Table of Recommended Rate Constants for Chemical Reactions Occurring in Combustion

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Sponsored by the

Department of Energy
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and

Office of Standard Reference Data
National Bureau of Standards
Washington, D.C 20234

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Issued April 1980

Library of Congress Cataloging in Publication Data

Westley, Francis.

Table of recommended rate constants for chemical reactions occurring in combustion.

(Nat. stand. ref. data ser. ; NSRDS-NBS 67)

"National standard reference data system."

Supt. of Docs. no.: C13.48:67

1. Chemical reaction, Rate of--Tables, etc. 2. Combustion--Tables, etc. I. Title. II. Series: United States. National Bureau of Standards. National standard reference data series ; NSRDS-NBS 67.

QC100.U573 no. 67 [QD502] 602'.1s [541.3'61'0212]

79-607159

NSRDS-NBS 67

Nat. Stand. Ref. Data Ser., Nat. Bur. Stand. (U.S.), 67, 119 pages (Apr. 1980)

CODEN: NSRDAP

U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON: 1980

For sale by the superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Price $4.25

Foreword

The National Standard Reference Data System provides access to the quantitative data of physical science, critically evaluated and compiled for convenience and readily accessible through a variety of distribution channels. The System was established in 1963 by action of the President's Office of Science and Technology and the Federal Council for Science and Technology, and responsibility to administer it was assigned to the National Bureau of Standards.

NSRDS receives advice and planning assistance from a Review Committee of the National Research Council of the National Academy of Sciences-National Academy of Engineering. A number of Advisory Panels, each concerned with a single technical area, meet regularly to examine major portions of the program, assign relative priorities, and identify specific key problems in need of further attention. For selected specific topics, the Advisory Panels sponsor subpanels which make detailed studies of users' needs, the present state of knowledge, and existing data resources as a basis for recommending one or more data compilation activities. This assembly of advisory services contributes greatly to the guidance of NSRDS activities.

The System now includes a complex of data centers and other activities in academic institutions and other laboratories. Components of the NSRDS produce compilations of critically evaluated data, reviews of the state of quantitative knowledge in specialized areas, and computations of useful functions derived from standard reference data. The centers and projects also establish criteria for evaluation and compilation of data and recommend improvements in experimental techniques. They are normally associated with research in the relevant field.

The technical scope of NSRDS is indicated by the categories of projects active or being planned: nuclear properties, atomic and molecular properties, solid state properties, thermodynamic and transport properties, chemical kinetics, and colloid and surface properties.

Reliable data on the properties of matter and materials are a major foundation of scientific and technical progress. Such important activities as basic scientific research, industrial quality control, development of new materials for building and other technologies, measuring and correcting environmental pollution depend on quality reference data. In NSRDS, the Bureau's responsibility to support American science, industry, and commerce is vitally fulfilled.

ERNEST AMBLER, *Director*

Contents

Table of Recommended Rate Constants for Chemical* Reactions Occurring in Combustion

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A table of recommended rate constants for gas phase chemical reactions occurring in combustion is presented. Specifically, it gives in tabular form the values of the parameters for the modified Arrhenius equation $k=AT^{B}\exp(-E/RT)$. The table covers reactions occurring in the combustion, oxidation and decomposition of aliphatic saturated or unsaturated C_1 to C_{10} hydrocarbons, alcohols, aldehydes, ketones, thiols, ethers, peroxides, amines, amides and their free radicals, as well as the reactions of O, O_2, H, H_2, OH, H_2O, H_2O_2, N, N_2, NO, N_2O, NO_2, N_2O_4, N_2O_5, S, S_2, SH, SO, SO_2, SOH, NS, with each other. The table includes 169 first order reactions 782 second order reactions and 57 third order reactions. There are 1770 entries covering 1008 distinct chemical reactions. These recommendations have been taken from eleven evaluations and critical reviews published between 1970 and 1976. The papers examined by the evaluators extend from the nineteen fifties up to and including 1975.

Keywords: Arrhenius parameters; chemical kinetics; combustion; decomposition; free radicals; gas phase; hydrocarbons; hydrogen; nitrogen; oxygen; rate of reaction; sulfur.

1. Introduction

This publication consists of a table of recommended reaction rate constants for the combustion, oxidation, and decomposition reactions of aliphatic saturated and unsaturated hydrocarbons, their oxygenated sulfur and amino derivatives, as well as for the reactions of hydrogen, nitrogen, oxygen, sulfur and their inorganic derivatives with each other. The table is a compilation of recommended rate constants given in eleven critical reviews on the kinetics of combustion, oxidation and decomposition reactions, published between 1970 and 1976. Its purpose is to provide the kineticists and kinetic modelers with a comprehensive and easy-to-consult reference book on the kinetic data for combustion and oxidation processes. The table gives 1008 recommended reaction rate constants from these eleven sources. A summary of the content of the table is given in the following listing of quotations from each source.

Source	No. of Recommended Rate Constants
Baulch et al. (1972)	40
Baulch et al. (1973)	64
Baulch et al. (1976)	36
Benson and O'Neal (1970)	167
Benson et al. (1975)	119
Engleman (1976)	123
Herron and Huie (1973)	46
Kerr and Parsonage (1972)	185
Kerr and Parsonage (1976)	181
Kondratiev (1970)	37
Lloyd (1974)	10
Total	1008

For ease of reference the bimolecular and termolecular reactions included in the table are listed separately under each reactant, so that a grouping of the reaction according to the first reactant is obtained. As a result, the total number of tabulated entries is 1770, although the real number of distinct chemical reactions is 1008.

The presentation of kinetic data is standardized and simplified as much as possible. Rate constants are expressed in the modified Arrhenius equation $k=AT^{B}\exp(-E/RT)$. In general uncertainties are given only for the rate constant k itself and not for the individual parameters in this equation. Sometimes an uncertainty is given for the value of E/R. This uncertainty is only of secondary importance and has been included in the uncertainty stated for the value of the rate constant. Rate constants are expressed in units of s^{-1}, $cm^3mol^{-1}s^{-1}$, and $cm^6mol^{-2}s^{-1}$ for reactions of first, second, and third order, respectively.

For the readers who prefer other kinetic units than the standard ones, two conversion tables for equivalent second and third order rate constant units are appended at the end of this publication.

*This work was supported by the Department of Energy and by the Office of Standard Reference Data of the National Bureau of Standards.

The arrangement of the tables is described in detail below, in the "Guidelines for the User."

It is hoped that this table of kinetic data will serve as a handy and easy to use reference book for all the kineticists and kinetic modelers interested in combustion and oxidation processes.

This publication is not the result of the effort of a single person, but of the whole staff of Chemical Kinetics Information Center. My thanks to all of them.

In particular, I wish to thank Dr. David Garvin, Chief of the Chemical Thermodynamics Division, and Dr. Robert F. Hampson, Jr., Director of the Chemical Kinetics Information Center, for their more than helpful suggestions and constant guidance; Dr. Wing Tsang, Chief of the Chemical Kinetics Division, for his encouragement in having this table published; Mr. James G. Koch, Supervisor, for putting the tables into a printable computer form; Mrs. Bettijoyce Molino and Mrs. Carla G. Messina from the Office of Standard Reference Data for applying the OMNIDATA and GPSDIC programs to the present tables; Mrs. Geraldine Zumwalt and Mrs. Janice L. Jones for punching and typing a difficult typescript, full of digits and numbers, with particular care.

2. Guidelines for the User

General

As pointed out above, the presentation of the kinetic data in this publication is an attempt to simplify and standardize them. In that respect, the choice of standard units for rate constants was easy; it was found that the most commonly used units for gas phase rate constants are the cubic centimeter, the mole and the second. The choice of a standard form for uncertainty limits is somewhat more complicated, but when a series of recommended rate constants is to be presented in a tabular form, the uncertainty limits cannot be omitted, for an uncertainty assigned to the recommended value of a rate constant is an estimate by the evaluator of the absolute accuracy of the preferred value. It is to be emphasized that in the present tables the concern is with the overall uncertainty of a reaction rate constant and not with the expression of precision of a set of experimental measurements. Most of the uncertainty limits included in this table are uniform within the respective temperature range indicated. However, for a limited number of reactions, the data warrant or require variable limits. In such cases, a note under the respective data indicates for which interval of the temperature range there is a change in the uncertainty limits.

It is thought that the uncertainty limits expressed in the form of lower and upper k factors, f and F, respectively, are the most suitable for tabulation. Thus, if k_o is the central value of a rate constant the limits of reliability for the rate constant k_o are defined by the relationship:

$$fk_o < k < Fk_o \tag{1}$$

i.e., multiplication of the central value k_o by f and F gives, respectively, the lower and upper reliability limits of the rate constant. In this standardized formulation of uncertainty limits, the value of f is less than unity and the value of F is greater than unity.

However the k factors are not the only way to express the uncertainty limits of a rate constant and different authors use different forms to indicate the degree of reliability of a recommended rate constant. It follows that certain mathematical relationships are needed to translate the different forms of uncertainty limits into the standard form used in this table (lower and upper k factors). The tranformation formulas are given and discussed below.

In general there are two ways to state uncertainty limits: (1) by factors and by algebraic addends.

Uncertainty Expressed by Factors

Besides the standard form of uncertainty limits expressd by the lower and upper factors f and F, as defined by the above given relationship (1), there is another form which expresses the uncertainty limits by a unique factor. Thus, if k_o is the central value of a rate constant, the statement that k_o is uncertain to a factor of F means that the uncertainty limits are defined by the relationship:

$$k_o/F < k < k_oF \tag{2}$$

which shows that division and multiplication of the central value k_o by F gives, respectively, the lower and upper reliability limits of the rate constant. By comparing relationships (1) and (2), it is obvious that in the case of an uncertainty expressed by a unique F the upper factor is equal to the unique factor itself, while the lower factor f is the reciprocal of F:

$$f = 1/F \tag{3}$$

Uncertainty Expressed by Algebraic Addends

There are three types of uncertainty limits for rate constants expressed as algebraic addends which are currently used by kineticists: (a) Uncertainty appended to one of the Arrhenius factors (A, B, or E/R), (b) Uncertainty appended to $\log_{10}k_o$, and (c) Uncertainty expressed as a percentage of k_o. With respect to the type (a) uncertainties, the B factor uncertainties have been eliminated as being unimportant, while the uncertainties for

the E/R factor may be omitted because they are of secondary importance and are included in the k factors. Therefore, the only uncertainty of type (a) considered below is the one appended to the coefficient of the A factor.

(a) Uncertainty appended to the coefficient of A factor. In scientific notation, the A factor is of the form:

$$A=a\times 10^n \tag{4}$$

where a is a numerical coefficient less than 10 and n is the power of 10. If an uncertainty $\pm a'$ is appended to the coefficient a, the A factor takes the form:

$$A=(a\pm a')\times 10^n \tag{5}$$

If lower and upper factors (f and F) are wanted instead, the A factor takes the form:

$$A=fa\times 10^n \tag{6}$$

or

$$A=Fa\times 10^n \tag{7}$$

Comparison of (6) and (7) to (5) leads to the relationships: $fa=a-a'$ and $Fa=a+a'$ from which the following formulas are obtained:

$$f=1-a'/a \tag{8}$$

and

$$F=1+a'/a \tag{9}$$

Formulas (8) and (9) are the relationships needed to transform an uncertainty appended to the coefficient of the A factor into one using a k factor. A numerical example follows: $A=(2.0\pm 0.5)\times 10^{14}$, therefore: $a=2.0$ and $a'=0.5$; $a'/a=0.5/2.0=0.25$ and the k factors are: $f=1-0.25=0.75$ and $F=1+0.25=1.25$.

(b) Uncertainty appended to $\log_{10}k_0$. If k_0 is the central value of a rate constant, C its logarithm to the base 10 and D the uncertainty expressed as an algebraic addend to C, then the following relationship is true:

$$\log_{10}k=C\pm D \tag{10}$$

where $C=\log_{10}k_0$. If D is put in logarithmic form, say:

$$D=\log_{10}F \tag{11}$$

then relationship (10) becomes:

$$\log_{10}k=\log_{10}k_0\pm\log_{10}F \tag{12}$$

which can take the form:

$$\log_{10}k_0/F<\log_{10}k<\log_{10}Fk_0$$

or

$$k_0/F<k<Fk_0 \tag{13}$$

Replacing $1/F$ by f, relationship (1) is obtained. It is obvious that the k factors f and F are the antilogarithms of $-D$ and D, respectively:

$$f=\text{antilog}\ (-D)=10^{-D} \tag{14}$$

$$F=\text{antilog}\ D=10^{D} \tag{15}$$

Formulas (14) and (15) are the relationships needed to transform the type b uncertainties into reliability limits expressed by k factors. A numerical example follows: $\log_{10}k=14.23\pm 0.3$, therefore: $f=10^{-0.3}=0.5$ and $F=10^{0.3}=2.0$.

(c) Uncertainty expressed in percentage of k_0. Some kineticists prefer to use percentage for defining the uncertainty limits of a rate constant. Thus, the statement that a rate constant is $\pm$ p% uncertain means that the uncertainty limits of k_0 are defined by the relationship:

$$k_0-(p/100)k_0<k<k_0+(p/100)k_0$$

or

$$(1-p/100)k_0<k<(1+p/100)k_0 \tag{16}$$

Replacing the percentage by the rate, defined as $r=p/100$, relationship (16) becomes:

$$(1-r)k_0<k<(1+r)k_0 \tag{17}$$

Comparison of relationships (17) and (1) leads to the following formulas:

$$f=1-r \tag{18}$$

and

$$F=1+r \tag{19}$$

which are the relationships needed to transform the type c uncertainties into reliability limits expressed by k factors. A numerical example follows: $k=3.7\times 10^{12}\pm 20\%$, therefore $p=20\%$ and $r=0.2$. Thus: $f=1-0.2=0.8$ and $F=1+0.2=1.2$.

When a percent error has been stated as $>$ 100%, the F factor is determined first, according to relationship (19) then, instead of relationship (18), one simply sets: $f=1/F$. E.g., for a 150% error, $r=1.5$, $F=1+r=2.5$ and $f=1/F=0.4$.

The above given relationships: (3), (8) and (9), (14) and (15), (18) and (19) can be used in reverse by the reader who prefers other types of uncertainty limits than the

standard k factors, f and F. However a word of caution is necessary. In contrast with the standard uncertainty limits, other types of uncertainties for rate constants using a unique factor or algebraic addend have a constraint imposed upon them. Thus, the uncertainties expressed by a unique algebraic addend are required to be symmetrical with respect to the central value to which they are appended, while the uncertainty expressed by a unique factor, F, indicates in fact that the upper factor F and the lower factor f are required to be inverse to each other ($f=1/F$). No such constraints are imposed on the standard uncertainty limits used here and for that reason this type of uncertainty has been found most suitable for tabulation purposed. Why some evaluators prefer uncertainty limits with constraints in not clear. It would seem more logical if the lower and upper uncertainty limits were studied independently from each other, without imposing any constraints on them. Probably it is a matter of convenience to express an uncertainty in the form, say: $\log_{10}k=C\pm D$ rather than by the inequality: $fk_o<k<Fk_o$.

If the transformation of the standard uncertainty limits into uncertainties with constraints is desired, some adjustments may be necessary according to the case. The following examples, for transformation of standard uncertainty into a unique factor uncertainty, are an illustration of the necessary adjustments:

(1) Standard factors: $f=0.5$ and $F=2.0$. It is obvious that $f=1/F$ and no adjustment is necessary.

(2) Standard factors: $f=0.8$ and $F=1.2$. In this case, f and F are not inverse to each other. Indeed $f'=1/F=0.83$ while $F'=1/f=1.25$.

The two pairs of factors ($f'=0.83$; $F=1.2$, and $f=0.8$; $F'=1.25$) are quite close. However, it is safer to choose the pair 0.8 and 1.25, by enlarging slightly the uncertainty range.

(3) Standard factors: $f=0.6$ and $F=1.4$. In this case, not only are the factors not inverse to each other, but the difference is significant: $f'=1/F=0.71$ and $F'=1/f=1.67$.

The two pairs of factors ($f'=0.71$; $F=1.4$, and $f=0.6$; $F'=1.67$) are significantly different. Again, it is safer to choose the pair 0.6 and 1.67 by enlarging the uncertainty range. And, since the concepts of uncertainty and reliability are opposite to each other, enlargement of the uncertainty range will result in a decrease in reliability.

The same adjustments may be necessary for transformation of k factors uncertainties into another type of uncertainties.

Arrangement of the Table

The table is arranged in six columns including the chemical reactions, temperature range, the parameters A, B, and E/R for the modified Arrhenius equation $k=AT^B\exp(-E/RT)$, and the uncertainty limits expressed as k factors f and F.

Section 3, the bibliography to the table includes the full references for the 11 critical reviews from which the present table was compiled. Following the bibliography, two conversion tables for equivalent second and third order rat constant units are appended.

Column 1 includes the chemical reactions indicating both the reactants and the products. In the same column, under each chemical reaction, the names of the reactants are given. The chemical nomenclature adopted is the one used in the Chemical Substance Indexes of Chemical Abstracts. Alternative names are not given. The chemical names of the products are not given. The line with chemical names is indented with respect to the line above it. Under the chemical names, the short reference of reviewer's book or article is given. It includes the last two digits of publication's year, followed by the first three letters of author's name. If two authors are given, a slash separates each author's three letters. Again, the short reference line is indented with respect to the line above it, e.g.,

73 HER/HUI indicates the review of rate constants for the reactions between aliphatic hydrocarbons and atomic oxygen, published by Herron and Huie in 1973.

In the same line with the short reference, but spaced out, the order of reaction is indicated by the words "Reaction order" followed by one of the digits 1, 2, or 3. As pointed out in the introduction, the order of reaction helps to establish the proper standard units for the reactions, as follows:

1 for first order reactions s^{-1}

2 for second order reactions $cm^3mol^{-1}s^{-1}$

3 for third order reactions $cm^6mol^{-2}s^{-1}$

Following the reaction order, on the same line, the presence of an inert reaction partner "third body" is indicated by the letter M, followed by its chemical formula, e.g., M:Ar or M:CO_2. No indication is given if M is undefined, or if the reaction does not include M. In all, there are 112 reactions with M specified.

For 124 reactions, no Arrhenius parameters are indicated. Instead, for each of these 124 reactions, the ratio of the rate constant with respect to the rate of a reference reaction, taken as unity, is given. This information follows the reaction order information, on the same line, and is indicated by the symbol k/k_{ref}: followed by a number, e.g., k/k_{ref}: 0.59.

The last line of column 1, placed under the line including the short reference and reaction order information, begins with the heading Note:. It is given only when necessary and might include information about the dependence of k factors on temperature range, or the reaction taken as reference when the ratio k/k_{ref} is given in the previous line, or other information pertinent to the reaction indicated above. The rate constant, k_{ref}, for the reference reaction indicated in the note (by the same author) can be found in the table in the proper place. For a certain number of reactions taken from Baulch et al. (1972, 1973, and 1976) the relationship $k_1 = Kk_{-1}$ included in the note indicates that the respective rate constant was calculated from the equilibrium constant K and the rate constant k_{-1} of the reverse reaction. In such cases, the author usually gives the rate constant of the reverse reaction immediately after the data for the forward reaction. The arrangement of the present table (based on the standard order, as described below in the following paragraph) does not allow the forward rate constant of a reaction to be followed immediately by its reverse reaction data. The reader will have to locate the rate constant of a reverse reaction (by the same author) in its proper place in the table.

Column 2, with the heading T/K, indicates in kelvins the temperature range of validity of the recommended rate parameters. For some reactions only one temperature is given, meaning that the reaction was studied only at one temperature. If no temperature at all is indicated, it means that the kinetic parameters of the corresponding reaction are valid throughout the normal temperature range for combustion. The data estimated by Benson and Golden in their report "Estimating the Kinetics of Combustion" are in this category. The temperatures are alined with the short reference and the reaction order information.

Column 3, with the heading A, gives the value of A for the equation $k = AT^B\exp(-E/RT)$ in short scientific notation. In other words, it appears as a number less than 10, followed by a parenthesis including an integer preceded by the sign + or −. The number less than 10 is the coefficient of the A factor, while the integer inside the parenthesis is the exponent of 10. Therefore, e.g., 3.5 (+14) should be read as $3.5\times10^{+14}$. The coefficient of the A factor has no more than one digit after the decimal point. The units of the A factor are the same as for the rate constant k_1 according to the order of the respective reaction, as shown above. For those cases when the recommended value is only for one temperature, the entry under this column is in fact the value of the rate constant k at this temperature. As for the temperatures, the data for the A factor are alined with the short reference and reaction order information. If a dash appears in this column, it means that no A factor value was reported by the evaluator for the corresponding reaction.

Column 4, with the heading B, gives the value of B for the equation $k = AT^B\exp(-E/RT)$. the value of B is usually low and varies from 0 to about 3 or 4. It may be negative or positive. The negative values of B are preceded by the sign −, while the positive values are without sign. No more than one digit is given after the decimal dot. If in this column a dash appears instead of a figure, it means that no B value was reported by the evaluator for the corresponding reaction. As for the temperature and A factor, the data for B are alined with the short reference and reaction order information.

Column 5, with the heading E/R, indicates the value of E/R for the equation $k = AT^B\exp(-E/RT)$. Since E is the activation energy in cal mol^{-1} and R the gas constant with a value of 1.987 cal $mol^{-1}K^{-1}$, it follows that the units of E/R are kelvins. The values given in column 5 for E/R may vary from 0 to over 100000 kelvins. The E/R values may be positive or negative. The negative values are preceded by −, while the positive values are without sign. Some of the E/R values included in the table are followed by an uncertainty with plus or minus sign. As pointed out in the introduction, these uncertainties may be ignored, as being included in the lower and upper k factors indicatd in the right column of the table. If in this column a dash appears instead of a figure, it means that no E/R value was reported by the evaluator. As for the data from the previous columns, the values for the E/R factor are alined with the short reference and reaction order information.

Column 6, with the heading "k factors" and two subheadings, "f" and "F", indicates the two uncertainty k factors, the lower factor f in the left subcolumn and the upper factor F in the right subcolumn. To find the uncertainty limits of a reaction, its rate constant is to be multiplied by the two factors, as shown above in relation (1): $fk_o < k < Fk_o$. The values of both factors are always positive. If no uncertainty limits are indicated by the evaluator, both subcolumns of the column 6 are left blank. As for the data from the previous columns, the k factors are alined with the short reference and reaction order information.

Ordering of Chemical Reactions

The general rule for ordering the chemical equations of the reactions listed in column 1 of the table is the standard order of arrangement as described in NBS Technical Note 270–3 pp. 5, 6, and 22 [1]). This rule is applied to the first reactants of the reactions listed in the table, as well as to the reactants following the first. The first reactant of a reaction takes precedence over the

following ones. The compounds listed as reactants may include the atoms O, H, S, N, and C, either each of them separately, or several, in any possible combination. The standard order of arangement, when applied to these five atomic species, will result in the sequence O, H, S, N, C, each atom in it taking precedence over the following ones. When applied to the first reactants listed in the table, the standard order of arrangement will result in a sequence of five chemical systems, whose order of precedence is as follows:

(1) O system, (2) H-O system, (3) S-O-H system, (4) N-O-H-S system, and (5) C-O-H-S-N system.

In each system, the first atom is underlined to show that the compounds containing this atom only, should be listed first. It is to be noted that the atomic species following the underlined atom are in standard order, while the underlined atom itself should be put at the end if the standard order were to be followed. As it will be shown below, this exception to the standard rule, which is apparent only but not real, is due to the fact that all the compounds containing the atoms of a system with the exception of the underlined atom, are already listed in the previous systems. In each of these five chemical systems, the order of the compounds listed in the table as first reactants is as follows:

(1) O system: O, O_2, O_3.

(2) H-O system: H, H_2, OH, HO_2, H_2O, H_2O_2.

(3) S-O-H system: S, S_2, SO, SO_3, SH, SH_2, SOH.

(4) N-O-H-S system: N, N_2, NO, NO_2, NO_3, N_2O, N_2O_4, N_2O_5, NH, NH_2, NH_3, N_2H_4, HN_3, HNO, HNO_3, NS.

(5) C-O-H-S-N system: C_1 compounds: C, CO, CO_2, CH, CH_2, CH_3, CH_4, CHO, HCHO, $CH_3O\cdot$, CH_3OH, CH_3OOH, CS, CS_2, COS, CH_3S, CH_3SH, CN, $C(NO_2)_4$, CHN, CH_3NH_2, CH≡N≡N, CH_3NHNH_2, CH_3NO, CH_3NO_2, CH_3NO_3, CH_3ONH_2. C_2 compounds: C_2, C_2O, CH≡CH, CH_2=CH_2, $CH_3CH_2\cdot$, CH_3CH_3, CH_2=C=O, etc. C_3 compounds, etc., up to C_{10} compounds follow, being ordered according to the same pattern.

It is clear now that, for instance, the compounds included in the S-O-H system contain at least one sulfur atom, while the compounds containing only H, or O atoms, or both, are already listed in the previous two systems (O-system and H-O system). It is to be noted that for the C-O-H-S-N system the standard order is applied in a slightly different way: the compounds are first grouped according to the number of C atoms, then the rule for the standard order of arrangement is applied for each group apart. This is necessary as a result of the very large number of organic compounds.

The standard order is applied in the same way for the second, or third reactants of chemical reactions. Since the reactants of a chemical equation can be switched around, a number of bimolecular and termolecular reactions are inserted in the table in two and three places, respectively. E.g., reaction $CH_4+O\rightarrow CH_3\cdot+OH$, is inserted in the C-O-H-S-N system. This reaction may also be written as $O+CH_4\rightarrow OH+CH_3\cdot$ and, as such, is listed in the O system. The advantage of such a procedure is obvious: referring to the example just given the reader will find the reaction between methane and oxygen listed with CH_4 as first reactant if he is interested in the reactions of methane, or listed with O as first reactant, if he is interested in the reactions of oxygen atom. The bimolecular reactions are the largest group of reactions included in the table. There are about 750 reactions listed in the table, having as reactants two distinct chemical compounds. Since each of these reactions is inserted twice, the number of entries for them will amount to about 1500. Only a small number of termolecular reactions has three distinct reactants. As an example, one of them is $NO+NO_2+O_2\rightarrow N_2O_5$. This reaction will also be inserted under the forms: $NO_2+NO+O_2\rightarrow N_2O_5$ and $O_2+NO+NO_2\rightarrow N_2O_5$. A number of second and third order reactions includes a second and third body M, respectively. For this group of reactions, M will always be placed after all the other reactants, which means that the second order reactions with M as reactant will be inserted in the table only once, while the third order reactions with M as reactant will be inserted only twice. E.g., reaction $O_3+M\rightarrow O+O_2+M$ is inserted in the table only once, while reaction $NO+O+M\rightarrow NO_2+M$ is inserted as such, and also under the form $O+NO+M\rightarrow NO_2+M$.

Most of the chemical reactions included in the table are balanced. A number of reactions are only apparently unbalanced. For instance, reaction

$$CH_3CH_2CH_2CH_3+H\rightarrow CH_3CH_2CH_2CH_2\cdot+CH_3CH_2CH(\cdot)CH_3+H_2 \quad (20)$$

has a rate constant which is in fact the sum of the rate constants for the two reactions

$$CH_3CH_2CH_2CH_3+H\rightarrow CH_3CH_2CH_2CH_2\cdot+H_2 \quad (21)$$

and

$$CH_3CH_2CH_2CH_3+H\rightarrow CH_3CH_2CH(\cdot)CH_3+H_2 \quad (22)$$

Since the Arrhenius parameters listed in the table refer to the total rate constant, the reaction is listed in the table under the form (20) rather than in two separate forms. In some instances, a reaction is balanced, but the alkyl radicals formed as products are not specified, e.g.:

$$CH_3\cdot+(CH_3)_2CHCH(CH_3)CH(CH_3)_2\rightarrow CH_4+[C_8H_{17}\cdot] \quad (23)$$

[1] Wagman, D. D., Evans, W. H., Parker, V. B., Halow, I., Bailey, S. M., and Schumm, R. H., "Selected Values of Chemical Thermodynamic Properties," NBS Tech. Note 270-3 pp. 5, 16, 22 (1968).

The unspecified octyl radical inserted in square brackets as product in equation (23) represents all primary, secondary and tertiary octyl radicals that could be formed by abstraction of a H atom from the reactant 2,3,4-trimethyl-pentane. There are a number of reactions with the products totally unspecified. In such a case, the word "products" appears after the arrow:

$$(CH_3)_2C{=}CHCH_3 + N \rightarrow \text{products} \qquad (24)$$

Display of Chemical Reactions and Formulae

A chemical reaction equation should show as clearly as possible the formation of products from the reactants. For that reason, the reactions listed in the table are written on the basis of semi-structural formulas.

Straight chain hydrocarbons. All saturated normal hydrocarbons up to, and including *n*-pentane, are written so as to show separately each methyl and methylene group in the chain: CH_4, CH_3CH_3, $CH_3CH_2CH_3$, $CH_3CH_2CH_2CH_3$, $CH_3CH_2CH_2CH_2CH_3$.

The higher hydrocarbons, from *n*-hexane to *n*-decane, are written in a more condensed form to facilitate the counting of the number of methylene groups in the chain: $CH_3(CH_2)_4CH_3$, $CH_3(CH_2)_5CH_3$, $CH_3(CH_2)_6CH_3$, $CH_3(CH_2)_7CH_3$, $CH_3(CH_2)_8CH_3$.

The unsaturated hydrocarbons are written so as to show the position of each double or triple bond in the molecule, e.g.:

Ethyne (Acetylene)	$CH{\equiv}CH$
1,2-Propadiene (Allene)	$CH_2{=}C{=}CH_2$
1,3-Butadiyne	$CH{\equiv}CC{\equiv}CH$
cis-2-Pentene	*cis*-$CH_3CH_2CH{=}CHCH_3$
1-Heptene	$CH_3(CH_2)_4CH{=}CH_2$

Alkyl radicals. The unpaired electron of each alkyl radical is always indicated, e.g.:

Methyl free radical	$CH_3\cdot$
Ethyl, 1-methyl-, free radical (Isopropyl)	$(CH_3)_2CH\cdot$
Methyl, hydroxy-, free radical	$\cdot CH_2OH$

If the unpaired electron of an alkyl radical belongs to a carbon in the middle of the chain, it is indicated inside a parenthesis following the carbon atom, e.g.:

Propyl, 1-methyl-, free radical (sec-Butyl)	$CH_3CH_2CH(\cdot)CH_3$
Butyl, 1,1-dimethyl-, free radical (2-Methyl-2-pentyl)	$CH_3CH_2CH_2C(\cdot)(CH_3)_2$
Methyl, oxo-, free radical (Formyl) is written:	$\cdot CHO$

Oxy free radicals. If the oxygen atom of an oxy radical is attached to the terminal carbon atom, the radical is written in the usual manner: CH_3O. If the oxygen atom of the oxy radical is attached to a C atom in the middle of the chain, then the oxygen atom, together with the unpaired electron, are inside a parenthesis following the C atom: $(CH_3)_2C(O\cdot)CH_2CH_3$.

Peroxo, and other free radicals. The rules for writing peroxo, and other free radicals are the same as for the oxy free radicals: $CH_3O_2\cdot$, $CH_3S\cdot$.

Atoms, like O, H, S, N, and simple radicals like OH, SH, NH, CH, CH_2, are written without dot. Hydroperoxyl free radical is written $HO_2\cdot$ (with dot).

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions			T/K	A	B	E/R (in K)	k factors f	k factors F
$O + O + M \rightarrow O_2 + M$								
OXYGEN ATOM								
76 BAU/DRY	REACTION ORDER: 3.	M: Ar	190–4000	1.9(+13)	0	-900±175	0.8	1.2
NOTE: k FACTORS CHANGING TO: f = 0.4; F = 1.6 AT 4000K.								
		M: N_2	190–400	1.0(+14)	0	-720	0.5	1.5
		M: O_2	2000–10000	4.7(+23)	-2.5	0	0.4	2.5
NOTE: $k_1 = Kk_{-1}$. k FACTORS CHANGING TO: f = 0.5; F = 2.0			AT ≅ 8000K.					
$O + O_2 \rightarrow O_2 + O$								
OXYGEN ATOM + OXYGEN MOLECULE								
76 BEN/GOL	REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O + O_2 + M \rightarrow O_3 + M$								
OXYGEN ATOM + OXYGEN MOLECULE								
76 BAU/DRY	REACTION ORDER: 3.	M: O_2	300	2.2(+14)	-	-	0.8	1.2
NOTE: M eff: O_2(1.5)								
		M: AR	300	1.5(+14)	-	-	0.8	1.3
NOTE: M eff: Ar(1.0)								
		M: N_2	300	2.1(+14)	-	-	0.8	1.2
NOTE: M eff: N_2(1.4)								
$O + O_3 \rightarrow O_2 + O_2$								
OXYGEN ATOM + OZONE								
76 BAU/DRY	REACTION ORDER: 2.		200–500	5.2(+12)	0	2090±260	0.5	1.5
NOTE: k FACTORS CHANGING TO: f = 0.6; F = 3.0 AT ≅ 1000K								
$O + H + M \rightarrow OH + M$								
OXYGEN + HYDROGEN ATOMS								
76 ENG	REACTION ORDER: 3.		1500–2500	7.9(+15)	0	0	0.1	10.
$O + H_2 \rightarrow OH + H$								
OXYGEN ATOM + HYDROGEN MOLECULE								
72 BAU/DRY	REACTION ORDER: 2.		400–2000	1.8(+10)	1.0	4480±150	0.7	1.3
$O + D_2 \rightarrow OD + D$								
OXYGEN ATOM + DEUTERIUM MOLECULE								
72 BAU/DRY	REACTION ORDER: 2.		416–968	2.0(+13)	0	5500	0.5	2.0
$O + OH \rightarrow O_2 + H$								
OXYGEN ATOM + HYDROXYL FREE RADICAL								
72 BAU/DRY	REACTION ORDER: 2.		300	2.3(+13)	-	-	0.6	1.4
76 ENG			1500–2500	2.5(+13)	0	0	0.5	2.0
$O + OH \rightarrow O_2 + H$								
OXYGEN ATOM + HYDROXYL FREE RADICAL								
75 BEN/GOL	REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O + OH + M \rightarrow HO_2 + M$								
OXYGEN ATOM + HYDROXYL FREE RADICAL								
76 ENG	REACTION ORDER: 3.		1500–2500	1.0(+17)	0	0	0.01	100.
$O + OH \rightarrow OH + O$								
OXYGEN ATOM + HYDROXYL FREE RADICAL								
75 BEN/GOL	REACTION ORDER: 2.			6.3(+11)	0.5	4000		
$O + H_2O \rightarrow OH + OH$								
OXYGEN ATOM + WATER								
72 BAU/DRY	REACTION ORDER: 2.		300–2000	6.8(+13)	0	9240±200	0.7	1.5
$O + S_2 \rightarrow SO + S$								
OXYGEN ATOM + SULFUR DIMER								
75 BEN/GOL	REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O + SO \rightarrow O_2 + S$								
OXYGEN ATOM + SULFUR MONOXIDE								
75 BEN/GOL	REACTION ORDER: 2.			2.0(+11)	0.5	2770		
$O + SO \rightarrow SO + O$								
OXYGEN ATOM + SULFUR MONOXIDE								
75 BEN/GOL	REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O + SO + M \rightarrow SO_2 + M$								
OXYGEN ATOM + SULFUR MONOXIDE								
76 BAU/DRY	REACTION ORDER: 3.	M: Ar	298	6.7(+16)	-	-	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—*Continued*

Chemical reactions		*T*/K	*A*	*B*	*E/R* (in K)	k factors f	F
$O + SO_2 \rightarrow O_2 + SO$							
OXYGEN ATOM + SULFUR DIOXIDE							
76 BAU/DRY REACTION ORDER: 2.		440–2100	1.3(+14)	-0.5	9980	0.3	1.7
NOTE: $k_1 = Kk_{-1}$							
$O + SH \rightarrow H + SO$							
OXYGEN ATOM + MERCAPTO FREE RADICAL							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O + SH \rightarrow OH + S$							
OXYGEN ATOM + MERCAPTO FREE RADICAL							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0	4000		
$O + N + M \rightarrow NO + M$							
OXYGEN ATOM + NITROGEN ATOM							
73 BAU/DRY REACTION ORDER: 3.	M: N_2	200–400	6.4(+16)	-0.5	0		
$O + N_2 \rightarrow NO + N$							
OXYGEN ATOM + NITROGEN MOLECULE							
73 BAU/DRY REACTION ORDER: 2.		2000–5000	7.6(+13)	0	38000±150	0.5	2.0
NOTE: $k_1 = Kk_{-1}$							
$O + N_2 + M \rightarrow N_2O + M$							
OXYGEN ATOM + NITROGEN MOLECULE							
73 BAU/DRY REACTION ORDER: 3.	M: Ar	1300–2500	1.4(+13)	0	10400±1500	0.7	1.5
$O + NO \rightarrow O_2 + N$							
OXYGEN ATOM + NITROGEN OXIDE(NO)							
73 BAU/DRY REACTION ORDER: 2.		1000–3000	1.5(+ 9)	1.0	19500±150	0.7	1.3
NOTE: $k_1 = Kk_{-1}$. k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 3000K							
$O + NO \rightarrow NO + O$							
OXYGEN ATOM + NITROGEN OXIDE(NO)							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O + NO + M \rightarrow NO_2 + M$							
OXYGEN ATOM + NITROGEN OXIDE(NO)							
73 BAU/DRY REACTION ORDER: 3.	M: O_2	200–500	1.1(+15)	0	-940±50	0.8	1.2
NOTE: M eff: O_2(1.0) AT 297K	M: Ar	200–500	1.1(+14)	0	-940±50	0.8	1.2
Ar(0.1) AT 297K	M: H_2O	200–500	6.7(+15)	0	-940±15	0.8	1.2
H_2O(6.1) AT 297K	M: D_2O	200–500	5.5(+15)	0	-940±50	0.8	1.2
D_2O(5.0) AT 297K	M: SF_6	200–500	2.9(+15)	0	-940±50	0.8	1.2
SF_6(2.6) AT 297K	M: N_2	200–500	1.5(+15)	0	-940±50	0.8	1.2
N_2(1.4) AT 297K	M: N_2O	200–500	2.3(+15)	0	-940±50	0.8	1.2
N_2O(2.1) AT 297K	M: CO_2	200–500	2.3(+15)	0	-940±50	0.8	1.2
CO_2(2.1) AT 297K	M: CH_4	200–500	2.4(+15)	0	-940±50	0.8	1.2
CH_4(2.2) AT 297K	M: CF_4	200–500	2.4(+15)	0	-940±50	0.8	1.2
CF_4(2.2) AT 297K							
$O + NO_2 \rightarrow O_2 + NO$							
OXYGEN ATOM + NITROGEN OXIDE(NO_2)							
73 BAU/DRY REACTION ORDER: 2.		300–550	1.0(+13)	0	300±100	0.8	1.3
$O + NO_2 \rightarrow O_2 + NO$							
OXYGEN ATOM + NITROGEN OXIDE(NO_2)							
76 ENG REACTION ORDER: 2.		1500–2500	1.0(+13)	0	500±250	0.5	2.0
$O + NO_2 + M \rightarrow NO_3 + M$							
OXYGEN ATOM + NITROGEN OXIDE(NO_2)							
73 BAU/DRY REACTION ORDER: 3.	M: N_2	295	2.3(+16)	-	-	0.4	2.5
NOTE: k_0 (LOW PRESSURE). REACTION ORDER: 2.	M: N_2	295	1.1(+13)	-	-	0.4	2.5
NOTE: LIMITING HIGH PRESSURE k.							

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	k factors F
$O + N_2O \rightarrow O_2 + N_2$						
OXYGEN ATOM + NITROGEN OXIDE(N_2O)						
73 BAU/DRY REACTION ORDER: 2.	1200–2000	1.0(+14)	0	14100±2000	0.4	2.5
$O + N_2O \rightarrow NO + NO$						
OXYGEN ATOM + NITROGEN OXIDE(N_2O)						
73 BAU/DRY REACTION ORDER: 2.	1200–2000	1.0(+14)	0	14100±1500	0.5	2.0
$O + NH \rightarrow OH + N$						
OXYGEN ATOM + IMIDOGEN FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$O + NH \rightarrow NO + H$						
OXYGEN ATOM + IMIDOGEN FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$O + NH + M \rightarrow HNO + M$						
OXYGEN ATOM + IMIDOGEN FREE RADICAL						
76 ENG REACTION ORDER: 3.	1500–2500	1.0(+16)	-0.5	0±2500	0.3	3.2
$O + NH_3 \rightarrow OH + NH_2$						
OXYGEN ATOM + AMMONIA						
73 BAU/DRY REACTION ORDER: 2.	300–1000	1.5(+12)	0	3000±300	0.5	1.5
$O + HNO \rightarrow OH + NO$						
OXYGEN ATOM + NITROSYL HYDRIDE						
76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	0±2500	0.3	3.2
$O + HNO \rightarrow O_2 + NH$						
OXYGEN ATOM + NITROSYL HYDRIDE						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	3500±2500	0.3	3.2
$O + HNO \rightarrow NO_2 + H$						
OXYGEN ATOM + NITROSYL HYDRIDE						
76 ENG REACTION ORDER: 2.	1500–2500	5.0(+10)	0.5	0±2500	0.3	3.2
$O + NS \rightarrow SO + N$						
OXYGEN ATOM + NITROGEN SULFIDE(NS)						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$O + NS \rightarrow NO + S$						
OXYGEN ATOM + NITROGEN SULFIDE(NS)						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$O + C + M \rightarrow CO + M$						
OXYGEN ATOM + CARBON ATOM						
76 BAU/DRY REACTION ORDER: 3.	7000–15000	3.3(+26)	-3.1	2114	0.3	1.8
NOTE: M = Ar, OR CO $k_1 = Kk_{-1}$						
$O + CO \rightarrow O_2 + C$						
OXYGEN ATOM + CARBON MONOXIDE						
75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	69300		
$O + CO \rightarrow CO + O$						
OXYGEN ATOM + CARBON MONOXIDE						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$O + CO + M \rightarrow CO_2 + M$						
OXYGEN ATOM + CARBON MONOXIDE						
76 BAU/DRY REACTION ORDER: 3. M: CO	250–500	2.4(+15)	0	2184±280	0.8	1.2
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.2 AT 500K.						
$O + CO_2 \rightarrow O_2 + CO$						
OXYGEN ATOM + CARBON DIOXIDE						
76 BAU/DRY REACTION ORDER: 2.	1500–3000	1.7(+13)	0	26500±2500	0.5	2.0
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 AT 3000K. $k_1 = Kk_{-1}$						
$O + CH \rightarrow OH + C$						
OXYGEN ATOM + METHYLIDYNE FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
O + CH → CO + H						
OXYGEN ATOM + METHYLIDYNE FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
O + CH + M → CHO + M						
OXYGEN ATOM + METHYLIDYNE FREE RADICAL						
76 ENG REACTION ORDER: 3.	1500–2500	1.0(+16)	-0.5	0±2500	0.3	3.2
O + :CH_2 → H + .CHO						
OXYGEN ATOM + METHYLENE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	2000±2500	0.3	3.2
O + :CH_2 → OH + CH						
OXYGEN ATOM + METHYLENE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.7	13100±2500	0.3	3.2
O + CH_3. → H + HCHO						
OXYGEN ATOM + METHYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	5.0(+13)	0	0	0.5	2.0
O + CH_4 → OH + CH_3.						
OXYGEN ATOM + METHANE						
73 HER/HUI REACTION ORDER: 2.	350–1000	2.1(+13)	0	4550	0.7	1.3
76 ENG	1500–2500	2.0(+13)	0	4530±500	0.6	1.6
O + .CHO → H + CO_2						
OXYGEN ATOM + METHYL, OXO-, FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0	0±1500		
NOTE: k ESTIMATED.						
O + .CHO → OH + CO						
OXYGEN ATOM + METHYL, OXO-, FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	1.0	250±1500		
NOTE: k ESTIMATED.						
O + HCHO → OH + .CHO						
OXYGEN ATOM + FORMALDEHYDE						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	1.0	1750±1000	0.5	1.2
O + HCHO → products						
OXYGEN ATOM + FORMALDEHYDE						
73 HER/HUI REACTION ORDER: 2.	300	9.0(+10)	-	-	0.7	1.3
O + HCDO → products						
OXYGEN ATOM + FORMALDEHYDE-d						
73 HER/HUI REACTION ORDER: 2.	300	4.9(+10)	-	-		
O + CH_3O. → OH + HCHO						
OXYGEN ATOM + METHOXY FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+14)	0	0±1500		
NOTE: k ESTIMATED						
O + CS → C + SO						
OXYGEN ATOM + CARBON MONOSULFIDE FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	28940		
O + CS → CO + S						
OXYGEN ATOM + CARBON MONOSULFIDE FREE RADICAL						
76 BAU/DRY REACTION ORDER: 2.	300	1.3(+13)	-	-	0.5	1.5
75 BEN/GOL		6.3(+11)	0.5	0		
O + CS_2 → S + COS						
OXYGEN ATOM + CARBON DISULFIDE						
76 BAU/DRY REACTION ORDER: 2.	302	2.2(+11)	-	-	0.5	1.5
O + CS_2 → SO + CS						
OXYGEN ATOM + CARBON DISULFIDE						
76 BAU/DRY REACTION ORDER: 2.	200–1000	2.2(+13)	0	700±150	0.7	1.3
O + COS → SO + CO						
OXYGEN ATOM + CARBON OXIDE SULFIDE						
76 BAU/DRY REACTION ORDER: 2.	190–1200	1.6(+13)	0	2250±250	0.5	1.5
NOTE: k FACTORS CHANGING TO: f = 0.3; F = 3.0 ABOVE 600K.						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
0 + CN → C + NO OXYGEN ATOM + CYANOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	14545		
0 + CN → CO + N OXYGEN ATOM + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+12)	0	0±2500	0.3	3.2
0 + C_2 → CO + C OXYGEN ATOM + CARBON DIMER 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
0 + CH≡CH → products OXYGEN ATOM + ETHYNE 73 HER/HUI REACTION ORDER: 2.	200–700	1.4(+13)	0	1500	0.8	1.2
0 + CH_2=CH_2 → cy-CH_2CH_2O OXYGEN ATOM + ETHENE 73 HER/HUI REACTION ORDER: 2.	200–500	3.3(+12)	0	565	0.8	1.2
0 + CH_3CH_3 → OH + CH_2CH_2. OXYGEN ATOM + ETHANE 73 HER/HUI REACTION ORDER: 2.	298–650	2.5(+13)	0	3200	0.7	1.3
0 + CH_2=C=O → products OXYGEN ATOM + ETHENONE 73 HER/HUI REACTION ORDER: 2.	298	5.3(+11)	-	-	0.7	1.3
0 + CH_3CHO → products OXYGEN ATOM + ACETALDEHYDE 73 HER/HUI REACTION ORDER: 2.	298–500	1.4(+13)	0	1140	0.5	2.0
0 + cy-CH_2CH_2O → products OXYGEN ATOM + OXIRANE 73 HER/HUI REACTION ORDER: 2.	298	7.0(+ 8)	-	-	0.6	1.5
0 + CH_3CH_2OH → products OXYGEN ATOM + ETHANOL 73 HER/HUI REACTION ORDER: 2.	298	8.7(+10)	-	-	0.6	1.5
0 + CH_3OCH_3 → products OXYGEN ATOM + METHANE, OXYBIS- 73 HER/HUI REACTION ORDER: 2.	200–500	5.9(+12)	0	1520	0.7	1.3
0 + CH_3C≡CH → products OXYGEN ATOM + PROPYNE 73 HER/HUI REACTION ORDER: 2.	298	4.0(+11)	-	-	0.5	2.0
0 + CH_3CH=CH_2 → cy-$(CH_3)CHCH_2O$ OXYGEN ATOM + 1-PROPENE 73 HER/HUI REACTION ORDER: 2.	200–500	2.5(+12)	0	38	0.8	1.2
0 + $CH_3CH_2CH_3$ → OH + $CH_3CH_2CH_2$. + $(CH_3)_2CH$. OXYGEN ATOM + PROPANE 73 HER/HUI REACTION ORDER: 2.	298	9.0(+ 9)	-	-	0.7	2
0 + $(CH_3)_2CHOH$ → products OXYGEN ATOM + 2-PROPANOL 73 HER/HUI REACTION ORDER: 2.	298	1.3(+11)	-	-	0.6	1.5
0 + $(CH_3)_2C$=CH_2 → cy-$(CH_3)_2CCH_2O$ OXYGEN ATOM + 1-PROPENE, 2-METHYL- 73 HER/HUI REACTION ORDER: 2.	298	1.2(+13)	-	-	0.7	1.3
0 + CH≡CC≡CH → products OXYGEN ATOM + 1,3-BUTADIYNE 73 HER/HUI REACTION ORDER: 2.	300	9.0(+11)	-	-	0.7	1.4
0 + CH_2=CHCH=CH_2 → products OXYGEN ATOM + 1,3-BUTADIENE 73 HER/HUI REACTION ORDER: 2.	298–400	3.4(+12)	0	-380	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
0 + $CH_3CH_2CH=CH_2$ → cy-$(CH_3CH_2)CHCH_2O$ OXYGEN ATOM + 1-BUTENE 73 HER/HUI REACTION ORDER: 2.	298	2.3(+12)	-	-	0.8	1.2
0 + cis-$CH_3CH=CHCH_3$ → products OXYGEN ATOM + cis-2-BUTENE 73 HER/HUI REACTION ORDER: 2.	250-500	5.9(+12)	0	-165	0.8	1.2
0 + trans-$CH_3CH=CHCH_3$ → products OXYGEN ATOM + trans-2-BUTENE 73 HER/HUI REACTION ORDER: 2.	298	1.4(+13)	-	-	0.7	1.3
0 + $CH_3CH_2CH_2CH_3$ → OH + $CH_3CH_2CH_2CH_2$. OXYGEN ATOM + BUTANE 73 HER/HUI REACTION ORDER: 2.	298-650	3.0(+13)	0	2920	0.7	1.3
0 + $CH_3CH_2CH_2CH_3$ → OH + $CH_3CH_2CH(.)CH_3$ OXYGEN ATOM + BUTANE 73 HER/HUI REACTION ORDER: 2.	298-650	4.3(+13)	0	2410	0.7	1.3
0 + $CH_3CH_2CH_2CH=CH_2$ → cy-$(CH_3CH_2CH_2)CHCH_2O$ OXYGEN ATOM + 1-PENTENE 73 HER/HUI REACTION ORDER: 2.	298	2.8(+12)	-	-	0.7	1.3
0 + cis-$CH_3CH_2CH=CHCH_3$ → products OXYGEN ATOM + cis-2-PENTENE 73 HER/HUI REACTION ORDER: 2.	298	1.1(+13)	-	-	0.7	1.3
0 + $(CH_3)_2C=CHCH_3$ → products OXYGEN ATOM + 2-BUTENE, 2-METHYL- 73 HER/HUI REACTION ORDER: 2.	298-400	3.9(+12)	0	-680	0.8	1.2
0 + $CH_3CH_2CH_2CH_2CH_3$ → OH + $CH_3CH_2CH_2CH_2CH_2$. OXYGEN ATOM + PENTANE 73 HER/HUI REACTION ORDER: 2.	298-650	2.9(+13)	0	2920	0.7	1.3
0 + $CH_3CH_2CH_2CH_2CH_3$ → OH + $CH_3CH_2CH_2CH(.)CH_3$ + $CH_3CH_2CH(.)CH_2CH_3$ OXYGEN ATOM + PENTANE 73 HER/HUI REACTION ORDER: 2.	298-650	8.0(+13)	0	2320	0.7	1.3
0 + $(CH_3)_2CHCH_2CH_3$ → OH + $(CH_3)_2C(.)CH_2CH_3$ + $(CH_3)_2CHCH(.)CH_3$ + $(CH_3)_2CHCH_2CH_2$. + $CH_2CH(CH_3)CH_2CH_3$ OXYGEN ATOM + BUTANE, 2-METHYL- 73 HER/HUI REACTION ORDER: 2.	307	8.0(+10)	-	-	0.7	1.4
0 + $(CH_3)_4C$ → OH + $(CH_3)_3CCH_2$. OXYGEN ATOM + PROPANE, 2,2-DIMETHYL- 73 HER/HUI REACTION ORDER: 2.	298-650	5.9(+13)	0	2920	0.7	1.4
0 + $CH_3CH_2CH_2CH_2CH=CH_2$ → cy-$(CH_3CH_2CH_2CH_2)CHCH_2O$ OXYGEN ATOM + 1-HEXENE 73 HER/HUI REACTION ORDER: 2.	298	3.1(+12)	-	-	0.7	1.3
0 + $(CH_3)_2C=C(CH_3)_2$ → products OXYGEN ATOM + 2-BUTENE, 2,3-DIMETHYL- 73 HER/HUI REACTION ORDER: 2.	298-400	3.4(+12)	0	-790	0.8	1.2
0 + $CH_3(CH_2)_4CH_3$ → OH + $CH_3(CH_2)_4CH_2$. OXYGEN ATOM + HEXANE 73 HER/HUI REACTION ORDER: 2.	298-650	2.9(+13)	0	2920	0.7	1.3
0 + $CH_3(CH_2)_4CH_3$ → OH + $CH_3CH(.)CH_2CH_2CH_2CH_3$ + $CH_3CH_2CH(.)CH_2CH_2CH_3$ OXYGEN ATOM + HEXANE 73 HER/HUI REACTION ORDER: 2.	298-650	1.1(+14)	0	2250	0.8	1.3
0 + $(CH_3)_2CHCH(CH_3)_2$ → OH + $CH_2CH(CH_3)CH(CH_3)_2$ OXYGEN ATOM + BUTANE, 2,3-DIMETHYL- 73 HER/HUI REACTION ORDER: 2.	298-650	5.9(+13)	0	2920	0.7	1.3
0 + $(CH_3)_2CHCH(CH_3)_2$ → OH + $(CH_3)_2C(.)CH(CH_3)_2$ OXYGEN ATOM + BUTANE, 2,3-DIMETHYL- 73 HER/HUI REACTION ORDER: 2.	298-650	3.1(+13)	0	1650	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions		T/K	A	B	E/R (in K)	k factors f	F
$O + CH_3(CH_2)_5CH_3 \rightarrow OH + CH_3(CH_2)_5CH_2.$							
OXYGEN ATOM + HEPTANE							
73 HER/HUI REACTION ORDER: 2.		298–650	2.9(+13)	0	2920	0.7	1.3
$O + CH_3(CH_2)_5CH_3 \rightarrow OH + CH_3(CH_2)_4CH(.)CH_3 + CH_3(CH_2)_3CH(.)(CH_2)_2CH_3 + CH_3(CH_2)_2CH(.)(CH_2)_2CH_3$							
OXYGEN ATOM + HEPTANE							
73 HER/HUI REACTION ORDER: 2.		298–650	1.2(+14)	0	2190	0.7	1.3
$O + (CH_3)_3C(CH_2)_2CH_3 \rightarrow$ products							
OXYGEN ATOM + PENTANE, 2,2-DIMETHYL-							
73 HER/HUI REACTION ORDER: 2.		307	6.5(+10)	-	-	0.7	1.4
$O + (CH_3)_2CHCH_2CH(CH_3)_2 \rightarrow$ products							
OXYGEN ATOM + PENTANE, 2,4-DIMETHYL-							
73 HER/HUI REACTION ORDER: 2.		307	1.0(+11)	-	-	0.7	1.4
$O + CH_3(CH_2)_6CH_3 \rightarrow OH + CH_3(CH_2)_6CH_2.$							
OXYGEN ATOM + OCTANE							
73 HER/HUI REACTION ORDER: 2.		298–650	2.9(+13)	0	2920	0.7	1.3
$O + CH_3(CH_2)_6CH_3 \rightarrow OH + CH_3(CH_2)_5CH(.)CH_3 + CH_3(CH_2)_4CH(.)CH_2CH_3 + CH_3(CH_2)_3CH(.)(CH_2)_2CH_3$							
OXYGEN ATOM + OCTANE							
73 HER/HUI REACTION ORDER: 2.		298–650	9.3(+13)	0	2030	0.7	1.3
$O + (CH_3)_3CCH_2CH(CH_3)_2 \rightarrow$ products							
OXYGEN ATOM + PENTANE, 2,2,4-TRIMETHYL-							
73 HER/HUI REACTION ORDER: 2.		307	5.5(+10)	-	-	0.6	1.5
$O + (CH_3)_2CHCH(CH_3)CH(CH_3)_2 \rightarrow$ products							
OXYGEN ATOM + PENTANE, 2,3,4-TRIMETHYL-							
73 HER/HUI REACTION ORDER: 2.		307	3.0(+10)	-	-	0.6	1.5
$O + (CH_3)_3CC(CH_3)_3 \rightarrow$ products							
OXYGEN ATOM + BUTANE, 2,2,3,3-TETRAMETHYL-							
73 HER/HUI REACTION ORDER: 2.		307	8.0(+ 9)	-	-	0.6	1.5
$O_2 + O \rightarrow O + O_2$							
OXYGEN MOLECULE + OXYGEN ATOM							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0.5	0		
$O_2 + O + M \rightarrow O_3 + M$							
OXYGEN MOLECULE + OXYGEN ATOM							
76 BAU/DRY REACTION ORDER: 3.	M: O_2	300	2.2(+14)	-	-	0.8	1.2
NOTE: M eff: O_2(1.5)	M: Ar	300	1.5(+14)	-	-	0.8	1.3
Ar(1.0)	M: N_2	300	2.1(+14)	-	-	0.8	1.2
N_2(1.4)							
$O_2 + H \rightarrow O + OH$							
OXYGEN MOLECULE + HYDROGEN ATOM							
72 BAU/DRY REACTION ORDER: 2.		700–2500	2.2(+14)	0	8450±250	0.7	1.3
72 KON		310–2060	1.5(+14)	0	8420±125	0.9	1.2
$O_2 + D \rightarrow O + OD$							
OXYGEN MOLECULE + DEUTERIUM ATOM							
72 BAU/DRY REACTION ORDER: 2.		800–1000	8.9(+13)	-	7500		
$O_2 + H + M \rightarrow HO_2 + M$							
OXYGEN MOLECULE + HYDROGEN ATOM							
72 BAU/DRY REACTION ORDER: 3.	M: H_2	300–2000	5.0(+15)	0	-500±250	0.5	1.5
NOTE: M eff: H_2(1.0)	M: 02	300–2000	2.0(+15)	0	-500±250	0.5	1.5
O_2(0.4)	M: H_2O	300–2000	3.2(+16)	0	-500±250	0.5	1.5
H_2O(6.4)	M: He	300–2000	1.5(+15)	0	-500±250	0.5	1.5
He(0.3). $k_1 = Kk_{-1}$	M: Ar	300–2000	1.5(+15)	0	-500±250	0.5	1.5
Ar(0.3). $k_1 = Kk_{-1}$	M: N_2	300–2000	2.0(+15)	0	-500±250	0.5	1.5
N_2(0.4)							

