31.165	32.434	31.946
1300	37.937	35.128	35.565	35.712	35.595	33.302	35.717	34.816	36.164	35.630
1400	41.813	38.817	39.255	39.430	39.283	36.909	39.411	38.484	39.903	39.321
1500	45.685	42.517	42.950	43.157	42.980	40.544	43.111	42.164	43.651	43.017
1600	49.552	46.226	46.652	46.892	46.682	44.204	46.816	45.858	47.407	46.720
1700	53.412	49.943	50.358	50.636	50.389	47.889	50.525	49.561	51.171	50.427
1800	57.266	53.668	54.067	54.386	54.099	51.598	54.236	53.274	54.939	54.138
1900	61.114	57.399	57.778	58.141	57.812	55.330	57.952	56.996	58.714	57.852
2000	64.956	61.134	61.494	61.902	61.527	59.084	61.670	60.723	62.494	61.569
2100	68.792	64.876	65.212	65.668	65.245	62.860	65.391	64.458	66.280	65.288
2200	72.625	68.622	68.932	69.440	68.966	66.659	69.113	68.199	70.073	69.007
2300	76.451	72.373	72.654	73.216	72.688	70.479	72.837	71.945	73.869	72.730
2400	80.272	76.128	76.378	76.999	76.412	74.319	76.562	75.696	77.670	76.454
2500	84.090	79.887	80.101	80.785	80.137	78.181	80.288	79.454	81.478	80.180
2600	87.904	83.646	83.827	84.575	83.864	82.061	84.016	83.214	85.289	83.907
2700	91.713	87.412	87.554	88.372	87.589	85.961	87.742	86.979	89.105	87.635
2800	95.518	91.181	91.283	92.172	91.317	89.879	91.472	90.750	92.928	91.363
2900	99.323	94.953	95.012	95.978	95.047	93.818	95.202	94.522	96.754	95.091
3000	103.122	98.728	98.742	99.787	98.777	97.771	98.933	98.299	100.588	98.821
3100	106.918	102.506	102.472	103.603	102.508	101.739	102.664	102.082	104.423	102.552
3200	110.713	106.288	106.201	107.421	106.239	105.723	106.397	105.868	108.267	106.284
3300	114.505	110.068	109.933	111.247	109.969	109.721	110.129	109.655	112.114	110.016
3400	118.294	113.855	113.666	115.078	113.702	113.733	113.863	113.447	115.968	113.749
3500	122.082	117.645	117.399	118.914	117.435	117.757	117.594	117.243	119.829	117.482
3600	125.866	121.437	121.132	122.756	121.168	121.797	121.328	121.043	123.691	121.213
3700	129.649	125.232	124.866	126.603	124.902	125.846	125.062	124.845	127.563	124.947
3800	133.432	129.029	128.597	130.459	128.637	129.904	128.797	128.649	131.441	128.682
3900	137.211	132.830	132.332	134.323	132.371	133.977	132.532	132.460	135.325	132.417
4000	140.988	136.633	136.067	138.193	136.104	138.055	136.268	136.273	139.216	136.152

T/K	PrO	PtO	PuO	RbO	ReO	RhO	RuO	SO	SbO	ScO
0	-8.862	-8.854	-8.867	-10.187	-8.817	-8.874	-8.844	-8.732	-8.878	-8.791
100	-5.952	-5.944	-5.957	-7.264	-5.907	-5.964	-5.934	-5.823	-5.968	-5.881
200	-3.016	-3.010	-3.020	-3.918	-2.981	-3.026	-3.002	-2.909	-3.029	-2.959
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.059	0.058	0.059	0.077	0.058	0.059	0.058	0.056	0.059	0.057
400	3.310	3.304	3.314	4.289	3.262	3.321	3.291	3.140	3.334	3.230
500	6.696	6.690	6.705	8.474	6.605	6.718	6.661	6.357	6.771	6.545
600	10.176	10.173	10.188	12.576	10.047	10.206	10.126	9.689	10.347	9.966
700	13.718	13.723	13.733	16.603	13.560	13.755	13.657	13.108	14.046	13.464
800	17.304	17.323	17.321	20.567	17.121	17.347	17.234	16.595	17.851	17.017
900	20.921	20.957	20.941	24.488	20.718	20.969	20.844	20.133	21.744	20.612
1000	24.561	24.619	24.582	28.375	24.341	24.612	24.478	23.710	25.705	24.238
1100	28.219	28.301	28.241	32.236	27.984	28.273	28.129	27.318	29.718	27.888
1200	31.889	32.001	31.913	36.076	31.643	31.946	31.795	30.952	33.769	31.557
1300	35.569	35.714	35.595	39.901	35.313	35.630	35.472	34.606	37.843	35.241
1400	39.258	39.440	39.283	43.715	38.992	39.321	39.158	38.275	41.933	38.939
1500	42.954	43.175	42.980	47.518	42.680	43.017	42.851	41.960	46.031	42.648
1600	46.655	46.920	46.682	51.313	46.375	46.720	46.550	45.657	50.130	46.366
1700	50.361	50.673	50.389	55.101	50.074	50.427	50.252	49.362	54.227	50.092
1800	54.071	54.433	54.099	58.884	53.777	54.138	53.960	53.079	58.320	53.824
1900	57.782	58.200	57.812	62.663	57.485	57.852	57.671	56.804	62.406	57.565
2000	61.498	61.974	61.527	66.438	61.196	61.569	61.385	60.534	66.484	61.311

TABLE 11. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kJ mol^{-1} — Continued

T/K	PrO	PtO	PuO	RbO	ReO	RhO	RuO	SO	SbO	ScO
2100	65.216	65.754	65.245	70.209	64.910	65.288	65.102	64.272	70.557	65.063
2200	68.937	69.540	68.966	73.977	68.625	69.007	68.819	68.017	74.619	68.819
2300	72.659	73.331	72.688	77.742	72.344	72.730	72.540	71.768	78.673	72.581
2400	76.382	77.128	76.412	81.506	76.064	76.454	76.262	75.521	82.718	76.344
2500	80.107	80.930	80.137	85.269	79.787	80.180	79.986	79.282	86.756	80.115
2600	83.831	84.741	83.864	89.027	83.510	83.907	83.711	83.047	90.787	83.889
2700	87.559	88.555	87.589	92.786	87.233	87.635	87.436	86.817	94.813	87.667
2800	91.287	92.373	91.317	96.544	90.959	91.363	91.163	90.588	98.833	91.449
2900	95.016	96.197	95.047	100.300	94.686	95.091	94.892	94.366	102.845	95.235
3000	98.746	100.026	98.777	104.056	98.414	98.821	98.621	98.148	106.852	99.024
3100	102.477	103.864	102.508	107.808	102.141	102.552	102.351	101.935	110.854	102.817
3200	106.206	107.704	106.239	111.562	105.871	106.284	106.082	105.721	114.855	106.613
3300	109.938	111.549	109.969	115.314	109.601	110.016	109.811	109.515	118.853	110.413
3400	113.670	115.404	113.702	119.066	113.332	113.749	113.543	113.312	122.845	114.216
3500	117.403	119.261	117.435	122.818	117.064	117.482	117.275	117.113	126.837	118.019
3600	121.137	123.128	121.168	126.567	120.793	121.213	121.008	120.913	130.827	121.829
3700	124.870	126.996	124.902	130.318	124.526	124.947	124.742	124.721	134.814	125.642
3800	128.602	130.875	128.637	134.067	128.259	128.682	128.473	128.533	138.802	129.459
3900	132.337	134.756	132.371	137.816	131.993	132.417	132.207	132.348	142.789	133.279
4000	136.072	138.648	136.104	141.564	135.724	136.152	135.942	136.166	146.776	137.102

T/K	SeO	SiO	SmO	SnO	SrO	TaO	TbO	TeO	ThO	TiO
0	-9.747	-8.715	-8.859	-8.871	-9.038	-8.765	-8.856	-9.459	-8.823	-9.585
100	-6.534	-5.805	-5.949	-5.961	-6.127	-5.855	-5.946	-6.548	-5.913	-6.349
200	-3.170	-2.893	-3.014	-3.024	-3.142	-2.937	-3.012	-3.487	-2.986	-3.098
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.060	0.055	0.059	0.059	0.061	0.057	0.058	0.070	0.058	0.059
400	3.363	3.104	3.307	3.321	3.452	3.194	3.304	3.971	3.269	3.293
500	6.767	6.278	6.691	6.720	6.961	6.472	6.686	7.978	6.621	6.636
600	10.254	9.566	10.168	10.215	10.545	9.866	10.161	11.982	10.073	10.074
700	13.803	12.945	13.709	13.773	14.178	13.355	13.700	15.953	13.598	13.587
800	17.397	16.396	17.294	17.378	17.845	16.926	17.284	19.891	17.180	17.162
900	21.025	19.902	20.910	21.015	21.537	20.574	20.899	23.799	20.818	20.789
1000	24.678	23.451	24.549	24.677	25.247	24.292	24.537	27.685	24.518	24.461
1100	28.353	27.035	28.206	28.359	28.973	28.076	28.193	31.553	28.295	28.172
1200	32.044	30.645	31.876	32.057	32.713	31.920	31.861	35.408	32.162	31.918
1300	35.748	34.279	35.555	35.767	36.462	35.817	35.541	39.252	36.138	35.696
1400	39.464	37.931	39.244	39.488	40.221	39.760	39.229	43.090	40.230	39.501
1500	43.189	41.598	42.939	43.218	43.991	43.742	42.924	46.922	44.450	43.329
1600	46.923	45.279	46.640	46.956	47.767	47.758	46.625	50.751	48.802	47.180
1700	50.664	48.971	50.346	50.702	51.550	51.801	50.330	54.577	53.281	51.049
1800	54.413	52.672	54.055	54.453	55.343	55.862	54.038	58.401	57.886	54.935
1900	58.167	56.383	57.766	58.211	59.141	59.940	57.750	62.225	62.599	58.833
2000	61.928	60.099	61.482	61.974	62.948	64.030	61.466	66.048	67.410	62.744
2100	65.694	63.825	65.200	65.742	66.759	68.129	65.183	69.872	72.308	66.666
2200	69.465	67.557	68.920	69.515	70.580	72.228	68.903	73.697	77.268	70.597
2300	73.241	71.292	72.642	73.293	74.408	76.334	72.625	77.523	82.285	74.535
2400	77.021	75.036	76.365	77.075	78.240	80.439	76.346	81.350	87.336	78.477
2500	80.807	78.784	80.088	80.861	82.081	84.543	80.071	85.181	92.414	82.426
2600	84.596	82.534	83.814	84.652	85.930	88.640	83.797	89.015	97.498	86.380
2700	88.390	86.291	87.541	88.450	89.787	92.737	87.524	92.850	102.586	90.336
2800	92.188	90.053	91.269	92.249	93.651	96.829	91.252	96.687	107.661	94.297
2900	95.990	93.815	94.998	96.052	97.522	100.916	94.981	100.526	112.723	98.258
3000	99.796	97.585	98.728	99.859	101.402	104.995	98.708	104.370	117.762	102.221
3100	103.607	101.357	102.456	103.670	105.294	109.068	102.439	108.219	122.766	106.186
3200	107.421	105.130	106.188	107.485	109.192	113.138	106.170	112.068	127.745	110.151
3300	111.239	108.910	109.920	111.304	113.103	117.201	109.902	115.923	132.686	114.119
3400	115.062	112.694	113.652	115.130	117.024	121.258	113.634	119.782	137.594	118.086
3500	118.889	116.480	117.385	118.958	120.957	125.306	117.367	123.643	142.464	122.054
3600	122.719	120.266	121.118	122.789	124.906	129.348	121.098	127.509	147.294	126.023
3700	126.554	124.059	124.849	126.628	128.874	133.387	124.831	131.381	152.088	129.992
3800	130.395	127.855	128.584	130.467	132.874	137.420	128.565	135.255	156.846	133.960
3900	134.241	131.650	132.318	134.311	137.045	141.447	132.300	139.136	161.563	137.929
4000	138.089	135.452	136.053	138.163	141.080	145.470	136.035	143.021	166.247	141.898

TABLE 11. Enthalpy functions, $(H_T^\circ - H_{298}^\circ)$, for gaseous monoxides in kJ mol^{-1} — Continued

T/K	TmO	UO	VO	WO	YO	YbO	ZnO	ZrO
0	-8.853	-8.867	-8.772	-8.756	-8.844	-8.852	-8.993	-8.805
100	-5.943	-5.957	-5.863	-5.847	-5.934	-5.942	-6.083	-5.896
200	-3.010	-3.020	-2.944	-2.930	-3.003	-3.009	-3.112	-2.974
298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
300	0.058	0.059	0.057	0.056	0.058	0.058	0.061	0.058
400	3.301	3.314	3.205	3.181	3.293	3.300	3.418	3.361
500	6.680	6.705	6.494	6.444	6.667	6.678	6.894	7.076
600	10.152	10.188	9.893	9.817	10.138	10.150	10.446	11.250
700	13.689	13.733	13.371	13.273	13.677	13.687	14.046	15.813
800	17.271	17.321	16.908	16.791	17.264	17.269	17.678	20.628
900	20.885	20.941	20.489	20.353	20.886	20.882	21.332	25.555
1000	24.522	24.582	24.104	23.950	24.534	24.519	25.003	30.491
1100	28.177	28.241	27.743	27.575	28.202	28.174	28.687	35.368
1200	31.844	31.913	31.405	31.221	31.886	31.841	32.379	40.153
1300	35.524	35.595	35.083	34.883	35.581	35.520	36.079	44.838
1400	39.211	39.283	38.774	38.561	39.288	39.208	39.784	49.422
1500	42.906	42.980	42.477	42.250	43.004	42.902	43.494	53.915
1600	46.606	46.682	46.190	45.949	46.728	46.602	47.208	58.322
1700	50.311	50.389	49.913	49.656	50.458	50.307	50.924	62.657
1800	54.018	54.099	53.643	53.371	54.194	54.014	54.644	66.929
1900	57.730	57.812	57.381	57.093	57.936	57.726	58.366	71.146
2000	61.445	61.527	61.122	60.819	61.682	61.441	62.089	75.318
2100	65.163	65.245	64.872	64.553	65.433	65.158	65.814	79.448
2200	68.882	68.966	68.626	68.291	69.188	68.878	69.541	83.545
2300	72.604	72.688	72.386	72.034	72.944	72.599	73.268	87.610
2400	76.325	76.412	76.151	75.778	76.706	76.320	76.997	91.652
2500	80.049	80.137	79.920	79.528	80.472	80.045	80.727	95.671
2600	83.775	83.864	83.690	83.282	84.241	83.771	84.458	99.669
2700	87.502	87.589	87.468	87.040	88.013	87.498	88.189	103.652
2800	91.230	91.317	91.249	90.798	91.788	91.225	91.921	107.620
2900	94.956	95.047	95.034	94.561	95.566	94.952	95.654	111.576
3000	98.686	98.777	98.823	98.328	99.347	98.681	99.387	115.521
3100	102.416	102.508	102.616	102.097	103.131	102.412	103.120	119.456
3200	106.147	106.239	106.412	105.870	106.918	106.143	106.855	123.383
3300	109.879	109.969	110.212	109.641	110.707	109.875	110.589	127.304
3400	113.611	113.702	114.016	113.419	114.499	113.607	114.324	131.218
3500	117.342	117.435	117.819	117.199	118.294	117.337	118.059	135.125
3600	121.075	121.168	121.630	120.981	122.091	121.070	121.794	139.029
3700	124.809	124.902	125.444	124.766	125.891	124.804	125.530	142.929
3800	128.543	128.637	129.262	128.550	129.694	128.538	129.266	146.824
3900	132.277	132.371	133.083	132.339	133.502	132.272	133.002	150.717
4000	136.012	136.104	136.908	136.132	137.310	136.007	136.739	154.610

