NATIONAL BUREAU OF STANDARDS REPORT

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NINTH PRELIMINARY REPORT ON
A SURVEY OF THERMODYNAMIC PROPERTIES OF THE
COMPOUNDS OF THE ELEMENTS CHNOPS

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U. S. DEPARTMENT OF COMMERCE
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FOREWORD

A study at the National Bureau of Standards (NBS), of which this is the ninth progress report, has been undertaken to meet the need of the National Aeronautics and Space Administration (NASA) for thermodynamic information on biologically related materials important to the space program for several reasons. Among these reasons are the necessity of inferring the maximum amount of useful chemistry of incompletely accessible environments, for which only limited information is available, the possibility of the occurrence of organic compounds naturally synthesized under primitive conditions, and the possibility of theoretically recovering part of the prebiological history of the earth.

This program is being carried out under the technical supervision of Dr. George Jacobs of NASA, and with the consultation of Dr. Harold Morowitz of the Yale University, Department of Molecular Biology and Biophysics, and Dr. C. W. Beckett of the Heat Division, Institute for Basic Standards (NBS). The contract (Contract No. R-138) was initiated 1 May 1964 and extended 29 April 1965. The program was extended by Amendment 1 for an additional year, beginning 1 July 1965. This report covers the final quarter of the extended contract. An extension of this work is being carried out under Amendment 2, beginning 1 October, 1966.

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Section I

Vaporization and Vapor Pressure of Amino Acids. II.

George T. Furukawa and Martin L. Reilly

Literature survey of the vapor pressures of amino acids and related substances has been continued. The first report concerning the vaporization properties of amino acids was made 1 February 1966 [1][a], at which time the only significant data found were on glycine. Since then data from a recent publication on the vapor pressure of thirteen amino acids have been analyzed. This report supplements the earlier report with some revisions of the results on glycine.

Recently, Svec and Clyde [2] reported vapor-pressure measurements on thirteen α-amino acids in the range 435 to 485°K obtained by means of the Knudsen cell effusion method. The pressures reported are, however, as much as about two orders of magnitude smaller than the sublimation pressures observed by Gross and Grodsky [3] on a number of amino acids, and the vapor pressures reported by Takagi, Chihara, and Seki [4] on α-glycine. Although Svec and Clyde [2] measured the vapor pressure of a large number of amino acids, the number of observations and temperature range are limited. Large standard deviations are, therefore, expected to be encountered with such data. The data of Svec and Clyde [2] also showed large scatter and the precision indicated by the authors seemed rather optimistic. Their data were, therefore, re-evaluated by the method of least squares using the usual relation

$$\ell n p = B + A/T,$$

based on the Clausius-Clapeyron equation.

The standard deviations of the slope and intercept were calculated according to method FI, described by Natrella [5], where the variable x (in this case 1/T) is relatively more accurate than y (in this case log p). The results of the calculation are given in Table 1.

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[a] Figures in brackets indicate literature references listed at the end of this chapter.

Table 1

Change in Thermodynamic Quantities on Sublimation
at 455°K for Some α-Amino Acids
Analysis of the Data of Svec and Clyde [2]

Amino Acid	ΔH kcal/mol	ΔS cal/deg-mol	ΔG kcal/mol
glycine	32.55 ±1.28	53.09 ±2.78	8.40 ±0.04
	30.57 ±0.66[a]	61.58 ±1.57[a]	4.70 ±0.02
ℓ-alanine	33.20 ±2.20	54.95 ±4.76	8.20 ±0.06
ℓ-α-amino-n-butyric acid	41.56 ±2.39	74.70 ±5.27	7.58 ±0.06
dℓ-norvaline	28.57 ±0.40	45.51 ±0.89	7.87 ±0.01
dℓ-norleucine	27.44 ±1.55	42.13 ±3.43	8.27 ±0.09
isoleucine	27.68 ±2.01	44.31 ±4.45	7.53 ±0.07
cycloleucine	27.96 ±1.11	44.60 ±2.44	7.68 ±0.05
α-amino-isobutyric acid	29.34 ±1.91	48.75 ±4.27	7.17 ±0.08
ℓ-valine	39.00 ±1.00	69.39 ±2.24	7.44 ±0.03
ℓ-leucine	35.85 ±1.93	61.09 ±4.26	8.06 ±0.05
ℓ-methionine	29.87 ±2.12	44.76 ±4.47	9.50 ±0.07
ℓ-phenylalanine	36.10 ±1.49	59.62 ±3.24	8.98 ±0.04
ℓ-proline	24.26 ±3.02	36.63 ±6.63	7.60 ±0.15

[a]Values at 420°K, Takagi, Chihara, and Seki [4]

The figures following the ± symbols are standard deviations calculated, therefore, for ΔG by

$$S_{\Delta G} = S_y = \left\{\frac{\Sigma \delta_i^2}{(k-2)}\right\}^{\frac{1}{2}} ,$$

for ΔH by

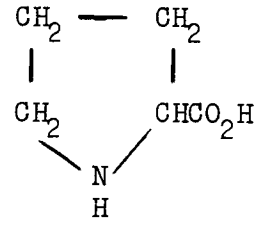
$$S_{\Delta H} = \left\{\frac{S_y^2}{\Sigma x_i^2 - (\Sigma x_i)^2/k}\right\}^{\frac{1}{2}} ,$$

and for ΔS by

$$S_{\Delta S} = \left\{\frac{S_y^2 \Sigma x_i^2}{k\Sigma x_i^2 - (\Sigma x_i)^2}\right\}^{\frac{1}{2}}$$

δ_i is the deviation of the experimental value from the "least squared" value and k the number of observations. The standard devlation obtained for ΔH and ΔS are in most cases about an order of magnitude greater than those given by Svec and Clyde [2]. The values of ΔH, ΔS, and ΔG are, however, fairly close in most of the cases.

These results show, as to be expected, that the heats of vaporization are relatively higher in comparison with hydrocarbons (about 10 to 15 kcal/mol) of similar molecular weight. The relatively low value (24.26 kcal/mol) for ℓ-proline seems consistent with its tightly assembled structure:



The lower heat of vaporization of the branched isomer over the normal amino acid (α-amino-isobutyric acid over α-amino-n-butyric acid) is also consistent with the observations found with hydrocarbons.

In the case of glycine the temperature ranges of measurements by Takagi, Chihara, and Seki [4] and Svec and Clyde [2] are sufficiently close to make direct comparison. The difference of about two orders of magnitude or more in the vapor pressure (Takagi, et al give 1.344×10^{-3} mm Hg at 412°K, while Svec and Clyde give 0.0587×10^{-3} mm Hg at 453°K) seems a rather high discrepancy considering both groups of investigators used the same Knudsen method. The 2 kcal/mol difference in the heat of vaporization and the corresponding 3.8 kcal/mol difference in $T\Delta S$ are larger than the standard deviation of either set of measurements. Considering these discrepancies additional measurements are needed with careful attention to purity, crystalline state, and the nature of the vapor species of the sample under investigation.

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Section II

Selected Values of Properties of Benzene, Naphthalene, Anthracene, and Phenanthrene

Iva Halow

Benzene (liq)

The heat of combustion of C_6H_6(liq), $\Delta H_c°$ = -780.98 kcal/mole at 25°C was taken from the API tables [1]. The heat of formation calculated from it is $\Delta Hf°$ C_6H_6(liq) = 11.73 kcal/mole.

The heat capacity at 25°C, $C_p°$ = 32.52 cal/mole degree and entropy S° = 41.41 cal/mole degree were taken from the low-temperature heat capacity measurements of Oliver, Eaton, and Huffman [2].

Benzene (g)

The heat of formation of C_6H_6(g) was calculated from the value for the liquid as $\Delta Hf°$ C_6H_6(g) = 19.83 kcal/mole. The ideal heat of vaporization, $\Delta H°$ = 8.10 kcal/mole was calculated from the value ΔH_v = 8.09 kcal/mole at 25°C given in the API tables [3].

The entropy of vaporization was calculated from the heat of vaporization as ΔS = 27.14 cal/mole degree. Corrected to standard state, this becomes $\Delta S°$ = 23.04 cal/mole degree. From this the entropy of the gas is calculated as S° = 64.45 cal/mole degree.

The thermal functions were calculated with the molecular data of B. P. Stoicheff [4] and Lord and Andrews [5].

Naphthalene (c)

The heat of combustion of naphthalene (c) has been measured by numerous investigators, as follows: (Corrected values for the standard heat of formation, $\Delta Hf°$ $C_{10}H_8$(c), at 25°C in kcal/mole, are given in each case.) Prosen and Colomina [6], 17.78; Verkade and Coops [7], 17.93; W. Swietoslawski [8], 17.90; Speros and Rossini [9], 18.76; Coleman and Pilcher [10], 18.58; Mackle and O'Hare [11], 16.43; M. Beckers [12], 17.49; L. J. P. Keffler [13], 17.38; Karrer and Fioroni [14], 17.51; Stohmann, Kleber and Langbein [15], 19.87 (measured at constant volume) and 21.22 (measured at constant pressure); H. C. Dickinson [16], 18.87; Huffman and Ellis [17], 16.58; Bender and Farber [18], 16.01; Fischer and Wrede [19], 19.25; Milone and Rossignoli [20], 19.78; Roth and Auwers [21], 20.42; Schläpfer and Fioroni [22], 17.73; and F. Wrede [23], 20.65.

Measurements of the heat of combustion of naphthalene (c) were also reported by Berthelot and Louguinine [24]; Berthelot and Recoura [25]; Berthelot and Vieille [26]; Riiber and Schetelig [27]; C. v. Rechenberg [28]; F. Stohmann [29]; [30]; and M. Rubner [31]. We have selected as "best" value, $\Delta Hf°\ C_{10}H_8(c)$ = 18.0 kcal/mole. The value for the heat of combustion of naphthalene relative to that of benzoic acid was well-established by various experimenters as 1.5202 - 1.5204, as discussed by P. E. Verkade [32]; Verkade, Coops, and Hartman [33]; Swietoslawski and Starczewska [34]; and W. Swietoslawski [35]. If we take the value 1.5204 and the presently accepted value for benzoic acid (ΔU_b = -26434 j/g at 25°C), we obtain $\Delta Hf°\ C_{10}H_8(c)$ = 17.76 kcal/mole, which confirms our selected value. Although naphthalene is readily obtained pure, its vaporization presents a problem in combustion. Two methods used to overcome this difficulty are enclosing the sample or determining the amount of reaction from the mass of CO_2 formed.

The heat capacity and entropy were taken from the low-temperature heat capacity measurements of McCullough, Finke, Messerly, Todd, Kincheloe, and Waddington [36].

Naphthalene (g)

The sublimation pressures of naphthalene have been measured by Bradley and Cleasby [37] from 8° to 17°C; Sherwood and Bryant [38] from 0° to 38°C; G. A. Miller [39] from -13° to -43°C; A. A. Zil'berman-Granovskaya [40] from 15° to 32°C; Swan and Mack [41] from 10° to 30°C; Winstrom and Kulp [42] from 30° to 60°C; R. W. Allen [43] from 0° to 75°C; Hoyer and Peperle [44] from -20° to 10°C; A. Aihara [45] from 2° to 10°C; Sears and Hopke [46] from 19° to 35°C; and Sklyarenko, Martin and Belyaeva [47] from 20° to 35°C. When plotted individually as log P vs 1/T, these sets of data show generally poor agreement, but when considered totally, they show good agreement, lying very well on a straight line. We have used a least-squares treatment of the vapor pressure data, and obtained the heat of sublimation, $\Delta H_s°$ = 17.61 kcal/mole at 25°C. This gives the heat of formation of the gas, $\Delta Hf°\ C_{10}H_8(g)$ = 35.61 kcal/mole.

The entropy of vaporization, ΔS = 59.06 cal/mole degree was corrected for gas compression to obtain $\Delta S°$ = 40.89 cal/mole degree. The entropy of the gas calculated from this is $S°_g$ = 80.90 cal/mole degree.

McClellan and Pimentel [48] calculated the thermal functions. The entropy at 298°K which they calculated, $S°_g$ = 80.4 cal/mole degree was selected in preference to the experimental one because the correction to standard state is very sensitive to changes in the pressure.

Anthracene (c)

The heat of combustion of anthracene (c) has been measured by the following investigators: (Corrected values for the standard heat of formation at 25°C, $\Delta Hf°$ $C_{14}H_{10}(c)$, are given in each case). Mackle and O'Hare [11], 27.83; M. Beckers [12], 27.51; Parks, West, Naylor, Fujii and McClaine [49], 25.69; Richardson and Parks [50], 27.28; Coleman and Pilcher [10], 30.87; Bender and Farber [51], 28.93; 30.84; Fries, Walter and Schilling [52], 32.53; Milone and Rossignoli [20], 30.39; Magnus, Hartmann, and Becker [53], 31.60; and G. Klaproth [54], 31.13. Measurements have been made also by Berthelot and Vieille [26]; Shchukarev and Shchukareva [55]; C. v. Rechenberg [28]; F. Stohmann [29]; and Stohmann, Kleber, and Langhein [15]. Discrepancies in these values are greater than expected precision errors in the determinations. A major cause of these differences may be the lack of purity of sample. We have selected $\Delta Hf°$ $C_{14}H_{10}(c)$ = 27.5 kcal/mole.

The specific heat of anthracene (c) has been measured by Huffman, Parks, and Barmore [56], and Ueberreiter and Orthmann [57]. Their data give the values 49.73 and 50.80 cal/mole degree, respectively for the heat capacity at 25°C. We have selected $Cp°$ = 50. cal/mole degree.

Anthracene (g)

Sublimination pressures have been measured by Bradley and Cleasby [37] in the range 65° to 80°C; B. Stevens [58] from 123° to 148°C; V. P. Klochkov [59] from 93° to 142°C; Inokuchi, Shita, Handa, and Akamatu [60] in a range with a mean temperature of 92°C; Sears and Hopke [46] from 105° to 125°C; Nitta, Seki, and Momotani [61] from 76° to 100°C; Kelly and Rice [62] from 69° to 86°C; and Hoyer and Peperle [44] from 30° to 100°C. These data lead to the following respective values for the heat of sublimation at 25°C, $\Delta H_s°$ = 24.68; 24.11; 24.73; 22.51; 23.97; 23.23; 23.91; and 24.99 kcal/mole. We have selected $\Delta H_s°$ = 24.7 kcal/mole. The heat of formation of the gas is calculated from this as $\Delta Hf°$ $C_{14}H_{10}(g)$ = 52.2 kcal/mole.

Phenanthrene (c)

The heat of combustion of phenanthrene (c) has been measured by the following investigators: (Corrected values for the standard heat of formation at 25°C, $\Delta Hf°$ $C_{14}H_{10}(c)$, are listed in each case). Richardson and Parks [50], 17.48; Bender and Farber [51], 27.13; Fries, Walter and Schilling [52], 27.80; Magnus, Hartmann, and Becker [53], 26.73; Milone and Rossignoli [20], 19.11; Coleman and Pilcher [10], 27.77; and G. Klaproth [54], 26.09. Measurements have also been made by Berthelot and Vieille [26]; Shchukarev and Shchukareva [55]; and Stohmann, Kleber, and Langbein [15]. As for anthracene (c), phenanthrene is not easily obtained in a pure state. The value which we have selected, $\Delta Hf°$ $C_{14}H_{10}(c)$ = 24. kcal/mole was derived from the value selected for anthracene and the differences obtained for anthracene and phenanthrene by Magnus, Hartmann, and Becker, Bender and Farber, and Coleman and Pilcher.

The specific heat of phenanthrene (c) has been measured by J. Eibert [63], W. R. Schmidt [64], Ueberreiter and Orthmann [57], Rastogi and Bassi [65] and Huffman, Parks, and Barmore [56]. Their data give the heat capacity at 25°C, C_p = 49.34; 53.86; 50.00; 52.99; and 55.97 cal/mole degree, respectively. We have selected $C_p°$ = 50. cal/mole degree.

Phenanthrene (g)

Sublimation pressures have been measured by Bradley and Cleasby [37], from 36° to 50°C; Inokuchi, Shiba, Handa, and Akamatu [60] in a range with a mean temperature of 42°C; and Hoyer and Peperle [44] from 0° to 60°C. These data give the values, $\Delta H_s°$ = 21.11; 21.81; and 22.94 kcal/mole at 25°C, respectively. We have selected the value $\Delta H_s°$ = 21.1 kcal/mole. This gives the heat of formation, $\Delta Hf°$ $C_{14}H_{10}(g)$ = 45.1 kcal/mole.

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SELECTED VALUES OF CHEMICAL THERMODYNAMIC PROPERTIES - SERIES I

National Bureau of Standards — Washington, D. C.

Enthalpy and Gibbs Energy of Formation; Entropy and Heat Capacity

Table

Substance				ΔHf°_0	ΔHf°	ΔGf°	$H^\circ_{298} - H^\circ_0$	S°	C_p°
Formula and Description		State	Formula Weight	0 °K	298.15 °K (25 °C)				
				kcal/mol				cal/deg mol	
C_6H_6	Benzene	liq	78.1147		11.73	29.75		41.41	32.52
		g		24.001	19.83	30.98	3.406	64.45	19.28
$C_{10}H_8$	Naphthalene	c	128.1753	22.68	18.0	47.4	5.925	40.01	39.60
		g		41.125	35.61	52.96	5.09	80.4	32.1
$C_{14}H_{10}$	Anthracene	c	178.2358		27.5				50.
		g			52.2				
$C_{14}H_{10}$	Phenanthrene	c	178.2358		24.				50.
		g			45.1				

Section III

Tables of Thermodynamic Functions for Nineteen Amino Acids plus Furan and Urea

G. T. Furukawa, M. L. Reilly, G. D. Mitchell
E. S. Domalski, and Iva Halow

The heat capacity data on nineteen amino acids, plus furan and urea have been examined and analyzed on the IBM 7040 computer. (Some of the data were on the hydrates and hydrochlorides of the amino acids.) Thermodynamic properties were calculated from the smoothed values of heat capacity and table prepared from 0° to 300°K.

The data for the amino acids were obtained from the references listed below as follows: Glycine [7,10], L-Alanine [10], L-Valine [11], L-Leucine [11], L-Isoleucine [11], L-Tyrosine [12,13], L-Phenylalanine [13], L-Tryptophane [13], L-Aspartic Acid [14,15], L-Asparagine Monohydrate [14,15], L-Glutamic Acid [15], L-Glutamine [15], L-Lysine Hydrochloride [16], L-Arginine Hydrochloride [16], L-Histidine Hydrochloride [16], L-Cystine [5,17], and L-Proline [13,18]. Additional remarks on ℓ-Serine, ℓ-Methionine, Furan, and Urea are given below.

ℓ-Serine, $HOCH_2CH(NH_2)COOH$, 105.09414

Hutchens, Cole, and Stout (11-302°K) [6] reported heat-capacity measurements on ℓ-serine. The thermodynamic properties given in table 18 are based on the data obtained by Hutchens, et al. No heat of combustion measurements have apparently been available at the time (1964). Hutchens, et al. estimated from structural factors $\Delta H_f^\circ(298°K) = -173.60$ kcal mol^{-1} and calculated $\Delta G_f^\circ(298°K) = -121.6$ kcal mol^{-1}. The value of entropy obtained in table 18 for ℓ-serine yields the same result for $\Delta G_f^\circ(298°K)$.

ℓ-Methionine, $CH_3SCH_2CH_2CH(NH_2)COOH$, 149.21292

Hutchens, Cole, and Stout (11-348°K) [5] determined the heat capacity of ℓ-methionine. A transition is shown that extends approximately from 180°K to 350°K with the heat capacity maximum at 305.5°K. Hutchens, et al. estimated the entropy of this transition to be 4.2 cal deg^{-1} mol^{-1} ($\sim R \ln 8$). Table 19 is based on the data reported by Hutchens, et al.

Furan, CHCHCHCHO, 68.07588

Heat-capacity measurements on furan were reported by Guthrie, et al. (12-300°K) [3]. The measurements shown a λ-point at 56°K, a first-order solid-phase transition at 150°K, and a melting point at 187.55°K. The thermodynamic properties given in table 20 are based on the data obtained by Guthrie, et al. The same authors determined $\Delta H_f^\circ(298°K)(\ell) = -14.90$ kcal mol^{-1} and $\Delta H_f^\circ(298°K)(g) = -8.29$ kcal mol^{-1} from heats of combustion measurements. From statistical thermodynamic calculations, based on rigid-rotator, harmonic-oscillator approximation, and the calorimetric data Guthrie, et al. obtained ΔH_f° and ΔG_f° for gaseous furan up to 1500°K. The following are some of the values that were reported:

T °K	$-\Delta H_f^\circ$ kcal/mol	ΔG_f° kcal/mol
298	8.293	0.208
400	9.191	3.258
500	9.872	6.452
800	11.13	16.61

In a more recent paper, Blinc and Pahor [1] described statistical thermodynamic calculations based on new molecular data. Values of C_p° are shown to be slightly lower than those obtained by Guthrie, et al.

Urea, NH_2CONH_2, 60.05583

Measurements of the heat capacity of urea have been reported by the following:

a. Gibson, Latimer, and Parks (86-300°K) [2]
b. Parks, Huffman, and Barmore (93-298°K) [7]
c. Ruehrwein and Huffman (19-318°K) [8]

The more extensive data of Ruehrwein and Huffman were analyzed to obtain the thermodynamic properties given in table 21. Using Huffman's [4] heat of combustion data, Ruehrwein and Huffman obtained $\Delta H_f^\circ(298°K) = -79.634$ kcal mol^{-1} and $\Delta G_f^\circ(298°K) = -47.118$ kcal mol^{-1}. The $S^\circ(298°K)$ of table 21 and appropriate recent thermodynamic data yield essentially the same $\Delta G_f^\circ(298°K)$ as obtained by Ruehrwein and Huffman. The National Bureau of Standards Technical Note 270-1 [9] gives $\Delta H_f^\circ(298°K) = -79.56$ and $\Delta G_f^\circ(298°K) = -47.04$ kcal mol^{-1}.

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List of Tables of Nineteen Amino Acids plus Furan and Urea

Table	Compound	State
1	Glycine (NH_2CH_2COOH)	Solid
2	L-Alanine ($CH_3(NH_2)CHCOOH$)	"
3	L-Valine ($(CH_3)_2CH(NH_2)CHCOOH$)	"
4	L-Leucine ($(CH_3)_2CHCH_2(NH_2)CHCOOH$)	"
5	L-Isoleucine ($(CH_3)(C_2H_5)CH(NH_2)CHCOOH$)	"
6	L-Tyrosine ($HOC_6H_4CH_2(NH_2)CHCOOH$)	"
7	L-Phenylalanine ($C_6H_5CH_2(NH_2)CHCOOH$)	"
8	L-Tryptophane ($C_8H_6NCH_2(NH_2)CHCOOH$)	"
9	L-Aspartic Acid ($HOOCCH_2(NH_2)CHCOOH$)	"
10	L-Asparagine Monohydrate ($NH_2COCH_2(NH_2)CHCOOH \cdot H_2O$)	"
11	L-Glutamic Acid ($HOOC(CH_2)_2CHCOOH$)	"
12	L-Glutamine ($NH_2CO(CH_2)_2(NH_2)CHCOOH$)	"
13	L-Lysine Hydrochloride ($(CNH_3C\ell)(CH_2)_4(NH_2)CHCOOH$)	"
14	L-Arginine Hydrochloride ($NH_2C(=NH_2C\ell)NH(CH_2(NH_2)CHCOOH$	"

List of Tables (Cont'd.)

TABLE 1

MOLAL THERMODYNAMIC PROPERTIES FOR GLYCINE

(NH_2CH_2COOH)

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 75.06765 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-8.120	-126.22	-423.34	-127.88	-88.09	-295.45

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.007	0.009	0.002	0.002	0.003	0.001
10.00	0.064	0.155	0.015	0.021	0.050	0.005
15.00	0.232	0.832	0.055	0.073	0.266	0.018
20.00	0.570	2.765	0.138	0.182	0.876	0.044
25.00	1.067	6.803	0.272	0.360	2.203	0.088
30.00	1.682	13.634	0.454	0.608	4.594	0.153
35.00	2.377	23.757	0.679	0.918	8.384	0.240
40.00	3.108	37.459	0.936	1.283	13.868	0.347
45.00	3.855	54.863	1.219	1.692	21.290	0.473
50.00	4.600	76.010	1.520	2.137	30.850	0.617
55.00	5.317	100.81	1.833	2.609	42.707	0.776
60.00	6.010	129.14	2.152	3.102	56.978	0.950
65.00	6.671	160.86	2.475	3.609	73.752	1.135
70.00	7.284	195.77	2.797	4.127	93.089	1.330
75.00	7.862	233.65	3.115	4.649	115.03	1.534
80.00	8.421	274.36	3.430	5.174	139.58	1.745
85.00	8.957	317.82	3.739	5.701	166.77	1.962
90.00	9.450	363.85	4.043	6.227	196.59	2.184
95.00	9.903	412.25	4.339	6.750	229.04	2.411
100.00	10.330	462.84	4.628	7.269	264.09	2.641
105.00	10.752	515.55	4.910	7.784	301.72	2.874
110.00	11.170	570.36	5.185	8.293	341.92	3.108
115.00	11.565	627.20	5.454	8.799	384.65	3.345
120.00	11.943	685.98	5.716	9.299	429.90	3.582
125.00	12.315	746.62	5.973	9.794	477.63	3.821
130.00	12.686	809.13	6.224	10.284	527.83	4.060
135.00	13.051	873.47	6.470	10.770	580.47	4.300
140.00	13.402	939.61	6.712	11.251	635.52	4.539
145.00	13.742	1007.5	6.948	11.727	692.97	4.779
150.00	14.078	1077.0	7.180	12.199	752.79	5.019
155.00	14.411	1148.2	7.408	12.666	814.95	5.258
160.00	14.737	1221.1	7.632	13.128	879.44	5.496
165.00	15.061	1295.6	7.852	13.587	946.23	5.735
170.00	15.387	1371.7	8.069	14.041	1015.3	5.972
175.00	15.710	1449.5	8.283	14.492	1086.6	6.209
180.00	16.027	1528.8	8.493	14.939	1160.2	6.446
185.00	16.338	1609.7	8.701	15.382	1236.0	6.681
190.00	16.650	1692.2	8.906	15.822	1314.0	6.916
195.00	16.965	1776.2	9.109	16.259	1394.2	7.150
200.00	17.281	1861.9	9.309	16.692	1476.6	7.383
205.00	17.592	1949.0	9.508	17.123	1561.2	7.615
210.00	17.898	2037.8	9.704	17.551	1647.8	7.847
215.00	18.201	2128.0	9.898	17.975	1736.7	8.077
220.00	18.505	2219.8	10.090	18.397	1827.6	8.307
225.00	18.815	2313.1	10.280	18.816	1920.6	8.536
230.00	19.133	2407.9	10.469	19.233	2015.7	8.764
235.00	19.457	2504.4	10.657	19.648	2113.0	8.991
240.00	19.788	2602.5	10.844	20.062	2212.2	9.218
245.00	20.122	2702.3	11.030	20.473	2313.6	9.443
250.00	20.458	2803.7	11.215	20.883	2417.0	9.668
255.00	20.795	2906.9	11.400	21.291	2522.4	9.892
260.00	21.133	3011.7	11.583	21.698	2629.9	10.115
265.00	21.472	3118.2	11.767	22.104	2739.4	10.337
270.00	21.811	3226.4	11.950	22.509	2850.9	10.559
273.15	22.023	3295.5	12.065	22.763	2922.2	10.698
275.00	22.148	3336.3	12.132	22.912	2964.5	10.780
280.00	22.482	3447.9	12.314	23.314	3080.0	11.000
285.00	22.814	3561.1	12.495	23.715	3197.6	11.220
290.00	23.144	3676.0	12.676	24.114	3317.2	11.439
295.00	23.475	3792.6	12.856	24.513	3438.7	11.657
298.15	23.687	3866.9	12.969	24.763	3516.3	11.794
300.00	23.814	3910.8	13.036	24.910	3562.3	11.874

TABLE 2

MOLAL THERMODYNAMIC PROPERTIES FOR L-ALANINE

($CH_3(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 89.09474 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-11.518	-133.96	-449.30	-154.34	-87.94	-294.95

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.085	0.109	0.022	0.029	0.037	0.007
10.00	0.597	1.592	0.159	0.215	0.557	0.056
15.00	1.518	6.786	0.452	0.623	2.566	0.171
20.00	2.586	16.993	0.850	1.203	7.075	0.354
25.00	3.776	32.864	1.315	1.907	14.805	0.592
30.00	5.004	54.807	1.827	2.704	26.298	0.877
35.00	6.252	82.945	2.370	3.569	41.954	1.199
40.00	7.466	117.26	2.931	4.483	62.066	1.552
45.00	8.657	157.57	3.502	5.431	86.841	1.930
50.00	9.822	203.79	4.076	6.404	116.42	2.328
55.00	10.947	255.72	4.650	7.393	150.91	2.744
60.00	12.037	313.20	5.220	8.393	190.37	3.173
65.00	13.103	376.06	5.786	9.399	234.85	3.613
70.00	14.103	444.12	6.345	10.407	284.36	4.062
75.00	15.064	517.04	6.894	11.413	338.91	4.519
80.00	16.050	594.82	7.435	12.416	398.48	4.981
85.00	17.027	677.53	7.971	13.419	463.07	5.448
90.00	17.911	764.91	8.499	14.417	532.67	5.919
95.00	18.728	856.52	9.016	15.408	607.23	6.392
100.00	19.533	952.18	9.522	16.389	686.73	6.867
105.00	20.336	1051.8	10.018	17.362	771.11	7.344
110.00	21.130	1155.5	10.505	18.326	860.33	7.821
115.00	21.896	1263.1	10.983	19.282	954.36	8.299
120.00	22.620	1374.4	11.453	20.230	1053.1	8.776
125.00	23.321	1489.3	11.914	21.167	1156.6	9.253
130.00	24.029	1607.6	12.366	22.096	1264.8	9.729
135.00	24.736	1729.6	12.812	23.016	1377.6	10.204
140.00	25.418	1855.0	13.250	23.928	1494.9	10.678
145.00	26.078	1983.7	13.681	24.831	1616.8	11.151
150.00	26.732	2115.7	14.105	25.726	1743.2	11.622
155.00	27.384	2251.0	14.523	26.614	1874.1	12.091
160.00	28.028	2389.6	14.935	27.493	2009.4	12.559
165.00	28.661	2531.3	15.341	28.365	2149.0	13.024
170.00	29.288	2676.2	15.742	29.230	2293.0	13.488
175.00	29.908	2824.1	16.138	30.088	2441.3	13.950
180.00	30.519	2975.2	16.529	30.939	2593.9	14.410
185.00	31.120	3129.3	16.915	31.784	2750.7	14.869
190.00	31.711	3286.4	17.297	32.622	2911.7	15.325
195.00	32.296	3446.4	17.674	33.453	3076.9	15.779
200.00	32.877	3609.3	18.047	34.278	3246.2	16.231
205.00	33.461	3775.2	18.416	35.097	3419.7	16.681
210.00	34.053	3944.0	18.781	35.910	3597.2	17.129
215.00	34.652	4115.7	19.143	36.719	3778.8	17.576
220.00	35.257	4290.5	19.502	37.522	3964.4	18.020
225.00	35.865	4468.3	19.859	38.321	4154.0	18.462
230.00	36.477	4649.2	20.214	39.116	4347.6	18.902
235.00	37.095	4833.1	20.566	39.907	4545.1	19.341
240.00	37.715	5020.1	20.917	40.695	4746.6	19.778
245.00	38.335	5210.2	21.266	41.479	4952.1	20.213
250.00	38.952	5403.5	21.614	42.259	5161.4	20.646
255.00	39.565	5599.7	21.960	43.037	5374.7	21.077
260.00	40.176	5799.1	22.304	43.811	5591.8	21.507
265.00	40.790	6001.5	22.647	44.582	5812.8	21.935
270.00	41.409	6207.0	22.989	45.350	6037.6	22.361
273.15	41.802	6338.1	23.204	45.833	6181.2	22.629
275.00	42.035	6415.6	23.330	46.116	6266.3	22.786
280.00	42.669	6627.4	23.669	46.879	6498.7	23.210
285.00	43.313	6842.3	24.008	47.640	6735.0	23.632
290.00	43.967	7060.5	24.347	48.399	6975.1	24.052
295.00	44.630	7282.0	24.685	49.156	7219.0	24.471
298.15	45.050	7423.3	24.898	49.632	7374.6	24.735
300.00	45.296	7506.8	25.023	49.912	7466.7	24.889

TABLE 3

MOLAL THERMODYNAMIC PROPERTIES FOR VALINE

($(CH_3)_2CH(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.=117.14892 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-30.559	-148.2	-497.06	-207.67	-86.3	-289.45