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	k factors F
M: CO_2	300–2000	7.5(+15)	0	-500±250	0.5	1.5
CO_2(1.5)						
$O_2 + H_2 \rightarrow OH + OH$						
OXYGEN MOLECULE + HYDROGEN MOLECULE						
76 ENG REACTION ORDER: 2.	1500–2500	2.5(+12)	0	19630±5000	0.1	10.
$O_2 + H_2 \rightarrow HO_2 + H$						
OXYGEN MOLECULE + HYDROGEN MOLECULE						
72 BAU/DRY REACTION ORDER: 2.	290–800	5.5(+13)	0	29100±350	0.4	2.5
$O_2 + S \rightarrow O + SO$						
OXYGEN MOLECULE + SULFUR ATOM						
76 BAU/DRY REACTION ORDER: 2.	250–450	1.4(+12)	0	0±50	0.3	1.7
$O_2 + SO \rightarrow O + SO_2$						
OXYGEN MOLECULE + SULFUR MONOXIDE						
76 BAU/DRY REACTION ORDER: 2.	440–2100	4.5(+11)	0	3250±590	0.3	1.7
$O_2 + N \rightarrow O + NO$						
OXYGEN MOLECULE + NITROGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	300–3000	6.4(+ 9)	1.0	3150±150	0.7	1.3
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 3000K.						
$O_2 + N_2 \rightarrow O + N_2O$						
OXYGEN MOLECULE + NITROGEN MOLECULE						
73 BAU/DRY REACTION ORDER: 2.	1200–2000	6.3(+13)	0	55200±2000	0.4	2.5
NOTE: $k_1 = Kk_{-1}$						
$O_2 + NO \rightarrow O + NO_2$						
OXYGEN MOLECULE + NITROGEN OXIDE(NO)						
73 BAU/DRY REACTION ORDER: 2.	300–550	1.7(+12)	0	23400	0.8	1.3
NOTE: $k_1 = Kk_{-1}$						
$O_2 + NO + NO \rightarrow NO_2 + NO_2$						
OXYGEN MOLECULE + NITROGEN OXIDE(NO)						
73 BAU/DRY REACTION ORDER: 3.	273–660	1.2(+ 9)	0	-530±100	0.5	1.5
$O_2 + NO + NO_2 \rightarrow NO_2 + NO_3$						
OXYGEN MOLECULE + NITROGEN OXIDE(NO) + NITROGEN OXIDE(NO_2)						
73 BAU/DRY REACTION ORDER: 3.	300–500	2.9(+ 7)	0	-400±500	0.4	2.5
$O_2 + C \rightarrow O + CO$						
OXYGEN MOLECULE + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$O_2 + CO \rightarrow O + CO_2$						
OXYGEN MOLECULE + CARBON MONOXIDE						
76 BAU/DRY REACTION ORDER: 2.	1500–3000	2.5(+12)	0	24000±2500	0.5	2.0
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 AT 3000K.						
$O_2 + CH \rightarrow O + .CHO$						
OXYGEN MOLECULE + METHYLIDYNE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$O_2 + CH_2 \rightarrow O + HCHO$						
OXYGEN MOLECULE + METHYLENE FREE RADICAL						
76 ENG REACTION ORDER: 2.		5.0(+11)	0.5	3500±2500	0.3	3.2
$O_2 + CH_3. \rightarrow O + CH_3O.$						
OXYGEN MOLECULE + METHYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+12)	0	15100±1500		
NOTE: k ESTIMATED.						
$O_2 + CH_3. \rightarrow OH + HCHO$						
OXYGEN MOLECULE + METHYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+13)	0	10000±5000	0.3	3.2
$O_2 + CH_3. \rightarrow HO_2. + :CH_2$						
OXYGEN MOLECULE + METHYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+12)	0	34975±1500		
NOTE: k ESTIMATED						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions		T/K	A	B	E/R (in K)	k factors f	F
O_2 + .CHO → HO_2 + CO							
OXYGEN MOLECULE + METHYL, OXO-, FREE RADICAL							
76 ENG	REACTION ORDER: 2.	1500-2500	1.6(+12)	0	3500±1500		
NOTE: k ESTIMATED.							
O_2 + CH_3O. → HO_2 + HCHO							
OXYGEN MOLECULE + METHOXY FREE RADICAL							
76 ENG	REACTION ORDER: 2.	1500-2500	1.0(+12)	0	3000±1500		
NOTE: k ESTIMATED.							
O_2 + CN → CO + NO							
OXYGEN MOLECULE + CYANOGEN FREE RADICAL							
76 ENG	REACTION ORDER: 2.	1500-2500	3.2(+11)	0	0±5000	0.3	3.2
O_2 + M → O + O + M							
OXYGEN MOLECULE							
76 BAU/DRY	REACTION ORDER: 2.	2500-8000	3.5(+25)	-2.5	59380	0.5	2.0
	M: 02	2000-10000	9.8(+24)	-2.5	59380	0.4	2.5
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT ≅ 8000K.							
	M: Ar	3000-18000	1.8(+18)	-1.0	59380±4900	0.5	2.0
O_3 + O → O_2 + O_2							
OZONE + OXYGEN ATOM							
76 BAU/DRY	REACTION ORDER: 2.	200-500	5.2(+12)	0	2090±260	0.5	1.5
NOTE: k FACTORS CHANGING TO: f = 0.3; F = 3.0 AT ≅ 1000K							
O_3 + H → O_2 + OH							
OZONE + HYDROGEN ATOM							
76 BAU/DRY	REACTION ORDER: 2.	300	1.6(+13)	-	-	0.5	2.0
O_3 + OH → O_2 + HO_2							
OZONE + HYDROXYL FREE RADICAL							
76 BAU/DRY	REACTION ORDER: 2.	300	3.9(+10)	-	-	0.5	1.5
O_3 + HO_2 → O_2 + O_2 + OH							
OZONE + HYDROPEROXYL FREE RADICAL							
76 BAU/DRY	REACTION ORDER: 2.	298	9.1(+ 8)	-	-	0.5	1.5
O_3 + H_2S → SO_2 + H_2O							
OZONE + HYDROGEN SULFIDE							
76 BAU/DRY	REACTION ORDER: 2.	298	4.0(+ 2)	-	-	0.1	10.
O_3 + NO → O_2 + NO_2							
OZONE + NITROGEN OXIDE(NO)							
73 BAU/DRY	REACTION ORDER: 2.	200-350	8.9(+11)	0	1330±130	0.5	1.5
O_3 + NO_2 → O_2 + NO_3							
OZONE + NITROGEN OXIDE(NO_2)							
73 BAU/DRY	REACTION ORDER: 2.	286-302	5.9(+12)	0	3500	0.5	2.0
O_3 + M → O + O_2 + M							
OZONE							
76 BAU/DRY	REACTION ORDER: 2. M: Ar	200-1000	2.48(+14)	0	11430±120	0.8	1.3
H + O + M → OH + M							
HYDROGEN ATOM + OXYGEN ATOM							
76 ENG	REACTION ORDER: 3.	1500-2500	7.9(+15)	0	0	0.1	10.
H + O_2 → OH + O							
HYDROGEN ATOM + OXYGEN MOLECULE							
72 BAU/DRY	REACTION ORDER: 2.	700-2500	2.2(+14)	0	8450±250	0.7	1.3
D + O_2 → OD + O							
DEUTERIUM ATOM + OXYGEN MOLECULE							
72 BAU/DRY	REACTION ORDER: 2.	800-1000	8.9(+13)	0	7500		
H + O_2 + M → HO_2 + M							
HYDROGEN ATOM + OXYGEN MOLECULE							
72 BAU/DRY	REACTION ORDER: 3. M: H_2	300-2000	5.0(+15)	0	-500±250	0.5	1.5
NOTE: M eff: H_2(1.0)							
	M: O_2	300-2000	2.0(+15)	0	-500±250	0.5	1.5
O_2(0.4)							
	M: H_2O	300-2000	3.2(+16)	0	-500±250	0.5	1.5
H_2O(6.4)							

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions		T/K	A	B	E/R (in K)	k factors f	F
	M: He	300–2000	1.5(+15)	0	-500±250	0.5	1.5
He(0.3). $k_1 = Kk_{-1}$							
	M: Ar	300–2000	1.5(+15)	0	-500±250	0.5	1.5
Ar(0.3). $k_1 = Kk_{-1}$							
	M: N_2	300–2000	2.0(+15)	0	-500±250	0.5	1.5
N_2(0.4)							
	M: CO_2	300–2000	7.5(+15)	0	-500±250	0.5	1.5
CO_2(1.5)							
$H + O_3 \rightarrow OH + O_2$							
HYDROGEN ATOM + OZONE							
76 BAU/DRY REACTION ORDER: 2.		300	1.6(+13)	-	-	0.5	2.0
$H + H + M \rightarrow H_2 + M$							
HYDROGEN ATOM							
72 BAU/DRY REACTION ORDER: 3.	M: H_2	300	3.0(+15)	-	-	0.5	1.5
	M: H_2	2500–5000	2.6(+15)	-1.0	0	0.4	2.5
NOTE: M eff: H_2(1.0)							
	M: Ar	2500–5000	6.4(+17)	-1.0	0	0.4	2.5
Ar(0.25). $k_1 = Kk_{-1}$							
$H + H_2 \rightarrow H_2 + H$							
HYDROGEN ATOM + HYDROGEN MOLECULE							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0.5	4000		
$H + D_2 \rightarrow DH + D$							
HYDROGEN ATOM + DEUTERIUM MOLECULE							
72 KON REACTION ORDER: 2.		368–1000	3.1(+13)	0	4485±250	0.6	1.6
$D + H_2 \rightarrow DH + H$							
DEUTERIUM ATOM + HYDROGEN MOLECULE							
72 KON REACTION ORDER: 2.		400–1000	5.0(+13)	0	3890±40	0.9	1.1
$H + OH \rightarrow H_2 + O$							
HYDROGEN ATOM + HYDROXYL FREE RADICAL							
72 BAU/DRY REACTION ORDER: 2.		400–2000	8.3(+ 9)	1.0	3500±150	0.7	1.3
$H + OH \rightarrow OH + H$							
HYDROGEN ATOM + HYDROXYL FREE RADICAL							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0.5	0		
$H + OH + M \rightarrow H_2O + M$							
HYDROGEN ATOM + HYDROXYL FREE RADICAL							
72 BAU/DRY REACTION ORDER: 3.	M: H_2O	1000–3000	1.4(+23)	-2.0	0	0.7	1.5
NOTE: M eff: H_2O(1.0). $k_1 = Kk_{-1}$							
	M: Ar	1000–3000	8.4(+21)	-2.0	0	0.5	2.0
Ar(0.06)							
	M: N_2	1000–3000	2.2(+22)	-2.0	0	0.5	2.0
N_2(0.16)							
$H + HO_2 \rightarrow O + H_2O$							
HYDROGEN ATOM + HYDROPEROXYL FREE RADICAL							
74 LLO REACTION ORDER: 2.		300–1000	5. (+13)	0	500	0.3	3.2
NOTE: E ESTIMATED.							
76 ENG		1500–2500	1.0(+13)	0	500±500	0.1	1.0
$H + HO_2 \rightarrow H_2 + O_2$							
HYDROGEN ATOM + HYDROPEROXYL FREE RADICAL							
72 BAU/DRY REACTION ORDER: 2.		290–800	2.5(+13)	0	350±350	0.4	2.5
76 ENG		1500–2500	2.5(+13)	0	350±350	0.5	2.0
$H + HO_2 \rightarrow OH + OH$							
HYDROGEN ATOM + HYDROPEROXYL FREE RADICAL							
72 BAU/DRY REACTION ORDER: 2.		290–800	2.5(+14)	0	950±350	0.5	2.0
76 ENG		1500–2500	2.5(+14)	0	950±500	0.5	2.0
$H + H_2O \rightarrow OH + H_2$							
HYDROGEN ATOM + WATER							
72 BAU/DRY REACTION ORDER: 2.		300–2500	9.3(+13)	0	10250±100	0.5	1.5
NOTE: ERROR LIMITS ARE 50% FOR UPPER T'S.							
$H + H_2O_2 \rightarrow H_2 + HO_2$							
HYDROGEN ATOM + HYDROGEN PEROXIDE							
72 BAU/DRY REACTION ORDER: 2.		300–800	1.7(+12)	0	1900±250	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A′	B	E/R (in K)	k factors f	F
$H + S_2 \rightarrow SH + S$ HYDROGEN ATOM + SULFUR DIMER 75 BEN/GOL REACTION ORDER: 2.		7.9(+12)	0.5	8355		
$H + SO \rightarrow OH + S$ HYDROGEN ATOM + SULFUR MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	11200		
$H + SO \rightarrow SH + O$ HYDROGEN ATOM + SULFUR MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	19930		
$H + SO_2 + M \rightarrow HSO_2 + M$ HYDROGEN ATOM + SULFUR DIOXIDE 76 BAU/DRY REACTION ORDER: 3.	1660–2120	5.1(+15)	–	–	0.5	1.5
$H + SH \rightarrow H_2 + S$ HYDROGEN ATOM + MERCAPTO FREE RADICAL 76 BAU/DRY REACTION ORDER: 2.	298	1.5(+13)	–	–	0.5	1.5
$H + SH \rightarrow SH + H$ HYDROGEN ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$H + H_2S \rightarrow H_2 + SH$ HYDROGEN ATOM + HYDROGEN SULFIDE 76 BAU/DRY REACTION ORDER: 2.	190–470	7.8(+12)	0	860±50	0.5	1.5
$H + N + M \rightarrow NH + M$ HYDROGEN ATOM + NITROGEN ATOM 76 ENG REACTION ORDER: 3.	1500–2500	2.5(+17)	-0.5	0±1000	0.1	10.
$H + N_2 \rightarrow NH + N$ HYDROGEN ATOM + NITROGEN MOLECULE 75 BEN/GOL REACTION ORDER: 2.		2.0(+13)	0.5	75945		
$H + NO \rightarrow OH + N$ HYDROGEN ATOM + NITROGEN OXIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	24460		
$H + NO \rightarrow NH + O$ HYDROGEN ATOM + NITROGEN OXIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		5.0(+12)	0.5	38200		
$H + NO + M \rightarrow HNO + M$ HYDROGEN ATOM + NITROGEN OXIDE(NO) 73 BAU/DRY REACTION ORDER: 3.	230–700	5.4(+15)	0	-300±100	0.5	1.5
$H + NO + M \rightarrow HNO + M$ HYDROGEN ATOM + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 3. M: H_2	1500–2500	5.0(+15)	0	-300±150	0.5	2.0
$H + NO_2 \rightarrow OH + NO$ HYDROGEN ATOM + NITROGEN OXIDE(NO_2) 73 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT T = 633K.	298–630	3.5(+14)	0	740±500	0.5	1.5
$H + NO_2 \rightarrow OH + NO$ HYDROGEN ATOM + NITROGEN OXIDE(NO_2) 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+14)	0	750±500	0.5	2.0
$H + N_2O \rightarrow OH + N_2$ HYDROGEN ATOM + NITROGEN OXIDE(N_2O) 73 BAU/DRY REACTION ORDER: 2.	700–2500	7.6(+13)	0	7600±500	0.5	1.5
$H + N_2O \rightarrow NH + NO$ HYDROGEN ATOM + NITROGEN OXIDE(N_2O) 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	15100±2500	0.3	3.2
$H + NH \rightarrow H_2 + N$ HYDROGEN ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$H + NH \rightarrow NH + H$ HYDROGEN ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$H + NH_2 + M \rightarrow NH_3 + M$ HYDROGEN ATOM + AMIDOGEN FREE RADICAL 73 BAU/DRY REACTION ORDER: 3. M: Ar NOTE: $k_1 = Kk_{-1}$	2000–3000	4.8(+14)	0	−8300±2500	0.5	2.0
$H + NH_2NH_2 \rightarrow H_2 + NH_2NH.$ HYDROGEN ATOM + HYDRAZINE 73 BAU/DRY REACTION ORDER: 2.	250–500	1.3(+13)	0	1260±100	0.5	2.0
$H + HNO \rightarrow H_2 + NO$ HYDROGEN ATOM + NITROSYL HYDRIDE 73 BAU/DRY REACTION ORDER: 2.	2000	4.8(+12)	–	–	0.5	1.5
$H + HNO \rightarrow OH + NH$ HYDROGEN ATOM + NITROSYL HYDRIDE 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	11600±2500	0.3	3.2
$H + NS \rightarrow SH + N$ HYDROGEN ATOM + NITROGEN SULFIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	15700		
$H + NS \rightarrow NH + S$ HYDROGEN ATOM + NITROGEN SULFIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	20735		
$H + CO \rightarrow OH + C$ HYDROGEN ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		2.0(+13)	0.5	77755		
$H + CO \rightarrow CH + O$ HYDROGEN ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		2.5(+13)	0.5	88020		
$H + CO + M \rightarrow .CHO + M$ HYDROGEN ATOM + CARBON MONOXIDE 76 BAU/DRY REACTION ORDER: 3. M: H_2 NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 773K.	298–773	6.9(+14)	0	850±500	0.7	1.3
76 ENG	1500–2500	1.6(+20)	−1.5	0	0.3	3.2
$H + CO_2 \rightarrow OH + CO$ HYDROGEN ATOM + CARBON DIOXIDE 76 BAU/DRY REACTION ORDER: 2.	1000–3000	1.5(+14)	0	13300±150	0.8	1.2
$H + CH \rightarrow H_2 + C$ HYDROGEN ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$H + CH \rightarrow CH + H$ HYDROGEN ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$H + CH + M \rightarrow CH_2 + M$ HYDROGEN ATOM + METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 3.	1500–2500	1.0(+19)	−1.0	0	0.3	3.2
$H + CH_2 \rightarrow H_2 + CH$ HYDROGEN ATOM + METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0.7	2500±2500	0.3	3.2
$H + CH_4 \rightarrow H_2 + CH_3.$ HYDROGEN ATOM + METHANE 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+13)	0	5990±150	0.5	2.0
$D + CH_4 \rightarrow DH + CH_3.$ DEUTERIUM ATOM + METHANE 72 KON REACTION ORDER: 2.	523–673	8.3(+12)	0	5100		
$H + .CHO \rightarrow H_2 + CO$ HYDROGEN ATOM + METHYL, OXO-, FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.6(+12)	0.5	0±2500	0.3	3.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$H + HCHO \rightarrow H_2 + .CHO$ HYDROGEN ATOM + FORMALDEHYDE 76 ENG REACTION ORDER: 2.	1500–2500	1.3(+10)	1.0	1600	0.3	3.2
$H + CH_3O. \rightarrow H_2 + HCHO$ HYDROGEN ATOM + METHOXY FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+14)	0	0±1500		
$H + CS \rightarrow C + SH$ HYDROGEN ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		2.0(+13)	0.5	48870		
$H + CS \rightarrow CH + S$ HYDROGEN ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.3(+13)	0.5	50930		
$H + COS \rightarrow HS + CO$ HYDROGEN ATOM + CARBON OXIDE SULFIDE 76 BAU/DRY REACTION ORDER: 2.	298	1.3(+10)	–	–	0.8	1.3
$H + CN \rightarrow C + NH$ HYDROGEN ATOM + CYANOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.0(+13)	0.5	52745		
$H + CN \rightarrow CH + N$ HYDROGEN ATOM + CYANOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+12)	0.5	49775		
$H + CN + M \rightarrow HCN + M$ HYDROGEN ATOM + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 3.	1500–2500	3.2(+16)	-0.5	0±2500	0.3	3.2
$H + C_2 \rightarrow CH + C$ HYDROGEN ATOM + CARBON DIMER 75 BEN/GOL REACTION ORDER: 2.		1.6(+13)	0.5	30450		
$H + CH_2{=}CH_2 \rightarrow CH_3CH_2.$ HYDROGEN ATOM + ETHENE 72 KER/PAR REACTION ORDER: 2.	298	9.3(+13)	0	1410		
$H + CH_2{=}CH_2 + M \rightarrow CH_3CH_2. + M$ HYDROGEN ATOM + ETHENE 72 KON REACTION ORDER: 3.	298–813	5.6(+17)	0.5	495		
$H + CH_3CH_3 \rightarrow H_2 + CH_3CH_2.$ HYDROGEN ATOM + ETHANE 72 KON REACTION ORDER: 2.	285–1440	1.0(+14)	0	4815±70	0.8	1.2
$H + CH_3C{\equiv}CH \rightarrow CH_3CH{=}CH + CH_3C(.){=}CH_2$ HYDROGEN ATOM + 1-PROPYNE 72 KER/PAR REACTION ORDER: 2. NOTE: k TAKEN AS LOWER LIMIT.	298	0.5(+11)	–	–		
$H + CH_3CH{=}CH_2 \rightarrow CH_3CH_2CH_2.$ HYDROGEN ATOM + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	298	7.2(+12)	0	1460		
$H + CH_3CH{=}CH_2 \rightarrow CH_3CH(.)CH_3$ HYDROGEN ATOM + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. NOTE: ARRHENIUS PARAMETERS ARE MINIMUM VALUES OF THEIR HIGH-PRESSURE LIMITS.	298	7.2(+12)	0	605		
$H + CH_3CH_2CH_3 \rightarrow H_2 + (CH_3)_2CH. + CH_3CH_2CH_2.$ HYDROGEN ATOM + PROPANE 72 KON REACTION ORDER: 2.	333–933	1.0(+13)	0	3130±180	0.7	1.4
$H + (CH_3)_2CO \rightarrow H_2 + CH_3C(O)CH_2.$ HYDROGEN ATOM + 2-PROPANONE 72 KON REACTION ORDER: 2.	298–873	4.6(+13)	0	4220±20		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
H + CH_2=CHCH=CH_2 → CH_2=CHCH(.)CH_3 + CH_2=$CHCH_2CH_2$. HYDROGEN ATOM + 1,3-BUTADIENE 72 KER/PAR REACTION ORDER: 2. NOTE: AVERAGED RATE CONSTANT.	298	4.10(+13)	0	655		
H + CH_2=CHCH=CH_2 → CH_2=CHCH(.)CH_3 + CH_2=$CHCH_2CH_2$. HYDROGEN ATOM + 1,3-BUTADIENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 4.9 NOTE: k_{ref}: H+ CH_3CH=CH_2	300	-	-	-		
H + CH_3CH_2CH=CH_2 → CH_3CH_2CH(.)CH_3 + $CH_3CH_2CH_2CH_2$. HYDROGEN ATOM + 1-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.03 NOTE: k_{ref}: H + CH_3CH=CH_2	300	-	-	-		
	298	8.7(+11)	-	-		
H + CH_3CH_2CH=CH_2 → $CH_3CH_2CH_2CH_2$. HYDROGEN ATOM + 1-BUTENE 72 KER/PAR REACTION ORDER: 2. NOTE: CALCULATED ON THE BASIS OF 5.7% NON-TERMINAL ADDITION OF H TO 1-BUTENE.	298	5.0(+10)	-	-		
H + CH_3CH_2CH=CH_2 → CH_3CH_2CH(.)CH_3 HYDROGEN ATOM + 1-BUTENE 72 KER/PAR REACTION ORDER: 2. NOTE: CALCULATED ON THE BASIS OF 5.7% NON-TERMINAL ADDITION OF H TO 1-BUTENE.	298	8.1(+11)	-	-		
H + cis-CH_3CH=$CHCH_3$ → CH_3CH_2CH(.)CH_3 HYDROGEN ATOM + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2. NOTE: NO KINETIC DATA ON REVERSE RADICAL DECOMPOSITION.	298	4.6(+11)	-	-		
k/k_{ref}: 0.47 NOTE: k_{ref}: H + CH_3CH=CH_2.	300	-	-	-		
H + trans-CH_3CH=$CHCH_3$ → CH_3CH_2CH(.)CH_3 HYDROGEN ATOM + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2. NOTE: AVERAGE k	298	5.6(+11)	-	-		
k/k_{ref}: 0.59 NOTE: k_{ref}: H + CH_3CH=CH_2.	300	-	-	-		
H + $(CH_3)_2C$=CH_2 → $(CH_3)_3C$. HYDROGEN ATOM + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2.	298	3.10(+13)	0	755		
H + $(CH_3)_2C$=CH_2 → $(CH_3)_2CHCH_2$. HYDROGEN ATOM + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. NOTE: CALCULATED ON THE BASIS OF 0.5% NON-TERMINAL ADDITION OF H TO $(CH_3)_2C$=CH_2.	298	1.3(+11)	-	-		
H + $(CH_3)_2C$=CH_2 → $(CH_3)_3C$. + $(CH_3)_2CHCH_2$. HYDROGEN ATOM + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.52 NOTE: k_{ref}: H + CH_3CH=CH_2	300	-	-	-		
H + $CH_3CH_2CH_2CH_3$ → H_2 + CH_3CH_2CH(.)CH_3 + $CH_3CH_2CH_2CH_2$. HYDROGEN ATOM + BUTANE 72 KON REACTION ORDER: 2.	320–930	4.1(+12)	0	2637±320	0.5	2.0
H + $(CH_3)_3CH$ → H_2 + $(CH_3)_3C$. + $(CH_3)_2CHCH_2$. HYDROGEN ATOM + PROPANE, 2-METHYL- 72 KON REACTION ORDER: 2.	300–800	1.9(+13)	0	2680±85	0.8	1.2
H + $CH_3CH_2CH_2CH$=CH_2 → $CH_3CH_2CH_2CH$(.)CH_3 + $CH_3CH_2CH_2CH_2CH_2$. HYDROGEN ATOM + 1-PENTENE 72 KER/PAR REACTION ORDER: 2.	298	8.3(+11)	-	-		
k/k_{ref}: 0.89 NOTE: k_{ref}: H + CH_3CH=CH_2.	300	-	-	-		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
H + cis-$CH_3CH_2CH=CHCH_3$ → $CH_3CH_2CH(.)CH_2CH_3$ + $CH_3CH_2CH_2CH(.)CH_3$						
HYDROGEN ATOM + cis-2-PENTENE						
72 KER/PAR REACTION ORDER: 2.	298	3.8(+11)	-	-		
k/k_{ref}: 0.39	300	-	-	-		
NOTE: k_{ref}: H + $CH_3CH=CH_2$.						
H + trans-$CH_3CH_2CH=CHCH_3$ → $CH_3CH_2CH(.)CH_2CH_3$ + $CH_3CH_2CH_2CH(.)CH_3$						
HYDROGEN ATOM + trans-2-PENTENE						
72 KER/PAR REACTION ORDER: 2.	298	4.1(+11)	-	-		
k/k_{ref}: 0.44	300	-	-	-		
NOTE: k_{ref}: H + $CH_3CH=CH_2$.						
H + $CH_3CH_2C(CH_3)=CH_2$ → $CH_3CH_2C(.)(CH_3)_2$ + $CH_3CH_2CH(CH_3)CH_2$.						
HYDROGEN ATOM + 1-BUTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	9.1(+11)	-	-		
D + $CH_3CH_2C(CH_3)=CH_2$ → $CH_3CH_2C(.)(CH_3)CH_2D$ + $CH_3CH_2CD(CH_3)CH_2$.						
DEUTERIUM ATOM + 1-BUTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	2.0(+12)	-	-		
H + $(CH_3)_2CHCH=CH_2$ → $(CH_3)_2CHCH(.)CH_3$ + $(CH_3)_2CHCH_2CH_2$.						
HYDROGEN ATOM + 1-BUTENE, 3-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	7.4(+11)	-	-		
D + $(CH_3)_2CHCH=CH_2$ → $(CH_3)_2CHCH(.)CH_2D$ + $(CH_3)_2CHCHDCH_2$.						
DEUTERIUM ATOM + 1-BUTENE, 3-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	7.6(+11)	-	-		
H + $(CH_3)_2C=CHCH_3$ → $(CH_3)_2CHCH(.)CH_3$ + $(CH_3)_2C(.)CH_2CH_3$						
HYDROGEN ATOM + 2-BUTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	9.1(+11)	-	-		
k/k_{ref}: 1.03	300	-	-	-		
NOTE: k_{ref}: H + $CH_3CH=CH_2$						
H + $(CH3)_2C=C(CH3)_2$ → $(CH3)_2CHC(.)(CH3)_2$						
HYDROGEN ATOM + 2-BUTENE, 2,3-DIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	298	7.8(+11)	-	-		
k/k_{ref}: 0.84	300	-	-	-		
NOTE: k_{ref}: H + $CH_3CH=CH_2$						
H + $(CH_3)_3CC(CH_3)=CH_2$ → $(CH_3)_3CCH(CH_3)CH_2$. + $(CH_3)_3CC(.)(CH_3)_2$						
HYDROGEN ATOM + 1-BUTENE, 2,3,3,-TRIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	298	1.6(+12)	-	-		
NOTE: TENTATIVE VALUE BASED ON REACTION: H + $(CH_3)_2C=CH_2$						
H_2 + O → H + OH						
HYDROGEN MOLECULE + OXYGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	400-2000	1.8(+10)	1.0	4480±150	0.7	1.3
D_2 + O → D + OD						
DEUTERIUM MOLECULE + OXYGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	416-968	2.0(+13)	0	5500	0.5	2.0
H_2 + O_2 → H + HO_2.						
HYDROGEN MOLECULE + OXYGEN MOLECULE						
72 BAU/DRY REACTION ORDER: 2.	290-800	5.5(+13)	0	29100±350	0.4	2.5
H_2 + O_2 → OH + OH						
HYDROGEN MOLECULE + OXYGEN MOLECULE						
76 ENG REACTION ORDER: 2.	1500-2500	2.5(+12)	0	19630±5000	0.1	10.
H_2 + H → H + H_2						
HYDROGEN MOLECULE + HYDROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$H_2 + D \rightarrow H + HD$ HYDROGEN MOLECULE + DEUTERIUM ATOM 72 KON REACTION ORDER: 2.	400–1000	5.0(+13)	0	3890±40	0.9	1.1
$D_2 + H \rightarrow D + DH$ DEUTERIUM MOLECULE + HYDROGEN ATOM 72 KON REACTION ORDER: 2.	1000	3.1(+13)	0	4485±250	0.6	1.6
$H_2 + OH \rightarrow H + H_2O$ HYDROGEN MOLECULE + HYDROXYL FREE RADICAL 72 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGING TO: f = 0.5: F = 1.5 FOR T :300K T >300K	300–2500	2.2(+13)	0	2590±100	0.8	1.2
$D_2 + OH \rightarrow D + DHO$ DEUTERIUM MOLECULE + HYDROXYL FREE RADICAL 72 KON REACTION ORDER: 2.	300–623	1.9(+13)	0	2904±280	0.5	2.0
$H_2 + HO_2 \rightarrow H + H_2O_2$ HYDROGEN MOLECULE + HYDROPEROXYL FREE RADICAL 72 BAU/DRY REACTION ORDER: 2.	300–800	7.3(+11)	0	9400±250	0.5	2.0
$H_2 + S \rightarrow H + SH$ HYDROGEN MOLECULE + SULFUR ATOM 76 BAU/DRY REACTION ORDER: 2. NOTE: $k_1 = Kk_{-1}$	298	1.3(- 1)	-	-	0.5	1.5
75 BEN/GOL		2.5(+12)	0.5	13640		
$H_2 + N \rightarrow H + NH$ HYDROGEN MOLECULE + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	18700		
$H_2 + C \rightarrow H + CH$ HYDROGEN MOLECULE + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	15700		
$H_2 + CO_2 \rightarrow H_2O + CO$ HYDROGEN MOLECULE + CARBON DIOXIDE 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+ 9)	0.5	7550±2500	0.3	3.2
$H_2 + CH_2 \rightarrow H + CH_3.$ HYDROGEN MOLECULE + METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+12)	0	3525±1500		
$H_2 + CH_3. \rightarrow H + CH_4$ HYDROGEN MOLECULE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	370–700	8.5(+11)	0	5500±500	0.7	1.3
$H_2 + CD_3. \rightarrow H + CD_3H$ HYDROGEN MOLECULE + METHYL-D_3-FREE RADICAL 72 KON REACTION ORDER: 2.	400–570	7.4(+11)	0	5250±235	0.6	1.7
$DH + CH_3. \rightarrow H + CH_3D$ DEUTERIUM HYDRIDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–700	2.4(+11)	0	5635±500	0.5	1.5
$DH + CH_3. \rightarrow D + CH_4$ DEUTERIUM HYDRIDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–700	2.1(+11)	0	5300±500	0.5	1.5
$D_2 + CH_3. \rightarrow D + CH_3D$ DEUTERIUM MOLECULE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–700	7.1(+11)	0	5990±250	0.7	1.3
$H_2 + CN \rightarrow H + HCN$ HYDROGEN MOLECULE + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+12)	0	2500±1500		
$H_2 + CH_3CH_2. \rightarrow H + CH_3CH_3$ HYDROGEN MOLECULE + ETHYL FREE RADICAL 72 KON REACTION ORDER: 2.	473–823	3.0(+11)	0	5435		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$H_2 + M \rightarrow H + H + M$ HYDROGEN MOLECULE 72 BAU/DRY REACTION ORDER: 2. M: Ar NOTE: $k_1 = Kk_{-1}$	2500–5000	2.2(+14)	0	48300±2000	0.5	2.0
$OH + O \rightarrow O + OH$ HYDROXYL FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$OH + O \rightarrow H + O_2$ HYDROXYL FREE RADICAL + OXYGEN ATOM 72 BAU/DRY REACTION ORDER: 2. NOTE: k_1 CALCULATED FROM $k_{-1}K$ IS: 1.3×10^{13} cc.mole^{-1}s^{-1}	300	2.3(+13)	–	–	0.6	1.4
$OH + O \rightarrow H + O_2$ HYDROXYL FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	2.5(+13)	0	0	0.5	2.0
$OH + O + M \rightarrow HO_2 + M$ HYDROXYL FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 3.	1500–2500	1.0(+17)	0	0	0.01	100.
$OH + O_3 \rightarrow HO_2. + O_2$ HYDROXYL FREE RADICAL + OZONE 76 BAU/DRY REACTION ORDER: 2.	300	3.9(+10)	–	–	0.5	1.5
$OH + H \rightarrow O + H_2$ HYDROXYL FREE RADICAL + HYDROGEN ATOM 72 BAU/DRY REACTION ORDER: 2.	400–2000	8.3(+ 9)	1.0	3500±150	0.7	1.3
$OH + H \rightarrow H + OH$ HYDROXYL FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$OH + H + M \rightarrow H_2O + M$ HYDROXYL FREE RADICAL + HYDROGEN ATOM 72 BAU/DRY REACTION ORDER: 3. M: H_2O NOTE: M eff: H_2O(1.0). $k_1 = Kk_{-1}$	1000–3000	1.4(+23)	–2.0	0	0.7	1.5
M: Ar Ar(0.06)	1000–3000	8.4(+21)	–2.0	0	0.5	2.0
M: N_2 N_2(0.16)	1000–3000	2.2(+22)	–2.0	0	0.5	2.0
$OH + H_2 \rightarrow H_2O + H$ HYDROXYL FREE RADICAL + HYDROGEN MOLECULE 72 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 FOR T >300K	300–2500	2.2(+13)	0	2590±100	0.8	1.2
$OH + D_2 \rightarrow DHO + D$ HYDROXYL FREE RADICAL + DEUTERIUM MOLECULE 72 KON REACTION ORDER: 2.	300–623	1.9(+13)	0	2904±280	0.5	2.0
$OH + OH \rightarrow HO_2 + H$ HYDROXYL FREE RADICAL 72 BAU/DRY REACTION ORDER: 2.	290–800	1.2(+13)	0	20200±350	0.5	2.0
$OH + OH \rightarrow H_2O + O$ HYDROXYL FREE RADICAL 72 BAU/DRY REACTION ORDER: 2.	300–2000	6.3(+12)	0	550±200	0.7	1.5
$OH + OH + M \rightarrow H_2O_2 + M$ HYDROXYL FREE RADICAL 72 BAU/DRY REACTION ORDER: 3. M: N_2 NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 1500K.	700–1500	9.1(+14)	0	2550±1000	0.8	1.3
$OH + H_2O_2 \rightarrow H_2O + HO_2$ HYDROXYL FREE RADICAL + HYDROGEN PEROXIDE 72 BAU/DRY REACTION ORDER: 2.	300–800	1.0(+13)	0	910±150	0.5	1.5
$OH + S \rightarrow O + SH$ HYDROXYL FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	12700		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	k factors F
OH + S → H + SO HYDROXYL FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
OH + H_2S → H_2O + HS HYDROXYL FREE RADICAL + HYDROGEN SULFIDE 76 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS INCREASING TO: f = 0.5; F = 1.5 AT 900K.	298–900	6.3(+12)	0	200±150	0.7	1.3
OH + N → O + NH HYDROXYL FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	17765		
OH + N → H + NO HYDROXYL FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
OH + N + M → HNO + M HYDROXYL FREE RADICAL + NITROGEN ATOM 76 ENG REACTION ORDER: 3.	1500–2500	1.0(+15)	-0.5	0		
OH + NO_2 + M → HNO_3 + M HYDROXYL FREE RADICAL + NITROGEN OXIDE(NO_2) 73 BAU/DRY REACTION ORDER: 3.	300	5.0(+17)	-	-	0.4	1.6
OH + N_2O → HO_2 + N_2 HYDROXYL FREE RADICAL + NITROGEN OXIDE(N_2O) 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+13)	0	7550		
OH + NH → H_2O + N HYDROXYL FREE RADICAL AND IMIDOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	1000±2500	0.3	3.2
OH + HNO → H_2O + NO HYDROXYL FREE RADICAL + NITROSYL HYDRIDE 73 BAU/DRY REACTION ORDER: 2.	2000	3.6(+13)	-	-	0.5	1.5
OH + HNO_3 → H_2O + NO_3 HYDROXYL FREE RADICAL + NITRIC ACID 73 BAU/DRY REACTION ORDER: 2.	300	8.0(+10)	-	-	0.5	2.0
OH + C → O + CH HYDROXYL FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		7.9(+11)	0.5	14800		
OH + C → H + CO HYDROXYL FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
OH + CO → H + CO_2 HYDROXYL FREE RADICAL + CARBON MONOXIDE 76 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS OVER 1000K: f = 0.5; F = 1.5. RECOMMENDED k FOR 250–2500K: $\log(k)ccmol^{-1}s^{-1} = 10.83 + 3.94^{-4}T$	250–2000	1.5(+ 7)	1.3	- 385	0.8	1.2
OH + CH → H + .CHO HYDROXYL FREE RADICAL AND METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.		5.0(+11)	0.5	5000±2500	0.3	3.2
OH + CH_2 → O + CH_3. HYDROXYL FREE RADICAL AND METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
OH + CH_2 → H + HCHO HYDROXYL FREE RADICAL AND METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+13)	0	2517		
OH + CH_2 → H_2O + CH HYDROXYL FREE RADICAL AND METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$OH + CH_3. \rightarrow H + CH_3O.$						
HYDROXYL FREE RADICAL AND METHYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500-2500	6.3(+12)	0	0		
$OH + CH_3. \rightarrow H_2O + CH_2$						
HYDROXYL FREE RADICAL AND METHYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500-2500	6.3(+10)	0.7	1000±2500	0.3	3.2
$OH + CH_4 \rightarrow H_2O + CH_3.$						
HYDROXYL FREE RADICAL + METHANE						
76 ENG REACTION ORDER: 2.	1500-2500	3.2(+13)	0	2500±250	0.5	2.0
$OH + .CHO \rightarrow H_2O + CO$						
HYDROXYL FREE RADICAL + METHYL, OXO-, FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500-2500	3.2(+10)	1.0	0±1500		
NOTE: k ESTIMATED.						
$OH + CH_3O. \rightarrow H_2O + HCHO$						
HYDROXYL FREE RADICAL + METHOXY FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500-2500	3.2(+13)	0	0±1500		
NOTE: k ESTIMATED.						
$OH + HCHO \rightarrow H_2O + .CHO$						
HYDROXYL FREE RADICAL + FORMALDEHYDE						
76 ENG REACTION ORDER: 2.	1500-2500	3.2(+10)	1.0	0±1500	0.5	2.0
$OH + CN \rightarrow O + HCN$						
HYDROXYL FREE RADICAL + CYANOGEN FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500-2500	3.2(+12)	0	1500±1500		
$OH + HCN \rightarrow H_2O + .CN$						
HYDROXYL FREE RADICAL + HYDROCYANIC ACID						
76 ENG REACTION ORDER: 2.	1500-2500	2.0(+11)	0.6	2500±2500	0.3	3.2
$OH + CH{\equiv}CH \rightarrow H_2O + CH{\equiv}CH.$						
HYDROXYL FREE RADICAL + ETHYNE						
72 KON REACTION ORDER: 2.	300-2000	7.6(+12)	0	2335±400	0.5	2.1
$OH + CH_2{=}CH_2 \rightarrow H_2O + CH_2{=}CH.$						
HYDROXYL FREE RADICAL + EHTENE						
72 KON REACTION ORDER: 2.	3500-1400	1.6(+14)	0	2831±445	0.4	2.4
$OH + CH_2{=}CH_2 \rightarrow .CH_2CH_2OH$						
HYDROXYL FREE RADICAL + ETHENE						
72 KER/PAR REACTION ORDER: 2.	300	1.1(+12)	-	-	0.8	1.3
$OH + CH_3CH_3 \rightarrow H_2O + CH_3CH_2.$						
HYDROXYL FREE RADICAL + ETHANE						
72 KON REACTION ORDER: 2.	302-793	1.3(+14)	0	1998		
$OH + CH_3CH{=}CH_2 \rightarrow CH_3CH(.)CH_2OH + CH_3CH(OH)CH_2.$						
HYDROXYL FREE RADICAL + 1-PROPENE						
72 KER/PAR REACTION ORDER: 2.	300	6.6(+12)	-	-		
NOTE: ADDITION TO TERMINAL CARBON OF DOUBLE BOND IS PROBABLY 95%						
$HO_2 + O_3 \rightarrow OH + O_2 + O_2$						
HYDROPEROXYL FREE RADICAL + OZONE						
76 BAU/DRY REACTION ORDER: 2.	298	9.1(+ 8)	-	-	0.5	1.5
$HO_2 + H \rightarrow O_2 + H_2$						
HYDROPEROXYL FREE RADICAL + HYDROGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	290-800	2.5(+13)	0	350±350	0.4	2.5
76 ENG	1500-2500	2.5(+13)	0	350±500	0.5	2.0
$HO_2 + H \rightarrow H_2O + O$						
HYDROPEROXYL FREE RADICAL + HYDROGEN ATOM						
74 LLO REACTION ORDER: 2.	300-1000	5. (+13)	0	500	0.3	3.2
NOTE: E ESTIMATED.						
$HO_2 + H \rightarrow OH + OH$						
HYDROPEROXYL FREE RADICAL + HYDROGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	290-800	2.5(+14)	0	950±350	0.5	2.0
76 ENG	1500-2500	2.5(+14)	0	956±500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$HO_2 + H \rightarrow H_2O + O$ HYDROPEROXYL FREE RADICAL + HYDROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+13)	0	500±500	0.1	10.
$HO_2 + H_2 \rightarrow H_2O_2 + H$ HYDROPEROXYL FREE RADICAL + HYDROGEN MOLECULE 72 BAU/DRY REACTION ORDER: 2.	300–800	7.3(+11)	0	9400±250	0.5	2.0
$HO_2 + HO_2 \rightarrow H_2O_2 + O_2$ HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: E ESTIMATED. k FACTORS ARE LARGER AT T>300K.	300–1000	1.0(+13)	0	500	0.5	2.0
$HO_2 + H_2O \rightarrow H_2O_2 + OH$ HYDROPEROXYL FREE RADICAL + WATER 72 BAU/DRY REACTION ORDER: 2.	300–800	2.8(+13)	0	16500±500	0.5	1.5
$HO_2 + SO_2 \rightarrow OH + SO_3$ HYDROPEROXYL FREE RADICAL + SULFUR DIOXIDE 74 LLO REACTION ORDER: 2.	300	5.2(+ 8)	–	–	0.9	1.2
$HO_2 + N \rightarrow O_2 + NH$ HYDROPEROXYL FREE RADICAL + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0	0±2500	0.3	3.2
$HO_2 + CO \rightarrow OH + CO_2$ HYDROPEROXYL FREE RADICAL + CARBON MONOXIDE 76 BAU/DRY REACTION ORDER: 2.	700–1000	1.5(+14)	0	11900±1000	0.3	3.0
$HO_2 + CH \rightarrow O_2 + CH_2$ HYDROPEROXYL FREE RADICAL AND METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+10)	0.5	7550±2500	0.3	3.2
$HO_2 + CH \rightarrow OH + .CHO$ HYDROPEROXYL FREE RADICAL AND METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$HO_2 + CH_3. \rightarrow O_2 + CH_4$ HYDROPEROXYL FREE RADICAL AND METHYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	3000±2500	0.3	3.2
$HO_2 + .CHO \rightarrow O_2 + HCHO$ HYDROPEROXYL FREE RADICAL + METHYL, OXO–, FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+14)	0	1500±1500		
$HO_2 + HCHO \rightarrow H_2O_2 + .CHO$ HYDROPEROXYL FREE RADICAL + FORMALDEHYDE 74 LLO REACTION ORDER: 2. NOTE: k FACTORS ARE: f = 0.1; F = 10. AT 300 K.	300–800	1.0(+12)	0	4000	0.7	1.5
$HO_2 + CH_2{=}CH_2 \rightarrow$ products HYDROPEROXYL FREE RADICAL + ETHENE 74 LLO REACTION ORDER: 2. NOTE: RATIO DATA VERSUS kref FOR $HO_2 + CO \rightarrow OH + CO_2$. k FACTORS MIGHT BE HIGHER.	300	1.0(+ 7)	–	–	0.1	10.
$HO_2 + CH_3CH_3 \rightarrow H_2O_2 + CH_3CH_2.$ HYDROPEROXYL RADICAL + ETHANE 74 LLO REACTION ORDER: 2. NOTE: E ESTIMATED. UPPER LIMIT RECOMMENDED. k_{ref} IS FOR $HO_2 + CO \rightarrow OH + CO_2$.	300–1000	1.0(+12)	0	7000	0.1	10.
$HO_2 + CH_3CH_2CH_3 \rightarrow H_2O_2 + (CH_3)_2CH.$ HYDROPEROXYL FREE RADICAL + PROPANE 74 LLO REACTION ORDER: 2. NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS k_{ref} FOR $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$	300–1000	2.0(+11)	0	5300	0.1	10.
$HO_2 + (CH_3)_2C{=}CH_2 \rightarrow$ products HYDROPEROXYL FREE RADICAL + 1-PROPENE, 2-METHYL– 74 LLO REACTION ORDER: 2. NOTE: SUGGESTED k VALUE.	300	1.0(+ 8)	–	–	0.1	10.