Appendix I. Process Catalogue Derived from Experimental Data File

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
AG1O(G)								
	72SMO/MAN	AG1O(G)+NI(G)=NI1O(G)+AG(G)	1722	MS	-38.64+/- 1.6	74.94+/- 4.3	**	52.0
					SELECTED	75.0 +/- 5.0		51.9
AL1O(G)								
	60DRO/DEM	AL2O3(C)=2AL1O(G)+O(G)	2332	MS	505.46+/-10.0	22.70+/- 5.0		114.5
	60DRO/DEM	AL2O3(L)=2AL1O(G)+O(G)	2276	MS	484.85+/-10.0	20.79+/- 5.0		116.4
	60DRO/DEM	AL1O(G)=AL(G)+O(G)	2305	MS	115.11+/- 5.0	23.24+/- 5.1		114.0
	66BUR	AL1O(G)=AL(G)+O(G)	2318	MS	116.68+/- 3.0	21.67+/- 3.2		115.5
	67TYT	AL1O(G)=AL(G)+O(G)	0	S	105.86+/- 2.3	32.49+/- 2.5		104.7
	69MCD/INN	AL1O(G)=AL(G)+O(G)	0	S	121.16+/- 5.0	17.19+/- 5.1	*	120.0
	71NEW/PAG	AL1O(G)=AL(G)+O(G)	0	FL	144.76+/- 8.0	-6.41+/- 8.1		143.6
	71NEW/PAG	AL1O(G)=AL(G)+O(G)	0	FL	141.96+/-18.0	-3.61+/-18.0		140.8
	72FAR/SRI	AL(G)+O(G)=AL1O(G)	2023	MS	-121.15+/- 3.0	17.20+/- 3.2	*	120.0
	72FAR/UY	AL1O(G)+V(G)=AL(G)+V1O(G)	2270	MS	-26.50+/- 4.0	15.10+/- 6.1		122.1
	72GOL/ZAR	AL(G)+O3(G)=AL1O(G)+O2(G)	0	CL	-94.05+/- 1.2	<18.85+/- 1.9	*	118.3
	72JEN/JON	AL(G)+H1O(G)=AL1O(G)+H(G)	2441	FL	-41.59+/- 4.8	-5.47+/- 4.9		142.7
	73HIL	AL(G)+O2(G)=AL1O(G)+O(G)	2223	MS	0.05+/- 3.0	19.30+/- 3.2		117.9
	73HIL	AL(G)+S1O(G)=S(G)+AL1O(G)	2036	MS	4.91+/- 2.5	18.51+/- 2.9		118.7
	74FRA/KRA	AL1O(G)=AL(G)+O(G)	0	FL	117.84+/- 1.8	20.51+/- 2.1		116.7
	75DAG/CRU	AL(G)+O2(G)=AL1O(G)+O(G)	0	CL	-2.72+/- 0.9	<16.52+/- 1.3	**	120.7
	76FAR/SRI2	AL(G)+H2O(G)=AL1O(G)+H2(G)	2250	FL	-1.77+/- 5.0	19.23+/- 5.1		118.0
	76FRA/KRA	AL1O(G)=AL(G)+O(G)	0	S	120.36+/- 7.0	17.99+/- 7.1	*	119.2
	76FU/BUR	AL1O(G)=AL(G)+O(G)	2203	MS	121.72+/- 2.5	16.64+/- 2.7	**	120.6
	76HIL	AL(G)+T1O(G)=AL1O(G)+T1(G)	1976	MS	36.46+/- 2.0	14.06+/- 3.2	*	123.1
	76MUR/HIL	EU(G)+AL1O(G)=EU1O(G)+AL(G)	2143	MS	10.97+/- 2.9	11.93+/- 5.0		125.3
	77CHE/PIV	AL1O(G)=AL(G)+O(G)	2445	MS	119.51+/- 2.4	18.85+/- 2.6		118.3
	77FON/FEL	AL(G)+C1O2(G)=AL1O(G)+C1O(G)	500	K	2.63+/- 1.3	13.79+/- 1.6		123.4
	77HIL	AL(G)+SM1O(G)=AL1O(G)+SM(G)	2201	MS	11.33+/- 2.5	12.73+/- 4.8		124.5
	77PAS/DAG	AL(G)+O2(G)=AL1O(G)+O(G)	0	LF	-3.02+/- 0.5	<16.22+/- 1.1	**	121.0
	79FON/FEL	AL(G)+S1O2(G)=AL1O(G)+S1O(G)	0	K	4.01+/- 0.4	10.87+/- 1.5		126.3
	80HO/BUR	AL2O3(C)=2AL1O(G)+O(G)	2270	MS	498.84+/- 5.0	19.39+/- 2.5		117.8
	80HO/BUR	AL1O(G)=AL(G)+O(G)	2270	MS	122.22+/- 2.5	16.13+/- 2.7	**	121.1
	80MUR/HIL	AL(G)+TM1O(G)=AL1O(G)+TM(G)	2300	MS	-0.14+/- 3.0	16.16+/- 6.0		121.0
					SELECTED	16.0 +/- 2.0		121.2
AU1O(G)								
	72SMO/MAN	AU1O(G)+CO(G)=CO1O(G)+AU(G)	1935	MS	-38.80+/- 1.8	94.40+/- 3.7	**	52.4
					SELECTED	94.5 +/- 5.0		52.3
B1O(G)								
	65DEG	B1O(G)=B(G)+O(G)	0	S	192.44+/- 7.0	0.91+/- 7.6	*	191.4
	66BLA/BUC	B2O2(G)=2B1O(G)	298	MS	113.20+/- 3.6	2.10+/- 2.1	**	190.2
	68COP/SMO	B(G)+LA1O(G)=B1O(G)+LA(G)	2231	MS	-2.93+/- 0.5	-1.13+/- 4.1	**	193.4
	68COP/SMO	U1O(G)+B(G)=U(G)+B1O(G)	2339	MS	-7.79+/- 0.5	4.01+/- 4.4		188.3
	68COP/SMO	U1O2(G)+B(G)=U1O(G)+B1O(G)	2262	MS	-11.57+/- 0.9	4.73+/- 4.2		187.6
	70UY/DRO	B(G)+Y1O(G)=Y(G)+B1O(G)	2345	MS	-23.00+/- 2.0	-1.70+/- 4.5	**	194.0
	75MUR/HIL	B1O(G)+ZR(G)=ZR1O(G)+B(G)	2293	MS	11.64+/- 3.0	-3.84+/- 5.3		196.2
					SELECTED	0.0 +/- 4.0		192.3
BA1O(G)								
	61NIK/OTM	BA1O(C)=BA1O(G)	1269	WL	98.66+/-10.0	-32.34+/-10.0		133.8
	64COL/GOL	BA1O(G)+S(G)=S1O(G)+BA(G)	2006	MS	6.42+/- 6.0	-28.82+/- 6.2		130.2
	65GUR/RYA	BA1O(G)=BA(G)+O(G)	0	FL	134.93+/- 8.0	-32.58+/- 8.1		134.0
	65KAL/HOL	BA1O(G)=BA(G)+O(G)	0	FL	116.23+/- 2.3	-13.88+/- 2.6		115.3
	68NEW/BAR	BA1O(C)=BA1O(G)	1663	WL	101.92+/- 0.5	-29.08+/- 0.7	*	130.5
	68NEW/BAR	BA1O(C)=BA1O(G)	1595	MS	102.16+/- 0.2	-28.84+/- 0.5		130.3
	70KAL/ALK	BA(G)+C1O2(G)=BA1O(G)+C1O(G)	2759	FL	-4.81+/- 1.0	-29.64+/- 1.6	*	131.1
	72JON/ZAR	BA(G)+N1O2(G)=N1O(G)+BA1O(G)	0	CL	-61.37+/- 1.0	<-32.24+/- 1.6	**	133.7
	72SEM/POP	BA1O(C)=BA1O(G)	1559	MS	102.17+/- 1.5	-28.83+/- 1.6		130.2
	73HER/LIN	BA(G)+S1O2(G)=BA1O(G)+S1O(G)	0	CB	0.24+/- 5.0	<-28.90+/- 5.2	*	130.3
	73KAL/ALK	BA1O(G)=BA(G)+O(G)	0	FL	131.68+/- 0.5	-29.33+/- 1.3		130.8
	73PAN/GUS	BA1O(G)=BA(G)+O(G)	0	EI	132.93+/- 5.0	-30.58+/- 5.1	*	132.0
	74DAG/CRU	BA(G)+C1O2(G)=BA1O(G)+C1O(G)	0	CL	-7.29+/- 1.3	<-32.13+/- 1.8	**	133.5
	75FAR/SRI1	BA1O(C)=BA1O(G)	1724	MS	102.77+/- 0.3	-28.23+/- 0.6		129.6
	75HIL/GER	BA1O(C)=BA1O(G)	1486	MS	103.58+/- 3.0	-27.42+/- 3.0		128.8

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
BA1O(G)								
	76ENG/SAN	BA(G)+CL1O2(G)=BA1O(G)+CL1O(G)	0	CL	-75.39+/- 2.0	<-32.43+/- 2.5	*?	133.9
	76HIL	BA(G)+TI1O(G)=BA1O(G)+TI(G)	2044	MS	28.56+/- 2.0	-29.84+/- 3.2	*	131.3
	76MUR/HIL	EU(G)+BA1O(G)=EU1O(G)+BA(G)	2116	MS	17.40+/- 2.9	-30.50+/- 5.1		131.9
					SELECTED	-32.0 +/- 3.0		133.4
BE1O(G)								
	59CHU/BER	BE1O(C)=BE1O(G)	2242	MS	176.48+/- 2.0	30.78+/- 2.1	*	105.2
	59CHU/BER	BE1O(G)=BE(G)+O(G)	2118	MS	105.04+/- 2.0	31.91+/- 2.3	*	104.0
	59CHU/BER	BE1O(G)+O(G)=BE(G)+O2(G)	2247	MS	-11.81+/- 2.0	29.66+/- 2.3		106.3
	64THE/HIL	BE1O(C)=BE1O(G)	2380	MS	176.31+/- 3.0	30.61+/- 3.1	**	105.3
	64THE/HIL	BE1O(G)+O(G)=BE(G)+O2(G)	2380	MS	-15.78+/- 3.0	33.63+/- 3.2	**	102.3
	64THE/HIL	BE1O(G)=BE(G)+O(G)	2380	MS	102.39+/- 3.0	34.56+/- 3.2	**	101.4
					SELECTED	33.0 +/- 3.0		102.9
BI1O(G)								
	67BAR/GIS	BI1O(G)=BI(G)+O(G)	0	S	86.94+/- 3.0	>22.71+/- 3.0		86.0
	69UY/DRO	PB(G)+BI1O(G)=BI(G)+PB1O(G)	1071	MS	-8.39+/- 1.0	26.84+/- 3.2	*	81.9
	72KAZ/CHI	BI2O3(C)=BI(G)+O2(G)+BI1O(G)	1065	MS	209.46+/- 3.0	22.20+/- 3.0		86.5
	72KAZ/CHI	BI1O(G)=BI(G)+0.5O2(G)	1065	MS	21.13+/- 3.0	28.97+/- 3.0	**	79.7
	80SID/MIN	BI(G)+0.5O2(G)=BI1O(G)	1104	MS	-20.40+/- 3.0	29.70+/- 3.0	**	79.0
					SELECTED	29.0 +/- 3.0		79.7
CA1O(G)								
	63BAB	CA1O(C)=CA1O(G)	2210	MS	145.58+/-15.0	-6.21+/-15.0		107.3
	64COL/GOL	CA1O(G)+S(G)=S1O(G)+CA(G)	2292	MS	-27.90+/- 6.0	5.20+/- 6.1	**	95.9
	64DRO/EXS	CA1O(G)+O(G)=CA(G)+O2(G)	2257	MS	-29.32+/- 5.0	12.27+/- 5.0		88.8
	64DRO/EXS	CA(G)+W1O3(G)=CA1O(G)+W1O2(G)	2331	MS	51.90+/- 3.0	5.60+/-10.4		95.0
	64DRO/EXS	CA(G)+MO1O3(G)=CA1O(G)+MO1O2(G)	2402	MS	55.80+/- 3.0	15.20+/- 7.7		85.0
	65KAL/HOL	CA1O(G)=CA(G)+O(G)	0	FL	92.25+/- 1.4	9.80+/- 1.4		91.3
	73KAL/ALK	CA1O(G)=CA(G)+O(G)	0	FL	90.00+/- 1.6	12.05+/- 1.6		89.1
	76ENG/SAN	CA(G)+CL1O2(G)=CA1O(G)+CL1O(G)	0	CL	-51.51+/- 2.0	<-8.85+/- 2.2		110.0
	76FAR/SRI1	CA1O(G)=CA(G)+0.5O2(G)	2140	MS	32.82+/- 0.2	9.68+/- 0.3	*	91.4
	77STA/RYA	CA(G)+O2(G)=CA1O(G)+O(G)	2680	FL	8.01+/- 1.3	-9.05+/- 1.3		110.2
	80IRV/DAG	CA(G)+O2(G)=CA1O(G)+O(G)	0	CL	23.19+/- 1.6	<6.14+/- 1.6	**	95.0
					SELECTED	6.0 +/- 4.0		95.1
CD1O(G)								
	63GLE/STO	CD1O(G)=CD(G)+0.5O2(G)	1300	MS	7.59+/- 2.0	>19.14+/- 2.0		66.2
	78GRA/HIR	CD1O(C)=CD1O(G)	1300	MS	58.88+/- 2.4	-2.82+/- 2.4		88.2
	78GRA/HIR	CD(G)+0.5O2(G)=CD1O(G)	1300	MS	-30.26+/- 2.4	-3.53+/- 2.4		88.9
					SELECTED	30.0 +/-20.0		55.4
CE1O(G)								
	61WAL/DEV	CE(G)+LA1O(G)=LA(G)+CE1O(G)	1859	MS	-1.12+/- 0.2	-32.12+/- 2.9	**	191.6
	67COP/SMO	CE1O(G)+LA(G)=CE(G)+LA1O(G)	1905	MS	1.22+/- 2.4	-32.22+/- 3.7	**	191.7
	71ACK/RAU2	CE(G)+LA1O(G)=LA(G)+CE1O(G)	1733	MS	-0.50+/- 1.0	-31.50+/- 3.0	**	191.0
	71ACK/RAU2	CE(G)+Y1O(G)=Y(G)+CE1O(G)	1733	MS	-20.51+/- 1.0	-32.01+/- 3.0	**	191.5
					SELECTED	-32.0 +/- 3.0		191.5
CO1O(G)								
	66GRI/BUR	2CO1O(G)=2CO(G)+O2(G)	1663	MS	64.58+/- 3.0	70.11+/- 1.8	**	90.8
	72SMO/MAN	AU1O(G)+CO(G)=CO1O(G)+AU(G)	1935	MS	-38.80+/- 1.8	70.10+/- 5.4		90.8
	72SMO/MAN	CO1O(G)+NI(G)=NI1O(G)+CO(G)	1792	MS	0.66+/- 1.5	69.94+/- 4.4		91.0
					SELECTED	70.0 +/- 3.0		90.9
CR1O(G)								
	61GRI/BUR1	2CR1O(G)=2CR(G)+O2(G)	1932	MS	89.18+/-14.0	50.41+/- 7.1	**	103.2
	61GRI/BUR1	CR1O(G)=CR(G)+O(G)	1932	MS	100.08+/- 7.0	54.47+/- 7.1	**	99.1
	61GRI/BUR1	0.5CR2O3(C)=CR1O(G)+0.25O2(G)	1932	MS	178.32+/- 7.0	42.02+/- 7.0		111.6
	61GRI/BUR1	0.5CR2O3(C)=CR1O(G)+0.5O(G)	1932	MS	206.07+/- 7.0	39.99+/- 7.0		113.6
					SELECTED	52.0 +/- 7.0		101.6
CS1O(G)								
	67GUS/GOR	CS1O(G)=CS(G)+O(G)	0	MS	70.73+/- 6.0	7.00+/- 6.0	**	70.0
					SELECTED	7.0 +/-15.0		70.0
CU1O(G)								
	72SMO/MAN	CU1O(G)+NI(G)=NI1O(G)+CU(G)	1713	MS	-26.94+/- 1.6	75.84+/- 4.3	**	63.7
					SELECTED	76.0 +/- 5.0		63.5
DY1O(G)								
	67AME/WAL	DY2O3(C)=1.85DY1O(G)+0.15DY(G) +1.15O(G)	2600	WL	491.09+/- 0.6	-17.84+/- 0.6	**	145.8
					SELECTED	-18.0 +/-10.0		146.0