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.031	0.039	0.008	0.010	0.013	0.003
10.00	0.248	0.627	0.063	0.084	0.210	0.021
15.00	0.772	3.046	0.203	0.273	1.044	0.070
20.00	1.580	8.830	0.441	0.600	3.168	0.158
25.00	2.556	19.125	0.765	1.055	7.258	0.290
30.00	3.629	34.554	1.152	1.615	13.895	0.463
35.00	4.742	55.484	1.585	2.258	23.547	0.673
40.00	5.848	81.955	2.049	2.963	36.578	0.914
45.00	6.949	113.95	2.532	3.716	53.259	1.184
50.00	8.027	151.41	3.028	4.504	73.796	1.476
55.00	9.049	194.12	3.529	5.317	98.342	1.788
60.00	10.060	241.89	4.031	6.148	127.00	2.117
65.00	11.033	294.65	4.533	6.992	159.85	2.459
70.00	11.930	352.09	5.030	7.843	196.93	2.813
75.00	12.829	413.98	5.520	8.697	238.28	3.177
80.00	13.756	480.44	6.005	9.554	283.91	3.549
85.00	14.649	551.47	6.488	10.415	333.83	3.927
90.00	15.486	626.83	6.965	11.277	388.06	4.312
95.00	16.272	706.24	7.434	12.135	446.59	4.701
100.00	17.031	789.51	7.895	12.989	509.40	5.094
105.00	17.792	876.56	8.348	13.838	576.48	5.490
110.00	18.539	967.40	8.795	14.683	647.78	5.889
115.00	19.257	1061.9	9.234	15.523	723.30	6.290
120.00	19.949	1159.9	9.666	16.358	803.01	6.695
125.00	20.627	1261.4	10.091	17.186	886.87	7.095
130.00	21.308	1366.2	10.509	18.008	974.86	7.499
135.00	21.989	1474.4	10.922	18.825	1066.9	7.903
140.00	22.638	1586.0	11.329	19.637	1163.1	8.308
145.00	23.246	1700.7	11.729	20.442	1263.3	8.712
150.00	23.841	1818.5	12.123	21.240	1367.5	9.117
155.00	24.446	1939.2	12.511	22.031	1475.7	9.521
160.00	25.060	2062.9	12.893	22.817	1587.8	9.924
165.00	25.678	2189.8	13.271	23.598	1703.8	10.326
170.00	26.293	2319.7	13.645	24.373	1823.8	10.728
175.00	26.890	2452.7	14.015	25.144	1947.6	11.129
180.00	27.455	2588.6	14.381	25.910	2075.2	11.529
185.00	27.993	2727.2	14.742	26.669	2206.7	11.928
190.00	28.519	2868.5	15.097	27.423	2341.9	12.326
195.00	29.045	3012.4	15.448	28.171	2480.9	12.722
200.00	29.577	3158.9	15.795	28.913	2623.6	13.118
205.00	30.116	3308.2	16.137	29.650	2770.0	13.512
210.00	30.663	3460.1	16.477	30.382	2920.1	13.905
215.00	31.218	3614.8	16.813	31.110	3073.8	14.297
220.00	31.771	3772.3	17.147	31.834	3231.2	14.687
225.00	32.316	3932.5	17.478	32.554	3392.1	15.076
230.00	32.851	4095.4	17.806	33.270	3556.7	15.464
235.00	33.379	4261.0	18.132	33.982	3724.8	15.850
240.00	33.908	4429.2	18.455	34.691	3896.5	16.235
245.00	34.444	4600.1	18.776	35.395	4071.7	16.619
250.00	34.992	4773.7	19.095	36.097	4250.5	17.002
255.00	35.550	4950.0	19.412	36.795	4432.7	17.383
260.00	36.115	5129.2	19.728	37.491	4618.4	17.763
265.00	36.680	5311.2	20.042	38.184	4807.6	18.142
270.00	37.238	5496.0	20.355	38.875	5000.2	18.519
273.15	37.584	5613.8	20.552	39.309	5123.4	18.757
275.00	37.787	5683.5	20.667	39.563	5196.3	18.896
280.00	38.331	5873.8	20.978	40.249	5395.9	19.271
285.00	38.876	6066.9	21.287	40.932	5598.8	19.645
290.00	39.430	6262.6	21.595	41.613	5805.2	20.018
295.00	39.993	6461.2	21.902	42.292	6015.0	20.390
298.15	40.351	6587.7	22.095	42.719	6148.8	20.623
300.00	40.561	6662.6	22.209	42.969	6228.1	20.760

TABLE 4

MOLAL THERMODYNAMIC PROPERTIES FOR L-LEUCINE

($(CH_3)_2CHCH_2(NH_2)CHCOOH$)

SOLID PHASE

.T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.=131.17601 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-19.318	-151.97	-509.71	-232.37	-82.69	-277.34

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.020	0.025	0.005	0.007	0.008	0.002
10.00	0.164	0.408	0.041	0.054	0.135	0.014
15.00	0.562	2.093	0.140	0.186	0.692	0.046
20.00	1.284	6.580	0.329	0.439	2.197	0.110
25.00	2.279	15.382	0.615	0.828	5.307	0.212
30.00	3.497	29.745	0.991	1.348	10.692	0.356
35.00	4.850	50.573	1.445	1.987	18.985	0.542
40.00	6.258	78.331	1.958	2.727	30.732	0.768
45.00	7.678	113.17	2.515	3.546	46.383	1.031
50.00	9.072	155.07	3.101	4.427	66.293	1.326
55.00	10.400	203.77	3.705	5.355	90.732	1.650
60.00	11.699	259.03	4.317	6.315	119.89	1.998
65.00	12.946	320.68	4.933	7.302	153.93	2.368
70.00	14.091	388.32	5.547	8.304	192.94	2.756
75.00	15.179	461.51	6.153	9.313	236.98	3.160
80.00	16.266	540.13	6.752	10.328	286.08	3.576
85.00	17.312	624.10	7.342	11.345	340.26	4.003
90.00	18.287	713.13	7.924	12.363	399.53	4.439
95.00	19.185	806.83	8.493	13.376	463.88	4.883
100.00	20.056	904.93	9.049	14.382	533.28	5.333
105.00	20.927	1007.4	9.594	15.382	607.69	5.788
110.00	21.787	1114.2	10.129	16.375	687.09	6.246
115.00	22.628	1225.2	10.654	17.362	771.43	6.708
120.00	23.449	1340.4	11.170	18.343	860.70	7.172
125.00	24.255	1459.7	11.678	19.316	954.85	7.639
130.00	25.059	1583.0	12.177	20.283	1053.8	8.107
135.00	25.860	1710.3	12.669	21.244	1157.7	8.575
140.00	26.646	1841.6	13.154	22.199	1266.3	9.045
145.00	27.419	1976.7	13.633	23.147	1379.6	9.515
150.00	28.187	2115.7	14.105	24.090	1497.7	9.985
155.00	28.953	2258.6	14.572	25.027	1620.5	10.455
160.00	29.714	2405.3	15.033	25.958	1748.0	10.925
165.00	30.469	2555.7	15.489	26.884	1880.1	11.395
170.00	31.226	2710.0	15.941	27.805	2016.8	11.864
175.00	31.984	2868.0	16.388	28.721	2158.1	12.332
180.00	32.739	3029.8	16.832	29.632	2304.0	12.800
185.00	33.480	3195.3	17.272	30.539	2454.5	13.267
190.00	34.207	3364.6	17.708	31.442	2609.4	13.734
195.00	34.924	3537.4	18.140	32.340	2768.9	14.199
200.00	35.639	3713.8	18.569	33.233	2932.8	14.664
205.00	36.357	3893.8	18.994	34.122	3101.2	15.128
210.00	37.079	4077.4	19.416	35.007	3274.0	15.591
215.00	37.803	4264.6	19.835	35.888	3451.3	16.052
220.00	38.527	4455.4	20.252	36.765	3632.9	16.513
225.00	39.251	4649.9	20.666	37.639	3818.9	16.973
230.00	39.976	4847.9	21.078	38.510	4009.3	17.432
235.00	40.702	5049.6	21.488	39.377	4204.0	17.889
240.00	41.429	5254.9	21.896	40.242	4403.0	18.346
245.00	42.158	5463.9	22.302	41.103	4606.4	18.802
250.00	42.884	5676.5	22.706	41.962	4814.1	19.256
255.00	43.606	5892.7	23.109	42.819	5026.0	19.710
260.00	44.322	6112.6	23.510	43.672	5242.3	20.163
265.00	45.032	6336.0	23.909	44.523	5462.7	20.614
270.00	45.737	6562.9	24.307	45.372	5687.5	21.065
273.15	46.180	6707.6	24.557	45.905	5831.2	21.348
275.00	46.441	6793.3	24.703	46.217	5916.5	21.514
280.00	47.150	7027.3	25.097	47.061	6149.6	21.963
285.00	47.866	7264.8	25.491	47.901	6387.1	22.411
290.00	48.590	7506.0	25.883	48.740	6628.7	22.857
295.00	49.313	7750.7	26.274	49.577	6874.5	23.303
298.15	49.763	7906.8	26.519	50.103	7031.4	23.584
300.00	50.024	7999.1	26.664	50.412	7124.4	23.748

TABLE 5

MOLAL THERMODYNAMIC PROPERTIES FOR L-ISOLEUCINE

($(CH_3)_2(C_2H_5)CH(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.=131.17601 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-16.993	-151.8	-509.14	-233.33	-82.2	-275.69

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.116	0.144	0.029	0.038	0.048	0.010
10.00	0.896	2.293	0.229	0.306	0.770	0.077
15.00	2.393	10.371	0.691	0.941	3.740	0.249
20.00	3.947	26.248	1.312	1.843	10.622	0.531
25.00	5.495	49.850	1.994	2.890	22.410	0.896
30.00	6.995	81.102	2.703	4.026	39.673	1.322
35.00	8.434	119.72	3.420	5.213	62.755	1.793
40.00	9.742	165.21	4.130	6.426	91.849	2.296
45.00	10.991	217.04	4.823	7.646	127.03	2.823
50.00	12.200	275.06	5.501	8.867	168.31	3.366
55.00	13.310	338.86	6.161	10.083	215.69	3.922
60.00	14.402	408.14	6.802	11.288	269.12	4.485
65.00	15.459	482.82	7.428	12.483	328.55	5.055
70.00	16.429	562.57	8.037	13.664	393.93	5.628
75.00	17.390	647.12	8.628	14.831	465.17	6.202
80.00	18.383	736.55	9.207	15.985	542.21	6.778
85.00	19.328	830.85	9.775	17.128	625.00	7.353
90.00	20.212	929.72	10.330	18.258	713.47	7.927
95.00	21.092	1033.0	10.873	19.374	807.55	8.501
100.00	21.979	1140.7	11.407	20.478	907.19	9.072
105.00	22.838	1252.7	11.931	21.572	1012.3	9.641
110.00	23.674	1369.0	12.445	22.653	1122.9	10.208
115.00	24.514	1489.5	12.952	23.724	1238.8	10.772
120.00	25.341	1614.1	13.451	24.785	1360.1	11.334
125.00	26.169	1742.9	13.943	25.836	1486.7	11.893
130.00	27.025	1875.8	14.430	26.879	1618.5	12.450
135.00	27.898	2013.2	14.912	27.916	1755.5	13.003
140.00	28.763	2154.8	15.392	28.946	1897.6	13.554
145.00	29.606	2300.7	15.867	29.970	2044.9	14.103
150.00	30.444	2450.9	16.339	30.988	2197.3	14.649
155.00	31.296	2605.2	16.808	32.000	2354.8	15.192
160.00	32.159	2763.8	17.274	33.007	2517.3	15.733
165.00	33.019	2926.8	17.738	34.010	2684.8	16.272
170.00	33.871	3094.0	18.200	35.008	2857.4	16.808
175.00	34.721	3265.5	18.660	36.002	3034.9	17.342
180.00	35.576	3441.2	19.118	36.992	3217.4	17.874
185.00	36.442	3621.3	19.575	37.979	3404.8	18.404
190.00	37.316	3805.7	20.030	38.962	3597.2	18.933
195.00	38.191	3994.4	20.484	39.943	3794.4	19.459
200.00	39.065	4187.6	20.938	40.921	3996.6	19.983
205.00	39.942	4385.1	21.391	41.896	4203.6	20.506
210.00	40.825	4587.0	21.843	42.869	4415.6	21.026
215.00	41.713	4793.4	22.295	43.840	4632.3	21.546
220.00	42.600	5004.1	22.746	44.810	4854.0	22.063
225.00	43.489	5219.4	23.197	45.777	5080.4	22.580
230.00	44.383	5439.0	23.648	46.742	5311.7	23.094
235.00	45.287	5663.2	24.099	47.707	5547.9	23.608
240.00	46.200	5891.9	24.550	48.670	5788.8	24.120
245.00	47.120	6125.2	25.001	49.632	6034.5	24.631
250.00	48.042	6363.1	25.453	50.593	6285.1	25.140
255.00	48.964	6605.6	25.904	51.553	6540.5	25.649
260.00	49.884	6852.8	26.357	52.513	6800.6	26.156
265.00	50.800	7104.5	26.809	53.472	7065.6	26.663
270.00	51.712	7360.8	27.262	54.430	7335.4	27.168
273.15	52.286	7524.6	27.547	55.033	7507.8	27.486
275.00	52.623	7621.6	27.715	55.387	7609.9	27.672
280.00	53.540	7887.0	28.168	56.344	7889.2	28.176
285.00	54.468	8157.0	28.621	57.299	8173.3	28.678
290.00	55.409	8431.7	29.075	58.255	8462.2	29.180
295.00	56.360	8711.1	29.529	59.210	8755.9	29.681
298.15	56.958	8889.6	29.816	59.812	8943.3	29.996
300.00	57.307	8995.3	29.984	60.165	9054.3	30.181

TABLE 6

MOLAL THERMODYNAMIC PROPERTIES FOR L-TYROSINE

($HOC_6H_4CH_2(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.=181.19292 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-12.993	-163.4	-548.04	-229.28	-95.0	-318.63

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.035	0.044	0.009	0.012	0.015	0.003
10.00	0.279	0.697	0.070	0.093	0.232	0.023
15.00	0.913	3.503	0.234	0.312	1.175	0.078
20.00	1.854	10.336	0.517	0.699	3.634	0.182
25.00	3.003	22.386	0.895	1.232	8.402	0.336
30.00	4.323	40.655	1.355	1.894	16.166	0.539
35.00	5.712	65.734	1.878	2.664	27.523	0.786
40.00	7.079	97.732	2.443	3.517	42.948	1.074
45.00	8.413	136.47	3.033	4.428	62.789	1.395
50.00	9.705	181.80	3.636	5.382	87.299	1.746
55.00	10.880	233.30	4.242	6.363	116.65	2.121
60.00	12.017	290.55	4.842	7.358	150.95	2.516
65.00	13.107	353.39	5.437	8.364	190.25	2.927
70.00	14.120	421.49	6.021	9.373	234.59	3.351
75.00	15.112	494.57	6.594	10.381	283.98	3.786
80.00	16.093	572.59	7.157	11.387	338.40	4.230
85.00	17.065	655.50	7.712	12.392	397.85	4.681
90.00	17.959	743.09	8.257	13.393	462.31	5.137
95.00	18.766	834.92	8.789	14.386	531.77	5.598
100.00	19.561	930.74	9.307	15.369	606.16	6.062
105.00	20.391	1030.6	9.815	16.343	685.44	6.528
110.00	21.230	1134.7	10.315	17.311	769.58	6.996
115.00	22.058	1242.9	10.808	18.273	858.54	7.466
120.00	22.860	1355.2	11.293	19.229	952.30	7.936
125.00	23.630	1471.4	11.771	20.178	1050.8	8.407
130.00	24.419	1591.5	12.243	21.120	1154.1	8.877
135.00	25.239	1715.7	12.709	22.057	1262.0	9.348
140.00	26.041	1843.9	13.171	22.989	1374.6	9.819
145.00	26.815	1976.0	13.628	23.917	1491.9	10.289
150.00	27.593	2112.0	14.080	24.839	1613.8	10.759
155.00	28.391	2252.0	14.529	25.757	1740.3	11.228
160.00	29.204	2396.0	14.975	26.671	1871.4	11.696
165.00	30.021	2544.0	15.418	27.582	2007.0	12.164
170.00	30.834	2696.2	15.860	28.490	2147.2	12.630
175.00	31.638	2852.4	16.299	29.396	2291.9	13.096
180.00	32.431	3012.5	16.736	30.298	2441.1	13.562
185.00	33.222	3176.7	17.171	31.197	2594.9	14.026
190.00	34.017	3344.8	17.604	32.094	2753.1	14.490
195.00	34.818	3516.8	18.035	32.988	2915.8	14.953
200.00	35.626	3693.0	18.465	33.880	3083.0	15.415
205.00	36.440	3873.1	18.893	34.769	3254.6	15.876
210.00	37.261	4057.4	19.321	35.657	3430.7	16.336
215.00	38.085	4245.7	19.748	36.544	3611.2	16.796
220.00	38.904	4438.2	20.174	37.429	3796.1	17.255
225.00	39.713	4634.8	20.599	38.312	3985.4	17.713
230.00	40.512	4835.3	21.023	39.194	4179.2	18.170
235.00	41.307	5039.9	21.446	40.073	4377.4	18.627
240.00	42.107	5248.4	21.868	40.951	4579.9	19.083
245.00	42.918	5461.0	22.290	41.828	4786.9	19.538
250.00	43.741	5677.6	22.710	42.703	4998.2	19.993
255.00	44.575	5898.4	23.131	43.578	5213.9	20.447
260.00	45.416	6123.4	23.551	44.451	5434.0	20.900
265.00	46.258	6352.5	23.972	45.324	5658.4	21.353
270.00	47.098	6585.9	24.392	46.197	5887.2	21.805
273.15	47.624	6735.1	24.657	46.746	6033.6	22.089
275.00	47.932	6823.5	24.813	47.069	6120.4	22.256
280.00	48.762	7065.2	25.233	47.940	6357.9	22.707
285.00	49.591	7311.1	25.653	48.810	6599.8	23.157
290.00	50.423	7561.2	26.073	49.680	6846.0	23.607
295.00	51.257	7815.4	26.493	50.549	7096.6	24.056
298.15	51.782	7977.6	26.757	51.096	7256.7	24.339
300.00	52.088	8073.7	26.912	51.417	7351.5	24.505

TABLE 7

MOLAL THERMODYNAMIC PROPERTIES FOR L-PHENYLALANINE

($C_6H_5CH_2(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.=165.19352 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-18.268	-111.9	-375.31	-204.87	-50.8	-170.38

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.074	0.093	0.019	0.025	0.031	0.006
10.00	0.575	1.469	0.147	0.196	0.493	0.049
15.00	1.597	6.745	0.450	0.610	2.406	0.160
20.00	2.836	17.774	0.889	1.236	6.948	0.347
25.00	4.157	35.240	1.410	2.010	15.013	0.601
30.00	5.534	59.442	1.981	2.889	27.222	0.907
35.00	6.915	90.591	2.588	3.846	44.033	1.258
40.00	8.211	128.44	3.211	4.855	65.771	1.644
45.00	9.426	172.57	3.835	5.893	92.634	2.059
50.00	10.567	222.57	4.451	6.946	124.73	2.495
55.00	11.652	278.15	5.057	8.005	162.10	2.947
60.00	12.660	338.96	5.649	9.062	204.77	3.413
65.00	13.617	404.67	6.226	10.114	252.72	3.888
70.00	14.511	475.03	6.786	11.156	305.90	4.370
75.00	15.366	549.73	7.330	12.186	364.26	4.857
80.00	16.251	628.78	7.860	13.206	427.74	5.347
85.00	17.083	712.14	8.378	14.217	496.31	5.839
90.00	17.852	799.49	8.883	15.215	569.89	6.332
95.00	18.588	890.60	9.375	16.200	648.44	6.826
100.00	19.314	985.36	9.854	17.172	731.87	7.319
105.00	20.050	1083.8	10.322	18.132	820.14	7.811
110.00	20.778	1185.8	10.780	19.082	913.18	8.302
115.00	21.486	1291.5	11.231	20.021	1010.9	8.791
120.00	22.168	1400.7	11.672	20.950	1113.4	9.278
125.00	22.844	1513.2	12.105	21.869	1220.4	9.763
130.00	23.544	1629.1	12.532	22.778	1332.1	10.247
135.00	24.256	1748.6	12.953	23.680	1448.2	10.727
140.00	24.949	1871.7	13.369	24.575	1568.8	11.206
145.00	25.627	1998.1	13.780	25.462	1693.9	11.682
150.00	26.319	2128.0	14.186	26.343	1823.5	12.156
155.00	27.031	2261.3	14.589	27.217	1957.4	12.628
160.00	27.746	2398.3	14.989	28.087	2095.6	13.098
165.00	28.455	2538.8	15.387	28.952	2238.2	13.565
170.00	29.164	2682.8	15.781	29.812	2385.1	14.030
175.00	29.872	2830.4	16.174	30.667	2536.3	14.493
180.00	30.579	2981.6	16.564	31.519	2691.8	14.954
185.00	31.287	3136.2	16.953	32.366	2851.5	15.414
190.00	31.999	3294.4	17.339	33.210	3015.4	15.871
195.00	32.714	3456.2	17.724	34.050	3183.6	16.326
200.00	33.427	3621.6	18.108	34.888	3355.9	16.780
205.00	34.141	3790.5	18.490	35.722	3532.5	17.232
210.00	34.861	3963.0	18.871	36.553	3713.2	17.682
215.00	35.597	4139.1	19.252	37.382	3898.0	18.130
220.00	36.349	4319.0	19.632	38.209	4087.0	18.577
225.00	37.116	4502.6	20.012	39.034	4280.1	19.023
230.00	37.888	4690.1	20.392	39.859	4477.3	19.467
235.00	38.662	4881.5	20.772	40.682	4678.7	19.909
240.00	39.435	5076.8	21.153	41.504	4884.1	20.351
245.00	40.206	5275.9	21.534	42.325	5093.7	20.791
250.00	40.979	5478.8	21.915	43.145	5307.4	21.229
255.00	41.755	5685.7	22.297	43.964	5525.1	21.667
260.00	42.536	5896.4	22.678	44.782	5747.0	22.104
265.00	43.320	6111.0	23.060	45.600	5973.0	22.539
270.00	44.106	6329.6	23.443	46.417	6203.0	22.974
273.15	44.600	6469.3	23.684	46.931	6350.0	23.247
275.00	44.890	6552.1	23.826	47.234	6437.1	23.408
280.00	45.671	6778.5	24.209	48.049	6675.3	23.841
285.00	46.448	7008.8	24.592	48.865	6917.6	24.272
290.00	47.221	7242.9	24.976	49.679	7164.0	24.703
295.00	47.993	7481.0	25.359	50.493	7414.4	25.134
298.15	48.481	7632.9	25.601	51.005	7574.3	25.404
300.00	48.768	7722.9	25.743	51.306	7668.9	25.563

TABLE 8

MOLAL THERMODYNAMIC PROPERTIES FOR L-TRYPTOPHANE

($C_8H_6NCH_2(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.=204.23049 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-17.313	-99.8	-334.73	-237.29	-29.1	-97.61

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.069	0.086	0.017	0.023	0.029	0.006
10.00	0.535	1.360	0.136	0.182	0.458	0.046
15.00	1.539	6.372	0.425	0.574	2.245	0.150
20.00	2.752	17.072	0.854	1.182	6.562	0.328
25.00	4.046	34.030	1.361	1.933	14.299	0.572
30.00	5.389	57.614	1.920	2.789	26.069	0.869
35.00	6.716	87.898	2.511	3.720	42.318	1.209
40.00	7.968	124.64	3.116	4.700	63.353	1.584
45.00	9.176	167.51	3.722	5.708	89.364	1.986
50.00	10.337	216.33	4.327	6.736	120.47	2.409
55.00	11.419	270.74	4.923	7.772	156.74	2.850
60.00	12.474	330.48	5.508	8.811	198.19	3.303
65.00	13.499	395.43	6.084	9.851	244.85	3.767
70.00	14.438	465.32	6.647	10.886	296.69	4.238
75.00	15.349	539.78	7.197	11.913	353.69	4.716
80.00	16.295	618.89	7.736	12.934	415.81	5.198
85.00	17.206	702.67	8.267	13.949	483.02	5.683
90.00	18.048	790.82	8.787	14.957	555.29	6.170
95.00	18.868	883.13	9.296	15.955	632.58	6.659
100.00	19.648	979.43	9.794	16.943	714.82	7.148
105.00	20.410	1079.6	10.282	17.920	801.98	7.638
110.00	21.167	1183.5	10.759	18.887	894.00	8.127
115.00	21.903	1291.2	11.228	19.844	990.83	8.616
120.00	22.618	1402.5	11.688	20.791	1092.4	9.104
125.00	23.323	1517.4	12.139	21.729	1198.7	9.590
130.00	24.015	1635.7	12.582	22.657	1309.7	10.075
135.00	24.689	1757.5	13.018	23.576	1425.3	10.558
140.00	25.356	1882.6	13.447	24.486	1545.4	11.039
145.00	26.020	2011.1	13.869	25.387	1670.1	11.518
150.00	26.674	2142.8	14.285	26.281	1799.3	11.995
155.00	27.318	2277.8	14.695	27.166	1932.9	12.470
160.00	27.960	2416.0	15.100	28.043	2070.9	12.943
165.00	28.608	2557.4	15.499	28.914	2213.3	13.414
170.00	29.261	2702.1	15.894	29.777	2360.1	13.883
175.00	29.910	2850.0	16.286	30.635	2511.1	14.349
180.00	30.544	3001.1	16.673	31.486	2666.4	14.813
185.00	31.160	3155.4	17.056	32.332	2826.0	15.275
190.00	31.767	3312.7	17.435	33.171	2989.7	15.735
195.00	32.378	3473.1	17.811	34.004	3157.7	16.193
200.00	33.003	3636.5	18.183	34.831	3329.7	16.649
205.00	33.644	3803.1	18.552	35.654	3506.0	17.102
210.00	34.296	3973.0	18.919	36.473	3686.3	17.554
215.00	34.950	4146.1	19.284	37.287	3870.7	18.003
220.00	35.608	4322.5	19.648	38.098	4059.1	18.451
225.00	36.279	4502.2	20.010	38.906	4251.7	18.896
230.00	36.969	4685.3	20.371	39.711	4448.2	19.340
235.00	37.679	4871.9	20.732	40.514	4648.8	19.782
240.00	38.401	5062.1	21.092	41.314	4853.3	20.222
245.00	39.127	5255.9	21.453	42.114	5061.9	20.661
250.00	39.858	5453.4	21.814	42.911	5274.5	21.098
255.00	40.598	5654.5	22.175	43.708	5491.0	21.533
260.00	41.356	5859.4	22.536	44.504	5711.5	21.967
265.00	42.137	6068.1	22.899	45.299	5936.0	22.400
270.00	42.943	6280.8	23.262	46.094	6164.5	22.832
273.15	43.467	6416.9	23.492	46.595	6310.5	23.103
275.00	43.780	6497.6	23.628	46.889	6397.0	23.262
280.00	44.656	6718.7	23.995	47.686	6633.4	23.691
285.00	45.577	6944.2	24.366	48.485	6873.9	24.119
290.00	46.539	7174.5	24.740	49.286	7118.3	24.546
295.00	47.527	7409.7	25.118	50.089	7366.7	24.972
298.15	48.146	7560.4	25.358	50.598	7525.3	25.240
300.00	48.504	7649.8	25.499	50.897	7619.2	25.397

TABLE 9

MOLAL THERMODYNAMIC PROPERTIES FOR L-ASPARTIC ACID

($HOOCCH_2(NH_2)CHCOOH$)

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 131.10469 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-12.687	-232.47	-779.04	-194.94	-174.35	-584.77

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.022	0.027	0.005	0.007	0.009	0.002
10.00	0.180	0.443	0.044	0.059	0.146	0.015
15.00	0.639	2.334	0.156	0.206	0.757	0.050
20.00	1.444	7.424	0.371	0.493	2.444	0.122
25.00	2.467	17.131	0.685	0.922	5.928	0.237
30.00	3.619	32.310	1.077	1.473	11.870	0.396
35.00	4.823	53.405	1.526	2.121	20.818	0.595
40.00	6.017	80.516	2.013	2.843	33.200	0.830
45.00	7.184	113.53	2.523	3.619	49.336	1.096
50.00	8.294	152.26	3.045	4.434	69.457	1.389
55.00	9.340	196.36	3.570	5.274	93.720	1.704
60.00	10.343	245.59	4.093	6.130	122.23	2.037
65.00	11.288	299.69	4.611	6.996	155.04	2.385
70.00	12.154	358.34	5.119	7.865	192.19	2.746
75.00	12.982	421.19	5.616	8.732	233.68	3.116
80.00	13.796	488.14	6.102	9.596	279.50	3.494
85.00	14.578	559.10	6.578	10.456	329.63	3.878
90.00	15.297	633.81	7.042	11.310	384.05	4.267
95.00	15.959	711.97	7.494	12.155	442.71	4.660
100.00	16.601	793.38	7.934	12.990	505.58	5.056
105.00	17.222	877.94	8.361	13.815	572.59	5.453
110.00	17.830	965.58	8.778	14.630	643.71	5.852
115.00	18.432	1056.2	9.185	15.436	718.87	6.251
120.00	19.011	1149.9	9.582	16.233	798.05	6.650
125.00	19.570	1246.3	9.970	17.020	881.18	7.049
130.00	20.129	1345.6	10.350	17.798	968.23	7.448
135.00	20.682	1447.6	10.723	18.568	1059.2	7.846
140.00	21.219	1552.3	11.088	19.330	1153.9	8.242
145.00	21.747	1659.8	11.447	20.084	1252.4	8.638
150.00	22.273	1769.8	11.799	20.830	1354.7	9.032
155.00	22.798	1882.5	12.145	21.569	1460.7	9.424
160.00	23.321	1997.8	12.486	22.301	1570.4	9.815
165.00	23.842	2115.7	12.822	23.027	1683.7	10.204
170.00	24.350	2236.2	13.154	23.746	1800.7	10.592
175.00	24.843	2359.2	13.481	24.459	1921.2	10.978
180.00	25.339	2484.6	13.804	25.166	2045.3	11.363
185.00	25.854	2612.6	14.122	25.867	2172.8	11.745
190.00	26.378	2743.2	14.438	26.564	2303.9	12.126
195.00	26.884	2876.4	14.751	27.256	2438.5	12.505
200.00	27.361	3012.0	15.060	27.942	2576.5	12.882
205.00	27.823	3149.9	15.366	28.624	2717.9	13.258
210.00	28.291	3290.2	15.668	29.300	2862.7	13.632
215.00	28.772	3432.9	15.967	29.971	3010.9	14.004
220.00	29.265	3578.0	16.263	30.638	3162.4	14.375
225.00	29.762	3725.5	16.558	31.301	3317.2	14.743
230.00	30.262	3875.6	16.850	31.961	3475.4	15.110
235.00	30.763	4028.2	17.141	32.617	3636.8	15.476
240.00	31.264	4183.2	17.430	33.270	3801.6	15.840
245.00	31.763	4340.8	17.718	33.920	3969.5	16.202
250.00	32.259	4500.9	18.003	34.566	4140.8	16.563
255.00	32.755	4663.4	18.288	35.210	4315.2	16.922
260.00	33.248	4828.4	18.571	35.851	4492.9	17.280
265.00	33.741	4995.9	18.852	36.489	4673.7	17.637
270.00	34.233	5165.8	19.133	37.124	4857.7	17.992
273.15	34.543	5274.1	19.309	37.523	4975.3	18.215
275.00	34.725	5338.2	19.412	37.757	5044.9	18.345
280.00	35.223	5513.1	19.690	38.387	5235.3	18.698
285.00	35.730	5690.4	19.966	39.015	5428.8	19.048
290.00	36.248	5870.4	20.243	39.641	5625.4	19.398
295.00	36.775	6052.9	20.518	40.265	5825.2	19.746
298.15	37.108	6169.3	20.692	40.657	5952.7	19.965
300.00	37.304	6238.1	20.794	40.887	6028.1	20.094

TABLE 10

MOLAL THERMODYNAMIC PROPERTIES FOR L-ASPARAGINE MONOHYDRATE

$(NH_2COCH_2(NH_2)CHCOOH \cdot H_2O)$

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 150.13530 GRAMS

SIANDARD THERMODYNAMIC CHANGES ON FORMAIION FROM IHE ELEMENIS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-13.850	-259.52	-870.43	-255.19	-183.44	-615.26