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$HO_2 + CH_3CH_2CH_2CH_3 \rightarrow H_2O_2 + CH_3CH_2CH(.)CH_3$						
HYDROPEROXYL FREE RADICAL + BUTANE						
74 LLO REACTION ORDER: 2.	300–1000	5.0(+11)	0	5285	0.1	10.
NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS kref FOR $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$						
$HO_2 + (CHO)_3CH \rightarrow H_2O_2 + (CH_3)_3C.$						
HYDROPEROXYL FREE RADICAL + PROPANE, 2-METHYL						
74 LLO REACTION ORDER: 2.	300–1000	1.0(+11)	0	3500	0.1	10.
NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS k_{ref} FOR $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$						
$HO_2 + M \rightarrow H + O_2 + M$						
HYDROPEROXYL FREE RADICAL						
72 BAU/DRY REACTION ORDER: 2.	300–2000	2.1(+15)	0	23000±250	0.5	1.5
NOTE: M = AR, OR He. $k_1 = Kk_{-1}$						
$H_2O + O \rightarrow OH + OH$						
WATER + OXYGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	300–2000	6.8(+13)	0	9240±200	0.7	1.5
$H_2O + H \rightarrow H_2 + OH$						
WATER + HYDROGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	300–2500	9.3(+13)	0	10250±100	0.5	1.5
NOTE: GIVEN k FACTORS ARE FOR HIGH T'S.						
$H_2O + HO_2 \rightarrow OH + H_2O_2$						
WATER + HYDROPEROXYL FREE RADICAL						
72 BAU/DRY REACTION ORDER: 2.	300–800	2.8(+13)	0	16500±500	0.5	1.5
$H_2O + NH \rightarrow H_2 + HNO$						
WATER + IMIDOGEN FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	1500±2500	0.3	3.2
$H_2O + CH_3. \rightarrow OH + CH_4$						
WATER + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	1273–1773	7.1(+12)	0	12900±1000	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$H_2O + M \rightarrow H + OH + M$						
WATER						
72 BAU/DRY REACTION ORDER: 2. M: H_2O	2000–6000	2.2(+16)	0	52900±2500	0.7	1.5
NOTE: M eff: H_2O(1.0). $k_1 = Kk_{-1}$						
M: Ar	2000–6000	1.3(+15)	0	52900±2500	0.5	2.0
Ar(0.06)						
M: N_2	2000–6000	3.5(+15)	0	52900±2500	0.5	2.0
N_2(0.16)						
$H_2O_2 + H \rightarrow HO_2 + H_2$						
HYDROGEN PEROXIDE + HYDROGEN ATOM						
72 BAU/DRY REACTION ORDER: 2.	300–800	1.7(+12)	0	1900±250	0.5	2.0
$H_2O_2 + OH \rightarrow HO_2 + H_2O$						
HYDROGEN PEROXIDE + HYDROXYL FREE RADICAL						
72 BAU/DRY REACTION ORDER: 2.	300–800	1.0(+13)	0	910±150	0.5	1.5
$H_2O_2 + M \rightarrow OH + OH + M$						
HYDROGEN PEROXIDE						
72 BAU/DRY REACTION ORDER: 2. M: N_2	700–1500	1.20(+17)	0	22900±1000	0.8	1.3
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 1500K.						
$S + O_2 \rightarrow SO + O$						
SULFUR ATOM + OXYGEN MOLECULE						
76 BAU/DRY REACTION ORDER: 2.	250–450	1.4(+12)	0	0.0±50	0.5	1.5
$S + H_2 \rightarrow SH + H$						
SULFUR ATOM + HYDROGEN MOLECULE						
76 BAU/DRY REACTION ORDER: 2.	298	1.3(- 1)	-	-	0.5	1.5
NOTE: $k_1 = Kk_{-1}$						
75 BEN/GOL		2.5(+12)	0.5	13640		
$S + OH \rightarrow SO + H$						
SULFUR ATOM + HYDROXYL FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
S + OH → SH + O SULFUR ATOM + HYDROXYL FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	12700		
S + S_2 → S_2 + S SULFUR ATOM + SULFUR DIMER 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + SO → S_2 + O SULFUR ATOM + SULFUR MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	11500		
S + SO → SO + S SULFUR ATOM + SULFUR MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + SH → S_2 + H SULFUR ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + SH → SH + S SULFUR ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
S + N_2 → NS + N SULFUR ATOM + NITROGEN MOLECULE 75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	55200		
S + NO → SO + N SULFUR ATOM + NITROGEN OXIDE (NO) 75 BEN/GOL REACTION ORDER: 2.		4.0(+11)	0.5	17260		
S + NO → NS + O SULFUR ATOM + NITROGEN OXIDE (NO) 75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	17465		
S + NH → SH + N SULFUR ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
S + NH → NS + H SULFUR ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + NS → S_2 + N SULFUR ATOM + NITROGEN SULFIDE(NS) 75 BEN/GOL REACTION ORDER: 2.		2.0(+11)	0.5	10870		
S + NS → NS + S SULFUR ATOM + NITROGEN SULFIDE(NS) 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + CO → SO + C SULFUR ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	66530		
S + CO → CS + O SULFUR ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	37600		
S + CH → SH + C SULFUR ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
S + CH → CS + H SULFUR ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + CS → S_2 + C SULFUR ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	40463		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
S + CS → CS + S						
SULFUR ATOM + CARBON MONOSULFIDE FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + CS + M → CS_2 + M						
SULFUR ATOM + CARBON MONOSULFIDE FREE RADICAL						
76 BAU/DRY REACTION ORDER: 3.	1800–3700	8.7(+13)	0	4370	0.5	1.5
NOTE: $k_1 = Kk_{-1}$						
S + CS_2 → S_2 + CS						
SULFUR ATOM + CARBON DISULFIDE						
76 BAU/DRY REACTION ORDER: 2.	298	3.9(+11)	-	-	0.5	1.5
S + COS → S_2 + CO						
SULFUR ATOM + CARBON OXIDE SULFIDE						
76 BAU/DRY REACTION ORDER: 2.	230–2600	1.7(+12)	0	2050±230	0.3	3.0
S + CN → NS + C						
SULFUR ATOM + CYANOGEN FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		2.0(+12)	0.5	32010		
S + CN → CS + N						
SULFUR ATOM + CYANOGEN FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + C_2 → CS + C						
SULFUR ATOM + CARBON DIMER						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
S + CH≡CH → cy-CH=CHS						
SULFUR ATOM + ETHYNE						
72 KER/PAR REACTION ORDER: 2.	298	1.7(+11)	-	-		
S + CH_2=CH_2 → cy-CH_2CH_2S						
SULFUR ATOM + ETHENE						
72 KER/PAR REACTION ORDER: 2.	298	8.1(+11)	-	-		
S + CH_3C≡CH → cy-(CH_3)C=CHS						
SULFUR ATOM + 1-PROPYNE						
72 KER/PAR REACTION ORDER: 2.	298	1.1(+12)	-	-		
S + CH_3CH=CH_2 → cy-$(CH_3)CHCH_2S$						
SULFUR ATOM + 1-PROPENE						
72 KER/PAR REACTION ORDER: 2.	298	5.8(+12)	-	-		
k/k_{ref}: 6.9	298	-	-	-		
NOTE: k_{ref}: S + CH_2=CH_2						
$S^*(^1D)$ + CH_3CH=CH_2 → cy-$(CH_3)CHCH_2S$						
SULFUR ATOM (^1D) + 1-PROPENE						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.7	300	-	-	-		
NOTE: k_{ref}: $S^*(^1D)$ + CH_2=CH_2						
S + CH_3C≡CCH_3 → cy-(CH_3)C=C(CH_3)S						
SULFUR ATOM + 2-BUTYNE						
72 KER/PAR REACTION ORDER: 2.	298	1.9(+13)	-	-		
S + CH_2=CHCH=CH_2 → cy-$(CH_2$=CH$)CHCH_2S$						
SULFUR ATOM + 1,3-BUTADIENE						
72 KER/PAR REACTION ORDER: 2.	298	6.0(+13)	-	-		
S + CH_3CH_2CH=CH_2 → cy-$(CH_3CH_2)CHCH_2S$						
SULFUR ATOM + 1-BUTENE						
72 KER/PAR REACTION ORDER: 2.	298	9.3(+12)	-	-		
k/k_{ref}: 10.0	298	-	-	-		
NOTE: k_{ref}: S + CH_2=CH_2						
S + cis-CH_3CH=$CHCH_3$ → cy-$(CH_3)CHCH(CH_3)S$						
SULFUR ATOM + cis-2-BUTENE						
72 KER/PAR REACTION ORDER: 2.	298	1.4(+13)	-	-		
k/k_{ref}: 16.0	298	-	-	-		
NOTE: k_{ref}: S + CH_2=CH_2						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$S + trans\text{-}CH_3CH{=}CHCH_3 \rightarrow cy\text{-}(CH_3)CHCH(CH_3)S$						
SULFUR ATOM + trans-2-BUTENE						
72 KER/PAR REACTION ORDER: 2.	298	1.4(+13)	–	–		
k/k_{ref}: 20.0	298	–	–	–		
NOTE: k_{ref}: $S + CH_2{=}CH_2$						
$S + (CH_3)_2C{=}CH_2 \rightarrow cy\text{-}(CH_3)_2CCH_2S$						
SULFUR ATOM + 1-PROPENE, 2-METHYL						
72 KER/PAR REACTION ORDER: 2.	298	4.0(+13)	–	–		
k/k_{ref}: 50.0	298	–	–	–		
NOTE: k_{ref}: $S + CH_2{=}CH_2$						
$S^*(^1D) + (CH_3)_2C{=}CH_2 \rightarrow cy\text{-}(CH_3)_2CCH_2S$						
SULFUR ATOM (^1D) + 1-PROPENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 3.5	300	–	–	–		
NOTE: k_{ref}: $S^*(^1D) + CH_2{=}CH_2$						
$S + CH_3(CH_2)_2CH{=}CH_2 \rightarrow cy\text{-}CH_3(CH_2)CHCH_2S$						
SULFUR ATOM + 1-PENTENE						
72 KER/PAR REACTION ORDER: 2.	298	8.1(+12)	–	–		
$S + CH_3CH_2C(CH_3){=}CH_2 \rightarrow cy\text{-}CH_3CH_2C(CH_3)CH_2S$						
SULFUR ATOM + 1-BUTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	7.4(+13)	–	–		
$S + (CH_3)_2C{=}CHCH_3 \rightarrow cy\text{-}(CH_3)_2CCH(CH_3)S$						
SULFUR ATOM + 2-BUTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	6.5(+13)	–	–		
k/k_{ref}: 56.	298	–	–	–		
NOTE: k_{ref}: $S + CH_2{=}CH_2$						
$S + (CH_3)_2C{=}C(CH_3)_2 \rightarrow cy\text{-}(CH_3)_2CC(CH_3)_2S$						
SULFUR ATOM + 2-BUTENE, 2,3-DIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	298	8.5(+13)	–	–		
$S_2 + O \rightarrow S + SO$						
SULFUR DIMER + OXYGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$S_2 + H \rightarrow S + SH$						
SULFUR DIMER + HYDROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		7.9(+12)	0.5	8355		
$S_2 + S \rightarrow S + S_2$						
SULFUR DIMER + SULFUR ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$S_2 + N \rightarrow S + NS$						
SULFUR DIMER + NITROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$S_2 + C \rightarrow S + CS$						
SULFUR DIMER + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SO + O \rightarrow O + SO$						
SULFUR MONOXIDE + OXYGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SO + O \rightarrow S + O_2$						
SULFUR MONOXIDE + OXYGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		2.0(+11)	0.5	2770		
$SO + O + M \rightarrow SO_2 + M$						
SULFUR MONOXIDE + OXYGEN ATOM						
76 BAU/DRY REACTION ORDER: 3.	298	6.7(+13)	–	–	0.7	1.3
$SO + O_2 \rightarrow SO_2 + O$						
SULFUR MONOXIDE + OXYGEN MOLECULE						
76 BAU/DRY REACTION ORDER: 2.	440–2100	4.5(+11)	0	3250±590	0.3	1.7
$SO + H \rightarrow O + SH$						
SULFUR MONOXIDE + HYDROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	19930		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$SO + H \rightarrow S + OH$ SULFUR MONOXIDE + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	11200		
$SO + S \rightarrow O + S_2$ SULFUR MONOXIDE + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	11500		
$SO + S \rightarrow S + SO$ SULFUR MONOXIDE + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SO + N \rightarrow O + NS$ SULFUR MONOXIDE + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	8254		
$SO + N \rightarrow S + NO$ SULFUR MONOXIDE + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$SO + C \rightarrow O + CS$ SULFUR MONOXIDE + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SO + C \rightarrow S + CO$ SULFUR MONOXIDE + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SO_2 + O \rightarrow SO + O_2$ SULFUR DIOXIDE + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 2. NOTE: $k_1 = Kk_{-1}$	440–2100	1.3(+14)	-0.5	9980	0.3	1.7
$SO_2 + H + M \rightarrow HSO_2 + M$ SULFUR DIOXIDE + HYDROGEN ATOM 76 BAU/DRY REACTION ORDER: 3.	1660–2120	5.1(+15)	–	–	0.5	1.5
$SO_2 + HO_2 \rightarrow SO_3 + OH$ SULFUR DIOXIDE + HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: RATIO DATA VERSUS kref FOR REACTION $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$.	300	5.2(+ 8)	–	–	0.9	1.2
$SH + O \rightarrow S + OH$ MERCAPTO FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$SH + O \rightarrow SO + H$ MERCAPTO FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SH + H \rightarrow S + H_2$ MERCAPTO FREE RADICAL + HYDROGEN ATOM 76 BAU/DRY REACTION ORDER: 2.	298	1.5(+13)	–	–	0.5	1.5
$SH + H \rightarrow H + SH$ MERCAPTO FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SH + S \rightarrow H + S_2$ MERCAPTO FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SH + S \rightarrow S + SH$ MERCAPTO FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(P11)	0.5	4000		
$SH + SH \rightarrow H_2S + S$ MERCAPTO FREE RADICAL 76 BAU/DRY REACTION ORDER: 2.	295	7.8(+12)	–	–	0.5	1.5
$SH + N \rightarrow H + NS$ MERCAPTO FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	403		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$SH + N \rightarrow S + NH$						
MERCAPTO FREE RADICAL + NITROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	9060		
$SH + C \rightarrow H + CS$						
MERCAPTO FREE RADICAL + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$SH + C \rightarrow S + CH$						
MERCAPTO FREE RADICAL + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		4.0(+11)	0.5	6090		
$H_2S + O_3 \rightarrow H_2O + SO_2$						
HYDROGEN SULFIDE + OZONE						
76 BAU/DRY REACTION ORDER: 2.	298	4.0(+ 2)	-	-	0.1	10.
$H_2S + H \rightarrow SH + H_2$						
HYDROGEN SULFIDE + HYDROGEN ATOM						
76 BAU/DRY REACTION ORDER: 2.	190–470	7.8(+12)	0	860±50	0.5	1.5
$H_2S + OH \rightarrow SH + H_2O$						
HYDROGEN SULFIDE + HYDROXYL FREE RADICAL						
76 BAU/DRY REACTION ORDER: 2.	298–900	6.3(+12)	0	200±150	0.7	1.3
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 AT 900K.						
$H_2S + CH_3. \rightarrow SH + CH_4$						
HYDROGEN SULFIDE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	300–600	2.00(+11)	0	2065±150	0.4	2.5
NOTE: TENTATIVE k VALUE.						
$N + O + M \rightarrow NO + M$						
NITROGEN ATOM + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 3. M: N_2	200–400	6.4(+16)	-0.5	0	0.5	1.5
$N + O_2 \rightarrow NO + O$						
NITROGEN ATOM + OXYGEN MOLECULE						
73 BAU/DRY REACTION ORDER: 2.	300–3000	6.4(+ 9)	1.0	3150±150	0.7	1.3
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 3000K.						
$N + H + M \rightarrow NH + M$						
NITROGEN ATOM + HYDROGEN ATOM						
76 ENG REACTION ORDER: 3.	1500–2500	2.5(+17)	-0.5	0±1000		
$N + H_2 \rightarrow NH + H$						
NITROGEN ATOM + HYDROGEN MOLECULE						
75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	18700		
$N + OH \rightarrow NO + H$						
NITROGEN ATOM + HYDROXYL FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$N + OH \rightarrow NH + O$						
NITROGEN ATOM + HYDROXYL FREE RADICAL						
75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	17765		
$N + OH + M \rightarrow HNO + M$						
NITROGEN ATOM + HYDROXYL FREE RADICAL						
76 ENG REACTION ORDER: 3.	1500–2500	1.00(+15)	-0.5	0		
$N + HO_2 \rightarrow NH + O_2$						
NITROGEN ATOM + HYDROPEROXYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.00(+11)	0	0±2500	0.3	3.2
$N + S_2 \rightarrow NS + S$						
NITROGEN ATOM + SULFUR DIMER						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N + SO \rightarrow NO + S$						
NITROGEN ATOM + SULFUR MONOXIDE						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N + SO \rightarrow NS + O$						
NITROGEN ATOM + SULFUR MONOXIDE						
75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	8254		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$N + SH \rightarrow NH + S$ NITROGEN ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	9060		
$N + SH \rightarrow NS + H$ NITROGEN ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	403		
$N + N + M \rightarrow N_2 + M$ NITROGEN ATOM 73 BAU/DRY REACTION ORDER: 3. M: N_2 NOTE: k FACTORS RANGE: 200-600K, BUT MIGHT INCREASE AT LOWER T'S.	100-600	3.0(+14)	0	- 500±50	0.5	1.5
$N + N_2 \rightarrow N_2 + N$ NITROGEN ATOM + NITROGEN MOLECULE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N + NO \rightarrow N_2 + O$ NITROGEN ATOM + NITROGEN OXIDE(NO) 73 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGE TO: f = 0.5; F = 2.0 ABOVE 2000K.	300-5000	1.6(+13)	0	0	0.8	1.2
$N + NO \rightarrow NO + N$ NITROGEN ATOM + NITROGEN OXIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N + NO_2 \rightarrow N_2 + O_2$ NITROGEN ATOM + NITROGEN OXIDE(NO_2) 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+12)	0	0±1500		
$N + NO_2 \rightarrow NO + NO$ NITROGEN ATOM + NITROGEN OXIDE(NO_2) 76 ENG REACTION ORDER: 2.	1500-2500	4.0(+12)	0	0±1500	0.2	5.0
$N + NO_2 \rightarrow N_2O + O$ NITROGEN ATOM + NITROGEN OXIDE(NO_2) 76 ENG REACTION ORDER: 2.	1500-2500	5.0(+12)	0	0±1500	0.5	2.0
$N + N_2O \rightarrow NO + N_2$ NITROGEN ATOM + NITROGEN OXIDE(N_2O) 76 ENG REACTION ORDER: 2.	1500-2500	5.0(+ 8)	0	5000±2500	0.3	3.2
$N + NH \rightarrow N_2 + H$ NITROGEN ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$N + NH \rightarrow NH + N$ NITROGEN ATOM + IMIDGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N + HNO \rightarrow H + N_2O$ NITROGEN ATOM + NITROSYL HYDRIDE 76 ENG REACTION ORDER: 2.	1500-2500	5.0(+10)	0.5	1500±2500		
$N + HNO \rightarrow NH + NO$ NITROGEN ATOM + NITROSYL HYDRIDE 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+11)	0.5	1000±2500		
$N + NS \rightarrow N_2 + S$ NITROGEN ATOM + NITROGEN SULFIDE(NS) 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$N + NS \rightarrow NS + N$ NITROGEN ATOM + NITROGEN SULFIDE(NS) 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N + CO \rightarrow NO + C$ NITROGEN ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		5.0(+12)	0.5	57300		
$N + CO \rightarrow CN + O$ NITROGEN ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		3.2(+12)	0.5	38800		

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$N + CO_2 \rightarrow NO + CO$ NITROGEN ATOM + CARBON DIOXIDE 76 ENG REACTION ORDER: 2.	1500–2500	2.00(+11)	0.5	1500±10000	0.1	10.
$N + CH \rightarrow NH + C$ NITROGEN ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	6995		
$N + CH \rightarrow CN + H$ NITROGEN ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$N + CH_2 \rightarrow NH + CH$ NITROGEN ATOM + METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+11)	0.67	20400±2500	0.3	3.2
$N + .CHO \rightarrow O + HCN$ NITROGEN ATOM + FORMYL FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+14)	0	0		
$N + .CHO \rightarrow NH + CO$ NITROGEN ATOM + FORMYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	1000±2500		
$N + CH_3O. \rightarrow NH + HCHO$ NITROGEN ATOM + METHOXY FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+14)	0	0±1500		
$N + CS \rightarrow C + NS$ NITROGEN ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	37200		
$N + CS \rightarrow .CN + S$ NITROGEN ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	1160		
$N + CN \rightarrow N_2 + C$ NITROGEN ATOM + CYANOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$N + C_2 \rightarrow CN + C$ NITROGEN ATOM + CARBON DIMER 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$N + CH{\equiv}CH \rightarrow C_2H_2N$ NITROGEN ATOM + ETHYNE 72 KER/PAR REACTION ORDER: 2. NOTE: UPPER LIMIT.	440	2.0(+ 9)	–	–		
$N + CH_2{=}CH_2 \rightarrow$ products NITROGEN ATOM + ETHENE 72 KER/PAR REACTION ORDER: 2.	320–550	2.0(+10)	0	353		
$N + CH_3C{\equiv}CH \rightarrow$ products NITROGEN ATOM + 1-PROPYNE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 6.5 NOTE: k_{ref}: N + CH≡CH	320–550 435	6.9(+10) –	0 –	745 –		
$N + CH_3CH{=}CH_2 \rightarrow$ products NITROGEN ATOM + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.8 NOTE: k_{ref}: $N + CH_2{=}CH_2$	320–550 435	1.2(+11) –	0 –	655 –		
$N + CH_3CH_2C{\equiv}CH \rightarrow$ products NITROGEN ATOM + 1-BUTYNE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 13.0 NOTE: k_{ref}: N + CH≡CH	320–550 435	3.5(+11) –	0 –	1125 –		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	*T*/K	*A*	*B*	*E*/*R* (in K)	k factors f	F
$N + CH_3C{\equiv}CCH_3 \rightarrow$ products						
NITROGEN ATOM + 2-BUTYNE						
72 KER/PAR REACTION ORDER: 2.	320–550	1.9(+11)	0	926		
k/k_{ref}: 12.0	435	–	–	–		
NOTE: k_{ref}: N + CH≡CH.						
$N + CH_2{=}CHCH{=}CH_2 \rightarrow$ products						
NITROGEN ATOM + 1.3-BUTADIENE						
72 KER/PAR REACTION ORDER: 2.	340	3.5(+10)	–	–		
$N + CH_3CH_2CH{=}CH_2 \rightarrow$ products						
NITROGEN ATOM + 1-BUTENE						
72 KER/PAR REACTION ORDER: 2.	320–550	1.6(+11)	0	660		
k/k_{ref}: 3.4	435	–	–	–		
NOTE: k_{ref}: $N + CH_2{=}CH_2$.						
$N + cis\text{-}CH_3CH{=}CHCH_3 \rightarrow$ products						
NITROGEN ATOM + cis-2-BUTENE						
72 KER/PAR REACTION ORDER: 2.	320–550	2.3(+11)	0	995		
k/k_{ref}: 2.4	435	–	–	–		
NOTE: k_{ref}: $N + CH_2{=}CH_2$						
$N + trans\text{-}CH_3CH{=}CHCH_3 \rightarrow$ products						
NITROGEN ATOM + trans-2-BUTENE						
72 KER/PAR REACTION ORDER: 2.	320–550	3.4(+11)	0	1055		
k/k_{ref}: 3.0	435	–	–	–		
NOTE: k_{ref}: $N + CH_2{=}CH_2$						
$N + (CH_3)_2C{=}CH_2 \rightarrow$ products						
NITROGEN ATOM + 1-PROPENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	320–550	7.8(+10)	0	277		
k/k_{ref}: 4.1	435	–	–	–		
NOTE: k_{ref}: $N + CH_2{=}CH_2$						
$N + CH_3CH_2CH_2C{\equiv}CH \rightarrow$ products						
NITROGEN ATOM + 1-PENTYNE						
72 KER/PAR REACTION ORDER: 2.	320–550	3.0(+11)	0	1047		
k/k_{ref}: 14.0	435	–	–	–		
NOTE: k_{ref}: N. + CH≡CH						
$N + (CH_3)_2C{=}CHCH_3 \rightarrow$ products						
NITROGEN ATOM + 2-BUTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	320–550	9.3(+10)	0	433		
k/k_{ref}: 3.5	435	–	–	–		
NOTE: k_{ref}: $N + CH_2{=}CH_2$						
$N + CH_3CH_2CH_2CH_2C{\equiv}CH \rightarrow$ products						
NITROGEN ATOM + 1-HEXYNE						
72 KER/PAR REACTION ORDER: 2.	320–55	4.6(+11)	0	1233		
k/k_{ref}: 14.0	435	–	–	–		
NOTE: k_{ref}: N + CH≡CH						
$N + CH_3CH_2C{\equiv}CCH_2CH_3 \rightarrow$ products						
NITROGEN ATOM + 3-HEXYNE						
72 KER/PAR REACTION ORDER: 2.	320–550	3.4(+11)	0	1102		
k/k_{ref}: 14.0	435	–	–	–		
NOTE: k_{ref}: N + CH≡CH						
$N + (CH_3)_2C{=}C(CH_3)_2 \rightarrow$ products						
NITROGEN ATOM + 2-BUTENE, 2,3-DIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	320–550	1.7(+11)	0	690		
k/k_{ref}: 3.5	435	–	–	–		
NOTE: k_{ref}: $N + CH_2{=}CH_2$						
$N_2 + O \rightarrow N + NO$						
NITROGEN MOLECULE + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	2000–5000	7.6(+13)	0	38000±150	0.5	2.0
NOTE: $k_1 = Kk_{-1}$						
$N_2 + O + M \rightarrow N_2O + M$						
NITROGEN MOLECULE + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 3. M: Ar	1300–2500	1.4(+13)	0	10400±1500	0.7	1.5

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$N_2 + O_2 \rightarrow N_2O + O$						
NITROGEN MOLECULE + OXYGEN MOLECULE						
73 BAU/DRY REACTION ORDER: 2.	1200–2000	6.3(+13)	0	55200±2000	0.4	2.5
NOTE: $k_1 = Kk_{-1}$						
$N_2 + H \rightarrow N + NH$						
NITROGEN MOLECULE + HYDROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		2.0(+13)	0.5	75945		
$N_2 + S \rightarrow N + NS$						
NITROGEN MOLECULE + SULFUR ATOM						
75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	55200		
$N_2 + N \rightarrow N + N_2$						
NITROGEN MOLECULE + NITROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$N_2 + C \rightarrow N + CN$						
NITROGEN MOLECULE + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	22750		
$N_2 + CH \rightarrow N + HCN$						
NITROGEN MOLECULE + METHYLIDYNE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0	9560		
NOTE: REVISED ESTIMATE.						
$N_2 + CH \rightarrow NH + CN$						
NITROGEN MOLECULE + METHYLIDYNE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+14)	0	46300±10000		
NOTE: k ESTIMATED.						
$N_2 + CH_2 \rightarrow NH + HCN$						
NITROGEN MOLECULE + METHYLENE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+14)	0	35230±10000		
NOTE: k ESTIMATED.						
$N_2 + M \rightarrow N + N + M$						
NITROGEN MOLECULE						
76 ENG REACTION ORDER: 2. M: N_2	1500–2500	4.0(+21)	-1.6	13240±500		
73 BAU/DRY	6000–15000	3.7(+21)	-1.6	113200±500	0.3	3.0
$NO + O \rightarrow O + NO$						
NITROGEN OXIDE(NO) + OXYGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NO + O \rightarrow N + O_2$						
NITROGEN OXIDE(NO) + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	1000–3000	1.5(+ 9)	1.0	19500±150	0.7	1.3
NOTE: k FACTORS INCREASING TO: f = 0.5; F = 2.0 AT 3000K. $k_1 = Kk_{-1}$						
$NO + O + M \rightarrow NO_2 + M$						
NITROGEN OXIDE(NO) + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 3. M: O_2	200–500	1.1(+15)	0	-940±50	0.8	1.2
NOTE: M eff: O_2(1.0) AT 297K M: Ar	200–500	1.1(+14)	0	-940±50	0.8	1.2
Ar(0.1) AT 297K M: H_2O	200–500	6.7(+15)	0	-940±50	0.8	1.2
H_2O(6.1) AT 297K M: D_2O	200–500	5.5(+15)	0	-940±50	0.8	1.2
D_2O(5.0) AT 297K M: SF_6	200–500	2.9(+15)	0	-940±50	0.8	1.2
SF_6(2.6) AT 297K M: N_2	200–500	1.5(+15)	0	-940±50	0.8	1.2
N_2(1.4) AT 297K M: N_2O	200–500	2.3(+15)	0	-940±50	0.8	1.2
N_2O(2.1) AT 297K M: CO_2	200–500	2.3(+15)	0	-940±50	0.8	1.2
CO_2(2.1) AT 297K M: CH_4	200–500	2.4(+15)	0	-940±50	0.8	1.2
CH_4(2.2) AT 297K M: CF_4	200–500	2.4(+15)	0	-940±50	0.8	1.2
CF_4(2.2) AT 297K						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions		T/K	A	B	E/R (in K)	k factors f	F
$NO + O_2 \rightarrow NO_2 + O$							
NITROGEN OXIDE(NO) + OXYGEN MOLECULE							
73 BAU/DRY REACTION ORDER: 2.		300–550	1.7(+12)	0	23400	0.8	1.3
NOTE: $k_1 = Kk_{-1}$							
$NO + O_3 \rightarrow NO_2 + O_2$							
NITROGEN OXIDE(NO) + OZONE							
73 BAU/DRY REACTION ORDER: 2.		200–350	8.9(+11)	0	1330±130	0.5	1.5
$NO + H \rightarrow O + NH$							
NITROGEN OXIDE(NO) + HYDROGEN ATOM							
75 BEN/GOL REACTION ORDER: 2.			5.0(+12)	0.5	38200		
$NO + H \rightarrow N + OH$							
NITROGEN OXIDE(NO) + HYDROGEN ATOM							
75 BEN/GOL REACTION ORDER: 2.			2.5(+12)	0.5	24460		
$NO + H + M \rightarrow HNO + M$							
NITROGEN OXIDE(NO) + HYDROGEN ATOM							
73 BAU/DRY REACTION ORDER: 3.	M: H_2	230–700	5.4(+15)	0	-300±100	0.5	1.5
76 ENG	M: H_2	1500–2500	5.0(+15)	0	-300±150	0.5	2.0
$NO + S \rightarrow O + NS$							
NITROGEN OXIDE(NO) + SULFUR ATOM							
75 BEN/GOL REACTION ORDER: 2.			1.0(+12)	0.5	17465		
$NO + S \rightarrow N + SO$							
NITROGEN OXIDE(NO) + SULFUR ATOM							
75 BEN/GOL REACTION ORDER: 2.			4.0(+11)	0.5	17260		
$NO + N \rightarrow O + N_2$							
NITROGEN OXIDE(NO) + NITROGEN ATOM							
73 BAU/DRY REACTION ORDER: 2.		300–5000	1.6(+13)	-	-	0.8	1.2
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 ABOVE 2000K							
$NO + N \rightarrow N + NO$							
NITROGEN OXIDE(NO) + NITROGEN ATOM							
75 BEN/GOL REACTION ORDER: 2.			6.3(+11)	0.5	4000		
$NO + NO \rightarrow N_2 + O_2$							
NITROGEN OXIDE(NO_2) + OXYGEN MOLECULE							
72 KON REACTION ORDER: 2.		1370–4300	1.3(+14)	0	38060±720	0.7	1.5
$NO + NO \rightarrow N_2O + O$							
NITROGEN OXIDE (NO)							
73 BAU/DRY REACTION ORDER: 2.		1200–2000	1.3(+12)	0	32100±1500	0.5	2.0
$NO + NO + O_2 \rightarrow NO_2 + NO_2$							
NITROGEN OXIDE(NO) + OXYGEN MOLECULE							
73 BAU/DRY REACTION ORDER: 3.		273–660	1.2(+ 9)	0	-530±100	0.5	1.5
$NO + NO_2 \rightarrow N_2O + O_2$							
NITROGEN OXIDE(NO) + NITROGEN OXIDE(NO_2)							
76 ENG REACTION ORDER: 2.		1500–2500	1.0 (+12)	0	30200	0.01	100.
$NO + NO_2 + O_2 \rightarrow NO_2 + NO_3$							
NITROGEN OXIDE(NO) + NITROGEN OXIDE(NO_2) + OXYGEN MOLECULE							
73 BAU/DRY REACTION ORDER: 3.		300–500	2.9(+ 7)	0	-400±500	0.4	2.5
$NO + NO_3 \rightarrow NO_2 + NO_2$							
NITROGEN OXIDE(NO) + NITROGEN OXIDE(NO_3)							
72 KON REACTION ORDER: 2.		298–547	1.5(+14)	0	1163±115	0.7	1.4
$NO + N_2O \rightarrow NO_2 + N_2$							
NITROGEN OXIDE(NO) + NITROGEN OXIDE(N_2O)							
76 ENG REACTION ORDER: 2.		1500–2500	2.0(+14)	0	25000	0.1	1.0
$NO + HNO \rightarrow N_2O + OH$							
NITROGEN OXIDE(NO) + NITROSYL HYDRIDE							
76 ENG REACTION ORDER: 2.		1500–2500	2.0(+12)	0	13000±2500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$NO + C \rightarrow O + CN$						
NITROGEN OXIDE(NO) + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NO + C \rightarrow N + CO$						
NITROGEN OXIDE(NO) + CARBON ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$NO + CH \rightarrow O + HCN$						
NITROGEN OXIDE(NO) + METHYLIDYNE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	2.0(+12)	0	0±1000		
NOTE: kESTIMATED.						
$NO + CH \rightarrow N + .CHO$						
NITROGEN OXIDE(NO) + METHYLIDYNE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.6(+13)	0	5000±3000		
NOTE: k ESTIMATED.						
$NO + CH_2 \rightarrow N + HCHO$						
NITROGEN OXIDE(NO) + METHYLENE FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	1.6(+12)	0	3500±2000		
NOTE: k ESTIMATED.						
$NO + .CHO \rightarrow HNO + CO$						
NITROGEN OXIDE(NO) + FORMYL FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	1000±2500	0.3	3.2
$NO + CN \rightarrow N_2 + CO$						
NITROGEN OXIDE(NO) + CYANOGEN FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0	0±2500	0.3	3.2
$NO + M \rightarrow N + O + M$						
NITROGEN OXIDE(NO)						
76 ENG REACTION ORDER: 2.	1500–2500	4.0(+20)	−1.5	75500±2500	0.3	3.2
NOTE: M = Ar, OR N_2 OR O_2. GIVEN WITH CAUTION.						
72 KON M: Ar	3000–8000	8.00(+ 2)	−1.5	75500		
$NO_2 + O \rightarrow NO + O_2$						
NITROGEN OXIDE(NO_2) + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	300–550	1.0(+13)	0	300±100	0.8	1.3
76 ENG	1500–2500	1.0(+13)	0	500±250	0.5	2.0
$NO_2 + O + M \rightarrow NO_3 + M$						
NITROGEN OXIDE(NO_2) + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 2. M: N_2	295	1.1(+13)	–	–	0.4	2.5
NOTE: LIMITING HIGH PRESSURE k						
REACTION ORDER: 3.	295	2.3(+16)	–	–	0.4	2.5
k_0 (LOW PRESSURE).						
$NO_2 + O_3 \rightarrow NO_3 + O_2$						
NITROGEN OXIDE(NO_2) + OZONE						
73 BAU/DRY REACTION ORDER: 2.	286–302	5.9(+12)	0	3500	0.5	2.0
$NO_2 + H \rightarrow NO + OH$						
NITROGEN OXIDE(NO_2) + HYDROGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	298–630	3.5(+14)	0	740±500	0.5	1.5
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 633K.						
76 ENG	1500–2500	3.2(+14)	0	750±500	0.5	2.0
$NO_2 + OH + M \rightarrow HNO_3 + M$						
NITROGEN OXIDE(NO_2) + HYDROXYL FREE RADICAL						
73 BAU/DRY REACTION ORDER: 3. M: He	300	5.0(+17)	–	–	0.4	1.6
$NO_2 + N \rightarrow O + N_2O$						
NITROGEN OXIDE(NO_2) + NITROGEN ATOM						
76 ENG REACTION ORDER: 2.	1500–2500	5.0(+12)	0	0±1500	0.5	2.0
$NO_2 + N \rightarrow O_2 + N_2$						
NITROGEN OXIDE(NO_2) + NITROGEN ATOM						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+12)	0	0±1500	0.5	2.0
$NO_2 + N \rightarrow NO + NO$						
NITROGEN OXIDE(NO_2) + NITROGEN ATOM						
76 ENG REACTION ORDER: 2.	1500–2500	4.0(+12)	0	0±1500	0.2	5.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	*T*/K	*A*	*B*	*E*/*R* (in K)	k factors f	F
$NO_2 + NO \rightarrow O_2 + N_2O$						
NITROGEN OXIDE(NO_2) + NITROGEN OXIDE(NO)						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+12)	0	30200	0.01	100.
$NO_2 + NO + O_2 \rightarrow NO_3 + NO_2$						
NITROGEN OXIDE(NO_2) + NITROGEN OXIDE(NO) + OXYGEN MOLECULE						
73 BAU/DRY REACTION ORDER: 3.	300–500	2.9(+ 7)	0	–400±500	0.4	2.5
$NO_2 + NO_2 \rightarrow NO + NO + O_2$						
NITROGEN OXIDE(NO_2)						
73 BAU/DRY REACTION ORDER: 2.	600–2000	2.0(+12)	0	13500±100	0.7	1.3
NOTE: k FACTORS INCREASING SLIGHTLY ABOVE 1000K.						
$NO_2 + NO_2 + M \rightarrow N_2O_4 + M$						
NITROGEN OXIDE(NO_2)						
73 BAU/DRY REACTION ORDER: 3. M: N_2	250–350	1.1(+13)	0	–1040	0.7	1.3
NOTE: CORRECTED k VALUE (PERSONAL COMMUNICATION FROM DR. BAULCH TO DR. HAMPSON). $k_1 = Kk_{-1}$						
$NO_2 + NO_3 \rightarrow NO + NO_2 + O_2$						
NITROGEN OXIDE(NO_2) + NITROGEN OXIDE(NO_3)						
73 BAU/DRY REACTION ORDER: 2.	300–850	1.4(+11)	0	1610±500	0.4	2.5
$NO_2 + NO_3 + M \rightarrow N_2O_5 + M$						
NITROGEN OXIDE(NO_2) + NITROGEN OXIDE(NO_3)						
73 BAU/DRY REACTION ORDER: 2.	300	2.3(+12)	–	–	0.4	2.5
NOTE: LIMITING HIGH PRESSURE k M IS A N_2O_5 + NO MIXTURE						
REACTION ORDER: 3.	300	1.0(+18)	–	–	0.5	2.0
k_0(LOW PRESSURE). M IS A N_2O_5 + NO MIXTURE.						
$NO_2 + NH \rightarrow NO + HNO$						
NITROGEN OXIDE(NO_2) + IMIDOGEN FREE RADICAL						
76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	2500±2500	0.3	3.2
$NO_2 + CO \rightarrow NO + CO_2$						
NITROGEN OXIDE(NO_2) + CARBON MONOXIDE						
72 KON REACTION ORDER: 2.	500–800	1.9(+12)	0	14726±385	0.5	1.9
76 ENG	1500–2500	2.00(+12)	0	15000±1500	0.5	2.0
$NO_2 + M \rightarrow NO + O + M$						
NITROGEN OXIDE(NO_2)						
73 BAU/DRY REACTION ORDER: 2. M: Ar	1400–2400	1.1(+16)	0	33000±750	0.8	1.3
$NO_3 + NO \rightarrow NO_2 + NO_2$						
NITROGEN OXIDE(NO_3) + NITROGEN OXIDE(NO)						
72 KON REACTION ORDER: 2.	298–547	1.5(+14)	0	1160±120	0.7	1.4
$NO_3 + NO_2 \rightarrow NO_2 + NO + O_2$						
NITROGEN OXIDE(NO_3) + NITROGEN OXIDE(NO_2)						
73 BAU/DRY REACTION ORDER: 2.	300–850	1.4(+11)	0	1600±500	0.4	2.5
$NO_3 + NO_2 + M \rightarrow N_2O_5 + M$						
NITROGEN OXIDE(NO_3) + NITROGEN OXIDE(NO_2)						
72 BAU/DRY REACTION ORDER: 2.	300	2.3(+12)	–	–	0.4	2.5
NOTE: LIMITING HIGH-PRESSURE k. M IS A N_2O_5 + NO MIXTURE. $k_1 = Kk_{-1}$						
REACTION ORDER: 3.	300	1.0(+18)	–	–	0.5	2.0
k_0(LOW PRESSURE). M IS A N_2O_5 + NO MIXTURE.						
$NO_3 + M \rightarrow NO + O_2 + M$						
NITROGEN OXIDE(NO_3)						
72 KON REACTION ORDER: 2. M: NO_2	500–1100	1.9(+11)	0	1990±110	0.8	1.3
$N_2O + O \rightarrow N_2 + O_2$						
NITROGEN OXIDE(N_2O) + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	1200–2000	1.0(+14)	0	14100±2000	0.4	2.5
$N_2O + O \rightarrow NO + NO$						
NITROGEN OXIDE(N_2O) + OXYGEN ATOM						
73 BAU/DRY REACTION ORDER: 2.	1200–2000	1.0(+14)	0	14000±1500	0.5	2.0
72 KON	900–2300	3.6(+13)	0	13700		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$N_2O + H \rightarrow N_2 + OH$ NITROGEN OXIDE(N_2O) + HYDROGEN ATOM 73 BAU/DRY REACTION ORDER: 2.	700–2500	7.6(+13)	0	7600±500	0.5	1.5
$N_2O + H \rightarrow NO + NH$ NITROGEN OXIDE(N_2O) + HYDROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	15100±2500	0.3	3.2
$N_2O + OH \rightarrow N_2 + HO_2$ NITROGEN OXIDE(N_2O) + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+13)	0	7550		
$N_2O + N \rightarrow N_2 + NO$ NITROGEN OXIDE(N_2O) + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+ 8)	0	5000±2500	0.3	3.2
$N_2O + NO \rightarrow N_2 + NO_2$ NITROGEN OXIDE(N_2O) + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+14)	0	25165	0.1	10.
$N_2O + CO \rightarrow N_2 + CO_2$ NITROGEN OXIDE(N_2O) + CARBON MONOXIDE 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0	10000±1500	0.5	2.0
$N_2O + M \rightarrow N_2 + O + M$ NITROGEN OXIDE(N_2O) 73 BAU/DRY REACTION ORDER: 2.	1300–2500	5.0(+14)	0	29000±1500	0.7	1.5
$N_2O_4 \rightarrow NO_2 + NO_2$ NITROGEN OXIDE(N_2O_4) 70 BEN/O'N REACTION ORDER: 1.	253–301	1.0(+16)	0	6600		
$N_2O_4 + M \rightarrow NO_2 + NO_2 + M$ NITROGEN OXIDE(N_2O_4) 73 BAU/DRY REACTION ORDER: 2. M: N_2	250–350	2.5(+17)	0	5550±500	0.7	1.3
$N_2O_5 + M \rightarrow NO_2 + NO_3 + M$ NITROGEN OXIDE (N_2O_5) 73 BAU/DRY REACTION ORDER: 1.	300–340	5.7(+14)	0	10600	0.4	2.5
NOTE: LIMITING HIGH-PRESSURE k. M IS A N_2O_5 + NO MIXTURE. REACTION ORDER: 2. k_0(LOW PRESSURE). M IS A N_2O_5 + NO MIXTURE.		1.3(+19)	0	9700	0.5	2.0
$NH + O \rightarrow H + NO$ IMIDOGEN FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NH + O \rightarrow N + OH$ IMIDOGEN FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$NH + O + M \rightarrow HNO + M$ IMIDOGEN FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+16)	-0.5	0±2500	0.3	3.2
$NH + H \rightarrow H + NH$ IMIDOGEN FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NH + H \rightarrow N + H_2$ IMIDOGEN FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$NH + OH \rightarrow N + H_2O$ IMIDOGEN FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	1000±2500	0.3	3.2
$NH + H_2O \rightarrow HNO + H_2$ IMIDOGEN FREE RADICAL + WATER 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	1500±2500	0.3	3.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$NH + S \rightarrow H + NS$ IMIDOGEN FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NH + S \rightarrow N + SH$ IMIDOGEN FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$NH + N \rightarrow H + N_2$ IMIDOGEN FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NH + N \rightarrow N + NH$ IMIDOGEN FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$NH + NO_2 \rightarrow HNO + NO$ IMIDOGEN FREE RADICAL + NITROGEN OXIDE(NO_2) 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	2500±2500	0.3	3.2
$NH + NH \rightarrow H_2 + N_2$ IMIDOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+13)	0	0	0.1	10.
$NH + C \rightarrow H + CN$ IMIDOGEN FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$NH + C \rightarrow N + CH$ IMIDOGEN FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$NH + CN \rightarrow N + HCN$ IMIDOGEN FREE RADICAL + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	1000±25000		
$NH_2 + H + M \rightarrow NH_3 + M$ AMIDOGEN FREE RADICAL + HYDROGEN ATOM 73 BAU/DRY REACTION ORDER: 3. M: Ar NOTE: $k_1 = Kk_{-1}$	2000–3000	4.8(+14)	0	−8300±2500	0.5	2.0
$NH_3 + O \rightarrow NH_2 + OH$ AMMONIA + OXYGEN ATOM 73 BAU/DRY REACTION ORDER: 2.	300–1000	1.5(+12)	0	3020±300	0.5	1.5
$NH_3 + CH_3. \rightarrow NH_2 + CH_4$ AMMONIA + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–650	1.0(+11)	0	5100±500	0.3	1.3
$ND_3 + CH_3. \rightarrow ND_2 + CH_3D$ AMMONIA-D_3 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	5535±500	0.3	1.3
$NH_3 + M \rightarrow H + NH_2 + M$ AMMONIA 73 BAU/DRY REACTION ORDER: 2. M: Ar	2000–3000	9.2(+15)	0	42400±2500	0.5	2.0
$NH_2NH_2 + H \rightarrow NH_2NH. + H_2$ HYDRAZINE + HYDROGEN ATOM 73 BAU/DRY REACTION ORDER: 2.	250–500	1.3(+13)	0	1260±100	0.5	2.0
$NH_2NH_2 + CH_3. \rightarrow NH_2NH. + CH_4$ HYDRAZINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	2515±500	0.5	2.0
$ND_2ND_2 + CH_3. \rightarrow ND_2ND. + CH_3D$ HYDRAZINE-D4 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	7.2(+10)	0	3200±500	0.5	2.0
$NH_2NH_2 + M \rightarrow NH_2. + NH_2. + M$ HYDRAZINE 73 BAU/DRY REACTION ORDER: 2. M: Ar NOTE: LIMITING HIGH PRESSURE k.	1250–1400	8.0(+13)	0	27700±1000	0.3	3.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$NH_2NH_2 + M \rightarrow NH_2. + NH_2. + M$ HYDRAZINE 73 BAU/DRY REACTION ORDER: 2. M: Ar NOTE: k_0(LOW PRESSURE).	1250–1400	4.0(+15)	0	20600±1000	0.3	3.0
$HN_3 + CH_3. \rightarrow N_3. + CH_4$ HYDRAZOIC ACID + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300–400	1.0(+11)	0	2100±500	0.5	2.0
$HNO + O \rightarrow H + NO_2$ NITROSYL HYDRIDE + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+10)	0.5	0±2500	0.3	3.2
$HNO + O \rightarrow NO + OH$ NITROSYL HYDRIDE + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	0±2500	0.3	3.2
$HNO + O \rightarrow NH + O_2$ NITROSYL HYDRIDE + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	3500±2500	0.3	3.2
$HNO + H \rightarrow NO + H_2$ NITROSYL HYDRIDE + HYDROGEN ATOM 73 BAU/DRY REACTION ORDER: 2.	2000	4.8(+12)	-	-	0.5	1.5
$HNO + H \rightarrow NH + OH$ NITROSYL HYDRIDE + HYDROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	11600±2500	0.3	3.2
$HNO + OH \rightarrow NO + H_2O$ NITROSYL HYDRIDE + HYDROXYL FREE RADICAL 73 BAU/DRY REACTION ORDER: 2.	2000	3.6(+13)	-	-	0.5	1.5
$HNO + N \rightarrow NO + NH$ NITROSYL HYDRIDE + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	1000±2500	0.3	3.2
$HNO + N \rightarrow N_2O + H$ NITROSYL HYDRIDE + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+10)	0.5	1500±2500	0.3	3.2
$HNO + NO \rightarrow OH + N_2O$ NITROSYL HYDRIDE + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+12)	0	13100±2500	0.5	2.0
$HNO + CO \rightarrow NH + CO_2$ NITROSYL HYDRIDE + CARBON MONOXIDE 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	3500±2500	0.3	3.2
$HNO + CH \rightarrow NO + CH_2$ NITROSYL HYDRIDE + METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+11)	0.5	0±2500	0.3	3.2
$HNO + CH_2 \rightarrow NO + CH_3.$ NITROSYL HYDRIDE + METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+11)	0.5	0±2500	0.3	3.2
$HNO + CH_3. \rightarrow NO + CH_4$ NITROSYL HYDRIDE + METHYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	0±2500	0.3	3.2
HNO + .CHO → NO + HCHO NITROSYL HYDRIDE + METHYL, OXO-, FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0.5	0±2500	0.3	3.2
HNO + CN → NO + HCN NITROSYL HYDRIDE + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	4.00(+11)	0.5	0±2500	0.3	3.2
$HNO_3 + OH \rightarrow NO_3 + H_2O$ NITRIC ACID + HYDROXYL FREE RADICAL 73 BAU/DRY REACTION ORDER: 2.	300	8.0(+10)	-	-	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	*T*/K	*A*	*B*	*E*/*R* (in K)	k factors f	F
$HNO_3 + M \rightarrow NO_2 + OH + M$ NITRIC ACID 73 BAU/DRY REACTION ORDER: 2. M: Ar	800–1200	1.6(+15)	0	15400±1500	0.4	2.5
NS + O → S + NO NITROGEN SULFIDE(NS) + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
NS + O → N + SO NITROGEN SULFIDE(NS) + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
NS + H → S + NH NITROGEN SULFIDE(NS) + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	20735		
NS + H → N + SH NITROGEN SULFIDE(NS) + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		2.5(+12)	0.5	15700		
NS + S → S + NS NITROGEN SULFIDE(NS) + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
NS + S → N + S_2 NITROGEN SULFIDE(NS) + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		2.0(+11)	0.5	10870		
NS + N → S + N_2 NITROGEN SULFIDE(NS) + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
NS + N → N + NS NITROGEN SULFIDE(NS) + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
NS + C → S + CN NITROGEN SULFIDE(NS) + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
NS + C → N + CS NITROGEN SULFIDE(NS) + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
C + O + M → CO + M CARBON ATOM + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 3. NOTE: M = Ar, OR CO $k_1 = Kk_{-1}$	7000–14000	3.3(+26)	-3.1	-2114	0.3	1.8
C + O_2 → CO + O CARBON ATOM + OXYGEN MOLECULE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
C + H_2 → CH + H CARBON ATOM + HYDROGEN MOLECULE 75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	15700		
C + OH → CO + H CARBON ATOM + HYDROXYL FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
C + OH → CH + O CARBON ATOM + HYDROXYL FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		7.9(+11)	0.5	14800		
C + S_2 → CS + S CARBON ATOM + SULFUR DIMER 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
C + SO → CO + S CARBON ATOM + SULFUR MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f F
C + SO → CS + O CARBON ATOM + SULFUR MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + SH → CH + S CARBON ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		4.0(+11)	0.5	6090	
C + SH → CS + H CARBON ATOM + MERCAPTO FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + N_2 → CN + N CARBON ATOM + NITROGEN MOLECULE 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	22750	
C + NO → CO + N CARBON ATOM + NITROGEN OXIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000	
C + NO → CN + O CARBON ATOM + NITROGEN OXIDE(NO) 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + NH → CH + N CARBON ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000	
C + NH → CN + H CARBON ATOM + IMIDOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + NS → CS + N CARBON ATOM ATOM + NITRIC SULFIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000	
C + NS → CN + S CARBON ATOM + NITRIC SULFIDE 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + CO → C_2 + O CARBON ATOM + CARBON MONOXIDE 75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	58025	
C + CH → CH + C CARBON ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000	
C + CH → C_2 + H CARBON ATOM + METHYLIDYNE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + CS → CS + C CARBON ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + CS → C_2 + S CARBON ATOM + CARBON MONOSULFIDE FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		5.0(+11)	0.5	20435	
C + CN → CN + C CARBON ATOM + CYANOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	
C + CN → C_2 + N CARBON ATOM + CYANOGEN FREE RADICAL 75 BEN/GOL REACTION ORDER: 2.		2.5(+11)	0.5	19300	
C + C_2 → C_2 + C CARBON ATOM + CARBON DIMER 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0	