Appendix 1. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
ER1O(G)								
	67AME/WAL	ER2O3(C)=1.7ER1O(G)+0.3ER(G) +1.3O(G)	2600	WL	527.82+/- 0.8	-15.26+/- 0.6		149.6
	8OMUR/HIL	ER(G)+TI1O(G)=ER1O(G)+TI(G)	2040	MS	15.08+/- 3.0	-10.32+/- 3.9	**	144.7
					SELECTED	-10.0 +/- 5.0		144.4
EU1O(G)								
	67AME/WAL	SM(G)+EU1O(G)-EU(G)+SM1O(G)	2320	MS	-12.97+/- 1.9	-22.53+/- 4.5		123.0
	67AME/WAL	EU2O3(C)=2EU1O(G)+O(G)	2000	WL	391.45+/- 1.3	-32.75+/- 0.8		133.2
	75DIC/ZAR	EU(G)+N1O2(G)=EU1O(G)+N1O(G)	0	CL	-59.20+/- 0.7	<-30.97+/- 0.8		131.5
	76DIR/MIC	EU(G)+O2(G)=EU1O(G)+O(G)	0	CB	2.01+/- 5.0	<-15.64+/- 5.0	**	116.1
	76MUR/HIL	EU(G)+AL1O(G)=EU1O(G)+AL(G)	2143	MS	10.97+/- 2.9	-9.93+/- 3.7		110.4
	76MUR/HIL	EU(G)+BA1O(G)=EU1O(G)+BA(G)	2116	MS	17.40+/- 2.9	-15.50+/- 4.3	*	116.0
	76MUR/HIL	EU(G)+TI1O(G)=EU1O(G)+TI(G)	2126	MS	45.64+/- 3.3	-13.66+/- 4.0	*	114.1
	77BAL/GIG	W1O3(G)+EU(G)=EU1O(G)+W1O2(G)	2071	MS	34.68+/- 0.4	-11.72+/- 9.9	**	112.2
	77HIL	EU(G)+SM1O(G)=EU1O(G)+SM(G)	2193	MS	22.13+/- 2.5	-13.37+/- 4.7	**	113.9
					SELECTED	-14.0 +/- 4.0		114.5
FE1O(G)								
	63WAS	FE1O(G)=FE(G)+0.5O2(G)	1873	MS	43.04+/- 5.0	56.26+/- 5.0		101.5
	71BAL/DEM	FE1O(G)=FE(G)+0.5O2(G)	1986	MS	42.81+/- 3.0	56.49+/- 3.0		101.2
	75HIL	FE(G)+O2(G)=FE1O(G)+O(G)	1715	MS	21.60+/- 3.0	61.34+/- 3.0	**	96.4
	8OMUR	FE(G)+H2O(G)=FE1O(G)+H2(G)	1766	MS	24.12+/- 3.0	65.62+/- 3.0	**	92.1
	8OMUR	FE(G)+H2O(G)=FE1O(G)+H2(G)	1780	MS	23.89+/- 3.0	65.40+/- 3.0	**	92.3
					SELECTED	65.5 +/- 4.0		92.2
GA1O(G)								
	65GUR/NOV	GA1O(G)=GA(G)+O(G)	0	S	75.04+/- 6.0	49.51+/- 6.0	**	74.0
	66BUR	GA1O(G)=GA(G)+O(G)	2068	MS	88.44+/- 3.5	36.11+/- 3.5	**	87.4
					SELECTED	40.0 +/-10.0		83.5
GD1O(G)								
	67AME/WAL	GD(G)+TB1O(G)=TB(G)+GD1O(G)	2083	MS	-0.90+/- 0.2	-15.80+/- 4.1	*	169.0
	67AME/WAL	GD2O3(C)=2GD1O(G)+O(G)	2400	WL	455.38+/- 0.7	-19.63+/- 0.5		172.9
	67MES	GD2O3(C)=2GD1O(G)+O(G)	2491	WL	469.50+/- 1.0	-12.58+/- 0.6		165.8
	72DRO/MYE	GD1O(G)+Y(G)=GD(G)+Y1O(G)	2395	MS	-0.97+/- 2.0	-16.53+/- 3.4	**	169.8
	72DRO/MYE	P1O(G)+GD(G)=P(G)+GD1O(G)	2436	MS	-27.02+/- 2.0	-15.66+/- 3.6	**	168.9
	8OMUR/HIL	GD(G)+TI1O(G)=GD1O(G)+TI(G)	1993	MS	-11.22+/- 2.0	-17.42+/- 3.0	**	170.7
	8OMUR/HIL	GD(G)+Y1O(G)=GD1O(G)+Y(G)	1945	MS	0.58+/- 3.0	-16.92+/- 4.1	**	170.2
					SELECTED	-16.5 +/- 3.0		169.7
GE1O(G)								
	65DRO/DEG	0.5GE(C)+0.5GE1O2(C)=GE1O(G)	844	WL	59.14+/- 1.0	-7.15+/- 1.0	**	154.9
	67COP/SMO	GE1O(G)+V(G)=V1O(G)+GE(G)	2044	MS	6.66+/- 2.0	-7.36+/- 4.9		155.1
	67COP/SMO	GE1O(G)+SC(G)=GE(G)+SC1O(G)	2047	MS	-3.71+/- 1.4	-10.11+/- 3.1	**	157.9
	71HAM/GIL	TI1O(G)+GE(G)=TI(G)+GE1O(G)	2300	MS	3.82+/- 1.3	-7.88+/- 2.6	**	155.7
	72HIL1	GE(G)+SI1O(G)=GE1O(G)+SI(G)	1506	MS	32.19+/- 2.0	-9.91+/- 3.8	**	157.7
					SELECTED	-8.5 +/- 3.0		156.3
HF1O(G)								
	63PAN/REI	HF1O2(C)=HF1O(G)+O(G)	2398	WL	341.68+/- 3.0	15.03 +/- 3.0	*	191.5
	74ACK/RAU	HF1O(G)+Y(G)=HF(G)+Y1O(G)	2392	MS	19.80+/- 2.0	15.70+/- 3.5	**	190.9
	74ACK/RAU	HF(G)+TH1O(G)=HF1O(G)+TH(G)	2345	MS	18.33-/- 2.0	15.93+/- 3.7	**	190.6
	74ACK/RAU	ZR(G)+HF1O(G)=ZR1O(G)+HF(G)	2392	MS	6.09+/- 2.0	15.91+/- 3.9	**	190.7
					SELECTED	16.0 +/- 3.0		190.6
HO1O(G)								
	67AME/WAL	HO2O3(C)=1.69HO1O(G)+0.31HO(G) +1.31O(G)	2600	WL	511.40+/- 3.5	-22.78+/- 2.2		153.3
	67AME/WAL	HO(G)+TB1O(G)=TB(G)+HO1O(G)	2000	MS	22.34+/- 1.5	-15.66+/- 4.3	*	146.1
	8OMUR/HIL	HO(G)+TI1O(G)=HO1O(G)+TI(G)	2049	MS	14.95+/- 3.0	-14.35+/- 3.8	**	144.8
					SELECTED	-14.5 +/- 6.0		145.0
IN1O(G)								
	63BUR/DEM	IN1O(G)=IN(G)+O(G)	0	MS	76.94+/-10.0	>40.61+/-10.0	**	76.0
					SELECTED	>41.0 +/-10.0		<75.6
IR1O(G)								
	65NOR/STA1	IR(C)+0.5O2(G)=IR1O(G)	2033	MS	120.46+/-10.0	120.46+/-10.0	**	98.1
					SELECTED	120.5 +/-10.0		98.1
K1O(G)								
	67GUS/GOR	K1O(G)=K(G)+O(G)	0	MS	60.56+/- 6.0	20.32+/- 6.0		60.0
	77EHL	K1O(G)=K(G)+0.5O2(G)	1164	MS	6.69+/- 2.0	14.64+/- 2.0	**	65.7
					SELECTED	14.5 +/- 5.0		65.8

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
LA1O(G)								
	60WAL/GOL	LA2O3(C)=2LA1O(G)+O(G)	2334	WL	426.34+/- 6.0	-30.91+/- 3.0	*?	192.5
	60WAL/GOL	LA2O3(C)+TA(C)=2LA1O(G)+TA1O(G)	2147	MS	402.08+/-10.0	-41.01+/- 5.2		202.6
	61GOL/WAL	LA2O3(C)=2LA1O(G)+O(G)	2359	WL	425.47+/- 1.0	-31.34+/- 0.5		192.9
	61WAL/DEV	CE(G)+LA1O(G)=LA(G)+CE1O(G)	1859	MS	-1.12+/- 0.2	-28.88+/- 3.3		190.4
	61WAL/DEV	PR(G)+LA1O(G)=LA(G)+PR1O(G)	1890	MS	11.64+/- 0.4	-27.64+/- 4.2		189.2
	62WHI/WAL	LA2O3(C)=2LA1O(G)+O(G)	2500	WL	421.04+/-10.0	-33.56+/- 5.0		195.1
	65SMO/DRO	Y1O(G)+LA(G)=Y(G)+LA1O(G)	2000	MS	-18.89+/- 1.0	-28.39+/- 3.0	**	189.9
	65SMO/DRO	SC1O(G)+LA(G)=SC(G)+LA1O(G)	2000	MS	-28.44+/- 1.0	-28.76+/- 3.0	**	190.3
	67AME/WAL	LA(G)+SC1O(G)=SC(G)+LA1O(G)	1936	MS	-26.72+/- 0.4	-27.04+/- 2.9	*	188.6
	67AME/WAL	LA(G)+LU1O(G)=LU(G)+LA1O(G)	2166	MS	-27.82+/- 0.6	-26.52+/- 4.2		188.1
	67AME/WAL	LA(G)+TB1O(G)=TB(G)+LA1O(G)	1942	MS	-20.62+/- 0.2	-27.52+/- 4.2		189.1
	67AME/WAL	LA(G)+Y1O(G)=Y(G)+LA1O(G)	2027	MS	-18.03+/- 0.2	-27.53+/- 2.9	*	189.1
	67COP/SMO	SI1O(G)+LA(G)=SI(G)+LA1O(G)	1972	MS	-0.30+/- 1.4	-28.90+/- 3.6	**	190.5
	67COP/SMO	CE1O(G)+LA(G)=CE(G)+LA1O(G)	1905	MS	1.22+/- 2.4	-28.78+/- 4.1		190.3
	68COP/SMO	B(G)+LA1O(G)=B1O(G)+LA(G)	2231	MS	-2.93+/- 0.5	-27.87+/- 5.1		189.4
	71ACK/RAU1	LA2O3(C)=2LA1O(G)+O(G)	1920	WL	429.91+/- 2.0	-29.12+/- 1.0	**	190.7
	71ACK/RAU1	LA(G)+Y1O(G)=LA1O(G)+Y(G)	1963	MS	-19.54+/- 1.0	-29.04+/- 3.0	**	190.6
	71ACK/RAU2	CE(G)+LA1O(G)=LA(G)+CE1O(G)	1733	MS	-0.50+/- 1.0	-29.50+/- 3.5		191.1
	76GOL/CHA	LA(G)+O2(G)=LA1O(G)+O(G)	0	CL	-70.63+/- 1.0	<-27.18+/- 1.4	*	188.7
					SELECTED	-29.0 +/- 2.5		190.6
LI1O(G)								
	63WHI/SES	LI2O(G)=LI(G)+LI1O(G)	1500	MS	96.76+/- 2.5	18.77+/- 3.5	**	77.9
	71DOU/DUN	LI(G)+C1O2(G)=LI1O(G)+C1O(G)	2295	FL	58.25+/- 3.0	28.70+/- 3.0		68.0
	72HIL2	LI(G)+O2(G)=LI1O(G)+O(G)	1835	MS	38.93+/- 6.4	17.46+/- 6.4	**	79.2
	72HIL2	LI2O(G)+O(G)=2LI1O(G)	1835	MS	14.46+/- 8.0	17.06+/- 4.2	**	79.6
	72HIL2	LI2O(C)=LI(G)+LI1O(G)	1500	MS	197.82+/- 2.0	16.63+/- 2.1	*	80.0
	78KUD/WU	LI2O(C)=LI(G)+LI1O(G)	1522	MS	190.43+/- 1.5	9.24+/- 1.6		87.4
	80KIM/ASA	LI1O(G)=LI(G)+0.5O2(G)	1414	MS	19.90+/- 0.8	18.19+/- 0.8	**	78.5
					SELECTED	18.0 +/- 2.0		78.7
LU1O(G)								
	67AME/WAL	LA(G)+LU1O(G)=LU(G)+LA1O(G)	2166	MS	-27.82+/- 0.6	-1.98+/- 2.8	*	162.8
	67AME/WAL	LU2O3(C)=1.94LU1O(G)+0.06LU(G) +1.06O(G)	2600	WL	506.77+/- 1.4	-5.87+/- 1.2		166.7
	80MUR/HIL	LU(G)+Y1O(G)=LU1O(G)+Y(G)	1904	MS	10.77+/- 3.0	0.47+/- 4.1	**	160.3
					SELECTED	0.5 +/- 4.0		160.3
MG1O(G)								
	63ALE/OGD	MG1O(C)=MG1O(G)	1895	WL	149.14+/- 5.0	5.34+/- 5.0		88.4
	63ALT	MG1O(C)=MG1O(G)	2140	MS	162.69+/- 4.0	18.89+/- 4.0		74.9
	64DRO/EXS	MG1O(G)+O(G)=MG(G)+O2(G)	2143	MS	-39.37+/- 2.1	14.98+/- 2.1		78.8
	64DRO/EXS	MG(G)+W1O3(G)=MG1O(G)+W1O2(G)	2166	MS	63.10+/- 3.0	9.46+/-10.0	*	84.3
	69COT/JEN	MG(G)+H1O(G)=MG1O(G)+H(G)	1898	FL	5.72+/- 3.0	-1.79+/- 3.0		95.5
	76FAR/SRI3	MG1O(C)=MG1O(G)	2098	MS	151.81+/- 0.5	8.01+/- 0.5	**	85.7
	76FAR/SRI3	MG1O(G)=MG(G)+0.5O2(G)	2098	MS	27.40+/- 0.5	7.76+/- 0.5	**	86.0
	77STA/BEL	MG1O(G)=MG(G)+O(G)	0	FL	86.96+/- 3.0	7.75+/- 3.0	*	86.0
	78MAE/SAS	MG1O(C)=MG1O(G)	1897	WL	143.89+/- 2.4	0.09+/- 2.4		93.7
					SELECTED	8.0 +/- 3.0		85.8
MN1O(G)								
	59DAS	MN1O(G)=MN(G)+O(G)	0	S	95.47+/- 2.0	31.78+/- 2.2	**	94.5
	59PAD/SUG	MN1O(G)=MN(G)+O(G)	0	FL	96.97+/- 3.0	30.28+/- 3.2	**	96.0
					SELECTED	31.0 +/-10.0		95.3
MO1O(G)								
	60DEM/BUR	MO1O(G)=MO(C)+O(G)	2356	MS	-39.66+/-15.0	99.21+/-15.0		116.7
	75CHO/GIN	2MO1O2(G)=MO1O(G)+MO1O3(G)	298	MS	-8.40+/- 4.0	71.60+/-11.9		144.3
	77EME/GUS	MO(G)+Y1O(G)=MO1O(G)+Y(G)	2751	MS	37.94+/- 3.0	82.74+/- 4.1	**	133.1
					SELECTED	83.0 +/- 5.0		132.9
NA1O(G)								
	70HIL/MUR	NA2O(C)=NA(G)+NA1O(G)	1081	MS	149.77+/- 4.0	24.27+/- 4.1	**	60.0
					SELECTED	24.0 +/- 4.0		60.3
NB1O(G)								
	66SHC/SEM	NB1O(C)=NB1O(G)	1995	MS	147.46+/- 1.0	47.16+/- 3.2	**	183.3
	66SHC/SEM	NB1O(L)=NB1O(G)	2330	MS	127.98+/- 1.0	47.50+/- 5.9	**	183.0
					SELECTED	47.5 +/- 6.0		182.9