SIANDARD IHERMODYNAMIC FUNCIIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.067	0.084	0.017	0.022	0.028	0.006
10.00	0.520	1.321	0.132	0.176	0.444	0.044
15.00	1.543	6.265	0.418	0.563	2.187	0.146
20.00	2.934	17.345	0.867	1.191	6.484	0.324
25.00	4.594	36.060	1.442	2.020	14.434	0.577
30.00	6.436	63.587	2.120	3.018	26.966	0.899
35.00	8.350	100.54	2.873	4.154	44.846	1.281
40.00	10.246	147.05	3.676	5.393	68.677	1.717
45.00	12.106	202.94	4.510	6.708	98.902	2.198
50.00	13.903	268.01	5.360	8.077	135.84	2.717
55.00	15.599	341.80	6.215	9.482	179.73	3.268
60.00	17.214	423.86	7.064	10.909	230.70	3.845
65.00	18.759	513.83	7.905	12.349	288.85	4.444
70.00	20.179	611.25	8.732	13.792	354.20	5.060
75.00	21.482	715.42	9.539	15.229	426.76	5.690
80.00	22.799	826.12	10.327	16.658	506.48	6.331
85.00	24.102	943.41	11.099	18.079	593.32	6.980
90.00	25.273	1066.9	11.854	19.490	687.25	7.636
95.00	26.354	1196.0	12.589	20.886	788.20	8.297
100.00	27.395	1330.4	13.304	22.264	896.08	8.961
105.00	28.436	1469.9	13.999	23.626	1010.8	9.627
110.00	29.466	1614.7	14.679	24.973	1132.3	10.294
115.00	30.456	1764.5	15.344	26.305	1260.5	10.961
120.00	31.411	1919.2	15.993	27.621	1395.3	11.628
125.00	32.353	2078.6	16.629	28.923	1536.7	12.294
130.00	33.306	2242.8	17.252	30.210	1684.5	12.958
135.00	34.256	2411.7	17.864	31.485	1838.8	13.621
140.00	35.179	2585.3	18.466	32.747	1999.4	14.281
145.00	36.074	2763.4	19.058	33.998	2166.2	14.940
150.00	36.959	2946.0	19.640	35.236	2339.3	15.596
155.00	37.845	3133.0	20.213	36.462	2518.6	16.249
160.00	38.731	3324.4	20.778	37.677	2703.9	16.900
165.00	39.616	3520.3	21.335	38.883	2895.3	17.547
170.00	40.498	3720.6	21.886	40.079	3092.7	18.193
175.00	41.368	3925.3	22.430	41.265	3296.1	18.835
180.00	42.224	4134.3	22.968	42.442	3505.4	19.474
185.00	43.073	4347.5	23.500	43.611	3720.5	20.111
190.00	43.923	4565.0	24.026	44.771	3941.5	20.745
195.00	44.775	4786.7	24.547	45.923	4168.2	21.375
200.00	45.624	5012.7	25.064	47.067	4400.7	22.003
205.00	46.469	5243.0	25.575	48.204	4638.9	22.629
210.00	47.314	5477.4	26.083	49.334	4882.7	23.251
215.00	48.161	5716.1	26.587	50.457	5132.2	23.871
220.00	49.012	5959.0	27.087	51.574	5387.3	24.488
225.00	49.867	6206.2	27.583	52.685	5647.9	25.102
230.00	50.719	6457.7	28.077	53.791	5914.1	25.714
235.00	51.568	6713.4	28.568	54.890	6185.8	26.323
240.00	52.413	6973.4	29.056	55.985	6463.0	26.929
245.00	53.261	7237.6	29.541	57.074	6745.7	27.533
250.00	54.117	7506.0	30.024	58.159	7033.8	28.135
255.00	54.983	7778.7	30.505	59.239	7327.2	28.734
260.00	55.857	8055.8	30.984	60.315	7626.1	29.331
265.00	56.733	8337.3	31.462	61.388	7930.4	29.926
270.00	57.605	8623.2	31.938	62.456	8240.0	30.519
273.15	58.151	8805.5	32.237	63.128	8437.8	30.891
275.00	58.470	8913.4	32.412	63.521	8555.0	31.109
280.00	59.326	9207.8	32.885	64.582	8875.2	31.697
285.00	60.176	9506.6	33.357	65.640	9200.8	32.283
290.00	61.022	9809.6	33.826	66.694	9531.6	32.868
295.00	61.864	10117.	34.294	67.744	9867.7	33.450
298.15	62.393	10313.	34.588	68.404	10082.	33.816
300.00	62.702	10428.	34.761	68.791	10209.	34.030

TABLE 11

MOLAL THERMODYNAMIC PROPERTIES FOR L-GLUTAMIC ACID

$(HOOC(CH_2)_2(NH_2)CHCOOH)$

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 147.13178 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-16.841	-240.05	-805.13	-223.19	-173.51	-581.95

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.025	0.031	0.006	0.008	0.011	0.002
10.00	0.200	0.500	0.050	0.067	0.167	0.017
15.00	0.665	2.515	0.168	0.224	0.843	0.056
20.00	1.494	7.767	0.388	0.520	2.640	0.132
25.00	2.598	17.913	0.717	0.969	6.301	0.252
30.00	3.856	34.001	1.133	1.552	12.550	0.418
35.00	5.184	56.591	1.617	2.246	22.003	0.629
40.00	6.497	85.811	2.145	3.024	35.146	0.879
45.00	7.779	121.51	2.700	3.863	52.343	1.163
50.00	9.022	163.54	3.271	4.748	73.856	1.477
55.00	10.192	211.61	3.848	5.663	99.873	1.816
60.00	11.286	265.33	4.422	6.597	130.52	2.175
65.00	12.335	324.41	4.991	7.543	165.87	2.552
70.00	13.298	388.53	5.550	8.493	205.95	2.942
75.00	14.199	457.29	6.097	9.441	250.79	3.344
80.00	15.107	530.56	6.632	10.387	300.36	3.754
85.00	15.980	608.30	7.156	11.329	354.65	4.172
90.00	16.791	690.25	7.669	12.265	413.64	4.596
95.00	17.550	776.12	8.170	13.194	477.29	5.024
100.00	18.267	865.68	8.657	14.112	545.56	5.456
105.00	18.983	958.81	9.131	15.021	618.40	5.890
110.00	19.694	1055.5	9.596	15.921	695.76	6.325
115.00	20.370	1155.7	10.049	16.811	777.59	6.762
120.00	21.010	1259.1	10.493	17.692	863.85	7.199
125.00	21.643	1365.8	10.926	18.562	954.49	7.636
130.00	22.286	1475.6	11.351	19.423	1049.5	8.073
135.00	22.924	1588.6	11.768	20.277	1148.7	8.509
140.00	23.533	1704.8	12.177	21.121	1252.2	8.944
145.00	24.123	1823.9	12.579	21.957	1359.9	9.379
150.00	24.717	1946.0	12.973	22.785	1471.8	9.812
155.00	25.321	2071.1	13.362	23.606	1587.7	10.244
160.00	25.924	2199.2	13.745	24.419	1707.8	10.674
165.00	26.517	2330.3	14.123	25.226	1831.9	11.103
170.00	27.097	2464.4	14.496	26.026	1960.1	11.530
175.00	27.670	2601.3	14.864	26.820	2092.2	11.955
180.00	28.244	2741.1	15.228	27.607	2228.2	12.379
185.00	28.820	2883.7	15.588	28.389	2368.2	12.801
190.00	29.395	3029.3	15.944	29.165	2512.1	13.222
195.00	29.961	3177.7	16.296	29.936	2659.9	13.640
200.00	30.519	3328.9	16.644	30.702	2811.5	14.057
205.00	31.081	3482.9	16.990	31.462	2966.9	14.473
210.00	31.654	3639.7	17.332	32.218	3126.1	14.886
215.00	32.238	3799.4	17.672	32.970	3289.1	15.298
220.00	32.823	3962.1	18.009	33.718	3455.8	15.708
225.00	33.398	4127.6	18.345	34.462	3626.2	16.117
230.00	33.962	4296.0	18.678	35.202	3800.4	16.523
235.00	34.520	4467.2	19.010	35.938	3978.2	16.929
240.00	35.078	4641.2	19.338	36.671	4159.8	17.332
245.00	35.640	4818.0	19.665	37.400	4344.9	17.734
250.00	36.210	4997.6	19.991	38.126	4533.8	18.135
255.00	36.785	5180.1	20.314	38.848	4726.2	18.534
260.00	37.364	5365.5	20.637	39.568	4922.2	18.932
265.00	37.944	5553.8	20.958	40.285	5121.9	19.328
270.00	38.523	5744.9	21.278	41.000	5325.1	19.723
273.15	38.888	5866.9	21.479	41.449	5454.9	19.971
275.00	39.102	5939.0	21.596	41.712	5531.9	20.116
280.00	39.684	6136.0	21.914	42.422	5742.2	20.508
285.00	40.276	6335.9	22.231	43.130	5956.1	20.899
290.00	40.881	6538.7	22.547	43.835	6173.5	21.288
295.00	41.496	6744.7	22.863	44.539	6394.4	21.676
298.15	41.884	6876.0	23.062	44.982	6535.4	21.920
300.00	42.109	6953.7	23.179	45.242	6618.9	22.063

TABLE 12

MOLAL THERMODYNAMIC PROPERTIES FOR L-GLUTAMINE

$(NH_2CO(CH_2)_2(NH_2)CHCOOH)$

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 146.14705 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-18.214	-197.8	-663.42	-235.53	-127.6	-427.97

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.022	0.028	0.006	0.007	0.009	0.002
10.00	0.177	0.444	0.044	0.059	0.148	0.015
15.00	0.598	2.244	0.150	0.200	0.749	0.050
20.00	1.389	7.048	0.352	0.471	2.363	0.118
25.00	2.507	16.686	0.667	0.896	5.715	0.229
30.00	3.811	32.420	1.081	1.466	11.564	0.385
35.00	5.217	54.969	1.571	2.159	20.580	0.588
40.00	6.617	84.568	2.114	2.947	33.310	0.833
45.00	7.991	121.10	2.691	3.806	50.166	1.115
50.00	9.304	164.38	3.288	4.717	71.455	1.429
55.00	10.527	213.99	3.891	5.661	97.389	1.771
60.00	11.693	269.56	4.493	6.628	128.10	2.135
65.00	12.771	330.77	5.089	7.607	163.69	2.518
70.00	13.760	397.13	5.673	8.590	204.18	2.917
75.00	14.695	468.28	6.244	9.572	249.59	3.328
80.00	15.615	544.05	6.801	10.549	299.89	3.749
85.00	16.554	624.49	7.347	11.524	355.08	4.177
90.00	17.391	709.40	7.882	12.495	415.13	4.613
95.00	18.125	798.21	8.402	13.455	480.00	5.053
100.00	18.863	890.68	8.907	14.403	549.65	5.497
105.00	19.593	986.82	9.398	15.341	624.02	5.943
110.00	20.316	1086.6	9.878	16.270	703.05	6.391
115.00	21.031	1190.0	10.348	17.189	786.70	6.841
120.00	21.691	1296.8	10.807	18.098	874.92	7.291
125.00	22.323	1406.8	11.255	18.996	967.66	7.741
130.00	22.991	1520.1	11.693	19.884	1064.9	8.191
135.00	23.678	1636.8	12.124	20.765	1166.5	8.641
140.00	24.339	1756.8	12.549	21.638	1272.5	9.089
145.00	24.977	1880.1	12.966	22.503	1382.9	9.537
150.00	25.615	2006.6	13.377	23.361	1497.5	9.983
155.00	26.259	2136.3	13.783	24.211	1616.5	10.429
160.00	26.903	2269.2	14.182	25.055	1739.6	10.873
165.00	27.546	2405.3	14.578	25.893	1867.0	11.315
170.00	28.183	2544.6	14.969	26.725	1998.5	11.756
175.00	28.815	2687.1	15.355	27.551	2134.2	12.196
180.00	29.440	2832.8	15.738	28.371	2274.0	12.634
185.00	30.061	2981.5	16.116	29.186	2417.9	13.070
190.00	30.679	3133.4	16.491	29.996	2565.9	13.505
195.00	31.296	3288.3	16.863	30.801	2717.9	13.938
200.00	31.916	3446.4	17.232	31.601	2873.9	14.369
205.00	32.539	3607.5	17.597	32.397	3033.9	14.799
210.00	33.163	3771.7	17.961	33.189	3197.9	15.228
215.00	33.787	3939.1	18.321	33.976	3365.8	15.655
220.00	34.413	4109.6	18.680	34.760	3537.6	16.080
225.00	35.049	4283.3	19.037	35.541	3713.4	16.504
230.00	35.696	4460.1	19.392	36.318	3893.0	16.926
235.00	36.351	4640.2	19.746	37.093	4076.5	17.347
240.00	37.007	4823.6	20.098	37.865	4263.9	17.766
245.00	37.654	5010.3	20.450	38.635	4455.2	18.184
250.00	38.285	5200.1	20.801	39.402	4650.3	18.601
255.00	38.897	5393.1	21.149	40.166	4849.2	19.016
260.00	39.492	5589.1	21.497	40.927	5051.9	19.431
265.00	40.075	5788.0	21.842	41.685	5258.5	19.843
270.00	40.655	5989.8	22.185	42.439	5468.8	20.255
273.15	41.021	6118.5	22.400	42.913	5603.2	20.513
275.00	41.237	6194.6	22.526	43.191	5682.9	20.665
280.00	41.823	6402.2	22.865	43.939	5900.7	21.074
285.00	42.408	6612.8	23.203	44.684	6122.2	21.482
290.00	42.987	6826.3	23.539	45.427	6347.5	21.888
295.00	43.563	7042.7	23.873	46.167	6576.5	22.293
298.15	43.927	7180.4	24.083	46.631	6722.7	22.548
300.00	44.144	7261.9	24.206	46.904	6809.2	22.697

TABLE 13

MOLAL THERMODYNAMIC PROPERTIES FOR L-LYSINE HYDROCHLORIDE

$((NH_3CL)(CH_2)_4(NH_2)CHCOOH)$

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 182.65165 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-28.848			-327.130		

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.062	0.077	0.015	0.021	0.026	0.005
10.00	0.499	1.248	0.125	0.166	0.415	0.041
15.00	1.552	6.139	0.409	0.549	2.089	0.139
20.00	2.934	17.290	0.864	1.181	6.322	0.316
25.00	4.496	35.782	1.431	1.999	14.202	0.568
30.00	6.191	62.472	2.082	2.968	26.565	0.886
35.00	7.913	97.742	2.793	4.052	44.074	1.259
40.00	9.584	141.51	3.538	5.218	67.221	1.681
45.00	11.209	193.50	4.300	6.441	96.350	2.141
50.00	12.838	253.62	5.072	7.706	131.70	2.634
55.00	14.394	321.76	5.850	9.004	173.47	3.154
60.00	15.849	397.38	6.623	10.319	221.77	3.696
65.00	17.257	480.18	7.387	11.644	276.68	4.257
70.00	18.549	569.75	8.139	12.971	338.22	4.832
75.00	19.785	665.59	8.875	14.293	406.38	5.418
80.00	21.043	767.66	9.596	15.610	481.14	6.014
85.00	22.277	875.99	10.306	16.923	562.47	6.617
90.00	23.381	990.18	11.002	18.228	650.35	7.226
95.00	24.394	1109.6	11.680	19.520	744.73	7.839
100.00	25.401	1234.1	12.341	20.797	845.53	8.455
105.00	26.399	1363.6	12.987	22.060	952.67	9.073
110.00	27.373	1498.1	13.619	23.311	1066.1	9.692
115.00	28.314	1637.3	14.238	24.548	1185.8	10.311
120.00	29.213	1781.1	14.843	25.773	1311.6	10.930
125.00	30.077	1929.4	15.435	26.983	1443.5	11.548
130.00	30.928	2081.9	16.015	28.179	1581.4	12.164
135.00	31.770	2238.7	16.583	29.362	1725.2	12.779
140.00	32.591	2399.6	17.140	30.532	1875.0	13.393
145.00	33.392	2564.5	17.686	31.690	2030.5	14.004
150.00	34.180	2733.5	18.223	32.835	2191.9	14.612
155.00	34.960	2906.3	18.750	33.969	2358.9	15.219
160.00	35.730	3083.0	19.269	35.091	2531.5	15.822
165.00	36.492	3263.6	19.779	36.202	2709.8	16.423
170.00	37.250	3448.0	20.282	37.303	2893.5	17.021
175.00	38.002	3636.1	20.778	38.394	3082.8	17.616
180.00	38.742	3828.0	21.266	39.475	3277.4	18.208
185.00	39.469	4023.5	21.749	40.546	3477.5	18.797
190.00	40.190	4222.6	22.224	41.608	3682.9	19.384
195.00	40.911	4425.4	22.694	42.661	3893.6	19.967
200.00	41.636	4631.8	23.159	43.706	4109.5	20.547
205.00	42.367	4841.8	23.618	44.743	4330.6	21.125
210.00	43.103	5055.4	24.074	45.773	4556.9	21.700
215.00	43.843	5272.8	24.525	46.796	4788.3	22.271
220.00	44.585	5493.9	24.972	47.812	5024.9	22.840
225.00	45.331	5718.7	25.416	48.823	5266.5	23.406
230.00	46.085	5947.2	25.857	49.827	5513.1	23.970
235.00	46.852	6179.5	26.296	50.827	5764.7	24.531
240.00	47.635	6415.7	26.732	51.821	6021.3	25.089
245.00	48.429	6655.9	27.167	52.812	6282.9	25.645
250.00	49.226	6900.0	27.600	53.798	6549.4	26.198
255.00	50.019	7148.2	28.032	54.781	6820.9	26.749
260.00	50.804	7400.2	28.462	55.759	7097.2	27.297
265.00	51.586	7656.2	28.891	56.735	7378.5	27.843
270.00	52.371	7916.1	29.319	57.706	7664.6	28.387
273.15	52.870	8081.8	29.588	58.317	7847.3	28.729
275.00	53.166	8179.9	29.745	58.674	7955.5	28.929
280.00	53.981	8447.8	30.171	59.640	8251.3	29.469
285.00	54.823	8719.8	30.596	60.602	8551.9	30.007
290.00	55.693	8996.1	31.021	61.563	8857.3	30.543
295.00	56.586	9276.7	31.447	62.523	9167.6	31.076
298.15	57.155	9455.9	31.715	63.127	9365.5	31.412
300.00	57.488	9561.9	31.873	63.482	9482.6	31.609

TABLE 14

MOLAL THERMODYNAMIC PROPERTIES FOR L-ARGININE HYDROCHLORIDE

$(NH_2C(=NH_2CL)NH(CH_2)_3(NH_2)CHCOOH)$

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 210.66505 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-16.754			-297.946		

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.015	0.018	0.004	0.005	0.006	0.001
10.00	0.117	0.293	0.029	0.039	0.098	0.010
15.00	0.401	1.494	0.100	0.133	0.496	0.033
20.00	0.919	4.701	0.235	0.314	1.571	0.079
25.00	1.610	10.970	0.439	0.590	3.793	0.152
30.00	2.414	20.991	0.700	0.954	7.620	0.254
35.00	3.289	35.233	1.007	1.391	13.453	0.384
40.00	4.153	53.853	1.346	1.887	21.628	0.541
45.00	5.004	76.745	1.705	2.425	32.393	0.720
50.00	5.840	103.87	2.077	2.996	45.935	0.919
55.00	6.639	135.08	2.456	3.590	62.393	1.134
60.00	7.412	170.21	2.837	4.201	81.866	1.364
65.00	8.155	209.15	3.218	4.824	104.43	1.607
70.00	8.838	251.65	3.595	5.454	130.12	1.859
75.00	9.503	297.51	3.967	6.086	158.97	2.120
80.00	10.186	346.73	4.334	6.721	190.99	2.387
85.00	10.850	399.33	4.698	7.359	226.19	2.661
90.00	11.450	455.11	5.057	7.996	264.58	2.940
95.00	12.005	513.76	5.408	8.631	306.15	3.223
100.00	12.552	575.15	5.752	9.260	350.88	3.509
105.00	13.093	639.27	6.088	9.886	398.74	3.798
110.00	13.612	706.04	6.419	10.507	449.73	4.088
115.00	14.112	775.36	6.742	11.123	503.80	4.381
120.00	14.603	847.15	7.060	11.734	560.95	4.675
125.00	15.088	921.38	7.371	12.340	621.14	4.969
130.00	15.572	998.03	7.677	12.941	684.34	5.264
135.00	16.047	1077.1	7.978	13.538	750.54	5.560
140.00	16.496	1158.5	8.275	14.130	819.71	5.855
145.00	16.925	1242.0	8.566	14.716	891.83	6.151
150.00	17.358	1327.7	8.851	15.297	966.87	6.446
155.00	17.800	1415.6	9.133	15.874	1044.8	6.741
160.00	18.240	1505.7	9.411	16.446	1125.6	7.035
165.00	18.671	1598.0	9.685	17.014	1209.2	7.329
170.00	19.090	1692.4	9.955	17.577	1295.7	7.622
175.00	19.498	1788.9	10.222	18.136	1385.0	7.914
180.00	19.895	1887.4	10.485	18.691	1477.1	8.206
185.00	20.288	1987.8	10.745	19.242	1571.9	8.497
190.00	20.679	2090.2	11.001	19.788	1669.5	8.787
195.00	21.070	2194.6	11.254	20.330	1769.8	9.076
200.00	21.459	2300.9	11.505	20.869	1872.8	9.364
205.00	21.847	2409.2	11.752	21.403	1978.5	9.651
210.00	22.233	2519.4	11.997	21.934	2086.8	9.937
215.00	22.619	2631.5	12.240	22.462	2197.8	10.222
220.00	23.008	2745.6	12.480	22.986	2311.4	10.506
225.00	23.404	2861.6	12.718	23.508	2427.7	10.790
230.00	23.807	2979.6	12.955	24.027	2546.5	11.072
235.00	24.216	3099.7	13.190	24.543	2667.9	11.353
240.00	24.624	3221.8	13.424	25.057	2791.9	11.633
245.00	25.025	3345.9	13.657	25.569	2918.5	11.912
250.00	25.418	3472.0	13.888	26.079	3047.6	12.190
255.00	25.807	3600.1	14.118	26.586	3179.3	12.468
260.00	26.197	3730.1	14.347	27.091	3313.5	12.744
265.00	26.595	3862.1	14.574	27.593	3450.2	13.020
270.00	27.001	3996.1	14.800	28.094	3589.4	13.294
273.15	27.259	4081.5	14.942	28.409	3678.4	13.467
275.00	27.411	4132.1	15.026	28.594	3731.1	13.568
280.00	27.819	4270.2	15.251	29.091	3875.3	13.840
285.00	28.218	4410.3	15.475	29.587	4022.0	14.112
290.00	28.606	4552.3	15.698	30.081	4171.2	14.383
295.00	28.984	4696.3	15.920	30.573	4322.8	14.654
298.15	29.219	4788.0	16.059	30.883	4419.6	14.824
300.00	29.357	4842.2	16.141	31.064	4476.9	14.923

TABLE 15

MOLAL THERMODYNAMIC PROPERTIES FOR L-HISTIDINE HYDROCHLORIDE

$(C_3H_3N_2(HCL)CH_2(NH_2)CHCOOH)$

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 191.61850 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-16.185			-292.018		

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.050	0.063	0.013	0.017	0.021	0.004
10.00	0.393	0.992	0.099	0.132	0.333	0.033
15.00	1.264	4.888	0.326	0.437	1.662	0.111
20.00	2.650	14.509	0.725	0.981	5.104	0.255
25.00	4.311	31.833	1.273	1.747	11.840	0.474
30.00	6.095	57.818	1.927	2.690	22.867	0.762
35.00	7.919	92.852	2.653	3.766	38.958	1.113
40.00	9.701	136.94	3.423	4.941	60.691	1.517
45.00	11.424	189.76	4.217	6.183	88.477	1.966
50.00	13.113	251.13	5.023	7.475	122.60	2.452
55.00	14.695	320.69	5.831	8.799	163.28	2.969
60.00	16.232	398.02	6.634	10.144	210.63	3.511
65.00	17.736	482.96	7.430	11.503	264.74	4.073
70.00	19.125	575.18	8.217	12.869	325.67	4.652
75.00	20.440	674.10	8.988	14.234	393.43	5.246
80.00	21.783	779.66	9.746	15.596	468.01	5.850
85.00	23.096	891.88	10.493	16.956	549.39	6.463
90.00	24.305	1010.4	11.227	18.311	637.56	7.084
95.00	25.427	1134.8	11.945	19.655	732.48	7.710
100.00	26.515	1264.6	12.646	20.987	834.09	8.341
105.00	27.600	1399.9	13.333	22.307	942.34	8.975
110.00	28.681	1540.6	14.006	23.616	1057.2	9.610
~~115.00~~	~~29.737~~	~~1686.7~~	~~14.667~~	~~24.915~~	~~1178.5~~	~~10.248~~
120.00	30.758	1837.9	15.316	26.202	1306.3	10.886
125.00	31.769	1994.3	15.954	27.478	1440.5	11.524
130.00	32.786	2155.7	16.582	28.744	1581.0	12.162
135.00	33.796	2322.1	17.201	30.000	1727.9	12.799
140.00	34.780	2493.6	17.811	31.247	1881.0	13.436
145.00	35.740	2669.9	18.413	32.484	2040.4	14.071
150.00	36.694	2851.0	19.006	33.712	2205.9	14.706
155.00	37.653	3036.8	19.592	34.931	2377.5	15.338
160.00	38.611	3227.5	20.172	36.142	2555.2	15.970
165.00	39.560	3422.9	20.745	37.344	2738.9	16.599
170.00	40.497	3623.1	21.312	38.539	2928.6	17.227
175.00	41.425	3827.9	21.874	39.726	3124.2	17.853
180.00	42.350	4037.3	22.430	40.906	3325.8	18.477
185.00	43.270	4251.4	22.980	42.079	3533.3	19.099
190.00	44.179	4470.0	23.526	43.245	3746.6	19.719
195.00	45.073	4693.1	24.067	44.404	3965.7	20.337
200.00	45.952	4920.7	24.604	45.557	4190.6	20.953
205.00	46.822	5152.6	25.135	46.702	4421.3	21.567
210.00	47.693	5388.9	25.662	47.841	4657.7	22.179
215.00	48.567	5629.6	26.184	48.973	4899.7	22.789
220.00	49.439	5874.6	26.703	50.100	5147.4	23.397
225.00	50.304	6124.0	27.218	51.221	5400.7	24.003
230.00	51.162	6377.6	27.729	52.336	5659.6	24.607
235.00	52.019	6635.6	28.236	53.445	5924.0	25.209
240.00	52.881	6897.8	28.741	54.549	6194.0	25.808
245.00	53.749	7164.4	29.242	55.649	6469.5	26.406
250.00	54.618	7435.3	29.741	56.743	6750.5	27.002
255.00	55.480	7710.6	30.237	57.833	7036.9	27.596
260.00	56.329	7990.1	30.731	58.919	7328.8	28.188
265.00	57.166	8273.8	31.222	60.000	7626.1	28.778
270.00	57.992	8561.7	31.710	61.076	7928.8	29.366
273.15	58.509	8745.2	32.016	61.752	8122.3	29.736
275.00	58.813	8853.7	32.195	62.148	8236.9	29.952
280.00	59.633	9149.8	32.678	63.215	8550.3	30.537
285.00	60.455	9450.1	33.158	64.277	8869.0	31.119
290.00	61.280	9754.4	33.636	65.336	9193.0	31.700
295.00	62.105	10063.	34.111	66.391	9522.4	32.279
298.15	62.622	10259.	34.410	67.053	9732.5	32.643
300.00	62.924	10375.	34.585	67.441	9856.9	32.856

TABLE 16

MOLAL THERMODYNAMIC PROPERTIES FOR L-CYSTINE

$((HOOC(NH_2)CHCH_2S-)_2)$

SOLID PHASE

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 240.30154 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	$\frac{CAL}{DEG\ MOL}$	$\frac{KCAL}{MOL}$	$\frac{CAL}{DEG\ MOL}$	$\frac{CAL}{DEG\ MOL}$	$\frac{KCAL}{MOL}$	$\frac{CAL}{DEG\ MOL}$
298.15	-22.761	-250.6	-840.51	-287.39	-164.9	-553.07

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	$\frac{CAL}{DEG\ MOL}$	$\frac{CAL}{MOL}$	$\frac{CAL}{DEG\ MOL}$	$\frac{CAL}{DEG\ MOL}$	$\frac{CAL}{MOL}$	$\frac{CAL}{DEG\ MOL}$
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.052	0.066	0.013	0.017	0.022	0.004
10.00	0.417	1.046	0.105	0.139	0.349	0.035
15.00	1.359	5.214	0.348	0.465	1.757	0.117
20.00	2.853	15.584	0.779	1.051	5.438	0.272
25.00	4.602	34.140	1.366	1.872	12.660	0.506
30.00	6.526	61.913	2.064	2.879	24.468	0.816
35.00	8.464	99.409	2.840	4.032	41.695	1.191
40.00	10.347	146.46	3.662	5.285	64.952	1.624
45.00	12.163	202.76	4.506	6.610	94.666	2.104
50.00	13.891	267.95	5.359	7.982	131.13	2.623
55.00	15.490	341.45	6.208	9.381	174.53	3.173
60.00	17.016	422.74	7.046	10.795	224.97	3.749
65.00	18.457	511.47	7.869	12.215	282.49	4.346
70.00	19.779	607.11	8.673	13.632	347.11	4.959
75.00	21.023	709.14	9.455	15.039	418.79	5.584
80.00	22.257	817.34	10.217	16.435	497.48	6.218
85.00	23.464	931.67	10.961	17.821	583.13	6.860
90.00	24.566	1051.8	11.687	19.194	675.67	7.507
95.00	25.563	1177.1	12.391	20.549	775.04	8.158
100.00	26.530	1307.4	13.074	21.885	881.13	8.811
105.00	27.490	1442.4	13.737	23.203	993.86	9.465
110.00	28.440	1582.3	14.384	24.504	1113.1	10.119
115.00	29.359	1726.8	15.015	25.788	1238.9	10.773
120.00	30.239	1875.8	15.632	27.056	1371.0	11.425
125.00	31.112	2029.2	16.233	28.309	1509.4	12.075
130.00	31.998	2186.9	16.823	29.546	1654.0	12.723
135.00	32.868	2349.1	17.401	30.770	1804.8	13.369
140.00	33.702	2515.6	17.968	31.981	1961.7	14.012
145.00	34.522	2686.1	18.525	33.178	2124.6	14.653
150.00	35.344	2860.8	19.072	34.362	2293.5	15.290
155.00	36.170	3039.6	19.610	35.534	2468.2	15.924
160.00	36.997	3222.5	20.140	36.695	2648.8	16.555
165.00	37.830	3409.5	20.664	37.847	2835.2	17.183
170.00	38.663	3600.8	21.181	38.988	3027.3	17.807
175.00	39.478	3796.1	21.692	40.121	3225.0	18.429
180.00	40.272	3995.5	22.197	41.244	3428.4	19.047
185.00	41.056	4198.8	22.696	42.358	3637.5	19.662
190.00	41.849	4406.1	23.190	43.464	3852.0	20.274
195.00	42.656	4617.4	23.679	44.561	4072.1	20.882
200.00	43.473	4832.7	24.163	45.651	4297.6	21.488
205.00	44.293	5052.1	24.644	46.735	4528.6	22.091
210.00	45.112	5275.6	25.122	47.812	4765.0	22.690
215.00	45.924	5503.2	25.596	48.883	5006.7	23.287
220.00	46.726	5734.8	26.067	49.948	5253.8	23.881
225.00	47.517	5970.4	26.535	51.007	5506.2	24.472
230.00	48.301	6210.0	27.000	52.060	5763.8	25.060
235.00	49.089	6453.5	27.462	53.107	6026.8	25.646
240.00	49.891	6700.9	27.920	54.149	6294.9	26.229
245.00	50.713	6952.4	28.377	55.186	6568.2	26.809
250.00	51.558	7208.1	28.832	56.219	6846.8	27.387
255.00	52.417	7468.0	29.286	57.249	7130.4	27.962
260.00	53.277	7732.2	29.739	58.275	7419.2	28.536
265.00	54.127	8000.8	30.192	59.298	7713.2	29.106
270.00	54.961	8273.5	30.643	60.317	8012.2	29.675
273.15	55.478	8447.4	30.926	60.958	8203.2	30.032
275.00	55.780	8550.3	31.092	61.333	8316.3	30.241
280.00	56.591	8831.3	31.540	62.346	8625.5	30.805
285.00	57.399	9116.2	31.987	63.355	8939.8	31.368
290.00	58.210	9405.3	32.432	64.360	9259.1	31.928
295.00	59.028	9698.4	32.876	65.362	9583.4	32.486
298.15	59.549	9885.1	33.155	65.992	9790.3	32.837
300.00	59.858	9995.6	33.319	66.361	9912.7	33.042

TABLE 17

MOLAL THERMODYNAMIC PROPERTIES FOR L-PROLINE

(C_4H_8NCOOH)

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 115.13298 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-15.599	-125.7	-421.60	-179.97	-72.0	-241.49

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.039	0.049	0.010	0.013	0.016	0.003
10.00	0.310	0.780	0.078	0.104	0.261	0.026
15.00	0.981	3.828	0.255	0.342	1.305	0.087
20.00	1.989	11.161	0.558	0.757	3.982	0.199
25.00	3.114	23.900	0.956	1.321	9.126	0.365
30.00	4.267	42.349	1.412	1.991	17.368	0.579
35.00	5.411	66.560	1.902	2.735	29.155	0.833
40.00	6.494	96.353	2.409	3.529	44.798	1.120
45.00	7.512	131.39	2.920	4.353	64.493	1.433
50.00	8.459	171.36	3.427	5.194	88.356	1.767
55.00	9.320	215.83	3.924	6.041	116.44	2.117
60.00	10.144	264.51	4.408	6.888	148.77	2.479
65.00	10.912	317.17	4.880	7.731	185.32	2.851
70.00	11.607	373.51	5.336	8.565	226.06	3.229
75.00	12.272	433.21	5.776	9.389	270.95	3.613
80.00	12.934	496.24	6.203	10.202	319.93	3.999
85.00	13.553	562.48	6.617	11.005	372.96	4.388
90.00	14.129	631.69	7.019	11.796	429.96	4.777
95.00	14.675	703.72	7.408	12.575	490.90	5.167
100.00	15.194	778.40	7.784	13.341	555.69	5.557
105.00	15.703	855.64	8.149	14.095	624.29	5.946
110.00	16.215	935.43	8.504	14.837	696.62	6.333
115.00	16.731	1017.8	8.850	15.569	772.64	6.719
120.00	17.244	1102.7	9.189	16.292	852.29	7.102
125.00	17.748	1190.2	9.522	17.006	935.54	7.484
130.00	18.256	1280.2	9.848	17.712	1022.3	7.864
135.00	18.767	1372.8	10.169	18.411	1112.6	8.242
140.00	19.275	1467.9	10.485	19.102	1206.4	8.617
145.00	19.787	1565.5	10.797	19.788	1303.7	8.991
150.00	20.314	1665.8	11.105	20.467	1404.3	9.362
155.00	20.848	1768.7	11.411	21.142	1508.3	9.731
160.00	21.379	1874.3	11.714	21.812	1615.7	10.098
165.00	21.907	1982.5	12.015	22.478	1726.4	10.463
170.00	22.438	2093.3	12.314	23.140	1840.5	10.826
175.00	22.976	2206.9	12.611	23.798	1957.8	11.188
180.00	23.518	2323.1	12.906	24.453	2078.5	11.547
185.00	24.060	2442.0	13.200	25.105	2202.4	11.905
190.00	24.597	2563.7	13.493	25.754	2329.5	12.261
195.00	25.124	2688.0	13.785	26.399	2459.9	12.615
200.00	25.641	2814.9	14.075	27.042	2593.5	12.968
205.00	26.156	2944.4	14.363	27.682	2730.3	13.319
210.00	26.678	3076.5	14.650	28.318	2870.3	13.668
215.00	27.210	3211.2	14.936	28.952	3013.5	14.016
220.00	27.745	3348.6	15.221	29.584	3159.8	14.363
225.00	28.274	3488.6	15.505	30.213	3309.3	14.708
230.00	28.793	3631.3	15.788	30.840	3462.0	15.052
235.00	29.306	3776.6	16.070	31.465	3617.7	15.395
240.00	29.824	3924.4	16.352	32.087	3776.6	15.736
245.00	30.350	4074.8	16.632	32.708	3938.6	16.076
250.00	30.887	4227.9	16.912	33.326	4103.7	16.415
255.00	31.429	4383.7	17.191	33.943	4271.9	16.752
260.00	31.969	4542.2	17.470	34.559	4443.1	17.089
265.00	32.505	4703.4	17.749	35.173	4617.4	17.424
270.00	33.037	4867.2	18.027	35.785	4794.8	17.759
273.15	33.371	4971.8	18.202	36.171	4908.2	17.969
275.00	33.568	5033.7	18.304	36.396	4975.3	18.092
280.00	34.102	5202.9	18.582	37.006	5158.8	18.424
285.00	34.642	5374.8	18.859	37.614	5345.3	18.756
290.00	35.190	5549.3	19.136	38.222	5534.9	19.086
295.00	35.748	5726.7	19.412	38.828	5727.6	19.415
298.15	36.106	5839.8	19.587	39.210	5850.5	19.623
300.00	36.319	5906.8	19.689	39.434	5923.2	19.744