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	k factors F
$CO + O \rightarrow O + CO$						
CARBON MONOXIDE + OXYGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CO + O + M \rightarrow CO_2 + M$						
CARBON MONOXIDE + OXYGEN ATOM						
76 BAU/DRY REACTION ORDER: 3. M: CO	250–500	2.4(+15)	0	2180±280	0.8	1.2
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 500K.						
$CO + O \rightarrow C + O_2$						
CARBON MONOXIDE + OXYGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	69300		
$CO + O_2 \rightarrow CO_2 + O$						
CARBON MONOXIDE + OXYGEN MOLECULE						
76 BAU/DRY REACTION ORDER: 2.	1500–3000	2.5(+12)	0	24000±2500	0.5	2.0
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 AT 3000K.						
$CO + H \rightarrow O + CH$						
CARBON MONOXIDE + HYDROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		2.5(+13)	0.5	88020		
$CO + H \rightarrow C + OH$						
CARBON MONOXIDE + HYDROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		2.0(+13)	0.5	77755		
$CO + H + M \rightarrow .CHO + M$						
CARBON MONOXIDE + HYDROGEN ATOM						
76 BAU/DRY REACTION ORDER: 3. M: H_2	298–773	7.2(+14)	0	850±500	0.7	1.3
NOTE: k FACTORS CHANGING TO: f = 0.5; F = 2.0 AT 773K.						
$CO + H + M \rightarrow .CHO + M$						
CARBON MONOXIDE + HYDROGEN ATOM						
76 ENG REACTION ORDER: 3.	1500–2500	1.6(+20)	-1.5	0	0.3	3.2
$CO + OH \rightarrow CO_2 + H$						
CARBON MONOXIDE + HYDROXYL FREE RADICAL						
76 BAU/DRY REACTION ORDER: 2.	250–2000	1.5(+ 7)	1.3	-385	0.8	1.2
NOTE: k FACTORS OVER 1000K: f = 0.5; F = 1.5.						
RECOMMENDED k FOR 250–2500K:						
$\log k(cm^3 mole^{-1} s^{-1}) = 10.83 + 3.94 \times 10^{-4} T$						
$CO + HO_2 \rightarrow CO_2 + OH$						
CARBON MONOXIDE + HYDROPEROXYL FREE RADICAL						
76 BAU/DRY REACTION ORDER: 2.	700–1000	1.5(+14)	0	11900±1000	0.3	3.0
$CO + S \rightarrow O + CS$						
CARBON MONOXIDE + SULFUR ATOM						
75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	37600		
$CO + S \rightarrow C + SO$						
CARBON MONOXIDE + SULFUR ATOM						
75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	66530		
$CO + N \rightarrow O + CN$						
CARBON MONOXIDE + NITROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		3.2(+12)	0.5	38800		
$CO + N \rightarrow C + NO$						
CARBON MONOXIDE + NITROGEN ATOM						
75 BEN/GOL REACTION ORDER: 2.		5.0(+12)	0.5	57300		
$CO + NO_2 \rightarrow CO_2 + NO$						
CARBON MONOXIDE + NITROGEN OXIDE(NO_2)						
72 KON REACTION ORDER: 2.	500–800	1.9(+12)	0	14726±385	0.5	1.9
76 ENG	1500–2500	2.0(+12)	0	15000±1500	0.5	2.0
$CO + N_2O \rightarrow CO_2 + N_2$						
CARBON MONOXIDE + NITROGEN OXIDE(N_2O)						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0	10000±1500	0.5	2.0
$CO + HNO \rightarrow CO_2 + NH$						
CARBON MONOXIDE + NITROSYL HYDRIDE						
76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	3500±2500	0.3	3.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CO + C \rightarrow O + C_2$ CARBON MONOXIDE + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	58025		
$CO + CH_3. \rightarrow CH_3C(O).$ CARBON MONOXIDE + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	273–400	3.8(+ 8)	0	1965		
$CO + M \rightarrow C + O + M$ CARBON MONOXIDE 76 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 OVER 10000K. M = Ar OR CO	7000–15000	8.8(+29)	-3.5	128700±1800	0.3	1.8
$CO_2 + O \rightarrow CO + O_2$ CARBON DIOXIDE + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGING TO: f = 0.5; F = 1.5 AT 3000K. $k_1 = Kk_{-1}$	1500–3000	1.7(+13)	0	26500±2500	0.5	2.0
$CO_2 + H \rightarrow CO + OH$ CARBON DIOXIDE + HYDROGEN ATOM 76 BAU/DRY REACTION ORDER: 2.	1000–3000	1.5(+14)	0	13300±150	0.8	1.2
$CO_2 + H_2 \rightarrow CO + H_2O$ CARBON DIOXIDE + HYDROGEN MOLECULE 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+ 9)	0.5	7550±2500	0.3	3.2
$CO_2 + N \rightarrow CO + NO$ CARBON DIOXIDE + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	15000±10000	0.1	1.0
$CO_2 + CH \rightarrow CO + .CHO$ CARBON DIOXIDE + METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+10)	0.5	3000±2500	0.3	3.2
$CO_2 + M \rightarrow CO + O + M$ CARBON DIOXIDE 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+15)	0	50000±2500	0.5	2.0
$CH + O \rightarrow H + CO$ METHYLIDYNE FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CH + O \rightarrow C + OH$ METHYLIDYNE FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$CH + O + M \rightarrow .CHO + M$ METHYLIDYNE FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 3.	1500–2500	1.0(+16)	-0.5	0±2500	0.3	3.2
$CH + O_2 \rightarrow .CHO + O$ METHYLIDYNE FREE RADICAL + OXYGEN MOLECULE 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$CH + H \rightarrow H + CH$ METHYLIDYNE FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CH + H \rightarrow C + H_2$ METHYLIDYNE FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$CH + H + M \rightarrow CH_2 + M$ METHYLIDYNE FREE RADICAL + HYDROGEN ATOM 76 ENG REACTION ORDER: 3.	1500–2500	1.00(+19)	-1.0	0	0.3	3.2
$CH + OH \rightarrow .CHO + H$ METHYLIDYNE FREE RADICAL + HYDROPEROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	5000±2500	0.3	3.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH + HO_2 \rightarrow CH_2 + O_2$ METHYLIDYNE FREE RADICAL + HYDROPEROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+10)	0.5	7550±2500	0.3	3.2
$CH + HO_2 \rightarrow .CHO + OH$ METHYLIDYNE FREE RADICAL + HYDROPEROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500-2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$CH + S \rightarrow H + CS$ METHYLIDYNE FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CH + S \rightarrow C + SH$ METHYLIDYNE FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$CH + N \rightarrow H + CN$ METHYLIDYNE FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CH + N \rightarrow C + NH$ METHYLIDYNE FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.0(+12)	0.5	6995		
$CH + N_2 \rightarrow CN + NH$ METHYLIDYNE FREE RADICAL + NITROGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500-2500	3.2(+14)	0	46300±10000		
$CH + N_2 \rightarrow HCN + N$ METHYLIDYNE FREE RADICAL + NITROGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: REVISED ESTIMATE.	1500-2500	1.0(+11)	0	9560		
$CH + NO \rightarrow .CHO + N$ METHYLIDYNE FREE RADICAL + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500-2500	1.6(+13)	0	5000±3000		
$CH + NO \rightarrow HCN + O$ METHYLIDYNE FREE RADICAL + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500-2500	2.0(+12)	0	0±1000		
$CH + HNO \rightarrow CH_2 + NO$ METHYLIDYNE FREE RADICAL + NITROSYL HYDRIDE 76 ENG REACTION ORDER: 2.	1500-2500	6.3(+11)	0.5	0±2500	0.3	3.2
$CH + C \rightarrow H + C_2$ METHYLIDYNE FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CH + C \rightarrow C + CH$ METHYLIDYNE FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	4000		
$CH + CO_2 \rightarrow .CHO + CO$ METHYLIDYNE FREE RADICAL + CARBON DIOXIDE 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+10)	0.5	3000±2500	0.3	3.2
$CH + CH_4 \rightarrow CH_2 + CH_3.$ METHYLIDYNE FREE RADICAL + METHANE 76 ENG REACTION ORDER: 2.	1500-2500	2.5(+11)	0.7	3000±2500	0.3	3.2
$CH + .CHO \rightarrow CH_2 + CO$ METHYLIDYNE FREE RADICAL + METHYL, OXO-, FREE RADICAL 76 ENG REACTION ORDER: 2.	1500-2500	3.2(+10)	0.7	500±2500	0.3	3.2
$CH + HCHO \rightarrow CH_2 + .CHO$ METHYLIDYNE FREE RADICAL + FORMALDEHYDE 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+11)	0.7	2000±2500	0.3	3.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_2 + O \rightarrow CH + OH$ METHYLENE FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.7	13000±2500	0.3	3.2
$CH_2 + O \rightarrow .CHO + H$ METHYLENE FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	2000±2500	0.3	3.2
$CH_2 + O_2 \rightarrow HCHO + O$ METHYLENE FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3500±2500	0.3	3.2
$CH_2 + H \rightarrow CH + H_2$ METHYLENE FREE RADICAL + HYDROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0.7	2500±2500	0.3	3.2
$CH_2 + H_2 \rightarrow CH_3. + H$ METHYLENE FREE RADICAL + HYDROGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+12)	0	3525±1500		
$CH_2 + OH \rightarrow CH + H_2O$ METHYLENE FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$CH_2 + OH \rightarrow CH_3. + O$ METHYLENE FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$CH_2 + OH \rightarrow HCHO + H$ METHYLENE FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+13)	0	2500		
$CH_2 + N \rightarrow CH + NH$ METHYLENE FREE RADICAL + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+11)	0.67	20400±2500	0.3	3.2
$CH_2 + N_2 \rightarrow HCN + NH$ METHYLENE FREE RADICAL + NITROGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+14)	0	35230±10000		
$CH_2 + NO \rightarrow HCHO + N$ METHYLENE FREE RADICAL + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.6(+12)	0	3500±2000		
$CH_2 + HNO \rightarrow CH_3. + NO$ METHYLENE FREE RADICAL + NITROSYL HYDRIDE 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+11)	0.5	0±2500	0.3	3.2
$CH_2 + CH_2 \rightarrow CH + CH_3.$ METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	3000±2500	0.3	3.2
$CH_2 + CH_4 \rightarrow CH_3. + CH_3.$ METHYLENE FREE RADICAL + METHANE 76 ENG REACTION ORDER: 2.	1500–2500	1.3(+12)	0.7	10000±2500	0.3	3.2
$CH_2 + .CHO \rightarrow CH_3. + CO$ METHYLENE FREE RADICAL + METHYL, OXO-, FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+10)	0.7	500±2500	0.3	3.2
$CH_2 + HCHO \rightarrow CH_3. + CHO$ METHYLENE FREE RADICAL + FORMALDEHYDE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	2.0(+11)	0	3270±1500		
$CH_2 + CN \rightarrow CH + HCN$ METHYLENE FREE RADICAL + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+12)	0	2500±1500		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$^1CH_2 + CH_3CH=CH_2 \rightarrow$ products METHYLENE FREE RADICAL + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.27 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2 + CH_3CH=CH_2 \rightarrow$ products METHYLENE FREE RADICAL + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.0 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$^1CH_2 + CH_3CH_2CH=CH_2 \rightarrow$ products METHYLENE FREE RADICAL + 1-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.63 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2 + CH_3CH_2CH=CH_2 \rightarrow$ products METHYLENE FREE RADICAL + 1-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.6 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$^1CH_2 + cis\text{-}CH_3CH=CHCH_3 \rightarrow$ products METHYLENE FREE RADICAL + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.37 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2$: + $cis\text{-}CH_3CH=CHCH_3 \rightarrow$ products METHYLENE FREE RADICAL + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.94 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$^1CH_2 + trans\text{-}CH_3CH=CHCH_3 \rightarrow$ products METHYLENE FREE RADICAL + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.39 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2 + trans\text{-}CH_3CH=CHCH_3 \rightarrow$ products METHYLENE FREE RADICAL + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.89 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$^1CH_2 + (CH_3)_2C=CH_2 \rightarrow$ products METHYLENE FREE RADICAL + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.96 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2 + (CH_3)_2C=CH_2 \rightarrow$ products METHYLENE FREE RADICAL + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.86 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$^1CH_2 + (CH_3)_2C=CHCH_3 \rightarrow$ products METHYLENE FREE RADICAL + 2-BUTENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.12 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2 + (CH_3)_2C=CHCH_3 \rightarrow$ products METHYLENE FREE RADICAL + 2-BUTENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.83 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$^1CH_2 + (CH_3)_2C=C(CH_3)_2 \rightarrow$ products METHYLENE FREE RADICAL + 2-BUTENE, 2,3-DIMETHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.16 NOTE: k_{ref}: $^1CH_2 + CH_2=CH_2$	297	-	-	-		
$^3CH_2 + (CH_3)_2C=C(CH_3)_2 \rightarrow$ products METHYLENE FREE RADICAL + 2-BUTENE, 2,3-DIMETHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.74 NOTE: k_{ref}: $^3CH_2 + CH_2=CH_2$	297	-	-	-		
$CH_3. + O \rightarrow HCHO + H$ METHYL FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500-2500	5.0(+13)	0	0	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3. + O_2 \rightarrow CH_2 + HO_2$ METHYL FREE RADICAL + OXYGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+12)	0	34975±1500		
$CH_3. + O_2 \rightarrow HCHO + OH$ METHYL FREE RADICAL + OXYGEN MOLECULE 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+13)	0	10000±5000	0.3	3.2
$CH_3. + O_2 \rightarrow CH_3O. + O$ METHYL FREE RADICAL + OXYGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+12)	0	15100±1500		
$CH_3. + H_2 \rightarrow CH_4 + H.$ METHYL FREE RADICAL + HYDROGEN MOLECULE 72 KER/PAR REACTION ORDER: 2.	370–700	8.5(+11)	0	5500±500	0.7	1.3
$CH_3. + HD \rightarrow CH_3D + H.$ METHYL FREE RADICAL + DEUTERIUM HYDRIDE 76 KER/PAR REACTION ORDER: 2.	400–700	2.4(+11)	0	5635±500	0.5	1.5
$CH_3. + HD \rightarrow CH_4 + D.$ METHYL FREE RADICAL + DEUTERIUM HYDRIDE 76 KER/PAR REACTION ORDER: 2.	400–700	2.1(+11)	0	5300±500	0.5	1.5
$CH_3. + D_2 \rightarrow CH_3D + D.$ METHYL FREE RADICAL + DEUTERIUM MOLECULE 76 KER/PAR REACTION ORDER: 2.	300–700	7.1(+11)	0	5990±250	0.7	1.3
$CD_3. + H_2 \rightarrow CD_3H + H.$ METHYL-D_3 FREE RADICAL + HYDROGEN MOLECULE 72 KON REACTION ORDER: 2.	400–570	7.4(+11)	0	5250±235	0.6	1.7
$CH_3. + OH \rightarrow CH_2 + H_2O$ METHYL FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+10)	0.7	1000±2500	0.3	3.2
$CH_3. + OH \rightarrow CH_3O. + H$ METHYL FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	6.3(+12)	0	0		
$CH_3. + HO_2 \rightarrow CH_4 + O_2$ METHYL FREE RADICAL + HYDROPEROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.5	3000±2500	0.3	3.2
$CH_3. + H_2O \rightarrow CH_4 + .OH$ METHYL FREE RADICAL + WATER 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	1273–1773	7.1(+12)	0	12900±1000	0.5	2.0
$CH_3. + H_2S \rightarrow CH_4 + SH$ METHYL FREE RADICAL + HYDROGEN SULFIDE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300–600	2.0(+11)	0	2065±750	0.4	2.5
$CH_3. + NH_3 \rightarrow CH_4 + NH_2$ METHYL FREE RADICAL + AMMONIA 76 KER/PAR REACTION ORDER: 2.	350–650	1.0(+11)	0	5100±500	0.3	1.8
$CH_3. + ND_3 \rightarrow CH_3D + ND_2$ METHYL FREE RADICAL + AMMONIA-d_3 76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	5535±500	0.3	1.8
$CH_3. + NH_2NH_2 \rightarrow CH_4 + NH_2NH.$ METHYL FREE RADICAL + HYDRAZINE 76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	2500±500	0.5	2.0
$CH_3. + ND_2ND_2 \rightarrow CH_3D + ND_2ND.$ METHYL FREE RADICAL + HYDRAZINE-d_4 76 KER/PAR REACTION ORDER: 2.	350–500	7.2(+10)	0	3200±500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3. + HN_3 \rightarrow CH_4 + N_3$ METHYL FREE RADICAL + HYDRAZOIC ACID 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300–400	1.0(+11)	0	2100±500	0.5	2.0
$CH_3. + HNO \rightarrow CH_4 + NO$ METHYL FREE RADICAL + NITROSYL HYDRIDE 76 KER/PAR REACTION ORDER: 2.	1500–2500	5.0(+11)	0.5	0±2500	0.3	3.2
$CH_3. + CO \rightarrow CH_3C(O).$ METHYL FREE RADICAL + CARBON MONOXIDE 72 KON REACTION ORDER: 2.	273–400	3.8(+8)	0	1968		
$CH_3. + CH_4 \rightarrow CH_4 + CH_3.$ METHYL FREE RADICAL + METHANE 76 KER/PAR REACTION ORDER: 2.	450–800	4.0(+11)	0	7045±250	0.7	1.3
$CH_3. + CHD_3 \rightarrow CH_4 + CD_3.$ METHYL FREE RADICAL + METHANE-d_3 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–650	1.1(+11)	0	6995±250	0.7	1.3
$CH_3. + CD_4 \rightarrow CH_3D + CD_3.$ METHYL FREE RADICAL + METHANE-d_4 76 KER/PAR REACTION ORDER: 2.	400–650	2.5(+11)	0	7700±500	0.5	1.5
$CD_3. + CH_3D \rightarrow CD_4 + CH_3.$ METHYL-d_3-FREE RADICAL + METHANE-d 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–650	5.0(+10)	0	7200±500	0.5	1.5
$CD_3. + CD_4 \rightarrow CD_4 + CD_3.$ METHYL-d_3-FREE RADICAL + METHANE-d_4 72 KON REACTION ORDER: 2.	473–623	4.1(+12)	0	8960±250		
$CH_3. + .CHO \rightarrow CH_4 + CO$ METHYL FREE RADICAL + METHYL, OXO-, FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0.5	0±2500	0.3	3.2
$CH_3. + HCHO \rightarrow CH_4 + .CHO$ METHYL FREE RADICAL + FORMALDEHYDE 76 KER/PAR REACTION ORDER: 2.	300–500	1.1(+11)	0	3070±500	0.5	1.5
$CH_3. + HCHO \rightarrow CH_4 + .CHO$ METHYL FREE RADICAL + FORMALDEHYDE 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+10)	0.5	3000±2500	0.3	3.2
$CH_3. + DCDO \rightarrow CH_3D + .CDO$ METHYL FREE RADICAL + FORMALDEHYDE-d_2 76 KER/PAR REACTION ORDER: 2.	300–500	1.4(+11)	0	3975±500	0.5	1.5
$CH_3. + CH_3OH \rightarrow CH_4 + CH_3O.$ METHYL FREE RADICAL + METHANOL 76 KER/PAR REACTION ORDER: 2.	350–550	6.2(+10)	0	4900±500	0.6	1.4
$CH_3. + CH_3OH \rightarrow CH_4 + .CH_2OH$ METHYL FREE RADICAL + METHANOL 76 KER/PAR REACTION ORDER: 2.	350–500	1.9(+11)	0	5035±500	0.6	1.4
$CH_3. + CH_3OH \rightarrow CH_4 + CH_3O. + .CH_2OH$ METHYL FREE RADICAL + METHANOL 76 KER/PAR REACTION ORDER: 2.	350–550	2.3(+11)	0	4900±500	0.6	1.4
$CH_3. + CD_3OH \rightarrow CH_3D + .CD_2OH$ METHYL FREE RADICAL + METHAN-d_3-OL 76 KER/PAR REACTION ORDR: 2.	370–550	2.0(+11)	0	5940±500	0.6	1.4
$CH_3. + CD_3OH \rightarrow CH_4 + CD_3O.$ METHYL FREE RADICAL + METHAN-d_3-OL 76 KER/PAR REACTION ORDER: 2.	370–550	6.2(+10)	0	4900±500	0.6	1.4
$CD_3. + CH_3OD \rightarrow CD_3H + .CH_2OD$ METHYL-d_3 FREE RADICAL + METHANOL-d 76 KER/PAR REACTION ORDER: 2.	400–500	1.9(+11)	0	5000±500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CD_3.$ + CH_3OD → CD_4 + $CH_3O.$ METHYL-d_3 FREE RADICAL + METHANOL-d 76 KER/PAR REACTION ORDER: 2. NOTE: GIVEN WITH CAUTION	400-500	3.2(+10)	0	5700±1000	0.5	2.0
$CH_3.$ + CH_3SH → CH_4 + $CH_3S.$ + $.CH_2SH$ METHYL FREE RADICAL + METHANETHIOL 76 KER/PAR REACTION ORDER: 2.	303	1.2(+ 8)	-	-	0.5	2.0
$CH_3.$ + CD_3SH → CH_4 + $CD_3S.$ METHYL FREE RADICAL + METHANE-d_3-THIOL 76 KER/PAR REACTION ORDER: 2.	400-500	1.1(+11)	0	2050±500	0.5	2.0
$CH_3.$ + CD_3SH → CH_3D + $.CD_2SH$ METHYL FREE RADICAL + METHANE-d_3-THIOL 76 KER/PAR REACTION ORDER: 2.	400-500	7.6(+10)	0	4200±250	0.5	2.0
$CH_3.$ + CN → CH_2 + HCN METHYL FREE RADICAL + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+11)	0.7	1500±2500	0.3	3.2
$CH_3.$ + CH_3NH_2 → CH_4 + $.CH_2NH_2$ METHYL FREE RADICAL + METHANAMINE 72 KON REACTION ORDER: 2.	388-617	5.4(+11)	0	5020±500	0.3	3.0
$CH_3.$ + CH_3NH_2 → CH_4 + $CH_3NH.$ + $.CH_2NH_2$ METHYL FREE RADICAL + METHANAMINE 76 KER/PAR REACTION ORDER: 2.	350-650	2.1(+11)	0	4330±500	0.7	1.3
$CH_3.$ + CH_3ND_2 → CH_4 + $.CH_2ND_2$ METHYL FREE RADICAL + METHANAMINE-d_2 76 KER/PAR REACTION ORDER 2.	350-450	1.4(+11)	0	4530±500	0.7	1.3
$CH_3.$ + CH_3ND_2 → CH_3D + CH_3ND METHYL FREE RADICAL + METHANAMINE-d_2 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-450	2.0(+11)	0	5135±1000	0.5	1.5
$CH_3.$ + CD_3NH_2 → CH_4 + $CD_3NH.$ METHYL FREE RADICAL + METHAN-d_3-AMINE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400-500	2.0(+11)	0	4530±750	0.5	2.0
$CH_3.$ + CD_3NH_2 → CH_3D + $.CD_2NH_2$ METHYL FREE RADICAL + METHAN-d_3-AMINE 76 KER/PAR REACTION ORDER: 2.	400-500	7.2(+10)	0	5100±500	0.5	1.5
$CH_3.$ + CH_3NHNH_2 → CH_4 + $CH_3N(.)NH_2$ + $CH_3NHNH.$ + $.CH_2NHNH_2$ METHYL FREE RADICAL + HYDRAZINE, METHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	420	6.3(+ 8)	-	-		
$CH_3.$ + $HCONH_2$ → CH_4 + HCONH. + $.CONH_2$ METHYL FREE RADICAL + FORMAMIDE 76 KER/PAR REACTION ORDER: 2.	350-500	3.6(+10)	0	3300±500	0.5	1.5
$CH_3.$ + $HCOND_2$ → CH_4 + $.COND_2$ METHYL FREE RADICAL + FORMAMIDE-N,N-d_2 76 KER/PAR REACTION ORDER: 2.	350-500	5.5(+10)	0	3575±500	0.5	2.0
$CH_3.$ + $HCOND_2$ → CH_3D + HCOND METHYL FREE RADICAL + FORMAMIDE-N,N-d_2 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	2.0(+11)	0	4900±500	0.5	2.0
$CH_3.$ + CH_3NO_2 → CH_4 + $.CH_2NO_2$ METHYL FREE RADICAL + METHANE, NITRO- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300-500	1.0(+11)	0	5100±750	0.5	2.5
$CH_3.$ + CH_3ONH_2 → CH_4 + $CH_3ONH.$ METHYL FREE RADICAL + HYDROXYLAMINE, O-METHYL- 76 KER/PAR REACTION ORDER: 2.	300-500	5.0(+10)	0	2265±500	0.5	1.5

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3. + CH_3OND_2 \rightarrow CH_3D + CH_3OND.$ METHYL FREE RADICAL + HYDROXYLAMINE-N,N-d_2, O-METHYL- 76 KER/PAR REACTION ORDER: 2.	300–500	3.5(+10)	0	2970±500	0.5	1.5
$CH_3. + CH{\equiv}CH \rightarrow CH_4 + CH{\equiv}C.$ METHYL FREE RADICAL + ETHYNE 76 KER/PAR REACTION ORDER: 2. NOTE: GIVEN WITH CAUTION.	473–773	–	–	7100		
$CH_3. + CH{\equiv}CH \rightarrow CH_3CH{=}CH.$ METHYL FREE RADICAL + ETHYNE 72 KER/PAR REACTION ORDER: 2.	371–479	2.5(+11)	0	3900		
$CH_3. + CH_2{=}CH_2 \rightarrow CH_4 + CH_2{=}CH.$ METHYL FREE RADICAL + ETHENE 76 KER/PAR REACTION ORDER: 2.	350–650	4.2(+11)	0	5600±500	0.5	1.5
$CH_3. + CH_2{=}CH_2 \rightarrow CH_3CH_2CH_2.$ METHYL FREE RADICAL + ETHENE 72 KER/PAR REACTION ORDER: 2.	353–453	3.3(+11)	0	3900		
$CH_3. + CH_2{=}CH_2 \rightarrow CH_3CH_2CH_2. + (CH_3)_2CH.$ METHYL FREE RADICAL + ETHENE 72 KON REACTION ORDER: 2.	350–705	2.0(+11)	0	3575±105	0.8	1.3
$CH_3. + CH_3CH_3 \rightarrow CH_4 + CH_3CH_2.$ METHYL FREE RADICAL + ETHANE 76 KER/PAR REACTION ORDER: 2.	400–800	5.6(+11)	0	5840±250	0.7	1.3
$CH_3. + CD_3CD_3 \rightarrow CH_3D + CD_3CD_2.$ METHYL FREE RADICAL + ETHANE-d_6 76 KER/PAR REACTION ORDER: 2.	500–900	5.6(+11)	0	6600±250	0.7	1.3
$CD_3. + CH_3CH_3 \rightarrow CD_3H + CH_3CH_2.$ METHYL-d_3 FREE RADICAL + ETHANE 72 KON REACTION ORDER: 2.	390–800	1.0(+12)	0	6085±165	0.7	1.4
$CD_3. + CH_3CD_3 \rightarrow CD_3H + CD_3CH_2.$ METHYL-d_3 FREE RADICAL + ETHANE-1,1,1-d_3 76 KER/PAR REACTION ORDER: 2.	500–750	3.0(+11)	0	5900±250	0.7	1.3
$CD_3. + CH_3CD_3 \rightarrow CD_4 + CH_3CD_2$ METHYL-d_3 FREE RADICAL + ETHANE-1,1,1-d_3 76 KER/PAR REACTION ORDER: 2.	500–750	4.3(+11)	0	6845+250	0.7	1.3
$CD_3. + CD_3CD_3 \rightarrow CD_4 + CD_3CD_2.$ METHYL-d_3 FREE RADICAL + ETHANE-d_6 72 KON REACTION ORDER: 2.	550–760	4.6(+11)	0	6405		
$CH_3. + CH_3CHO \rightarrow CH_4 + CH_3C(O).$ METHYL FREE RADICAL + ACETALDEHYDE 76 KER/PAR REACTION ORDER: 2.	300–525	8.5(+10)	0	3000±250	0.4	1.6
$CH_3. + CH_3CDO \rightarrow CH_3D + CH_3C(O).$ METHYL FREE RADICAL + ACETALDEHYDE-1-d 76 KER/PAR REACTION ORDER: 2.	300–500	1.0(+11)	0	3975±500	0.5	1.5
$CH_3. + cy\text{-}CH_2CH_2O \rightarrow CH_4 + cy\text{-}CH_2CH(.)O$ METHYL FREE RADICAL + OXIRANE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	5435±750	0.5	2.0
$CH_3. + HCOOCH_3 \rightarrow CH_4 + .COOCH_3$ METHYL FREE RADICAL + FORMIC ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2.	350–550	2.0(+11)	0	4900±500	0.5	1.5
$CH_3. + HCOOCH_3 \rightarrow CH_4 + HCOOCH_2.$ METHYL FREE RADICAL + FORMIC ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2.	350–550	1.6(+11)	0	5635±500	0.5	1.5
$CH_3. + HCOOCH_3 \rightarrow CH_4 + .COOCH_3 + HCOOCH_2$ METHYL FREE RADICAL + FORMIC ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2.	350–550	3.0(+11)	0	4980±500	0.5	1.5

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $DCOOCH_3$ → CH_3D + $.COOCH_3$ METHYL FREE RADICAL + FORMIC-d ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2.	350–550	2.5(+11)	0	5900±500	0.5	1.5
$CH_3.$ + $DCOOCH_3$ → CH_4 + $DCOOCH_2.$ METHYL FREE RADICAL + FORMIC-d ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–550	1.6(+11)	0	5635±500	0.5	1.5
$CH_3.$ + CH_3COOD → CH_4 + $.CH_2COOD$ METHYL FREE RADICAL + ACETIC ACID-d 76 KER/PAR REACTION ORDER: 2.	300–600	1.6(+11)	0	5135±500	0.6	1.4
$CH_3.$ + CH_3CH_2OH → CH_4 + $CH_3CH_2O.$ METHYL FREE RADICAL + ETHANOL 76 KER/PAR REACTION ORDER: 2.	400–625	7.9(+10)	0	4730±500	0.6	1.4
$CH_3.$ + CH_3CH_2OH → CH_4 + $CH_3CH(.)OH$ METHYL FREE RADICAL + ETHANOL 76 KER/PAR REACTION ORDER: 2.	400–625	4.00(+11)	0	4900±500	0.6	1.4
$CH_3.$ + CH_3CH_2OH → CH_4 + $CH_3CH_2O.$ + $CH_3CH(.)OH$ + $.CH_2CH_2OH$ METHYL FREE RADICAL + ETHANOL 76 KER/PAR REACTION ORDER: 2.	400–625	5.1(+11)	0	4900±500	0.6	1.4
$CH_3.$ + CH_3CD_2OH → CH_4 + $CH_3CD_2O.$ + $.CH_2CD_2OH$ METHYL FREE RADICAL + ETHAN-1,1-d_2-OL 76 KER/PAR REACTION ORDER: 2.	400–550	7.1(+10)	0	4530±500	0.6	1.4
$CH_3.$ + CH_3CD_2OH → CH_3D + $CH_3CD(.)OH$ METHYL FREE RADICAL + ETHAN-1,1-d_2-OL 76 KER/PAR REACTION ORDER: 2.	400–550	4.1(+11)	0	5735±500	0.6	1.4
$CD_3.$ + CH_3CH_2OD → CD_3H + $CH_3CH(.)OD$ + $.CH_2CH_2OD$ METHYL-d_3 FREE RADICAL + ETHANOL-d 76 KER/PAR REACTION ORDER: 2.	400–525	4.4(+11)	0	4900±500	0.6	1.4
$CD_3.$ + CH_3CH_2OD → CD_4 + $CH_3CH_2O.$ METHYL-d_3 FREE RADICAL + ETHANOL-d 76 KER/PAR REACTION ORDER: 2.	400–525	6.2(+10)	0	5135±500	0.5	2.0
$CH_3.$ + CH_3OCH_3 → CH_4 + $CH_3OCH_2.$ METHYL FREE RADICAL + METHANE, OXYBIS- 76 KER/PAR REACTION ORDER: 2.	300–550	4.2(+11)	0	5035±500	0.5	1.5
$CH_3.$ + CH_3OOCH_3 → CH_4 + $CH_3OOCH_2.$ METHYL FREE RADICAL + PEROXIDE, DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	4.2(+11)	0	5000±1000	0.3	3.0
$CD_3.$ + cy-CH_2CH_2S → CD_3H + cy-$CH_2CH(.)S$ METHYL-d_3 FREE RADICAL + THIIRANE 76 KER/PAR REACTION ORDER: 2.	300–500	2.2(+11)	0	4800±500	0.5	2.0
$CH_3.$ + CH_3CH_2SH → CH_4 + $CH_3CH_2S.$ + $CH_3CH(.)SH$ + $.CH_2CH_2SH$ METHYL FREE RADICAL + ETHANETHIOL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	303	3.5(+ 7)	-	-	0.5	2.0
$CH_3.$ + CH_3CN → CH_4 + $.CH_2CN$ METHYL FREE RADICAL + ACETONITRILE 76 KER/PAR REACTION ORDER: 2.	350–600	5.4(+11)	0	5100±500	0.5	1.5
$CH_3.$ + $CH_3CH_2NH_2$ → CH_4 + $CH_3CH_2NH.$ + $CH_3CH(.)NH_2$ + $.CH_2CH_2NH_2$ METHYL FREE RADICAL + ETHANAMINE 76 KER/PAR REACTION ORDER: 2.	350–500	2.9(+11)	0	4200±500	0.5	2.0
$CH_3.$ + $CH_3CH_2NH_2$ → CH_4 + $CH_3CH_2NH.$ METHYL FREE RADICAL + ETHANAMINE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.0(+11)	0	4600±500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $CD_3CH_2NH_2$ → CH_4 + CH_3D + $CD_3CH(.)NH_2$ + $.CD_2CH_2NH_2$ METHYL FREE RADICAL + ETHAN-2,2,2-d_3-AMINE 76 KER/PAR REACTION ORDER: 2.	350-500	2.9(+11)	0	4200±500	0.5	2.0
$CH_3.$ + $CD_3CH_2NH_2$ → CH_4 + $CD_3CH_2NH.$ METHYL FREE RADICAL + ETHAN-2,2,2-d_3-AMINE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	423	4.0(+ 5)	-	-		
$CH_3.$ + $(CH_3)_2NH$ → CH_4 + $(CH_3)_2N.$ + $.CH_2NHCH_3$ METHYL FREE RADICAL + METHANAMINE, N-METHYL- 76 KER/PAR REACTION ORDER: 2.	350-650	1.6(+11)	0	3500±500	0.5	2.0
$CH_3.$ + $(CH_3)_2NH$ → CH_4 + $(CH_3)_2N.$ METHYL FREE RADICAL + METHANAMINE, N-METHYL- 76 KER/PAR REACTION ORDER: 2.	350-650	6.5(+10)	0	3200±500	0.5	2.0
$CH_3.$ + $(CH_3)_2ND$ → CH_4 + $.CH_2NDCH_3$ METHYL FREE RADICAL + METHANAMINE-d, N-METHYL- 76 KER/PAR REACTION ORDER: 2.	350-500	2.9(+11)	0	4400±500	0.5	1.5
$CH_3.$ + $(CH_3)_2ND$ → CH_3D + $(CH_3)_2N.$ METHYL FREE RADICAL + METHANAMINE-d, N-METHYL- 76 KER/PAR REACTION ORDER: 2.	350-500	1.0(+11)	0	4300±500	0.5	1.5
$CH_3.$ + $CH_3N{=}NCH_3$ → CH_4 + $.CH_2N{=}NCH_3$ METHYL FREE RADICAL + DIAZENE, DIMETHYL- 76 KER/PAR REACTION ORDER: 2.	300-500	1.1(+11)	0	3975±250	0.7	1.3
$CH_3.$ + $CH_3N{=}NCH_3$ → $(CH_3)_2NN(.)CH_3$ METHYL FREE RADICAL + DIAZENE, DIMETHYL- 72 KON REACTION ORDER: 2.	300-450	5.0(+10)	0	3040±355	0.4	2.6
$CD_3.$ + $CD_3N{=}NCD_3$ → CD_4 + $CD_2N{=}NCD_3$ METHYL-d_3 FREE RADICAL + DIAZENE, DI(METHYL-d_3)- 76 KER/PAR REACTION ORDER: 2.	300-500	6.6(+10)	0	4125±500	0.5	1.5
$CH_3.$ + $NH_2CH_2CH_2NH_2$ → CH_4 + $.NHCH_2CH_2NH_2$ + $NH_2CH(.)CH_2NH_2$ METHYL FREE RADICAL + 1,2-ETHANEDIAMINE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	3.8(+11)	0	4200±500	0.5	2.0
$CH_3.$ + $NH_2CH_2CH_2NH_2$ → CH_4 + $.NHCH_2CH_2NH_2$ METHYL FREE RADICAL + 1,2-ETHANEDIAMINE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	2.0(+11)	0	4430±500	0.5	2.0
$CH_3.$ + $ND_2CH_2CH_2ND_2$ → CH_4 + $ND_2CH(.)CH_2ND_2$ METHYL FREE RADICAL + 1,2-ETHANEDI(AMINE-d_2) 76 KER/PAR REACTION ORDER: 2.	350-500	2.0(+11)	0	4000±500	0.5	2.0
$CH_3.$ + $ND_2CH_2CH_2ND_2$ → CH_3D + $.NDCH_2CH_2ND_2$ METHYL FREE RADICAL + 1,2-ETHANEDI(AMINE-d_2) 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	3.2(+11)	0	5100±500	0.5	2.0
$CH_3.$ + $(CH_3)_2NNH_2$ → CH_4 + $(CH_3)_2NNH$ METHYL FREE RADICAL + HYDRAZINE, 1,1-DIMETHYL- 76 KER/PAR REACTION ORDER: 2.	350-500	1.7(+11)	0	2870±500	0.5	1.5
$CH_3.$ + $(CH_3)_2NNH_2$ → CH_4 + $(CH_3)_2NNH.$ + $.CH_2N(CH_3)NH_2$ METHYL FREE RADICAL + HYDRAZINE, 1,1-DIMETHYL- 76 KER/PAR REACTION ORDER: 2.	350-500	2.4(+11)	0	2970±500	0.5	1.5
$CH_3.$ + $(CH_3)_2NND_2$ → CH_4 + $.CH_2N(CH_3)ND.$ METHYL FREE RADICAL + HYDRAZINE-d_2, 1,1-DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	3.2(+11)	0	4125±750	0.5	2.0
$CH_3.$ + $(CH_3)_2NND_2$ → CH_3D + $(CH_3)_2NND.$ METHYL FREE RADICAL + HYDRAZINE-d_2, 1,1-DIMETHYL- 76 KER/PAR REACTION ORDER: 2.	350-500	2.1(+11)	0	3400±500	0.5	1.5

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $CH_3NHNHCH_3$ → CH_4 + $CH_3N(.)NHCH_3$ + $.CH_2NHNHCH_3$ METHYL FREE RADICAL + HYDRAZINE, 1,2-DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	2400±250	0.5	2.0
$CH_3.$ + $CH_3NDNDCH_3$ → CH_3D + $CH_3N(.)NDCH_3$ METHYL FREE RADICAL + HYDRAZINE-1,2-d_2, 1,2-DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.0(+11)	0	2700±500	0.5	2.0
$CH_3.$ + $HCONHCH_3$ → CH_4 + $.CONHCH_3$ + $HCON(.)CH_3$ + $HCONHCH_2.$ METHYL FREE RADICAL + FORMAMIDE, N-METHYL- 76 KER/PAR REACTION ORDER: 2.	400–600	7.9(+10)	0	3800±500	0.5	1.5
$CH_3.$ + CH_3CONH_2 → CH_4 + $CH_3CONH.$ + $.CH_2CONH_2$ METHYL FREE RADICAL + ACETAMIDE 76 KER/PAR REACTION ORDER: 2.	350–600	2.1(+11)	0	5235±500	0.5	1.5
$CH_3.$ + CH_3CONH_2 → CH_4 + $.CH_2CONH_2$ METHYL FREE RADICAL + ACETAMIDE 76 KER/PAR REACTION ORDER: 2.	350–600	1.0(+11)	0	5200±500	0.5	1.5
$CD_3.$ + CD_3CONH_2 → CD_3H + $CD_3CONH.$ METHYL FREE RADICAL + ACETAMIDE-2,2,2-d_3 76 KER/PAR REACTION ORDER: 2.	350–600	1.1(+11)	0	5235±500	0.5	1.5
$CD_3.$ + CD_3CONH_2 → CD_4 + $.CD_2CONH_2$ METHYL FREE RADICAL + ACETAMIDE-2,2,2-d_3 76 KER/PAR REACTION ORDER: 2.	350–600	1.4(+11)	0	5800±500	0.5	1.5
$CH_3.$ + $CH_3C{\equiv}CH$ → $(CH_3)_2C{=}CH.$ + $CH_3C(.){=}CHCH_3$ METHYL FREE RADICAL + 1-PROPYNE 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE. CH_3 ADDITION OCCURS PREDOMINANTLY AT TERMINAL C ATOM.	379–465	5.0(+11)	0	4400		
$CH_3.$ + $CH_2{=}C{=}CH_2$ → $CH_3CH_2C(.){=}CH_2$ METHYL FREE RADICAL + 1,2-PROPADIENE 72 KER/PAR REACTION ORDER: 2.	373–483	2.0(+11)	0	4100		
$CH_3.$ + $CH_3CH{=}CH_2$ → CH_4 + $CH_3C(.){=}CH_2$ METHYL FREE RADICAL + 1-PROPENE 76 KER/PAR REACTION ORDER: 2.	350–600	1.4(+11)	0	4430±500	0.6	1.4
$CH_3.$ + $CH_3CH{=}CH_2$ → CH_4 + $[C_3H_5.]$ METHYL FREE RADICAL + 1-PROPENE 72 KON REACTION ORDER: 2.	350–580	3.2(+10)	0	3775±300	0.5	2.0
$CH_3.$ + $CH_3CH{=}CH_2$ → $CH_3CH_2CH(.)CH_3$ + $(CH_3)_2CHCH_2.$ METHYL FREE RADICAL + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.72 NOTE: k_{ref}: $CH_3.$ + $CH_2{=}CH_2$	353–453 453	1.7(+11) –	0 –	3700 –		
$CH_3.$ + $CH_3CH_2CH_3$ → CH_4 + $(CH_3)_2CH.$ METHYL FREE RADICAL + PROPANE 76 KER/PAR REACTION ORDER: 2.	550–750	2.0(+11)	0	4830±250	0.7	1.3
$CD_3.$ + $CH_3CD_2CH_3$ → CD_3H + $CH_3CD_2CH_2.$ METHYL-d_3 FREE RADICAL + PROPANE-2,2-d_2 76 KER/PAR REACTION ORDER: 2.	550–750	4.4(+11)	0	5735±250	0.7	1.3
CD_3 + $CH_3CD_2CH_3$ → CD_4 + $(CH_3)_2CD.$ METHYL-d_3 FREE RADICAL + PROPANE-2,2-d_2 76 KER/PAR REACTION ORDER: 2.	550–750	2.5(+11)	0	5735±250	0.7	1.3
$CH_3.$ + CH_3CH_2CHO → CH_4 + $CH_3CH_2C(O).$ METHYL FREE RADICAL + PROPANAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	2970±500	0.4	1.6

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $(CH_3)_2CO$ → CH_4 + $CH_3C(O)CH_2.$ METHYL FREE RADICAL + 2-PROPANONE 76 KER/PAR REACTION ORDER: 2.	350–700	3.5(+11)	0	4900±250	0.8	1.3
$CD_3.$ + $(CD_3)_2CO$ → CD_4 + $CD_3C(O)CD_2.$ METHYL-d_3 FREE RADICAL + 2-PROPANONE-1,1,1,3,3,3-d_6 76 KER/PAR REACTION ORDER: 2.	350–800	4.8(+11)	0	5735±250	0.8	1.3
$CH_3.$ + $HCOOCH_2CH_3$ → CH_4 + $.COOCH_2CH_3$ + $HCOOCH(.)CH_3$ METHYL FREE RADICAL + FORMIC ACID ETHYL ESTER 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	5100±500	0.5	2.0
$CH_3.$ + CH_3COOCH_3 → CH_4 + $.CH_2COOCH_3$ + $CH_3COOCH_2.$ METHYL FREE RADICAL + ACETIC ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2.	350–600	2.1(+11)	0	5035±500	0.5	1.5
$CH_3.$ + CH_3COOCD_3 → CH_4 + $.CH_2COOCD_3$ METHYL FREE RADICAL + ACETIC ACID METHYL-d_3 ESTER 76 KER/PAR REACTION ORDER: 2.	350–650	1.9(+11)	0	5035±500	0.4	1.6
$CH_3.$ + CD_3COOCH_3 → CH_4 + $CD_3COOCH_2.$ METHYL FREE RADICAL + ACETIC-d_3 ACID METHYL ESTER 76 KER/PAR REACTION ORDER: 2.	400–600	1.7(+11)	0	5990±500	0.5	1.5
$CH_3.$ + $CH_3OCOOCH_3$ → CH_4 + $.CH_2OCOOCH_3$ METHYL FREE RADICAL + CARBONIC ACID DIMETHYL ESTER 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	3.2(+11)	0	5800±750	0.5	2.0
$CH_3.$ + $(CH_3)_2CDOH$ → CH_3D + $(CH_3)_2C(.)OH$ METHYL FREE RADICAL + 2-PROPAN-2-d-OL 76 KER/PAR REACTION ORDER: 2.	400–525	1.9(+11)	0	4900±500	0.6	1.4
$CD_3.$ + $(CH_3)_2CHOD$ → CD_3H + $(CH_3)_2C(.)OD$ + $.CH_2CH(CH_3)OD$ METHYL-d_3 FREE RADICAL + 2-PROPANOL-d 76 KER/PAR REACTION ORDER: 2.	400–525	1.5(+11)	0	3975±500	0.6	1.4
$CH_3.$ + cy-$CH_2CH_2CH_2S$ → CH_4 + cy-$CH_2CH(.)CH_2S$ METHYL FREE RADICAL + THIETANE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300–450	3.2(+11)	0	4630±750	0.5	2.0
$CH_3.$ + $(CH_3)_2CHSH$ → CH_4 + $(CH_3)_2CHS.$ + $(CH_3)_2C(.)SH$ + $.CH_2CH(CH_3)SH$ METHYL FREE RADICAL + 2-PROPANETHIOL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	303	4.1(+ 7)	–	–	0.5	2.0
$CD_3.$ + CH_3CH_2CN → CD_3H + $CH_3CH(.)CN$ + $.CH_2CH_2CN$ METHYL-d_3 FREE RADICAL + PROPANENITRILE 76 KER/PAR REACTION ORDER: 2.	400–600	3.6(+11)	0	4330±500	0.5	1.5
$CH_3.$ + $(CH_3)_3N$ → CH_4 + $.CH_2N(CH_3)_2$ METHYL FREE RADICAL + METHANAMINE,N,N-DIMETHYL- 76 KER/PAR REACTION ORDER: 2.	350–600	4.7(+11)	0	4600±500	0.7	1.3
$CH_3.$ + $HCON(CH_3)_2$ → CH_4 + $.CON(CH_3)_2$ + $HCO-(CH_3)NCH_2.$ METHYL FREE RADICAL + FORMAMIDE, N,N-DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–600	6.3(+10)	0	3600±500	0.5	1.5
$CH_3.$ + $CH_3CH_2C{\equiv}CH$ → CH_4 + $CH_3CH(.)C{\equiv}CH$ + $.CH_2CH_2C{\equiv}CH$ + $CH_3CH_2C{\equiv}C.$ METHYL FREE RADICAL + 1-BUTYNE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	456–620	1.9(+12)	0	5135±500	0.6	1.4
$CH_3.$ + $CH_3C{\equiv}CCH_3$ → CH_4 + $CH_3C{\equiv}CCH_2.$ METHYL FREE RADICAL + 2-BUTYNE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	486–619	1.1(+12)	0	4900±500	0.6	1.4