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
ND1O(G)								
	60WAL/GOL	ND2O3(C)=2ND1O(G)+O(G)	2315	WL	421.68+/- 6.0	34.99+/ 3.0		171.9
	60WAL/GOL	ND2O3(C)+TA(C)=2ND1O(G)+TA1O(G)	2151	MS	399.81+/-10.0	-43.89+/- 5.2		180.8
	61GOL/WAL	ND2O3(C)=2ND1O(G)+O(G)	2337	WL	426.71+/- 2.3	-32.47+/- 1.2	*?	169.3
	61WAL/DEV	ND(G)+PR1O(G)=PR(G)+ND1O(G)	1878	MS	10.32+/- 0.6	-30.38+/- 4.1	**	167.2
	62WHI/WAL	ND2O3(C)=2ND1O(G)+O(G)	2500	WL	421.52+/-10.0	-35.06+/- 5.0		171.9
	75TET	ND2O3(C)=2ND1O(G)+0.5O2(G)	2341	WL	375.72+/- 2.6	-28.19+/- 1.3	*?	165.1
	78MUR	ND(G)+SC1O(G)=ND1O(G)+SC(G)	1933	MS	-4.90+/- 3.0	-29.92+/- 4.1	**	166.8
	78MUR	ND(G)+TI1O(G)=ND1O(G)+TI(G)	1933	MS	-7.31+/- 3.0	-30.21+/- 3.8	**	167.1
					SELECTED	-30.0 +/- 3.0		166.9
NI1O(G)								
	61GRI/BUR2	2NI1O(G)=2NI(G)+O2(G)	1649	MS	64.69+/-10.0	70.45+/- 5.0	*	90.8
	72SMO/MAN	CU1O(G)+NI(G)=NI1O(G)+CU(G)	1713	MS	-26.94+/- 1.6	71.16+/- 5.3		90.1
	72SMO/MAN	AG1O(G)+NI(G)=NI1O(G)+AG(G)	1722	MS	-38.64+/- 1.6	71.06+/- 5.3		90.2
	72SMO/MAN	CO1O(G)+NI(G)=NI1O(G)+CO(G)	1792	MS	0.66+/- 1.5	71.06+/- 3.5	**	90.2
					SELECTED	71.0 +/- 4.0		90.2
NP1O(G)								
	66ACK/FAI1	NP1O(G)=NP(G)+O(G)	0	WL	171.57+/- 7.0	-0.92+/- 7.1	**	170.6
					SELECTED	-1.0 +/-10.0		170.7
OS1O(G)								
	60GRI/BUR	OS1O(G)+O2(G)=OS1O3(G)	1700	MS	-123.85+/-10.0	>56.95+/-10.4		190.0
					SELECTED	105.0 +/-20.0		142.0
P1O(G)								
	63SAN/RAO	P1O(G)=P(G)+O(G)	0	S	157.84+/-10.0	>-22.65+/-10.0		157.0
	65COR/WAR	P1O(G)=P(G)+O(G)	0	S	123.04+/-10.0	12.15+/-10.0		122.2
	66MEI/KRA	P1O(G)=P(G)+O(G)	0	S	119.64+/- 5.0	15.55+/- 5.0		118.8
	72DRO/MYE	P1O(G)+Y(G)=Y1O(G)+P(G)	2414	MS	-28.94+/- 2.0	-7.92+/- 3.4	**	142.3
	72DRO/MYE	P1O(G)+GD(G)=P(G)+GD1O(G)	2436	MS	-27.02+/- 2.0	-8.84+/- 3.6	**	143.2
	72DRO/MYE	P1O(G)+SN(G)=SN1O(G)+0.5P2(G)	1359	MS	-43.32+/- 1.3	-6.96+/- 3.3	**	141.3
	76SMO/DRO	TA(C)+P1O(G)=TA1O(G)+P(G)	2162	MS	136.41+/- 2.1	-5.27+/- 3.7	*	139.6
					SELECTED	-8.0 +/- 3.0		142.4
PB1O(G)								
	65DRO/COL	PB1O(C)=PB1O(G)	1061	WL	68.93+/- 1.3	16.81+/- 1.3	*	88.4
	69CHI/KAZ	PB1O(C)=PB1O(G)	869	MS	65.71+/- 5.0	13.59+/- 5.0	*	91.7
	69UY/DRO	PB(G)+BI1O(G)=BI(G)+PB1O(G)	1071	MS	-8.39+/- 1.0	17.16+/- 3.2	*	88.1
	72FRI/JEN	PB1O(G)=PB(G)+O(G)	0	FL	92.25+/- 2.0	13.96+/- 2.0	*	91.3
	75OLD/DIC	PB(G)+O3(G)=PB1O(G)+O2(G)	0	CL	-61.77+/- 0.7	<18.98+/- 1.2	*	86.3
	78SRI/DIG	C(G)+PB1O(G)=C1O(G)+PB(G)	0	CL	-166.15+/- 2.3	15.09+/- 2.3	**	90.2
	78ZMB/MIL	TE1O(G)+PB(G)=PB1O(G)+TE(G)	887	MS	1.19+/- 0.2	17.43+/- 5.0		87.8
	78ZMB/MIL	TE1O(G)+PB1TE(G)=TE2(G)+PB1O(G)	887	MS	-1.48+/- 0.2	12.68+/- 5.4		92.6
					SELECTED	15.0 +/- 3.0		90.3
PD1O(G)								
	65NOR/STA2	PD(C)+0.5O2(G)=PD1O(G)	1900	MS	92.62+/- 3.0	92.62+/- 3.0		56.0
					SELECTED	58.5 +/-20.0		90.1
PR1O(G)								
	61WAL/DEV	PR(G)+LA1O(G)=LA(G)+PR1O(G)	1890	MS	11.64+/- 0.4	-35.36+/- 2.8	**	178.9
	61WAL/DEV	ND(G)+PR1O(G)=PR(G)+ND1O(G)	1878	MS	10.32+/- 0.6	-33.62+/- 3.1	*	177.2
	67AME/WAL	PR(G)+TB1O(G)=TB(G)+PR1O(G)	1973	MS	-8.66+/- 0.3	-33.56+/- 4.1		177.1
	70FRI	Y(G)+PR1O(G)=Y1O(G)+PR(G)	0	MS	10.74+/- 3.5	-38.24+/- 4.4		181.8
	78MUR	PR(G)+TI1O(G)=PR1O(G)+TI(G)	1867	MS	-16.52+/- 3.0	-32.72+/- 3.8	**	176.3
					SELECTED	-34.0 +/- 4.0		177.6
PT1O(G)								
	67NOR/STA	PT(C)+0.5O2(G)=PT1O(G)	2018	MS	101.21+/- 5.0	101.21+/- 5.0	**	92.3
					SELECTED	101.0 +/-10.0		92.5
PU1O(G)								
	62ACK/THO	PU(L)+0.5O2(G)=PU1O(G)	1838	MS	-30.44+/- 5.0	-30.44+/- 5.0	**	171.5
	66ACK/FAI2	PU(L)+0.5O2(G)=PU1O(G)	1835	WL	-27.38+/- 5.0	-27.38+/- 5.0	**	168.5
					SELECTED	-29.0 +/- 8.0		170.1
RE1O(G)								
	74FAR/HAR	RE1O(G)+2H2O(G)=RE1O3(G)+2H2(G)	298	FL	-5.90+/- 6.0	54.49+/- 7.2		189.3
					SELECTED	95.0 +/-20.0		148.8
RH1O(G)								
	64NOR/STA	RH(C)+0.5O2(G)=RH1O(G)		MS	94.68+/- 5.0	94.68+/- 5.0	**	96.1
					SELECTED	95.0 +/-10.0		95.8