TABLE 18

MOLAL THERMODYNAMIC PROPERTIES FOR L-SERINE

$HOCH_2CH(NH_2)COOH$

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 105.09414 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p°	ΔH_T°	$\Delta H_T^\circ/T$	ΔS_T°	ΔG_T°	$\Delta G_T^\circ/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-11.847	-173.6	-582.25	-123.283	-413.491	-174.018

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p°	$(H_T^\circ-H_0^\circ)$	$(H_T^\circ-H_0^\circ)/T$	S_T°	$-(G_T^\circ-H_0^\circ)$	$-(G_T^\circ-H_0^\circ)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.024	0.030	0.006	0.008	0.010	0.002
10.00	0.195	0.487	0.049	0.065	0.162	0.016
15.00	0.646	2.456	0.164	0.218	0.821	0.055
20.00	1.328	7.332	0.367	0.494	2.554	0.128
25.00	2.166	16.013	0.641	0.878	5.943	0.238
30.00	3.112	29.174	0.972	1.356	11.492	0.383
35.00	4.115	47.226	1.349	1.910	19.628	0.561
40.00	5.126	70.330	1.758	2.526	30.694	0.767
45.00	6.126	98.469	2.188	3.187	44.960	0.999
50.00	7.098	131.54	2.631	3.883	62.625	1.252
55.00	8.025	169.37	3.079	4.604	83.834	1.524
60.00	8.916	211.74	3.529	5.341	108.69	1.811
65.00	9.760	258.45	3.976	6.088	137.26	2.112
70.00	10.552	309.25	4.418	6.840	169.58	2.423
75.00	11.306	363.91	4.852	7.594	205.66	2.742
80.00	12.033	422.27	5.278	8.347	245.52	3.069
85.00	12.723	484.17	5.696	9.098	289.13	3.402
90.00	13.371	549.42	6.105	9.844	336.49	3.739
95.00	13.990	617.84	6.504	10.583	387.56	4.080
100.00	14.588	689.29	6.893	11.316	442.31	4.423
105.00	15.166	763.69	7.273	12.042	500.71	4.769
110.00	15.719	840.91	7.645	12.760	562.71	5.116
115.00	16.246	920.83	8.007	13.471	628.30	5.463
120.00	16.756	1003.3	8.361	14.173	697.41	5.812
125.00	17.259	1088.4	8.707	14.867	770.01	6.160
130.00	17.759	1175.9	9.046	15.554	846.07	6.508
135.00	18.255	1266.0	9.378	16.233	925.54	6.856
140.00	18.742	1358.5	9.703	16.906	1008.4	7.203
145.00	19.217	1453.4	10.023	17.572	1094.6	7.549
150.00	19.678	1550.6	10.337	18.231	1184.1	7.894
155.00	20.128	1650.1	10.646	18.884	1276.9	8.238
160.00	20.571	1751.9	10.949	19.530	1372.9	8.581
165.00	21.010	1855.8	11.248	20.170	1472.2	8.922
170.00	21.450	1962.0	11.541	20.804	1574.6	9.262
175.00	21.894	2070.4	11.831	21.432	1680.2	9.601
180.00	22.343	2180.9	12.116	22.055	1788.9	9.938
185.00	22.798	2293.8	12.399	22.673	1900.8	10.274
190.00	23.254	2408.9	12.679	23.287	2015.7	10.609
195.00	23.708	2526.3	12.956	23.897	2133.6	10.942
200.00	24.155	2646.0	13.230	24.503	2254.6	11.273
205.00	24.589	2767.9	13.502	25.105	2378.6	11.603
210.00	25.011	2891.9	13.771	25.703	2505.7	11.932
215.00	25.421	3018.0	14.037	26.296	2635.7	12.259
220.00	25.824	3146.1	14.300	26.885	2768.6	12.585
225.00	26.222	3276.2	14.561	27.470	2904.5	12.909
230.00	26.622	3408.3	14.819	28.050	3043.3	13.232
235.00	27.024	3542.4	15.074	28.627	3185.0	13.553
240.00	27.432	3678.5	15.327	29.200	3329.6	13.873
245.00	27.845	3816.7	15.578	29.770	3477.0	14.192
250.00	28.263	3957.0	15.828	30.337	3627.3	14.509
255.00	28.684	4099.4	16.076	30.901	3780.4	14.825
260.00	29.108	4243.8	16.322	31.462	3936.3	15.140
265.00	29.535	4390.5	16.568	32.021	4095.0	15.453
270.00	29.962	4539.2	16.812	32.577	4256.5	15.765
273.15	30.233	4634.0	16.965	32.926	4359.6	15.961
275.00	30.392	4690.1	17.055	33.130	4420.7	16.075
280.00	30.822	4843.1	17.297	33.682	4587.8	16.385
285.00	31.255	4998.3	17.538	34.231	4757.6	16.693
290.00	31.689	5155.7	17.778	34.778	4930.1	17.000
295.00	32.124	5315.2	18.018	35.324	5105.3	17.306
298.15	32.400	5416.8	18.168	35.667	5217.1	17.498
300.00	32.562	5476.9	18.256	35.867	5283.3	17.611
310.00	33.440	5806.9	18.732	36.949	5647.4	18.217

TABLE 19

MOLAL THERMODYNAMIC PROPERTIES FOR L-METHIONINE

$CH_3SCH_2CH_2CH(NH_2)COOH$

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 149.21292 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	5.362	-180.4	-605.062	-121.834	-408.631	-202.628

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.062	0.077	0.015	0.021	0.026	0.005
10.00	0.481	1.225	0.122	0.164	0.411	0.041
15.00	1.409	5.744	0.383	0.518	2.019	0.135
20.00	2.746	16.022	0.801	1.100	5.971	0.299
25.00	4.251	33.477	1.339	1.872	13.333	0.533
30.00	5.794	58.581	1.953	2.784	24.925	0.831
35.00	7.328	91.430	2.612	3.793	41.333	1.181
40.00	8.771	131.72	3.293	4.867	62.963	1.574
45.00	10.143	179.03	3.978	5.980	90.068	2.002
50.00	11.445	233.03	4.661	7.117	122.80	2.456
55.00	12.666	293.34	5.333	8.265	161.25	2.932
60.00	13.838	359.62	5.994	9.418	205.46	3.424
65.00	14.960	431.64	6.641	10.570	255.43	3.930
70.00	16.003	509.08	7.273	11.718	311.16	4.445
75.00	16.971	591.52	7.887	12.855	372.59	4.968
80.00	17.968	678.87	8.486	13.982	439.69	5.496
85.00	18.926	771.14	9.072	15.101	512.40	6.028
90.00	19.785	867.95	9.644	16.207	590.68	6.563
95.00	20.602	968.93	10.199	17.299	674.45	7.099
100.00	21.391	1073.9	10.739	18.376	763.64	7.636
105.00	22.160	1182.8	11.265	19.438	858.18	8.173
110.00	22.921	1295.5	11.777	20.487	957.99	8.709
115.00	23.657	1412.0	12.278	21.522	1068.0	9.244
120.00	24.361	1532.0	12.767	22.544	1173.2	9.777
125.00	25.048	1655.6	13.244	23.552	1288.4	10.307
130.00	25.732	1782.5	13.712	24.548	1408.7	10.836
135.00	26.408	1912.9	14.169	25.532	1533.9	11.362
140.00	27.067	2046.6	14.618	26.504	1664.0	11.886
145.00	27.715	2183.5	15.059	27.465	1798.9	12.406
150.00	28.359	2323.7	15.491	28.416	1938.6	12.924
155.00	29.000	2467.1	15.917	29.356	2083.1	13.439
160.00	29.633	2613.7	16.336	30.287	2232.2	13.951
165.00	30.258	2763.4	16.748	31.208	2385.9	14.460
170.00	30.881	2916.3	17.155	32.121	2544.2	14.966
175.00	31.506	3072.2	17.556	33.025	2707.1	15.469
180.00	32.131	3231.3	17.952	33.921	2874.5	15.969
185.00	32.757	3393.5	18.343	34.810	3046.3	16.466
190.00	33.387	3558.9	18.731	35.692	3222.5	16.961
195.00	34.030	3727.4	19.115	36.567	3403.2	17.452
200.00	34.699	3899.2	19.496	37.437	3588.2	17.941
205.00	35.388	4074.4	19.875	38.302	3777.5	18.427
210.00	36.097	4253.1	20.253	39.163	3971.2	18.910
215.00	36.831	4435.4	20.630	40.021	4169.2	19.391
220.00	37.592	4621.5	21.007	40.877	4371.4	19.870
225.00	38.387	4811.4	21.384	41.730	4577.9	20.346
230.00	39.223	5005.4	21.763	42.583	4788.7	20.820
235.00	40.111	5203.7	22.144	43.436	5003.8	21.293
240.00	41.065	5406.6	22.528	44.290	5223.1	21.763
245.00	42.107	5614.5	22.916	45.148	5446.7	22.231
250.00	43.263	5827.9	23.312	46.010	5674.6	22.698
255.00	44.566	6047.4	23.715	46.879	5906.8	23.164
260.00	46.055	6273.9	24.130	47.759	6143.4	23.628
265.00	47.777	6508.3	24.560	48.652	6384.4	24.092
270.00	49.785	6752.1	25.008	49.563	6629.9	24.555
273.15	51.223	6911.2	25.302	50.149	6786.9	24.847
275.00	52.137	7006.8	25.479	50.497	6880.0	25.018
280.00	54.894	7274.2	25.979	51.461	7134.9	25.482
285.00	58.123	7556.5	26.514	52.460	7394.7	25.946
290.00	61.890	7856.3	27.091	53.503	7659.6	26.412
295.00	66.263	8176.4	27.717	54.597	7929.8	26.881
298.15	69.360	8389.9	28.140	55.317	8102.9	27.177
300.00	71.310	8520.0	28.400	55.752	8205.7	27.352
305.00	77.098	8890.7	29.150	56.978	8487.5	27.828
305.50	77.721	8929.4	29.229	57.105	8516.0	27.876
310.00	70.117	9261.4	29.875	58.183	8775.5	28.308
315.00	63.800	9595.3	30.461	59.252	9069.1	28.791
320.00	59.387	9902.5	30.945	60.220	9367.8	29.274
325.00	56.525	10192.	31.359	61.117	9671.2	29.757
330.00	54.864	10470.	31.727	61.966	9978.9	30.239
335.00	54.051	10742.	32.065	62.784	10291.	30.719
340.00	53.736	11011.	32.386	63.582	10607.	31.196
345.00	53.566	11279.	32.694	64.365	10927.	31.671
350.00	53.191	11546.	32.990	65.134	11250.	32.144

TABLE 20

MOLAL THERMODYNAMIC PROPERTIES FOR FURAN

CHCHCHCHCHO

SOLID AND LIQUID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 68.07588 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.592	14.903	-49.885	0.050	-0.167	-67.095

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.078	0.097	0.019	0.026	0.032	0.006
10.00	0.597	1.532	0.153	0.205	0.517	0.052
15.00	1.636	6.980	0.465	0.632	2.506	0.167
20.00	2.807	18.082	0.904	1.263	7.180	0.359
25.00	3.965	35.034	1.401	2.015	15.336	0.613
30.00	5.040	57.589	1.920	2.834	27.440	0.915
35.00	6.032	85.308	2.437	3.687	43.733	1.250
40.00	6.913	117.72	2.943	4.551	64.328	1.608
45.00	7.675	154.23	3.427	5.411	89.237	1.983
50.00	8.336	194.30	3.886	6.253	118.35	2.367
55.00	8.922	237.46	4.317	7.076	151.72	2.759
57.50	9.204	260.12	4.524	7.479	169.92	2.955
			LAMBDA TRANSITION			
57.50	9.084	260.12	4.524	7.479	169.92	2.955
60.00	9.302	283.11	4.718	7.870	189.11	3.152
65.00	9.699	330.63	5.087	8.631	230.38	3.544
70.00	10.056	380.03	5.429	9.363	275.37	3.934
75.00	10.386	431.15	5.749	10.068	323.96	4.319
80.00	10.689	483.85	6.048	10.748	376.01	4.700
85.00	10.963	537.99	6.329	11.405	431.40	5.075
90.00	11.207	593.43	6.594	12.038	490.02	5.445
95.00	11.430	650.02	6.842	12.650	551.75	5.808
100.00	11.643	707.71	7.077	13.242	616.49	6.165
105.00	11.857	766.46	7.300	13.815	684.14	6.516
110.00	12.078	826.29	7.512	14.372	754.61	6.860
115.00	12.311	887.26	7.715	14.914	827.83	7.199
120.00	12.553	949.42	7.912	15.443	903.73	7.531
125.00	12.803	1012.8	8.102	15.960	982.24	7.858
130.00	13.058	1077.5	8.288	16.467	1063.3	8.179
135.00	13.314	1143.4	8.470	16.965	1146.9	8.496
140.00	13.570	1210.6	8.647	17.454	1233.0	8.807
145.00	13.822	1279.1	8.821	17.935	1321.4	9.113
150.00	14.070	1348.8	8.992	18.407	1412.3	9.415
			SOLID PHASE II			
150.00	17.028	1838.0	12.253	21.669	1412.3	9.415
155.00	17.290	1923.8	12.412	22.231	1522.0	9.820
160.00	17.572	2010.9	12.568	22.785	1634.6	10.216
165.00	17.881	2099.6	12.725	23.330	1749.9	10.605
170.00	18.230	2189.8	12.881	23.869	1867.9	10.987
175.00	18.627	2281.9	13.040	24.403	1988.5	11.363
180.00	19.085	2376.2	13.201	24.934	2111.9	11.733
185.00	19.614	2472.9	13.367	25.464	2237.9	12.097
187.55	19.916	2523.3	13.454	25.734	2303.2	12.280
			LIQUID PHASE			
187.55	23.816	3432.1	18.300	30.580	2303.2	12.280
190.00	23.843	3490.5	18.371	30.889	2378.5	12.518
195.00	23.907	3609.9	18.512	31.509	2534.5	12.997
200.00	23.982	3729.6	18.648	32.116	2693.5	13.468
205.00	24.067	3849.7	18.779	32.709	2855.6	13.930
210.00	24.162	3970.3	18.906	33.290	3020.6	14.384
215.00	24.269	4091.3	19.029	33.860	3188.5	14.830
220.00	24.386	4213.0	19.150	34.419	3359.2	15.269
225.00	24.514	4335.2	19.268	34.968	3532.6	15.701
230.00	24.652	4458.1	19.383	35.509	3708.8	16.125
235.00	24.800	4581.7	19.497	36.040	3887.7	16.543
240.00	24.959	4706.1	19.609	36.564	4069.2	16.955
245.00	25.127	4831.3	19.720	37.080	4253.3	17.361
250.00	25.304	4957.4	19.830	37.590	4440.0	17.760
255.00	25.490	5084.4	19.939	38.093	4629.2	18.154
260.00	25.685	5212.3	20.047	38.590	4820.9	18.542
265.00	25.888	5341.3	20.156	39.081	5015.1	18.925
270.00	26.098	5471.2	20.264	39.567	5211.7	19.303
273.15	26.234	5553.7	20.332	39.870	5336.8	19.538
275.00	26.315	5602.3	20.372	40.047	5410.8	19.676
280.00	26.538	5734.4	20.480	40.524	5612.2	20.044
285.00	26.767	5867.6	20.588	40.995	5816.0	20.407
290.00	27.000	6002.1	20.697	41.463	6022.1	20.766
295.00	27.237	6137.7	20.806	41.926	6230.6	21.121
298.15	27.388	6223.7	20.874	42.216	6363.1	21.342
300.00	27.478	6274.4	20.915	42.386	6441.4	21.471

TABLE 21

MOLAL THERMODYNAMIC PROPERTIES FOR UREA

NH_2CONH_2

SOLID PHASE

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 60.05583 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-4.037	-79.56	-266.844	-47.04	-157.772	-109.050

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.021	0.026	0.005	0.007	0.009	0.002
10.00	0.169	0.423	0.042	0.056	0.141	0.014
15.00	0.557	2.122	0.141	0.189	0.712	0.047
20.00	1.212	6.453	0.323	0.434	2.219	0.111
25.00	1.988	14.430	0.577	0.786	5.230	0.209
30.00	2.789	26.363	0.879	1.219	10.216	0.341
35.00	3.580	42.300	1.209	1.709	17.518	0.501
40.00	4.319	62.067	1.552	2.236	27.368	0.684
45.00	5.015	85.423	1.898	2.785	39.914	0.887
50.00	5.653	112.12	2.242	3.347	55.242	1.105
55.00	6.237	141.86	2.579	3.914	73.394	1.334
60.00	6.787	174.44	2.907	4.480	94.380	1.573
65.00	7.284	209.64	3.225	5.044	118.19	1.818
70.00	7.726	247.18	3.531	5.600	144.80	2.069
75.00	8.137	286.85	3.825	6.147	174.18	2.322
80.00	8.537	328.54	4.107	6.685	206.26	2.578
85.00	8.911	372.17	4.378	7.214	241.01	2.835
90.00	9.256	417.60	4.640	7.733	278.38	3.093
95.00	9.573	464.68	4.891	8.242	318.33	3.351
100.00	9.870	513.30	5.133	8.741	360.79	3.608
105.00	10.165	563.38	5.366	9.230	405.72	3.864
110.00	10.463	614.95	5.590	9.709	453.07	4.119
115.00	10.765	668.02	5.809	10.181	502.80	4.372
120.00	11.068	722.61	6.022	10.646	554.87	4.624
125.00	11.369	778.70	6.230	11.104	609.25	4.874
130.00	11.670	836.29	6.433	11.555	665.90	5.122
135.00	11.973	895.40	6.633	12.001	724.79	5.369
140.00	12.277	956.02	6.829	12.442	785.90	5.614
145.00	12.581	1018.2	7.022	12.879	849.21	5.857
150.00	12.886	1081.8	7.212	13.310	914.68	6.098
155.00	13.194	1147.0	7.400	13.738	982.30	6.337
160.00	13.505	1213.8	7.586	14.161	1052.1	6.575
165.00	13.818	1282.1	7.770	14.582	1123.9	6.812
170.00	14.132	1352.0	7.953	14.999	1197.9	7.046
175.00	14.446	1423.4	8.134	15.413	1273.9	7.279
180.00	14.761	1496.4	8.313	15.825	1352.0	7.511
185.00	15.076	1571.0	8.492	16.233	1432.1	7.741
190.00	15.391	1647.2	8.669	16.640	1514.3	7.970
195.00	15.705	1724.9	8.846	17.043	1598.5	8.198
200.00	16.019	1804.2	9.021	17.445	1684.7	8.424
205.00	16.332	1885.1	9.196	17.844	1773.0	8.649
210.00	16.643	1967.6	9.369	18.242	1863.2	8.872
215.00	16.952	2051.5	9.542	18.637	1955.4	9.095
220.00	17.258	2137.1	9.714	19.030	2049.6	9.316
225.00	17.564	2224.1	9.885	19.421	2145.7	9.536
230.00	17.871	2312.7	10.055	19.811	2243.8	9.756
235.00	18.181	2402.8	10.225	20.198	2343.8	9.974
240.00	18.496	2494.5	10.394	20.585	2445.7	10.191
245.00	18.814	2587.8	10.562	20.969	2549.6	10.407
250.00	19.136	2682.7	10.731	21.353	2655.4	10.622
255.00	19.460	2779.2	10.899	21.735	2763.2	10.836
260.00	19.785	2877.3	11.066	22.116	2872.8	11.049
265.00	20.109	2977.0	11.234	22.496	2984.3	11.262
270.00	20.433	3078.4	11.401	22.875	3097.7	11.473
273.15	20.637	3143.1	11.507	23.113	3170.2	11.606
275.00	20.757	3181.4	11.569	23.252	3213.1	11.684
280.00	21.080	3285.9	11.736	23.629	3330.3	11.894
285.00	21.403	3392.2	11.902	24.005	3449.3	12.103
290.00	21.727	3500.0	12.069	24.380	3570.3	12.311
295.00	22.052	3609.4	12.235	24.755	3693.1	12.519
298.15	22.256	3679.2	12.340	24.990	3771.5	12.650
300.00	22.377	3720.5	12.402	25.128	3817.9	12.726
310.00	23.027	3947.5	12.734	25.872	4072.9	13.138
320.00	23.674	4181.0	13.066	26.613	4335.3	13.548

Section IV

Tables of Thermodynamic Functions of Inorganic and a Few Simple Organic Compounds

G. T. Furukawa, M. L. Reilly, and G. D. Mitchell

Standard Thermodynamic Changes on Formation from the Elements.

Whenever possible values of ΔH_T° and ΔG_T° were taken from NBS Technical Note 270-1 (Wagman, et al.). The only other source consulted was the JANAF Thermochemical Tables (1965). Interconsistency between the values of ΔH_T° nad ΔG_T° was tested with the thermodynamic data of the lower part of the table. Where values of ΔG_T°, ΔS_T° and $\Delta C_{p_T}^\circ$ and the other values at 298.15°K were lacking, they were calculated from ΔH_T° using the data from the tables. The preparation of the data for presentation is described briefly in the next paragraph.

Standard Thermodynamic Functions.

Except for $P_4O_{10}(c)$ and $P_4S_3(c)$ the tables of thermodynamic properties given in this report are the results of processing the values of the JANAF Thermochemical Tables. The JANAF Tables stored on magnetic tapes were "manipulated" on the IBM 7094 computer to obtain the values in the desired units and format. The results of the calculations were placed on punched cards so that after inserting the title and column heading cards and cards containing the values of standard thermodynamic changes on formation, the final printed tables could be prepared on the IBM 407 lister. Wherever they were available the most recent issues of the JANAF Table values were used in the calculations.

The reference temperature of the JANAF Thermochemical Tables is 298.15°K for the Gibbs energy function and relative enthalpy. The entropy is in most cases relative to 0°K. The following relations were used to convert the JANAF Table values wherever possible to the 0°K reference temperature:

$$H^\circ_{T°K} - H^\circ_{0°K} = (H^\circ_{T°K} - H^\circ_{298.15°K}) - (H^\circ_{0°K} - H^\circ_{298.15°K}) \qquad (1)$$

$$-(G^\circ_{T°K} - H^\circ_{0°K}) = T\,S^\circ_{T°K} - (H^\circ_{T°K} - H^\circ_{0°K}) \,. \qquad (2)$$

The enthalpy function, $(H^\circ_{T°K} - H^\circ_{0°K})/T$, and the Gibbs energy function, $-(G^\circ_{T°K} - H^\circ_{0°K})/T$, relative to 0°K were obtained by dividing the values of the respective equations (1) and (2) by the corresponding temperature T. Whenever the conversion to 0°K was not possible, the 298.15°K reference temperature was used.

The value of the gas constant R used in the JANAF Tables is 1.98726 cal deg^{-1} mol^{-1}. The values of thermodynamic properties from statistical calculations given in the JANAF Tables were, therefore, converted to the value of R (8.3143/4.1840 cal deg^{-1} mol^{-1}) accepted by the National Bureau of Standards.

Some of the tables were calculated directly by means of the usual statistical methods from molecular constants and spectroscopic data. The input data for the statistical calculations were also taken from the JANAF Tables. The tables of the following substances were prepared by this method: e^-, C^-, C_2H_4, C_3O_2, H^-, HN, HO, HO^-, HO^+, HO_2, H_2N, H_2N_2, H_4N_2, N, NO_2, O^-, OS, OS_2, O_3S, $O_{10}P_4(g)$, and $S_8(g)$. The results calculated are in agreement with the JANAF Tables, except for a small discrepancy with C_3O_2 and OS. In C_3O_2, the heat capacity is in agreement but the entropy and enthalpy are different by more than the expected amount. The difference is, however, smaller than the uncertainty in the data used for the calculation. In OS, although the values for entropy and heat capacity agree, there is a constant 3 cal difference in the enthalpy.

The heat-capacity measurements on $P_4O_{10}(c)$ reported by R.J.L. Andon, J. F. Counsell, H. McKerrell, and J. F. Martin (Trans. Faraday Soc. 59, 2702 (1963)) were analyzed to obtain the tables of thermodynamic properties on $P_4O_{10}(c)$ from 0 to 330°K. For $P_4S_3(c)$ the measurements reported by H. L. Clever, E. F. Westrum, Jr., and A. W. Cordes (J. Phys. Chem. 69, 1214 (1965)) were analyzed to obtain the thermodynamic properties from 0 to 350°K.

As in the JANAF Tables, the phase states of some of the substances were extrapolated smoothly beyond the known stable temperatures for purposes of high-speed computer applications. For example, the solid phase properties of $N_2O_4(c)$ were extrapolated beyond the melting point. The properties of $S(\ell)$ were extrapolated below the melting point and above the boiling point. The values of thermodynamic properties in the stable temperature range are separated by dashed lines from those in the hypothetical range. Similarly, dashed lines have been placed wherever phase changes and, hence, discontinuities in the thermodynamic properties occur. Wherever the liquid state properties of a substance is extrapolated below the melting point, the reference temperature of the properties tabulated is 298.15°K and not 0°K.

List of Thermodynamic Tables

List of Thermodynamic Tables (Cont'd.)

Table	Compound	State
52	Imidogen (HN)	Ideal gas
53	Nitroyl (HNO)	" "
54	Nitrous Acid Cis (HNO_2)	" "
55	Nitrous Acid Trans (HNO_2)	" "
56	Nitric Acid (HNO_3)	" "
57	Hydroxyl (HO)	" "
58	Hydroxyl Unipositive Ion (HO^+)	" "
59	Hydroxyl Uninegative Ion (HO^-)	" "
60	Hydroperoxyl (HO_2)	" "
61	Phosphorus Monohydride (HP)	" "
62	Sulfur Monohydride (HS)	" "
63	Hydrogen Diatomic (Ref. St.) (H_2)	" "
64	Amidogen (H_2N)	" "
65	Diimide (H_2N_2)	" "
66	Water (H_2O)	" "
67	Hydrogen Peroxide (H_2O_2)	" "
68	Hydrogen Sulfate (H_2O_4S)	Liquid
69	Hydrogen Sulfide (H_2S)	Ideal gas
70	Ammonia (H_3N)	" "
71	Phosphine (H_3P)	" "
72	Ortho-Phosphoric Acid (H_3O_4P)	Liquid
73	Ortho-Phosphoric Acid (H_3O_4P)	Crystal
74	Hydrazine (H_4N_2)	Ideal gas
75	Hydrazine (H_4N_2)	Liquid
76	Monatomic Nitrogen (N)	Ideal gas
77	Nitric Oxide (NO)	" "
78	Nitrogen Dioxide (NO_2)	" "
79	Nitrogen Diatomic Uninegative Ion (NO_2^-)	" "
80	Nitrogen Trioxide (NO_3)	" "
81	Phosphorus Nitride (NP)	" "
82	Nitrogen (Ref. St.) (N_2)	" "
83	Sulfur Nitride (NS)	" "
84	Dinitrogen Monoxide (N_2O)	" "

List of Thermodynamic Tables (Cont'd.)

Table	Compound	State
85	Dinitrogen Trioxide (N_2O_3)	Ideal gas
86	Nitrogen Tetroxide (N_2O_4)	" "
87	Nitrogen Tetroxide (N_2O_4)	Liquid
88	Nitrogen Tetroxide (N_2O_4)	Crystal
89	Nitrogen Pentoxide (N_2O_5)	Ideal gas
90	Triphosphorus Penlanitride (N_3P_5)	Crystal
91	Oxygen Monatomic (O)	Ideal gas
92	Oxygen Uninegative Ion (O^-)	" "
93	Phosphorus Monoxide (OP)	" "
94	Sulful Monoxide (OS)	" "
95	Disulfur Monoxide (OS_2)	" "
96	Oxygen Diatomic (Ref. St.) (O_2)	" "
97	Phosphorus Dioxide (O_2P)	" "
98	Sulfur Dioxide (O_2S)	" "
99	Ozone (O_3)	" "
100	Sulfur Trioxide (O_3S)	" "
101	Phosphorus Trioxide Dimeric (O_6P_4)	" "
102	Phosphorus Pentoxide Dimeric ($O_{10}P_4$)	" "
103	Phosphorus Pentoxide Dimeric ($O_{10}P_4$)	Crystal
104	Phosphorus (P)	Ideal gas
105	Phosphorus (P)	Liquid
106	Phosphorus Red (P)	Crystal
107	Phosphorus White (Ref. St.) (P)	"
108	Phosphorus Sulfide (PS)	Ideal gas
109	Phosphorus Diatomic (P_2)	" "
110	Phosphorus Tetratomic (P_4)	" "
111	Phosphorus Sulfide Dimeric (P_4S_3)	" "
112	Phosphorus Sulfide Dimeric (P_4S_3)	Liquid
113	Phosphorus Sulfide Dimeric (P_4S_3)	Crystal
114	Sulfur (Ref. St.) (S)	Ideal gas

List of Thermodynamic Tables (Cont'd.)