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + CH_3=CHCH=CH_2 → $CH_3CH_2CH(.)CH=CH_2$ METHYL FREE RADICAL + 1,3-BUTADIENE 72 KER/PAR REACTION ORDER: 2.	353–453	8.1(+10)	0	2065		
$CH_3.$ + CH_2=CHCH=CH_2 → $CH_3CH_2CH(.)CH=CH_2$ + $.CH_2CH(CH_3)CH=CH_2$ METHYL FREE RADICAL + 1,3-BUTADIENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 12.0 NOTE: k_{ref}: CH_3 + CH_2=CH_2	453	–	–	–		
$CH_3.$ + CH_3CH_2CH=CH_2 → CH_4 + $CH_3CH(.)CH=CH_2$ METHYL FREE RADICAL + 1-BUTENE 76 KER/PAR REACTION ORDER: 2.	350–650	2.5(+11)	0	4200±500	0.6	1.4
$CH_3.$ + CH_3CH_2CH=CH_2 → $CH_3CH_2CH(.)CHCH_3$ + $CH_3CH_2CH(CH_3)CH_2.$ METHYL FREE RADICAL + 1-BUTENE 72 KER/PAR REACTION ORDER: 2.	353–453	1.0(+11)	0	3600		
k/k_{ref}: 0.7 NOTE: k_{ref}: CH_3 + CH_2=CH_2	453	–	–	–		
$CH_3.$ + cis-CH_3CH=$CHCH_3$ → CH_4 + CH_3CH=$CHCH_2.$ METHYL FREE RADICAL + cis-2-BUTENE 76 KER/PAR REACTION ORDER: 2.	350–650	1.8(+11)	0	4100±500	0.6	1.4
$CH_3.$ + cis-CH_3CH=$CHCH_3$ → $(CH_3)_2CHCH(.)CH_3$ METHYL FREE RADICAL + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	353–453	4.5(+10)	0	3675		
k/k_{ref}: 0.2 NOTE: k_{ref}: $CH_3.$ + CH_2=CH_2	453	–	–	–		
$CH_3.$ + trans-CH_3CH=$CHCH_3$ → CH_4 + CH_3CH=$CHCH_2.$ METHYL FREE RADICAL + trans-2-BUTENE 76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+12)	0	4830±500	0.6	1.4
$CH_3.$ + trans-CH_3CH=$CHCH_3$ → $(CH_3)_2CHCH(.)CH_3$ METHYL FREE RADICAL + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	353–453	1.4(+11)	0	4075		
k/k_{ref}: 0.4 NOTE: k_{ref}: $CH_3.$ + CH_2=CH_2	453	–	–	–		
$CH_3.$ + $(CH_3)_2C$=CH_2 → CH_4 + $.CH_2C(CH_3)$=CH_2 METHYL FREE RADICAL + 1-PROPENE, 2-METHYL- 76 KER/PAR REACTION ORDER: 2.	350–600	3.0(+11)	0	4500±500	0.6	1.4
$CH_3.$ + $(CH_3)_2C$=CH_2 → $(CH_3)_3CCH_2.$ + $(CH_3)_2C(.)CH_2CH_3$ METHYL FREE RADICAL + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2.	353–453	1.4(+11)	0	3475		
k/k_{ref}: 1.1 NOTE: k_{ref}: CH_3 + CH_2=CH_2	453	–	–	–		
CH_3 + $CH_3CH_2CH_2CH_3$ → CH_4 + $CH_3CH_2CH(.)CH_3$ METHYL FREE RADICAL + BUTANE 76 KER/PAR REACTION ORDER: 2.	350–750	4.0(+11)	0	4830±250	0.7	1.3
$CH_3.$ + $CH_3CH_2CH_2CH_3$ → CH_4 + $CH_3CH_2CH(.)CH_3$ + $CH_3CH_2CH_2CH_2.$ METHYL FREE RADICAL + BUTANE 72 KON REACTION ORDER: 2.	350–500	1.6(+11)	0	4540±150	0.7	1.4
$CD_3.$ + $CH_3CD_2CD_2CH_3$ → CD_3H + $CH_3CD_2CD_2CH_2.$ METHYL-d_3 FREE RADICAL + BUTANE-2,2,3,3-d_4 76 KER/PAR REACTION ORDER: 2.	600–750	4.8+11)	0	5735±250	0.7	1.3
$CD_3.$ + $CH_3CD_2CD_2CH_3$ → CD_4 + $CH_3CD_2CD(.)CH_3$ METHYL-d_3 FREE RADICAL + BUTANE-2,2,3,3-d_4 76 KER/PAR REACTION ORDER: 2.	600–750	4.5(+11)	0	5735±250	0.7	1.3
$CH_3.$ + $(CH_3)_3CH$ → CH_4 + $(CH_3)_3C.$ + $(CH_3)_2CHCH_2.$ METHYL FREE RADICAL + PROPANE, 2-METHYL- 76 KER/PAR REACTION ORDER: 2.	300–500	8.3(+10)	0	4000±500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $(CH_3)_3CH$ → CH_4 + $(CH_3)_3C.$ METHYL FREE RADICAL + PROPANE, 2-METHYL- 76 KER/PAR REACTION ORDER: 2.	550–750	9.6(+10)	0	3975±250	0.7	1.3
$CD_3.$ + $(CH_3)_3CD$ → CD_3H + $(CH_3)_2CDCH_2.$ METHYL-d_3 FREE RADICAL + PROPANE-2-d, 2-METHYL- 76 KER/PAR REACTION ORDER: 2.	550–750	6.0(+11)	0	5735±250	0.7	1.3
$CD_3.$ + $(CH_3)_3CD$ → CD_4 + $(CH_3)_3C.$ METHYL-d_3 FREE RADICAL + PROPANE-2-d, 2-METHYL- 76 KER/PAR REACTION ORDER: 2.	550–750	1.2(+11)	0	4800±250	0.7	1.3
$CH_3.$ + $CH_3CH{=}CHCHO$ → CH_4 + $CH_3CH{=}CHC(O).$ METHYL FREE RADICAL + 2-BUTENAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	3400±500	0.4	2.5
$CH_3.$ + $CH_3COCOCH_3$ → CH_4 + $CH_3COCOCH_2.$ METHYL FREE RADICAL + 2,3-BUTANEDIONE 76 KER/PAR REACTION ORDER: 2.	300–800	2.2(+11)	0	4300±500	0.5	1.5
$CH_3.$ + $(CH_3CO)_2O$ → CH_4 + $CH_3COOOCCH_2.$ METHYL FREE RADICAL + ACETIC ACID ANHYDRIDE 76 KER/PAR REACTION ORDER: 2.	300–500	1.8(+11)	0	4830±500	0.6	1.4
$CH_3.$ + $CH_3CH_2CH_2CHO$ → CH_4 + $CH_3CH_2CH_2C(O).$ METHYL FREE RADICAL + BUTANAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	2970±500	0.4	1.6
$CH_3.$ + $(CH_3)_2CHCHO$ → CH_4 + $(CH_3)_2CHC(O).$ METHYL FREE RADICAL + PROPANAL, 2-METHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	2970±500	0.4	1.6
$CH_3.$ + $CH_3CH_2COCH_3$ → CH_4 + $CH_3CH(.)COCH_3$ + $.CH_2CH_2COCH_3$ + $CH_3CH_2COCH_2.$ METHYL FREE RADICAL + 2-BUTANONE 76 KER/PAR REACTION ORDER: 2.	300–500	8.2(+10)	0	3700±500	0.5	1.5
$CH_3.$ + $HCOOCH_2CH_2CH_3$ → CH_4 + $.COOCH_2CH_2CH_3$ METHYL FREE RADICAL + FORMIC ACID PROPYL ESTER 72 KON REACTION ORDER: 2.	347–455	1.3(+10)	0	3675		
$CH_3.$ + $HCOOCH_2CH_2CH_3$ → CH_4 + $.COOCH_2CH_2CH_3$ + $HCOOCH(.)CH_2CH_3$ + $HCOOCH_2CH(.)CH_3$ + $HCOOCH_2CH_2CH_2.$ METHYL FREE RADICAL + FORMIC ACID PROPYL ESTER 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	5000±500	0.5	2.0
$CH_3.$ + $HCOOCH(CH_3)_2$ → CH_4 + $.COOCH(CH_3)_2$ + $HCOOC(.)(CH_3)_2$ + $HCOOCH(CH_3)CH_2.$ METHYL FREE RADICAL + FORMIC ACID 1-METHYLETHYL ESTER 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	4980±500	0.5	2.0
$CH_3.$ + $CH_3CH_2OCH_2CH_3$ → CH_4 + $CH_3CH_2OCH(.)CH_3$ + $CH_3CH_2OCH_2CH_2.$ METHYL FREE RADICAL + ETHANE, 1,1'-OXYBIS- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–500	2.5(+11)	0	4200±750	0.5	2.0
$CH_3.$ + $(CH_3)_3CSH$ → CH_4 + $(CH_3)_3CS.$ + $.CH_2C(CH_3)_2SH$ METHYL FREE RADICAL + 2-PROPANETHIOL, 2-METHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	303	5.9(+ 7)	–	–	0.5	2.0
$CH_3.$ + $CH_3CH{=}NN{=}CHCH_3$ → CH_4 + $CH_3C(.){=}NN{=}CHCH_3$ + $.CH_2CH{=}NN{=}CHCH_3$ METHYL FREE RADICAL + ACETALDEHYDE ETHYLIDENEHYDRAZONE 76 KER/PAR REACTION ORDER: 2.	350–600	2.5(+11)	0	3975±500	0.5	2.0

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $CH_3CH_2CH_2CH_2NH_2$ → CH_4 + $CH_3CH_2CH_2CH_2NH.$ + $CH_3CH_2CH_2CH(.)NH_2$ + $.CH_2CH_2CH_2CH_2NH_2$ METHYL FREE RADICAL + 1-BUTANAMINE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	426	3.2(+ 7)	–	–	0.5	2.0
$CH_3.$ + $(CH_3CH_2)_2NH$ → CH_4 + $(CH_3CH_2)_2N.$ + $CH_3CH(.)NHCH_2CH_3$ + $.CH_2CH_2NHCH_2CH_3$ METHYL FREE RADICAL + ETHANAMINE, N-ETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE K VALUE.	350–500	2.2(+11)	0	3550±500	0.5	2.0
$CH_3.$ + $CH_3CH_2N(CH_3)_2$ → CH_4 + $CH_3CH(.)N(CH_3)_2$ + $CH_2CH_2N(CH_3)_2$ + $CH_3CH_2N(CH_3)CH_2.$ METHYL FREE RADICAL + ETHANAMINE, N,N-DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	420	2.6(+ 7)	–	–	0.5	2.0
CH_3 + $CH_3CON(CH_3)_2$ → CH_4 + $.CH_2CON(CH_3)_2$ + $CH_3CON(CH_3)CH_2.$ METHYL FREE RADICAL + ACETAMIDE, N,N-DIMETHYL- 76 KER/PAR REACTION ORDER: 2.	350–600	2.0(+11)	0	4200±500	0.5	1.5
$CH_3.$ + $CH_3CON(CH_3)_2$ → CH_4 + $CH_3CON(CH_3)CH_2.$ METHYL FREE RADICAL + ACETAMIDE, N,N-DIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–600	1.6(+11)	0	4125±500	0.5	1.5
$CH_3.$ + $CH_3(CH_2)_2CH=CH_2$ → CH_4 + $CH_3CH_2CH(.)CH=CH_2$ METHYL FREE RADICAL + 1-PENTENE 76 KER/PAR REACTION ORDER: 2.	450–650	4.5(+11)	0	4500±500	0.6	1.4
$CH_3.$ + cis-$CH_3CH_2CH=CHCH_3$ → $CH_3CH_2CH(.)CH(CH_3)_2$ METHYL FREE RADICAL + cis-2-PENTENE 72 KER/PAR REACTION ORDER: 2.	298	–	–	4060		
$CH_3.$ + cis-$CH_3CH_2CH=CHCH_3$ → $CH_3CH_2CH(CH_3)CH(.)CH_3$ METHYL FREE RADICAL + cis-2-PENTENE 72 KER/PAR REACTION ORDER: 2.	298	–	–	4125		
$CH_3.$ + $(CH_3)_2CHCH=CH_2$ → $(CH_3)_2CHCH(.)CH_2CH_3$ METHYL FREE RADICAL + 1-BUTENE, 3-METHYL- 72 KER/PAR REACTION ORDER: 2.	298	–	–	3500		
$CH_3.$ + $(CH_3)_2CHCH=CH_2$ → CH_4 + $(CH_3)_2C(.)CH=CH_2$ METHYL FREE RADICAL + 1-BUTENE, 3-METHYL- 76 KER/PAR REACTION ORDER: 2.	450–600	4.4(+11)	0	4225±7500	0.5	1.5
$CH_3.$ + $(CH_3)_2C=CHCH_3$ → CH_4 + $(CH_3)_2C=CH_2CH_2.$ + $.CH_2C(CH_3)=CHCH_3$ METHYL FREE RADICAL + 2-BUTENE, 2-METHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–500	4.9(+11)	0	4300±500	0.5	1.5
$CH_3.$ + $(CH_3)_2C=CHCH_3$ → $(CH_3)_3CCH(.)CH_3$ + $(CH_3)_2C(.)CH(CH_3)_2$ METHYL FREE RADICAL + 2-BUTENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.4 NOTE: k_{ref}: $CH_3.$ + $CH_2=CH_2$	453	–	–	–		
TENTATIVE k VALUE.	403–455	1.4(+10)	0	3070		
$CH_3.$ + $CH_3CH_2CH_2CH_2CH_3$ → CH_4 + $CH_3CH_2CH_2CH_2CH_2.$ METHYL FREE RADICAL + PENTANE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	4.8(+11)	0	5800±250	0.7	1.3
$CH_3.$ + $CH_3CH_2CH_2CH_2CH_3$ → CH_4 + $CH_3CH_2CH(.)CH_2CH_3$ + $CH_3CH_2CH_2CH_2(.)CH_3$ METHYL FREE RADICAL + PENTANE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	6.0(+11)	0	4830±250	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $(CH_3)_2CHCH_2CH_3$ → CH_4 + $(CH_3)_2C(.)CH_2CH_3$						
METHYL FREE RADICAL + BUTANE, 2-METHYL-						
76 KER/PAR REACTION ORDER: 2.	350–750	9.6(+10)	0	3975±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_2CHCH_2CH_3$ → CH_4 + $(CH_3)_2CHCH(.)CH_3$						
METHYL FREE RADICAL + BUTANE, 2-METHYL-						
76 KER/PAR REACTION ORDER: 2.	350–750	2.0(+11)	0	4830±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_2CHCH_2CH_3$ → CH_4 + $(CH_3)_2CHCH_2CH_2.$ + $.CH_2CH(CH_3)CH_2CH_3$						
METHYL FREE RADICAL + BUTANE, 2-METHYL-						
76 KER/PAR REACTION ORDER: 2.	350–750	7.1(+11)	0	5800±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_4C$ → CH_4 + $(CH_3)_3CCH_2.$						
METHYL FREE RADICAL + PROPANE, 2,2-DIMETHYL-						
76 KER/PAR REACTION ORDER: 2.	400–600	8.3(+11)	0	5940±350	0.6	1.4
$CH_3.$ + $CH_3CH_2CH_2CH_2CHO$ → CH_4 + $CH_3CH_2CH_2CH_2C(0).$						
METHYL FREE RADICAL + PENTANAL						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	3000±500	0.4	1.6
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $CH_3CH_2CH(CH_3)CHO$ → CH_4 + $CH_3CH_2CH(CH_3)C(0).$						
METHYL FREE RADICAL + BUTANAL, 2-METHYL-						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	3200±500	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_2CHCH_2CH_3$ → CH_4 + $(CH_3)_2CHCH_2C(0).$						
METHYL FREE RADICAL + BUTANAL, 3-METHYL-						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	3070±500	0.4	1.6
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_3CCHO$ → CH_4 + $(CH_3)_3CC(0).$						
METHYL FREE RADICAL + PROPANOL, 2,2-DIMETHYL-						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	3170±500	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3CH_2)_2CO$ → CH_4 + $CH_3CH(.)COCH_3CH_3$ + $.CH_2CH_2CONH_2CH_3$						
METHYL FREE RADICAL + 3-PENTANONE						
76 KER/PAR REACTION ORDER: 2.	300–450	1.9(+11)	0	3675±500	0.5	1.5
$CH_3.$ + $(CH_3CD_2)_2CO$ → CH_4 + $CH_3CD_2COCD_2CH_2.$						
METHYL FREE RADICAL + 3-PENTANONE-2,2,4,4-d_4						
76 KER/PAR REACTION ORDER: 2.	500–600	2.0(+11)	0	5535±500	0.5	2.0
$CH_3.$ + $(CH_3CD_2)_2CO$ → CH_3D + $CH_3CD_2COCD(.)CH_3$						
METHYL FREE RADICAL + 3-PENTANONE-2,2,4,4-d_4						
76 KER/PAR REACTION ORDER: 2.	500–600	1.3(+11)	0	4200±500	0.5	2.0
$CH_3.$ + $HCOO(CH_2)_3CH_3$ → CH_4 + $.COO(CH_2)_3CH_3$ + $HCOOCH(.)(CH_2)_2CH_3$ + $HCOOCH_2CH(.)CH_2CH_3$ + $HCOOCH_2CH_2CH(.)CH_3$ + $HCOO(CH_2)_3CH_2$						
METHYL FREE RADICAL + FORMIC ACID BUTYL ESTER						
76 KER/PAR REACTION ORDER: 2.	350–500	2.5(+11)	0	4980±500	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $CH_3CH_2COOCH_2CH_3$ → CH_4 + $CH_3CH(.)COOCH_2CH_3$ + $CH_3CH_2COOCH(.)CH_3$ + $.CH_2CH_2COOCH_2CH_3$ + $CH_3CH_2COOCH_2CH_2.$						
METHYL FREE RADICAL + PROPANOIC ACID ETHYL ESTER						
76 KER/PAR REACTION ORDER: 2.	300–650	2.5(+11)	0	4125+500	0.5	1.5
$CH_3.$ + $(CH_3CH_2)_2NCH_3$ → CH_4 + $CH_3CH(.)N(CH_2CH_3)CH_3$ + $.CH_2CH_2N(CH_2CH_3)CH_3$ + $(CH_3CH_2)_2NCH_2.$						
METHYL FREE RADICAL + ETHANAMINE, N-ETHYL-N-METHYL-						
76 KER/PAR REACTION ORDER: 2.	420	3.0(+ 7)	-	-	0.5	2.0
NOTE: TENTATIVE k VALUE.						

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $(CH_3)_2NCON(CH_3)_2$ → CH_4 + $.CH_2N(CH_3)CON(CH_3)_2$						
METHYL FREE RADICAL + UREA TETRAMETHYL-						
76 KER/PAR REACTION ORDER: 2.	350–550	2.0(+11)	0	3975±500	0.5	1.5
$CH_3.$ + cis-$CH_3CH_2CH_2CH{=}CHCH_3$ → $CH_3CH_2CH_2CH(.)CH(CH_3)_2$						
METHYL FREE RADICAL + cis-2-HEXENE						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4060		
$CH_3.$ + cis-$CH_3CH_2CH_2CH{=}CHCH_3$ → $CH_3CH_2CH_2CH(CH_3)CH(.)CH_3$						
METHYL FREE RADICAL + cis-2-HEXENE						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4150		
$CH_3.$ + $CH_3CH_2CH_2C(CH_3){=}CH_2$ → $CH_3CH_2CH_2C(.)(CH_3)CH_2CH_3$						
METHYL FREE RADICAL + 1-PENTENE, 2-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	–	–	3450		
$CH_3.$ + cis-$(CH_3)_2CHCH{=}CHCH_3$ → $(CH_3)_2CHCH(.)CH(CH_3)_2$						
METHYL FREE RADICAL + cis-2-PENTENE, 4-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4390		
$CH_3.$ + $(CH_3)_2C{=}C(CH_3)_2$ → CH_4 + $(CH_3)_2C{=}(CH_3)CCH_2.$						
METHYL FREE RADICAL + 2-BUTENE, 2-3-DIMETHYL-						
76 KER/PAR REACTION ORDER: 2.	403–614	7.8(+11)	0	4400±500	0.6	1.4
$CH_3.$ + $(CH_3)_2C{=}C(CH_3)_2$ → $(CH_3)_3CC(.)(CH_3)_2$						
METHYL FREE RADICAL + 2-BUTENE, 2-3-DIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	403–453	1.0(+10)	0	3400		
NOTE: TENTATIVE k VALUE.						
k/k_{ref}: 0.2	453	–	–	–		
NOTE: k_{ref}: $CH_3.$ + $CH_2{=}CH_2$						
$CH_3.$ + $CH_3(CH_2)_4CH_3$ → CH_4 + $CH_3(CH_2)_4CH_2.$						
METHYL FREE RADICAL + HEXANE						
76 KER/PAR REACTION ORDER: 2.	350–800	4.8(+11)	0	5800±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $CH_3(CH_2)_4CH_3$ → CH_4 + $CH_3CH_2CH(.)CH_2CH_2CH_3$ + $CH_3CH_2CH_2CH(.)CH_3$						
METHYL FREE RADICAL + HEXANE						
76 KER/PAR REACTION ORDER: 2.	350–800	7.9(+11)	0	4830±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_2CHCH(CH_3)_2$ → CH_4 + $.CH_2CH(CH_3)CH(CH_3)_2$						
METHYL FREE RADICAL + BUTANE, 2,3-DIMETHYL-						
76 KER/PAR REACTION ORDER: 2.	350–750	9.5(+11)	0	5800±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_2CHCH(CH_3)_2$ → CH_4 + $(CH_3)_2C(.)CH(CH_3)_2$						
METHYL FREE RADICAL + BUTANE, 2,3-DIMETHYL-						
76 KER/PAR REACTION ORDER: 2.	350–750	1.9(+11)	0	3975±250	0.7	1.3
NOTE: TENTATIVE k VALUE.						
$CH_3.$ + $(CH_3)_2CHCH(CH_3)_2$ → CH_4 + $(CH_3)_2CHC(.)(CH_3)_2$ + $.CH_3CH(CH_3)CH(CH_3)_2$						
METHYL FREE RADICAL + BUTANE, 2,3-DIMETHYL-						
72 KON REACTION ORDER: 2.	300–500	5.0(+10)	0	3445		
$CD_3.$ + $(CH_3)_2CHCH(CH_3)_2$ → CD_3H + $(CH_3)_2C(.)CH(CH_3)_2$ + $.CH_2CH(CH_3)CH(CH_3)_2$						
METHYL-d_3 FREE RADICAL + BUTANE, 2,3-DIMETHYL-						
72 KON REACTION ORDER: 2.	439–566	4.7(+11)	0	4525		
$CH_3.$ + $(CH_3)_2CHOCH(CH_3)_2$ → CH_4 + $(CH_3)_2C(.)OCH(CH_3)_2$ + $.CH_2CH(CH_3)OCH(CH_3)_2$						
METHYL FREE RADICAL + PROPANE, 2,2'-OXYBIS-						
76 KER/PAR REACTION ORDER: 2.	400–600	2.1(+11)	0	4100±500	0.5	2.0
$CH_3.$ + $(CH_3)_2CHOOCH(CH_3)_2$ → CH_4 + $(CH_3)_2C(.)OOCH(CH_3)_2$ + $.CH_2CH(CH_3)OOCH(CH_3)$						
METHYL FREE RADICAL + PEROXIDE, BIS(1-METHYLETHYL)-						
76 KER/PAR REACTION ORDER: 2.	300–450	2.3(+11)	0	4100±500	0.5	1.5

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3.$ + $CH_3CH{=}NC(CH_3)_3$ → CH_4 + $CH_3C(.){=}NC(CH_3)_3$ + $.CH_2CH{=}NC(CH_3)_3$ + $CH_3CH{=}NC(CH_3)_2CH_2.$ METHYL FREE RADICAL + PROPANIMINE, N-ETHYLIDENE-2-METHYL- 76 KER/PAR REACTION ORDER: 2.	350–500	8.9(+10)	0	3925±500	0.5	1.5
$CH_3.$ + $(CH_3)_2CHNHCH(CH_3)_2$ → CH_4 + $(CH_3)_2CHN(.)CH(CH_3)_2$ + $(CH_3)_2C(.)NHCH(CH_3)_2$ METHYL FREE RADICAL + 2-PROPANAMINE, N-(1-METHYLETHYL)- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.0(+11)	0	3370±750	0.5	2.0
$CH_3.$ + $(CH_3CH_2)_3N$ → CH_4 + $CH_3CH(.)N(CH_2CH_3)_2$ + $.CH_2CH_2N(CH_2CH_3)_2$ METHYL FREE RADICAL + ETHANAMINE, N,N-DIETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–600	5.0(+11)	0	4000±500	0.5	2.0
$CH_3.$ + $(CH_3CH_2)_3CH$ → CH_4 + $(CH_3CH_2)_3C.$ METHYL FREE RADICAL + PENTANE, 3-ETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	9.5(+10)	0	3975±250	0.7	1.3
$CH_3.$ + $(CH_3CH_2)_3CH$ → CH_4 + $(CH_3CH_2)_2CHCH(.)CH_3$ METHYL FREE RADICAL + PENTANE, 3-ETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	6.0(+11)	0	4830±250	0.7	1.3
$CH_3.$ + $(CH_3CH_2)_3CH$ → CH_4 + $(CH_3CH_2)_2CHCH_2CH_2.$ METHYL FREE RADICAL + PENTANE, 3-ETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	7.1(+11)	0	5800±250	0.7	1.3
$CH_3.$ + $CH_3(CH_2)_6CH_3$ → CH_4 + $CH_3(CH_2)_6CH_2.$ METHYL FREE RADICAL + OCTANE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	4.8(+11)	0	5800±250	0.7	1.3
$CH_3.$ + $CH_3(CH_2)_6CH_3$ → CH_4 + $CH_3(CH_2)_3CH(.)CH_2CH_2CH_3$ + $CH_3(CH_2)_4CH(.)CH_2CH_3$ + $CH_3(CH_2)_5CH(.)CH_3$ METHYL FREE RADICAL + OCTANE 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	1.2(+12)	0	4830±250	0.7	1.3
$CH_3.$ + $(CH_3)_3CCH_2CH(CH_3)_2$ → CH_4 + $(CH_3)_3CCH(.)CH(CH_3)_2$ METHYL FREE RADICAL + PENTANE, 2,2,4-TRIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	2.0(+11)	0	4830±250	0.7	1.3
$CH_3.$ + $(CH_3)_3CCH_2CH(CH_3)_2$ → CH_4 + $(CH_3)_3CCH_2C(.)(CH_3)_2$ METHYL FREE RADICAL + PENTANE, 2,2,4-TRIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	9.5(+10)	0	3975±250	0.7	1.3
$CH_3.$ + $(CH_3)_3CCH_2CH(CH_3)_2$ → CH_4 + $(CH_3)_3CCH_2CH(CH_3)CH_2.$ + $.CH_2C(CH_3)_2CH_2CH(CH_3)_2$ METHYL FREE RADICAL + PENTANE, 2,2,4-TRIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	1.2(+12)	0	5800±250	0.7	1.3
$CH_3.$ + $(CH_3)_2CHCH(CHO)CH(CH_3)_2$ → CH_4 + $.CH_2CH(CH_3)CH(CHO)CH(CH_3)_2$ METHYL FREE RADICAL + PENTANE, 2,3,4-TRIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	1.2(+12)	0	5800±250	0.7	1.3
$CH_3.$ + $(CH_3)_2CHCH(CH_3)CH(CH_3)_2$ → CH_4 + $(CH_3)_2CHC(.)(CH_3)CH(CH_3)_2$ + $(CH_3)_2C(.)CH(CH_3)CH(CH_3)_2$ METHYL FREE RADICAL + PENTANE, 2,3,4-TRIMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	2.9(+11)	0	3975±250	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	k factors F
$CH_3. + (CH_3)_2CHCH(CH_3)CH(CH_3)_2 \rightarrow CH_4 + [C_8H_{17}.]$ METHYL FREE RADICAL + PENTANE, 2,3,4-TRIMETHYL- 72 KON REACTION ORDER: 2.	414–605	4.7(+11)	0	4575		
$CH_3 + (CH_3)_3CC(CH_3)_3 \rightarrow CH_4 + .CH_2C(CH_3)_2C(CH_3)_3$ METHYL FREE RADICAL + BUTANE, 2,2,3,3-TETRAMETHYL- 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	1.4(+12)	0	5800±250	0.7	1.3
$CH_3. + (CH_3)_3COOC(CH_3)_3 \rightarrow CH_4 + .CH_2C(CH_3)_2COOC(CH_3)_3$ METHYL FREE RADICAL + PEROXIDE, BIS(1,1-DIMETHYLETHYL)- 76 KER/PAR REACTION ORDER: 2.	350–500	1.8(+12)	0	5900±750	0.3	3.0
$CH_4 \rightarrow CH_3. + H$ METHANE 70 BEN/O'N REACTION ORDER: 1.	1200–1800	2.0(+15)	0	52340		
$CH_4 + O \rightarrow CH_3. + OH$ METHANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	350–1000	2.1(+13)	0	4550	0.7	1.3
$CH_4 + O \rightarrow CH_3. + OH$ METHANE + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+13)	0	4530±500	0.6	1.6
$CH_4 + H \rightarrow CH_3. + H_2$ METHANE + HYDROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	6.3(+13)	0	5990±150	0.5	2.0
$CH_4 + D \rightarrow CH_3. + HD$ METHANE + DEUTERIUM ATOM 72 KON REACTION ORDER: 2.	523–673	8.3(+12)	0	5100		
$CH_4 + OH \rightarrow CH_3. + H_2O$ METHANE + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+13)	0	2500±250	0.5	2.0
$CH_4 + CH \rightarrow CH_3. + :CH_2$ METHANE + METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	2.5(+11)	0.7	3000±2500	0.3	3.2
$CH_4 + CH_2 \rightarrow CH_3. + CH_3.$ METHANE + METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.3(+12)	0.7	10000±2500	0.3	3.2
$CH_4 + CH_3. \rightarrow CH_3. + CH_4$ METHANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	450–800	4.0(+11)	0	7045±250	0.7	1.3
$CH_3D + CD_3. \rightarrow CH_3. + CD_4$ METHANE-d + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–650	5.0(+10)	0	7200±500	0.5	1.5
$CHD_3 + CH_3. \rightarrow CD_3. + CH_4$ METHANE-d_3 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–650	1.1(+11)	0	6995±250	0.7	1.3
$CD_4 + CH_3. \rightarrow CD_3. + CDH_3$ METHANE-d_4 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	370–550	2.5(+11)	0	7700±500	0.5	1.5
$CD_4. + CD_3. \rightarrow CD_3. + CD_4$ METHANE-d_4 + METHYL-d_3 FREE RADICAL 72 KON REACTION ORDER: 2.	473–623	4.1(+12)	0	8960±250		
$CH_4 + CN \rightarrow HCN + CH_3.$ METHANE + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0.7	2500±2500	0.3	3.2
$CH_4 + M \rightarrow CH_3. + H + M$ METHANE 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+17)	0	44035±1000	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions		*T*/K	*A*	*B*	*E*/*R* (in K)	k factors f	F
.CHO → CO + H METHYL, OXO-, FREE RADICAL 70 BEN/O'N	REACTION ORDER: 1.	298	5.0(+13)	0	9560		
.CHO + O → CO_2 + H METHYL, OXO-, FREE RADICAL + OXYGEN ATOM 76 ENG NOTE: k ESTIMATED.	REACTION ORDER: 2.	1500-2500	3.2(+11)	0	0±1500		
.CHO + O → CO + OH METHYL, OXO-, FREE RADICAL + OXYGEN ATOM 76 ENG NOTE: k ESTIMATED.	REACTION ORDER: 2.	1500-2500	3.2(+11)	1.0	250±1500		
.CHO + O_2 → CO + HO_2 METHYL, OXO-, FREE RADICAL + OXYGEN MOLECULE 76 ENG NOTE: k ESTIMATED.	REACTION ORDER: 2.	1500-2500	1.6(+12)	0	3500±1500		
.CHO + H → CO + H_2 METHYL, OXO-, FREE RADICAL + HYDROGEN ATOM 76 ENG	REACTION ORDER: 2.	1500-2500	1.6(+12)	0.5	0±2500	0.3	3.2
.CHO + OH → CO + H_2O METHYL, OXO-, FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG NOTE: k ESTIMATED.	REACTION ORDER: 2.	1500-2500	3.2(+10)	1.0	0±1500		
.CHO + HO_2 → HCHO + O_2 METHYL, OXO-, FREE RADICAL + HYDROPEROXYL FREE RADICAL 76 ENG NOTE: k ESTIMATED.	REACTION ORDER: 2.	1500-2500	1.0(+14)	0	1500±1500		
.CHO + N → HCN + O METHYL, OXO-, FREE RADICAL + NITROGEN ATOM 76 ENG NOTE: k ESTIMATED.	REACTION ORDER: 2.	1500-2500	1.0(+14)	0	0±1000		
.CHO + N → CO + NH METHYL, OXO-, FREE RADICAL + NITROGEN ATOM 76 ENG	REACTION ORDER: 2.	1500-2500	2.0(+11)	0.5	1000±2500	0.3	3.2
.CHO + NO → CO + HNO METHYL, OXO-, FREE RADICAL + NITROGEN OXIDE(NO) 76 ENG	REACTION ORDER: 2.	1500-2500	2.0(+11)	0.5	1000±2500	0.3	3.2
.CHO + HNO → HCHO + NO METHYL, OXO-, FREE RADICAL + NITROSYL HYDRIDE 76 ENG	REACTION ORDER: 2.	1500-2500	3.2(+11)	0.5	0±2500	0.3	3.2
.CHO + CH → CO + CH_2 METHYL, OXO-, FREE RADICAL + METHYLIDYNE FREE RADICAL 76 ENG	REACTION ORDER: 2.	1500-2500	3.2(+10)	0.7	500±2500	0.3	3.2
.CHO + CH_2 → CO + CH_3. METHYL, OXO-, FREE RADICAL + METHYLENE FREE RADICAL 76 ENG	REACTION ORDER: 2.	1500-2500	3.2(+10)	0.7	500±2500	0.3	3.2
.CHO + CH_3. → CO + CH_4 METHYL, OXO-, FREE RADICAL + METHYL FREE RADICAL 76 ENG	REACTION ORDER: 2.	1500-2500	3.2(+11)	0.5	0±2500	0.3	3.2
.CHO + .CHO → HCHO + CO METHYL, OXO-, FREE RADICAL 76 ENG	REACTION ORDER: 2.	1500-2500	1.6(+11)	0.5	0±2500	0.3	3.2
.CHO + CN → HCN + CO METHYL, OXO-, FREE RADICAL + CYANOGEN FREE RADICAL 76 ENG	REACTION ORDER: 2.	1500-2500	2.0(+11)	0.5	0±2500	0.3	3.2
HCHO + O → .CHO + OH FORMALDEHYDE + OXYGEN ATOM 76 ENG	REACTION ORDER: 2.	1500-2500	1.0(+11)	1.0	1750±1000	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
HCHO + O → products FORMALDEHYDE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	300	9.0(+10)	–	–	0.7	1.3
HCDO + O → products FORMALDEHYDE-d + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	300	4.9(+10)	–	–	0.7	1.3
HCHO + H → .CHO + H_2 FORMALDEHYDE + HYDROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.3(+10)	1.0	1600	0.3	3.2
HCHO + OH → .CHO + H_2O FORMALDEHYDE + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+10)	1.0	0±1500	0.5	2.0
HCHO + HO_2 → .CHO + H_2O_2 FORMALDEHYDE + HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: k FACTORS ARE: f = 0.1; F = 10. AT 300K.	300–800	1.0(+12)	0	4000	0.7	1.5
HCHO + CH → .CHO + CH_2 FORMALDEHYDE + METHYLIDYNE FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+11)	0.7	2000±2500	0.3	3.2
HCHO + CH_2 → .CHO + CH_3. FORMALDEHYDE + METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	2.0(+11)	0	3270±1500	–	–
HCHO + CH_3. → .CHO + CH_4 FORMALDEHYDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. 76 ENG	300–500 1500–2500	1.1(+11) 1.0(+10)	0 0.5	3070±500 3000±2500	0.5 0.3	1.5 3.2
DCDO + CH_3. → .CDO + CH_3D FORMALDEHYDE-d + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	1.4(+11)	0	3975±500	0.5	1.5
HCHO + CN → .CHO + HCN FORMALDEHYDE + CYANOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	1.3(+11)	0.7	1500±2500	0.3	3.2
HCHO + M → .CHO + H + M FORMALDEHYDE 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+17)	0	43800±2500	0.3	3.2
CH_2OH → HCHO + H METHYL, HYDROXY-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 2.	673–773	1.1(+13)	0	14600		
CH_3O. + O → HCHO + OH METHOXY FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+14)	0	0±1500		
CH_3O. + O_2 → HCHO + HO_2 METHOXY FREE RADICAL + OXYGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+12)	0	3000±1500		
CH_3O. + H → HCHO + H_2 METHOXY FREE RADICAL + HYDROGEN ATOM 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	1.0(+14)	0	0±1500		
CH_3O. + OH → HCHO + H_2O METHOXY FREE RADICAL + HYDROXY FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	3.2(+13)	0	0±1500		
CH_3O. + N → HCHO + NH METHOXY FREE RADICAL + NITROGEN ATOM 76 ENG REACTION ORDER: 2.	1500–2500	1.0(+14)	0	0±1500		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	*T*/K	*A*	*B*	*E*/*R* (in K)	k factors f	F
$CH_3O.$ + M → HCHO + H + M METHOXY FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500–2500	4.0(+40)	−7.5	11375±1500		
$CH_3OH + CH_3.$ → $.CH_2OH + CH_4$ METHANOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	1.9(+11)	0	5035±500	0.6	1.4
$CH_3OH + CH_3.$ → $CH_3O. + CH_4$ METHANOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.		6.2(+10)	0	4900±500	0.6	1.4
$CH_3OH + CH_3.$ → $CH_3O. + .CH_2OH + CH_4$ METHANOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–550	2.3(+11)	0	4930±500	0.6	1.4
$CH_3OD + CD_3.$ → $.CH_2OD + CD_3H$ METHANOL-d + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–500	1.9(+11)	0	5000±500	0.5	2.0
$CH_3OD + CD_3.$ → $CH_3O. + CD_4$ METHANOL-d + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: GIVEN WITH CAUTION.	400–500	3.2(+10)	0	5700±1000	0.5	2.0
$CD_3OH + CH_3.$ → $.CD_2OH + CH_3D.$ METHAN-d_3-OL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER 2.	370–550	2.0(+11)	0	5940±500		
$CD_3OH + CH_3.$ → $CD_3O. + CH_4$ METHAN-d_3-OL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	370–550	6.2(+10)	0	4900±500	0.6	1.4
CH_3OOH → $CH_3O. + OH$ HYDROPEROXIDE, METHYL 70 BEN/O'N REACTION ORDER: 1. NOTE: RATE CONSTANTS MAY BE SLIGHTLY LOW.	565–651	7.9(+14)	0	21640		
CS + O → S + CO CARBON MONOSULFIDE FREE RADICAL + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 2.	300	1.3(+13)	–	–	0.5	1.5
CS + O → S + CO CARBON MONOSULFIDE FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
CS + O → SO + C CARBON MONOSULFIDE FREE RADICAL + OXYGEN 75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	28940		
CS + H → S + CH CARBON MONOSULFIDE FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.3(+13)	0.5	50930		
CS + H → SH + C CARBON MONOSULFIDE FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		2.0(+13)	0.5	48870		
CS + S → S + CS CARBON MONOSULFIDE FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
CS + S → C + S_2 CARBON MONOSULFIDE FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		1.6(+12)	0.5	40463		
CS + S + M → CS_2 +M CARBON MONOSULFIDE FREE RADICAL + SULFUR ATOM 76 BAU/DRY REACTION ORDER: 3. NOTE: $k_1 = Kk_{-1}$	1800–3700	8.7(+13)	0	4370	0.5	1.5

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
CS + N → S + CN CARBON MONOSULFIDE FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	1160		
CS + N → C + NS CARBON MONOSULFIDE FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		4.0(+12)	0.5	37200		
CS + C → S + C_2 CARBON MONOSULFIDE FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		5.0(+11)	0.5	20435		
CS + C → C + CS CARBON MONOSULFIDE FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
CS_2 + O → CS + SO CARBON DISULFIDE + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 2.	200–1000	2.2(+13)	0	700	0.7	1.3
CS_2 + O → COS + S CARBON DISULFIDE + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 2.	302	2.2(+11)	–	–	0.5	1.5
CS_2 + S → CS + S_2 CARBON DISULFIDE + SULFUR ATOM 76 BAU/DRY REACTION ORDER: 2.	298	3.9(+11)	–	–	0.5	1.5
CS_2 + M → CS + S + M CARBON DISULFIDE 76 BAU/DRY REACTION ORDER: 2. M: AR	1800–3700	2.6(+15)	0	38960±9000	0.5	1.5
COS + O → CO + SO CARBON OXIDE SULFIDE + OXYGEN ATOM 76 BAU/DRY REACTION ORDER: 2. NOTE: k FACTORS CHANGING TO: f = 0.3; F = 3.0 ABOVE 300K.	190–1200	1.6(+13)	0	2250±250	0.5	1.5
COS + H → CO + HS CARBON OXIDE SULFIDE 76 BAU/DRY REACTION ORDER: 2.	298	1.3(+10)	–	–	0.8	1.3
COS + S → CO + S_2 CARBON OXIDE SULFIDE + SULFUR ATOM 76 BAU/DRY REACTION ORDER: 2.	230–2600	1.7(+12)	0	2050±230	0.3	3.0
$CH_3S.$ + CH≡CH → $CH_3SCH{=}CH.$ METHYLTHIO FREE RADICAL + ETHYNE 72 KER/PAR REACTION ORDER: 2.	298–333	7.9(+ 7)	–	–		
$CH_3S.$ + $CH_2{=}CH_2$ → $CH_3SCH_2CH_2.$ METHYLTHIO FREE RADICAL + ETHENE 72 KER/PAR REACTION ORDER: 2.	298	4.8(+ 8)	–	–		
$CH_3S.$ + $CH_3CH{=}CHCH_3$ → $CH_3CH(SCH_3)CH(.)CH_3$ METHYLTHIO FREE RADICAL + 2-BUTENE 72 KER/PAR REACTION ORDER: 2. NOTE: cis-trans EQUILIBRIUM - WEIGHTED k.	298–333	1.6(+ 9)	–	–		
CH_3SH → $CH_3.$ + SH METHANETHIOL 70 BEN/O'N REACTION ORDER: 1.	1005–1102	3.2(+15)	0	38550		
CH_3SH + CH_3 → $CH_3S.$ + $.CH_2SH$ + CH_4 METHANETHIOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	303	1.2(+ 8)	–	–	0.5	2.0
CD_3SH + $CH_3.$ → $CD_3S.$ + CH_4 METHANE-d_3-THIOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–500	1.1(+11)	0	2065±500	0.5	2.0
CD_3SH + $CH_3.$ → $.CD_2SH$ + CH_3D METHANE-d_3-THIOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–500	7.6(+10)	0	4200±250	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
CN + O → N + CO CYANOGEN FREE RADICAL + OXYGEN ATOM 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+12)	0	0±2500	0.3	3.2
CN + O → NO + C CYANOGEN FREE RADICAL + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.3(+12)	0.5	14545		
CN + O_2 → NO + CO CYANOGEN FREE RADICAL + OXYGEN MOLECULE 76 ENG REACTION ORDER: 2.	1500-2500	3.2(+11)	0	0±5000	0.3	3.2
CN + H → N + CH CYANOGEN FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+12)	0.5	49775		
CN + H → NH + C CYANOGEN FREE RADICAL + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.0(+13)	0.5	52745		
CN + H + M → HCN + M CYANOGEN FREE RADICAL + HYDROGEN ATOM 76 ENG REACTION ORDER: 3.	1500-2500	3.2(+16)	-0.5	0±2500	0.3	3.2
CN + H_2 → HCN + H CYANOGEN FREE RADICAL + HYDROGEN MOLECULE 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500-2500	3.2(+12)	0	2500±1500		
CN + OH → HCN + O CYANOGEN FREE RADICAL + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500-2500	3.2(+12)	0	1500±1500		
CN + S → N + CS CYANOGEN FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
CN + S → C + NS CYANOGEN FREE RADICAL + SULFUR ATOM 75 BEN/GOL REACTION ORDER: 2.		2.0(+12)	0.5	32010		
CN + N → C + N_2 CYANOGEN FREE RADICAL + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
CN + NO → CO + N_2 CYANOGEN FREE RADICAL + NITROGEN OXIDE(NO) 76 ENG REACTION ORDER: 2.	1500-2500	3.2(+11)	0	0±2500	0.3	3.2
CN + NH → HCN + N CYANOGEN FREE RADICAL + IMIDOGEN FREE RADICAL 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+11)	0.5	1000±2500	0.3	3.2
CN + HNO → HCN + NO CYANOGEN FREE RADICAL + NITROSYL HYDRIDE 76 ENG REACTION ORDER: 2.	1500-2500	4.0(+11)	0.5	0±2500	0.3	3.2
CN + C → N + C_2 CYANOGEN FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		2.5(+11)	0.5	19300		
CN + C → C + CN CYANOGEN FREE RADICAL + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
CN + CH_2 → HCN + CH CYANOGEN FREE RADICAL + METHYLENE FREE RADICAL 76 ENG REACTION ORDER: 2. NOTE: k ESTIMATED.	1500-2500	3.2(+12)	0	2500±1500		
CN + CH_3. → HCN + CH_2 CYANOGEN FREE RADICAL + METHYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500-2500	1.0(+11)	0.7	1500±2500		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CN + CH_4 \rightarrow HCN + CH_3$ CYANOGEN FREE RADICAL + METHANE 76 ENG REACTION ORDER: 2.	1500–2500	3.2(+11)	0.7	2500±2500	0.3	3.2
$CN + .CHO \rightarrow CO + HCN$ CYANOGEN FREE RADICAL + METHYL, OXO-, FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.5	0±2500	0.3	3.2
$CN + HCHO \rightarrow HCN + CHO$ CYANOGEN FREE RADICAL + FORMALDEHYDE 76 ENG REACTION ORDER: 2.	1500–2500	1.3(+11)	0.7	1500±2500	0.3	3.2
$C(NO_2)_4 \rightarrow .C(NO_2)_3 + NO_2$ METHANE, TETRANITRO- 70 BEN/O'N REACTION ORDER: 1.	443–506	3.4(+17)	0	20575		
$HCN + OH \rightarrow CN + H_2O$ HYDROCYANIC ACID + HYDROXYL FREE RADICAL 76 ENG REACTION ORDER: 2.	1500–2500	2.0(+11)	0.6	2500±2500	0.3	3.2
$CH_3NH_2 + CH_3. \rightarrow CH_3NH. + .CH_2NH_2 + CH_4$ METHANAMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–650	2.1(+11)	0	4330±500	0.7	1.3
$CH_3NH_2 + CH_3. \rightarrow .CH_2NH_2 + CH_4$ METHANAMINE + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	388–617	5.4(+11)	0	5020±500	0.3	3.0
$CH_3ND_2 + CH_3. \rightarrow CH_3ND. + CH_3D$ METHANAMINE-d_2 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–450	2.0(+11)	0	5135±1000	0.5	1.5
$CH_3ND_2 + CH_3. \rightarrow .CH_2ND_2 + CH_4$ METHANAMINE-d_2 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–450	1.4(+11)	0	4530±500	0.7	1.3
$CD_3NH_2 + CH_3. \rightarrow .CD_2NH_2 + CH_3D$ METHAN-d_3-AMINE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	400–500	7.2(+10)	0	5100±500	0.5	1.5
$CD_3NH_2 + CH_3. \rightarrow CD_3NH. + CH_4$ METHAN-d_3-AMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–500	2.0(+11)	0	4530±750	0.5	2.0
$CH_2{=}N{\equiv}N \rightarrow CH_2 + N_2$ METHANE, DIAZO- 70 BEN/O'N REACTION ORDER: 1.	498–723	1.0(+13)	0	17600		
$CH_3NHNH_2 \rightarrow CH_3NH. + NH_2$ HYDRAZINE, METHYL- 70 BEN/O'N REACTION ORDER: 1. NOTE: SUSPECT ARRHENIUS FACTORS.	746–862	5.0(+16)	–	32600		
$CH_3NHNH_2 + CH_3. \rightarrow CH_3N(.)NH_2 + CH_3NHNH.$ $+ .CH_2NHNH_2 + CH_4$ HYDRAZINE, METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	420	6.3(+ 8)	–	–		
$CH_3NO \rightarrow CH_2{=}NOH$ METHANE, NITROSO- 70 BEN/O'N REACTION ORDER: 1.	633–698	7.9(+12)	0	19800		
$HCONH_2 + CH_3. \rightarrow HCONH. + .CONH_2 + CH_4$ FORMAMIDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	3.6(+10)	0	3300±5000	0.5	1.5
$HCOND_2 + CH_3. \rightarrow HCOND. + CH_3D$ FORMAMIDE-N,N-d_2 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.0(+11)	0	4900±500	0.5	2.0