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_f H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
RU1O(G)								
	60ALC/HOO	RU(C)+0.502(G)=RU1O(G)	1567	WL	55.44+/- 5.0	55.44+/- 5.0		158.8
	65RAZ/MAC	RU1O(G)=RU(G)+O(G)	0	S	42.48+/-20.0	172.77+/-20.0		41.5
	68NOR/STA	RU(C)+0.502(G)=RU1O(G)	1900	MS	88.98+/- 5.0	88.98+/- 5.0	**	125.3
					SELECTED	89.0 +/-10.0		125.3
S1O(G)								
	62MCG/MCG	S1O(G)=S(G)+O(G)	0	S	128.21+/- 0.1	-2.46+/- 0.1		127.1
	64COL/GOL	CA1O(G)+S(G)=S1O(G)+CA(G)	2292	MS	-27.90+/- 6.0	1.80+/- 7.2		122.8
	64COL/GOL	SR1O(G)+S(G)=S1O(G)+SR(G)	1997	MS	-21.88+/- 6.0	2.12+/- 7.2		122.5
	64COL/GOL	BA1O(G)+S(G)=S1O(G)+BA(G)	2006	MS	6.42+/- 6.0	-2.18+/- 6.8		126.8
	73HER/LIN	BA(G)+S1O2(G)=BA1O(G)+S1O(G)	0	CB	0.24+/- 5.0	4.10+/- 6.0		120.5
	73HIL	AL(G)+S1O(G)=S(G)+AL1O(G)	2036	MS	4.91+/- 2.5	-1.51+/- 3.4		126.1
	79FON/FEL	AL(G)+S1O2(G)=AL1O(G)+S1O(G)	0	K	4.01+/- 0.4	-4.13+/- 2.3		128.8
	79HUB/HER	S1O(G)=S(G)+O(G)	0	S	124.71+/- 0.1	1.04+/- 0.1	**	123.6
					SELECTED	1.0 +/- 1.0		123.6
SB1O(G)								
	75FAR/SRI2	SB(G)+H2O(G)=SB1O(G)+H2(G)	2230	FL	13.25+/- 5.0	18.68+/- 5.0	**	103.1
					SELECTED	19.0 +/-10.0		102.8
SC1O(G)								
	65SMO/DRO	SC1O(G)+Y(G)-SC(G)+Y1O(G)	2105	MS	-9.25+/- 1.0	-12.93+/- 3.0	**	161.6
	65SMO/DRO	SC1O(G)+LA(G)=SC(G)+LA1O(G)	2000	MS	-28.44+/- 1.0	-13.24+/- 3.0	**	161.9
	67AME/WAL	LA(G)+SC1O(G)=SC(G)+LA1O(G)	1936	MS	-26.72+/- 0.4	-14.96+/- 2.9	*	163.7
	67AME/WAL	SC2O3(C)=1.97SC1O(G)+0.03SC(G) +1.03O(G)	2600	WL	489.05+/- 0.2	-15.80+/- 0.3		164.5
	67COP/SMO	GE1O(G)+SC(G)=GE(G)+SC1O(G)	2047	MS	-3.71+/- 1.4	-11.39+/- 3.5		160.1
	69DRO/COP	TI1O(G)+SC(G)=TI(G)+SC1O(G)	2177	MS	-2.32+/- 0.2	-13.20+/- 2.5	**	161.9
	71HAM/GIL	TI1O(G)+SC(G)=TI(G)+SC1O(G)	2300	MS	-2.35+/- 0.1	-13.23+/- 2.5	**	161.9
	76YUD/MOG	SC2O3(C)=2SC1O(G)+O(G)	2125	MS	436.72+/- 3.0	-39.47+/- 1.5		188.2
	77CHA/GOL	SC(G)+O2(G)=SC1O(G)+O(G)	0	CL	-46.54+/- 2.3	<-15.77+/- 2.5		164.5
	78MUR	ND(G)+SC1O(G)=ND1O(G)+SC(G)	1933	MS	-4.90+/- 3.0	-13.08+/- 4.4		161.8
					SELECTED	-13.0 +/- 2.5		161.7
SE1O(G)								
	67DEM	SE1O(G)=SE(G)+O(G)	0	MS	112.06+/- 2.5	1.79+/- 2.7	**	111.3
					SELECTED	2.0 +/- 5.0		111.1
SI1O(G)								
	67COP/SMO	SI1O(G)+LA(G)=SI(G)+LA1O(G)	1972	MS	-0.30+/- 1.4	-24.10+/- 3.6	*	189.9
	72HIL1	GE(G)+SI1O(G)=GE1O(G)+SI(G)	1506	MS	32.19+/- 2.0	-22.59+/- 4.2		188.4
	73NAG/NIW	SI1O2(C2)=SI1O(G)+0.5O2(G)	1872	WL	187.49+/- 2.5	-28.93+/- 2.6		194.7
	73ZMB/AME	SI(C)+SI1O2(C2)=2SI1O(G)	1356	MS	164.48+/- 5.0	-25.97+/- 2.5	*?	191.8
	74HIL/MUR	SI(G)+TH1O(G)=SI1O(G)+TH(G)	2143	MS	19.11+/- 3.1	-23.69+/- 4.7	*	189.5
	74KUB/CHA	0.5SI(C)+0.5SI1O2(C1)=SI1O(G)	1426	WL	84.85+/- 3.0	-23.98+/- 3.0	**	189.8
	76KVA/WAH	0.5SI(C)+0.5SI1O2(C1)=SI1O(G)	1367	MS	82.19+/- 3.0	-26.64+/- 3.0	*?	192.5
					SELECTED	-24.0 +/- 2.5		189.8
SM1O(G)								
	67AME/WAL	Y(G)+SM1O(G)=SM(G)+Y1O(G)	2410	MS	-31.30+/- 0.3	-31.80+/- 2.8	*	139.3
	67AME/WAL	SM(G)+EU1O(G)=EU(G)+SM1O(G)	2320	MS	-12.97+/- 1.9	-19.47+/- 4.5		127.0
	67AME/WAL	SM2O3(C)=1.8SM1O(G)+0.2SM(G) +1.2O(G)	2400	WL	457.36+/- 0.9	-33.10+/- 0.7		140.6
	75DIC/ZAR	SM(G)+N1O2(G)=SM1O(G)+N1O(G)	0	CL	-63.77+/- 0.7	<-28.04+/- 0.9	*?	135.6
	77HIL	AL(G)+SM1O(G)=AL1O(G)+SM(G)	2201	MS	11.33+/- 2.5	-24.73+/- 3.4	*	132.2
	77HIL	SM(G)+TI1O(G)=SM1O(G)+TI(G)	2193	MS	24.65+/- 2.5	-27.15+/- 3.4	*	134.7
	77HIL	EU(G)+SM1O(G)=EU1O(G)+SM(G)	2193	MS	22.13+/- 2.5	-28.63+/- 4.7	*	136.1
					SELECTED	-28.0 +/- 4.0		135.5
SN1O(G)								
	65COL/DRO	2SN1O2(C)=2SN1O(G)+O2(G)	1369	MS	287.18+/- 4.0	4.78+/- 2.0	**	125.8
	66HOE/SEA	SN1O2(C)=SN1O(G)+0.5O2(G)	1499	WL	144.48+/- 1.1	5.67+/- 1.1	**	124.9
	72DRO/MYE	P1O(G)+SN(G)=SN1O(G)+0.5P2(G)	1359	MS	-43.32+/- 1.3	3.46+/- 3.3		127.1
	72DRO/MYE	P1O2(G)+2SN(G)=2SN1O(G)+0.5P2(G)	1347	MS	-50.11+/- 1.4	2.83+/- 0.8	**	127.7
	72TUM/BAI	SN(C)+0.5O2(G)=SN1O(G)	298	MS	-23.44+/- 3.0	-23.44+/- 3.0		154.0
	76KAZ/CHI	SN1O2(C)=SN1O(G)+0.5O2(G)	1351	MS	143.73+/- 3.0	4.92+/- 3.0	**	125.7
	79KOS/GRE	SN1O(C)=SN1O(G)	1310	WL	69.81+/- 1.0	1.46+/- 1.0	*	129.1
					SELECTED	4.5 +/- 3.0		126.1

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
SR1O(G)								
	64COL/GOL	SR1O(G)+S(G)=S1O(G)+SR(G)	1997	MS	-21.88+/- 6.0	-4.12+/- 6.1	**	101.9
	64DRO/EXS	SR1O(G)+O(G)=SR(G)+02(G)	2242	MS	-16.83+/- 3.3	-3.52+/- 3.3	**	101.3
	65KAL/HOL	SR1O(G)=SR(G)+O(G)	0	FL	95.73+/- 1.4	3.02+/- 1.5		94.8
	72ASA/YAM	SR1O(G)=SR(G)+O(G)	1799	MS	97.01+/- 1.0	1.74+/- 1.1		96.1
	72BAT/MIC	SR(G)+02(G)=SR1O(G)+O(G)	0	CB	5.71+/- 3.5	<-14.64+/- 3.5		112.5
	73KAL/ALK	SR1O(G)=SR(G)+O(G)	0	FL	92.73+/- 3.0	6.02+/- 3.0		91.8
	76ENG/SAN	SR(G)+CL102(G)=SR1O(G)+CL1O(G)	0	CL	-49.49+/- 2.0	<-10.13+/- 2.3		108.0
	76FAR/SRI1	SR1O(G)=SR(G)+0.502(G)	2057	MS	39.93+/- 0.2	-0.73+/- 0.4	**	98.6
					SELECTED	-3.0 +/- 4.0		100.8
TA1O(G)								
	60WAL/GOL	LA203(C)+TA(C)=2LA1O(G)+TA1O(G)	2147	MS	402.08+/-10.0	31.48+/-11.2		214.0
	60WAL/GOL	ND203(C)+TA(C)=2ND1O(G)+TA1O(G)	2151	MS	399.81+/-10.0	27.71+/-11.7		217.7
	65KRI/CAR	0.6TA(C)+0.2TA205(C)=TA1O(G)	1976	MS	175.18+/- 4.0	77.38+/- 4.0		168.1
	65KRI/CAR	0.6TA(C)+0.2TA205(L)=TA1O(G)	2234	MS	172.62+/- 4.0	79.07+/- 4.0		166.4
	76SMO/DRO	0.6TA(C)+0.2TA205(C)=TA1O(G)	2002	MS	156.06+/- 2.0	58.26+/- 2.0	**	187.2
	76SMO/DRO	0.6TA(C)+0.2TA205(L)=TA1O(G)	2303	MS	151.93+/- 2.0	58.38+/- 2.0	**	187.1
	76SMO/DRO	TA(C)+TI1O(G)=TA1O(G)+TI(G)	2235	MS	154.09+/- 2.0	52.89+/- 3.0	**	192.6
	76SMO/DRO	TA(C)+P1O(G)=TA1O(G)+P(G)	2162	MS	136.41+/- 2.1	52.77+/- 3.7	**	192.7
					SELECTED	55.5 +/- 3.0		190.0
TB1O(G)								
	67AME/WAL	LA(G)+TB1O(G)=TB(G)+LA1O(G)	1942	MS	-20.62+/- 0.2	-18.48+/- 2.7	**	169.7
	67AME/WAL	PR(G)+TB1O(G)=TB(G)+PR1O(G)	1973	MS	-8.66+/- 0.3	-17.44+/- 4.1	**	168.6
	67AME/WAL	GD(G)+TB1O(G)=TB(G)+GD1O(G)	2083	MS	0.90+/- 0.2	17.70+/- 3.1	**	168.9
	67AME/WAL	HO(G)+TB1O(G)=TB(G)+HO1O(G)	2000	MS	22.34+/- 1.5	-15.84+/- 6.2	**	167.0
					SELECTED	-17.0 +/- 4.0		168.2
TE1O(G)								
	65CHA/HUR	TE1O(G)=TE(G)+O(G)	0	S	90.83+/- 5.0	>15.64+/- 5.0	**	90.0
	69MUE/HAS	TE1O(G)=0.5TE2(G)+0.502(G)	836	MS	2.90+/- 2.0	17.22+/- 2.0	**	88.4
	70STA	TE1O(G)=TE(G)+0.502(G)	1300	MS	35.65+/- 4.5	11.26+/- 4.5		94.4
	78ZMB/MIL	TE1O(G)+PB(G)=PB1O(G)+TE(G)	887	MS	1.19+/- 0.2	14.07+/- 3.0	**	91.6
	78ZMB/MIL	TE1O(G)+PB1TE(G)=TE2(G)+PB1O(G)	887	MS	-1.48+/- 0.2	18.82+/- 3.6	**	86.8
					SELECTED	16.5 +/- 5.0		89.1
TH1O(G)								
	61DAR/MCC	0.5TH(L)+0.5TH102(C)=TH1O(G)	2237	MS	140.11+/- 5.0	-6.44+/- 5.0	*	207.9
	62ACK/THO	TH(L)+0.502(G)=TH1O(G)	2538	MS	-6.31+/- 2.2	-6.31+/- 2.2	*	207.8
	63ACK/RAU	TH102(C)+TH(L)=2TH1O(G)	2550	WL	277.40+/- 5.0	>-7.85+/- 2.5	**	209.3
	73ACK/RAU1	0.5TH(L)+0.5TH102(C)=TH1O(G)	2202	WL	139.62+/- 0.5	-6.93+/- 0.7	**	208.4
	73ACK/RAU1	Y1O(G)+TH(G)=Y(G)+TH1O(G)	2090	MS	-38.51+/- 1.6	-8.11+/- 3.5	**	209.6
	74ACK/RAU	ZR(G)+TH1O(G)=ZR1O(G)+TH(G)	2237	MS	25.12+/- 2.0	-8.22+/- 4.0		209.7
	74ACK/RAU	HF(G)+TH1O(G)=HF1O(G)+TH(G)	2345	MS	18.33+/- 2.0	-7.43+/- 4.0		208.9
	74HIL/MUR	0.5TH(C)+0.5TH102(C)=TH1O(G)	1861	MS	141.15+/- 1.4	-5.40+/- 1.5	*	206.9
	74HIL/MUR	SI(G)+TH1O(G)=SI1O(G)+TH(G)	2143	MS	19.11+/- 3.1	-7.81+/- 4.7	*	209.3
	75MUR/HIL	TH1O(G)+ZR(G)=TH(G)+ZR1O(G)	2288	MS	25.15+/- 3.6	-8.25+/- 5.0		209.7
					SELECTED	-7.5 +/- 2.5		209.0
TI1O(G)								
	67WAH/GIL	TI305(C)=3TI1O(G)+2O(G)	1955	MS	711.05+/- 3.1	2.43+/- 1.0		169.2
	69DRO/COP	TI1O(G)+SC(G)=TI(G)+SC1O(G)	2177	MS	-2.32+/- 0.2	12.20+/- 2.9		159.4
	69DRO/COP	TI1O(G)+Y(G)=TI(G)+Y1O(G)	2313	MS	-11.24+/- 2.0	11.94+/- 3.5		159.7
	71HAM/GIL	TI1O(G)+SC(G)=TI(G)+SC1O(G)	2300	MS	-2.35+/- 0.1	12.23+/- 2.9		159.4
	71HAM/GIL	TI1O(G)+GE(G)=TI(G)+GE1O(G)	2300	MS	3.82+/- 1.3	11.38+/- 3.5		160.3
	71HAM/GIL	TI102(G)=TI1O(G)+O(G)	1900	MS	146.00+/- 0.1	13.45+/- 3.0	*	158.2
	71HAM/GIL	TI1O(G)+W103(G)=TI102(G)+W102(G)	1900	MS	3.14+/- 0.1	12.16+/-10.3	*	159.5
	71HAM/GIL	TI102(G)+TI(G)=2TI1O(G)	2300	MS	-14.11+/- 1.0	13.05+/- 1.7	*	158.6
	72BAL/DEM	TI102(G)=TI1O(G)+O(G)	2122	MS	130.97+/- 0.4	-1.58+/- 3.0		173.2
	72BAL/DEM	TI102(G)+TI(G)=2TI1O(G)	2324	MS	-16.36+/- 0.1	11.92+/- 1.6	*?	159.7
	72WU/WAH	2TI203(C)=TI305(C)+TI1O(G)	1998	WL	154.37+/- 0.7	12.02+/- 4.1	**	159.6
	72WU/WAH	2TI203(C)=TI305(C)+TI1O(G)	1980	MS	152.76+/- 3.2	10.41+/- 5.1	**	161.2
	75LIU/WAH	2TI203(C)=TI305(C)+TI1O(G)	1985	MS	155.02+/- 1.4	12.67+/- 4.2	**	159.0
	76HIL	AL(G)+TI1O(G)=AL1O(G)+TI(G)	1976	MS	36.46+/- 2.0	13.94+/- 3.2	*	157.7
	76HIL	BA(G)+TI1O(G)=BA1O(G)+TI(G)	2044	MS	28.56+/- 2.0	9.84+/- 3.9		161.8
	76HIL	TI(G)+TI102(G)=2TI1O(G)	2102	MS	-13.99+/- 2.0	13.10+/- 1.9	*	158.5
	76MUR/HIL	EU(G)+TI1O(G)=EU1O(G)+TI(G)	2126	MS	45.64+/- 3.3	11.66+/- 5.3		160.0
	76SMO/DRO	TA(C)+TI1O(G)=TA1O(G)+TI(G)	2235	MS	154.09+/- 2.0	14.61+/- 3.7		157.0