Table	Compound	State
115	Sulfur Monatomic (S)	Ideal gas
116	Sulfur Monatomic (S)	Liquid
117	Sulfur Monatomic (S)	Crystal
118	Sulfur Diatomic (S_2)	Ideal gas
119	Sulfur Octatomic (S_8)	" "
120	Electron Gas (e^-)	" "

TABLE 22

MOLAR THERMODYNAMIC PROPERTIES FOR GRAPHITE (REF. ST.) (C)

CRYSTAL

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 12.01115 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.00	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	0.395	13.999	0.140	0.210	7.000	0.070
200.00	1.202	91.995	0.460	0.720	51.997	0.260
298.15	2.038	251.99	0.845	1.359	153.20	0.514
300.00	2.054	255.99	0.853	1.372	155.59	0.519
400.00	2.851	501.97	1.255	2.075	327.98	0.820
500.00	3.496	820.96	1.642	2.784	570.97	1.142
600.00	4.038	1196.9	1.996	3.471	883.56	1.473
700.00	4.440	1623.9	2.320	4.126	1264.1	1.806
800.00	4.740	2082.9	2.604	4.739	1708.1	2.135
900.00	4.970	2569.9	2.855	5.311	2209.8	2.455
1000.00	5.149	3075.8	3.076	5.844	2767.9	2.768
1100.00	5.304	3598.8	3.272	6.342	3377.0	3.070
1200.00	5.430	4134.8	3.446	6.809	4035.6	3.363
1300.00	5.527	4683.8	3.603	7.248	4738.2	3.645
1400.00	5.605	5239.7	3.743	7.661	5485.1	3.918
1500.00	5.669	5803.7	3.869	8.050	6270.7	4.180
1600.00	5.721	6373.7	3.984	8.417	7092.8	4.433
1700.00	5.765	6947.7	4.087	8.765	7952.1	4.678
1800.00	5.803	7526.6	4.181	9.096	8845.4	4.914
1900.00	5.836	8108.6	4.268	9.411	9771.4	5.143
2000.00	5.865	8693.6	4.347	9.711	10727.	5.364
2100.00	5.891	9280.5	4.419	9.997	11714.	5.578
2200.00	5.914	9871.5	4.487	10.271	12726.	5.784
2300.00	5.936	10463.	4.549	10.535	13768.	5.986
2400.00	5.956	11058.	4.608	10.788	14834.	6.181
2500.00	5.974	11654.	4.662	11.031	15924.	6.370
2600.00	5.992	12253.	4.713	11.266	17039.	6.554
2700.00	6.009	12853.	4.761	11.492	18176.	6.732
2800.00	6.026	13454.	4.805	11.711	19338.	6.906
2900.00	6.042	14058.	4.848	11.923	20520.	7.076
3000.00	6.057	14663.	4.888	12.128	21722.	7.241
3100.00	6.073	15269.	4.926	12.327	22946.	7.402
3200.00	6.088	15877.	4.962	12.520	24188.	7.559
3300.00	6.103	16487.	4.996	12.707	25447.	7.711
3400.00	6.119	17098.	5.029	12.890	26729.	7.861
3500.00	6.134	17711.	5.060	13.067	28025.	8.007
3600.00	6.150	18325.	5.090	13.240	29340.	8.150
3700.00	6.165	18941.	5.119	13.409	30673.	8.290
3800.00	6.181	19558.	5.147	13.574	32024.	8.427
3900.00	6.197	20177.	5.174	13.735	33391.	8.562
4000.00	6.213	20797.	5.199	13.892	34772.	8.693
4100.00	6.230	21419.	5.224	14.045	36167.	8.821
4200.00	6.247	22043.	5.248	14.196	37582.	8.948
4300.00	6.264	22669.	5.272	14.343	39007.	9.071
4400.00	6.281	23296.	5.295	14.487	40448.	9.193
4500.00	6.299	23925.	5.317	14.628	41902.	9.312
4600.00	6.317	24556.	5.338	14.767	43374.	9.429
4700.00	6.335	25188.	5.359	14.903	44858.	9.544
4800.00	6.354	25823.	5.380	15.037	46356.	9.658
4900.00	6.373	26459.	5.400	15.168	47866.	9.769
5000.00	6.392	27097.	5.419	15.297	49390.	9.878
5100.00	6.412	27738.	5.439	15.423	50921.	9.984
5200.00	6.432	28380.	5.458	15.548	52471.	10.091
5300.00	6.452	29024.	5.476	15.671	54034.	10.195
5400.00	6.473	29670.	5.494	15.792	55608.	10.298
5500.00	6.494	30318.	5.512	15.911	57193.	10.399
5600.00	6.516	30968.	5.530	16.028	58789.	10.498
5700.00	6.538	31621.	5.548	16.143	60395.	10.596
5800.00	6.560	32276.	5.565	16.257	62015.	10.692
5900.00	6.583	32933.	5.582	16.370	63651.	10.788
6000.00	6.606	33592.	5.599	16.480	65289.	10.881

TABLE 23

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON MONATOMIC (C)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 12.01115 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	2.900	171.291	574.5128	36.400	160.442	538.1224

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	5.084	570.20	5.702	32.281	2657.9	26.579
200.00	4.996	1072.8	5.364	35.768	6080.8	30.404
298.15	4.980	1562.2	5.240	37.759	9695.7	32.519
300.00	4.980	1571.4	5.238	37.790	9765.6	32.552
400.00	4.975	2069.1	5.173	39.222	13620.	34.049
500.00	4.972	2566.5	5.133	40.332	17599.	35.199
600.00	4.971	3063.6	5.106	41.238	21679.	36.132
700.00	4.970	3560.7	5.087	42.004	25842.	36.918
800.00	4.970	4057.7	5.072	42.668	30077.	37.596
900.00	4.969	4554.6	5.061	43.253	34373.	38.193
1000.00	4.969	5051.5	5.052	43.777	38725.	38.725
1100.00	4.969	5548.5	5.044	44.250	43127.	39.206
1200.00	4.969	6045.4	5.038	44.683	47574.	39.645
1300.00	4.970	6542.4	5.033	45.081	52062.	40.048
1400.00	4.972	7039.5	5.028	45.449	56589.	40.421
1500.00	4.975	7536.8	5.025	45.792	61151.	40.768
1600.00	4.978	8034.4	5.022	46.113	65747.	41.092
1700.00	4.983	8532.5	5.019	46.415	70373.	41.396
1800.00	4.990	9031.1	5.017	46.700	75029.	41.683
1900.00	4.998	9530.5	5.016	46.970	79713.	41.954
2000.00	5.008	10031.	5.015	47.227	84423.	42.211
2100.00	5.019	10532.	5.015	47.471	89158.	42.456
2200.00	5.031	11035.	5.016	47.705	93917.	42.689
2300.00	5.045	11538.	5.017	47.929	98699.	42.912
2400.00	5.060	12044.	5.018	48.144	103502.	43.126
2500.00	5.077	12551.	5.020	48.351	108327.	43.331
2600.00	5.094	13059.	5.023	48.550	113172.	43.528
2700.00	5.112	13569.	5.026	48.743	118037.	43.717
2800.00	5.130	14081.	5.029	48.929	122921.	43.900
2900.00	5.149	14595.	5.033	49.110	127823.	44.077
3000.00	5.167	15111.	5.037	49.284	132742.	44.247
3100.00	5.186	15629.	5.042	49.454	137679.	44.413
3200.00	5.205	16148.	5.046	49.619	142633.	44.573
3300.00	5.224	16670.	5.051	49.780	147603.	44.728
3400.00	5.243	17193.	5.057	49.936	152589.	44.879
3500.00	5.261	17718.	5.062	50.088	157590.	45.026
3600.00	5.279	18245.	5.068	50.237	162606.	45.168
3700.00	5.296	18774.	5.074	50.381	167637.	45.307
3800.00	5.313	19305.	5.080	50.523	172682.	45.443
3900.00	5.329	19837.	5.086	50.661	177742.	45.575
4000.00	5.345	20370.	5.093	50.796	182815.	45.704
4100.00	5.360	20906.	5.099	50.928	187901.	45.829
4200.00	5.374	21442.	5.105	51.058	193000.	45.952
4300.00	5.388	21980.	5.112	51.184	198112.	46.073
4400.00	5.401	22520.	5.118	51.308	203237.	46.190
4500.00	5.414	23061.	5.125	51.430	208374.	46.305
4600.00	5.426	23603.	5.131	51.549	213523.	46.418
4700.00	5.437	24146.	5.137	51.666	218684.	46.528
4800.00	5.448	24690.	5.144	51.780	223856.	46.637
4900.00	5.458	25235.	5.150	51.893	229040.	46.743
5000.00	5.468	25782.	5.156	52.003	234234.	46.847
5100.00	5.477	26329.	5.163	52.112	239440.	46.949
5200.00	5.486	26877.	5.169	52.218	244657.	47.049
5300.00	5.494	27426.	5.175	52.323	249884.	47.148
5400.00	5.502	27976.	5.181	52.425	255121.	47.245
5500.00	5.509	28526.	5.187	52.526	260369.	47.340
5600.00	5.516	29078.	5.192	52.626	265626.	47.433
5700.00	5.523	29630.	5.198	52.723	270894.	47.525
5800.00	5.529	30182.	5.204	52.820	276171.	47.616
5900.00	5.535	30735.	5.209	52.914	281458.	47.705
6000.00	5.540	31289.	5.215	53.007	286754.	47.792

TABLE 24

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON UNINEGATIVE (C^-)
IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 12.01170 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.038	140.5	47.1237	29.807	131.6059	44.1406

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	4.968	496.79	4.968	30.727	2575.9	25.759
200.00	4.968	993.58	4.968	34.170	5840.5	29.202
298.15	4.968	1481.2	4.968	36.154	9298.1	31.186
300.00	4.968	1490.4	4.968	36.185	9365.0	31.217
400.00	4.968	1987.2	4.968	37.614	13058.	32.646
500.00	4.968	2483.9	4.968	38.722	16877.	33.754
600.00	4.968	2980.7	4.968	39.628	20796.	34.660
700.00	4.968	3477.5	4.968	40.394	24798.	35.426
800.00	4.968	3974.3	4.968	41.057	28872.	36.089
900.00	4.968	4471.1	4.968	41.642	33007.	36.675
1000.00	4.968	4967.9	4.968	42.166	37198.	37.198
1100.00	4.968	5464.7	4.968	42.639	41439.	37.671
1200.00	4.968	5961.5	4.968	43.072	45724.	38.104
1300.00	4.968	6458.3	4.968	43.469	50052.	38.501
1400.00	4.968	6955.1	4.968	43.837	54417.	38.870
1500.00	4.968	7451.9	4.968	44.180	58818.	39.212
1600.00	4.968	7948.6	4.968	44.501	63253.	39.533
1700.00	4.968	8445.4	4.968	44.802	67718.	39.834
1800.00	4.968	8942.2	4.968	45.086	72212.	40.118
1900.00	4.968	9439.1	4.968	45.355	76735.	40.387
2000.00	4.969	9935.9	4.968	45.609	81283.	40.641
2100.00	4.970	10433.	4.968	45.852	85856.	40.884
2200.00	4.971	10930.	4.968	46.083	90453.	41.115
2300.00	4.972	11427.	4.968	46.304	95072.	41.336
2400.00	4.974	11924.	4.968	46.516	99713.	41.547
2500.00	4.977	12422.	4.969	46.719	104375.	41.750
2600.00	4.981	12920.	4.969	46.914	109057.	41.945
2700.00	4.987	13418.	4.970	47.102	113758.	42.133
2800.00	4.993	13917.	4.970	47.284	118477.	42.313
2900.00	5.001	14417.	4.971	47.459	123214.	42.488
3000.00	5.010	14917.	4.972	47.629	127969.	42.656
3100.00	5.021	15419.	4.974	47.793	132740.	42.819
3200.00	5.034	15922.	4.976	47.953	137527.	42.977
3300.00	5.049	16426.	4.978	48.108	142330.	43.130
3400.00	5.066	16932.	4.980	48.259	147149.	43.279
3500.00	5.085	17439.	4.983	48.406	151982.	43.423
3600.00	5.106	17949.	4.986	48.550	156830.	43.564
3700.00	5.130	18461.	4.989	48.690	161692.	43.700
3800.00	5.155	18975.	4.993	48.827	166568.	43.834
3900.00	5.183	19492.	4.998	48.961	171457.	43.963
4000.00	5.212	20011.	5.003	49.093	176360.	44.090
4100.00	5.244	20534.	5.008	49.222	181276.	44.214
4200.00	5.278	21060.	5.014	49.349	186204.	44.334
4300.00	5.313	21590.	5.021	49.473	191145.	44.452
4400.00	5.351	22123.	5.028	49.596	196099.	44.568
4500.00	5.390	22660.	5.036	49.717	201064.	44.681
4600.00	5.431	23201.	5.044	49.835	206042.	44.792
4700.00	5.473	23746.	5.052	49.953	211031.	44.900
4800.00	5.516	24296.	5.062	50.068	216032.	45.007
4900.00	5.561	24850.	5.071	50.183	221045.	45.111
5000.00	5.607	25408.	5.082	50.295	226069.	45.214
5100.00	5.654	25971.	5.092	50.407	231104.	45.315
5200.00	5.702	26539.	5.104	50.517	236150.	45.414
5300.00	5.751	27111.	5.115	50.626	241207.	45.511
5400.00	5.800	27689.	5.128	50.734	246275.	45.607
5500.00	5.849	28271.	5.140	50.841	251354.	45.701
5600.00	5.899	28859.	5.153	50.947	256444.	45.793
5700.00	5.949	29451.	5.167	51.052	261544.	45.885
5800.00	5.999	30049.	5.181	51.156	266654.	45.975
5900.00	6.050	30651.	5.195	51.259	271775.	46.063
6000.00	6.100	31259.	5.210	51.361	276906.	46.151

TABLE 25

MOLAR THERMODYNAMIC PROPERTIES FOR METHYLIDYNE (CH)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 13.01912 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	1.488	142.4	477.609	26.759	134.426	450.8670

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.994	703.96	7.040	36.099	2906.0	29.060
200.00	6.972	1401.9	7.010	40.937	6785.5	33.927
298.15	6.972	2085.9	6.996	43.721	10950.	36.726
300.00	6.972	2098.9	6.996	43.764	11030.	36.767
400.00	6.985	2796.9	6.992	45.771	15511.	38.779
500.00	7.026	3496.8	6.994	47.333	20169.	40.339
600.00	7.108	4202.8	7.005	48.621	24970.	41.616
700.00	7.224	4919.8	7.028	49.725	29887.	42.696
800.00	7.361	5648.7	7.061	50.697	34909.	43.637
900.00	7.508	6391.7	7.102	51.573	40024.	44.472
1000.00	7.654	7149.6	7.150	52.371	45222.	45.222
1100.00	7.794	7922.6	7.202	53.107	50495.	45.905
1200.00	7.925	8708.6	7.257	53.791	55841.	46.534
1300.00	8.044	9506.5	7.313	54.430	61253.	47.118
1400.00	8.153	10316.	7.369	55.031	66727.	47.662
1500.00	8.252	11137.	7.425	55.597	72258.	48.172
1600.00	8.342	11966.	7.479	56.132	77845.	48.653
1700.00	8.423	12805.	7.533	56.640	83483.	49.108
1800.00	8.496	13651.	7.584	57.124	89172.	49.540
1900.00	8.563	14504.	7.634	57.585	94907.	49.951
2000.00	8.624	15363.	7.682	58.026	100689.	50.344
2100.00	8.680	16228.	7.728	58.448	106513.	50.720
2200.00	8.731	17099.	7.772	58.853	112378.	51.081
2300.00	8.779	17975.	7.815	59.242	118282.	51.427
2400.00	8.823	18855.	7.856	59.617	124226.	51.761
2500.00	8.864	19739.	7.896	59.978	130206.	52.082
2600.00	8.902	20627.	7.933	60.326	136221.	52.393
2700.00	8.938	21519.	7.970	60.663	142271.	52.693
2800.00	8.971	22415.	8.005	60.988	148351.	52.983
2900.00	9.003	23314.	8.039	61.304	154468.	53.265
3000.00	9.033	24215.	8.072	61.609	160612.	53.537
3100.00	9.062	25120.	8.103	61.906	166789.	53.803
3200.00	9.089	26028.	8.134	62.194	172993.	54.060
3300.00	9.115	26938.	8.163	62.474	179226.	54.311
3400.00	9.140	27851.	8.191	62.747	185489.	54.556
3500.00	9.164	28766.	8.219	63.012	191776.	54.793
3600.00	9.187	29684.	8.245	63.271	198091.	55.025
3700.00	9.210	30602.	8.271	63.523	204432.	55.252
3800.00	9.231	31524.	8.296	63.769	210797.	55.473
3900.00	9.252	32449.	8.320	64.009	217185.	55.688
4000.00	9.273	33375.	8.344	64.243	223596.	55.899
4100.00	9.293	34303.	8.367	64.472	230031.	56.105
4200.00	9.312	35233.	8.389	64.697	236493.	56.308
4300.00	9.331	36166.	8.411	64.916	242972.	56.505
4400.00	9.350	37100.	8.432	65.131	249475.	56.699
4500.00	9.368	38036.	8.452	65.341	255997.	56.888
4600.00	9.385	38973.	8.472	65.547	262542.	57.074
4700.00	9.403	39913.	8.492	65.749	269106.	57.257
4800.00	9.420	40854.	8.511	65.947	275690.	57.435
4900.00	9.437	41797.	8.530	66.142	282297.	57.612
5000.00	9.454	42741.	8.548	66.332	288918.	57.784
5100.00	9.470	43687.	8.566	66.520	295564.	57.954
5200.00	9.486	44635.	8.584	66.704	302224.	58.120
5300.00	9.502	45584.	8.601	66.885	308905.	58.284
5400.00	9.518	46535.	8.618	67.062	315598.	58.444
5500.00	9.533	47488.	8.634	67.237	322314.	58.603
5600.00	9.549	48442.	8.650	67.409	329047.	58.758
5700.00	9.564	49398.	8.666	67.578	335795.	58.911
5800.00	9.579	50354.	8.682	67.745	342564.	59.063
5900.00	9.594	51313.	8.697	67.909	349347.	59.211
6000.00	9.609	52273.	8.712	68.070	356144.	59.357

TABLE 26

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN CYANIDE (CHN)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 27.10582 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 0.370	32.3	108.334	8.385	29.8	99.9492

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.971	693.97	6.940	40.023	3308.3	33.083
200.00	7.589	1413.9	7.070	44.990	7584.0	37.920
298.15	8.594	2208.9	7.409	48.211	12165.	40.801
300.00	8.611	2224.9	7.416	48.264	12254.	40.847
400.00	9.421	3128.8	7.822	50.857	17214.	43.035
500.00	10.041	4102.8	8.206	53.029	22412.	44.824
600.00	10.561	5133.7	8.556	54.907	27811.	46.351
700.00	11.024	6212.7	8.875	56.570	33386.	47.695
800.00	11.446	7336.6	9.171	58.070	39119.	48.899
900.00	11.831	8501.6	9.446	59.441	44995.	49.995
1000.00	12.181	9702.5	9.703	60.706	51003.	51.003
1100.00	12.498	10936.	9.942	61.882	57134.	51.940
1200.00	12.784	12200.	10.167	62.983	63379.	52.816
1300.00	13.041	13492.	10.379	64.016	69728.	53.637
1400.00	13.272	14808.	10.577	64.991	76179.	54.413
1500.00	13.478	16146.	10.764	65.914	82724.	55.150
1600.00	13.664	17503.	10.939	66.790	89360.	55.850
1700.00	13.832	18878.	11.105	67.624	96082.	56.519
1800.00	13.983	20269.	11.261	68.419	102884.	57.158
1900.00	14.121	21675.	11.408	69.179	109764.	57.771
2000.00	14.245	23093.	11.546	69.906	116718.	58.359
2100.00	14.360	24523.	11.678	70.603	123745.	58.926
2200.00	14.464	25965.	11.802	71.274	130839.	59.472
2300.00	14.560	27416.	11.920	71.919	137999.	60.000
2400.00	14.649	28877.	12.032	72.540	145220.	60.508
2500.00	14.732	30345.	12.138	73.140	152505.	61.002
2600.00	14.808	31822.	12.239	73.719	159848.	61.480
2700.00	14.880	33307.	12.336	74.280	167249.	61.944
2800.00	14.947	34798.	12.428	74.822	174704.	62.394
2900.00	15.010	36296.	12.516	75.348	182214.	62.832
3000.00	15.070	37800.	12.600	75.858	189775.	63.258
3100.00	15.126	39310.	12.681	76.353	197385.	63.673
3200.00	15.180	40826.	12.758	76.834	205043.	64.076
3300.00	15.231	42346.	12.832	77.302	212751.	64.470
3400.00	15.279	43872.	12.903	77.757	220502.	64.854
3500.00	15.325	45402.	12.972	78.201	228302.	65.229
3600.00	15.370	46937.	13.038	78.633	236142.	65.595
3700.00	15.413	48476.	13.102	79.055	244028.	65.954
3800.00	15.454	50019.	13.163	79.467	251955.	66.304
3900.00	15.494	51566.	13.222	79.869	259923.	66.647
4000.00	15.532	53118.	13.280	80.261	267926.	66.981
4100.00	15.569	54673.	13.335	80.645	275971.	67.310
4200.00	15.605	56232.	13.389	81.021	284056.	67.632
4300.00	15.640	57794.	13.440	81.389	292178.	67.948
4400.00	15.674	59360.	13.491	81.749	300335.	68.258
4500.00	15.707	60929.	13.540	82.101	308525.	68.561
4600.00	15.739	62502.	13.587	82.447	316754.	68.860
4700.00	15.771	64077.	13.633	82.786	325017.	69.152
4800.00	15.802	65656.	13.678	83.118	333310.	69.440
4900.00	15.832	67238.	13.722	83.444	341637.	69.722
5000.00	15.861	68822.	13.764	83.764	349997.	69.999
5100.00	15.890	70409.	13.806	84.079	358392.	70.273
5200.00	15.918	72000.	13.846	84.388	366816.	70.542
5300.00	15.946	73593.	13.886	84.691	375268.	70.805
5400.00	15.973	75189.	13.924	84.989	383750.	71.065
5500.00	16.000	76788.	13.961	85.283	392267.	71.321
5600.00	16.026	78389.	13.998	85.571	400807.	71.573
5700.00	16.052	79993.	14.034	85.855	409379.	71.821
5800.00	16.077	81600.	14.069	86.135	417981.	72.066
5900.00	16.101	83209.	14.103	86.410	426608.	72.306
6000.00	16.125	84820.	14.137	86.680	435258.	72.543

TABLE 27

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN ISOCYANATE (CHNO)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 29.01852 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 2.093	- 27.9	-93.5766	- 7.441	-25.6786	-86.1266

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.000	794.96	7.950	47.151	3920.1	39.201
200.00	9.121	1639.9	8.200	52.960	8952.2	44.761
298.15	10.723	2614.9	8.770	56.906	14352.	48.137
300.00	10.751	2634.9	8.783	56.972	14457.	48.189
400.00	12.084	3779.8	9.450	60.256	20323.	50.806
500.00	13.113	5041.7	10.083	63.068	26492.	52.984
600.00	13.933	6395.7	10.659	65.534	32925.	54.874
700.00	14.612	7823.6	11.177	67.735	39591.	56.558
800.00	15.190	9314.5	11.643	69.725	46465.	58.081
900.00	15.689	10858.	12.065	71.542	53530.	59.477
1000.00	16.124	12450.	12.450	73.218	60768.	60.768
1100.00	16.506	14082.	12.807	74.774	68169.	61.972
1200.00	16.841	15750.	13.125	76.225	75720.	63.100
1300.00	17.135	17449.	13.422	77.585	83412.	64.163
1400.00	17.393	19175.	13.696	78.864	91235.	65.168
1500.00	17.621	20927.	13.951	80.072	99181.	66.121
1600.00	17.822	22699.	14.187	81.216	107247.	67.029
1700.00	18.000	24490.	14.406	82.302	115423.	67.896
1800.00	18.158	26299.	14.610	83.335	123704.	68.724
1900.00	18.298	28122.	14.801	84.321	132088.	69.520
2000.00	18.423	29958.	14.979	85.263	140568.	70.284
2100.00	18.534	31805.	15.145	86.164	149138.	71.018
2200.00	18.634	33663.	15.302	87.029	157800.	71.727
2300.00	18.724	35531.	15.448	87.859	166544.	72.410
2400.00	18.804	37408.	15.587	88.658	175370.	73.071
2500.00	18.877	39292.	15.717	89.427	184274.	73.710
2600.00	18.943	41183.	15.840	90.168	193255.	74.329
2700.00	19.003	43081.	15.956	90.884	202307.	74.929
2800.00	19.058	44984.	16.066	91.576	211430.	75.511
2900.00	19.107	46892.	16.170	92.246	220623.	76.077
3000.00	19.153	48806.	16.269	92.894	229878.	76.626
3100.00	19.194	50722.	16.362	93.523	239200.	77.161
3200.00	19.233	52644.	16.451	94.133	248582.	77.682
3300.00	19.268	54569.	16.536	94.726	258027.	78.190
3400.00	19.300	56497.	16.617	95.301	267527.	78.684
3500.00	19.330	58429.	16.694	95.861	277085.	79.167
3600.00	19.358	60363.	16.767	96.406	286699.	79.639
3700.00	19.383	62300.	16.838	96.937	296368.	80.099
3800.00	19.407	64240.	16.905	97.454	306086.	80.549
3900.00	19.429	66182.	16.970	97.959	315859.	80.989
4000.00	19.450	68126.	17.031	98.451	325679.	81.420
4100.00	19.469	70071.	17.091	98.931	335546.	81.840
4200.00	19.487	72019.	17.147	99.401	345465.	82.254
4300.00	19.504	73969.	17.202	99.860	355429.	82.658
4400.00	19.520	75920.	17.255	100.31	365435.	83.053
4500.00	19.535	77873.	17.305	100.75	375488.	83.442
4600.00	19.549	79827.	17.354	101.18	385587.	83.823
4700.00	19.562	81783.	17.401	101.60	395723.	84.196
4800.00	19.574	83740.	17.446	102.01	405903.	84.563
4900.00	19.585	85698.	17.489	102.41	416125.	84.924
5000.00	19.596	87657.	17.531	102.81	426388.	85.278
5100.00	19.607	89617.	17.572	103.20	436687.	85.625
5200.00	19.616	91578.	17.611	103.58	447026.	85.967
5300.00	19.626	93540.	17.649	103.95	457399.	86.302
5400.00	19.634	95503.	17.686	104.32	467813.	86.632
5500.00	19.643	97467.	17.721	104.68	478266.	86.957
5600.00	19.651	99432.	17.756	105.03	488751.	87.277
5700.00	19.658	101397.	17.789	105.38	499273.	87.592
5800.00	19.665	103363.	17.821	105.72	509829.	87.902
5900.00	19.672	105330.	17.852	106.06	520417.	88.206
6000.00	19.678	107298.	17.883	106.39	531040.	88.507

TABLE 28

MOLAR THERMODYNAMIC PROPERTIES FOR FORMYL (CHO)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 43.10522 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 0.730	- 2.9	- 9.7266	12.217	- 6.543	-21.9445

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	793.96	7.940	44.928	3698.8	36.988
200.00	7.999	1590.9	7.955	50.444	8498.0	42.490
298.15	8.264	2386.9	8.006	53.680	13618.	45.675
300.00	8.271	2401.9	8.006	53.731	13718.	45.725
400.00	8.703	3249.8	8.125	56.168	19217.	48.044
500.00	9.184	4144.8	8.290	58.161	24936.	49.872
600.00	9.660	5086.7	8.478	59.878	30840.	51.400
700.00	10.107	6075.7	8.680	61.401	36905.	52.721
800.00	10.517	7106.6	8.883	62.778	43116.	53.895
900.00	10.887	8177.6	9.086	64.039	49457.	54.953
1000.00	11.215	9282.5	9.283	65.203	55920.	55.920
1100.00	11.504	10419.	9.472	66.286	62495.	56.813
1200.00	11.757	11582.	9.652	67.298	69175.	57.646
1300.00	11.978	12769.	9.823	68.248	75953.	58.425
1400.00	12.171	13977.	9.984	69.143	82822.	59.159
1500.00	12.340	15203.	10.135	69.988	89780.	59.853
1600.00	12.488	16445.	10.278	70.789	96818.	60.511
1700.00	12.617	17700.	10.412	71.550	103936.	61.139
1800.00	12.731	18968.	10.538	72.275	111128.	61.738
1900.00	12.831	20246.	10.656	72.966	118390.	62.311
2000.00	12.920	21534.	10.767	73.626	125719.	62.859
2100.00	12.999	22830.	10.871	74.259	133115.	63.388
2200.00	13.070	24133.	10.969	74.865	140571.	63.896
2300.00	13.132	25444.	11.062	75.448	148087.	64.386
2400.00	13.189	26760.	11.150	76.008	155660.	64.858
2500.00	13.239	28081.	11.232	76.547	163287.	65.315
2600.00	13.285	29408.	11.311	77.067	170967.	65.757
2700.00	13.326	30738.	11.385	77.570	178701.	66.186
2800.00	13.364	32072.	11.454	78.055	186482.	66.601
2900.00	13.398	33410.	11.521	78.525	194312.	67.004
3000.00	13.429	34752.	11.584	78.979	202185.	67.395
3100.00	13.457	36096.	11.644	79.420	210106.	67.776
3200.00	13.483	37443.	11.701	79.848	218070.	68.147
3300.00	13.507	38793.	11.755	80.263	226075.	68.508
3400.00	13.529	40145.	11.807	80.667	234123.	68.860
3500.00	13.549	41499.	11.857	81.059	242207.	69.202
3600.00	13.568	42855.	11.904	81.441	250332.	69.537
3700.00	13.585	44213.	11.949	81.813	258495.	69.864
3800.00	13.601	45572.	11.993	82.176	266697.	70.183
3900.00	13.616	46933.	12.034	82.529	274930.	70.495
4000.00	13.630	48296.	12.074	82.874	283200.	70.800
4100.00	13.643	49660.	12.112	83.211	291505.	71.099
4200.00	13.655	51024.	12.149	83.540	299843.	71.391
4300.00	13.666	52390.	12.184	83.862	308215.	71.678
4400.00	13.677	53757.	12.218	84.176	316616.	71.958
4500.00	13.687	55125.	12.250	84.483	325047.	72.233
4600.00	13.696	56495.	12.282	84.784	333510.	72.502
4700.00	13.705	57865.	12.312	85.079	342005.	72.767
4800.00	13.713	59236.	12.341	85.368	350529.	73.027
4900.00	13.721	60608.	12.369	85.650	359076.	73.281
5000.00	13.728	61980.	12.396	85.928	367659.	73.532
5100.00	13.735	63353.	12.422	86.200	376266.	73.778
5200.00	13.741	64727.	12.447	86.466	384895.	74.018
5300.00	13.748	66102.	12.472	86.728	393555.	74.256
5400.00	13.753	67477.	12.496	86.985	402240.	74.489
5500.00	13.759	68853.	12.519	87.238	410954.	74.719
5600.00	13.764	70228.	12.541	87.486	419691.	74.945
5700.00	13.769	71605.	12.562	87.729	428448.	75.166
5800.00	13.774	72982.	12.583	87.969	437236.	75.385
5900.00	13.778	74360.	12.603	88.204	446041.	75.600
6000.00	13.783	75738.	12.623	88.436	454875.	75.813

TABLE 29

MOLAR THERMODYNAMIC PROPERTIES FOR METHYLENE (CH_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 14.02709 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 1.488	93.7	314.2698	10.704	91.8035	307.9107

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.956	687.97	6.880	35.553	2867.4	28.674
200.00	7.040	1385.9	6.930	40.386	6691.3	33.456
298.15	7.492	2095.9	7.030	43.269	10805.	36.240
300.00	7.504	2109.9	7.033	43.315	10885.	36.282
400.00	8.167	2892.9	7.232	45.564	15333.	38.332
500.00	8.799	3741.8	7.484	47.456	19986.	39.972
600.00	9.357	4649.8	7.750	49.110	24816.	41.360
700.00	9.857	5610.7	8.015	50.590	29803.	42.575
800.00	10.316	6619.7	8.275	51.936	34929.	43.662
900.00	10.741	7673.6	8.526	53.176	40185.	44.650
1000.00	11.132	8767.6	8.768	54.329	45562.	45.562
1100.00	11.488	9898.5	8.999	55.407	51049.	46.409
1200.00	11.809	11063.	9.220	56.420	56641.	47.201
1300.00	12.097	12259.	9.430	57.377	62331.	47.947
1400.00	12.355	13482.	9.630	58.283	68114.	48.653
1500.00	12.584	14729.	9.820	59.144	73987.	49.325
1600.00	12.788	15998.	9.999	59.963	79943.	49.964
1700.00	12.970	17286.	10.168	60.744	85979.	50.576
1800.00	13.131	18592.	10.329	61.490	92090.	51.161
1900.00	13.275	19912.	10.480	62.204	98275.	51.724
2000.00	13.404	21246.	10.623	62.888	104530.	52.265
2100.00	13.519	22593.	10.759	63.545	110851.	52.786
2200.00	13.622	23950.	10.886	64.176	117237.	53.290
2300.00	13.715	25317.	11.007	64.784	123686.	53.776
2400.00	13.798	26693.	11.122	65.369	130192.	54.247
2500.00	13.874	28077.	11.231	65.934	136758.	54.703
2600.00	13.942	29468.	11.334	66.480	143380.	55.146
2700.00	14.004	30864.	11.431	67.007	150053.	55.575
2800.00	14.061	32268.	11.524	67.518	156781.	55.993
2900.00	14.112	33676.	11.613	68.012	163557.	56.399
3000.00	14.159	35090.	11.697	68.491	170381.	56.794
3100.00	14.203	36508.	11.777	68.956	177254.	57.179
3200.00	14.242	37931.	11.853	69.408	184173.	57.554
3300.00	14.279	39357.	11.926	69.847	191136.	57.920
3400.00	14.312	40787.	11.996	70.273	198143.	58.277
3500.00	14.343	42219.	12.063	70.688	205191.	58.626
3600.00	14.372	43655.	12.126	71.092	212278.	58.966
3700.00	14.399	45094.	12.187	71.487	219410.	59.300
3800.00	14.423	46535.	12.246	71.871	226577.	59.625
3900.00	14.446	47979.	12.302	72.246	233782.	59.944
4000.00	14.468	49425.	12.356	72.612	241025.	60.256
4100.00	14.487	50871.	12.408	72.969	248303.	60.562
4200.00	14.506	52321.	12.457	73.319	255620.	60.862
4300.00	14.523	53773.	12.505	73.660	262966.	61.155
4400.00	14.540	55226.	12.551	73.994	270349.	61.443
4500.00	14.555	56681.	12.596	74.321	277765.	61.725
4600.00	14.569	58137.	12.638	74.642	285217.	62.004
4700.00	14.583	59595.	12.680	74.955	292695.	62.275
4800.00	14.596	61054.	12.720	75.262	300205.	62.543
4900.00	14.608	62514.	12.758	75.563	307746.	62.805
5000.00	14.619	63976.	12.795	75.859	315320.	63.064
5100.00	14.630	65438.	12.831	76.148	322918.	63.317
5200.00	14.640	66902.	12.866	76.432	330546.	63.566
5300.00	14.649	68366.	12.899	76.711	338204.	63.812
5400.00	14.658	69832.	12.932	76.985	345888.	64.053
5500.00	14.667	71297.	12.963	77.254	353600.	64.291
5600.00	14.675	72764.	12.994	77.519	361343.	64.525
5700.00	14.683	74232.	13.023	77.779	369109.	64.756
5800.00	14.690	75701.	13.052	78.034	376897.	64.982
5900.00	14.697	77171.	13.080	78.285	384711.	65.205
6000.00	14.704	78641.	13.107	78.532	392551.	65.425

TABLE 30

MOLAR THERMODYNAMIC PROPERTIES FOR FORMALDEHYDE (CH_2O)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 30.02649 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 4.006	-28.	-93.912	-4.808	-26.265	-90.5584