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$HCOND_2 + CH_3. \rightarrow .COND_2 + CH_4$ FORMAMIDE-N,N-d_2 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	5.5(+10)	0	3575±500	0.5	2.0
$CH_3ONO \rightarrow CH_3O. + NO$ NITROUS ACID METHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	453–513	4.0(+15)	0	20700		
$CH_3NO_2 \rightarrow CH_3. + NO_2$ METHANE, NITRO- 70 BEN/O'N REACTION ORDER: 1.	660	4.0(+15)	0	29700		
$CH_3NO_2 + CH_3. \rightarrow .CH_2NO_2 + CH_4$ METHANE, NITRO- + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300–500	1.0(+11)	0	5100±750	0.4	2.5
$CH_3ONO_2 \rightarrow CH_3O. + NO_2$ NITRIC ACID METHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	483–513	3.2(+15)	0	20030		
$CH_3ONH_2 + CH_3. \rightarrow CH_3ONH. + CH_4$ HYDROXYLAMINE, O-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	5.0(+10)	0	2265±500	0.5	1.5
$CH_3OND_2 + CH_3. \rightarrow CHO_3ND. + CH_3D$ HYDROXYLAMINE-N,N-d_2, O-METHYL, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	3.5(+10)	0	2970±500	0.5	1.5
$C_2 + O \rightarrow C + CO$ CARBON DIMER + OXYGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$C_2 + H \rightarrow C + CH$ CARBON DIMER + HYDROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		1.6(+13)	0.5	30450		
$C_2 + S \rightarrow C + CS$ CARBON DIMER + SULFUR ATOM 75 BEN/GOL REACTION ODER: 2.		6.3(+11)	0.5	0		
$C_2 + N \rightarrow C + CN$ CARBON DIMER + NITROGEN ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$C_2 + C \rightarrow C + C_2$ CARBON DIMER + CARBON ATOM 75 BEN/GOL REACTION ORDER: 2.		6.3(+11)	0.5	0		
$CCO + CH{\equiv}CH \rightarrow$ products CARBON OXIDE(C_2O) + ETHYNE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.3 NOTE: k_{ref}: $CCO + CH_2{=}CH_2$	304	–	–	–		
$CCO + CH_3CH{=}CH_2 \rightarrow CO + CH_3CH{=}C{=}CH_2$ CARBON OXIDE(C2O) + 1-PROPENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 5.7 NOTE: k_{ref}: $CCO + CH_2{=}CH_2$	297	–	–	–		
$CCO + CH_3C{\equiv}CCH_3 \rightarrow$ products CARBON OXIDE(C_2O) + 2-BUTYNE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 8.5 NOTE: k_{ref}: $CCO + CH_2{=}CH_2$	304	–	–	–		
$CCO + CH_2{=}CHCH{=}CH_2 \rightarrow CO + CH_2{=}C{=}CHCH{=}CH_2$ CARBON OXIDE(C_2O) + 1,3-BUTADIENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 210. NOTE: k_{ref}: $CCO + CH_2{=}CH_2$	298	–	–	–		
$CCO + CH_3CH_2CH{=}CH_2 \rightarrow CH_3CH_2CH{=}C{=}CH_2 + CO$ CARBON OXIDE(C_2O) + 1-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 7.0 NOTE: k_{ref}: $CCO + CH_2{=}CH_2$	298	–	–	–		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
CCO + cis-$CH_3CH=CHCH_3$ → CO + cis-$CH_3CH=C=CHCH_3$ CARBON OXIDE(C_2O) + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 9.1 NOTE: k_{ref}: CCO + $CH_2=CH_2$	297	-	-	-		
CCO + trans-$CH_3CH=CHCH_3$ → CO + trans-$CH_3CH=C=CHCH_3$ CARBON OXIDE(C_2O) + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 10.6 NOTE: k_{ref}: CCO + $CH_2=CH_2$	297	-	-	-		
CCO + $(CH_3)_2C=CH_2$ → CO + $(CH_3)_2C=C=CH_2$ CARBON OXIDE(C_2O) + 1-PROPENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 50.0 NOTE: k_{ref}: CCO + $CH_2=CH_2$	297	-	-	-		
CCO + $(CH_3)_2C=CHCH_3$ → CO + $(CH_3)_2C=C=CHCH_3$ CARBON OXIDE(C_2O) + 2-BUTENE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 100. NOTE: k_{ref}: CCO + $CH_2=CH_2$	298	-	-	-		
CCO + $(CH_3)_2C=C(CH_3)_2$ → CO + $(CH_3)_2C=C=C(CH_3)_2$ CARBON OXIDE(C_2O) + 2-BUTENE, 2,3-DIMETHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 250. NOTE: k_{ref}: CCO + $CH_2=CH_2$	298	-	-	-		
CCO + $(CH_3)_2C=C=C(CH_3)_2$ → CO + $(CH_3)_2C=C=C(CH_3)_2$ CARBON OXIDE(C_2O) + 2,3-PENTADIENE, 2,4-DIMETHYL- 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 113. NOTE: k_{ref}: CCO + $CH_2=CH_2$	304	-	-	-		
CH≡CH + O → products ETHYNE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	200–700	1.4(+13)	0	1500	0.8	1.2
CH≡CH + OH → CH≡C. + H_2O ETHYNE + HYDROXYL FREE RADICAL 72 KON REACTION ORDER: 2.	300–2000	7.6(+12)	0	2335±400	0.5	2.1
CH≡CH + S → cy-CH=CHS ETHYNE + SULFUR ATOM 72 KER/PAR REACTION ORDER: 2.	298	1.7(+11)	-	-		
CH≡CH + N → C_2H_2N ETHYNE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: UPPER LIMIT.	440	2.0(+ 9)	-	-		
CH≡CH + CH_3. → CH≡C. + CH_4 ETHYNE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: GIVEN WITH CAUTION.	473–773	-	-	7100		
CH≡CH + CH_3. → $CH_3CH=CH$. ETHYNE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2	371–479	2.5(+11)	0	3900		
CH≡CH + CH_3S. → $CH_3SCH=CH$. ETHYNE + METHYLTHIO FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	298–333	7.9(+ 7)	-	-		
CH≡CH + CCO → products ETHYNE + CARBON OXIDE(C_2O) 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.3 NOTE: k_{ref}: $CH_2=CH_2$ + CCO	304	-	-	-		
CH≡CH + CH_3CH_2. → $CH_3CH_2CH=CH$. ETHYNE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	373–473	5.0(+10)	0	3500		
CH≡CH + $(CH_3)_2CH$. → $(CH_3)_2CHCH=CH$. ETHYNE + ETHYL, 1-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.		5.0(+10)	0	3475		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH{\equiv}CH + (CH_3)_3C. \rightarrow (CH_3)_3CCH{=}CH.$ ETHYNE + ETHYL, 1,1-DIMETHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	363–577	1.0(+11)	0	3875		
cis-CDH=CDH → trans-CDH=CHD cis-ETHENE-1,2-d_2 70 BEN/O'N REACTION ORDER: 1.	723–823	1.0(+13)	0	32700		
$CH_2{=}CH_2 + O \rightarrow cy\text{-}CH_2CH_2O$ ETHENE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	200–500	3.3(+12)	0	565	0.8	1.2
$CH_2{=}CH_2 + H \rightarrow CH_3CH_2.$ ETHENE + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2.	298	9.3(+13)	0	1410		
$CH_2{=}CH_2 + H + M \rightarrow CH_3CH_2. + M$ ETHENE + HYDROGEN ATOM 72 KON REACTION ORDER: 3. M: H_2	298–813	5.6(+17)	0.5	495		
$CH_2{=}CH_2 + OH \rightarrow CH_2{=}CH. + H_2O$ ETHENE + HYDROXYL FREE RADICAL 72 KON REACTION ORDER: 2.	3500–1400	1.6(+14)	0	2831±445	0.4	2.4
$CH_2{=}CH_2 + OH \rightarrow .CH_2CH_2OH$ ETHENE + HYDROXYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.		1.1(+12)	-	-	0.8	1.3
$CH_2{=}CH_2 + HO_2 \rightarrow$ products ETHENE + HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: RATIO DATA VERSUS kref. FOR $HO_2 + CO \rightarrow CO_2 + OH$ k FACTORS MIGHT BE HIGH.	300	1.0(+ 7)	-	-	0.1	10.
$CH_2{=}CH_2 + S \rightarrow cy\text{-}CH_2CH_2S$ ETHENE + SULFUR ATOM 72 KER/PAR REACTION ORDER: 2.	298	8.1(+11)	-	-		
$CH_2{=}CH_2 + N \rightarrow$ products ETHENE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2.	320–550	2.0(+10)	0	353		
$CH_2{=}CH_2 + CH_3. \rightarrow CH_2{=}CH. + CH_4$ ETHENE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–650	4.2(+11)	0	5600±500	0.5	1.5
$CH_2{=}CH_2 + CH_3. \rightarrow CH_3CH_2CH_2.$ ETHENE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	353–453	3.3(+11)	0	3900		
$CH_2{=}CH_2 + CH_3. \rightarrow CH_3CH_2CH_2. + (CH_3)_2CH.$ ETHENE + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	350–705	2.0(+11)	0	3575±105	0.8	1.3
$CH_2{=}CH_2 + CH_3S. \rightarrow CH_3SCH_2CH_2.$ ETHENE + METHYLTHIO FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	298	4.8(+ 8)	-	-		
$CH_2{=}CH_2 + CH_3CH_2. \rightarrow CH_3CH_2CH_2CH_2.$ ETHENE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	348–482	1.6(+11)	0	3675		
$CH_2{=}CH_2 + CH_3CH_2CH_2. \rightarrow CH_3CH_2CH_2CH_2CH_2.$ ETHENE + PROPYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	375–503	1.9(+10)	0	3070		
$CH_2{=}CH_2 + (CH_3)_2CH. \rightarrow (CH_3)_2CHCH_2CH_2.$ ETHENE + ETHYL, 1-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	340–457	6.9(+10)	0	3475		

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_2=CH_2 + CH_3CH_2CH_2. \rightarrow CH_3(CH_2)_4CH_2.$ ETHENE + BUTYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	352–405	2.3(+10)	0	3370		
$CH_2=CH_2 + (CH_3)_3C. \rightarrow (CH_3)_3CCH_2CH_2.$ ETHENE + ETHYL, 1,1-DIMETHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	300–650	2.8(+10)	0	3575		
$CH_2=CH_2 + (CH_3)_2CHCH_2CH_2. \rightarrow (CH_3)_2CH(CH_2)_3CH_2.$ ETHENE + BUTYL, 3-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	340–413	1.2(+10)	0	3235		
$CH_3CH_2. \rightarrow CH_2=CH_2 + H$ ETHYL FREE RADICAL 72 KON REACTION ORDER: 1.	673–893	2.3(+14)	0	19990±355	0.6	1.6
$CH_3CH_2. + H_2 \rightarrow CH_3CH_3 + H$ ETHYL FREE RADICAL + HYDROGEN MOLECULE 72 KON REACTION ORDER: 2.	473–823	3.0(+11)	0	5435		
$CH_3CH_2. + CH{\equiv}CH \rightarrow CH_3CH_2CH{=}CH.$ ETHYL FREE RADICAL + ETHYNE 72 KER/PAR REACTION ORDER: 2.	373–473	5.0(+10)	0	3500		
$CH_3CH_2. + CH_2=CH_2 \rightarrow CH_3CH_2CH_2CH$ ETHYL FREE RADICAL + ETHENE 72 KER/PAR REACTION ORDER: 2.	348–482	1.6(+11)	0	3675		
$CH_3CH_2. + CH_2=C=CH_2 \rightarrow CH_3CH_2CH_2C(.)=CH_2$ ETHYL FREE RADICAL + 1,2-PROPADIENE 72 KER/PAR REACTION ORDER: 2.	379–465	3.2(+11)	0	4630		
$CH_3CH_2. + CH_2=CHCH_2OH \rightarrow CH_3CH_2CH(.)CH_2OH + .CH_2CH(CH_2CH_3)CH_2OH$ ETHYL FREE RADICL + 2-PROPEN-1-OL 72 KER/PAR REACTION ORDER: 2.	323–415	1.9(+11)	0	3901		
$CH_3CH_2. + CH_2=CHCN \rightarrow CH_3CH_2CH_2CH(.)CN + .CH_2CH(CH_2CH_3)CN$ ETHYL FREE RADICAL + 2-PROPENENITRILE 72 KER/PAR REACTION ORDER: 2.	323–454	6.2(+10)	0	1700		
$CH_3CH_2. + CH_3CH_2CH{=}CH_2 \rightarrow CH_3CH_2CH_2CH(.)CH_2CH_3$ ETHYL FREE RADICAL + 1-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	3675		
$CH_3CH_2. + cis\text{-}CH_3CH{=}CHCH_2 \rightarrow CH_3CH(CH_2CH_3)CH(.)CH_3$ ETHYL FREE RADICAL + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	4265		
$CH_3CH_2. + trans\text{-}CH_3CH{=}CHCH_3 \rightarrow CH_3CH(CH_2CH_3)CH(.)CH_3$ ETHYL FREE RADICAL + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	4350		
$CH_3CH_2. + CH_3COOCH{=}CH_2 \rightarrow CH_3COOCH(.)CH_2CH_2CH_3 + CH_3COOCH(CH_2CH_3)CH_2.$ ETHYL FREE RADICAL + ACETIC ACID ETHENYL ESTER 72 KER/PAR REACTION ORDER: 2.	303–417	7.8(+10)	0	3475		
$CH_3CH_2. + cis\text{-}CH_3CH{=}CHCN \rightarrow CH_3CH(CH_2CH_3)CH(.)CN + CH_3CH(.)CH(CH_2CH_3)CN$ ETHYL FREE RADICAL + cis-2-BUTENENITRILE 72 KER/PAR REACTION ORDER: 2.	323–454	1.5(+10)	0	2500		
$CH_3CH_2. + trans\text{-}CH_3CH{=}CHCN \rightarrow CH_3CH(CH_2CH_3)CH(.)CN + CH_3CH(.)CH(CH_2CH_3)CN$ ETHYL FREE RADICAL + trans-2-BUTENENITRILE 72 KER/PAR REACTION ORDER: 2.	323754	3.1(+10)	0	2600		
$CH_3CH_2. + CH_2=C(CH_3)CN \rightarrow CH_3CH_2CH_2C(.)(CH_3)CN + CH_2C(CH_3)(CH_2CH_3)CN$ ETHYL FREE RADICAL + 2-PROPENENITRILE, 2-METHYL- 72 KER/PAR REACTION ORDER: 2.	312–400	2.5(+11)	0	2300		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CH_2.$ + cis-$CH_3CH_2CH{=}CHCH_3$ → $CH_3CH_2CH(CH_2CH_3)CH(.)CH_3$						
ETHYL FREE RADICAL + cis-2-PENTENE						
72 KER/PAR REACTION ORDER: 2.	298	-	-	4300		
$CH_3CH_2.$ + $(CH_3)_2CHCH{=}CH_2$ → $(CH_3)_2CHCH(.)CH_2CH_2CH_3$						
ETHYL FREE RADICAL + 1-BUTENE, 3-METHYL-						
72 KER/PAR REACTION ORDER: 2.	298	-	-	3620		
$CH_3CH_2.$ + $CH_3COOCH_2CH{=}CH_2$ → $CH_3COOCH_2CH(.)CH_2CH_2CH_3$ + $CH_3COOCH_2CH(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + ACETIC ACID 2-PROPENYL ESTER						
72 KER/PAR REACTION ORDER: 2.	308-448	2.5(+11)	0	3900		
$CH_3CH_2.$ + $CH_3CH_2COCH_2CH_3$ → CH_3CH_3 + $.CH_2CH_2COCH_2CH_3$						
ETHYL FREE RADICAL + 3-PENTANONE						
72 KON REACTION ORDER: 2.	300-520	2.8(+11)	0	3986+100	0.4	2.2
$CH_3CH_2.$ + $CH_2{=}C(CH_3)C(CH_3){=}CH_2$ → $CH_3CH_2CH_2C(.)(CH_3)C(CH_3){=}CH_2$ + $.CH_2C(CH_2)(CH_2CH_3)C(CH_3){=}CH_2$						
ETHYL FREE RADICAL + 1,3-BUTADIENE, 2,3-DIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	318-414	1.6(+11)	0	2265		
$CH_3CH_2.$ + $CH_3(CH_2)_3CH{=}CH_2$ → $CH_3(CH_2)_3CH(.)CH_2CH_2CH_3$ + $CH_3(CH_2)_3CH(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + 1-HEXENE						
72 KER/PAR REACTION ORDER: 2.	338-435	3.9(+10)	0	3400		
$CH_3CH_2.$ + $CH_3CH_2COOCH_2CH{=}CH_3$ → $CH_3CH_2COOCH_2CH(.)CH_2CH_2CH_3$ + $CH_3CH_2COOCH_2CH(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + PROPANOIC ACID 2-PROPENYL ESTER						
72 KER/PAR REACTION ORDER: 2.	352-435	2.5(+11)	0	3875		
$CH_3CH_2.$ + $CH_2{=}CHO(CH_2)_3CH_3$ → $CH_3CH_2CH_2CH(.)O(CH_2)_3CH_3$ + $.CH_2CH(CH_2CH_3)O(CH_2)_3CH_3$						
ETHYL FREE RADICAL + BUTANE, 1-ETHENYLOXY-						
72 KER/PAR REACTION ORDER: 2.	303-435	2.5(+10)	0	3070		
$CH_3CH_2.$ + $CH_3(CH_2)_4C{\equiv}CH$ → $CH_3((CH_2)_4C(.){=}CHCH_2CH_3$ + $CH_3(CH_2)_4C(CH_2CH_3){=}CH.$						
ETHYL FREE RADICAL + 1-HEPTYNE						
72 KER/PAR REACTION ORDER: 2.	300-455	3.9(+11)	0	4430		
$CH_3CH_2.$ + $CH_3(CH_2)_4CH{=}CH_2$ → $CH_3(CH_2)_4CH(.)CH_2CH_2CH_3$ + $CH_3(CH_2)_4CH(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + 1-HEPTENE						
72 KER/PAR REACTION ORDER: 2.	359-439	6.2(+10)	0	3500		
$CH_3CH_2.$ + $(CH_3)_3CC(CH_3){=}CH_2$ → $CH_3C(CH_3)_2C(.)(CH_3)CH_2CH_2CH_3$ + $CH_3C(CH_3)_2C(CH_3)(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + 1-BUTENE, 2,3,3-TRIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	322-364	7.8(+ 9)	0	2800		
$CH_3CH_2.$ + $(CH_3)_2C{=}CHCH{=}C(CH_3)_2$ → $(CH_3)_2C(CH_2CH_3)CH(.)CH{=}C(CH_3)_2$ + $(CH_3)_2C(.)CH(CH_2CH_3)CH{=}C(CH_3)_2$						
ETHYL FREE RADICAL + 2,4-HEXADIENE, 2,5-DIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	328-420	6.2(+10)	0	3300		
$CH_3CH_2.$ + $CH_3(CH_2)_5CH{=}CH_2$ → $CH_3(CH_2)_5CH(.)CH_2CH_2CH_3$ + $CH_3(CH_2)_5CH(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + 1-OCTENE						
72 KER/PAR REACTION ORDER: 2.	339-425	1.2(+11)	0	3825		
$CH_3CH_2.$ + $(CH_3)_3CCH_2C(CH_3){=}CH_2$ → $(CH_3)_3CCH_2C(.)(CH_3)CH_2CH_2CH_3$ + $(CH_3)_3CCH_2C(CH_3)(CH_2CH_3)CH_2.$						
ETHYL FREE RADICAL + 1-PENTENE, 2,4,4-TRIMETHYL-						
72 KER/PAR REACTION ORDER: 2.	309-364	1.9(+10)	0	2870		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CH_3 \rightarrow CH_3. + CH_3.$ ETHANE 70 BEN/O'N REACTION ORDER: 1.	298–858	5.6(+16)	0	45045		
$CH_3CH_3 + O \rightarrow CH_3CH_2. + OH$ ETHANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.		2.5(+13)	0	3200	0.7	1.3
$CH_3CH_3 + H \rightarrow CH_3CH_2. + H_2$ ETHANE + HYDROGEN ATOM 72 KON REACTION ORDER: 2.	285–1440	1.0(+14)	0	4815±70	0.8	1.2
$CH_3CH_3 + OH \rightarrow CH_3CH_2. + H_2O$ ETHANE + HYDROXYL FREE RADICAL 72 KON REACTION ORDER: 2.		1.3(+14)	0	1998		
$CH_3CH_3 + HO_2 \rightarrow CH_3CH_2. + H_2O_2$ ETHANE + HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS k_{ref} FOR $HO_2 + CO \rightarrow HO + CO_2$	300–1000	1.0(+12)	0	7000	0.1	10.
$CH_3CH_3 + CH_3. \rightarrow CH_3CH_2. + CH_4$ ETHANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.		5.6(+11)	0	5840±250	0.7	1.3
$CH_3CH_3 + CD_3. \rightarrow CH_3CH_2. + CD_3H$ ETHANE + METHYL-d_3 FREE RADICAL 72 KON REACTION ORDER: 2.	390–800	1.0(+12)	0	6085±165	0.7	1.4
$CH_3CD_3 + CD_3. \rightarrow CH_3CD_2. + CD_4$ ETHANE-1,1,1-d_3 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	500–750	4.3(+11)	0	6845±250	0.7	1.3
$CD_3CH_3 + CD_3. \rightarrow CD_3CH_2. + CD_3H$ ETHANE-1,1,1-d_3 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.		3.0(+11)	0	5900±250	0.7	1.3
$CD_3CD_3 + CH_3. \rightarrow CD_3CD_2. + CH_3D$ ETHANE-d_6 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	500–900	5.6(+11)	0	6600±250	0.7	1.3
$CD_3CD_3 + CD_3. \rightarrow CD_3CD_2. + CD_4$ ETHANE-d_6 + METHYL-d_3 FREE RADICAL 72 KON REACTION ORDER: 2.		4.6(+11)	0	6405		
$CH_2=C=O + O \rightarrow$ products ETHENONE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298	5.3(+11)	–	–	0.7	1.3
$HOOC-COOH \rightarrow HCOOH + CO_2$ ETHANEDIOIC ACID 70 BEN/O'N REACTION ORDER: 1.	390–420	7.9(+11)	0	15100		
$CH_3C(O). \rightarrow CH_3. + CO$ ETHYL, 1-OXO-, FREE RADICAL 72 KON REACTION ORDER: 1.	273–413	1.5(+10)	0	6790±115	0.7	1.4
$CH_3C(O). \rightarrow CH_3. + CO$ ETHYL, 1-OXO-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.		2.0(+10)	0	7550		
$CH_3CHO + O \rightarrow$ products ACETALDEHYDE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298–500	1.4(+13)	0	1140	0.5	2.0
$CH_3CHO + CH_3. \rightarrow CH_3C(O). + CH_4$ ACETALDEHYDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–525	8.5(+10)	0	3000±250	0.4	1.6
$CH_3CDO + CH_3. \rightarrow CH_3C(O). + CH_3D$ ACETALDEHYDE-1-d + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	1.0(+11)	0	3975±500	0.5	1.5

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$cy\text{-}CH_2CH_2O + O \rightarrow$ products OXIRANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298	7.0(+ 8)	-	-	0.6	1.5
$cy\text{-}CH_2CH_2O + CH_3. \rightarrow cy\text{-}CH_2CH(.)O + CH_4$ OXIRANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	2.5(+11)	0	5435±750	0.5	2.0
$HCOOCH_3 + CH_3. \rightarrow .COOCH_3 + CH_4$ FORMIC ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–550	2.0(+11)	0	4900±500	0.5	1.5
$HCOOCH_3 + CH_3. \rightarrow HCOOCH_2. + CH_4$ FORMIC ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–550	1.6(+11)	0	5635±500	0.5	1.5
$HCOOCH_3 + CH_3. \rightarrow .COOCH_3 + HCOOCH_3. + CH_4$ FORMIC ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–550	3.0(+11)	0	4980±500	0.5	1.5
$DCOOCH_3 + CH_3. \rightarrow .COOCH_3 + CH_3D$ FORMIC-d ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–550	2.5(+11)	0	5900±500	0.5	1.5
$DCOOCH_3 + CH_3. \rightarrow DCOOCH_2. + CH_4$ FORMIC-d ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.		1.6(+11)	0	5635±500	0.5	1.5
$CH_3COOH \rightarrow CH_2=C=O + H_2O$ ACETIC ACID 70 BEN/O'N REACTION ORDER: 1. NOTE: SUSPECT VALUE.	773–973	8.9(+12)	0	33970		
$CH_3COOD + CH_3. \rightarrow .CH_2COOD + CH_4$ ACETIC ACID-d + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–600	1.6(+11)	0	5135±500	0.6	1.4
$CH_3CH_2O. \rightarrow CH_3. + HCHO$ ETHOXY FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	488–468	2.5(+13)	0	8805		
$CH_3CH_2OH + O \rightarrow$ products ETHANOL + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298	8.7(+10)	-	-	0.6	1.5
$CH_3CH_2OH + CH_3. \rightarrow CH_3CH_2O. + CH_4$ ETHANOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–625	7.9(+10)	0	4730±500	0.6	1.4
$CH_3CH_2OH + CH_3. \rightarrow CH_3CH(.)OH + CH_4$ ETHANOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–625	4.0(+11)	0	4900±500	0.6	1.4
$CH_3CH_2OH + CH_3. \rightarrow CH_3CH_2O. + CH_3CH(.)OH + .CH_2CH_2OH + CH_4$ ETHANOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–625	5.1(+11)	0	4900±500	0.6	1.4
$CH_3CD_2OH + CH_3. \rightarrow CH_3CD(.)OH + CH_3D$ ETHAN-1,1-d_2-OL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–550	4.1(+11)	0	5735±500	0.6	1.4
$CH_3CD_2OH + CH_3. \rightarrow CH_3CD_2O. + .CH_2CD_2OH + CH_4$ ETHAN-1,1-d_2-OL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–550	7.1(+10)	0	4530±500	0.6	1.4
$CH_3CH_2OD + CD_3. \rightarrow CH_3CH_2O. + CD_4$ ETHANOL-d + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–525	6.2(+10)	0	5135±500	0.5	2.0
$CH_3CH_2OD + CD_3. \rightarrow CH_3CH(.)OD + .CH_2CH_2OD + CD_3H$ ETHANOL-d + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–525	4.4(+11)	0	4900±500	0.6	1.4

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3OCH_3 \rightarrow CH_3O. + CH_3.$ METHANE, OXYBIS- 70 BEN/O'N REACTION ORDER: 1.	750–820	1.0(+16)	0	40765		
$CH_3OCH_3 + O \rightarrow$ products METHANE, OXYBIS-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	200–500	5.9(+12)	0	1520	0.7	1.3
$CH_3OCH_3 + CH_3. \rightarrow CH_3OCH_2. + CH_4$ METHANE, OXYBIS-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–550	4.2(+11)	0	5035±500	0.5	1.5
$CH_3OOCH_3 \rightarrow CH_3O. + CH_3O.$ PEROXIDE, DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	393–452	4.0(+15)	0	18570		
$CH_3OOCH_3 + CH_3. \rightarrow CH_3OOCH_2. + CH_4$ PEROXIDE, DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	4.2(+11)	0	5000±1000	0.3	3.0
$CH_3CH_2OOH \rightarrow CH_3CH_2O. + OH$ HYDROPEROXYDE, ETHYL- 70 BEN/O'N REACTION ORDER: 1. NOTE: k PROBABLY RELIABLE.	553–653	2.2(+15)	0	21640		
$cy\text{-}CH_2CH_2S + CD_3. \rightarrow cy\text{-}CH_3CH(.)S + CD_3H$ THYIRANE + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	2.2(+11)	0	4800±500	0.5	2.0
$CH_3CH_2SH \rightarrow CH_2{=}CH_2 + H_2S$ ETHANETHIOL 70 BEN/O'N REACTION ORDER: 1.	785–938	1.0(+13)	0	25900		
$CH_3CH_2SH \rightarrow CH_3CH_2. + .SH$ ETHANETHIOL 70 BEN/O'N REACTION ORDER: 1.	785–938	6.3(+15)	0	36336		
$CH_3CH_2SH + CH_3. \rightarrow CH_3CH_2S. + CH_3CH(.)SH + .CH_2CH_2SH + CH_4$ ETHANETHIOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	303	3.5(+ 7)	–	–	0.5	2.0
$CH_3SO_2CH_3 \rightarrow CH_3SO_2. + CH_3$ METHANE, SULFONYLBIS- 70 BEN/O'N REACTION ORDER: 1.	783–913	2.0(+14)	0	30500		
$CH_3NC \rightarrow CH_3CN$ METHANE, ISOCYANO- 70 BEN/O'N REACTION ORDER: 1.	472–533	4.0(+13)	0	19325		
$CH_3CN + CH_3. \rightarrow .CH_2CH + CH_4$ ACETONITRILE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	5.4(+11)	0	5100±500	0.7	1.5
$CH_3CH_2NH_2 + CH_3. \rightarrow CH_3CH_2NH. + CH_3CH(.)NH_2 + .CH_2CH_2NH_2 + CH_4$ ETHANAMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	2.9(+11)	0	4200±500	0.5	2.0
$CH_3CH_2NH_2 + CH_3. \rightarrow CH_3CH_2NH. + CH_4$ ETHANAMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.0(+11)	0	4600±500	0.5	2.0
$CD_3CH_2NH_2 + CH_3. \rightarrow CH_4 + CH_3D + CD_3CH(.)NH_2 + .CD_2CH_2NH_2$ ETHAN-2,2,2-d_3-AMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	2.9(+11)	0	4200±500	0.5	2.0
$CD_3CH_2NH_2 + CH_3 \rightarrow CD_3CH_2NH. + CH_4$ ETHAN-2,2,2-d_3-AMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	423	4.0(+ 5)	–	–		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3)_2NH + CH_3. \rightarrow (CH_3)_2N. + .CH_2NH(CH_3) + CH_4$ METHANAMINE, N-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-650	1.6(+11)	0	3500±500	0.5	2.0
$(CH_3)_2NH + CH_3. \rightarrow (CH_3)_2N. + CH_4$ METHANAMINE, N-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-650	6.5(+10)	0	3200±500	0.5	2.0
$(CH_3)_2ND + CH_3. \rightarrow CH_2NDCH_3 + CH_4$ METHANAMINE-d, N-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	2.9(+11)	0	4400±500	0.5	1.5
$(CH_3)_2ND + CH_3. \rightarrow (CH_3)_2N. + CH_3D$ METHANAMINE-d, N-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	1.0(+11)	0	4300±500	0.5	1.5
$CH_3N=NCH_3 \rightarrow CH_3. + CH_3N=N.$ DIAZENE, DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	552-600	3.2(+16)	0	26400		
$CH_3N=NCH_3 + CH_3. \rightarrow CH_2N=NCH_3 + CH_4$ DIAZENE, DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300-500	1.1(+11)	0	3975±250		
$CH_3N=NCH_3 + CH_3. \rightarrow (CH_3)_2NN(.)CH_3$ DIAZENE, DIMETHYL-, + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	300-450	5.0(+10)	0	3040±355		
$CD_3N=NCD_3 + CD_3. \rightarrow .CD_2N=NCD_3 + CD_4$ DIAZENE, DI(METHYL-d_3)-, + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300-500	6.6(+10)	0	4125±500		
$NH_2CH_2CH_2NH_2 + CH_3. \rightarrow .NHCH_2CH_2NH_2$ $+ NH_2CH(.)CH_2NH_2 + CH_4$ ETHANEDIAMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	3.8(+11)	0	4200±500		
$NH_2CH_2CH_2NH_2 + CH_3. \rightarrow .NHCH_2CH_2NH_2 + CH_4$ ETHANEDIAMINE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	2.0(+11)	0	4430±500		
$ND_2CH_2CH_2ND_2 + CH_3. \rightarrow .NDCH_2CH_2ND_2 + CH_3D$ ETHANDI(AMINE-d_2) + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	3.2(+11)	0	5100±500		
$ND_2CH_2CH_2ND_2 + CH_3. \rightarrow ND_2CH(.)CH_2ND_2 + CH_4$ ETHANEDI(AMINE-d_2) + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	2.0(+11)	0	4025±500		
$(CH_3)_2NNH_2 + CH_3. \rightarrow (CH_3)_2NNH. + CH_4$ HYDRAZINE, 1,1-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	1.7(+11)	0	2870±500		
$(CH_3)_2NNH_2 + CH_3. \rightarrow (CH_3)_2NNH. + .CH_2N(CH_3)NH_2 + CH_4$ HYDRAZINE, 1,1-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	2.4(+11)	0	2970±500		
$(CH_3)_2NND_2 + CH_3. \rightarrow (CH_3)_2NND. + CH_3D$ HYDRAZINE-d_2, 1,1-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	2.1(+11)	0	3400±500		
$(CH_3)_2NND_2 + CH_3. \rightarrow CH_2N(CH_3)ND_2 + CH_4$ HYDRAZINE-d_2, 1,1-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	3.2(+11)	0	4125±750		
$CH_3NHNHCH_3 + CH_3. \rightarrow CH_3N(.)NHCH_3 + .CH_2NHNHCH_3 + CH_4$ HYDRAZINE, 1,2-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	2.5(+11)	0	2400±250		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	k factors F
$CH_3NDNDCH_3 + CH_3. \rightarrow CH_3N(.)NDCH_3 + CH_3D$ HYDRAZINE-d_2, 1,2-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.0(+11)	0	2700±500		
$CH_3CH{=}NOH \rightarrow CH_3CH{=}N. + OH$ ACETALDEHYDE, OXIME 70 BEN/O'N REACTION ORDER: 1.	603–713	6.8(+12)	0	23655		
$HCONHCH_3 + CH_3. \rightarrow .CONHCH_3 + HCON(.)CH_3 + HCONHCH_2. + CH_4$ FORMAMIDE, N-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–600	7.9(+10)	0	3800±500		
$CH_3CONH_2 + CH_3. \rightarrow CH_3CONH. + .CH_2CONH_2 + CH_4$ ACETAMIDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	2.1(+11)	0	5235±500		
$CH_3CONH_2 + CH_3. \rightarrow .CH_2CONH_2 + CH_4$ ACETAMIDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	1.0(+11)	0	5200±500		
$CD_3CONH_2 + CD_3. \rightarrow .CD_2CONH_2 + CD_4$ ACETAMIDE-2,2,2-d_3 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	1.4(+11)	0	5800±500		
$CD_3CONH_2 + CD_3 \rightarrow CD_3CONH. + CD_3H$ ACETAMIDE-2,2,2-d_3 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	1.1(+11)	0	5235±500		
$CH_3CH_2NO_2 \rightarrow CH_2{=}CH_2 + HONO$ ETHANE, NITRO- 70 BEN/O'N REACTION ORDER: 1.	583–715	2.5(+12)	0	22645		
$CH_3CH_2ONO \rightarrow CH_3CH_2O. + NO$ NITROUS ACID ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	484–505	1.2(+16)	0	20400		
$CH_3CH_2ONO_2 \rightarrow CH_3CH_2O. + NO_2$ NITRIC ACID ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	434–474	3.2(+16)	0	19830		
$O_2NOCH_2CH_2ONO_2 \rightarrow$ products 1,2-ETHANEDIOL, DINITRATE 70 BEN/O'N REACTION ORDER: 1.	358–378	7.9(+15)	0	19630		
$CH_3N(O)N(O)CH_3 \rightarrow CH_3NO + CH_3NO$ DIAZENE, DIMETHYL-1,2-DIOXIDE- 70 BEN/O'N REACTION ORDER: 1.	374–404	2.5(+13)	0	11600		
$CH_3C{\equiv}CH + O \rightarrow$ products 1-PROPYNE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298	4.0(+11)	–	–	0.5	2.0
$CH_3C{\equiv}CH + H \rightarrow CH_3CH{=}CH. + CH_3C(.){=}CH_2$ 1-PROPYNE + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: k TAKEN AS LOWER LIMIT.	298	2.5(+11)	–	–		
$CH_3C{\equiv}CH + S \rightarrow$ cy-$CH_3C{=}CHS$ 1-PROPYNE + SULFUR ATOM 72 KER/PAR REACTION ORDER: 2.	298	1.1(+12)	–	–		
$CH_3C{\equiv}CH + N \rightarrow$ products 1-PROPYNE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2.	320–550	6.9(+10)	0	745		
$CH_3C{\equiv}CH + N \rightarrow$ products 1-PROPYNE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: k_{ref}: CHCH + N	435	–	–	–		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3C{\equiv}CH + CH_3. \rightarrow (CH_3)_2C{=}CH. + CH_3C(.){=}CHCH_3$ 1-PROPYNE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE. CH_3 ADDITION OCCURS PREDOMINANTLY AT TERMINAL C ATOM.	379–465	5.0(+11)	0	4400		
$CH_3C{\equiv}CH + (CH_3)_2CH. \rightarrow (CH_3)_2CHCH{=}C(.)CH_3$ 1-PROPYNE + ETHYL, 1-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: SUSPECT k VALUE.	360–439	1.9(+ 9)	0	2870		
$CH_3C{\equiv}CH + (CH_3)_3C. \rightarrow (CH_3)_3CC(CH_3){=}CH.$ $+ (CH_3)_3CCH{=}C(.)CH_3$ 1-PROPYNE + ETHYL-, 1,1-DIMETHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: SUSPECT k VALUE.	360–439	5.0(+ 8)	0	2770		
$CH_2{=}C{=}CH_2 + CH_3. \rightarrow CH_3CH_2C(.){=}CH_2$ 1,2-PROPADIENE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	373–483	2.0(+11)	0	4100		
$CH_3{=}C{=}CH_2 + CH_3CH_2. \rightarrow CH_3CH_2CH_2C(.)CH_2$ 1,2-PROPADIENE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	379–465	3.2(+11)	0	4630		
$CH_2{=}C{=}CH_2 + (CH_3)_2CH. \rightarrow (CH_3)_2CHCH_2C(.){=}CH_2$ 1,2-PROPADIENE + ETHYL, 1-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	366–473	3.6(+10)	0	3660		
$CH_3CH{=}CH_2 \rightarrow CH_2{=}CHCH_2. + H$ 1-PROPENE 70 BEN/O'N REACTION ORDER: 1.	953–1143	2.0(+15)	0	44900		
$CH_3CH{=}CH_2 + O \rightarrow cy\text{-}(CH_3)CHCH_2O$ 1-PROPENE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	200–500	2.5(+12)	0	38	0.8	1.2
$CH_3CH{=}CH_2 + H \rightarrow CH_3CH_2CH_2.$ 1-PROPENE + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	298	11.2(+12)	0	1460		
$CH_3CH{=}CH_2 + H \rightarrow CH_3CH(.)CH_3$ 1-PROPENE + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: ARRHENIUS PARAMETERS ARE MINIMUM VALUES OF THEIR HIGH PRESSURE LIMITS.	298	7.2(+12)	0	600		
$CH_3CH{=}CH_2 + OH \rightarrow CH_3CH(.)CH_2OH + CH_3CH(OH)CH_2.$ 1-PROPENE + HYDROXYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: ADDITION TO TERMINAL CARBON OF DOUBLE BOND IS PROBABLY 95%.	300	6.6(+12)	–	–		
$CH_3CH{=}CH_2 + S \rightarrow cy\text{-}(CH_3)CHCH_2S$ 1-PROPENE + SULFUR ATOM 72 KER/PAR REACTION ORDER: 2.	298	5.8(+12)	–	–		
$CH_3CH{=}CH_2 + S \rightarrow cy\text{-}(CH_3)CHCH_2S$ 1-PROPENE + SULFUR ATOM 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 6.9 NOTE: k_{ref}: $CH_2{=}CH_2 + S$	298	–	–	–		
$CH_3CH{=}CH_2 + S^*(^1D) \rightarrow cy\text{-}(CH_3)CHCH_2S$ 1-PROPENE + SULFUR ATOM(^1D) 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.7 NOTE: k_{ref}: $CH_2{=}CH_2 + S^*(^1D)$	300	–	–	–		
$CH_3CH{=}CH_2 + N \rightarrow$ products 1-PROPENE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2.	320–550	1.2(+11)	0	655		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f F
$CH_3CH=CH_2 + N \rightarrow$ products 1-PROPENE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.8 NOTE: k_{ref}: $CH_2=CH_2 + N$	435	-	-	-	
$CH_3CH=CH_2 + {}^1CH_2 \rightarrow$ products 1-PROPENE + METHYLENE FREE RADICAL 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.27 NOTE: k_{ref}: $CH_2=CH_2 + {}^1CH_2$	297	-	-	-	
$CH_3CH=CH_2 + {}^3CH_2 \rightarrow$ products 1-PROPENE + METHYLENE FREE RADICAL 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.0 NOTE: k_{ref}: $CH_2=CH_2 + {}^3CH_2$	297	-	-	-	
$CH_3CH=CH_2 + CH_3. \rightarrow CH_3C(.)=CH_2 + CH_4$ 1-PROPENE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	1.4(+11)	0	4430±500	
$CH_3CH=CH_2 + CH_3. \rightarrow [C_3H_5.] + CH_4$ 1-PROPENE + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	350–580	3.2(+10)	0	3775±300	
$CH_3CH=CH_2 + CH_3. \rightarrow CH_3CH_2CH(.)CH_3 + (CH_3)_2CHCH_2.$ 1-PROPENE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	353–453	1.7(+11)	0	3770	
$CH_3CH=CH_2 + CH_3. \rightarrow CH_3CH_2CH(.)CH_3 + (CH_3)_2CHCH_2.$ 1-PROPENE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.72 NOTE: k_{ref}: $CH_2=CH_2 + CH_3$	453	-	-	-	
$CH_3CH=CH_2 + CCO \rightarrow CH_3CH=C=CH_2 + CO$ 1-PROPENE + CARBON OXIDE(C_2O) 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 5.7 NOTE: k_{ref}: $CH_2=CH_2 + CCO$	297	-	-	-	
$CH_3CH=CH_2 + CH_3CH_2CH(.)CH_3 \rightarrow CH_3CH_2CH(CH_3)CH(CH_3)CH_2.$ $+ CH_3CH_2CH(CH_3)CH_2CH(.)CH_3$ 1-PROPENE + PROPYL, 1-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	381–412	6.3(+10)	0	3725	
$CH_3CH_2CH_2. \rightarrow CH_3. + CH_2=CH_2$ 1-PROPYL FREE RADICAL 72 KON REACTION ORDER: 1.	300–750	5.8(+14)	0	16880±350	
$CH_3CH_2CH_2. \rightarrow CH_3. + CH_2=CH_2$ 1-PROPYL FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	297–564	4.0(+13)	0	16660	
$CH_3CH_2CH_2. \rightarrow CH_3CH=CH_2 + H$ 1-PROPYL FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	298–723	6.3(+13)	0	1 9100	
$CH_3CH_2CH_2. + CH_2=CH_2 \rightarrow CH_3CH_2CH_2CH_2CH_2.$ 1-PROPYL FREE RADICAL + ETHENE 72 KON REACTION ORDER: 2. NOTE: TENTATIVE k VALUE	375–503	1.9(+10)	0	3070	
$CH_3CH_2CH_2. + CH_3CH_2CH=CH_2 \rightarrow CH_3CH_2CH(.)CH_2CH_2CH_2CH_3$ 1-PROPYL FREE RADICAL + 1-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	3630	
$CH_3CH_2CH_2. + cis\text{-}CH_3CH=CHCH_3 \rightarrow CH_3CH(CH_2CH_2CH_3)CH(.)CH_3$ 1-PROPYL FREE RADICAL + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	4370	
$CH_3CH_2CH_2. + trans\text{-}CH_3CH=CHCH_3 \rightarrow$ $CH_3CH(CH_2CH_2CH_3)CH(.)CH_3$ 1-PROPYL FREE RADICAL + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	4515	