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_f H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
TI1O(G)								
	77DUB/GOL	TI1O(G)=TI(G)+O(G)	0	CL	160.92+/- 3.0	11.83+/- 3.2	*	159.8
	77HIL	SM(G)+TI1O(G)=SM1O(G)+TI(G)	2193	MS	24.65+/- 2.5	11.15+/- 4.8		160.5
	77SHE/GIL	TI1O(C)=TI1O(G)	1782	MS	140.68+/- 0.2	11.98+/- 3.0	**	159.7
	78GIL/SHE	TI1O(C)=TI1O(G)	1806	WL	140.72+/- 0.1	12.02+/- 3.0	**	159.6
	78MUR	PR(G)+TI1O(G)=PR1O(G)+TI(G)	1867	MS	-16.52+/- 3.0	10.72+/- 5.1		160.9
	78MUR	ND(G)+TI1O(G)=ND1O(G)+TI(G)	1933	MS	-7.31+/- 3.0	12.21+/- 4.4		159.4
	80MUR/HIL	GD(G)+TI1O(G)=GD1O(G)+TI(G)	1993	MS	-11.22+/- 2.0	12.92+/- 3.8		158.7
	80MUR/HIL	ER(G)+TI1O(G)=ER1O(G)+TI(G)	2040	MS	15.08+/- 3.0	12.32+/- 6.0		159.3
	80MUR/HIL	HO(G)+TI1O(G)=HO1O(G)+TI(G)	2049	MS	14.95+/- 3.0	11.85+/- 6.8		159.8
					SELECTED	12.0 +/- 2.0		159.6
TM1O(G)								
	67AME/WAL	TM2O3(C)=1.1TM1O(G)+0.9TM(G) +1.9O(G)	2600	WL	593.37+/- 0.7	-19.21+/- 1.6		133.3
	80MUR/HIL	AL(G)+TM1O(G)=AL1O(G)+TM(G)	2300	MS	-0.14+/- 3.0	-7.16+/- 3.9	**	121.2
					SELECTED	-7.0 +/- 5.0		121.1
U1O(G)								
	60DEM/BUR	2U1O(G)=U1O2(G)+U(G)	1896	MS	1.91+/- 5.0	7.29+/- 2.8	*?	179.2
	60DEM/BUR	2U1O2(G)=U1O3(G)+U1O(G)	2252	MS	13.37+/- 5.0	-18.43+/- 7.3		204.9
	60DEM/BUR	U1O2(G)-U1O(G)+O(G)	2252	MS	177.40+/- 5.0	6.35+/- 5.1	*?	180.2
	62ACK/THO	U(L)+0.5O2(G)=U1O(G)	2159	MS	4.13+/- 5.0	4.13+/- 5.0	*	182.4
	64DRO/PAT	0.5U(L)+0.5U1O2(C)=U1O(G)	1886	MS	135.69+/- 4.0	6.04+/- 4.0	**	180.5
	66PAT/SMO	0.5U(L)+0.5U1O2(C)=U1O(G)	1955	MS	135.28+/- 4.0	5.63+/- 4.0	**	180.9
	67PAT/DRO	0.5U(L)+0.5U1O2(C)=U1O(G)	1899	MS	135.63+/- 3.0	5.98+/- 3.0	**	180.5
	68COP/SMO	U1O(G)+B(G)=U(G)+B1O(G)	2339	MS	-7.79+/- 0.5	1.99+/- 5.4		184.5
	68COP/SMO	U1O2(G)+B(G)=U1O(G)+B1O(G)	2262	MS	-11.57+/- 0.9	10.73+/- 5.2		175.8
	69ACK/RAU	U(G)+U1O2(G)=2U1O(G)	1988	MS	-4.89+/- 1.0	5.80+/- 1.3	**	180.7
	75STE/CAT	Y1O(G)+U(G)=U1O(G)+Y(G)	2253	MS	-13.87+/- 0.3	1.63+/- 3.4		184.9
					SELECTED	6.0 +/- 2.5		180.5
V1O(G)								
	67COP/SMO	GE1O(G)+V(G)=V1O(G)+GE(G)	2044	MS	6.66+/- 2.0	31.86+/- 4.2	**	149.5
	72FAR/UY	AL1O(G)+V(G)=AL(G)+V1O(G)	2270	MS	-26.50+/- 4.0	33.90+/- 5.0	**	147.5
	76JON/GOL	V(G)+N1O2(G)=V1O(G)+N1O(G)	0	CL	-67.35+/- 2.0	<42.18+/- 2.8		139.2
					SELECTED	33.0 +/- 4.0		148.4
W1O(G)								
	60DEM/BUR	W1O(G)=W(C)+O(G)		MS	-42.04+/-10.0	101.59+/-10.0	**	160.0
					SELECTED	102.0 +/-10.0		159.6
Y1O(G)								
	60WAL/GOL	Y2O3(C)=2Y1O(G)+O(G)	2597	WL	493.85+/- 8.0	-10.50+/- 4.0	*?	170.4
	64ACK/RAU	2Y(C)+O2(G)=2Y1O(G)	2596	WL	-14.73+/- 5.0	-7.36+/- 2.5		167.3
	65SMO/DRO	SC1O(G)+Y(G)=SC(G)+Y1O(G)	2105	MS	-9.25+/- 1.0	-11.07+/- 3.0	**	171.0
	65SMO/DRO	Y1O(G)+LA(G)=Y(G)+LA1O(G)	2000	MS	-18.89+/- 1.0	-11.61+/- 3.0	**	171.5
	67AME/WAL	Y(G)+SM1O(G)=SM(G)+Y1O(G)	2410	MS	-31.30+/- 0.3	-7.20+/- 4.2		167.1
	67AME/WAL	LA(G)+Y1O(G)=Y(G)+LA1O(G)	2027	MS	-18.03+/- 0.2	-12.47+/- 2.9	*	172.4
	67AME/WAL	Y2O3(C)=2Y1O(G)+O(G)	2600	WL	492.27+/- 1.2	-11.29+/- 0.8	*?	171.2
	69DRO/COP	TI1O(G)+Y(G)=TI(G)+Y1O(G)	2313	MS	-11.24+/- 2.0	-10.94+/- 3.2	**	170.9
	70FRI	Y(G)+PR1O(G)=Y1O(G)+PR(G)	0	MS	10.74+/- 3.5	-6.76+/- 5.4		166.7
	70UY/DRO	B(G)+Y1O(G)=Y(G)+B1O(G)	2345	MS	-23.00+/- 2.0	-9.30+/- 5.5		169.2
	71ACK/RAU1	LA(G)+Y1O(G)=LA1O(G)+Y(G)	1963	MS	-19.54+/- 1.0	-10.96+/- 3.0	**	170.9
	71ACK/RAU2	CE(G)+Y1O(G)=Y(G)+CE1O(G)	1733	MS	-20.51+/- 1.0	-10.99+/- 3.5		170.9
	72DRO/MYE	P1O(G)+Y(G)=Y1O(G)+P(G)	2414	MS	-28.94+/- 2.0	-11.08+/- 3.7		171.0
	72DRO/MYE	GD1O(G)+Y(G)=GD(G)+Y1O(G)	2395	MS	-0.97+/- 2.0	-10.97+/- 3.8		170.9
	73ACK/RAU1	Y1O(G)+TH(G)=Y(G)+TH1O(G)	2090	MS	-38.51+/- 1.6	-10.39+/- 3.5	**	170.3
	73ACK/RAU2	Y2O3(C)=2Y1O(G)+O(G)	2416	WL	496.70+/- 1.5	-9.07+/- 0.9	*	169.0
	74ACK/RAU	ZR1O(G)+Y(G)=ZR(G)+Y1O(G)	2445	MS	14.59+/- 2.0	-9.91+/- 3.9		169.8
	74ACK/RAU	HF1O(G)+Y(G)=HF(G)+Y1O(G)	2392	MS	19.80+/- 2.0	-10.70+/- 3.9		170.6
	74LIU/WAH	Y2O3(C)=2Y1O(G)+O(G)	2492	WL	492.04+/- 0.7	-11.41+/- 0.6	**	171.3
	75STE/CAT	Y1O(G)+U(G)=U1O(G)+Y(G)	2253	MS	-13.87+/- 0.3	-6.63+/- 3.4		166.6
	76YUD/MOG	Y2O3(C)=2Y1O(G)+O(G)	2125	MS	485.88+/- 5.0	-14.49+/- 2.5		174.4
	76YUD/MOG	Y1O(G)=Y(G)+O(G)	2125	MS	161.01+/- 3.0	0.04+/- 3.2		159.9
	77CHA/GOL	Y(G)+O2(G)=Y1O(G)+O(G)	0	CL	-56.19+/- 2.3	<-14.25+/- 2.5		174.2
	77EME/GUS	MO(G)+Y1O(G)=MO1O(G)+Y(G)	2751	MS	37.94+/- 3.0	-10.84+/- 5.0		170.8
	80MUR/HIL	GD(G)+Y1O(G)=GD1O(G)+Y(G)	1945	MS	0.58+/- 3.0	-10.58+/- 4.4		170.5
	80MUR/HIL	LU(G)+Y1O(G)=LU1O(G)+Y(G)	1904	MS	10.77+/- 3.0	-10.97+/- 5.1		170.9
					SELECTED	-11.0 +/- 2.5		170.9

Appendix I. Process Catalogue Derived from Experimental Data File — Continued

MO(G)	CODE	PROCESS	TAV/K	METHOD	$\Delta_r H^\circ_{298}$	$\Delta_f H_{298}$(MO) /kcal mol^{-1}		D°_0(MO)
YB1O(G)								
	76YOK/MEN	YB(G)+03(G)=YB1O(G)+02(G)	0	CL	-69.96+/- 1.5	<0.49+/- 1.8	*	94.4
	77COS/D'A	YB(G)+02(G)=YB1O(G)+0(G)	0	CB	19.27+/- 1.0	-3.94+/- 1.0	**	98.9
					SELECTED	-4.0 +/- 2.0		98.9
ZN1O(G)								
	64ANT/SEA	ZN1O(G)=ZN(G)+0.502(G)	1249	MS	5.16+/-10.0	>26.01+/-10.0	**	63.8
					SELECTED	>26.0 +/-10.0		<63.8
ZR1O(G)								
	74ACK/RAU	ZR1O(G)+Y(G)=ZR(G)+Y1O(G)	2445	MS	14.59+/- 2.0	18.41+/- 3.5	**	185.5
	74ACK/RAU	ZR(G)+TH1O(G)=ZR1O(G)+TH(G)	2237	MS	25.12+/- 2.0	20.22+/- 3.7	**	183.7
	74ACK/RAU	ZR(G)+HF1O(G)=ZR1O(G)+HF(G)	2392	MS	6.09+/- 2.0	19.59+/- 3.9		184.3
	75MUR/HIL	ZR(C)+ZR1O2(C)=2ZR1O(G)	1898	MS	300.77+/- 0.6	19.24+/- 0.4	*	184.7
	75MUR/HIL	TH1O(G)+ZR(G)=TH(G)+ZR1O(G)	2288	MS	25.15+/- 3.6	20.25+/- 4.7	*	183.7
	75MUR/HIL	B1O(G)+ZR(G)=ZR1O(G)+B(G)	2293	MS	11.64+/- 3.0	23.34+/- 5.9		180.6
	75MUR/HIL	ZR(G)+ZR1O2(G)=2ZR1O(G)	2360	MS	-34.91+/- 7.2	21.09+/- 6.6	*	182.8
					SELECTED	19.5 +/- 3.0		184.4

The column headings and contents of the file are as follows:

MO(G) Formula of monoxide.
Since only capital letters are used in the files a number '1' is inserted to separate element symbols.

CODE Date of publication followed by 3 letter contractions of up to 2 names of authors. Publications in the same year by the same authors are distinguished by numbers in the last position in the code, e.g. 76FAR/SRI1 and 76FAR/SRI2.

PROCESS Computer representation of the chemical or physical process. The following symbols are used:
- (C) Crystalline
- (L) Liquid
- (G) Ideal Gas

TAV/K Reciprocal of average value of $1/T$ for a set of measurements.

METHOD The following abbreviations for the experimental techniques are used.
- CB Crossed Beam
- CL Chemiluminescence
- EI Electron Impact
- FL Flame Equilibria
- K Kinetic
- LF Laser Fluorescence
- MS Mass Spectrometry
- S Spectroscopy
- WL Weight Loss

$\Delta_r H^\circ_{298}$ Standard enthalpy of reaction at 298.15 K derived as illustrated in table 3. Where authors do not give errors these have been estimated by comparison with those for similar processes and techniques.

$\Delta_f H^\circ_{298}$(MO) Standard enthalpy of formation of the gaseous monoxide derived for each process as illustrated in table 3.

** The selected values of $\Delta_f H^\circ_{298}$(MO) are based on these measurements and are rounded to the nearest 0.5 kcal mol^{-1}. The selected average uncertainty takes into account the spread of values, their uncertainties, the number of values and our assessment of their reliability.

* Measurements which support the selected value but are considered to be less reliable than those indicated by **.

*? Measurements which support the selected value but the paper concerned contains other data which appear to be in error, thus raising doubts about the validity of the work.

For a given monoxide, unlabelled measurements have been ignored in the selection process either because they are considered unreliable or because in metathetical reactions, the data have been used only to calculate the standard enthalpy of formation of another monoxide.

D°_0(MO) The dissociation energy has been calculated using data for the atoms from Appendix III.

Details of the assessment for each monoxide are given in sections 5.2 to 5.7.

Appendix II. Molecular Parameters for Gaseous Monoxides

Formula/Term symbol	g	T_e	ω_e	$\omega_e x_e$	B_e	α_e	D_e
AG1O(G)							
2PI1/2	2	0.00	490.20	3.060	0.302000	0.002500	4.500
2PI3/2	2	135.00	490.50	2.860	0.303600	0.002600	5.000
AL1O(G)							
2SIG+	2	0.00	979.23	6.970	0.641360	0.005800	10.800
2PI(I)	2	5341.70	728.50	4.150	0.533300		11.000
2PI(I)	2	5470.60	728.50	4.150	0.537400		11.000
AS1O(G)							
2PI(R)1/2	2	0.00	967.08	4.850	0.484820	0.003299	4.900
2PI(R)3/2	2	1025.97	965.90	4.909	0.485520	0.003320	4.900
AU1O(G)							
2P1/2	2	0.00	530.00		0.263200		
2P3/2	2	270.00	530.00		0.263200		
TE AND WE FROM 72SMO/MAN, BE FROM 69BRE/ROS							
B1O(G)							
2SIG+	2	0.00	1885.69	11.810	1.782000	0.016600	63.200
BA1O(G)							
1SIG+	1	0.00	669.76	2.028	0.312614	0.001392	2.724
BE1O(G)							
1SIG+	1	0.00	1487.32	11.830	1.651000	0.019000	82.000
3PI	6	8480.00	1144.24	8.415	1.366100	0.016280	79.900
1PI	2	9405.61	1144.24	8.415	1.366100	0.016280	79.900
BI1O(G)							
2PI1/2	2	0.00	692.40	4.340	0.303400	0.002200	2.210
2PI3/2	2	8000.00	692.40	4.340	0.303400	0.002200	2.210
BR1O(G)							
2PI3/2	2	0.00	778.70	6.820	0.429598	0.003639	5.230
2PI1/2	2	900.00	778.70	6.820	0.429598	0.003639	5.230
C1O(G)							
1SIG+	1	0.00	2169.81	13.288	1.931281	0.017504	61.215
CA1O(G)							
1SIG+	1	0.00	732.11	4.810	0.444520	0.003380	6.580
3PI(I)	6	8313.00	556.00	3.300	0.335000	0.001500	
1PI	2	8433.00	545.70	2.540	0.337000	0.002100	
CD1O(G)							
1SIG+	1	0.00	550.00		0.351500		
69BRE/ROS							
CE1O(G)							
3PHI2	2	0.00	826.00		0.354520		2.400
3PHI3	2	0.00	822.76	3.090	0.357790	0.001790	2.690
3PHI4	2	0.00	932.00		0.353770	0.001140	2.030
PRIVATE COMMUNICATION FROM M.H. RAND CONCERNING WE VALUE OF GROUND STATE.							
CL1O(G)							
2PI(I)	2	0.00	853.80	5.500	0.623448	0.005800	13.300
2PI(I)	2	318.00	853.80	5.500	0.623448	0.005800	13.300
CO1O(G)							
4SIG	4	0.00	853.75	3.650	0.492100		
WE AND WEXE FROM 79GRE/REE, BE FROM 69BRE/ROS.							
CR1O(G)							
5PI-1	2	0.00	898.40	6.750	0.523100	0.007000	
5PI0	2	0.00	898.40	6.750	0.523300	0.003600	
5PI1	2	0.00	898.40	6.750	0.528400	0.005000	
5PI2	2	0.00	898.40	6.750	0.534800	0.004900	
5PI3	2	0.00	898.40	6.750	0.541000	0.004900	
CS1O(G)							
2SIG+	2	0.00	280.00	1.000	0.198000	0.001000	
71JANAF. GROUND STATE ASSIGNED BY 79HUB/HER.							
CU1O(G)							
2PI3/2	2	0.00	640.17	4.430	0.444540	0.004560	8.500
2PI1/2	2	279.02	636.18	4.360	0.444150	0.004490	8.400
DY1O(G)							
7?	14	0.00	836.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							