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.96	7.950	43.477	3552.7	35.527
200.00	8.007	1590.9	7.955	48.994	8207.8	41.039
298.15	8.461	2394.9	8.033	52.258	13186.	44.226
300.00	8.475	2410.9	8.036	52.310	13282.	44.274
400.00	9.385	3300.8	8.252	54.866	18646.	46.614
500.00	10.459	4292.8	8.586	57.074	24244.	48.489
600.00	11.523	5392.7	8.988	59.076	30053.	50.088
700.00	12.504	6594.7	9.421	60.928	36055.	51.507
800.00	13.379	7889.6	9.862	62.656	42235.	52.794
900.00	14.148	9266.5	10.296	64.277	48583.	53.981
1000.00	14.816	10716.	10.716	65.803	55086.	55.086
1100.00	15.394	12227.	11.116	67.243	61740.	56.127
1200.00	15.892	13792.	11.494	68.605	68533.	57.111
1300.00	16.321	15403.	11.849	69.894	75458.	58.045
1400.00	16.692	17054.	12.182	71.117	82510.	58.936
1500.00	17.012	18740.	12.493	72.280	89681.	59.787
1600.00	17.290	20456.	12.785	73.387	96964.	60.602
1700.00	17.533	22197.	13.057	74.442	104355.	61.385
1800.00	17.745	23961.	13.312	75.451	111851.	62.140
1900.00	17.931	25745.	13.550	76.415	119444.	62.865
2000.00	18.094	27547.	13.773	77.339	127132.	63.566
2100.00	18.239	29364.	13.983	78.226	134911.	64.243
2200.00	18.368	31193.	14.179	79.077	142776.	64.898
2300.00	18.482	33036.	14.364	79.896	150724.	65.532
2400.00	18.584	34890.	14.538	80.685	158754.	66.147
2500.00	18.676	36753.	14.701	81.446	166862.	66.745
2600.00	18.759	38625.	14.856	82.180	175043.	67.324
2700.00	18.833	40505.	15.002	82.889	183295.	67.887
2800.00	18.901	42391.	15.140	83.576	191621.	68.436
2900.00	18.962	44285.	15.271	84.240	200011.	68.969
3000.00	19.018	46184.	15.395	84.884	208468.	69.489
3100.00	19.069	48088.	15.512	85.508	216986.	69.996
3200.00	19.115	49997.	15.624	86.115	225570.	70.490
3300.00	19.158	51910.	15.730	86.703	234208.	70.972
3400.00	19.197	53828.	15.832	87.276	242909.	71.444
3500.00	19.234	55750.	15.929	87.833	251664.	71.904
3600.00	19.267	57675.	16.021	88.375	260473.	72.354
3700.00	19.298	59604.	16.109	88.904	269339.	72.794
3800.00	19.326	61535.	16.193	89.419	278255.	73.225
3900.00	19.353	63469.	16.274	89.921	287221.	73.646
4000.00	19.378	65406.	16.351	90.410	296236.	74.059
4100.00	19.400	67345.	16.426	90.889	305302.	74.464
4200.00	19.422	69286.	16.497	91.357	314416.	74.861
4300.00	19.442	71228.	16.565	91.814	323574.	75.250
4400.00	19.461	73173.	16.630	92.262	332781.	75.632
4500.00	19.478	75120.	16.693	92.699	342027.	76.006
4600.00	19.495	77069.	16.754	93.127	351317.	76.373
4700.00	19.510	79019.	16.813	93.547	360653.	76.735
4800.00	19.525	80971.	16.869	93.958	370029.	77.089
4900.00	19.538	82925.	16.923	94.361	379445.	77.438
5000.00	19.551	84879.	16.976	94.755	388898.	77.780
5100.00	19.563	86835.	17.026	95.143	398396.	78.117
5200.00	19.575	88792.	17.075	95.523	407929.	78.448
5300.00	19.586	90749.	17.123	95.896	417500.	78.774
5400.00	19.596	92708.	17.168	96.262	427107.	79.094
5500.00	19.606	94668.	17.212	96.622	436754.	79.410
5600.00	19.615	96630.	17.255	96.975	446431.	79.720
5700.00	19.624	98592.	17.297	97.322	456144.	80.025
5800.00	19.632	100554.	17.337	97.664	465898.	80.327
5900.00	19.640	102518.	17.376	97.999	475677.	80.623
6000.00	19.647	104483.	17.414	98.329	485492.	80.915

TABLE 31

MOLAR THERMODYNAMIC PROPERTIES FOR METHYL (CH_3)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 15.03506 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.3988	34.0	114.036	-2.033	33.2	111.3528

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.951	794.96	7.950	37.233	2928.4	29.284
200.00	8.142	1595.9	7.980	42.779	6959.9	34.799
298.15	8.773	2422.9	8.126	46.135	11332.	38.007
300.00	8.788	2438.9	8.130	46.189	11418.	38.059
400.00	9.649	3360.8	8.402	48.836	16173.	40.433
500.00	10.594	4373.8	8.748	51.092	21172.	42.345
600.00	11.498	5478.7	9.131	53.104	26384.	43.973
700.00	12.358	6672.7	9.532	54.942	31787.	45.410
800.00	13.156	7948.6	9.936	56.645	37368.	46.709
900.00	13.883	9301.5	10.335	58.237	43112.	47.902
1000.00	14.534	10722.	10.722	59.734	49012.	49.012
1100.00	15.109	12205.	11.096	61.147	55056.	50.051
1200.00	15.615	13742.	11.452	62.484	61238.	51.032
1300.00	16.056	15326.	11.789	63.752	67551.	51.962
1400.00	16.442	16952.	12.109	64.956	73986.	52.847
1500.00	16.778	18613.	12.409	66.103	80541.	53.694
1600.00	17.072	20306.	12.691	67.195	87205.	54.503
1700.00	17.330	22027.	12.957	68.238	93977.	55.281
1800.00	17.556	23771.	13.206	69.235	100851.	56.029
1900.00	17.755	25537.	13.440	70.189	107823.	56.749
2000.00	17.931	27322.	13.661	71.104	114887.	57.444
2100.00	18.087	29123.	13.868	71.983	122043.	58.116
2200.00	18.226	30938.	14.063	72.828	129284.	58.765
2300.00	18.350	32767.	14.247	73.641	136606.	59.395
2400.00	18.461	34608.	14.420	74.424	144010.	60.004
2500.00	18.561	36459.	14.584	75.180	151491.	60.597
2600.00	18.651	38320.	14.738	75.910	159046.	61.172
2700.00	18.732	40189.	14.885	76.615	166672.	61.730
2800.00	18.806	42066.	15.024	77.298	174369.	62.275
2900.00	18.873	43950.	15.155	77.959	182132.	62.804
3000.00	18.933	45840.	15.280	78.600	189960.	63.320
3100.00	18.989	47737.	15.399	79.222	197852.	63.823
3200.00	19.040	49638.	15.512	79.825	205803.	64.313
3300.00	19.087	51544.	15.620	80.412	213815.	64.792
3400.00	19.130	53455.	15.722	80.982	221883.	65.260
3500.00	19.169	55370.	15.820	81.537	230009.	65.717
3600.00	19.206	57289.	15.914	82.078	238191.	66.164
3700.00	19.240	59211.	16.003	82.605	246427.	66.602
3800.00	19.271	61137.	16.089	83.118	254711.	67.029
3900.00	19.300	63066.	16.171	83.619	263048.	67.448
4000.00	19.327	64997.	16.249	84.108	271434.	67.859
4100.00	19.353	66931.	16.325	84.586	279871.	68.261
4200.00	19.376	68868.	16.397	85.053	288354.	68.656
4300.00	19.398	70806.	16.467	85.509	296881.	69.042
4400.00	19.419	72746.	16.533	85.955	305454.	69.421
4500.00	19.438	74689.	16.598	86.392	314073.	69.794
4600.00	19.456	76634.	16.660	86.819	322732.	70.159
4700.00	19.473	78581.	16.719	87.238	331436.	70.518
4800.00	19.489	80529.	16.777	87.648	340180.	70.871
4900.00	19.504	82479.	16.832	88.050	348964.	71.217
5000.00	19.518	84430.	16.886	88.444	357788.	71.558
5100.00	19.532	86383.	16.936	88.831	366653.	71.893
5200.00	19.544	88336.	16.988	89.210	375554.	72.222
5300.00	19.556	90291.	17.036	89.583	384496.	72.546
5400.00	19.568	92247.	17.083	89.948	393469.	72.865
5500.00	19.578	94204.	17.128	90.306	402481.	73.178
5600.00	19.588	96163.	17.172	90.659	411530.	73.487
5700.00	19.598	98122.	17.214	91.006	420615.	73.792
5800.00	19.607	100082.	17.256	91.347	429733.	74.092
5900.00	19.616	102044.	17.296	91.682	438882.	74.387
6000.00	19.624	104006.	17.334	92.012	448069.	74.678

TABLE 32

MOLAR THERMODYNAMIC PROPERTIES FOR METHANE (CH_4)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 16.04303 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 7.304	-17.88	-59.9969	-19.283	-12.13	-40.6840

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.96	7.950	35.704	2775.5	27.755
200.00	8.001	1590.9	7.955	41.220	6653.1	33.265
298.15	8.518	2395.9	8.036	44.488	10868.	36.451
300.00	8.535	2411.9	8.040	44.541	10950.	36.501
400.00	9.680	3318.8	8.297	47.142	15538.	38.845
500.00	11.075	4355.8	8.712	49.451	20369.	40.739
600.00	12.482	5533.7	9.223	51.594	25423.	42.372
700.00	13.812	6849.7	9.785	53.619	30684.	43.834
800.00	15.040	8292.6	10.366	55.545	36144.	45.179
900.00	16.156	9853.5	10.948	57.382	41790.	46.434
1000.00	17.159	11520.	11.520	59.138	47618.	47.618
1100.00	18.051	13282.	12.075	60.816	53615.	48.741
1200.00	18.841	15127.	12.606	62.421	59778.	49.815
1300.00	19.537	17047.	13.113	63.957	66097.	50.844
1400.00	20.149	19032.	13.594	65.428	72567.	51.833
1500.00	20.687	21074.	14.049	66.837	79181.	52.787
1600.00	21.160	23167.	14.479	68.188	85933.	53.708
1700.00	21.578	25305.	14.885	69.483	92816.	54.597
1800.00	21.946	27481.	15.267	70.726	99827.	55.459
1900.00	22.272	29693.	15.628	71.922	106960.	56.295
2000.00	22.561	31934.	15.967	73.072	114210.	57.105
2100.00	22.819	34203.	16.287	74.179	121573.	57.892
2200.00	23.049	36497.	16.590	75.246	129045.	58.657
2300.00	23.255	38812.	16.875	76.275	136621.	59.400
2400.00	23.440	41147.	17.145	77.269	144299.	60.125
2500.00	23.607	43500.	17.400	78.229	152073.	60.829
2600.00	23.757	45868.	17.641	79.158	159943.	61.517
2700.00	23.893	48251.	17.871	80.058	167906.	62.187
2800.00	24.017	50646.	18.088	80.929	175955.	62.841
2900.00	24.130	53053.	18.294	81.774	184091.	63.480
3000.00	24.232	55472.	18.491	82.593	192306.	64.102
3100.00	24.326	57900.	18.677	83.390	200608.	64.712
3200.00	24.412	60337.	18.855	84.163	208984.	65.307
3300.00	24.492	62782.	19.025	84.916	217440.	65.891
3400.00	24.564	65235.	19.187	85.648	225967.	66.461
3500.00	24.632	67695.	19.341	86.361	234568.	67.019
3600.00	24.694	70160.	19.489	87.056	243240.	67.567
3700.00	24.751	72633.	19.631	87.733	251977.	68.102
3800.00	24.805	75111.	19.766	88.394	260784.	68.627
3900.00	24.854	77594.	19.896	89.039	269656.	69.143
4000.00	24.900	80082.	20.020	89.669	278592.	69.648
4100.00	24.943	82574.	20.140	90.283	287588.	70.144
4200.00	24.983	85070.	20.255	90.885	296649.	70.631
4300.00	25.021	87571.	20.365	91.473	305765.	71.108
4400.00	25.056	90074.	20.471	92.049	314943.	71.578
4500.00	25.089	92581.	20.574	92.612	324174.	72.039
4600.00	25.120	95092.	20.672	93.164	333464.	72.492
4700.00	25.149	97605.	20.767	93.705	342810.	72.938
4800.00	25.176	100121.	20.859	94.235	352208.	73.377
4900.00	25.202	102640.	20.947	94.754	361656.	73.807
5000.00	25.226	105162.	21.032	95.263	371154.	74.231
5100.00	25.249	107686.	21.115	95.763	380707.	74.648
5200.00	25.271	110211.	21.195	96.254	390310.	75.060
5300.00	25.291	112739.	21.272	96.735	399957.	75.464
5400.00	25.310	115269.	21.346	97.208	409655.	75.862
5500.00	25.329	117801.	21.418	97.673	419401.	76.255
5600.00	25.346	120335.	21.488	98.129	429188.	76.641
5700.00	25.363	122871.	21.556	98.578	439024.	77.022
5800.00	25.378	125408.	21.622	99.019	448903.	77.397
5900.00	25.393	127947.	21.686	99.453	458826.	77.767
6000.00	25.408	130486.	21.748	99.880	468794.	78.132

TABLE 33

MOLAR THERMODYNAMIC PROPERTIES FOR CYANO (CN)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 26.01785 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	1.451	109.	365.586	24.161	101.791	341.4086

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.956	693.97	6.940	40.802	3386.2	33.862
200.00	6.957	1389.9	6.950	45.624	7734.8	38.674
298.15	6.969	2072.9	6.953	48.404	12359.	41.452
300.00	6.969	2085.9	6.953	48.447	12448.	41.494
400.00	7.029	2784.9	6.962	50.457	17398.	43.495
500.00	7.155	3493.8	6.988	52.038	22525.	45.051
600.00	7.326	4217.8	7.030	53.357	27797.	46.328
700.00	7.510	4959.8	7.085	54.500	33190.	47.415
800.00	7.689	5719.7	7.150	55.515	38692.	48.366
900.00	7.852	6496.7	7.219	56.430	44290.	49.212
1000.00	7.996	7288.6	7.289	57.265	49977.	49.977
1100.00	8.123	8094.6	7.359	58.033	55742.	50.674
1200.00	8.236	8912.6	7.427	58.745	61582.	51.318
1300.00	8.337	9741.5	7.493	59.408	67489.	51.915
1400.00	8.432	10580.	7.557	60.030	73462.	52.473
1500.00	8.522	11427.	7.618	60.615	79495.	52.997
1600.00	8.612	12284.	7.678	61.167	85583.	53.489
1700.00	8.702	13150.	7.735	61.692	91726.	53.956
1800.00	8.794	14025.	7.792	62.192	97920.	54.400
1900.00	8.890	14909.	7.847	62.670	104163.	54.823
2000.00	8.989	15803.	7.902	63.129	110454.	55.227
2100.00	9.091	16707.	7.956	63.570	116789.	55.614
2200.00	9.196	17621.	8.010	63.995	123167.	55.985
2300.00	9.302	18546.	8.064	64.406	129587.	56.342
2400.00	9.411	19482.	8.118	64.804	136047.	56.686
2500.00	9.520	20428.	8.171	65.191	142549.	57.020
2600.00	9.628	21386.	8.225	65.566	149085.	57.340
2700.00	9.735	22354.	8.279	65.932	155662.	57.652
2800.00	9.840	23332.	8.333	66.288	162274.	57.955
2900.00	9.942	24322.	8.387	66.635	168919.	58.248
3000.00	10.039	25321.	8.440	66.973	175597.	58.532
3100.00	10.134	26329.	8.493	67.304	182313.	58.811
3200.00	10.224	27348.	8.546	67.627	189058.	59.080
3300.00	10.309	28374.	8.598	67.943	195837.	59.345
3400.00	10.389	29409.	8.650	68.252	202647.	59.602
3500.00	10.463	30451.	8.700	68.555	209490.	59.854
3600.00	10.533	31501.	8.750	68.850	216357.	60.099
3700.00	10.597	32558.	8.800	69.140	223258.	60.340
3800.00	10.656	33621.	8.848	69.423	230184.	60.575
3900.00	10.709	34689.	8.895	69.701	237143.	60.806
4000.00	10.758	35762.	8.941	69.973	244128.	61.032
4100.00	10.801	36841.	8.986	70.238	251137.	61.253
4200.00	10.840	37923.	9.029	70.499	258175.	61.470
4300.00	10.875	39009.	9.072	70.754	265235.	61.683
4400.00	10.905	40098.	9.113	71.004	272322.	61.891
4500.00	10.932	41190.	9.153	71.250	279437.	62.097
4600.00	10.955	42284.	9.192	71.490	286572.	62.298
4700.00	10.974	43381.	9.230	71.726	293733.	62.496
4800.00	10.991	44479.	9.266	71.957	300917.	62.691
4900.00	11.004	45579.	9.302	72.184	308125.	62.883
5000.00	11.015	46680.	9.336	72.407	315357.	63.071
5100.00	11.023	47782.	9.369	72.625	322608.	63.256
5200.00	11.030	48885.	9.401	72.839	329880.	63.438
5300.00	11.034	49988.	9.432	73.049	337174.	63.618
5400.00	11.037	51091.	9.461	73.256	344493.	63.795
5500.00	11.038	52195.	9.490	73.458	351825.	63.968
5600.00	11.038	53299.	9.518	73.657	359182.	64.140
5700.00	11.036	54402.	9.544	73.852	366556.	64.308
5800.00	11.034	55506.	9.570	74.044	373951.	64.474
5900.00	11.030	56609.	9.595	74.233	381367.	64.639
6000.00	11.026	57712.	9.619	74.418	388798.	64.800

TABLE 34

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON MONOXIDE (CO)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 28.01055 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	1.417	-26.416	-88.5992	21.352	-32.781	-109.9474

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.152	679.97	6.800	39.515	3271.5	32.715
200.00	7.011	1387.9	6.940	44.424	7496.8	37.484
298.15	6.965	2072.9	6.953	47.212	12003.	40.258
300.00	6.965	2085.9	6.953	47.255	12090.	40.302
400.00	7.013	2783.9	6.960	49.263	16921.	42.303
500.00	7.121	3489.8	6.980	50.838	21929.	43.859
600.00	7.276	4209.8	7.016	52.149	27080.	45.133
700.00	7.450	4945.8	7.065	53.284	32353.	46.219
800.00	7.624	5699.7	7.125	54.290	37733.	47.166
900.00	7.786	6469.7	7.189	55.197	43208.	48.009
1000.00	7.931	7255.6	7.256	56.025	48770.	48.770
1100.00	8.057	8055.6	7.323	56.787	54410.	49.464
1200.00	8.168	8866.6	7.389	57.493	60125.	50.104
1300.00	8.263	9688.5	7.453	58.151	65908.	50.698
1400.00	8.346	10518.	7.513	58.766	71754.	51.253
1500.00	8.417	11357.	7.572	59.345	77660.	51.773
1600.00	8.480	12202.	7.626	59.890	83622.	52.264
1700.00	8.535	13052.	7.678	60.406	89638.	52.728
1800.00	8.583	13908.	7.727	60.895	95703.	53.168
1900.00	8.626	14769.	7.773	61.360	101815.	53.587
2000.00	8.664	15633.	7.817	61.804	107975.	53.987
2100.00	8.698	16502.	7.858	62.227	114174.	54.369
2200.00	8.728	17373.	7.897	62.632	120417.	54.735
2300.00	8.756	18247.	7.934	63.021	126701.	55.087
2400.00	8.781	19124.	7.968	63.394	133021.	55.425
2500.00	8.804	20003.	8.001	63.753	139379.	55.752
2600.00	8.825	20885.	8.033	64.099	145772.	56.066
2700.00	8.844	21768.	8.062	64.432	152198.	56.370
2800.00	8.863	22654.	8.091	64.754	158657.	56.663
2900.00	8.879	23541.	8.118	65.066	165150.	56.948
3000.00	8.895	24429.	8.143	65.367	171671.	57.224
3100.00	8.910	25320.	8.168	65.659	178222.	57.491
3200.00	8.924	26211.	8.191	65.942	184803.	57.751
3300.00	8.937	27104.	8.213	66.217	191411.	58.003
3400.00	8.949	27999.	8.235	66.484	198046.	58.249
3500.00	8.961	28894.	8.255	66.743	204706.	58.487
3600.00	8.973	29791.	8.275	66.996	211394.	58.721
3700.00	8.984	30688.	8.294	67.242	218106.	58.947
3800.00	8.994	31587.	8.312	67.482	224843.	59.169
3900.00	9.004	32487.	8.330	67.715	231600.	59.385
4000.00	9.014	33387.	8.347	67.943	238383.	59.596
4100.00	9.024	34289.	8.363	68.166	245190.	59.802
4200.00	9.033	35192.	8.379	68.384	252019.	60.004
4300.00	9.042	36096.	8.394	68.596	258865.	60.201
4400.00	9.051	37001.	8.409	68.804	265735.	60.394
4500.00	9.059	37906.	8.424	69.008	272628.	60.584
4600.00	9.068	38812.	8.437	69.207	279538.	60.769
4700.00	9.076	39720.	8.451	69.402	286467.	60.950
4800.00	9.084	40628.	8.464	69.593	293416.	61.128
4900.00	9.092	41536.	8.477	69.781	300389.	61.304
5000.00	9.100	42446.	8.489	69.964	307372.	61.474
5100.00	9.107	43356.	8.501	70.144	314381.	61.643
5200.00	9.115	44267.	8.513	70.321	321405.	61.809
5300.00	9.123	45179.	8.524	70.494	328442.	61.970
5400.00	9.130	46092.	8.535	70.665	335502.	62.130
5500.00	9.138	47005.	8.546	70.832	342574.	62.286
5600.00	9.145	47920.	8.557	70.997	349666.	62.440
5700.00	9.153	48834.	8.567	71.159	356775.	62.592
5800.00	9.160	49750.	8.578	71.318	363897.	62.741
5900.00	9.167	50665.	8.587	71.475	371040.	62.888
6000.00	9.175	51583.	8.597	71.629	378193.	63.032

TABLE 35

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON DIOXIDE (CO_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 44.00995 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.1840	-94.051	-315.4470	0.708	-94.258	-316.1413

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.981	694.97	6.950	42.756	3580.6	35.806
200.00	7.734	1421.9	7.110	47.767	8131.4	40.657
298.15	8.874	2237.9	7.506	51.069	12988.	43.564
300.00	8.896	2253.9	7.513	51.124	13083.	43.611
400.00	9.877	3195.8	7.990	53.827	18335.	45.838
500.00	10.665	4224.8	8.450	56.119	23835.	47.670
600.00	11.309	5324.7	8.875	58.123	29549.	49.249
700.00	11.845	6482.7	9.261	59.907	35452.	50.646
800.00	12.292	7690.6	9.613	61.519	41525.	51.906
900.00	12.666	8939.6	9.933	62.989	47750.	53.056
1000.00	12.979	10221.	10.221	64.341	54119.	54.119
1100.00	13.242	11533.	10.484	65.591	60617.	55.106
1200.00	13.465	12869.	10.724	66.753	67234.	56.029
1300.00	13.655	14225.	10.942	67.838	73965.	56.896
1400.00	13.814	15599.	11.142	68.856	80800.	57.714
1500.00	13.952	16987.	11.325	69.814	87734.	58.489
1600.00	14.073	18389.	11.493	70.718	94761.	59.226
1700.00	14.176	19801.	11.648	71.575	101876.	59.927
1800.00	14.268	21223.	11.791	72.388	109074.	60.597
1900.00	14.351	22655.	11.923	73.161	116352.	61.238
2000.00	14.423	24093.	12.047	73.899	123705.	61.853
2100.00	14.488	25539.	12.161	74.605	131131.	62.443
2200.00	14.546	26991.	12.269	75.280	138625.	63.012
2300.00	14.599	28448.	12.369	75.928	146186.	63.559
2400.00	14.647	29910.	12.463	76.550	153810.	64.088
2500.00	14.691	31377.	12.551	77.149	161495.	64.598
2600.00	14.733	32849.	12.634	77.726	169239.	65.092
2700.00	14.770	34324.	12.713	78.283	177040.	65.570
2800.00	14.806	35803.	12.787	78.821	184895.	66.034
2900.00	14.840	37285.	12.857	79.341	192803.	66.484
3000.00	14.872	38771.	12.924	79.844	200763.	66.921
3100.00	14.901	40259.	12.987	80.333	208772.	67.346
3200.00	14.929	41751.	13.047	80.806	216829.	67.759
3300.00	14.955	43245.	13.105	81.266	224932.	68.161
3400.00	14.981	44742.	13.159	81.713	233081.	68.553
3500.00	15.005	46241.	13.212	82.147	241274.	68.936
3600.00	15.029	47743.	13.262	82.570	249510.	69.308
3700.00	15.052	49247.	13.310	82.982	257788.	69.672
3800.00	15.074	50753.	13.356	83.384	266107.	70.028
3900.00	15.096	52262.	13.400	83.776	274465.	70.376
4000.00	15.118	53773.	13.443	84.159	282861.	70.715
4100.00	15.138	55285.	13.484	84.532	291296.	71.048
4200.00	15.158	56800.	13.524	84.897	299768.	71.373
4300.00	15.178	58317.	13.562	85.254	308275.	71.692
4400.00	15.196	59836.	13.599	85.603	316818.	72.004
4500.00	15.215	61356.	13.635	85.945	325396.	72.310
4600.00	15.233	62879.	13.669	86.279	334007.	72.610
4700.00	15.253	64403.	13.703	86.607	342651.	72.905
4800.00	15.271	65929.	13.735	86.929	351328.	73.193
4900.00	15.289	67457.	13.767	87.244	360037.	73.477
5000.00	15.305	68987.	13.797	87.553	368777.	73.755
5100.00	15.326	70519.	13.827	87.856	377547.	74.029
5200.00	15.348	72052.	13.856	88.154	386348.	74.298
5300.00	15.370	73588.	13.885	88.446	395178.	74.562
5400.00	15.392	75126.	13.912	88.734	404037.	74.822
5500.00	15.414	76667.	13.939	89.017	412924.	75.077
5600.00	15.436	78209.	13.966	89.294	421840.	75.329
5700.00	15.458	79754.	13.992	89.568	430783.	75.576
5800.00	15.480	81301.	14.017	89.837	439753.	75.820
5900.00	15.502	82850.	14.042	90.102	448750.	76.059
6000.00	15.524	84401.	14.067	90.362	457773.	76.296

TABLE 36

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON OXYSULFIDE (COS)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 60.07455 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	1.007	-33.96	-113.901	23.188	-40.47	-135.7363

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.077	696.97	6.970	46.385	3941.5	39.415
200.00	8.478	1466.9	7.335	51.662	8865.6	44.328
298.15	9.918	2372.9	7.959	55.320	14121.	47.362
300.00	9.940	2390.9	7.970	55.381	14223.	47.412
400.00	10.958	3438.8	8.597	58.387	19916.	49.790
500.00	11.687	4573.8	9.148	60.917	25885.	51.769
600.00	12.248	5770.7	9.618	63.099	32089.	53.481
700.00	12.699	7019.6	10.028	65.022	38496.	54.994
800.00	13.067	8308.6	10.386	66.743	45086.	56.357
900.00	13.369	9630.5	10.701	68.300	51839.	57.599
1000.00	13.620	10980.	10.980	69.722	58741.	58.741
1100.00	13.828	12353.	11.230	71.030	65780.	59.800
1200.00	14.004	13745.	11.454	72.241	72944.	60.787
1300.00	14.152	15153.	11.656	73.368	80226.	61.712
1400.00	14.279	16575.	11.839	74.421	87615.	62.582
1500.00	14.389	18008.	12.005	75.410	95107.	63.405
1600.00	14.484	19452.	12.158	76.342	102695.	64.185
1700.00	14.568	20905.	12.297	77.223	110374.	64.926
1800.00	14.642	22366.	12.425	78.058	118139.	65.633
1900.00	14.709	23833.	12.544	78.851	125984.	66.307
2000.00	14.769	25307.	12.653	79.607	133907.	66.954
2100.00	14.823	26787.	12.756	80.329	141904.	67.573
2200.00	14.873	28272.	12.851	81.020	149972.	68.169
2300.00	14.919	29762.	12.940	81.682	158107.	68.742
2400.00	14.961	31255.	13.023	82.318	166307.	69.295
2500.00	15.001	32753.	13.101	82.930	174571.	69.829
2600.00	15.037	34255.	13.175	83.519	182894.	70.344
2700.00	15.072	35761.	13.245	84.087	191273.	70.842
2800.00	15.105	37270.	13.311	84.636	199710.	71.325
2900.00	15.136	38782.	13.373	85.166	208199.	71.793
3000.00	15.166	40297.	13.432	85.680	216742.	72.247
3100.00	15.195	41815.	13.489	86.178	225336.	72.689
3200.00	15.222	43336.	13.542	86.661	233978.	73.118
3300.00	15.249	44860.	13.594	87.130	242668.	73.536
3400.00	15.274	46386.	13.643	87.585	251402.	73.942
3500.00	15.299	47915.	13.690	88.028	260182.	74.338
3600.00	15.323	49446.	13.735	88.460	269009.	74.725
3700.00	15.346	50979.	13.778	88.880	277875.	75.101
3800.00	15.369	52514.	13.820	89.289	286782.	75.469
3900.00	15.391	54052.	13.860	89.689	295733.	75.829
4000.00	15.413	55593.	13.898	90.078	304721.	76.180
4100.00	15.435	57135.	13.935	90.459	313749.	76.524
4200.00	15.456	58680.	13.971	90.831	322812.	76.860
4300.00	15.476	60227.	14.006	91.195	331913.	77.189
4400.00	15.497	61775.	14.040	91.551	341051.	77.512
4500.00	15.517	63326.	14.072	91.900	350226.	77.828
4600.00	15.536	64879.	14.104	92.241	359432.	78.137
4700.00	15.556	66434.	14.135	92.575	368671.	78.441
4800.00	15.575	67990.	14.164	92.903	377946.	78.739
4900.00	15.594	69549.	14.194	93.224	387251.	79.031
5000.00	15.613	71108.	14.222	93.540	396593.	79.319
5100.00	15.632	72671.	14.249	93.849	405960.	79.600
5200.00	15.650	74235.	14.276	94.153	415362.	79.877
5300.00	15.669	75801.	14.302	94.451	424791.	80.149
5400.00	15.687	77369.	14.328	94.744	434250.	80.417
5500.00	15.705	78938.	14.352	95.032	443739.	80.680
5600.00	15.723	80510.	14.377	95.315	453255.	80.938
5700.00	15.741	82083.	14.401	95.594	462804.	81.194
5800.00	15.759	83658.	14.424	95.868	472378.	81.444
5900.00	15.776	85235.	14.447	96.137	481975.	81.691
6000.00	15.794	86814.	14.469	96.402	491599.	81.933

TABLE 37

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON PHOSPHIDE (CP)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 42.98495 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.047	111.7	374.6418	44.849	98.322	329.7719

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.957	694.97	6.950	44.021	3707.1	37.071
200.00	6.981	1390.9	6.955	48.846	8378.2	41.891
298.15	7.149	2082.9	6.986	51.658	13319.	44.672
300.00	7.154	2095.9	6.986	51.702	13415.	44.716
400.00	7.446	2825.9	7.065	53.799	18694.	46.735
500.00	7.741	3584.8	7.170	55.493	24162.	48.324
600.00	7.989	4371.8	7.286	56.927	29785.	49.641
700.00	8.184	5180.7	7.401	58.174	35541.	50.773
800.00	8.335	6007.7	7.510	59.277	41414.	51.767
900.00	8.452	6846.7	7.607	60.266	47393.	52.659
1000.00	8.545	7696.6	7.697	61.161	53464.	53.464
1100.00	8.619	8555.6	7.778	61.979	59621.	54.201
1200.00	8.679	9420.5	7.850	62.732	65858.	54.881
1300.00	8.728	10290.	7.916	63.429	72167.	55.513
1400.00	8.770	11165.	7.975	64.077	78542.	56.101
1500.00	8.805	12044.	8.030	64.683	84980.	56.653
1600.00	8.835	12926.	8.079	65.253	91478.	57.174
1700.00	8.861	13811.	8.124	65.789	98029.	57.664
1800.00	8.884	14698.	8.166	66.296	104634.	58.130
1900.00	8.905	15587.	8.204	66.777	111288.	58.573
2000.00	8.923	16479.	8.240	67.234	117988.	58.994
2100.00	8.940	17372.	8.272	67.670	124734.	59.397
2200.00	8.955	18267.	8.303	68.086	131521.	59.782
2300.00	8.969	19163.	8.332	68.485	138351.	60.153
2400.00	8.982	20061.	8.359	68.867	145219.	60.508
2500.00	8.994	20959.	8.384	69.234	152125.	60.850
2600.00	9.005	21859.	8.407	69.587	159066.	61.179
2700.00	9.016	22760.	8.430	69.927	166042.	61.497
2800.00	9.026	23663.	8.451	70.254	173050.	61.803
2900.00	9.036	24566.	8.471	70.571	180091.	62.101
3000.00	9.045	25470.	8.490	70.877	187163.	62.388
3100.00	9.054	26375.	8.508	71.174	194266.	62.666
3200.00	9.063	27281.	8.525	71.461	201396.	62.936
3300.00	9.071	28187.	8.541	71.740	208557.	63.199
3400.00	9.079	29095.	8.557	72.011	215744.	63.454
3500.00	9.087	30002.	8.572	72.275	222961.	63.703
3600.00	9.095	30911.	8.587	72.531	230201.	63.945
3700.00	9.102	31821.	8.600	72.780	237466.	64.180
3800.00	9.110	32732.	8.614	73.023	244756.	64.410
3900.00	9.117	33643.	8.626	73.260	252072.	64.634
4000.00	9.124	34555.	8.639	73.491	259410.	64.853
4100.00	9.131	35468.	8.651	73.716	266769.	65.066
4200.00	9.137	36381.	8.662	73.936	274151.	65.274
4300.00	9.144	37295.	8.673	74.151	281555.	65.478
4400.00	9.151	38210.	8.684	74.361	288980.	65.677
4500.00	9.157	39125.	8.694	74.567	296428.	65.873
4600.00	9.164	40041.	8.705	74.768	303893.	66.064
4700.00	9.170	40958.	8.714	74.966	311383.	66.252
4800.00	9.176	41875.	8.724	75.159	318889.	66.435
4900.00	9.182	42793.	8.733	75.348	326413.	66.615
5000.00	9.189	43712.	8.742	75.534	333959.	66.792
5100.00	9.195	44631.	8.751	75.716	341522.	66.965
5200.00	9.201	45551.	8.760	75.894	349099.	67.134
5300.00	9.207	46471.	8.768	76.069	356696.	67.301
5400.00	9.213	47392.	8.776	76.242	364316.	67.466
5500.00	9.219	48314.	8.784	76.411	371948.	67.627
5600.00	9.225	49236.	8.792	76.577	379597.	67.785
5700.00	9.231	50158.	8.800	76.740	387260.	67.940
5800.00	9.237	51081.	8.807	76.901	394945.	68.094
5900.00	9.243	52005.	8.814	77.059	402644.	68.245
6000.00	9.248	52930.	8.822	77.214	410354.	68.392