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CH_2CH_2.$ + $CH_3CH_2CH_2CH=CH_2$ → $CH_3CH_2CH_2CH(.)CH_2CH_2CH_2CH_3$ 1-PROPYL FREE RADICAL + 1-PENTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	3410		
$(CH_3)_2CH.$ → CH_3 + $CH_2=CH_2$ ETHYL, 1-METHYL-, FREE RADICAL 72 KON REACTION ORDER: 1.	690–814	1.9(+11)	0	16045±1150		
$(CH_3)_2CD.$ → $CH_3CD=CH_2$ + H. ETHYL-1-d, 1-METHYL-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	673–777	2.00(+14)	0	20800		
$(CH_3)_2CH.$ + CH≡CH → $(CH_3)_2CHCH=CH.$ ETHYL, 1-METHYL, FREE RADICAL + ETHYNE 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	363–577	5.0(+10)	0	3475		
$(CH_3)_2CH.$ + $CH_2=CH_2$ → $(CH_3)_2CHCH_2CH_2.$ ETHYL, 1-METHYL-, FREE RADICAL + ETHENE 72 KER/PAR REACTION ORDER: 2.	340–457	6.9(+10)	0	3475		
$(CH_3)_2CH.$ + $CH_3C≡CH$ → $(CH_3)_2CHCH=C(.)CH_3$ ETHYL, 1-METHYL-, FREE RADICAL + 1-PROPYNE 72 KER/PAR REACTION ORDER: 2. NOTE: SUSPECT k VALUE.	360–439	1.90(+ 9)	0	2870		
$(CH_3)_2CH.$ + $CH_2=C=CH_2$ → $(CH_3)_2CHCH_2C(.)=CH_2$ ETHYL, 1-METHYL-, FREE RADICAL + 1,2-PROPADIENE 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	366–473	3.6(+10)	0	3600		
$(CH_3)_2CH.$ + $CH_3CH_2CH=CH_2$ → $(CH_3)_2CHCH_2CH(.)CH_2CH_3$ ETHYL, 1-METHYL-, FREE RADICAL + 1-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	3480		
$(CH_3)_2CH.$ + cis-$CH_3CH=CHCH_3$ → $CH_3CH[CH(CH_3)_2]CH(.)CH_3$ ETHYL, 1-METHYL-, FREE RADICAL + cis-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	3950		
$(CH_3)_2CH.$ + trans-$CH_3CH=CHCH$ → $CH_3CH[CH(CH_3)_2]CH(.)CH_3$ ETHYL, 1-METHYL-, FREE RADICAL + trans-2-BUTENE 72 KER/PAR REACTION ORDER: 2.	298	-	-	4065		
$CH_3CH_2CH_3$ + O → products PROPANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298	9.0(+ 9)	-	-	0.7	2.0
$CH_3CH_2CH_3$ + H → $(CH_3)_2CH.$ + $CH_3CH_2CH_2.$ + H_2 PROPANE + HYDROGEN ATOM 72 KON REACTION ORDER: 2.	333–933	1.0(+13)	0	3130±180		
$CH_3CH_2CH_3$ + HO_2 → $(CH_3)_2CH.$ + H_2O_2 PROPANE + HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS k_{ref} FOR HO_2 + HO_2 → H_2O_2 + O_2	300–1000	2.0(+11)	0	5300		
$CH_3CH_2CH_3$ + $CH_3.$ → $(CH_3)_2CH.$ + CH_4 PROPANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	550–750	2.0(+11)	0	4820±250		
$CH_3CD_2CH_3$ + $CD_3.$ → $(CH_3)_2CD.$ + CD_4 PROPANE-2,2-d_2 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	550–750	2.5(+11)	0	5735±250		
$CH_3CD_2CH_3$ + $CD_3.$ → $CH_3CD_2CH_2.$ + CD_3H PROPANE-2,2-d_2 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	550–750	4.4(+11)	0	5735±250		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3COCH_2.$ → $CH_3.$ + CH_2=C=O PROPYL, 2-OXO-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	365–435	3.2(+12)	0	20130		
CH_3CH_2CHO + $CH_3.$ → $CH_3CH_2C(O).$ + CH_4 PROPANOL + METHYL FREE RADICL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	2970±500		
$(CH_3)_2CO$ → $CH_3C(O).$ + $CH_3.$ 1-PROPANONE 70 BEN/O'N REACTION ORDER: 1.	990–1101	1.8(+16)	0	40765		
$(CH_3)_2CO$ + H → $CH_3COCH_2.$ + H_2 2-PROPANONE + HYDROGEN ATOM 72 KON REACTION ORDER: 2.	298–873	4.6(+13)	0	4220±20		
$(CH_3)_2CO$ + CH_3 → $CH_3COCH_2.$ + CH_4 2-PROPANONE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–700	3.5(+11)	0	4900±250		
$(CD_3)_2CO$ + $CD_3.$ → $CD_3COCD_2.$ + CD_4 2-PROPANONE-1,1,1,3,3,3-d_6 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–800	4.8(+11)	0	5735±250		
CH_2=$CHCH_2OH$ + $CH_3CH_2.$ → $CH_3CH_2CH_2CH(.)CH_2OH$ + $.CH_2CH(CH_2CH_3)CH_2OH$ 2-PROPEN-1-OL + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	323–415	1.9(+11)	0	3901		
$HCOOCH_2CH_3$ → HCOOH + CH_2=CH_2 FORMIC ACID ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	648–920	2.5(+12)	0	24300		
$HCOOCH_2CH_3$ + $CH_3.$ → $.COOCH_2CH_2$ + $HCOOCH(.)CH_3$ + CH_4 FORMIC ACID ETHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	5100±500		
CH_3COOCH_3 + $CH_3.$ → $.CH_2COOCH_3$ + $CH_3COOCH_2.$ + CH_4 ACETIC ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	2.1(+11)	0	5035±500		
CH_3COOCD_3 + $CH_3.$ → $.CH_2COOCD_3$ + CH_4 ACETIC ACID METHYL-d_3 ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–650	1.9(+11)	0	5035±500		
CD_3COOCH_3 + $CH_3.$ → CD_3COOCH_2 + CH_4 ACETIC-d_3 ACID METHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–600	1.7(+11)	0	5990±500		
$CH_3OCOOCH_3$ + $CH_3.$ → $.CH_2OCOOCH_3$ + CH_4 CARBONIC ACID DIMETHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	3.2(+11)	0	5800±750		
$(CH_3)_2CHOH$ + O → products 2-PROPANOL + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298	1.3(+11)	–	–	0.6	1.5
$(CH_3)_2CDOH$ + $CH_3.$ → $(CH_3)_2C(.)OH$ + CH_3D 2-PROPAN-2-d-OL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–525	1.9(+11)	0	4990±500		
$(CH_3)_2CHOD$ + $CD_3.$ → $(CH_3)_2C(.)OD$ + $.CH_2CH(CH_3)OD$ + CD_3H 2-PROPANOL-d + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–525	1.5(+11)	0	3975±500		
$(CH_3)_2CHOOH$ → $(CH_3)_2CHO.$ + OH HYDROPEROXIDE, 1-METHYLETHYL 70 BEN/O'N REACTION ORDER: 1.	553–653	3.2(+15)	0	21640		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
cy-$CH_2CH_2CH_2S$ + CH_3 → cy-$CH_2CH(.)CH_2S$ + CH_4 THIETANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	300–450	3.2(+11)	0	4630±750		
$(CH_3)_2CHSH$ + CH_3. → $(CH_3)_2CHS$. + $(CH_3)_2C(.)SH$ + .$CH_2CH(CH_3)SH$ + CH_4 2-PROPANETHIOL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	303	4.1(+ 7)	–	–		
CH_2=CHCN + CH_3CH_2. → $CH_3CH_2CH_2CH(.)CN$ + .$CH_2CH(CH_2CH_3)CN$ 2-PROPENENITRILE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	323–454	6.2(+10)	0	1700		
CH_3CH_2CN → CH_3. + .CH_2CN PROPANENITRILE 70 BEN/O'N REACTION ORDER: 1.	958–1038	1.3(+14)	0	36600		
CH_3CH_2CN + CD_3. → $CH_3CH(.)CN$ + .CH_2CH_2CN + CD_3H PROPANENITRILE + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–600	3.6(+11)	0	4330±500		
$(CH_3)_3N$ + CH_3. → .$CH_2N(CH_3)_2$ + CH_4 METHANAMINE, N,N-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–600	4.7(+11)	0	4600±500		
$O_2NOCH_2CH(ONO_2)CH_2ONO_2$ → products 1,2,3-PROPANETRIOL, TRINITRATE 70 BEN/O'N REACTION ORDER: 1.	348–378	1.3(+17)	0	20300		
$O_2NOCH_2CH(ONO_2)CH_3$ → products 1,2-PROPANEDIOL, DINITRATE 70 BEN/O'N REACTION ORDER: 1.	353–373	1.6(+15)	0	18800		
$O_2NOCH_2CH_2CH_2ONO_2$ → products 1,3-PROPANEDIOL, DINITRATE 70 BEN/O'N REACTION ORDER: 1.	358–383	1.6(+15)	0	19175		
$HCON(CH_3)_2$ + CH_3. → $CON(CH_3)_2$ + $HCO-(CH_3)NCH_2$. + CH_4 FORMAMIDE, N,N-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–600	6.3(+10)	0	3600±500		
$CH_3CH_2CH_2NO_2$ → $CH_3CH=CH_2$ + HONO PROPANE, 1-NITRO- 70 BEN/O'N REACTION ORDER: 1.	687–733	2.50(+13)	0	24005		
$CH_3CH(NO_2)CH_3$ → $CH_3CH=CH_2$ + HONO PROPANE, 2-NITRO- 70 BEN/O'N REACTION ORDER: 1.	800–1000	2.0(+11)	0	20130		
$CH_3CH_2CH_2ONO$ → $CH_3CH_2CH_2O$. + NO NITROUS ACID PROPYL ESTER 70 BEN/O'N REACTION ORDER: 1.	443–483	1.6(+16)	0	20230		
$(CH_3)_2CHONO$ → $(CH_3)_2CHO$. + NO NITROUS ACID 1-METHYL ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	443–483	3.2(+16)	0	18600		
CH≡CC≡CH + O → products 1,3-BUTADIYNE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	300	9.0(+11)	–	–	0.7	1.4
CH_3CH_2C≡CH + N → products 1-BUTYNE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 13.0 NOTE: k_{ref}: CH≡CH + N	320–550 435	3.5(+11) –	0 –	1125 –		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CH_2C{\equiv}CH + CH_3. \rightarrow CH_3CH(.)C{\equiv}CH + .CH_2CH_2C{\equiv}CH + CH_3CH_2C{\equiv}C. + CH_4$						
1-BUTYNE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	456–620	1.9(+12)	0	5135±500		
NOTE: TENTATIVE k VALUE.						
$CH_3C{\equiv}CCH_3 + S \rightarrow cy\text{-}(CH_3)C{=}C(CH_3)S$						
2-BUTYNE + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	1.9(+13)	–	–		
$CH_3C{\equiv}CCH_3 + N \rightarrow$ products						
2-BUTYNE + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320–550	1.9(+11)	0	926		
k/k_{ref}: 12.0	435	–	–	–		
NOTE: k_{ref}: CH≡CH + N						
$CH_3C{\equiv}CCH_3 + CH_3. \rightarrow CH_3C{\equiv}CH_2. + CH_4$						
2-BUTYNE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	486–619	1.1(+12)	0	4900±500		
NOTE: TENTATIVE k VALUE.						
$CH_3C{\equiv}CCH_3 + CCO \rightarrow$ products						
2-BUTYNE + CARBON OXIDE(C_2O)						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 8.5	304	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2 + CCO$						
$CH_2{=}CHCH{=}CH_2 + O \rightarrow$ products						
1,3-BUTADIENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298–400	3.4(+12)	0	– 380	0.7	1.3
$CH_2{=}CHCH{=}CH_2 + H \rightarrow CH_2{=}CHCH(.)CH_3 + CH_2{=}CHCH_2CH_2.$						
1,3-BUTADIENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	4.10(+13)	0	655		
NOTE: AVERAGED k.						
k/k_{ref}: 4.9	300	–	–	–		
NOTE: k_{ref}: $CH_3CH{=}CH_2 + H$						
$CH_2{=}CHCH{=}CH_2 + S \rightarrow cy\text{-}(CH_2{=}CH)CHCH_2S$						
1,3-BUTADIENE + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	6.0(+13)	–	–		
$CH_2{=}CHCH{=}CH_2 + N \rightarrow$ products						
1,3-BUTADIENE + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	340	3.5(+10)	–	–		
$CH_2{=}CHCH{=}CH_2 + {}^1CH_2 \rightarrow$ products						
1,3-BUTADIENE + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 3.2	297	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2 + {}^1CH_2$ ASSUMING 10% ${}^3CH_2$						
$CH_2{=}CHCH{=}CH_2 + CH_3. \rightarrow CH_3CH_2CH(.)CH{=}CH_2.$						
1,3-BUTADIENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	353–453	8.1(+10)	0	2065		
$CH_2{=}CHCH{=}CH_2 + CH_3. \rightarrow CH_3CH_2CH(.)CH{=}CH_2 + .CH_2CH(CH_3)CH{=}CH_2$						
1,3-BUTADIENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 12.0	435	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2 + CH_3.$						
$CH_2{=}CHCH{=}CH_2 + CCO \rightarrow CH_2{=}C{=}CHCH{=}CH_2 + CO$						
1,3-BUTADIENE + CARBON OXIDE(C_2O)						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 210.	298	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2 + CCO$						
$CH_3CH_2CH{=}CH_2 + O \rightarrow cy\text{-}(CH_3CH_2)CHCH_2O$						
1-BUTENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	2.3(+12)	–	–	0.8	1.2
$CH_3CH_2CH{=}CH_2 + H \rightarrow CH_3CH_2CH(.)CH_3 + CH_3CH_2CH_2CH_2.$						
1-BUTENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	8.7(+11)	–	–		
k/k_{ref}: 1.03	300	–	–	–		
NOTE: k_{ref}: $CH_3CH{=}CH_2 + H$						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CH_2CH=CH_2$ + H → $CH_3CH_2CH_2CH_2$. 1-BUTENE + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: CALCULATED ON THE BASIS OF 5.7% NON-TERMINAL ADDITION OF H TO 1-BUTENE.	298	5.0(+10)	-	-		
$CH_3CH_2CH=CH_2$ + H → $CH_3CH_2CH(.)CH_3$ 1-BUTENE + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: CALCULATED ON THE BASIS OF 5.7% NON-TERMINAL ADDITION OF H TO 1-BUTENE.	298	8.1(+11)	-	-		
$CH_3CH_2CH=CH_2$ + S → cy-$(CH_3CH_2)CHCH_2S$ 1-BUTENE + SULFUR ATOM 72 KER/PAR REACTION ORDER: 2.	298	9.3(+12)	-	-		
k/k_{ref}: 10.0	298	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2$ + S						
$CH_3CH_2CH=CH_2$ + N → products 1-BUTENE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2.	320–550	1.6(+11)	0	660		
k/k_{ref}: 3.4	435	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2$ + N						
$CH_3CH_2CH=CH_2$ + $^1CH_2$: → products 1-BUTENE + METHYLENE FREE RADICAL 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.63 NOTE: k_{ref}: $CH_2=CH_2$ + $^1CH_2$	297	-	-	-		
$CH_3CH_2CH=CH_2$ + $^3CH_2$ → products 1-BUTENE + METHYLENE FREE RADICAL 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.6 NOTE: k_{ref}: $CH_2=CH_2$ + $^3CH_2$	297	-	-	-		
$CH_3CH_2CH=CH_2$ + CH_3. → $CH_3CH(.)CH=CH_2$ + CH_4 1-BUTENE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–650	2.5(+11)	0	4200±500	0.6	1.4
$CH_3CH_2CH=CH_2$ + CH_3. → $CH_3CH_2CH(.)CH_2CH_3$ + $CH_3CH_2CH(CH_3)CH_2$. 1-BUTENE + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	353–453	1.0(+11)	0	3600		
k/k_{ref}: 12.0	453	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2$ + CH_3.						
$CH_3CH_2CH=CH_2$ + CCO → $CH_3CH_2CH=C=CH_2$ + CO 1-BUTENE + CARBON OXIDE(C_2O) 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 7.0 NOTE: k_{ref}: $CH_2=CH_2$ + CCO	298	-	-	-		
$CH_3CH_2CH=CH_2$ + CH_3CH_2. → $CH_3CH_2CH_2CH(.)CH_2CH_3$ 1-BUTENE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	298	-	-	3675		
$CH_3CH_2CH=CH_2$ + $CH_3CH_2CH_2$. → $CH_3CH_2CH(.)CH_2CH_2CH_2CH_3$ 1-BUTENE + PROPYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	298	-	-	3630		
$CH_3CH_2CH=CH_2$ + $(CH_3)_2CH$. → $(CH_3)_2CHCH_2CH(.)CH_2CH_3$ 1-BUTENE + ETHYL, 1-METHYL-, FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	298	-	-	3480		
$CH_2=CHCH_2CH_3$(+M) → $CH_2=CHCH_2$. + CH_3.(+M) 1-BUTENE 70 BEN/O'N REACTION ORDER: 1. NOTE: k ESTIMATED.	900–1051	1.00(+16)	0	36900		
$CH_3CH=CHCH_3$ + CH_3S. → $CH_3CH(SCH_3)CH(.)CH_3$ 2-BUTENE + METHYLTHIO FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: cis-trans EQUILIBRIUM - WEIGHTED k.	298–333	1.6(+ 9)	-	-		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
cis-$CH_3CH{=}CHCH_3$ → trans-$CH_3CH{=}CHCH_3$						
cis-2-BUTENE						
70 BEN/O'N REACTION ORDER: 1.	686–742	6.00(+13)	0	31600		
cis-$CH_3CH{=}CHCH_3$ + O → products						
cis-2-BUTENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	250–500	5.9(+12)	0	- 165	0.8	1.2
cis-$CH_3CH{=}CHCH_3$ + H → $CH_3CH_2CH(.)CH_3$						
cis-2-BUTENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	208	4.6(+11)	–	–		
NOTE: NO KINETIC DATA ON REVERSE RADICAL DECOMPOSITION.						
k/k_{ref}: 0.47	300	–	–	–		
NOTE: k_{ref}: $CH_3CH{=}CH_2$ + H						
cis-$CH_3CH{=}CHCH_3$ + S → cy-$(CH_3CH)CH(CH_3)S$						
cis-2-BUTENE + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	1.4(+13)	–	–		
k/k_{ref}: 16.0	298	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2$ + S						
cis-$CH_3CH{=}CHCH_3$ + N → products						
cis-2-BUTENE + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320–550	2.3(+11)	0	995		
k/k_{ref}: 2.4	435	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2$ + N						
cis-$CH_3CH{=}CHCH_3$ + $^1CH_2$: → products						
cis-2-BUTENE + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.37	297	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2$ + $^1CH_2$						
cis-$CH_3CH{=}CHCH_3$ + $^3CH_2$ → products						
cis-2-BUTENE + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.94	297	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2$ + $^3CH_2$						
cis-$CH_3CH{=}CHCH_3$ + $CH_3.$ → $CH_3CH{=}CHCH_2.$ + CH_4						
cis-2-BUTENE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–650	1.8(+11)	0	4100±500		
cis-$CH_3CH{=}CHCH_3$ + $CH_3.$ → $(CH_3)_2CHCH(.)CH_3$						
cis-2-BUTENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	353–453	4.5(+10)	0	3675		
k/k_{ref}: 0.2	453	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2$ + $CH_3.$						
cis-$CH_3CH{=}CHCH_3$ + CCO → cis-$CH_3CH{=}C{=}CHCH_3$ + CO						
cis-2-BUTENE + CARBON OXIDE(C_2O)						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 9.1	297	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2$ + CCO						
cis-$CH_3CH{=}CHCH_3$ + $CH_3CH_2.$ → $CH_3CH(CH_2CH_3)CH(.)CH_3$						
cis-2-BUTENE + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4265		
cis-$CH_3CH{=}CHCH_3$ + $CH_3CH_2CH_2.$ → $CH_3CH(CH_2CH_2CH_3)CH(.)CH_3$						
cis-2-BUTENE + PROPYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4370		
cis-$CH_3CH{=}CHCH_3$ + $(CH_3)_2CH.$ → $CH_3CH[CH(CH_3)_2]CH(.)CH_3$						
cis-2-BUTENE + ETHYL, 1-METHYL-, FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	3950		
trans-$CH_3CH{=}CHCH_3$ + O → products						
trans-2-BUTENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	1.4(+13)	–	–	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
trans-$CH_3CH=CHCH_3$ + H → $CH_3CH_2CH(.)CH_3$						
trans-2-BUTENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	5.6(+11)	–	–		
NOTE: AVERAGE k.						
k/k_{ref}: 0.59	300	–	–	–		
NOTE: k_{ref}: $CH_3CH=CH_2$ + H						
trans-$CH_3CH=CHCH_3$ + S → cy-$(CH_3CH)CH(CH_3)S$						
trans-2-BUTENE + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	1.4(+13)	–	–		
k/k_{ref}: 20.0	298	–	–	–		
NOTE: k_{ref}: $CH_2=CH_2$ + S						
trans-$CH_3CH=CHCH_3$ + N → products						
trans-2-BUTENE + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320–550	3.4(+11)	0	1055		
k/k_{ref}: 3.0	435	–	–	–		
NOTE: k_{ref}: $CH_2=CH_2$ + N						
trans-$CH_3CH=CHCH_3$ + $^1CH_2$ → products						
trans-2-BUTENE + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.39	297	–	–	–		
NOTE: k_{ref}: $CH_2=CH_2$ + $^1CH_2$						
trans-$CH_3CH=CHCH_3$ + $^3CH_2$ → products						
trans-2-BUTENE + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.89	297	–	–	–		
NOTE: k_{ref}: $CH_2=CH_2$ + $^3CH_2$						
trans-$CH_3CH=CHCH_3$ + $CH_3.$ → $CH_3CH=CHCH_2.$ + CH_4						
trans-2-BUTENE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+12)	0	4830±500		
trans-$CH_3CH=CHCH_3$ + $CH_3.$ → $(CH_3)_2CHCH(.)CH_3$						
trans-2-BUTENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	353–453	1.4(+11)	0	4075		
trans-$CH_3CH=CHCH_3$ + $CH_3.$ → $(CH_3)_2CHCH(.)CH_3$						
trans-2-BUTENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.4	453	–	–	–		
NOTE: k_{ref}: $CH_2=CH_2$ + CH_3						
trans-$CH_3CH=CHCH_3$ + CCO → $CH_3CH=C=CHCH_3$ + CO						
trans-2-BUTENE + CARBON OXIDE(C_2O)						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 10.6	297	–	–	–		
NOTE: k_{ref}: $CH_2=CH_2$ + CCO						
trans-$CH_3CH=CHCH_3$ + $CH_3CH_2.$ → $CH_3CH(CH_2CH_3)CH(.)CH_3$						
trans-2-BUTENE + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4350		
trans-$CH_3CH=CHCH_3$ + $CH_3CH_2CH_2.$ → $CH_3CH(CH_2CH_2CH_3)CH(.)CH_3$						
trans-2-BUTENE + PROPYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4515		
trans-$CH_3CH=CHCH_3$ + $(CH_3)_2CH.$ → $CH_3CH[CH(CH_3)_2]CH(.)CH_3$						
trans-2-BUTENE + ETHYL, 1-METHYL-, FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4065		
$(CH_3)_2C=CH_2$ → $.CH_2C(CH_3)=CH_2$ + H						
1-PROPENE, 2-METHYL-						
70 BEN/O'N REACTION ORDER: 1.	930–1082	1.0(+17)	0	44400		
$(CH_3)_2C=CH_2$ + O → cy-$[(CH_3)_2]CCH_2O$						
1-PROPENE, 2-METHYL-, + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	1.2(+13)	–	–	0.7	1.3
$(CH_3)_2C=CH_2$ + H → $(CH_3)_3C.$						
1-PROPENE, 2-METHYL-, + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	3.1(+13)	0	755		

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3)_2C=CH_2 + H \rightarrow (CH_3)_2CHCH_2.$						
1-PROPENE, 2-METHYL-, + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	1.3(+11)	-	-		
NOTE: CALCULATED ON THE BASIS OF 0.5% NON-TERMINAL ADDITION OF H TO $(CH_3)_2C=CH_2$.						
$(CH_3)_2C=CH_2 + H \rightarrow (CH_3)_3C. + (CH_3)_2CHCH_2.$						
1-PROPENE, 2-METHYL-, + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.52	300	-	-	-		
NOTE: k_{ref}: $CH_3CH=CH_2 + H$						
$(CH_3)_2C=CH_2 + HO_2 \rightarrow$ products						
1-PROPENE, 2-METHYL-, + HYDROPEROXYL FREE RADICAL						
74 LLO REACTION ORDER: 2.	300	1.0(+ 8)	-	-	0.1	10.
NOTE: SUGGESTED k VALUE.						
$(CH_3)_2C=CH_2 + S \rightarrow$ cy-$[(CH_3)_2]CCH_2S$						
1-PROPENE, 2-METHYL-, + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	4.0(+13)	-	-		
k/k_{ref}: 50.0	298	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + S$						
$(CH_3)_2C=CH_2 + S^*(^1D) \rightarrow$ cy-$[(CH_3)_2]CCH_2S$						
1-PROPENE, 2-METHYL-, + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 3.5	300	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + S^*(^1D)$						
$(CH_3)_2C=CH_2 + N \rightarrow$ products						
1-PROPENE, 2-METHYL-, + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320–550	7.8(+10)	0	277		
$(CH_3)_2C=CH_2 + N \rightarrow$ products						
1-PROPENE, 2-METHYL-, + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 4.1	435	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + N$						
$(CH_3)_2C=CH_2 + {}^1CH_2 \rightarrow$ products						
1-PROPENE, 2-METHYL-, + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.96	297	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + {}^1CH_2$						
$(CH_3)_2C=CH_2 + {}^3CH_2 \rightarrow$ products						
1-PROPENE, 2-METHYL-, + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.86	297	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + {}^3CH_2$						
$(CH_3)_2C=CH_2 + CH_3. \rightarrow .CH_2C(CH_3)=CH_2 + CH_4$						
1-PROPENE, 2-METHYL-, + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–600	3.0(+11)	0	4500±500	0.6	1.4
$(CH_3)_2C=CH_2 + CH_3. \rightarrow (CH_3)_3CCH_2. + (CH_3)_2C(.)CH_2CH_3$						
1-PROPENE, 2-METHYL-, + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	353–453	1.4(+11)	0	3475		
k/k_{ref}: 1.1	453	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + CH_3$						
$(CH_3)_2C=CH_2 + CCO \rightarrow (CH_3)_2C=C=CH_2 + CO$						
1-PROPENE, 2-METHYL-, + CARBON OXIDE(C_2O)						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 50.0	297	-	-	-		
NOTE: k_{ref}: $CH_2=CH_2 + CCO$						
$CH_3CH_2CH_2CH_2. \rightarrow CH_3CH_2. + CH_2=CH_2$						
BUTYL FREE RADICAL						
70 BEN/O'N REACTION ORDER: 1.	334–689	4.0(+13)	0	14600		
$CH_3CH_2CH_2CH_2. + CH_2=CH_2 \rightarrow CH_3(CH_2)_4CH_2.$						
BUTYL FREE RADICAL + ETHENE						
72 KER/PAR REACTION ORDER: 2.	352–405	2.3(+10)	0	3370		
NOTE: TENTATIVE k VALUE.						
$CH_3CH_2CH(.)CH_3 \rightarrow CH_3CH=CH_2 + CH_3$						
PROPYL, 1-METHYL-, FREE RADICAL						
70 BEN/O'N REACTION ORDER: 1.	523–622	1.4(+14)	0	17060		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CH_2CH(.)CH_3 + CH_3CH=CH_2 \rightarrow CH_3CH_2CH(CH_3)CH(CH_3)CH_2.$ + $CH_3CH_2CH(CH_3)CH_2CH(.)CH_3$						
PROPYL, 1-METHYL-, FREE RADICAL + 1-PROPENE						
72 KER/PAR REACTION ORDER: 2.	381-412	6.3(+10)	0	3725		
NOTE: TENTATIVE k VALUE.						
$(CH_3)_2CHCH_2. \rightarrow CH_3. + CH_3CH=CH_2$						
PROPYL, 2-METHYL-, FREE RADICAL						
70 BEN/O'N REACTION ORDER: 1.	299-691	1.6(+14)	0	16455		
$(CH_3)_2CHCH_2. \rightarrow (CH_3)_3C=CH_2 + H$						
PROPYL, 2-METHYL-, FREE RADICAL						
70 BEN/O'N REACTION ORDER: 1.	299-691	5.0(+13)	0	18420		
$(CH_3)_3C. \rightarrow (CH_3)_2C=CH_2 + H$						
ETHYL, 1,1-DIMETHYL-, FREE RADICAL						
70 BEN/O'N REACTION ORDER: 1.	300-897	4.0(+14)	0	21700	0.2	5.0
$(CH_3)_3C. + CH{\equiv}CH \rightarrow (CH_3)_3CCH=CH.$						
ETHYL, 1,1-DIMETHYL-, FREE RADICAL + ETHYNE						
72 KER/PAR REACTION ORDER: 2.	363-577	1.0(+11)	0	3875		
NOTE: TENTATIVE k VALUE.						
$(CH_3)_3C. + CH_2=CH_2 \rightarrow (CH_3)_3CCH_2CH_2.$						
ETHYL, 1,1-DIMETHYL-, FREE RADICAL + ETHENE						
72 KER/PAR REACTION ORDER: 2.	300-650	2.8(+10)	0	3575		
$(CH_3)_3C. + CH_3C{\equiv}CH \rightarrow (CH_3)_3CC(CH_3)=CH. + (CH_3)_3CCH=C(.)CH_3$						
ETHYL, 1,1-DIMETHYL-, FREE RADICAL + 1-PROPYNE						
72 KER/PAR REACTION ORDER: 2.	360-439	5.0(+ 8)	0	2770		
NOTE: SUSPECT k VALUE.						
$CH_3CH_2CH_2CH_3 \rightarrow CH_3. + CH_3CH_2CH_2.$						
BUTANE						
70 BEN/O'N REACTION ORDER: 1.	693-803	4.0(+17)	0	43230		
NOTE: k ESTIMATED.						
$CH_3CH_2CH_2CH_3 \rightarrow CH_3CH_2. + CH_3CH_2.$						
BUTANE						
70 BEN/O'N REACTION ORDER: 1.	693-803	1.9(+17)	0	41170		
$CH_3CH_2CH_2CH_3 + O \rightarrow CH_3CH_2CH_2CH_2. + OH$						
BUTANE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298-650	3.0(+13)	0	2920	0.7	1.3
$CH_3CH_2CH_2CH_3 + O \rightarrow CH_3CH_2CH(.)CH_3 + OH$						
BUTANE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298-650	4.6(+13)	0	2410	0.7	1.3
$CH_3CH_2CH_2CH_3 + H \rightarrow CH_3CH_2CH(.)CH_3 + CH_3CH_2CH_2CH_2. + H_2$						
BUTANE + HYDROGEN ATOM						
72 KON REACTION ORDER: 2.	320-930	4.1(+12)	0	2637±320	0.5	2.0
$CH_3CH_2CH_2CH_3 + HO_2 \rightarrow CH_3CH_2CH(.)CH_3 + H_2O_2$						
BUTANE + HYDROPEROXYL FREE RADICAL						
74 LLO REACTION ORDER: 2.	300-1000	5.0(+11)	0	5285	0.1	10.
NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS k_{ref} for $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$						
$CH_3CH_2CH_2CH_3 + CH_3. \rightarrow CH_3CH_2CH(.)CH_3$ + $CH_3CH_2CH_2CH_2. + CH_4$						
BUTANE + METHYL FREE RADICAL						
72 KON REACTION ORDER: 2.	350-00	1.6(+11)	0	4540±150	0.7	1.4
$CH_3CH_2CH_2CH_3 + CH_3. \rightarrow CH_3CH_2CH(.)CH_3 + CH_4$						
BUTANE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350-750	4.0(+11)	0	4830±250	0.7	1.3
$CH_3CD_2CD_2CH_3 + CD_3. \rightarrow CH_3CD_2CD(.)CH_3 + CD_4$						
BUTANE-2,2,3,3-d_4 + METHYL-d_3 FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	600-750	4.5(+11)	0	5735±250	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3CD_2CD_2CH_3 + CD_3. \rightarrow CH_3CD_2CD_2CH_2. + CD_3H$ BUTANE-2,2,3,3-d_4 + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	600–750	4.8(+11)	0	5735±250	0.7	1.3
$(CH_3)_3CH + H \rightarrow (CH_3)_3C. + (CH_3)_2CHCH_2. + H_2$ PROPANE, 2-METHYL-, + HYDROGEN ATOM 72 KON REACTION ORDER: 2.	300–800	1.9(+13)	0	2680±85	0.8	1.2
$(CH_3)_3CH + HO_2 \rightarrow (CH_3)_3C. + H_2O_2$ PROPANE, 2-METHYL-, + HYDROPEROXYL FREE RADICAL 74 LLO REACTION ORDER: 2. NOTE: UPPER LIMIT RECOMMENDED. RATIO DATA VERSUS k_{ref} for $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$	300–1000	1.0(+11)	0	3500	0.1	10.
$(CH_3)_3CH + CH_3. \rightarrow (CH_3)_3C. + CH_4$ PROPANE, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	550–750	9.6(+10)	0	3975±250	0.7	1.3
$(CH_3)_3CH + CH_3. \rightarrow (CH_3)_3C. + (CH_3)_2CHCH_2. + CH_4$ PROPANE, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	8.3(+10)	0	4000±500	0.5	2.0
$(CH_3)_3CD + CD_3. \rightarrow (CH_3)_3C. + CD_4$ PROPANE-2-d, 2-METHYL-, + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	550–750	1.2(+11)	0	4800±250	0.7	1.3
$(CH_3)_3CD + CD_3. \rightarrow (CH_3)_2CDCH_2. + CD_3H$ PROPANE-2-d, 2-METHYL-, + METHYL-d_3 FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	550–750	6.0(+11)	0	5735±250	0.7	1.3
$CH_3CH=CHCHO + CH_3. \rightarrow CH_3CH=CHC(O). + CH_4$ 2-BUTENAL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	3400±500	0.4	2.5
$CH_2=CHCH_2COOH \rightarrow CH_3CH=CH_2 + CO_2$ 3-BUTENOIC ACID 70 BEN/O'N REACTION ORDER: 1.	587–651	2.2(+11)	0	20435		
$CH_3COOCH=CH_2 + CH_3CH_2. \rightarrow CH_3COOCH(.)CH_2CH_2CH_3 + CH_3COOCH(CH_2CH_3)CH_2.$ ACETIC ACID ETHENYL ESTER + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	303–417	7.8(+10)	0	3475		
$CH_3COCOCH_3 + CH_3. \rightarrow CH_3COCOCH_2. + CH_4$ 2,3-BUTANEDIONE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–800	2.2(+11)	0	4300±500	0.5	1.5
$CH_3COCOCH_3 \rightarrow CH_3C(O). + CH_3C(O).$ 2,3-BUTANEDIONE 70 BEN/O'N REACTION ORDER: 1.	626–698	1.6(+16)	0	33970		
$(CH_3CO)_2O \rightarrow CH_3COOH + CH_2=C=O$ ACETIC ACID ANHYDRIDE 70 BEN/O'N REACTION ORDER: 1.	553–646	1.0(+12)	0	17365		
$(CH_3CO)_2O + CH_3. \rightarrow CH_3COOCOCH_2. + CH_4$ ACETIC ACID ANHYDRIDE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	1.8(+11)	0	4830±500	0.6	1.4
$CH_3C(O)OOC(O)CH_3 \rightarrow CH_3C(O)O + CH_3C(O)O.$ PEROXIDE, DIACETYL 70 BEN/O'N REACTION ORDER: 1.	363–463	1.8(+14)	0	14845		
$CH_3CH_2COCH_3 + CH_3. \rightarrow CH_3CH(.)COCH_3 + .CH_2CH_2COCH_3 + CH_3CH_2COCH_2. + CH_4$ 2-BUTANONE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–500	8.2(+10)	0	3700±500	0.5	1.5
$HCOOCH_2CH_2CH_3 \rightarrow HCOOH + CH_3CH=CH_2$ FORMIC ACID PROPYL ESTER 70 BEN/O'N REACTION ORDER: 1.	613–673	1.3(+12)	0	24006		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$HCOOCH_2CH_2CH_3 + CH_3. \rightarrow .COOCH_2CH_2CH_3 + CH_4$ FORMIC ACID PROPYL ESTER + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	347–455	1.3(+10)	0	3675		
$HCOOCH_2CH_2CH_3 + CH_3. \rightarrow .COOCH_2CH_2CH_3 + HCOOCH(.)CH_2CH_3 + HCOOCH_2CH(.)CH_3 + HCOOCH_2CH_2CH_2. + CH_4$ FORMIC ACID PROPYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	5000±500	0.5	2.0
$HCOOCH(CH_3)_2 \rightarrow HCOOH + CH_3CH=CH_2$ FORMIC ACID 1-METHYLETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	721–811	4.0(+12)	0	22145		
$HCOOCH(CH_3)_2 + CH_3. \rightarrow .COOCH(CH_3)_2 + HCOOC(.)(CH_3)_2 + HCOOCH(CH_3)CH_2. + CH_4$ FORMIC ACID 1-METHYLETHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	4980±500	0.5	2.0
$CH_3COOCH_2CH_3 \rightarrow CH_3COOH + CH_2=CH_2$ ACETIC ACID ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	725–883	3.9(+12)	0	24155		
$CH_3OCOOCH_2CH_3 \rightarrow CH_3OH + CO_2 + CH_2=CH_2$ CARBONIC ACID ETHYL METHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	573–648	4.0(+12)	0	21640		
$CH_3CH(.)OCH_2CH_3 \rightarrow CH_3CHO + CH_3CH_2.$ ETHYL, 1-ETHOXY-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1. NOTE: logA PROBABLY LOW.	418–453	8.1(+10)	0	11825		
$CH_3CH(O.)CH_2CH_3 \rightarrow CH_3CHO + CH_3CH_2.$ ETHOXY, 1-ETHYL-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1. NOTE: ESTIMATED ARRHENIUS PARAMETERS (VERY LIKELY LOWER LIMITS).	423–463	1.0(+14)	0	8800		
$(CH_3)_3CO. \rightarrow (CH_3)_2CO + CH_3.$ ETHOXY, 1,1-DIMETHYL-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1. NOTE: TENTATIVE k.	393–453	3.2(+13)	0	8300		
$(CH_3)_3COH \rightarrow (CH_3)_2C=CH_2 + H_2O$ 2-PROPANOL, 2-METHYL- 70 BEN/O'N REACTION ORDER: 1.	1050–1300	2.5(+13)	0	31001		
$CH_3CH_2OCH_2CH_3 \rightarrow CH_3CH_2. + CH_3CH_2O.$ ETHANE, 1,1'-OXYBIS- 70 BEN/O'N REACTION ORDER: 1. NOTE: k PROBABLY RELIABLE.	833–913	1.0(+18)	0	42275		
$CH_3CH_2OCH_2CH_3 + CH_3. \rightarrow CH_3CH_2OCH(.)CH_3 + CH_3CH_2OCH_2CH_2. + CH_4$ ETHANE, 1,1'-OXYBIS-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–500	2.5(+11)	0	4200±750	0.5	2.0
$CH_3CH_2OOCH_2CH_3 \rightarrow CH_3CH_2O. + CH_3CH_2O.$ PEROXIDE, DIETHYL 70 BEN/O'N REACTION ORDER: 1.	413–518	4.0(+15)	0	18770		
$(CH_3)_3COOH \rightarrow (CH_3)_3CO. + OH$ HYDROPEROXIDE, 1,1-DIMETHYLETHYL 70 BEN/O'N REACTION ORDER: 1.	553–653	4.0(+15)	0	21640		
$(CH_3)_3CSH \rightarrow (CH_3)_2C=CH_2 + H_2S$ 2-PROPANETHIOL, 2-METHYL- 70 BEN/O'N REACTION ORDER: 1.	950–1230	2.5(+13)	0	27830		
$(CH_3)_3CSH + CH_3. \rightarrow (CH_3)_3CS. + .CH_2C(CH_3)_2SH + CH_4$ 2-PROPANETHIOL, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	303	5.9(+ 7)	-	-		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
CH_2=$CHCH_2SO_2CH_3$ → CH_2=$CHCH_2$. + CH_3SO_2.						
1-PROPENE, 3-METHYLSULFONYL-						
70 BEN/O'N REACTION ORDER: 1.	633–733	1.3(+14)	0	24006		
cis-CH_3CH=CHCN → trans-CH_3CH=CHCN						
cis-2-BUTENENITRILE						
70 BEN/O'N REACTION ORDER: 1.	573–633	5.0(+12)	0	28030		
cis-CH_3CH=CHCN + CH_3CH_2. → $CH_3CH(CH_2CH_3)CH(.)CN$ + $CH_3CH(.)CH(CH_2CH_3)CN$						
cis-2-BUTENENITRILE + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	323–454	1.5(+10)	0	2500		
trans-CH_3CH=CHCN + CH_3CH_2. → $CH_3CH(CH_2CH_3)CH(.)CN$ + $CH_3CH(.)CH(CH_2CH_3)CN$						
trans-2-BUTENENITRILE + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	323–754	3.1(+10)	0	2600		
CH_2=$C(CH_3)CN$ + CH_3CH_2. → $CH_3CH_2CH_2C(.)(CH_3)CN$ + $.CH_2C(CH_3)(CH_2CH_3)CN$						
2-PROPENENITRILE, 2-METHYL-, + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	312–400	2.5(+11)	0	2300		
CH_3CH=NN=$CHCH_3$ + CH_3. → $CH_3C(.)$=NN=$CHCH_3$ + $.CH_2CH$=NN=$CHCH_3$ + CH_4						
ACETALDEHYDE ETHYLIDENEHYDRAZONE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–600	2.5(+11)	0	3975±500	0.5	2.0
CH_3CH_2N=NCH_2CH_3 → CH_3CH_2N=N. + CH_3CH_2.						
DIAZENE, DIETHYL-						
70 BEN/O'N REACTION ORDER 1.		2.0(+16)	0	25165		
CH_3N=$NCH(CH_3)_2$ → CH_3N=N. + $(CH_3)_2CH$.						
DIAZENE, METHYL(1-METHYLETHYL)-						
70 BEN/O'N REACTION ORDER 1.	543–605	2.5(+16)	0	23900		
$CH_3CH_2CH_2CH_2NH_2$ + CH_3. → $CH_3CH_2CH_2CH_2NH$. + $CH_3CH_2CH_2CH(.)NH_2$ + $.CH_2CH_2CH_2CH_2NH_2$						
1-BUTANAMINE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	426	3.2(+ 7)	–	–	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$(CH_3CH_2)_2NH$ + CH_3. → $(CH_3CH_2)_2N$. + $CH_3CH(.)NHCH_2CH_3$ + $.CH_2CH_2NHCH_2CH_3$ + CH_4						
ETHANAMINE, N-ETHYL-, + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–500	2.2(+11)	0	3550±500	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$CH_3CH_2N(CH_3)_2$ + CH_3. → $CH_3CH(.)N(CH_3)_2$ + $.CH_2CH_2N(CH_3)_2$ + $CH_3CH_2N(CH_3)CH_2$. + CH_4						
ETHANAMINE, N,N-DIMETHYL-, + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	420	2.6(+ 7)	–	–	0.5	2.0
NOTE: TENTATIVE k VALUE.						
$(CH_3)_2NN$=$NN(CH_3)_2$ → $(CH_3)_2NN$=N. + $(CH_3)_2N$.						
2-TETRAZENE, 1,1,4,4-TETRAMETHYL-						
70 BEN/O'N REACTION ORDER: 1.	466–539	2.5(+14)	0	18170		
CH_3CH_2OCH=CH_2 → CH_3CHO + CH_2=CH_2						
ETHENE, ETHOXY-						
70 BEN/O'N REACTION ORDER: 1.	640–859	4.0(+11)	0	22345		
CH_2=$CHCH_2CH_2OH$ → CH_3CH=CH_2 + HCHO						
3-BUTEN-1-OL						
70 BEN/O'N REACTION ORDER: 1.	643–685	4.5(+11)	0	20635		
$CH_3CH_2CH_2CHO$ + CH_3. → $CH_3CH_2CH_2C(O)$. + CH_4						
BUTANAL + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	2970±500	0.4	1.6
NOTE: TENTATIVE k VALUE.						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3)_2CHCHO + CH_3. \rightarrow (CH_3)_2CHC(O). + CH_4$						
PROPANAL, 2-METHYL-, + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–500	1.0(+11)	0	2970±500	0.4	1.6
NOTE: TENTATIVE k VALUE.						
$CH_3CON(CH_3)_2 + CH_3 \rightarrow CH_3CON(CH_3)CH_2. + CH_4$						
ACETAMIDE, N,N-DIMETHYL-, + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–600	1.6(+11)	0	4125±500	0.5	1.5
NOTE: TENTATIVE k VALUE.						
$CH_3CON(CH_3)_2 + CH_3. \rightarrow .CH_2CON(CH_3)_2 + CH_3CON(CH_3)CH_2. + CH_4$						
ACETAMIDE, N,N-DIMETHYL-, + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	350–600	2.0(+11)	0	4200±500	0.5	1.5
$CH_3CH_2CH_2CH_2ONO \rightarrow CH_3CH_2CH_2CH_2O. + NO$						
NITROUS ACID BUTYL ESTER						
70 BEN/O'N REACTION ORDER: 1.	443–485	2.0(+16)	0	20400		
$CH_3CH_2CH_2C{\equiv}CH + N \rightarrow$ products						
1-PENTYNE + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320–550	3.0(+11)	0	1047		
k/k_{ref}: 14.0	435	–	–	–		
NOTE: k_{ref}: CHCH + N						
$CH_3(CH_2)_2CH{=}CH_2 + O \rightarrow$ cy-$(CH_3CH_2CH_2)CHCH_2O$						
1-PENTENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	2.8(+12)	–	–	0.7	1.3
$CH_3(CH_2)_2CH{=}CH_2 + H \rightarrow CH_3(CH_2)_2CH(.)CH_3 + CH_3(CH_2)_3CH_2.$						
1-PENTENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	8.3(+11)	–	–		
k/k_{ref}: 0.89	300	–	–	–		
NOTE: k_{ref}: $CH_3CH{=}CH_2 + H$						
$CH_3(CH_2)_2CH{=}CH_2 + S \rightarrow$ cy-$[CH_3(CH_2)_2]CHCH_2S$						
1-PENTENE + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	8.1(+12)	–	–		
$CH_3(CH_2)_2CH{=}CH_2 + CH_3. \rightarrow CH_3CH_2CH(.)CH{=}CH_2 + CH_4$						
1-PENTENE + METHYL FREE RADICAL						
76 KER/PAR REACTION ORDER: 2.	450–650	4.5(+11)	0	4500±500	0.6	1.4
$CH_3(CH_2)_2CH{=}CH_2 + CHCH_2CH_2. \rightarrow CH_3(CH_2)_2CH(.)CH_2(CH_2)_2CH_3$						
1-PENTENE + PROPYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	3410		
cis-$CH_3CH_2CH{=}CHCH_3 + O \rightarrow$ products						
cis-2-PENTENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	1.1(+13)	–	–	0.7	1.3
cis-$CH_3CH_2CH{=}CHCH_3 + H \rightarrow CH_3CH_2CH(.)CH_2CH_3 + CH_3CH_2CH_2CH(.)CH_3$						
cis-2-PENTENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	3.8(+11)	–	–		
k/k_{ref}: 0.39	300	–	–	–		
NOTE: k_{ref}: $CH_3CH{=}CH_2 + H$						
cis-$CH_3CH_2CH{=}CHCH_3 + CH_3. \rightarrow CH_3CH_2CH(.)CH(CH_3)_2$						
cis-2-PENTENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4060		
cis-$CH_3CH_2CH{=}CHCH_3 + CH_3. \rightarrow CH_3CH_2CH(CH_3)CH(.)CH_3$						
cis-2-PENTENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4125		
cis-$CH_3CH_2CH{=}CHCH_3 + CH_3CH_2. \rightarrow CH_3CH_2CH(CH_2CH_3)CH(.)CH_3$						
cis-2-PENTENE + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4300		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
trans-$CH_3CH_2CH{=}CHCH_3$ + H → $CH_3CH_2CH(.)CH_2CH_3$ + $CH_3CH_2CH_2CH(.)CH_3$						
trans-2-PENTENE + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 0.44	300	-	-	-		
NOTE: k_{ref}: $CH_3CH{=}CH_2$ + H	298	4.1(+11)	-	-		
$CH_3CH_2C(CH_3){=}CH_2$ + H → $CH_3CH_2C(.)(CH_3)_2$ + $CH_3CH_2CH(CH_3)CH_2.$						
1-BUTENE, 2-METHYL-, + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	9.1(+11)	-	-		
$CH_3CH_2C(CH_3){=}CH_2$ + D → $CH_3CH_2C(.)(CH_3)CH_2D$ + $CH_3CH_2CD(CH_3)CH_2.$						
1-BUTENE, 2-METHYL-, + DEUTERIUM ATOM						
72 KER/PAR REACTION ORDER: 2.	298	2.0(+12)	-	-		
$CH_3CH_2C(CH_3){=}CH_2$ + S → cy-$(CH_3CH_2)C(CH_3)CH_2S$						
1-BUTENE, 2-METHYL-, + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	7.4(+13)	-	-		
$(CH_3)_2CHCH{=}CH_2$ + H → $(CH_3)_2CHCH(.)CH_3$ + $(CH_3)_2CHCH_2CH_2.$						
1-BUTENE, 3-METHYL-, + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	7.4(+11)	-	-		
$(CH_3)_2CHCH{=}CH_2$ + D → $(CH_3)_2CHCH(.)CH_2D$ + $(CH_3)_2CHCHDCH_2.$						
1-BUTENE, 3-METHYL-, + DEUTERIUM ATOM						
72 KER/PAR REACTION ORDER: 2.	298	7.6(+11)	-	-		
$(CH_3)_2CHCH{=}CH_2$ + $CH_3.$ → $(CH_3)_2CHCH(.)CH_2CH_3$						
1-BUTENE, 3-METHYL-, + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	-	-	3500		
$(CH_3)_2CHCH{=}CH_2$ + $CH_3.$ → $(CH_3)_2C(.)CH{=}CH_2$ + CH_4						
1-BUTENE, 3-METHYL-, + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	450-600	4.4(+11)	0	4225±750	0.5	1.5
$(CH_3)_2CHCH{=}CH_2$ + $CH_3CH_2.$ → $(CH_3)_2CHCH(.)CH_2CH_2CH_3$						
1-BUTENE, 3-METHYL-, + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	-	-	3620		
$(CH_3)_2C{=}CHCH_3$ + O → products						
2-BUTENE, 2-METHYL-, + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298-400	3.9(+12)	0	- 680	0.8	1.2
$(CH_3)_2C{=}CHCH_3$ + H → $(CH_3)_2CHC(.)CH_3$ + $(CH_3)_2C(.)CH_2CH_3$						
2-BUTENE, 2-METHYL-, + HYDROGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	9.1(+11)	-	-		
k/k_{ref}: 1.03	300	-	-	-		
NOTE: k_{ref}: $CH_3CH{=}CH_2$ + H						
$(CH_3)_2C{=}CHCH_3$ + S → cy-$[(CH_3)_2]CCH(CH_3)S$						
2-BUTENE, 2-METHYL-, + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	6.5(+13)	-	-		
k/k_{ref}: 56.0	298	-	-	-		
NOTE: k_{ref}: $CH_2{=}CH_2$ + S						
$(CH_3)_2C{=}CHCH_3$ + N → products						
2-BUTENE, 2-METHYL-, + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320-550	9.3(+10)	0	433		
k/k_{ref}: 3.5	435	-	-	-		
NOTE: k_{ref}: $CH_2{=}CH_2$ + N						
$(CH_3)2C{=}CHCH_3$ + $^1CH_2$ → products						
2-BUTENE, 2-METHYL-, + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.12	297	-	-	-		
NOTE: k_{ref}: $CH_2{=}CH_2$ + $^1CH_2$						
$(CH_3)_2C{=}CHCH_3$ + $^3CH_2$ → products						
2-BUTENE, 2-METHYL-, + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 1.83		-	-	-		
NOTE: k_{ref}: $CH_2{=}CH_2$ + $^3CH_2$						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3)_2C=CHCH_3 + CH_3. \rightarrow (CH_3)_2C=CHCH_2. + .CH_2C(CH_3)=CHCH_3 + CH_4$ 2-BUTENE, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	400–500	4.9(+11)	0	4300±500	0.5	1.5
$(CH_3)_2C=CHCH_3 + CH_3. \rightarrow (CH_3)_3CCH(.)CH_3 + (CH_3)_2C(.)CH(CH_3)_2$ 2-BUTENE, 2-METHYL-, + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	403–455	1.4(+10)	0	3070		
k/k_{ref}: 0.4 NOTE: k_{ref}: $CH_2=CH_2 + CH_3$	453	–	–	–		
$(CH_3)_2C=CHCH_3 + CCO \rightarrow (CH_3)_2C=C=CHCH_3 + CO$ 2-BUTENE, 2-METHYL-, + CARBON OXIDE(C_2O) 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 100. NOTE: k_{ref}: $CH_2=CH_2 + CCO$	298	–	–	–		
$(CH_3)_3CCH_2. \rightarrow (CH_3)_2C=CH_2 + CH_3.$ PROPYL, 2,2-DIMETHYL-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	762	1.0(+14)	0	18875		
$(CH_3)_2CHCH_2CH_2. + CH_2=CH_2 \rightarrow (CH_3)_2CH(CH_2)_3CH_2.$ BUTYL, 3-METHYL-, FREE RADICAL + ETHENE 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	340–413	1.2(+10)	0	3235		
$CH_3CH_2CH_2CH_2CH_3 + O \rightarrow CH_3CH_2CH_2CH_2CH_2. + OH$ PENTANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298–650	2.9(+13)	0	2920	0.7	1.3
$CH_3CH_2CH_2CH_2CH_3 + O \rightarrow CH_3CH_2CH_2CH(.)CH_3 + CH_3CH_2CH(.)CH_2CH_3 + OH$ PENTANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298–650	8.0(+13)	0	2320	0.7	1.3
$CH_3CH_2CH_2CH_2CH_3 + CH_3. \rightarrow CH_3CH_2CH_2CH_2CH_2. + CH_4$ PENTANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	4.8(+11)	0	5800±250	0.7	1.3
$CH_3CH_2CH_2CH_2CH_3 + CH_3. \rightarrow CH_3CH_2CH(.)CH_2CH_3 + CH_3CH_2CH_2CH(.)CH_3 + CH_4$ PENTANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	6.0(+11)	0	4830±250	0.7	1.3
$(CH_3)_2CHCH_2CH_3 + O \rightarrow [C_5H_{11}.] + OH$ BUTANE, 2-METHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	307	8.0(+10)	–	–	0.7	1.4
$(CH_3)_2CHCH_2CH_3 + CH_3. \rightarrow (CH_3)_2C(.)CH_2CH_3 + CH_4$ BUTANE, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	9.6(+10)	0	3975±250	0.7	1.3
$(CH_3)_2CHCH_2CH_3 + CH_3. \rightarrow (CH_3)_2CHCH(.)CH_3 + CH_4$ BUTANE, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	2.0(+11)	0	4830±250	0.7	1.3
$(CH_3)_2CHCH_2CH_3 + CH_3. \rightarrow (CH_3)_2CHCH_2CH_2. + .CH_2CH(CH_3)CH_2CH_3 + CH_4$ BUTANE, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	7.1(+11)	0	5800±250	0.7	1.3
$(CH_3)_4C \rightarrow (CH_3)_3C. + CH_3$ PROPANE, 2,2-DIMEHYL- 70 BEN/O'N REACTION ORDER: 1.	803–1200	5.0(+16)	0	40465		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3)_4C + O \rightarrow (CH_3)_3CCH_2. + OH$ PROPANE, 2,2-DIMEHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298–650	5.9(+13)	0	2920	0.7	1.4
$(CH_3)_4C + CH_3. \rightarrow (CH_3)_3CCH_2. + CH_4$ PROPANE, 2,2-DIMEHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400–600	8.3(+11)	0	5940±350	0.6	1.4
$CH_2=CHOCH_2CH=CH_2 \rightarrow CH_2=CHCH_2CH_2CHO$ 1-PROPENE, 3-ETHENYLOXY- 70 BEN/O'N REACTION ORDER: 1.	440–473	5.0(+11)	0	15400		
$cis\text{-}CH_3CH=CHCOOCH_3 \rightarrow trans\text{-}CH_3CH=CHCOOCH_3$ cis-2-BUTENOIC ACID METHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	673–833	1.6(+11)	0	29090		
$trans\text{-}CH_3CH=CHCOOCH_3 \rightarrow cis\text{-}CH_3CH=CHCOOCH_3$ trans-2-BUTENOIC ACID METHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	673–833	4.0(+12)	0	29190		
$CH_3COOCH_2CH=CH_2 + CH_3CH_2. \rightarrow CH_3COOCH_2CH(.)CH_2CH_2CH_3 + CH_3COOCH_2CH(CH_2CH_3)CH_2.$ ACETIC ACID 2-PROPENYL ESTER + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	308–448	2.5(+11)	0	3900		
$(CH_3COO)_2CH_2 \rightarrow (CH_3CO)_2O + HCHO$ METHANEDIOL, DIACETATE 70 BEN/O'N REACTION ORDER: 1.	493–578	5.0(+10)	0	18300		
$(CH_3)_2CHOCH=CH_2 \rightarrow CH_3CH=CH_2 + CH_3CHO$ PROPANE, 2-(ETHENYLOXY)- 70 BEN/O'N REACTION ORDER: 1.	720–794	3.8(+12)	0	21920		
$CH_2=CHCH_2CH(OH)CH_3 \rightarrow CH_3CH=CH_2 + CH_3CHO$ 4-PENTEN-2-OL 70 BEN/O'N REACTION ORDER: 1.	625–663	8.5(+11)	0	20600		
$CH_3CH_2CH_2CH_2CHO + CH_3. \rightarrow CH_3CH_2CH_2CH_2C(O). + CH_4$ PENTANAL + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	3000±500	0.4	1.6
$CH_3CH_2CH(CH_3)CHO + CH_3. \rightarrow CH_3CH_2CH(CH_3)C(O). + CH_4$ BUTANAL, 2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	3200±500	0	2.0
$(CH_3)_2CHCH_2CHO + CH_3. \rightarrow (CH_3)_2CHCH_2C(O). + CH_4$ BUTANAL, 3-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	3070±500	0.4	1.6
$(CH_3)_3CCHO + CH_3. \rightarrow (CH_3)_3C(O). + CH_4$ PROPANAL, 2,2-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	1.0(+11)	0	3170±500	0.5	2.0
$(CH_3CH_2)_2CO + CH_3. \rightarrow CH_3CH(.)COCH_2CH_3 + .CH_2CH_2COCH_2CH_3 + CH_4$ 3-PENTANONE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–450	1.9(+11)	0	3675±500	0.5	1.5
$(CH_3CD_2)_2CO + CH_3. \rightarrow CH_3CD_2COCD_2CH_2. + CH_4$ 3-PENTANONE-2,2,4,4-d_4 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	500–600	2.0(+11)	0	5535±500	0.5	2.0
$(CH_3CD_2)_2CO + CH_3 \rightarrow CH_3CD_2COCD(.)CH_3 + CH_4$ 3-PENTANONE-2,2,4,4-d_4 + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	500–600	1.3(+11)	0	4200±500	0.5	2.0
$(CH_3CH_2)_2CO + CH_3CH_2. \rightarrow .CH_23H_2COCH_2CH_3 + CH_3CH_3$ 3-PENTANONE + ETHYL FREE RADICAL 72 KON REACTION ORDER: 2.	300–520	2.8(+11)	0	3986±100	0.4	2.2