Appendix II. Molecular Parameters for Gaseous Monoxides — Continued

Formula/Term symbol	g	T_e	ω_e	$\omega_e x_e$	B_e	α_e	D_e
ER1O(G)							
5?	10	0.00	839.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
EU1O(G)							
8?	16	0.00	832.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
F1O(G)							
2PI	4	0.00	1028.70	5.150	1.104000	0.009700	
FE1O(G)							
5SIG+	5	0.00	880.61	4.643	0.512720	0.003760	6.300
8OHAR/BAR							
GA1O(G)							
2SIG	2	0.00	767.30	6.240	0.427100		3.700
GD1O(G)							
9SIG	9	0.00	834.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
GE1O(G)							
1SIG+	1	0.00	985.50	4.290	0.485696	0.003076	4.720
H1O(G)							
2PI(I)	2	0.00	3737.76	84.882	18.910801	0.724200	
2PI(I)	2	139.40	3737.76	84.882	18.910801	0.724200	
HF1O(G)							
1SIG+	1	0.00	974.09	3.228	0.386537	0.001724	2.438
HO1O(G)							
6?	12	0.00	838.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
I1O(G)							
2PI3/2	2	0.00	681.47	4.290	0.340260	0.002696	3.600
2PI1/2	2	2330.00	681.47	4.290	0.340260	0.002696	3.600
IN1O(G)							
2SIG	2	0.00	695.63		0.358200		
69BRE/ROS							
IR1O(G)							
2DEL3/2	2	0.00	909.40	4.700	0.384700	0.002500	3.000
2DEL5/2	2	0.00	903.30	4.700	0.386700	0.002400	2.900
OUR ASSIGNMENT OF GROUND STATE.[b]							
K1O(G)							
2SIG+	2	0.00	384.00		0.306800		
2PI	4	347.00	442.00		0.306800		
BE VALUE FROM 71JANAF.							
LA1O(G)							
2SIG+	2	0.00	812.75	2.220	0.352600	0.001400	2.600
2DEL(R)	2	4493.40	768.00	2.170	0.343500	0.001600	2.800
2DEL(R)	2	8191.20	771.60	2.300	0.344400	0.001700	2.800
LI1O(G)							
2PI(I)	4	0.00	851.50	12.500	1.202000	0.015100	
2SIG+	2	2330.00	866.70	6.700	1.349000	0.019900	
LU1O(G)							
2SIG+	2	0.00	842.50	3.100	0.358060	0.001600	2.550
MG1O(G)							
1SIG+	1	0.00	785.06	5.180	0.574300	0.005000	12.200
3PI(I)	6	2400.00	650.00		0.500000		
1PI	2	3563.30	664.44	3.910	0.505600	0.004600	11.800
MN1O(G)							
6SIG	6	0.00	839.60	4.790	0.435000		
MO1O(G)							
5PI	10	0.00	950.00		0.410700		
69BRE/ROS. OUR ASSIGNMENT OF GROUND STATE.[b]							
N1O(G)							
2PI(R)	2	0.00	1904.20	14.075	1.671950	0.017100	5.400
2PI(R)	2	119.82	1904.04	14.100	1.720160	0.018200	
NA1O(G)							
2PI	4	0.00	526.00		0.425000		
2SIG	2	1500.00	548.00		0.470000		

Appendix II. Molecular Parameters for Gaseous Monoxides — Continued

Formula/Term symbol	g	T_e	ω_e	$\omega_e x_e$	B_e	α_e	D_e
NB1O(G)							
4SIG-	4	0.00	989.00	3.830	0.432100	0.002100	2.200
ND1O(G)							
5?	10	0.00	828.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
NI1O(G)							
3SIG	3	0.00	837.61	5.920	0.498200		
BE FROM 69BRE/ROS, WE AND WEXE FROM 79GRE/REE.							
NP1O(G)							
1SIG	1	0.00	820.00		0.275000		
ESTIMATED FROM DATA ON UO AND PUO.							
O2(G)							
3SIG-G	3	0.00	1580.19	11.981	1.445630	0.015930	48.390
1DELG	2	7918.10	1483.50	12.900	1.426400	0.017100	48.600
OS1O(G)							
1SIG	1	0.00	785.00		0.333600		
69 BRE/ROS. OUR ASSIGNMENT OF GROUND STATE.[b]							
P1O(G)							
2PI(R)1/2	2	0.00	1233.34	6.560	0.733700	0.005500	13.000
2PI(R)3/2	2	224.00	1233.34	6.560	0.733700	0.005500	13.000
PD1O(G)							
1SIG+	1	0.00	721.00	3.540	0.307306	0.001915	2.230
PD1O(G)							
3SIG	3	0.00	810.00		0.382600		
69BRE/ROS. OUR ASSIGNMENT OF GROUND STATE.[b]							
PR1O(G)							
4?	8	0.00	827.00		0.360900		
BE FROM 77DEL/VAN, OTHER VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
PT1O(G)							
1SIG	1	0.00	851.11	4.980	0.382240	0.002830	3.050
PU1O(G)							
1SIG	1	0.00	820.00		0.250000		
WE FROM 78GRE/REE, BE ESTIMATED FROM DATA ON THO AND UO.							
RB1O(G)							
2SIG+	2	0.00	433.00		0.258300		
2PI(I)	4	606.00	389.00		0.258300		
BE VALUE FROM 69BRE/ROS.							
RE1O(G)							
2SIG	2	0.00	900.00		0.340000		
ESTIMATED FROM DATA ON OSO AND WO							
RH1O(G)							
4SIG	4	0.00	810.00		0.384200		
69 BRE/ROS. OUR ASSIGNMENT OF GROUND STATE.[b]							
RU1O(G)							
5SIG	5	0.00	854.60		0.422000		
69BRE/ROS. OUR ASSIGNMENT OF GROUND STATE.[b]							
S1O(G)							
3SIG-	3	0.00	1149.22	5.630	0.720817	0.005737	11.340
SB1O(G)							
2PI(R)	2	0.00	816.00	4.200	0.358000	0.002200	2.700
2PI(R)	2	2272.00	816.00	4.200	0.358000	0.002200	2.700
SC1O(G)							
2SIG+	2	0.00	964.95	4.200	0.513430	0.003300	5.850
SE1O(G)							
3SIG-0+	1	0.00	914.69	4.520	0.465500	0.003230	5.000
3SIG-1	2	165.90	915.43	4.520	0.473800	0.003390	5.000
SI1O(G)							
1SIG+	1	0.00	1241.56	5.966	0.726751	0.005038	9.800
SM1O(G)							
7?	14	0.00	831.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
SN1O(G)							
1SIG	1	0.00	823.40	3.770	0.355719	0.002143	2.660
WE AND WEXE FROM 76CAP/LIN.							
SR1O(G)							
1SIG+	1	0.00	653.49	3.960	0.337980	0.002194	3.600

Appendix II. Molecular Parameters for Gaseous Monoxides — Continued

Formula/Term symbol	g	T_e	ω_e	$\omega_e x_e$	B_e	α_e	D_e
TA1O(G)							
2DEL3/2	2	0.00	1028.69	3.510	0.402840	0.001820	2.450
2DEL5/2	2	3504.39	1030.81	3.590	0.403584	0.001870	2.503
TB1O(G)							
8?	16	0.00	835.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
TE1O(G)							
0+	1	0.00	797.11	4.000	0.355400	0.002370	2.700
1	2	679.00	798.06	4.000	0.356400	0.002360	3.000
TH1O(G)							
1SIG	1	0.00	895.77	2.390	0.332600	0.001300	1.833
3DEL	2	5305.00	895.77	2.390	0.332600	0.001300	1.833
3DEL	2	5805.00	895.77	2.390	0.332600	0.001300	1.833
3DEL	2	6305.00	895.77	2.390	0.332600	0.001300	1.833
75RAN							
TI1O(G)							
3DEL(R)	2	0.00	1009.02	4.498	0.535410	0.003010	6.030
3DEL(R)	2	96.40	1009.02	4.498	0.535410	0.003010	6.030
3DEL(R)	2	197.50	1009.02	4.498	0.535410	0.003010	6.030
1DEL	2	3440.00	1009.30	3.930	0.537600	0.002980	5.900
1SIG	1	5655.60	1014.60	4.640	0.549220	0.003370	6.000
TM1O(G)							
4?	8	0.00	840.00		0.356000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
U1O(G)							
5DEL	10	0.00	820.00		0.292700		
BE FROM 69BRE/ROS. OUR ASSIGNMENT OF GROUND STATE.[b]							
V1O(G)							
4SIG-	4	0.00	1011.30	4.860	0.548250	0.003520	6.000
W1O(G)							
3SIG-	3	0.00	1055.00	3.850	0.349800	0.001600	
71JANAF							
Y1O(G)							
2SIG+	2	0.00	861.00	2.930	0.388100	0.001800	3.200
YB1O(G)							
3?	6	0.00	841.00		0.350000		
VALUES ESTIMATED FROM DATA ON LAO, CEO AND LUO.[a]							
ZN1O(G)							
1SIG	1	0.00	680.00		0.433200		
69BRE/ROS, OUR ASSIGNMENT OF GROUND STATE.[b]							
ZR1O(G)							
1SIG-	1	0.00	969.76	4.900	0.422630	0.002300	3.190
3DEL(R)	2	1700.00	936.50	3.470	0.413280	0.001780	3.169
3DEL(R)	2	2000.00	936.50	3.470	0.414750	0.001900	3.269
3DEL(R)	2	2300.00	936.50	3.470	0.415730	0.001730	3.309

See next page for footnotes to Appendix II.

Footnotes to Appendix II.

Data from Huber and Herzberg [3] unless otherwise indicated (see footnotes which follow). Energy units in cm^{-1}.

g	statistical weight of electronic level
T_e	term value
ω_e	fundamental frequency
$\omega_e x_e$	anharmonicity correction
B_e	rotational constant
α_e	rotational vibrational interaction constant
D_e	centrifugal distortion constant.

Term symbols marked ? are unknown but assumed not to be sigma states.

[a]The molecular parameters for the lanthanide monoxides have been estimated as follows:

SOMURA/HIL observed that the dissociation energies for these species could be explained satisfactorily by an ionic model in which the electronic configuration of the doubly charged metal ion is $5d^1 4f^n$ with $n = 0$ for La^{2+} and $n = 14$ for Lu^{2+}. Since the bonding is predominantly ionic the form of the potential energy curves near the minimum must be similar throughout the series, and values of ω_e and B_e should change very little, as is already indicated by the experimental data for LaO, CeO, and LuO. Values for the remaining gaseous lanthanide monoxides have been estimated by interpolating the data for these three species.

Filling of the f shell according to Hundt's rule gives multiplicities rising from 2 for LaO to 9 for GdO, and falling back to 2 for LuO. Both LaO and LuO have $^2\Sigma^+$ ground states indicating that the $5d$ electron has an m_l value of zero, probably because this orbital can contribute a polarisation term to the ionic model. If this d orbital is retained throughout the series and the $4f$ orbitals of higher value are filled first, then the monoxides other than those of La and Lu will have electronic states with total angular momentum greater than zero, except for GdO, where maximum spin would impose the $^9\Sigma$ state.

[b]The electronic configuration of the ground state has been estimated by comparison with other monoxides in the same group in the Periodic Table.

Appendix III. Data and Reference Codes for Subsidiary Species

Formula	$\Delta_f H^\circ_{298}$[a] /kcal mol^{-1}		Reference code[b]	$H_{298}-H_0$ /kcal mol^{-1}	Reference code for source of thermal functions[c]
AG(C)	0.000	0.000	77CODATA	1.377	73HUL/DES
AG(G)	68.100	0.200	77CODATA	1.481	73HUL/DES
AL(C)	0.000	0.000	77CODATA	1.089	73HUL/DES
AL(G)	78.800	1.000	77CODATA	1.653	71JANAF
AL2O(G)	-31.200	5.000	78JANAF	3.129	78JANAF
AL2O2(G)	-104.000	10.000	78JANAF	3.330	78JANAF
AL2O3(C)	-400.500	0.300	77CODATA	2.395	78JANAF
AL2O3(L)	-383.710	1.000	78JANAF	-	78JANAF
AM(G)	67.900	1.000	76OET/RAN	1.481	76OET/RAN
AS(G)	71.862	0.550	73HUL/DES	1.481	73HUL/DES
AU(G)	88.000	0.300	73HUL/DES	1.481	73HUL/DES
B(C)	0.000	0.000	77CODATA	0.292	79JANAF55
B(G)	133.800	3.000	77CODATA	1.510	79JANAF55
B2O2(G)	-109.000	2.000	71JANAF	2.963	71JANAF
BA(C)	0.000	0.000	73HUL/DES	1.652	73HUL/DES
BA(G)	42.800	1.200	74JANAF	1.481	73HUL/DES
BA1O(C)	-131.000	0.500	75JANAF	2.386	75JANAF
BE(G)	77.400	1.200	77CODATA	1.481	73HUL/DES
BE1O(C)	-145.700	0.600	77CODATA	0.677	78JANAF
BI(G)	50.100	0.500	73HUL/DES	1.481	73HUL/DES
BI2O3(C)	-137.160	0.100	NBSTN270	5.000	60KEL
	-(G(T)-H(298)) FROM (H(T)-H(298)) AND (S(T)-S(298)) IN 60KEL COMBINED WITH S(298) FROM NBSTN270. (H(298)-H(0)) ESTIMATED BY COMPARISON WITH OTHER SESQUIOXIDES				
BR(G)	26.735	0.029	77CODATA	1.481	77CODATA
C(G)	171.290	0.110	77CODATA	1.562	81IVTAN
C1O(G)	-26.417	0.041	77CODATA	2.072	81IVTAN
C1O2(G)	-94.051	0.031	77CODATA	2.238	81IVTAN
CA(G)	42.500	0.200	77CODATA	1.481	71JANAF
CA1O(C)	-151.790	0.210	77CODATA	1.613	75JANAF
CD(G)	26.730	0.050	78CODATA	1.481	60KEL
	-(G(T)-H(298))/T CALCULATED FROM 60KEL USING VALUE OF S298 FROM IHT298DATA.				
CD1O(C)	-61.700	0.200	77CODATA	2.010	ESTIMATED
	-(G(T)-H(298)) ESTIMATED FROM VALUES FOR OTHER MONOXIDES, (H(T)-H(298)) CALCULATED FROM EQUATION FOR C(P) IN 60KEL.				
CE(G)	101.000	1.000	73HUL/DES	1.594	73HUL/DES
CL(G)	28.992	0.002	77CODATA	1.499	77CODATA
CL1O(G)	24.340	0.100	NBSTN270	2.114	NBSTN270
CL1O2(G)	24.500	1.000	NBSTN270	2.580	NBSTN270
CO(G)	102.400	1.000	73HUL/DES	1.520	73HUL/DES
CR(G)	95.000	1.000	75JANAF	1.481	75JANAF
CR2O3(C)	-272.600	0.400	IHT298DATA*	3.650	60KEL
CS(G)	18.180	0.050	73HUL/DES	1.481	73HUL/DES
CU(G)	80.700	0.300	77CODATA	1.481	73HUL/DES
DY(G)	69.400	1.000	73HUL/DES	1.481	73HUL/DES
DY2O3(C)	-445.200	0.900	IHT298DATA*	5.025	67AME/WAL
ER(G)	75.800	1.000	73HUL/DES	1.481	73HUL/DES
ER2O3(C)	-453.600	0.500	IHT298DATA*	4.780	67AME/WAL
EU(G)	41.900	0.200	73HUL/DES	1.481	56STU/SIN
EU2O3(C)	-397.400	0.900	IHT298DATA*	4.500	67AME/WAL
F(G)	18.860	0.070	77CODATA	1.558	77CODATA
FE(G)	99.300	0.300	73HUL/DES	1.637	73HUL/DES
GA(G)	65.000	0.500	73HUL/DES	1.566	73HUL/DES
GA2O(G)	-20.500	1.500	IHT298DATA*	2.890	66BUR
GD(G)	95.000	0.500	73HUL/DES	1.825	73HUL/DES
GD2O3(C)	-435.100	0.800	IHT298DATA*	4.450	67AME/WAL
GE(C)	0.000	0.000	77CODATA	1.108	81IVTAN
GE(G)	89.500	0.500	78CODATA	1.768	81IVTAN
GE1O2(C)	-132.580	0.240	IHT298DATA	1.728	81IVTAN