TABLE 38

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON MONOSULFIDE (CS)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 44.07515 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_p^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	42.682	55.0	184.4878	41.306	42.682	143.1561

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_p^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.957	693.97	6.940	42.665	3572.5	35.725
200.00	6.975	1390.9	6.955	47.490	8107.0	40.535
298.15	7.122	2080.9	6.979	50.296	12915.	43.317
300.00	7.126	2093.9	6.980	50.340	13008.	43.361
400.00	7.401	2819.9	7.050	52.426	18151.	45.377
500.00	7.690	3574.8	7.150	54.109	23480.	46.960
600.00	7.939	4356.8	7.261	55.534	28964.	48.273
700.00	8.137	5160.7	7.372	56.773	34580.	49.401
800.00	8.293	5982.7	7.478	57.870	40313.	50.392
900.00	8.415	6817.7	7.575	58.855	46152.	51.280
1000.00	8.512	7664.6	7.665	59.746	52081.	52.081
1100.00	8.589	8519.6	7.745	60.561	58097.	52.816
1200.00	8.651	9381.5	7.818	61.311	64192.	53.493
1300.00	8.703	10249.	7.884	62.006	70358.	54.122
1400.00	8.746	11121.	7.944	62.653	76593.	54.709
1500.00	8.783	11998.	7.999	63.257	82887.	55.258
1600.00	8.814	12878.	8.049	63.825	89241.	55.776
1700.00	8.841	13761.	8.095	64.360	95650.	56.265
1800.00	8.865	14646.	8.137	64.866	102112.	56.729
1900.00	8.886	15533.	8.175	65.346	108624.	57.170
2000.00	8.904	16423.	8.212	65.802	115180.	57.590
2100.00	8.921	17314.	8.245	66.237	121783.	57.992
2200.00	8.937	18207.	8.276	66.653	128429.	58.377
2300.00	8.951	19102.	8.305	67.050	135112.	58.744
2400.00	8.964	19997.	8.332	67.432	141839.	59.100
2500.00	8.976	20894.	8.358	67.798	148600.	59.440
2600.00	8.987	21793.	8.382	68.150	155396.	59.768
2700.00	8.998	22692.	8.404	68.489	162227.	60.084
2800.00	9.008	23592.	8.426	68.817	169095.	60.391
2900.00	9.018	24493.	8.446	69.133	175992.	60.687
3000.00	9.027	25396.	8.465	69.439	182920.	60.973
3100.00	9.036	26299.	8.483	69.735	189878.	61.251
3200.00	9.044	27203.	8.501	70.021	196866.	61.521
3300.00	9.052	28108.	8.517	70.299	203881.	61.782
3400.00	9.060	29013.	8.533	70.570	210927.	62.037
3500.00	9.067	29919.	8.548	70.833	217999.	62.285
3600.00	9.075	30826.	8.563	71.088	225092.	62.526
3700.00	9.082	31733.	8.577	71.337	232215.	62.761
3800.00	9.089	32642.	8.590	71.579	239359.	62.989
3900.00	9.095	33551.	8.603	71.815	246529.	63.213
4000.00	9.102	34461.	8.615	72.046	253724.	63.431
4100.00	9.109	35371.	8.627	72.270	260937.	63.643
4200.00	9.115	36283.	8.639	72.490	268176.	63.852
4300.00	9.121	37194.	8.650	72.705	275439.	64.056
4400.00	9.128	38107.	8.661	72.914	282716.	64.254
4500.00	9.134	39020.	8.671	73.120	290021.	64.449
4600.00	9.140	39934.	8.681	73.320	297340.	64.639
4700.00	9.146	40848.	8.691	73.517	304683.	64.826
4800.00	9.152	41763.	8.701	73.710	312047.	65.010
4900.00	9.157	42678.	8.710	73.898	319424.	65.189
5000.00	9.163	43594.	8.719	74.083	326823.	65.365
5100.00	9.169	44511.	8.728	74.265	334242.	65.538
5200.00	9.175	45428.	8.736	74.443	341677.	65.707
5300.00	9.180	46346.	8.744	74.618	349131.	65.874
5400.00	9.186	47264.	8.753	74.789	356598.	66.037
5500.00	9.191	48183.	8.760	74.958	364088.	66.198
5600.00	9.197	49102.	8.768	75.124	371594.	66.356
5700.00	9.202	50021.	8.776	75.287	379116.	66.512
5800.00	9.208	50942.	8.783	75.447	386651.	66.664
5900.00	9.213	51863.	8.790	75.604	394201.	66.814
6000.00	9.219	52784.	8.797	75.759	401771.	66.962

TABLE 39

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON DISULFIDE (CS_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 76.13915 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	3.435	27.98	93.8449	40.208	15.989	53.6271

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.404	702.96	7.030	47.011	3998.1	39.981
200.00	9.461	1546.9	7.735	52.773	9007.7	45.039
298.15	10.874	2550.9	8.556	56.829	14393.	48.274
300.00	10.894	2570.9	8.570	56.896	14498.	48.327
400.00	11.819	3708.8	9.272	60.163	20356.	50.891
500.00	12.479	4925.8	9.852	62.877	26513.	53.025
600.00	12.973	6199.7	10.333	65.197	32918.	54.864
700.00	13.347	7516.6	10.738	67.227	39542.	56.489
800.00	13.635	8866.6	11.083	69.029	46356.	57.945
900.00	13.857	10241.	11.379	70.647	53341.	59.268
1000.00	14.032	11636.	11.636	72.117	60481.	60.481
1100.00	14.171	13047.	11.861	73.461	67760.	61.600
1200.00	14.282	14469.	12.058	74.699	75170.	62.642
1300.00	14.374	15902.	12.232	75.846	82698.	63.614
1400.00	14.449	17344.	12.389	76.914	90336.	64.525
1500.00	14.512	18792.	12.528	77.913	98078.	65.385
1600.00	14.566	20246.	12.654	78.852	105917.	66.198
1700.00	14.611	21705.	12.768	79.736	113846.	66.968
1800.00	14.651	23166.	12.871	80.573	121864.	67.702
1900.00	14.685	24635.	12.966	81.366	129960.	68.400
2000.00	14.715	26106.	13.053	82.120	138134.	69.067
2100.00	14.741	27578.	13.132	82.839	146384.	69.707
2200.00	14.765	29054.	13.206	83.525	154701.	70.319
2300.00	14.786	30531.	13.275	84.182	163087.	70.907
2400.00	14.805	32010.	13.338	84.812	171538.	71.474
2500.00	14.823	33492.	13.397	85.416	180047.	72.019
2600.00	14.838	34975.	13.452	85.998	188619.	72.546
2700.00	14.853	36460.	13.504	86.558	197246.	73.054
2800.00	14.866	37946.	13.552	87.099	205930.	73.546
2900.00	14.879	39433.	13.598	87.621	214667.	74.023
3000.00	14.891	40922.	13.641	88.125	223452.	74.484
3100.00	14.901	42411.	13.681	88.614	232291.	74.933
3200.00	14.912	43902.	13.719	89.087	241175.	75.367
3300.00	14.921	45394.	13.756	89.546	250106.	75.790
3400.00	14.930	46886.	13.790	89.991	259085.	76.202
3500.00	14.939	48380.	13.823	90.424	268106.	76.602
3600.00	14.947	49874.	13.854	90.845	277170.	76.992
3700.00	14.955	51369.	13.884	91.254	286272.	77.371
3800.00	14.962	52865.	13.912	91.653	295418.	77.741
3900.00	14.970	54361.	13.939	92.042	304604.	78.104
4000.00	14.976	55859.	13.965	92.421	313826.	78.457
4100.00	14.983	57357.	13.990	92.791	323087.	78.802
4200.00	14.990	58855.	14.013	93.152	332385.	79.139
4300.00	14.996	60355.	14.036	93.505	341718.	79.469
4400.00	15.002	61855.	14.058	93.850	351086.	79.792
4500.00	15.008	63355.	14.079	94.187	360488.	80.108
4600.00	15.014	64857.	14.099	94.517	369923.	80.418
4700.00	15.020	66358.	14.119	94.840	379392.	80.722
4800.00	15.025	67861.	14.138	95.156	388889.	81.019
4900.00	15.030	69364.	14.156	95.466	398421.	81.310
5000.00	15.036	70866.	14.173	95.770	407985.	81.597
5100.00	15.041	72370.	14.190	96.068	417577.	81.878
5200.00	15.046	73874.	14.207	96.360	427199.	82.154
5300.00	15.051	75379.	14.222	96.647	436851.	82.425
5400.00	15.056	76885.	14.238	96.928	446527.	82.690
5500.00	15.061	78391.	14.253	97.204	456232.	82.951
5600.00	15.065	79897.	14.267	97.476	465969.	83.209
5700.00	15.070	81404.	14.281	97.742	475726.	83.461
5800.00	15.075	82911.	14.295	98.005	485519.	83.710
5900.00	15.079	84419.	14.308	98.262	495328.	83.954
6000.00	15.084	85927.	14.321	98.516	505170.	84.195

TABLE 40

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON DIATOMIC (C_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 24.02250 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	6.239	199.	666.446	44.912	185.626	622.5926

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.114	696.97	6.970	37.917	3094.7	30.947
200.00	9.670	1524.9	7.625	43.547	7184.4	35.922
298.15	10.316	2529.9	8.485	47.626	11670.	39.141
300.00	10.299	2548.9	8.496	47.690	11758.	39.193
400.00	9.472	3535.8	8.840	50.533	16678.	41.694
500.00	8.868	4450.8	8.902	52.578	21838.	43.677
600.00	8.593	5321.7	8.870	54.167	27179.	45.298
700.00	8.501	6175.7	8.822	55.483	32563.	46.661
800.00	8.496	7024.6	8.781	56.617	38269.	47.836
900.00	8.530	7875.6	8.751	57.619	43982.	48.868
1000.00	8.582	8731.6	8.732	58.521	49790.	49.790
1100.00	8.642	9592.5	8.720	59.342	55684.	50.622
1200.00	8.706	10459.	8.716	60.096	61656.	51.380
1300.00	8.772	11333.	8.718	60.796	67701.	52.078
1400.00	8.839	12214.	8.725	61.448	73813.	52.723
1500.00	8.907	13101.	8.734	62.060	79988.	53.326
1600.00	8.975	13995.	8.747	62.637	86224.	53.890
1700.00	9.042	14896.	8.763	63.183	92515.	54.420
1800.00	9.108	15803.	8.780	63.702	98860.	54.922
1900.00	9.172	16717.	8.799	64.196	105255.	55.397
2000.00	9.255	17639.	8.820	64.669	111698.	55.849
2100.00	9.334	18568.	8.842	65.122	118188.	56.280
2200.00	9.407	19505.	8.866	65.558	124722.	56.692
2300.00	9.475	20450.	8.891	65.978	131299.	57.086
2400.00	9.538	21400.	8.917	66.383	137919.	57.466
2500.00	9.600	22357.	8.943	66.773	144575.	57.830
2600.00	9.660	23320.	8.969	67.151	151272.	58.181
2700.00	9.717	24289.	8.996	67.517	158006.	58.521
2800.00	9.772	25264.	9.023	67.871	164774.	58.848
2900.00	9.825	26243.	9.049	68.215	171580.	59.165
3000.00	9.875	27228.	9.076	68.549	178418.	59.473
3100.00	9.922	28218.	9.102	68.873	185287.	59.770
3200.00	9.967	29213.	9.129	69.189	192191.	60.060
3300.00	10.008	30211.	9.155	69.496	199124.	60.341
3400.00	10.048	31214.	9.181	69.796	206090.	60.615
3500.00	10.086	32220.	9.206	70.087	213086.	60.882
3600.00	10.122	33231.	9.231	70.371	220106.	61.141
3700.00	10.156	34245.	9.255	70.649	227158.	61.394
3800.00	10.187	35262.	9.280	70.920	234235.	61.641
3900.00	10.217	36282.	9.303	71.185	241341.	61.882
4000.00	10.244	37306.	9.327	71.444	248472.	62.118
4100.00	10.270	38331.	9.349	71.698	255632.	62.349
4200.00	10.294	39360.	9.371	71.946	262815.	62.575
4300.00	10.317	40390.	9.393	72.188	270020.	62.795
4400.00	10.338	41423.	9.414	72.426	277253.	63.012
4500.00	10.358	42458.	9.435	72.658	284505.	63.223
4600.00	10.377	43495.	9.455	72.886	291782.	63.431
4700.00	10.395	44534.	9.475	73.109	299080.	63.634
4800.00	10.411	45574.	9.495	73.328	306402.	63.834
4900.00	10.426	46616.	9.513	73.543	313747.	64.030
5000.00	10.440	47659.	9.532	73.754	321113.	64.223
5100.00	10.453	48704.	9.550	73.961	328499.	64.412
5200.00	10.465	49750.	9.567	74.164	335905.	64.597
5300.00	10.477	50796.	9.584	74.364	343334.	64.780
5400.00	10.488	51845.	9.601	74.559	350775.	64.958
5500.00	10.498	52894.	9.617	74.752	358243.	65.135
5600.00	10.508	53945.	9.633	74.941	365726.	65.308
5700.00	10.517	54996.	9.648	75.127	373229.	65.479
5800.00	10.525	56048.	9.663	75.310	380751.	65.647
5900.00	10.533	57101.	9.678	75.490	388291.	65.812
6000.00	10.541	58155.	9.693	75.667	395848.	65.975

TABLE 41

MOLAR THERMODYNAMIC PROPERTIES FOR ACETYLENE (C_2H_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 26.03844 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-0.430	54.19	18.1754	14.078	49.990	16.7667

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.014	694.97	6.950	39.000	3205.0	32.050
200.00	8.505	1454.9	7.275	44.211	7387.2	36.936
298.15	10.538	2392.9	8.026	48.002	11919.	39.976
300.00	10.570	2412.9	8.043	48.067	12007.	40.024
400.00	12.064	3547.8	8.870	51.323	16982.	42.454
500.00	13.113	4810.8	9.622	54.136	22257.	44.515
600.00	13.930	6163.7	10.273	56.601	27797.	46.328
700.00	14.614	7591.6	10.845	58.802	33570.	47.957
800.00	15.238	9085.5	11.357	60.795	39550.	49.438
900.00	15.800	10637.	11.819	62.622	45722.	50.802
1000.00	16.317	12244.	12.244	64.314	52069.	52.069
1100.00	16.788	13899.	12.636	65.892	58582.	53.256
1200.00	17.220	15600.	13.000	67.372	65246.	54.371
1300.00	17.612	17342.	13.340	68.766	72053.	55.425
1400.00	17.967	19121.	13.658	70.083	78996.	56.426
1500.00	18.290	20935.	13.957	71.334	86067.	57.378
1600.00	18.581	22779.	14.237	72.524	93260.	58.288
1700.00	18.844	24650.	14.500	73.659	100571.	59.159
1800.00	19.084	26547.	14.748	74.743	107991.	59.995
1900.00	19.301	28466.	14.982	75.781	115519.	60.799
2000.00	19.503	30406.	15.203	76.776	123146.	61.573
2100.00	19.683	32365.	15.412	77.732	130872.	62.320
2200.00	19.852	34342.	15.610	78.652	138692.	63.042
2300.00	20.003	36335.	15.798	79.537	146600.	63.739
2400.00	20.150	38343.	15.976	80.392	154598.	64.416
2500.00	20.281	40365.	16.146	81.217	162677.	65.071
2600.00	20.403	42399.	16.307	82.015	170840.	65.708
2700.00	20.518	44446.	16.461	82.787	179079.	66.325
2800.00	20.624	46503.	16.608	83.536	187398.	66.928
2900.00	20.725	48570.	16.748	84.261	195787.	67.513
3000.00	20.819	50647.	16.882	84.965	204247.	68.082
3100.00	20.909	52733.	17.011	85.650	212781.	68.639
3200.00	20.995	54829.	17.134	86.315	221378.	69.181
3300.00	21.077	56932.	17.252	86.962	230041.	69.709
3400.00	21.153	59044.	17.366	87.592	238767.	70.226
3500.00	21.224	61163.	17.475	88.207	247560.	70.731
3600.00	21.296	63289.	17.580	88.806	256411.	71.225
3700.00	21.366	65422.	17.682	89.390	265320.	71.708
3800.00	21.430	67562.	17.779	89.961	274288.	72.181
3900.00	21.493	69709.	17.874	90.517	283310.	72.643
4000.00	21.556	71860.	17.965	91.062	292389.	73.097
4100.00	21.614	74019.	18.053	91.595	301522.	73.542
4200.00	21.669	76183.	18.139	92.117	310710.	73.979
4300.00	21.727	78353.	18.222	92.627	319945.	74.406
4400.00	21.781	80528.	18.302	93.128	329237.	74.827
4500.00	21.834	82709.	18.380	93.618	338574.	75.239
4600.00	21.882	84895.	18.455	94.098	347957.	75.643
4700.00	21.934	87086.	18.529	94.569	357390.	76.040
4800.00	21.984	89282.	18.600	95.032	366873.	76.432
4900.00	22.035	91482.	18.670	95.485	376395.	76.815
5000.00	22.076	93688.	18.738	95.931	385968.	77.194
5100.00	22.128	95898.	18.804	96.369	395585.	77.566
5200.00	22.173	98113.	18.868	96.799	405243.	77.931
5300.00	22.218	100333.	18.931	97.222	414944.	78.291
5400.00	22.262	102557.	18.992	97.637	424684.	78.645
5500.00	22.308	104785.	19.052	98.046	434469.	78.994
5600.00	22.348	107018.	19.110	98.449	444297.	79.339
5700.00	22.392	109255.	19.167	98.845	454162.	79.678
5800.00	22.432	111495.	19.223	99.234	464062.	80.011
5900.00	22.473	113741.	19.278	99.618	474005.	80.340
6000.00	22.520	115990.	19.332	99.996	483986.	80.664

TABLE 42

MOLAR THERMODYNAMIC PROPERTIES FOR ETHYLENE (C_2H_4)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 28.10034 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-7.610	12.496	41.9115	-12.7370	16.281	54.6067

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/0$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.952	794.89	7.949	43.123	3517.4	35.174
200.00	8.451	1604.7	8.024	48.719	8139.0	40.695
298.15	10.250	2513.9	8.432	52.393	13107.	43.962
300.00	10.292	2532.9	8.443	52.457	13204.	44.014
400.00	12.678	3680.7	9.202	55.742	18616.	46.540
500.00	14.932	5063.5	10.127	58.819	24346.	48.692
600.00	16.889	6657.1	11.095	61.718	30374.	50.623
700.00	18.574	8432.2	12.046	64.452	36684.	52.406
800.00	20.038	10364.	12.956	67.030	43259.	54.074
900.00	21.319	12434.	13.815	69.465	50085.	55.650
1000.00	22.442	14623.	14.623	71.771	57148.	57.148
1100.00	23.426	16917.	15.380	73.957	64435.	58.578
1200.00	24.289	19304.	16.087	76.033	71936.	59.946
1300.00	25.044	21772.	16.747	78.008	79639.	61.260
1400.00	25.705	24310.	17.364	79.888	87534.	62.524
1500.00	26.284	26910.	17.940	81.682	95613.	63.742
1600.00	26.793	29564.	18.478	83.395	103868.	64.917
1700.00	27.240	32266.	18.980	85.033	112290.	66.053
1800.00	27.635	35011.	19.450	86.601	120872.	67.151
1900.00	27.985	37792.	19.890	88.105	129608.	68.215
2000.00	28.294	40606.	20.303	89.549	138491.	69.246
2100.00	28.570	43450.	20.690	90.936	147516.	70.246
2200.00	28.816	46319.	21.054	92.271	156677.	71.217
2300.00	29.037	49212.	21.397	93.557	165968.	72.160
2400.00	29.234	52126.	21.719	94.797	175386.	73.078
2500.00	29.413	55058.	22.023	95.994	184926.	73.970
2600.00	29.574	58008.	22.311	97.151	194584.	74.840
2700.00	29.719	60972.	22.582	98.269	204355.	75.687
2800.00	29.851	63951.	22.840	99.353	214236.	76.513
2900.00	29.972	66942.	23.084	100.40	224224.	77.319
3000.00	30.082	69945.	23.315	101.42	234316.	78.105
3100.00	30.182	72958.	23.535	102.41	244508.	78.873
3200.00	30.274	75981.	23.744	103.37	254797.	79.624
3300.00	30.359	79013.	23.943	104.30	265180.	80.358
3400.00	30.437	82053.	24.133	105.21	275656.	81.075
3500.00	30.509	85100.	24.314	106.09	286221.	81.777
3600.00	30.575	88154.	24.487	106.95	296874.	82.465
3700.00	30.637	91215.	24.653	107.79	307611.	83.138
3800.00	30.694	94282.	24.811	108.61	318431.	83.798
3900.00	30.747	97354.	24.962	109.41	329332.	84.444
4000.00	30.796	100431.	25.108	110.19	340312.	85.078
4100.00	30.842	103513.	25.247	110.95	351368.	85.700
4200.00	30.885	106599.	25.381	111.69	362500.	86.310
4300.00	30.925	109690.	25.509	112.42	373706.	86.908
4400.00	30.962	112784.	25.633	113.13	384983.	87.496
4500.00	30.998	115882.	25.752	113.83	396331.	88.074
4600.00	31.031	118983.	25.866	114.51	407748.	88.641
4700.00	31.062	122088.	25.976	115.17	419232.	89.198
4800.00	31.091	125196.	26.082	115.83	430782.	89.746
4900.00	31.119	128306.	26.185	116.47	442397.	90.285
5000.00	31.144	131419.	26.284	117.10	454076.	90.815
5100.00	31.169	134535.	26.379	117.72	465817.	91.337
5200.00	31.192	137653.	26.472	118.32	477619.	91.850
5300.00	31.214	140773.	26.561	118.92	489481.	92.355
5400.00	31.235	143896.	26.647	119.50	501402.	92.852
5500.00	31.254	147020.	26.731	120.07	513380.	93.342
5600.00	31.273	150147.	26.812	120.64	525416.	93.824
5700.00	31.291	153275.	26.890	121.19	537507.	94.300
5800.00	31.308	156405.	26.966	121.73	549654.	94.768
5900.00	31.324	159536.	27.040	122.27	561854.	95.229
6000.00	31.339	162670.	27.112	122.80	574107.	95.685

TABLE 43

MOLAR THERMODYNAMIC PROPERTIES FOR EHTYLENE OXIDE (C_2H_4O)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 44.09974 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMAIION FROM IHE ELEMENIS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL
298.15	-9.949	-12.19	-40.8852	-31.578	-2.771	-9.2939

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.956	794.96	7.950	48.442	4049.2	40.492
200.00	8.772	1614.9	8.075	54.099	9204.9	46.025
298.15	11.448	2595.9	8.707	58.053	14713.	49.347
300.00	11.509	2616.9	8.723	58.124	14820.	49.401
400.00	14.912	3937.8	9.845	61.901	20823.	52.056
500.00	18.022	5588.7	11.177	65.572	27197.	54.394
600.00	20.628	7525.6	12.543	69.096	33932.	56.553
700.00	22.792	9699.5	13.856	72.442	41010.	58.586
800.00	24.610	12072.	15.090	75.608	48414.	60.518
900.00	26.154	14612.	16.236	78.598	56126.	62.362
1000.00	27.476	17296.	17.296	81.424	64128.	64.128
1100.00	28.614	20102.	18.275	84.097	72405.	65.823
1200.00	29.596	23014.	19.178	86.630	80943.	67.452
1300.00	30.445	26017.	20.013	89.033	89727.	69.021
1400.00	31.182	29099.	20.785	91.317	98745.	70.532
1500.00	31.824	32250.	21.500	93.491	107987.	71.991
1600.00	32.384	35461.	22.163	95.563	117440.	73.400
1700.00	32.874	38725.	22.779	97.542	127096.	74.762
1800.00	33.304	42034.	23.352	99.433	136946.	76.081
1900.00	33.684	45384.	23.886	101.24	146980.	77.358
2000.00	34.020	48769.	24.385	102.98	157192.	78.596
2100.00	34.317	52187.	24.851	104.65	167574.	79.797
2200.00	34.583	55632.	25.287	106.25	178119.	80.963
2300.00	34.820	59102.	25.697	107.79	188822.	82.096
2400.00	35.032	62595.	26.081	109.28	199676.	83.198
2500.00	35.224	66108.	26.443	110.71	210676.	84.270
2600.00	35.396	69639.	26.784	112.10	221817.	85.314
2700.00	35.552	73187.	27.106	113.44	233094.	86.331
2800.00	35.693	76749.	27.410	114.73	244503.	87.323
2900.00	35.822	80325.	27.698	115.99	256039.	88.289
3000.00	35.939	83913.	27.971	117.20	267699.	89.233
3100.00	36.046	87513.	28.230	118.38	279479.	90.155
3200.00	36.144	91122.	28.476	119.53	291375.	91.055
3300.00	36.235	94741.	28.709	120.64	303384.	91.935
3400.00	36.317	98369.	28.932	121.73	315503.	92.795
3500.00	36.394	102004.	29.144	122.78	327728.	93.637
3600.00	36.464	105647.	29.346	123.81	340058.	94.461
3700.00	36.530	109297.	29.540	124.81	352489.	95.267
3800.00	36.590	112953.	29.725	125.78	365019.	96.058
3900.00	36.647	116615.	29.901	126.73	377645.	96.832
4000.00	36.699	120282.	30.071	127.66	390365.	97.591
4100.00	36.748	123955.	30.233	128.57	403176.	98.336
4200.00	36.793	127632.	30.389	129.45	416078.	99.066
4300.00	36.836	131313.	30.538	130.32	429066.	99.783
4400.00	36.876	134999.	30.682	131.17	442141.	100.49
4500.00	36.913	138689.	30.820	132.00	455299.	101.18
4600.00	36.948	142382.	30.953	132.81	468540.	101.86
4700.00	36.981	146078.	31.080	133.60	481861.	102.52
4800.00	37.012	149778.	31.204	134.38	495260.	103.18
4900.00	37.041	153480.	31.323	135.15	508737.	103.82
5000.00	37.069	157186.	31.437	135.89	522289.	104.46
5100.00	37.095	160894.	31.548	136.63	535915.	105.08
5200.00	37.119	164605.	31.655	137.35	549614.	105.70
5300.00	37.142	168318.	31.758	138.06	563385.	106.30
5400.00	37.164	172033.	31.858	138.75	577225.	106.89
5500.00	37.185	175751.	31.955	139.43	591135.	107.48
5600.00	37.205	179470.	32.048	140.10	605112.	108.06
5700.00	37.224	183192.	32.139	140.76	619155.	108.62
5800.00	37.241	186915.	32.227	141.41	633264.	109.18
5900.00	37.258	190640.	32.312	142.05	647437.	109.74
6000.00	37.275	194367.	32.394	142.67	661673.	110.28

TABLE 44

MOLAR THERMODYNAMIC PROPERTIES FOR CYANOGEN (C_2N_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 52.15650 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	2.525	73.87	247.7599	9.222	71.114	238.5275

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.700	742.96	7.430	45.652	3822.2	38.222
200.00	11.689	1770.9	8.855	52.660	8761.2	43.806
298.15	13.562	3017.8	10.122	57.708	14188.	47.587
300.00	13.589	3042.8	10.143	57.792	14295.	47.649
400.00	14.770	4464.8	11.162	61.875	20285.	50.713
500.00	15.614	5985.7	11.971	65.266	26647.	53.294
600.00	16.304	7582.6	12.638	68.175	33322.	55.537
700.00	16.898	9243.5	13.205	70.733	40270.	57.528
800.00	17.414	10959.	13.699	73.024	47460.	59.325
900.00	17.857	12724.	14.138	75.102	54868.	60.964
1000.00	18.236	14529.	14.529	77.003	62474.	62.474
1100.00	18.558	16369.	14.881	78.757	70264.	63.876
1200.00	18.832	18239.	15.199	80.384	78222.	65.185
1300.00	19.065	20134.	15.488	81.901	86337.	66.413
1400.00	19.263	22051.	15.751	83.321	94598.	67.570
1500.00	19.433	23986.	15.991	84.656	102998.	68.665
1600.00	19.578	25937.	16.210	85.915	111527.	69.704
1700.00	19.704	27902.	16.413	87.106	120178.	70.693
1800.00	19.814	29878.	16.599	88.236	128947.	71.637
1900.00	19.909	31863.	16.770	89.310	137825.	72.539
2000.00	19.992	33858.	16.929	90.332	146807.	73.403
2100.00	20.065	35861.	17.077	91.309	155889.	74.233
2200.00	20.130	37871.	17.214	92.244	165067.	75.030
2300.00	20.187	39887.	17.342	93.140	174336.	75.798
2400.00	20.238	41909.	17.462	94.001	183694.	76.539
2500.00	20.284	43935.	17.574	94.828	193136.	77.254
2600.00	20.325	45965.	17.679	95.624	202658.	77.945
2700.00	20.362	48000.	17.778	96.392	212259.	78.615
2800.00	20.395	50037.	17.871	97.133	221935.	79.263
2900.00	20.425	52078.	17.958	97.850	231687.	79.892
3000.00	20.453	54122.	18.041	98.543	241507.	80.502
3100.00	20.478	56169.	18.119	99.214	251394.	81.095
3200.00	20.501	58218.	18.193	99.864	261347.	81.671
3300.00	20.521	60269.	18.263	100.49	271364.	82.232
3400.00	20.541	62322.	18.330	101.11	281445.	82.778
3500.00	20.558	64377.	18.393	101.70	291587.	83.311
3600.00	20.574	66434.	18.454	102.28	301785.	83.829
3700.00	20.589	68492.	18.511	102.85	312042.	84.336
3800.00	20.603	70551.	18.566	103.40	322356.	84.831
3900.00	20.616	72612.	18.619	103.93	332722.	85.313
4000.00	20.628	74674.	18.669	104.45	343141.	85.785
4100.00	20.639	76738.	18.717	104.96	353613.	86.247
4200.00	20.650	78802.	18.762	105.46	364133.	86.698
4300.00	20.659	80868.	18.807	105.95	374703.	87.140
4400.00	20.668	82934.	18.849	106.42	385322.	87.573
4500.00	20.677	85002.	18.889	106.89	395988.	87.997
4600.00	20.685	87070.	18.928	107.34	406697.	88.412
4700.00	20.692	89139.	18.966	107.79	417454.	88.820
4800.00	20.699	91208.	19.002	108.22	428255.	89.220
4900.00	20.706	93278.	19.036	108.65	439100.	89.612
5000.00	20.712	95349.	19.070	109.07	449983.	89.997
5100.00	20.718	97420.	19.102	109.48	460915.	90.376
5200.00	20.723	99493.	19.133	109.88	471880.	90.746
5300.00	20.729	101565.	19.163	110.27	482890.	91.111
5400.00	20.733	103639.	19.192	110.66	493933.	91.469
5500.00	20.738	105712.	19.220	111.04	505022.	91.822
5600.00	20.743	107786.	19.247	111.42	516146.	92.169
5700.00	20.747	109861.	19.274	111.78	527305.	92.510
5800.00	20.751	111935.	19.299	112.14	538502.	92.845
5900.00	20.755	114010.	19.324	112.50	549730.	93.175
6000.00	20.758	116086.	19.348	112.85	560998.	93.500

TABLE 45

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON TRIATOMIC (C_3)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 36.03345 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	3.274	189.77	636.2538	46.608	175.777	589.5287