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$HCOO(CH_2)_3CH_3 + CH_3. \rightarrow .COO(CH_2)_3CH_3 + HCOOCH(.)(CH_2)_2CH_3$ + $HCOOCH_2CH(.)CH_2CH_3$ + $HCOOCH_2CH_2CH(.)CH_3$ + $HCOO(CH_2)_3CH_2. + CH_4$ FORMIC ACID BUTYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–500	2.5(+11)	0	4980±500	0.5	2.0
$HCOOC(CH_3)_3 \rightarrow (CH_3)_2C=CH_2 + HCOOH$ FORMIC ACID 1,1-DIMETHYLETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	503–573	7.9(+12)	0	19730		
$CH_3COOCH_2CH_2CH_3 \rightarrow CH_3CH=CH_2 + CH_3COOH$ ACETIC ACID PROPYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: RELIABILITY NO BETTER THAN AN ORDER OF MAGNITUDE.	725–810	2.5(+12)	0	24006		
$CH_3COOCH(CH_3)_2 \rightarrow CH_3CH=CH_2 + CH_3COOH$ ACETIC ACID 1-METHYLETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	586–801	1.0(+13)	0	22645		
$CH_3CH_2COOCH_2CH_3 \rightarrow CH_3CH_2COOH + CH_2=CH_2$ PROPANOIC ACID ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	778–875	5.6(+12)	0	24400		
$CH_3CH_2COOCH_2CH_3 + CH_3. \rightarrow CH_3CH(.)COOCH_2CH_3$ + $CH_3CH_2COOCH(.)CH_3$ + $.CH_2CH_2COOCH_2CH_3$ + $CH_3CH_2COOCH_2CH_2. + CH_4$ PROPANOIC ACID ETHYL ESTER + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300–650	2.5(+11)	0	4125±500	0.5	1.5
$CH_3COOCH_2CH_2OCH_3 \rightarrow CH_2=CHOCH_3 + CH_3COOH$ ACETIC ACID (2-METHOXYETHYL) ESTER 70 BEN/O'N REACTION ORDER: 1.	725–810	1.6(+12)	0	24460		
$CH_3CH_2OCOOCH_2CH_3 \rightarrow CH_3CH_2OH + CO_2 + CH_2=CH_2$ CARBONIC ACID DIETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	573–648	7.9(+12)	0	21800		
$(CH_3CH_2)C(CH_3)_2OH \rightarrow CH_3CH_2C(CH_3)=CH_2$ + $CH_3CH=C(CH_3)_2 + H_2O$ 2-BUTANOL, 2-METHYL- 70 BEN/O'N REACTION ORDER: 1.	757–799	3.2(+13)	0	30200		
$(CH_3)_3CCN \rightarrow (CH_3)_2C(.)CN + CH_3.$ PROPANENITRILE, 2,2-DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	875–925	1.4(+15)	0	35330		
$(CH_3CH_2)_2NCH_3 + CH_3. \rightarrow CH_3CH(.)N(CH_2CH_3CH_3$ + $.CH_2CH_2N(CH_2CH_3)CH_3 + (CH_3CH_2)_2NCH_2. + CH_4$ ETHANAMINE, N-ETHYL-N-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	420	3.0(+ 7)	-	-	0.5	2.0
$(CH_3)_2NCON(CH_3)_2 + CH_3. \rightarrow .CH_2(CH_3)NCON(CH_3)_2 + CH_4$ UREA, TETRAMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–550	2.0(+11)	0	3975±500	0.5	1.5
$CH_2=CHCH=CHCH=CH_2 \rightarrow cy\text{-}CH_2CH=CHCH=CHCH_2$ cis-1,3,5-HEXATRIENE 70 BEN/O'N REACTION ORDER: 1.	390–463	7.1(+11)	0	15050		
$CH_3CH_2CH_2CH_2C\equiv CH + N \rightarrow$ products 1-HEXYNE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 14.0 NOTE: k_{ref}: CHCH + N.	320–550 435	4.6(+11) -	0 -	1233 -		
$CH_3CH_2C\equiv CCH_2CH_3 + N \rightarrow$ products 3-HEXYNE + NITROGEN ATOM 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 14.0 NOTE: k_{ref}: CH≡CH + N	320–550 435	3.4(+11) -	0 -	1102 -		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$cis\text{-}CH_2{=}CHCH{=}CHCH_2CH_3 \rightarrow CH_3CH{=}CHCH{=}CHCH_3$ cis-1,3-HEXADIENE						
70 BEN/O'N REACTION ORDER: 1.	474–518	6.3(+10)	0	16355		
$CD_2{=}CHCH_2CH{=}CD_2 \rightarrow CH_2{=}CHCD_2CD_2CH{=}CH_2$ 1,5-HEXADIENE-1,1,6,6-D_4						
70 BEN/O'N REACTION ORDER: 1.	530	1.3(+11)	0	17865		
$(CH_3)_2C{=}CHCH{=}CH_2 \rightarrow CH_2{=}C(CH_3)CH{=}CHCH_3$ 1,3-PENTADIENE, 4-METHYL-						
70 BEN/O'N REACTION ORDER: 1.	473–510	5.2(+11)	0	18199		
$CH_2{=}C(CH_3)C(CH_3){=}CH_2 + CH_3CH_2. \rightarrow$ $+ CH_3CH_2CH_2C(.)(CH_3)C(CH_3){=}CH_2$ $+ .CH_2C(CH_3)(CH_2CH_3)C(CH_3){=}CH_2$ 1,3-BUTADIENE, 2,3-DIMETHYL-, + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	318–414	1.6(+11)	0	2265		
$cis\text{-}CH_2{=}C(CH_3)CH{=}CHCH_3 \rightarrow (CH_3)_2C{=}CHCH{=}CH_2$ cis-1,3-PENTADIENE, 2-METHYL-						
70 BEN/O'N REACTION ORDER: 1.	473	1.7(+11)	0	16485		
$CH_3(CH_2)_3CH{=}CH_2 + O \rightarrow cy\text{-}[CH_3(CH_2)_3]CHCH_2O$ 1-HEXENE + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298	3.1(+12)	–	–	0.7	1.3
$CH_3(CH_2)_3CH{=}CH_2 + CH_3CH_2. \rightarrow CH_3(CH_3)_3CH(.)CH_2CH_2CH_3$ $+ CH_3(CH_2)_3CH(CH_2CH_3)CH_2.$ 1-HEXENE + ETHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	338–435	3.9(+10)	0	3400		
$cis\text{-}CH_3CH_2CH_2CH{=}CHCH_3 + CH_3. \rightarrow CH_3CH_2CH_2CH(.)CH(CH_3)_2$ cis-2-HEXENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4060		
$cis\text{-}CH_3CH_2CH_2CH{=}CHCH_3 + CH_3. \rightarrow CH_3CH_2CH_2CH(CH_3)CH(.)CH_3$ cis-2-HEXENE + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4150		
$CH_3CH_2CH_2C(CH_3){=}CH_2 + CH_3. \rightarrow CH_3CH_2CH_2C(.)(CH_3)CH_2CH_3$ 1-PENTENE, 2-METHYL-, + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	3450		
$cis\text{-}(CH_3)_2CHCH{=}CHCH_3 + CH_3. \rightarrow (CH_3)_2CHCH(.)CH(CH_3)_2$ cis-2-PENTENE, 4-METHYL-, + METHYL FREE RADICAL						
72 KER/PAR REACTION ORDER: 2.	298	–	–	4390		
$(CH_3)_2C{=}C(CH_3)_2 + O \rightarrow$ products 2-BUTENE, 2,3-DIMETHYL-, + OXYGEN ATOM						
73 HER/HUI REACTION ORDER: 2.	298–400	3.4(+12)	0	–790	0.8	1.2
$(CH_3)_2C{=}C(CH_3)_2 + H \rightarrow (CH_3)_2C(.)CH(CH_3)_2$ 2-BUTENE, 2,3-DIMETHYL-, + HYDROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	298	7.8(+11)	–	–		
k/k_{ref}: 0.84	300	–	–	–		
NOTE: k_{ref}: $CH_3CH{=}CH_2 + H$						
$(CH_3)_2C{=}C(CH_3)_2 + S \rightarrow cy\text{-}[(CH_3)_2]CC(CH_3)_2S$ 2-BUTENE, 2,3-DIMETHYL-, + SULFUR ATOM						
72 KER/PAR REACTION ORDER: 2.	298	8.5(+13)	–	–		
$(CH_3)_2C{=}C(CH_3)_2 + N \rightarrow$ products 2-BUTENE, 2,3-DIMETHYL-, + NITROGEN ATOM						
72 KER/PAR REACTION ORDER: 2.	320–550	1.7(+11)	0	690		
k/k_{ref}: 3.5	435	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2 + N$						
$(CH_3)_2C{=}C(CH_3)_2 + {}^1CH_2 \rightarrow$ products 2-BUTENE, 2,3-DIMETHYL-, + METHYLENE FREE RADICAL						
72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.16	297	–	–	–		
NOTE: k_{ref}: $CH_2{=}CH_2 + {}^1CH_2$						

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3)_2C=C(CH_3)_2 + {}^3CH_2 \rightarrow$ products 2-BUTENE, 2,3-DIMETHYL-, + METHYLENE FREE RADICAL 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 2.74 NOTE: k_{ref}: $CH_2=CH_2 + {}^3CH_2$	297	-	-	-		
$(CH_3)_2C=C(CH_3)_2 + CH_3. \rightarrow (CH_3)_2C=(CH_3)CCH_2. + CH_4$ 2-BUTENE, 2,3-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	403-614	7.8(+11)	0	4400±500	0.6	1.4
$(CH_3)_2C=C(CH_3)_2 + CH_3. \rightarrow (CH_3)_3CC(.)(CH_3)_2$ 2-BUTENE, 2,3-DIMETHYL-, + METHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	403-453	1.0(+10)	0	3400		
k/k_{ref}: 0.2 NOTE: k_{ref}: $CH_2=CH_2 + CH_3$	453	-	-	-		
$(CH_3)_2C=C(CH_3)_2 + CCO \rightarrow (CH_3)_2C=C=C(CH_3)_2 + CO$ 2-BUTENE, 2,3-DIMETHYL-, + CARBON OXIDE(C_2O) 72 KER/PAR REACTION ORDER: 2. k/k_{ref}: 250. NOTE: k_{ref}: $CH_2=CH_2 + CCO$	298	-	-	-		
$CH_3CH(.)CH_2CH_2CH_2CH_3 \rightarrow CH_3CH=CH_2 + CH_3CH_2CH_2.$ PENTYL, 1-METHYL-, FREE RADICAL 70 BEN/O'N REACTION ORDER: 1.	822	2.0(+14)	0	13800		
$CH_3(CH_2)_4CH_3 + O \rightarrow CH_3(CH_2)_4CH_2. + OH$ HEXANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298-650	2.9(+13)	0	2920	0.7	1.3
$CH_3(CH_2)_4CH_3 + O \rightarrow CH_3CH(.)CH_2CH_2CH_2CH_3$ $+ CH_3CH_2CH(.)CH_2CH_2CH_3 + OH$ HEXANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298-650	1.1(+14)	0	2250	0.7	1.3
$CH_3(CH_2)_4CH_3 + CH_3. \rightarrow CH_3(CH_2)_4CH_2. + CH_4$ HEXANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-800	4.8(+11)	0	5800±250	0.7	1.3
$CH_3(CH_2)_4CH_3 + CH_3. \rightarrow CH_3CH_2CH(.)CH_2CH_2CH_3$ $+ CH_3CH_2CH_2CH_2CH(.)CH_3 + CH_4$ HEXANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-800	7.9(+11)	0	4830±250	0.7	1.3
$(CH_3)_2CHCH(CH_3)_2 \rightarrow (CH_3)_2CH. + (CH_3)_2CH.$ BUTANE, 2,3-DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	1000-1200	3.2(+16)	0	39250		
$(CH_3)_2CHCH(CH_3)_2 \rightarrow (CH_3)_2CH(.)CH(CH_3)_2 + CH_3.$ BUTANE, 2,3-DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	1000-1200	1.0(+17)	0	41800		
$(CH_3)_2CHCH(CH_3)_2 + O \rightarrow .CH_2CH(CH_3)CH(CH_3)_2 + OH$ BUTANE, 2,3-DIMETHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298-650	5.9(+13)	0	2920	0.7	1.3
$(CH_3)_2CHCH(CH_3)_2 + O \rightarrow (CH_3)_2C(.)CH(CH_3)_2 + OH$ BUTANE, 2,3-DIMETHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298-650	3.1(+13)	0	1650	0.7	1.3
$(CH_3)_2CHCH(CH_3)_2 + CH_3. \rightarrow .CH_2CH(CH_3)CH(CH_3)_2 + CH_4$ BUTANE, 2,3-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-750	9.5(+11)	0	5800±250	0.7	1.3
$(CH_3)_2CHCH(CH_3)_2 + CH_3. \rightarrow (CH_3)_2C(.)CH(CH_3)_2 + CH_4$ BUTANE, 2,3-DIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-750	1.9(+11)	0	3975±250	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f F
$(CH_3)_2CHCH(CH_3)_2 + CH_3. \rightarrow (CH_3)_2CHC(.)(CH_3)_2 + .CH_2CH(CH_3)CH(CH_3)_2 + CH_4$ BUTANE, 2,3-DIMETHYL-, + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	300–500	5.0(+10)	0	3445	
$(CH_3)_2CHCH(CH_3)_2 + CD_3. \rightarrow (CH_3)_2C(.)CH(CH_3)_2 + .CH_2CH(CH_3)CH(CH_3)_2 + CD_3H$ BUTANE, 2,3-DIMETHYL-, + METHYL-d_3 FREE RADICAL 72 KON REACTION ORDER: 2.	439–566	4.7(+11)	0	4525	
$CH_2=C(CH_3)OCH_2CH=CH_2 \rightarrow CH_3C(0)CH_2CH_2CH=CH_2$ 1-PROPENE, 3-(1-METHYLETHENYLOXY)- 70 BEN/O'N REACTION ORDER: 1.	416–467	5.4(+11)	0	14745	
$CH_2=C(CH_3)CH_2OCH=CH_2 \rightarrow CH_2=C(CH_3)CH_2CH_2CHO$ 1-PROPENE, 2-METHYL-3(ETHENYLOXY)- 70 BEN/O'N REACTION ORDER: 1.	423–461	1.4(+11)	0	14645	
$CH_2=CHCH(CH_3)OCH=CH_2 \rightarrow CH_3CH=CHCH_2CH_2CHO$ 1-PROPENE, 3-METHYL-3(ETHENYLOXY)- 70 BEN/O'N REACTION ORDER: 1.	423–461	2.1(+11)	0	14025	
$CH_2=CHC(CH_3)_2COOH \rightarrow CH_3CH=C(CH_3)_2 + CO_2$ 3-BUTENOIC ACID, 2,2-DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	511–548	1.4(+11)	0	18400	
$CH_3CH_2COOCH_2CH=CH_2 + CH_3CH_2. \rightarrow CH_3CH_2COOCH_2CH(.)CH_2CH_2CH_3 + CH_3CH_2COOCH_2CH(CH_2CH_3)CH_2.$ PROPANOIC ACID 2-PROPENYL ESTER + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	352–453	2.5(+11)	0	3875	
$(CH_3COO)_2CHCH_3 \rightarrow CH_3COOCOCH_3 + CH_3CHO$ 1,1-ETHANEDIOL, DIACETATE 70 BEN/O'N REACTION ORDER: 1.	493–541	1.9(+10)	0	16560	
$CH_3CH_2C(0)OOC(0)CH_2CH_3 \rightarrow CH_3CH_2C(0)0. + CH_3CH_2C(0)0.$ PEROXIDE, BIS(1-OXOPROPYL)- 70 BEN/O'N REACTION ORDER: 1.	373–464	2.5(+14)	0	15100	
$CH_2=CHCH_2C(OH)(CH_3)_2 \rightarrow CH_3CH=CH_2 + (CH_3)_2CO$ 4-PENTEN-2-OL, 2-METHYL- 70 BEN/O'N REACTION ORDER: 1.	607–643	1.4(+12)	0	20500	
$CH_2=CHO(CH_2)_3CH_3 \rightarrow CH_3CH_2CH=CH_2 + CH_3CHO$ BUTANE, 1-(ETHENYLOXY)- 70 BEN/O'N REACTION ORDER: 1.	590–650	1.4(+11)	0	21330	
$CH_2=CHO(CH_2)_3CH_3 + CH_3CH_2. \rightarrow CH_3CH_2CH_2CH(.)O(CH_3)_3CH_3 + .CH_2CH(CH_2CH_3)O(CH_2)_3CH_3$ BUTANE, 1-ETHENYLOXY-, + ETHYL FREE RADICAL 70 BEN/O'N REACTION ORDER: 2.	303–435	2.5(+10)	0	3070	
$CH_3COO(CH_2)_3CH_3 \rightarrow CH_3CH_2CH=CH_2 + CH_3COOH$ ACETIC ACID BUTYL ESTER 72 KER/PAR REACTION ORDER: 1.	725–810	1.6(+12)	0	23150	
$CH_3COOCH(CH_3)CH_2CH_3 \rightarrow CH_3COOH + cis\text{-}CH_3CH=CHCH_3 + trans\text{-}CH_3CH=CHCH_3 + CH_3CH_2CH=CH_2$ ACETIC ACID 1-METHYLPEROPYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 57% 1-BUTENE: trans/cis-2-BUTENE = 0.64.	576–710	2.0(+13)	0	23450	
$CH_3COOCH_2CH(CH_3)_2 \rightarrow (CH_3)_2C=CH_2 + CH_3COOH$ ACETIC ACID 2-METHYLPROPYL ESTER 70 BEN/O'N REACTION ORDER: 1.	725–810	7.9(+11)	0	23800	
$CH_3COOC(CH_3)_3 \rightarrow (CH_3)_2C=CH_3 + CH_3COOH$ ACETIC ACID 1,1-DIMETHYLETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	514–564	1.4(+13)	0	20130	
$(CH_3)_2C(OH)CH_2COCH_3 \rightarrow (CH_3)_2CO + (CH_3)_2CO$ 2-PENTANONE, 4-HYDROXY-4-METHYL- 70 BEN/O'N REACTION ORDER: 1.	495–528	4.3(+11)	0	16255	

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3COOCH(CH_3)CH_2OCH_3$ → CH_3COOH + CH_2=$CHCH_2OCH_3$ + cis- and trans-CH_3CH=$CHOCH_3$ 2-PROPANOL, 1-METHOXY-, ACETATE 70 BEN/O'N REACTION ORDER: 1. NOTE: 58% PROPENE, 3-METHOXY-	650-710	1.1(+13)	0	23450		
$CH_3COOCH_2CH_2OCH_2CH_3$ → CH_2=$CHOCH_2CH_3$ + CH_3COOH ETHANOL, 2-ETHOXY-, ACETATE 70 BEN/O'N REACTION ORDER: 1.	725-810	1.2(+12)	0	24100		
$(CH_3)_2CHOCH(CH_3)_2$ → CH_3CH=CH_2 + $(CH_3)_2CHOH$ PROPANE, 2,2'-OXYBIS- 70 BEN/O'N REACTION ORDER: 1. NOTE: SUSPECT RATE CONSTANT.	696-760	4.2(+14)	0	31960		
$(CH_3)_2CHOCH(CH_3)_2$ + CH_3. → $(CH_3)_2C(.)OCH(CH_3)_2$ + $.CH_2CH(CH_3)OCH(CH_3)_2$ + CH_4 PROPANE, 2,2'-OXYBIS-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	400-600	2.1(+11)	0	4100±500	0.5	2.0
$CH_3CH_2CH_2OOCH_2CH_2CH_3$ → $CH_3CH_2CH_2O.$ + $CH_3CH_2CH_2O.$ PEROXIDE, DIPROPYL 70 BEN/O'N REACTION ORDER: 1.	420-428	4.0(+15)	0	18700		
$(CH_3)_2CHOOCH(CH_3)_2$ + CH_3. → $(CH_3)_2C(.)OOCH(CH_3)_2$ + $.CH_2CH(CH_3)OOCH(CH_3)_2$ + CH_2. + CH_4 PEROXIDE, BIS(1-METHYLETHYL)-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	300-450	2.3(+11)	0	4100±500	0.5	1.5
CH_3CH=$NC(CH_3)_3$ + CH_3. → $CH_3C(.)$=$NC(CH_3)_3$ + $.CH_2CH$=$NC(CH_3)_3$ + CH_3CH=$NC(CH_3)_2CH_2$. + CH_4 2-PROPANIMINE, N-ETHYLIDENE-2-METHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350-500	8.9(+10)	0	3925±500	0.5	1.5
$(CH_3)_2CHN$=$NCH(CH_3)_2$ → $(CH_3)_2CHN$=N. + $(CH_3)_2CH$. DIAZENE, BIS(1-METHYLETHYL)- 70 BEN/O'N REACTION ORDER: 1.	523-563	2.5(+16)	0	23900		
$(CH_3)_2CHNHCH(CH_3)_2$ + CH_3. → $(CH_3)_2CHN(.)CH(CH_3)_2$ + $(CH_3)_2C(.)NHCH(CH_3)_2$ + $CH_2CH(CH_3)NHCH(CH_3)_2$ + CH_4 2-PROPANAMINE, N-(1-METHYLETHYL)-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-500	2.0(+11)	0	3370±750		
$(CH_3CH_2)_3N$ + CH_3. → $CH_3CH(.)N(CH_2CH_3)_2$ + $.CH_2CH_2N(CH_2CH_3)_2$ + CH_4 ETHANAMINE, N,N-DIETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-600	5.0(+11)	0	4000±500	0	2.0
CH_2=C=$CHCH_2CH_2CH$=CH_2 → CH_2=$CHC(=CH_2)CH_2CH$=CH_2 1,2,6-HEPTATRIENE 70 BEN/O'N REACTION ORDER: 1.	445-491	9.3(+ 9)	0	14330		
$CH_3(CH_2)_4CCH$ + CH_3CH_2. → $CH_3(CH_2)_4C(.)$=$CHCH_2CH_3$ + $CH_3(CH_2)_4C(CH_2CH_3)$=CH. 1-HEPTYNE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.		3.9(+11)	0	4430		
CH_2=$CHCH_2CH_2CH$=$CHCH_3$ → CH_2CH=$CH_2CH(CH_3)CH$=CH_2 1,5-HEPTADIENE 70 BEN/O'N REACTION ORDER: 1.	451-523	1.3(+11)	0	16355		
CH_2=$CHCH(CH_3)CH_2CH$=CH_3 → CH_2=$CHCH_2CH_2CH$=$CHCH_3$ 1,5-HEXADIENE, 3-METHYL- 70 BEN/O'N REACTION ORDER: 1.	451-523	7.1(+10)	0	17590		
$(CH_3)_2C$=C=$C(CH_3)_2$ + CCO → $(CH_3)_2C$=C=C=$C(CH_3)_2$ + CO 2,3-PENTADIENE, 2,4-DIMETHYL-, + CARBON OXIDE(C_2O) 70 BEN/O'N REACTION ORDER: 2. k/k_{ref}: 113. NOTE: k_{ref}: CH_2=CH_2 + CCO	304	-	-	-		

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3(CH_2)_4CH=CH_2 + CH_3CH_2. \rightarrow CH_3(CH_2)_4CH(.)CH_2CH_2CH_3 + CH_3(CH_2)_4CH(CH_2CH_3)CH_2.$ 1-HEPTENE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	359-439	6.2(+10)	0	3500		
$(CH_3)_3CC(CH_3)=CH_2 + H \rightarrow (CH_3)_3CCH(CH_3)CH_2. + (CH_3)_3CC(.)(CH_3)_2$ 1-BUTENE, 2,3,3-TRIMETHYL-, + HYDROGEN ATOM 72 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE BASED ON REACTION $(CH_3)_2C=CH_2 + H$	298	1.6(+12)	-	-		
$CH_3C(CH_3)_2C(CH_3)=CH_2 + CH_3CH_2. \rightarrow CH_3C(CH_3)_2C(.)(CH_3)CH_2CH_2CH_3 + CH_3C(CH_3)_2C(CH_3)(CH_2CH_3)CH_2.$ 1-BUTENE, 2,3,3-TRIMETHYL-, + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	322-364	7.8(+ 9)	0	2800		
$CH_3(CH_2)_5CH_3 + O \rightarrow CH_3(CH_2)_5CH_2. + OH$ HEPTANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298-650	2.9(+13)	0	2920	0.7	1.3
$CH_3(CH_2)_5CH_3 + O \rightarrow CH_3(CH_2)_4CH(.)CH_3 + CH_3(CH_2)_3CH(.)(CH_2)_2CH_3 + CH_3(CH_2)_2CH(.)(CH_2)_2CH_3 + OH$ HEPTANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298-650	1.2(+14)	0	2190	0.7	1.3
$(CH_3)_3C(CH_2)_2CH_3 + O \rightarrow$ products PENTANE, 2,2-DIMETHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	307	6.5(+10)	-	-	0.7	1.4
$(CH_3)_2CHCH_2CH(CH_3)_2 + O \rightarrow$ products PENTANE, 2,4-DIMETHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	307	1.0(+11)	-	-	0.7	1.4
$(CH_3CH_2)_3CH + CH_3. \rightarrow (CH_3CH_2)_3C. + CH_4$ PENTANE, 3-ETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-750	9.5(+10)	0	3975±250	0.7	1.3
$(CH_3CH_2)_3CH + CH_3. \rightarrow (CH_3CH_2)_2CHCH(.)CH_3 + CH_4$ PENTANE, 3-ETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-750	6.0(+11)	0	4830±250	0.7	1.3
$(CH_3CH_2)_3CH + CH_3. \rightarrow (CH_3CH_2)_2CHCH_2CH_2. + CH_4$ PENTANE, 3-ETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350-750	7.1(+11)	0	5800±250	0.7	1.3
$(CH_3)_3CCH(CH_3)_2 \rightarrow (CH_3)_3C. + (CH_3)_2CH.$ BUTANE, 2,2,3-TRIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	1069-1197	1.1(+16)	0	36335		
$CH_2=C(CH_3)C(CH_3)_2COOH \rightarrow (CH_3)_2C=C(CH_3)_2 + CO_2$ 3-BUTENOIC ACID 2,2,3-TRIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	447-488	7.1(+10)	0	16560		
trans-$CH_3CH=CHC(CH_3)_2COOH \rightarrow CH_3CH_2CH=C(CH_3)_2 + CO_2$ trans-3-PENTENOIC ACID, 2,2-DIMETHYL- 70 BEN/O'N REACTION ORDER: 1.	526-564	5.5(+11)	0	20300		
$CH_3COOCH(CH_3)CH_2CH=CH_2 \rightarrow CH_3COOH + CH_2=CHCH_2CH=CH_2$ + cis-, and trans $CH_3CH=CHCH=CH_2$ ACETIC ACID 1-METHYL-3-BUTENYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: trans/cis-1,3-PENTADIENE = 7/3; 1,4-PENTADIENE/1,3-PENTADIENE = 1/2.	564-628	2.0(+13)	0	22345		
$CH_3COOCH(CH_3)CH_2COCH_3 \rightarrow CH_3CH=CHCOCH_3 + CH_3COOH$ 2-2-PENTANONE, 4-ACETYLOXY- 70 BEN/O'N REACTION ORDER: 1.	529-570	7.9(+11)	0	18800		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$(CH_3CH_2COO)_2CH_2 \rightarrow (CH_3CH_2CO)_2O + HCHO$ METHANEDIOL, DIPROPANOATE 70 BEN/O'N REACTION ORDER: 1.	493–578	5.0(+10)	0	18300		
$CH_3COO(CH_2)_4CH_3 \rightarrow CH_3CH_2CH_2CH=CH_2 + CH_3COOH$ ACETIC ACID PENTYL ESTER 70 BEN/O'N REACTION ORDER: 1.	725–810	1.6(+12)	0	23350		
$CH_3COOCH(CH_3)CH_2CH_2CH_3 \rightarrow$ cis-, and trans-$CH_3CH=CHCH_2CH_3$ + $CH_3CH_2CH_2CH=CH_2 + CH_3COOH$ ACETIC ACID 1-METHYLBUTYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 55% 1-PENTENE.	650–710	5.0(+12)	0	21995		
$CH_3COOCH(CH_2CH_3)_2 \rightarrow$ cis-, and trans-$CH_3CH=CHCH_2CH_3$ + CH_3COOH ACETIC ACID 1-ETHYLPROPYL ESTER 70 BEN/O'N REACTION ORDER: 1.	650–710	1.2(+13)	0	22500		
$CH_3COOCH_2CH(CH_3)CH_2CH_3 \rightarrow CH_3CH_2C(CH_3)=CH_2 + CH_3COOH$ ACETIC ACID 2-METHYLBUTYL ESTER 70 BEN/O'N REACTION ORDER: 1.	725–810	7.9(+11)	0	23500		
$CH_3COOC[(CH_3)_2]CH_2CH_3 \rightarrow CH_3CH_2C(CH_3)=CH_2$ + $(CH_3)_2C=CHCH_3 + CH_3COOH$ ACETIC ACID 1,1-DIMETHYLPROPYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 75% 1-BUTENE, 2-METHYL-.	501–562	2.5(+13)	0	20300		
$CH_3COOCH_2CH_2CH(CH_3)_2 \rightarrow (CH_3)_2CHCH=CH_2 + CH_3COOH$ ACETIC ACID 3-METHYLBUTYL ESTER 70 BEN/O'N REACTION ORDER: 1.	725–810	1.6(+12)	0	23350		
$(CH_3)_3CCOOCH_2CH_3 \rightarrow (CH_3)_3CCOOH + CH_2=CH_2$ PROPANOIC ACID, 2,2-DIMETHYL-, ETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	635–694	4.0(+12)	0	24200		
$CH_3CH_2COOC(CH_3)_3 \rightarrow (CH_3)_2C=CH_2 + CH_3CH_2COOH$ PROPANOIC ACID, 1,1-DIMETHYLETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	513–569	6.3(+12)	0	19730		
$CH_3COOCH(CH_3)CH_2N(CH_3)_2 \rightarrow CH_2=CHCH_2N(CHO)_2$ + cis-, and trans-$CH_3CH=CHN(CH_3)_2 + CH_3COOH$ ACETIC ACID 1-METHYL-2-DIMETHYLAMINOETHYL ESTER 70 BEN/O'N REACTION ORDER: 1.	650–710	6.3(+12)	0	22245		
$(CH_3)_2C=CHCH=C(CH_3)_2 + 3CH_3CH_2 \rightarrow$ $(CH_3)_2C(CH_2CH_3)CH(.)=C(CH_3)_2$ + $(CH_3)_2C(.)CH(CH_2CH_3)CH=C(CH_3)_2$ 2,4-HEXADIENE, 2,5-DIMETHYL-, + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	328–420	6.2(+10)	0	3300		
$CH_3(CH_2)_5CH=CH_2 + CH_3CH_2. \rightarrow CH_3(CH_2)_5CH(.)CH_2CH_2CH_3$ + $CH_3(CH_2)_5CH(CH_2CH_3)CH_2.$ 1-OCTENE + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	339–425	1.2(+11)	0	3825		
$(CH_3)_3CCH_2C(CH_3)=CH_2 + CH_3CH_2. \rightarrow$ $(CH_3)_3CCH_2C(.)(CH_3)CH_2CH_2CH_3$ + $(CH_3)_3CCH_2C(CH_3)(CH_2CH_3)CH_2.$ 1-PENTENE, 2,4,4-TRIMETHYL-, + ETHYL FREE RADICAL 72 KER/PAR REACTION ORDER: 2.	309–364	1.9(+10)	0	2870		
$CH_3(CH_2)_6CH_3 + O \rightarrow CH_3(CH_2)_6CH_2. + OH$ OCTANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298–650	2.9(+13)	0	2920	0.7	1.3
$CH_3(CH_2)_6CH_3 + O \rightarrow CH_3(CH_2)_5CH(.)CH_3$ + $CH_3(CH_2)_4CH(.)CH_2CH_3 + CH_3(CH_2)_3CH(.)(CH_2)_2CH_3 + OH$ OCTANE + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	298–650	9.3(+13)	0	2030	0.7	1.3

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f	F
$CH_3(CH_2)_6CH_3 + CH_3. \rightarrow CH_3(CH_2)_6CH_2. + CH_4$ OCTANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	4.8(+11)	0	5800±250	0.7	1.3
$CH_3(CH_2)_6CH_3 + CH_3. \rightarrow CH_3(CH_2)_3CH(.)CH_2CH_2CH_3 + CH_3(CH_2)_4CH(.)CH_2CH_3 + CH_3(CH_2)_5CH(.)CH_3 + CH_4$ OCTANE + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	1.2(+12)	0	4830±250	0.7	1.3
$(CH_3)_3CCH_2CH(CH_3)_2 + O \rightarrow$ products PENTANE, 2,2,4-TRIMETHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	307	5.5(+10)	–	–	0.6	1.5
$(CH_3)_3CCH_2CH(CH_3)_2 + CH_3. \rightarrow (CH_3)_3CCH(.)CH(CH_3)_2 + CH_4$ PENTANE, 2,2,4-TRIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	2.0(+11)	0	4830±250	0.7	1.3
$(CH_3)_3CCH_2CH(CH_3)_2 + CH_3. \rightarrow (CH_3)_3CCH_2C(.)(CH_3)_2 + CH_4$ PENTANE, 2,2,4-TRIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	9.5(+10)	0	3975±250	0.7	1.3
$(CH_3)_3CCH_2CH(CH_3)_2 + CH_3. \rightarrow (CH_3)_3CCH_2CH(CH_3)CH_2. + CH_2C(CH_3)_2CH_2CH(CH_3)_2 + CH_4$ PENTANE, 2,2,4-TRIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	1.2(+12)	0	5800±250	0.7	1.3
$(CH_3)_2CHCH(CH_3)CH(CH_3)_2 + O \rightarrow$ products PENTANE, 2,3,4-TRIMETHYL-, + OXYGEN ATOM 73 HER/HUI REACTION ORDER: 2.	307	3.0(+10)	–	–	0.6	1.5
$(CH_3)_2CHCH(CH_3)CH(CH_3)_2 + CH_3. \rightarrow .CH_2CH(CH_3)CH(CH_3)CH(CH_3)_2 + CH_4$ PENTANE, 2,3,4-TRIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	1.2(+12)	0	5800±250	0.7	1.3
$(CH_3)_2CHCH(CH_3)CH(CH_3)_2 + CH_3. \rightarrow (CH_3)_2CHC(.)(CH_3)CH(CH_3)_2 + (CH_3)_2C(.)CH(CH_3)_2 + CH_4$ PENTANE, 2,3,4-TRIMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–750	2.9(+11)	0	3975±250	0.7	1.3
$(CH_3)_2CHCH(CH_3)CH(CH_3)_2 + CH_3. \rightarrow [C_8H_{17}.] + CH_4$ PENTANE, 2,3,4-TRIMETHYL-, + METHYL FREE RADICAL 72 KON REACTION ORDER: 2.	414–605	4.7(+11)	0	4575		
$(CH_3)_3CC(CH_3)_3 \rightarrow (CH_3)_3C. + (CH_3)_3C.$ BUTANE, 2,2,3,3-TETRAMETHYL- 70 BEN/O'N REACTION ORDER: 1.	985–1119	5.0(+16)	0	33800		
$(CH_3)_3CC(CH_3)_3 + O \rightarrow$ products BUTANE, 2,2,3,3-TETRAMETHYL- 73 HER/HUI REACTION ORDER: 2.	307	8.0(+ 9)	–	–	0.6	1.5
$(CH_3)_3CC(CH_3)_3 + CH_3. \rightarrow .CH_2C(CH_3)_2CC(CH_3)_2 + CH_4$ BUTANE, 2,2,3,3-TETRAMETHYL-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2. NOTE: TENTATIVE k VALUE.	350–800	1.4(+12)	0	5800±250	0.7	1.3
$(CH_3COO)_2CHCH=CHCH_3 \rightarrow (CH_3CO)_2O + cis\text{-}CH_3CH=CHCHO$ 2-BUTENE-1,1-DIOL, DIACETATE 70 BEN/O'N REACTION ORDER: 1. NOTE: PROBABLY RELIABLE k.	492–533	1.3(+11)	0	16600		
$(CH_3COO)_2CHCH_2CH_2CH_3 \rightarrow (CH_3CO)_2O + CH_3CH_2CH_2CHO$ 1,1-BUTANEDIOL, DIACETATE 70 BEN/O'N REACTION ORDER: 1. NOTE: PROBABLY RELIABLE k.	484–538	3.0(+10)	0	16560		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	*T*/K	*A*	*B*	*E*/*R* (in K)	k factors f	F
$(CH_3CH_2COO)_2CHCH_3 \rightarrow (CH_3CH_2CO)_2O + CH_3CHO$ 1,1-ETHANEDIOL, DIPROPANOATE 70 BEN/O'N REACTION ORDER: 1.	484–538	2.5(+10)	0	16560		
$CH_3CH_2CH_2C(O)OOC(O)CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2C(O)O. + CH_3CH_2CH_2C(O)O.$ PEROXIDE, BIS(1-OXOBUTYL) 70 BEN/O'N REACTION ORDER: 1.	370–452	2.0(+14)	0	14900		
$CH_3COOC(CH_2CH_3)_2CH_3 \rightarrow$ cis-, and trans-$CH_3CH=C(CH_3)CH_2CH_3 + CH_2=C(CH_2CH_3)_2 + CH_3COOH$ ACETIC ACID 1-ETHYL-1-METHYLPROPYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 65% 1-BUTENE, 2-ETHYL-.	560–610	1.4(+13)	0	19400		
$CH_3COOCH_2CH(CH_2CH_3)_2 \rightarrow (CH_3CH_2)_2C=CH_2 + CH_3COOH$ ACETIC ACID 2-ETHYLBUTYL ESTER 70 BEN/O'N REACTION ORDER: 1.	725–810	7.9(+11)	0	23050		
$CH_3COOCH(CH_3)CH(CH_3)CH_2CH_3 \rightarrow CH_2=CHCH(CH_3)CH_2CH_3$ + cis-, and trans-$CH_3CH=C(CH_3)CH_2CH_3 + CH_3COOH$ ACETIC ACID 1,2-DIMETHYLBUTYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 76% 1-PENTENE, 3-METHYL-.	650–710	4.0(+12)	0	21740		
$CH_3COOC(CH_3)_2CH_2CH_2CH_3 \rightarrow CH_2=C(CH_3)CH_2CH_2CH_3$ $+ (CH_3)_2C=CHCH_2CH_3 + CH_3COOH$ ACETIC ACID 1,1-DIMETHYLBUTYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 72% 1-PENTENE, 2-METHYL-.	560–610	1.5(+13)	0	19525		
$CH_3COOC(CH_3)_2CH(CH_3)_2 \rightarrow (CH_3)_2C=C(CH_3)_2$ $+ CH_2=C(CH_3)CH(CH_3)_2 + CH_3COOH$ ACETIC ACID 1,1,2-TRIMETHYLPROPYL ESTER 70 BEN/O'N REACTION ORDER: 1. NOTE: 90% 1-BUTENE, 2,3-DIMETHYL-.	560–610	1.3(+13)	0	19075		
$(CH_3)_3COOC(CH_3)_3 \rightarrow (CH_3)_3CHO. + (CH_3)_3CO.$ PEROXIDE, BIS(1,1-DIMETHYLETHYL) 70 BEN/O'N REACTION ORDER: 1.	403–443	4.0(+15)	0	18800		
$(CH_3)_3COOC(CH_3)_3 + CH_3. \rightarrow .CH_2C(CH_3)_2OOC(CH_3)_3 + CH_4$ PEROXIDE, BIS(1,1-DIMETHYLETHYL)-, + METHYL FREE RADICAL 76 KER/PAR REACTION ORDER: 2.	350–500	1.8(+12)	0	5900±150	0.3	3
$CH_3CH_2CH_2CH_2N=NCH_2CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2CH_2N=N. + CH_3CH_2CH_2CH_2.$ DIAZENE, DIBUTYL- 70 BEN/O'N REACTION ORDER: 1.	473–673	3.2(+16)	0	25165		
$CH_3CH_2CH(CH_3)N=NCH(CH_3)CH_2CH_3 \rightarrow CH_3CH_2CH(CH_3)N=N. + CH_3CH_2CH(.)CH_3$ DIAZENE, BIS(1-METHYLPROPYL)- 70 BEN/O'N REACTION ORDER: 1.	539–618	4.0(+16)	0	23500		
$(CH_3)_2CHCH_2N=NCH_2CH(CH_3)_2 \rightarrow (CH_3)_2CHCH_2N=N. + (CH_3)_2CHCH_2.$ DIAZENE, BIS(2-METHYLPROPYL)- 70 BEN/O'N REACTION ORDER: 1.	473–673	1.7(+16)	0	24660		
$(CH_3)_3CN=NC(CH_3)_3 \rightarrow (CH_3)_3CN=N. + (CH_3)_3C.$ DIAZENE, BIS(1,1-DIMETHYLETHYL)- 70 BEN/O'N REACTION ORDER: 1.	473–673	1.4(+17)	0	21900		
$(CH_3CH_2)_2NN=NN(CH_2CH_3)_2 \rightarrow (CH_3CH_2)_2NN=N. + (CH_3CH_2)_2N.$ 2-TETRAZENE, 1,1,4,4-TETRAETHYL- 70 BEN/O'N REACTION ORDER: 1.	471–508	2.5(+14)	0	17365		
$(CH_3)_2CHCH_2N(O)N(O)CH_2CH(CH_3)_2 \rightarrow (CH_3)_2CHCH_2NO + (CH_3)_2CHCH_2NO$ PROPANE, 1-NITROSO-2-METHYL-, DIMERIC 70 BEN/O'N REACTION ORDER: 1.	374–402	2.5(+14)	0	12900		

Table of Arrhenius parameters for chemical reactions occurring in combustion—Continued

Chemical reactions	T/K	A	B	E/R (in K)	k factors f F
$CH_3CH=C(CH_2CH_3)C(CH_3)_2COOH \rightarrow (CH_3CH_2)_2C=C(CH_3)_2 + CO_2$					
PENTANOIC ACID, 2,2-DIMETHYL-3-ETHYLIDENE-					
70 BEN/O'N REACTION ORDER: 1.	468–502	4.8(+11)	0	18100	
NOTE: RELIABLE k.					
$(CH_3CH_2CH_2COO)_2CH_2 \rightarrow (CH_3CH_2CH_2CO)_2O + HCHO$					
METHANEDIOL, DIBUTANOATE					
70 BEN/O'N REACTION ORDER: 1.	493–578	5.0(+10)	0	18300	
$CH_3COOCH(CH_3)(CH_2)_4CH_3 \rightarrow CH_3(CH_2)_4CH=CH_2$					
+ cis-, and trans-$CH_3CH=CH(CH_2)_3CH_3$					
ACETIC ACID 1-METHYLHEXYL ESTER					
70 BEN/O'N REACTION ORDER: 1.	650–710	5.4(+12)	0	21995	
NOTE: 58% 1-HEPTENE.					
$CH_3COOCH(CH_2CH_3)CH_2CH_2CH_2CH_3 \rightarrow CH_3CH=CH(CH_2)_3CH_3$					
+ cis-, and trans-$CH_3CH_2CH=CHCH_2CH_2CH_3 + CH_3COOH$					
ACETIC ACID 1-ETHYLPENTYL ESTER					
70 BEN/O'N REACTION ORDER: 1.	650–710	5.6(+12)	0	21740	
$CH_3COOCH(CH_2CH_2CH_3)_2 \rightarrow$					
+ cis-, and trans-$CH_3CH_2CH=CHCH_2CH_2CH_3 + CH_3COOH$					
ACETIC ACID 1-PROPYLBUTYL ESTER					
70 BEN/O'N REACTION ORDER: 1.	50–710	4.0(+12)	0	21500	
$CH_3COOCH[CH(CH_3)_2]_2 \rightarrow (CH_3)_2CHCH=C(CH_3)_2 + CH_3COOH$					
ACETIC ACID 1-(1'-METHYLETHYL)-2-METHYLPROPYL ESTER					
70 BEN/O'N REACTION ORDER: 1.	650–710	6.9(+12)	0	22500	
$(CH_3)_2C=CHCH_2CH_2CH(CH_3)CH=CH_2 \rightarrow$					
cy-$[CH_2=C(CH_3)]CHCH(CH_3)CH(CH_3)CH_2CH_2$					
1,6-OCTADIENE, 3,7-DIMETHYL-					
70 BEN/O'N REACTION ORDER: 1.	656–682	1.2(+ 9)	0	17700	
$(CH_3CH_2CH_2COO)_2CHCH_3 \rightarrow (CH_3CH_2CH_2CO)_2O + CH_3CHO$					
1,1-ETHANEDIOL, DIBUTANOATE					
70 BEN/O'N REACTION ORDER: 1.	473–573	1.8(+10)	0	16600	
NOTE: PROBABLY RELIABLE k.					
$(CH_3COO)_2CH(CH_2)_5CH_3 \rightarrow CH_3(CH_2)_5CHO + (CH_3CO)_2O$					
1,1-HEPTANEDIOL, DIACETATE					
70 BEN/O'N REACTION ORDER: 1.	473–573	3.0(+10)	0	16600	
NOTE: PROBABLY RELIABLE k.					

3. Sources of Recommended Rate Constants

Baulch, D. L., Drysdale, D. D., Horne, D. G., and Lloyd, A. C., "Evaluated Kinetics Data for High Temperature Reactions, Vol. 1: Homogeneous Gas Phase Reactions of the H_2–O_2 System," (Butterworths, London, 1972).

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Appendix: Conversion Tables

Equivalent second order rate constants

A / *B*	cm ^{3}mol^{-1}s^{-1}	dm ^{3}mol^{-1}s^{-1}	m ^{3}mol^{-1}s^{-1}	cm ^{3}molecule^{-1}s^{-1}	(mm Hg)$^{-1}$s^{-1}	atm^{-1}s^{-1}	ppm^{-1}min^{-1}	m ^{3}kN^{-1}s^{-1}
1 cm ^{3}mol^{-1}s^{-1}	1	10^{-3}	10^{-6}	1.66×10^{-24}	$1.604 \times 10^{-5}\,T^{-1}$	$1.219 \times 10^{-2}\,T^{-1}$	2.453×10^{-9}	$1.203 \times 10^{-4}\,T^{-1}$
1 dm ^{3}mol^{-1}s^{-1}=	10^{3}	1	10^{-3}	1.66×10^{-21}	$1.604 \times 10^{-2}\,T^{-1}$	$12.19\,T^{-1}$	2.453×10^{-6}	$1.203 \times 10^{-1}\,T^{-1}$
1 m ^{3}mol^{-1}s^{-1}	10^{6}	10^{3}	1	1.66×10^{-18}	$16.04\,T^{-1}$	$1.219 \times 10^{4}\,T^{-1}$	2.453×10^{-3}	$120.3\,T^{-1}$
1 cm ^{3}molecule^{-1}s^{-1}=	6.023×10^{23}	6.023×10^{20}	6.023×10^{17}	1	$9.658 \times 10^{18}\,T^{-1}$	$7.34 \times 10^{21}\,T^{-1}$	1.478×10^{15}	$7.244 \times 10^{19}\,T^{-1}$
1 (mm Hg)$^{-1}$s^{-1}=	$6.236 \times 10^{4}\,T$	$62.36\,T$	$6.236 \times 10^{-2}\,T$	$1.035 \times 10^{-19}\,T$	1	760	4.56×10^{-2}	7.500
1 atm^{-1}s^{-1}=	$82.06\,T$	$8.206 \times 10^{-2}\,T$	$8.206 \times 10^{-5}\,T$	$1.362 \times 10^{-22}\,T$	1.316×10^{-3}	1	6×10^{-5}	9.969×10^{-3}
1 ppm^{-1}min^{-1}= at 298 K, 1 atm total pressure	4.077×10^{6}	4.077×10^{5}	407.7	6.76×10^{-16}	21.93	1.667×10^{4}	1	164.5
1 m ^{3}kN^{-1}s^{-1}=	$8.314\,T$	$8.314\,T$	$8.314 \times 10^{-3}\,T$	$1.38 \times 10^{-20}\,T$	0.1333	101.325	6.079×10^{-3}	1

To convert a rate constant from one set of units *A* to a new set *B* find the conversion factor for the row *A* under column *B* and multiply the old value by it, e.g., to convert cm ^{3}molecule^{-1}s^{-1} to m ^{3}mol^{-1}s^{-1} multiply by 6.023×10^{17}.

Table adapted from Evaluated Kinetic Data for High Temperature Reactions, Volume 1: Homogeneous Gas Phase Reactions of the H_2–O_2 System, Butterworths, London, 1972.

Equivalent third order rate constants

A / *B*	cm ^{6}mol^{-2}s^{-1}	dm ^{6}mol^{-2}s^{-1}	m ^{6}mol^{-2}s^{-1}	cm ^{6}molecule^{-2}s^{-1}	(mm Hg)$^{-2}$s^{-1}	atm^{-2}s^{-1}	ppm^{-2}min^{-1}	m ^{6}kN^{-2}s^{-1}
1 cm ^{6}mol^{-2}s^{-1}=	1	10^{-6}	10^{-12}	2.76×10^{-48}	$2.57 \times 10^{-10}\,T^{-2}$	$1.48 \times 10^{-4}\,T^{-2}$	1.003×10^{-19}	$1.447 \times 10^{-8}\,T^{-2}$
1 dm ^{6}mol^{-2}s^{-1}=	10^{-6}	1	10^{-6}	2.76×10^{-42}	$2.57 \times 10^{-4}\,T^{-2}$	$1.48\,T^{-2}$	1.003×10^{-13}	$1.447 \times 10^{-2}\,T^{-2}$
1 m ^{6}mol^{-2}s^{-1}	10^{12}	10^{6}	1	2.76×10^{-36}	$257\,T^{-2}$	$1.48 \times 10^{8}\,T^{-2}$	1.003×10^{-7}	$1.447 \times 10^{4}\,T^{-2}$
1 cm ^{6}molecule^{-2}s^{-1}=	3.628×10^{47}	3.628×10^{41}	3.628×10^{35}	1	$9.328 \times 10^{37}\,T^{-2}$	$5.388 \times 10^{43}\,T^{-2}$	3.64×10^{28}	$5.248 \times 10^{39}\,T^{-2}$
1 (mm Hg)$^{-2}$s^{-1}=	$3.89 \times 10^{9}\,T^{2}$	$3.89\,T$ $\times 10^{3}\,T^{2}$	$3.89 \times 10^{-3}\,T^{2}$	$1.07 \times 10^{-38}\,T^{2}$	1	5.776×10^{5}	3.46×10^{-5}	56.25
1 atm^{-2}s^{-1}=	$6.733 \times 10^{3}\,T^{2}$	$6.733 \times 10^{-3}\,T^{2}$	$6.733 \times 10^{-9}\,T^{2}$	$1.86 \times 10^{-44}\,T^{2}$	1.73×10^{-6}	1	6×10^{-11}	9.74×10^{-5}
1 ppm^{-2}min^{-1}= at 298 K, 1 atm total pressure	9.97×10^{18}	9.97×10^{12}	9.97×10^{6}	2.75×10^{-29}	2.89×10^{4}	1.667×10^{10}	1	1.623×10^{6}
1 m ^{6}kN^{-2}s^{-1}=	$6.91\,T$ $\times 10^{7}\,T^{2}$	$69.1\,T^{2}$	$6.91 \times 10^{-5}\,T^{2}$	$1.904 \times 10^{-40}\,T^{2}$	0.0178	1.027×10^{4}	6.16×10^{-7}	1

See note to Table for second order rate constants.

NBS-114A (REV. 9-78)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NSRDS-NBS 67	2. Recipient's Accession No.

4. TITLE AND SUBTITLE

Table of Recommended Rate Constants for Chemical Reactions Occurring in Combustion

5. Publication Date

April 1980

6. Performing Organization Code

7. AUTHOR(S)

Francis Westley

8. Performing Organ. Report No.

9. PERFORMING ORGANIZATION NAME AND ADDRESS

NATIONAL BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, DC 20234

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS *(Street, City, State, ZIP)*

Department of Energy, Washington, DC 20545 and
Office of Standard Reference Data, National Bureau of Standards, Washington, DC 20234

13. Type of Report & Period Covered

N/A

14. Sponsoring Agency Code

15. SUPPLEMENTARY NOTES

Library of Congress Catalog Card Number: 79-607159

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

A table of recommended rate constants for gas phase chemical reactions occurring in combustion is presented. Specifically, it gives in tabular form the values of the parameters for the modified Arrhenius equation $k = AT^{B}\exp(-E/RT)$. The table covers reactions occurring in the combustion, oxidation, and decomposition of aliphatic saturated or unsaturated C_1 to C_{10} hydrocarbons, alcohols, aldehydes, ketones, thiols, ethers, peroxides, amines, amides and their free radicals, as well as the reactions of O, O_2, H, H_2, OH, H_2O, H_2O_2, N, N_2, NO, N_2O, NO_2, N_2O_4, N_2O_5, S, S_2, SH, SO, SO_2, SOH, NS, with each other. The table includes 169 first order reactions, 782 second order reactions, and 57 third order reactions. There are 1770 entries covering 1008 distinct chemical reactions. These recommendations have been taken from eleven evaluations and critical reviews published between 1970 and 1976. The papers examined by the evaluators extend from the nineteen fifties up to - and including - 1975.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Arrhenius parameters; chemical kinetics; combustion; decomposition; free radicals; gas phase; hydrocarbons; hydrogen; nitrogen; oxygen; rate of reaction; sulfur.

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19. SECURITY CLASS (THIS REPORT)	21. NO. OF PRINTED PAGES
UNCLASSIFIED	119
20. SECURITY CLASS (THIS PAGE)	**22. Price**
UNCLASSIFIED	$4.25

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