Appendix III. Data and Reference Codes for Subsidiary Species — Continued

Formula	$\Delta_f H^\circ_{298}$[a] /kcal mol^{-1}		Reference code[b]	$H_{298}-H_0$ /kcal mol^{-1}	Reference code for source of thermal functions[c]
H(G)	52.103	0.001	77CODATA	1.481	81IVTAN
H10(G)	9.432	0.300	71JANAF	2.192	71JANAF
H2(G)	0.000	0.000	77CODATA	2.024	81IVTAN
H20(G)	-57.795	0.010	77CODATA	2.367	81IVTAN
HF(G)	148.000	1.000	79JANAF55	1.481	79JANAF55
HF102(C)	-267.100	0.500	IHT298DATA*	2.345	60KEL
	-(G(T)-H(298))/T CALCULATED FROM 60KEL USING VALUE OF S(298) FROM IHT298DATA.				
HG(G)	14.670	0.010	77CODATA	1.481	77CODATA
HO(G)	71.900	0.250	73HUL/DES	1.481	73HUL/DES
HO203(C)	-449.600	1.200	IHT298DATA*	5.015	67AME/WAL
I(G)	25.520	0.010	77CODATA	1.481	77CODATA
IN(G)	58.000	0.250	73HUL/DES	1.481	73HUL/DES
IN20(G)	-13.230	7.300	IHT298DATA*	2.980	66BUR
IR(C)	0.000	0.000	73HUL/DES	1.259	73HUL/DES
IR(G)	160.000	1.500	73HUL/DES	1.481	73HUL/DES
K(G)	21.330	0.050	73HUL/DES	1.481	73HUL/DES
LA(L)	0.000	0.000	73HUL/DES	1.593	73HUL/DES
LA(G)	103.000	1.000	73HUL/DES	1.509	73HUL/DES
LA203(C)	-428.600	0.200	69BRE/ROS	4.742	80IVTAN
	VALUE FOR (H(298)-H(0)) FROM 63JUS/WES THERMAL FUNCTIONS AT 2500K FROM 59GOL/NEI				
LI(G)	38.090	0.200	73HUL/DES	1.481	73HUL/DES
LI20(C)	-143.100	0.500	71JANAF	1.732	71JANAF
LI20(G)	-39.900	2.500	71JANAF	2.984	71JANAF
LU(G)	102.200	0.400	73HUL/DES	1.482	73HUL/DES
LU203(C)	-448.900	1.800	IHT298DATA*	4.192	67AME/WAL
MG(G)	35.160	0.200	77CODATA	1.481	71JANAF
MG10(C)	-143.800	0.100	77CODATA	1.233	78JANAF
MN(G)	67.700	1.000	73HUL/DES	1.481	73HUL/DES
MN10(C)	-92.040	0.110	IHT298DATA*	2.200	60KEL
	-(G(T)-H(298))/T CALCULATED FROM 60KEL USING VALUE OF S(298) FROM IHT298DATA.				
MO(C)	0.000	0.000	73HUL/DES	1.098	73HUL/DES
MO(G)	157.300	0.500	73HUL/DES	1.481	73HUL/DES
MO102(G)	-3.100	5.000	71JANAF	2.684	71JANAF
MO103(G)	-86.200	5.000	71JANAF	3.225	71JANAF
N(G)	112.970	0.100	77CODATA	1.481	77CODATA
N10(G)	21.580	0.040	71JANAF	2.197	71JANAF
N102(G)	7.910	0.200	71JANAF	2.435	71JANAF
N20(G)	19.610	0.100	71JANAF	2.290	71JANAF
NA(G)	25.600	0.100	73HUL/DES	1.481	73HUL/DES
NA20(C)	-99.900	1.000	71JANAF	2.964	71JANAF
NB(G)	172.400	1.000	73HUL/DES	1.997	73HUL/DES
NB10(C)	-100.300	3.000	75JANAF	-	75JANAF
NB10(L)	-80.484	5.800	75JANAF	-	75JANAF
NB102(C)	-190.000	2.000	75JANAF	2.216	75JANAF
NB102(L)	-169.902	5.400	75JANAF	-	75JANAF
ND(G)	78.300	0.500	73HUL/DES	1.498	73HUL/DES
ND203(C)	-432.100	0.600	IHT298DATA*	5.000	59GOL/NEI
NI(G)	102.800	0.500	73HUL/DES	1.631	73HUL/DES
NP(G)	111.100	1.000	76OET/RAN	1.481	73HUL/DES
O(G)	59.553	0.024	77CODATA	1.607	81IVTAN
O2(G)	0.000	0.000	77CODATA	2.075	81IVTAN
O3(G)	34.100	1.000	NBSTN270	2.474	NBSTN270
OS(G)	188.400	0.900	73HUL/DES	1.481	73HUL/DES
OS103(G)	-66.900	3.000	IHT298DATA	-	ESTIMATED
	THERMAL FUNCTIONS ESTIMATED FROM VALUES FOR W103(G)				
P(G)	75.640	0.200	77CODATA	1.481	81IVTAN
P2(G)	34.420	0.500	77CODATA	2.128	81IVTAN
P102(G)	-71.000	0.100	71JANAF	2.538	71JANAF

Appendix III. Data and Reference Codes for Subsidiary Species — Continued

Formula	$\Delta_f H^\circ_{298}$ /kcal mol^{-1}		Reference code[b]	$H_{298}-H_0$ /kcal mol^{-1}	Reference code for source of thermal functions[c]
PB(G)	46.650	0.200	77CODATA	1.481	81IVTAN
PB10(C) (YELLOW FORM)	-52.120	0.150	74JANAF	2.208	74JANAF
PB1TE(G)	37.210	1.000	IHT298DATA*	2.416	69UY/DRO
PD(C)	0.000	0.000	73HUL/DES	1.307	73HUL/DES
PD(G)	90.000	0.500	73HUL/DES	1.481	73HUL/DES
PR(G)	85.000	0.500	73HUL/DES	1.487	73HUL/DES
PT(C)	0.000	0.000	73HUL/DES	1.368	73HUL/DES
PT(G)	135.000	0.300	73HUL/DES	1.572	73HUL/DES
PU(L)	0.000	0.000	76OET/RAN	1.708	76OET/RAN
PU(G)	82.500	1.000	76OET/RAN	1.482	76OET/RAN
RB(G)	19.330	0.050	73HUL/DES	1.481	73HUL/DES
RE(G)	185.200	1.500	73HUL/DES	1.481	73HUL/DES
RE103(G)	-67.000	4.000	73SKI/SEA	-	ESTIMATED
	THERMAL FUNCTIONS ESTIMATED FROM VALUES FOR W103(G)				
RH(C)	0.000	0.000	73HUL/DES	1.176	73HUL/DES
RH(G)	132.200	1.000	73HUL/DES	1.483	73HUL/DES
RU(C)	0.000	0.000	73HUL/DES	1.100	73HUL/DES
RU(G)	155.700	1.000	73HUL/DES	1.490	73HUL/DES
S(G)	66.200	0.060	77CODATA	1.591	81IVTAN
S102(G)	-70.939	0.050	77CODATA	2.521	77CODATA
SB(G)	63.230	0.600	73HUL/DES	1.481	73HUL/DES
SC(G)	90.320	1.000	73HUL/DES	1.674	73HUL/DES
SC203(C)	-456.120	0.500	IHT298DATA	3.335	67AME/WAL
	VALUES FOR (H(T)-H(0)) ESTIMATED FROM VALUES FOR Y203(C) IN 80IVTAN.				
SE(G)	54.300	1.000	NBSTN270	1.481	NBSTN270
SI(C)	0.000	0.000	73HUL/DES	0.769	81IVTAN
SI(G)	107.600	2.000	77CODATA	1.805	81IVTAN
SI102(C1) (QUARTZ)	-217.660	0.240	77CODATA	1.653	71JANAF
SI102(C2) (HIGH CRISTOBALITE)	-216.417	0.700	71JANAF	1.682	71JANAF
SM(G)	49.400	0.500	73HUL/DES*	1.953	56STU/SIN
SM203(C)	-435.600	0.800	IHT298DATA*	5.022	67AME/WAL
SN(C)	0.000	0.000	77CODATA	1.511	81IVTAN
SN(G)	71.990	0.400	77CODATA	1.485	81IVTAN
SN10(C)	-68.350	0.160	IHT298DATA	2.088	81IVTAN
SN102(C)	-138.810	0.100	77CODATA	2.004	81IVTAN
SR(G)	39.200	0.400	74JANAF	1.481	74JANAF
SR10(C)	-141.500	0.800	75JANAF	2.073	75JANAF
TA(C)	0.000	0.000	75JANAF	1.358	75JANAF
TA(G)	186.900	0.500	75JANAF	1.482	75JANAF
TA205(C)	-489.000	1.000	75JANAF	5.507	75JANAF
TA205(L)	-467.775	1.000	75JANAF	-	75JANAF
TB(G)	92.900	0.500	73HUL/DES	1.779	73HUL/DES
TE(G)	46.910	0.100	73HUL/DES	1.481	73HUL/DES
TE2(G)	40.240	0.200	73HUL/DES	2.379	73HUL/DES
TH(C)	0.000	0.000	77CODATA	1.556	76OET/RAN
TH(L)	0.000	0.000	76OET/RAN	1.556	76OET/RAN
TH(G)	142.900	1.500	77CODATA	1.481	76OET/RAN
TH102(C)	-293.100	0.900	77CODATA	2.524	NBSTN270
TI(C)	0.000	0.000	73HUL/DES	1.149	73HUL/DES
TI(G)	113.200	1.000	78CODATA	1.802	73HUL/DES
TI10(C)	-128.700	3.000	75JANAF	-	75JANAF
TI102(G)	-73.000	3.000	75JANAF	2.714	75JANAF
TI203(C)	-363.500	2.000	75JANAF	3.367	75JANAF
TI305(C)	-584.653	0.000	75JANAF	-	75JANAF
TM(G)	55.500	1.000	73HUL/DES	1.481	73HUL/DES
TM203(C)	-451.400	1.400	IHT298DATA*	4.990	67AME/WAL

Appendix III. Data and Reference Codes for Subsidiary Species — Continued

Formula	$\Delta_f H^\circ_{298}$[a] /kcal mol^{-1}		Reference code[b]	$H_{298}-H_0$ /kcal mol^{-1}	Reference code for source of thermal functions[c]
U(L)	0.000	0.000	77CODATA	1.521	76OET/RAN
U(G)	128.000	2.000	77CODATA	1.554	76OET/RAN
U102(C)	-259.300	0.200	77CODATA*	2.690	67PAT/DRO
U102(G)	-111.500	1.200	80GRE1	3.150	80GRE1
U103(G)	-191.200	4.800	80GRE1	-	80GRE1
V(G)	123.200	2.000	75JANAF	1.890	75JANAF
V10(C)	-103.200	1.500	75JANAF	1.651	75JANAF
W(C)	0.000	0.000	73HUL/DES	1.190	73HUL/DE
W(G)	203.000	1.000	73HUL/DES	1.486	73HUL/DE
W102(G)	18.300	7.000	71JANAF	2.688	71JANAF
W103(G)	-70.000	7.000	71JANAF	3.248	71JANAF
Y(C)	0.000	0.000	73HUL/DES	1.426	73HUL/DES
Y(G)	101.500	1.000	73HUL/DES	1.639	73HUL/DES
Y203(C)	-455.300	1.000	IHT298DATA	3.990	80IVTAN
	THERMAL FUNCTIONS ABOVE 2000K FROM 73ACK/RAU2, TABLE 2 AND CALCULATED FROM EQUATION 6				
YB(G)	36.350	0.200	73HUL/DES*	1.481	56STU/SIN
YB203(C)	-433.700	0.600	IHT298DATA*	4.685	67AME/WAL
ZN(G)	31.170	0.050	77CODATA	1.481	78JANAF54
ZR(C)	0.000	0.000	73HUL/DES	1.322	73HUL/DES
ZR(G)	145.500	1.000	73HUL/DES	1.629	73HUL/DES
ZR102(C)	-262.300	0.400	71JANAF	2.091	71JANAF
ZR102(G)	-68.400	11.000	71JANAF	2.870	71JANAF

[a] $\Delta_f H^\circ_{298}$ = Standard enthalpy of formation and uncertainty.

[b] If the reference code is followed by *, then $(H_{298}-H_0)$ is taken from this reference, otherwise it is taken from the same source as the other thermal functions.

[c] Thermal functions are contained in a subsidiary data file but are not presented here.

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