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.047	696.97	6.970	41.984	3501.4	35.014
200.00	8.207	1452.9	7.265	47.178	7982.6	39.913
298.15	9.388	2318.9	7.778	50.685	12793.	42.907
300.00	9.407	2335.9	7.786	50.743	12887.	42.957
400.00	10.310	3323.8	8.310	53.578	18107.	45.269
500.00	11.028	4391.8	8.784	55.959	23588.	47.176
600.00	11.621	5525.7	9.210	58.024	29289.	48.815
700.00	12.114	6713.7	9.591	59.854	35184.	50.263
800.00	12.523	7945.6	9.932	61.499	41254.	51.567
900.00	12.861	9215.5	10.239	62.994	47479.	52.754
1000.00	13.140	10516.	10.516	64.365	53848.	53.848
1100.00	13.372	11842.	10.766	65.628	60348.	54.862
1200.00	13.564	13189.	10.991	66.800	66970.	55.809
1300.00	13.726	14554.	11.196	67.893	73706.	56.697
1400.00	13.861	15933.	11.381	68.915	80547.	57.534
1500.00	13.976	17325.	11.550	69.875	87487.	58.324
1600.00	14.073	18728.	11.705	70.780	94521.	59.075
1700.00	14.157	20140.	11.847	71.635	101640.	59.788
1800.00	14.229	21559.	11.977	72.447	108846.	60.470
1900.00	14.291	22985.	12.097	73.218	116130.	61.121
2000.00	14.346	24417.	12.208	73.952	123488.	61.744
2100.00	14.393	25855.	12.312	74.654	130919.	62.343
2200.00	14.435	27296.	12.407	75.324	138418.	62.917
2300.00	14.472	28742.	12.496	75.967	145983.	63.471
2400.00	14.505	30190.	12.579	76.583	153609.	64.004
2500.00	14.535	31642.	12.657	77.176	161298.	64.519
2600.00	14.561	33097.	12.730	77.747	169045.	65.017
2700.00	14.585	34554.	12.798	78.297	176848.	65.499
2800.00	14.606	36014.	12.862	78.828	184704.	65.966
2900.00	14.625	37475.	12.922	79.341	192614.	66.419
3000.00	14.643	38939.	12.980	79.837	200572.	66.857
3100.00	14.659	40404.	13.034	80.317	208579.	67.283
3200.00	14.673	41871.	13.085	80.783	216635.	67.698
3300.00	14.686	43339.	13.133	81.235	224736.	68.102
3400.00	14.699	44808.	13.179	81.673	232880.	68.494
3500.00	14.710	46279.	13.222	82.099	241067.	68.876
3600.00	14.720	47750.	13.264	82.514	249300.	69.250
3700.00	14.730	49223.	13.303	82.918	257574.	69.614
3800.00	14.738	50696.	13.341	83.310	265881.	69.969
3900.00	14.747	52170.	13.377	83.693	274232.	70.316
4000.00	14.754	53645.	13.411	84.067	282622.	70.655
4100.00	14.761	55121.	13.444	84.431	291045.	70.987
4200.00	14.768	56598.	13.476	84.787	299506.	71.311
4300.00	14.774	58075.	13.506	85.135	308004.	71.629
4400.00	14.780	59552.	13.535	85.475	316537.	71.940
4500.00	14.785	61031.	13.562	85.807	325099.	72.244
4600.00	14.790	62510.	13.589	86.132	333696.	72.543
4700.00	14.795	63989.	13.615	86.450	342325.	72.835
4800.00	14.799	65469.	13.639	86.761	350982.	73.121
4900.00	14.803	66949.	13.663	87.067	359678.	73.404
5000.00	14.807	68430.	13.686	87.366	368399.	73.680
5100.00	14.811	69911.	13.708	87.659	377148.	73.951
5200.00	14.814	71391.	13.729	87.947	385931.	74.217
5300.00	14.818	72873.	13.750	88.229	394738.	74.479
5400.00	14.821	74355.	13.769	88.506	403575.	74.736
5500.00	14.824	75837.	13.789	88.778	412439.	74.989
5600.00	14.826	77320.	13.807	89.045	421329.	75.237
5700.00	14.829	78802.	13.825	89.308	430251.	75.483
5800.00	14.832	80286.	13.842	89.566	439194.	75.723
5900.00	14.834	81769.	13.859	89.819	448160.	75.959
6000.00	14.836	83253.	13.875	90.067	457152.	76.192

TABLE 46

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON SUBOXIDE (C_3O_2)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 68.03225 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	6.385	-23.38	-78.416	12.865	-27.244	-91.376

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	10.828	941.18	9.412	51.883	4247.1	42.471
200.00	13.395	2139.0	10.695	60.082	9877.5	49.388
298.15	16.007	3588.5	12.036	65.944	16073.	53.909
300.00	16.048	3618.2	12.061	66.044	16195.	53.983
400.00	17.915	5321.6	13.304	70.931	23051.	57.627
500.00	19.309	7185.6	14.371	75.085	30357.	60.714
600.00	20.432	9174.5	15.291	78.708	38050.	63.417
700.00	21.365	11266.	16.094	81.930	46085.	65.836
800.00	22.144	13442.	16.803	84.835	54426.	68.032
900.00	22.793	15690.	17.433	87.482	63043.	70.048
1000.00	23.334	17997.	17.997	89.912	71915.	71.915
1100.00	23.785	20354.	18.504	92.158	81020.	73.654
1200.00	24.162	22752.	18.960	94.244	90341.	75.284
1300.00	24.478	25184.	19.373	96.191	99864.	76.818
1400.00	24.745	27646.	19.747	98.015	109575.	78.268
1500.00	24.972	30132.	20.088	99.730	119463.	79.642
1600.00	25.165	32639.	20.400	101.35	129518.	80.949
1700.00	25.331	35164.	20.685	102.88	139730.	82.194
1800.00	25.475	37705.	20.947	104.33	150091.	83.384
1900.00	25.599	40259.	21.189	105.71	160594.	84.523
2000.00	25.708	42824.	21.412	107.03	171231.	85.616
2100.00	25.803	45400.	21.619	108.28	181997.	86.665
2200.00	25.887	47984.	21.811	109.49	192886.	87.676
2300.00	25.961	50577.	21.990	110.64	203893.	88.649
2400.00	26.027	53176.	22.157	111.75	215013.	89.589
2500.00	26.086	55782.	22.313	112.81	226241.	90.496
2600.00	26.138	58393.	22.459	113.83	237573.	91.374
2700.00	26.186	61009.	22.596	114.82	249006.	92.225
2800.00	26.229	63630.	22.725	115.77	260536.	93.049
2900.00	26.267	66255.	22.847	116.69	272160.	93.848
3000.00	26.302	68883.	22.961	117.59	283874.	94.625
3100.00	26.334	71515.	23.069	118.45	295676.	95.379
3200.00	26.363	74150.	23.172	119.29	307563.	96.113
3300.00	26.390	76788.	23.269	120.10	319532.	96.828
3400.00	26.414	79428.	23.361	120.89	331582.	97.524
3500.00	26.437	82071.	23.449	121.65	343709.	98.202
3600.00	26.458	84715.	23.532	122.40	355911.	98.864
3700.00	26.477	87362.	23.611	123.12	368187.	99.510
3800.00	26.494	90011.	23.687	123.83	380535.	100.14
3900.00	26.511	92661.	23.759	124.52	392952.	100.76
4000.00	26.526	95313.	23.828	125.19	405437.	101.36
4100.00	26.540	97966.	23.894	125.84	417989.	101.95
4200.00	26.553	100621.	23.957	126.48	430605.	102.53
4300.00	26.566	103277.	24.018	127.11	443285.	103.09
4400.00	26.577	105934.	24.076	127.72	456027.	103.64
4500.00	26.588	108592.	24.132	128.32	468828.	104.18
4600.00	26.598	111251.	24.185	128.90	481689.	104.72
4700.00	26.607	113912.	24.237	129.47	494608.	105.24
4800.00	26.616	116573.	24.286	130.03	507583.	105.75
4900.00	26.625	119235.	24.334	130.58	520614.	106.25
5000.00	26.632	121898.	24.380	131.12	533699.	106.74
5100.00	26.640	124561.	24.424	131.65	546838.	107.22
5200.00	26.647	127226.	24.466	132.16	560028.	107.70
5300.00	26.654	129891.	24.508	132.67	573270.	108.16
5400.00	26.660	132556.	24.547	133.17	586562.	108.62
5500.00	26.666	135223.	24.586	133.66	599904.	109.07
5600.00	26.671	137890.	24.623	134.14	613294.	109.52
5700.00	26.677	140557.	24.659	134.61	626732.	109.95
5800.00	26.682	143225.	24.694	135.08	640216.	110.38
5900.00	26.687	145893.	24.728	135.53	653746.	110.80
6000.00	26.691	148562.	24.760	135.98	667322.	111.22

TABLE 47

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON TETRATOMIC (C_4)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 47.04460 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	4.650	242.3	812.6742	52.652	226.618	760.0804

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.062	964.95	9.650	46.999	3734.9	37.349
200.00	10.719	1663.9	8.320	53.332	9002.5	45.013
298.15	12.802	2824.9	9.475	58.080	14492.	48.606
300.00	12.832	2848.9	9.496	58.159	14599.	48.663
400.00	14.249	4205.8	10.514	62.054	20616.	51.539
500.00	15.296	5685.7	11.371	65.353	26991.	53.981
600.00	16.147	7259.6	12.099	68.220	33672.	56.120
700.00	16.853	8910.6	12.729	70.763	40624.	58.034
800.00	17.439	10626.	13.283	73.053	47816.	59.770
900.00	17.924	12395.	13.773	75.136	55227.	61.364
1000.00	18.325	14208.	14.208	77.046	62838.	62.838
1100.00	18.659	16058.	14.598	78.808	70631.	64.210
1200.00	18.936	17938.	14.948	80.444	78595.	65.496
1300.00	19.169	19844.	15.265	81.970	86717.	66.705
1400.00	19.364	21771.	15.551	83.398	94986.	67.847
1500.00	19.529	23716.	15.811	84.739	103392.	68.928
1600.00	19.669	25676.	16.047	86.004	111930.	69.956
1700.00	19.790	27649.	16.264	87.201	120592.	70.937
1800.00	19.894	29633.	16.463	88.335	129370.	71.872
1900.00	19.983	31627.	16.646	89.413	138256.	72.767
2000.00	20.063	33629.	16.815	90.439	147250.	73.625
2100.00	20.131	35639.	16.971	91.420	156344.	74.449
2200.00	20.191	37655.	17.116	92.358	165533.	75.242
2300.00	20.245	39677.	17.251	93.256	174813.	76.005
2400.00	20.292	41704.	17.377	94.119	184182.	76.743
2500.00	20.335	43736.	17.494	94.948	193635.	77.454
2600.00	20.372	45771.	17.604	95.747	203172.	78.143
2700.00	20.407	47810.	17.707	96.516	212784.	78.809
2800.00	20.437	49852.	17.804	97.259	222474.	79.455
2900.00	20.465	51897.	17.896	97.977	232236.	80.081
3000.00	20.490	53945.	17.982	98.671	242068.	80.689
3100.00	20.513	55995.	18.063	99.343	251968.	81.280
3200.00	20.534	58047.	18.140	99.995	261937.	81.855
3300.00	20.553	60102.	18.213	100.63	271967.	82.414
3400.00	20.571	62158.	18.282	101.24	282061.	82.959
3500.00	20.587	64216.	18.347	101.84	292213.	83.490
3600.00	20.602	66276.	18.410	102.42	302429.	84.008
3700.00	20.616	68337.	18.469	102.98	312696.	84.513
3800.00	20.628	70398.	18.526	103.53	323022.	85.006
3900.00	20.640	72461.	18.580	104.07	333403.	85.488
4000.00	20.651	74526.	18.632	104.59	343837.	85.959
4100.00	20.661	76592.	18.681	105.10	354321.	86.420
4200.00	20.670	78658.	18.728	105.60	364857.	86.871
4300.00	20.679	80726.	18.773	106.09	375443.	87.312
4400.00	20.688	82794.	18.817	106.56	386073.	87.744
4500.00	20.695	84864.	18.859	107.03	396752.	88.167
4600.00	20.702	86934.	18.899	107.48	407477.	88.582
4700.00	20.709	89004.	18.937	107.93	418247.	88.989
4800.00	20.715	91075.	18.974	108.36	429060.	89.388
4900.00	20.721	93147.	19.010	108.79	439921.	89.780
5000.00	20.727	95219.	19.044	109.21	450818.	90.164
5100.00	20.732	97292.	19.077	109.62	461762.	90.542
5200.00	20.737	99366.	19.109	110.02	472741.	90.912
5300.00	20.742	101440.	19.140	110.42	483762.	91.276
5400.00	20.747	103514.	19.169	110.80	494825.	91.634
5500.00	20.751	105589.	19.198	111.18	505926.	91.986
5600.00	20.754	107665.	19.226	111.56	517063.	92.333
5700.00	20.758	109740.	19.253	111.93	528235.	92.673
5800.00	20.762	111815.	19.279	112.29	539446.	93.008
5900.00	20.765	113892.	19.304	112.64	550692.	93.338
6000.00	20.769	115969.	19.328	112.99	561973.	93.662

TABLE 48

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON SUBNITRIDE (C_4N_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 52.15650 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	5.414	127.5	427.635	18.1070	122.092	409.4985

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	11.947	902.95	9.030	51.786	4275.7	42.757
200.00	17.204	2372.9	11.864	61.765	9980.1	49.901
298.15	20.527	4238.8	14.217	69.311	16426.	55.093
300.00	20.575	4276.8	14.256	69.438	16554.	55.182
400.00	22.663	6445.7	16.114	75.662	23819.	59.548
500.00	24.161	8790.6	17.581	80.888	31653.	63.307
600.00	25.369	11268.	18.781	85.403	39973.	66.622
700.00	26.390	13857.	19.796	89.393	48717.	69.596
800.00	27.258	16541.	20.676	92.974	57838.	72.298
900.00	27.995	19305.	21.450	96.228	67300.	74.778
1000.00	28.616	22136.	22.136	99.211	77075.	77.075
1100.00	29.140	25025.	22.750	101.96	87136.	79.214
1200.00	29.581	27962.	23.301	104.52	97461.	81.217
1300.00	29.954	30938.	23.799	106.90	108034.	83.103
1400.00	30.270	33950.	24.250	109.13	118837.	84.883
1500.00	30.540	36991.	24.661	111.23	129856.	86.571
1600.00	30.771	40057.	25.036	113.21	141078.	88.174
1700.00	30.970	43145.	25.379	115.08	152493.	89.702
1800.00	31.143	46251.	25.695	116.86	164092.	91.162
1900.00	31.293	49373.	25.986	118.55	175863.	92.560
2000.00	31.424	52508.	26.254	120.15	187798.	93.899
2100.00	31.539	55656.	26.503	121.69	199891.	95.186
2200.00	31.640	58816.	26.735	123.16	212133.	96.424
2300.00	31.730	61985.	26.950	124.57	224521.	97.618
2400.00	31.811	65162.	27.151	125.92	237046.	98.769
2500.00	31.882	68347.	27.339	127.22	249703.	99.881
2600.00	31.946	71537.	27.514	128.47	262489.	100.96
2700.00	32.004	74735.	27.680	129.68	275397.	102.00
2800.00	32.056	77938.	27.835	130.84	288421.	103.01
2900.00	32.103	81147.	27.982	131.97	301561.	103.99
3000.00	32.146	84359.	28.120	133.06	314813.	104.94
3100.00	32.185	87576.	28.250	134.11	328172.	105.86
3200.00	32.220	90795.	28.374	135.14	341637.	106.76
3300.00	32.253	94019.	28.491	136.13	355200.	107.64
3400.00	32.283	97246.	28.602	137.09	368860.	108.49
3500.00	32.310	100476.	28.707	138.03	382615.	109.32
3600.00	32.335	103709.	28.808	138.94	396465.	110.13
3700.00	32.359	106944.	28.904	139.82	410401.	110.92
3800.00	32.380	110180.	28.995	140.69	424426.	111.69
3900.00	32.401	113419.	29.082	141.53	438540.	112.45
4000.00	32.419	116660.	29.165	142.35	452735.	113.18
4100.00	32.436	119903.	29.245	143.15	467007.	113.90
4200.00	32.453	123148.	29.321	143.93	481362.	114.61
4300.00	32.468	126394.	29.394	144.69	495794.	115.30
4400.00	32.482	129642.	29.464	145.44	510302.	115.98
4500.00	32.495	132890.	29.531	146.17	524882.	116.64
4600.00	32.507	136140.	29.596	146.89	539534.	117.29
4700.00	32.519	139392.	29.658	147.58	554256.	117.93
4800.00	32.530	142644.	29.717	148.27	569050.	118.55
4900.00	32.540	145898.	29.775	148.94	583911.	119.17
5000.00	32.550	149153.	29.831	149.60	598840.	119.77
5100.00	32.559	152407.	29.884	150.24	613829.	120.36
5200.00	32.567	155664.	29.935	150.88	628888.	120.94
5300.00	32.575	158921.	29.985	151.50	644005.	121.51
5400.00	32.583	162179.	30.033	152.10	659185.	122.07
5500.00	32.590	165438.	30.080	152.70	674425.	122.62
5600.00	32.597	168698.	30.125	153.29	689723.	123.16
5700.00	32.604	171957.	30.168	153.87	705086.	123.70
5800.00	32.610	175218.	30.210	154.43	720501.	124.22
5900.00	32.616	178479.	30.251	154.99	735969.	124.74
6000.00	32.622	181742.	30.290	155.54	751499.	125.25

TABLE 49

MOLAR THERMODYNAMIC PROPERTIES FOR CARBON PENTATOMIC (C_5)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 60.05575 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	6.027	242.4	813.0096	52.810	226.623	760.0972

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	9.077	1232.9	12.329	46.144	3381.4	33.814
200.00	13.232	1874.9	9.375	53.617	8848.6	44.243
298.15	16.217	3330.8	11.172	59.605	14440.	48.432
300.00	16.258	3360.8	11.203	59.705	14551.	48.502
400.00	18.188	5087.7	12.719	64.660	20776.	51.940
500.00	19.564	6979.7	13.959	68.877	27459.	54.917
600.00	20.673	8993.6	14.989	72.544	34533.	57.555
700.00	21.592	11108.	15.869	75.803	41954.	59.934
800.00	22.355	13306.	16.633	78.737	49683.	62.104
900.00	22.987	15575.	17.306	81.408	57692.	64.102
1000.00	23.510	17900.	17.900	83.858	65958.	65.958
1100.00	23.946	20274.	18.431	86.120	74458.	67.689
1200.00	24.308	22687.	18.906	88.220	83177.	69.314
1300.00	24.612	25134.	19.334	90.177	92097.	70.844
1400.00	24.867	27608.	19.720	92.010	101207.	72.291
1500.00	25.082	30105.	20.070	93.734	110496.	73.664
1600.00	25.265	32623.	20.390	95.358	119950.	74.969
1700.00	25.423	35157.	20.681	96.895	129565.	76.214
1800.00	25.559	37707.	20.948	98.352	139327.	77.404
1900.00	25.675	40269.	21.194	99.737	149231.	78.543
2000.00	25.780	42842.	21.421	101.06	159272.	79.636
2100.00	25.869	45424.	21.630	102.32	169442.	80.687
2200.00	25.947	48015.	21.825	103.52	179733.	81.697
2300.00	26.018	50613.	22.006	104.68	190143.	82.671
2400.00	26.079	53218.	22.174	105.79	200667.	83.611
2500.00	26.135	55829.	22.332	106.85	211300.	84.520
2600.00	26.183	58445.	22.479	107.88	222037.	85.399
2700.00	26.229	61065.	22.617	108.87	232875.	86.250
2800.00	26.268	63690.	22.746	109.82	243810.	87.075
2900.00	26.305	66319.	22.869	110.74	254837.	87.875
3000.00	26.337	68951.	22.984	111.64	265956.	88.652
3100.00	26.367	71586.	23.092	112.50	277162.	89.407
3200.00	26.395	74224.	23.195	113.34	288455.	90.142
3300.00	26.420	76865.	23.292	114.15	299831.	90.858
3400.00	26.443	79508.	23.385	114.94	311285.	91.555
3500.00	26.464	82153.	23.472	115.71	322819.	92.234
3600.00	26.484	84801.	23.556	116.45	334423.	92.895
3700.00	26.502	87450.	23.635	117.18	346106.	93.542
3800.00	26.518	90101.	23.711	117.88	357858.	94.173
3900.00	26.533	92753.	23.783	118.57	369682.	94.790
4000.00	26.548	95407.	23.852	119.25	381573.	95.393
4100.00	26.561	98063.	23.918	119.90	393531.	95.983
4200.00	26.572	100720.	23.981	120.54	405552.	96.560
4300.00	26.584	103378.	24.041	121.17	417640.	97.126
4400.00	26.596	106037.	24.099	121.78	429786.	97.679
4500.00	26.605	108697.	24.155	122.38	441995.	98.221
4600.00	26.614	111357.	24.208	122.96	454262.	98.753
4700.00	26.623	114019.	24.259	123.53	466585.	99.273
4800.00	26.631	116682.	24.309	124.09	478968.	99.785
4900.00	26.639	119345.	24.356	124.64	491405.	100.29
5000.00	26.647	122010.	24.402	125.18	503894.	100.78
5100.00	26.653	124675.	24.446	125.71	516440.	101.26
5200.00	26.660	127341.	24.489	126.23	529038.	101.74
5300.00	26.666	130006.	24.530	126.73	541682.	102.20
5400.00	26.673	132673.	24.569	127.23	554383.	102.66
5500.00	26.678	135341.	24.607	127.72	567133.	103.12
5600.00	26.682	138009.	24.644	128.20	579925.	103.56
5700.00	26.687	140677.	24.680	128.68	592774.	104.00
5800.00	26.692	143346.	24.715	129.14	605664.	104.42
5900.00	26.696	146016.	24.748	129.60	618598.	104.85
6000.00	26.702	148686.	24.781	130.04	631581.	105.26

TABLE 50

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN MONATOMIC (H)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 1.00797 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	1.522	52.095	174.7266	10.410	48.580	162.9373

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	4.968	496.98	4.970	21.964	1699.4	16.994
200.00	4.968	992.95	4.965	25.407	4088.4	20.442
298.15	4.966	1480.9	4.967	27.391	6885.7	22.424
300.00	4.968	1489.9	4.966	27.422	6736.6	22.455
400.00	4.968	1986.9	4.967	28.851	9553.3	23.883
500.00	4.968	2483.9	4.968	29.960	12496.	24.992
600.00	4.968	2980.9	4.968	30.865	15538.	25.897
700.00	4.968	3476.8	4.967	31.630	18664.	26.664
800.00	4.968	3973.8	4.967	32.294	21862.	27.327
900.00	4.968	4470.8	4.968	32.879	25121.	27.912
1000.00	4.968	4967.8	4.968	33.402	28435.	28.435
1100.00	4.968	5464.7	4.968	33.876	31799.	28.908
1200.00	4.968	5961.7	4.968	34.308	35208.	29.340
1300.00	4.968	6457.7	4.967	34.706	38660.	29.739
1400.00	4.968	6954.7	4.968	35.074	42149.	30.107
1500.00	4.968	7451.6	4.968	35.417	45674.	30.449
1600.00	4.968	7948.6	4.968	35.737	49231.	30.769
1700.00	4.968	8445.6	4.968	36.039	52821.	31.071
1800.00	4.968	8941.6	4.968	36.323	56440.	31.356
1900.00	4.968	9438.5	4.968	36.591	60085.	31.624
2000.00	4.968	9935.5	4.968	36.846	63757.	31.878
2100.00	4.968	10432.	4.968	37.088	67453.	32.120
2200.00	4.968	10929.	4.968	37.320	71175.	32.352
2300.00	4.968	11425.	4.968	37.540	74917.	32.573
2400.00	4.968	11922.	4.968	37.752	78683.	32.784
2500.00	4.968	12419.	4.968	37.955	82468.	32.987
2600.00	4.968	12916.	4.968	38.150	86274.	33.182
2700.00	4.968	13413.	4.968	38.337	90097.	33.369
2800.00	4.968	13910.	4.968	38.518	93940.	33.550
2900.00	4.968	14406.	4.968	38.692	97801.	33.724
3000.00	4.968	14903.	4.968	38.860	101677.	33.892
3100.00	4.968	15400.	4.968	39.023	105571.	34.055
3200.00	4.968	15897.	4.968	39.181	109482.	34.213
3300.00	4.968	16394.	4.968	39.334	113408.	34.366
3400.00	4.968	16890.	4.968	39.482	117349.	34.514
3500.00	4.968	17387.	4.968	39.626	121304.	34.658
3600.00	4.968	17884.	4.968	39.766	125274.	34.798
3700.00	4.968	18381.	4.968	39.902	129256.	34.934
3800.00	4.968	18878.	4.968	40.035	133255.	35.067
3900.00	4.968	19375.	4.968	40.164	137265.	35.196
4000.00	4.968	19871.	4.968	40.290	141289.	35.322
4100.00	4.968	20368.	4.968	40.412	145321.	35.444
4200.00	4.968	20865.	4.968	40.532	149369.	35.564
4300.00	4.968	21362.	4.968	40.649	153429.	35.681
4400.00	4.968	21859.	4.968	40.763	157498.	35.795
4500.00	4.968	22355.	4.968	40.875	161582.	35.907
4600.00	4.968	22852.	4.968	40.984	165674.	36.016
4700.00	4.968	23349.	4.968	41.091	169779.	36.123
4800.00	4.968	23846.	4.968	41.196	173895.	36.228
4900.00	4.968	24343.	4.968	41.298	178017.	36.330
5000.00	4.968	24839.	4.968	41.398	182151.	36.430
5100.00	4.968	25336.	4.968	41.497	186299.	36.529
5200.00	4.968	25833.	4.968	41.593	190450.	36.625
5300.00	4.968	26330.	4.968	41.688	194616.	36.720
5400.00	4.968	26827.	4.968	41.781	198790.	36.813
5500.00	4.968	27324.	4.968	41.872	202972.	36.904
5600.00	4.968	27820.	4.968	41.961	207161.	36.993
5700.00	4.968	28317.	4.968	42.049	211362.	37.081
5800.00	4.968	28814.	4.968	42.136	215575.	37.168
5900.00	4.968	29311.	4.968	42.221	219793.	37.253
6000.00	4.968	29808.	4.968	42.304	224016.	37.336

TABLE 51

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN UNINEGATIVE ION (H^-)
IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 1.00852 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.4445	33.38	111.95	60.9433	31.587	105.9433

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	4.968	496.79	4.968	20.586	1561.8	15.618
200.00	4.968	993.58	4.968	24.030	3812.3	19.062
298.15	4.968	1481.2	4.968	26.013	6274.6	21.045
300.00	4.968	1490.4	4.968	26.044	6322.8	21.076
400.00	4.968	1987.2	4.968	27.473	9002.1	22.505
500.00	4.968	2483.9	4.968	28.582	11807.	23.614
600.00	4.968	2980.7	4.968	29.487	14712.	24.519
700.00	4.968	3477.5	4.968	30.253	17700.	25.285
800.00	4.968	3974.3	4.968	30.917	20759.	25.949
900.00	4.968	4471.1	4.968	31.502	23880.	26.534
1000.00	4.968	4967.9	4.968	32.025	27057.	27.057
1100.00	4.968	5464.7	4.968	32.499	30284.	27.531
1200.00	4.968	5961.5	4.968	32.931	33556.	27.963
1300.00	4.968	6458.3	4.968	33.329	36869.	28.361
1400.00	4.968	6955.1	4.968	33.697	40220.	28.729
1500.00	4.968	7451.8	4.968	34.039	43607.	29.072
1600.00	4.968	7948.6	4.968	34.360	47027.	29.392
1700.00	4.968	8445.4	4.968	34.661	50479.	29.693
1800.00	4.968	8942.2	4.968	34.945	53959.	29.977
1900.00	4.968	9439.0	4.968	35.214	57467.	30.246
2000.00	4.968	9935.8	4.968	35.469	61001.	30.501
2100.00	4.968	10433.	4.968	35.711	64560.	30.743
2200.00	4.968	10929.	4.968	35.942	68143.	30.974
2300.00	4.968	11426.	4.968	36.163	71749.	31.195
2400.00	4.968	11923.	4.968	36.374	75375.	31.406
2500.00	4.968	12420.	4.968	36.577	79023.	31.609
2600.00	4.968	12917.	4.968	36.772	82691.	31.804
2700.00	4.968	13413.	4.968	36.959	86377.	31.992
2800.00	4.968	13910.	4.968	37.140	90082.	32.172
2900.00	4.968	14407.	4.968	37.314	93805.	32.347
3000.00	4.968	14904.	4.968	37.483	97545.	32.515
3100.00	4.968	15400.	4.968	37.646	101301.	32.678
3200.00	4.968	15897.	4.968	37.804	105074.	32.836
3300.00	4.968	16394.	4.968	37.956	108862.	32.988
3400.00	4.968	16891.	4.968	38.105	112665.	33.137
3500.00	4.968	17388.	4.968	38.249	116483.	33.281
3600.00	4.968	17884.	4.968	38.389	120315.	33.421
3700.00	4.968	18381.	4.968	38.525	124160.	33.557
3800.00	4.968	18878.	4.968	38.657	128020.	33.689
3900.00	4.968	19375.	4.968	38.786	131892.	33.818
4000.00	4.968	19872.	4.968	38.912	135777.	33.944
4100.00	4.968	20368.	4.968	39.035	139674.	34.067
4200.00	4.968	20865.	4.968	39.154	143584.	34.187
4300.00	4.968	21362.	4.968	39.271	147505.	34.303
4400.00	4.968	21859.	4.968	39.386	151438.	34.418
4500.00	4.968	22356.	4.968	39.497	155382.	34.529
4600.00	4.968	22852.	4.968	39.606	159337.	34.639
4700.00	4.968	23349.	4.968	39.713	163303.	34.745
4800.00	4.968	23846.	4.968	39.818	167280.	34.850
4900.00	4.968	24343.	4.968	39.920	171267.	34.952
5000.00	4.968	24839.	4.968	40.021	175264.	35.053
5100.00	4.968	25336.	4.968	40.119	179271.	35.151
5200.00	4.968	25833.	4.968	40.215	183287.	35.248
5300.00	4.968	26330.	4.968	40.310	187314.	35.342
5400.00	4.968	26827.	4.968	40.403	191349.	35.435
5500.00	4.968	27323.	4.968	40.494	195394.	35.526
5600.00	4.968	27820.	4.968	40.584	199448.	35.616
5700.00	4.968	28317.	4.968	40.672	203511.	35.704
5800.00	4.968	28814.	4.968	40.758	207582.	35.790
5900.00	4.968	29311.	4.968	40.843	211662.	35.875
6000.00	4.968	29807.	4.968	40.926	215751.	35.958

TABLE 52

MOLAR THERMODYNAMIC PROPERTIES FOR IMIDOGEN (HN)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 15.01467 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	0.039	80.	268.32	4.805	77.7617	260.8140

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.961	679.86	6.799	35.686	2888.8	28.888
200.00	6.963	1376.0	6.880	40.512	6726.3	33.631
298.15	6.966	2059.6	6.908	43.292	10848.	36.384
300.00	6.966	2072.5	6.908	43.335	10928.	36.427
400.00	6.973	2769.3	6.923	45.340	15367.	38.417
500.00	6.994	3467.5	6.935	46.898	19981.	39.963
600.00	7.041	4169.0	6.948	48.177	24737.	41.228
700.00	7.119	4876.7	6.967	49.268	29611.	42.301
800.00	7.222	5593.6	6.992	50.225	34586.	43.233
900.00	7.343	6321.8	7.024	51.082	39652.	44.058
1000.00	7.471	7062.4	7.062	51.862	44800.	44.800
1100.00	7.601	7816.0	7.105	52.581	50023.	45.475
1200.00	7.727	8582.4	7.152	53.247	55314.	46.095
1300.00	7.847	9361.1	7.201	53.871	60671.	46.670
1400.00	7.960	10152.	7.251	54.456	66087.	47.205
1500.00	8.064	10953.	7.302	55.009	71561.	47.707
1600.00	8.161	11764.	7.353	55.533	77088.	48.180
1700.00	8.249	12585.	7.403	56.030	82666.	48.627
1800.00	8.331	13414.	7.452	56.504	88293.	49.052
1900.00	8.405	14251.	7.500	56.956	93966.	49.456
2000.00	8.474	15095.	7.547	57.389	99684.	49.842
2100.00	8.537	15945.	7.593	57.804	105444.	50.211
2200.00	8.596	16802.	7.637	58.203	111244.	50.566
2300.00	8.650	17664.	7.680	58.586	117084.	50.906
2400.00	8.700	18532.	7.722	58.955	122961.	51.234
2500.00	8.747	19404.	7.762	59.311	128874.	51.550
2600.00	8.791	20281.	7.800	59.655	134823.	51.855
2700.00	8.832	21162.	7.838	59.988	140805.	52.150
2800.00	8.870	22047.	7.874	60.310	146820.	52.436
2900.00	8.906	22936.	7.909	60.622	152867.	52.713
3000.00	8.941	23828.	7.943	60.924	158944.	52.981
3100.00	8.973	24724.	7.976	61.216	165051.	53.242
3200.00	9.004	25623.	8.007	61.503	171187.	53.496
3300.00	9.033	26525.	8.038	61.781	177352.	53.743
3400.00	9.061	27430.	8.068	62.051	183543.	53.983
3500.00	9.088	28337.	8.096	62.314	189762.	54.218
3600.00	9.114	29247.	8.124	62.570	196006.	54.446
3700.00	9.139	30160.	8.151	62.820	202275.	54.669
3800.00	9.163	31075.	8.178	63.064	208570.	54.887
3900.00	9.186	31992.	8.203	63.303	214888.	55.100
4000.00	9.208	32912.	8.228	63.536	221230.	55.308
4100.00	9.230	33834.	8.252	63.763	227595.	55.511
4200.00	9.251	34758.	8.276	63.986	233983.	55.710
4300.00	9.271	35684.	8.299	64.204	240392.	55.905
4400.00	9.291	36612.	8.321	64.417	246823.	56.096
4500.00	9.311	37542.	8.343	64.626	253275.	56.283
4600.00	9.330	38474.	8.364	64.831	259748.	56.467
4700.00	9.349	39408.	8.385	65.032	266241.	56.647
4800.00	9.367	40344.	8.405	65.229	272754.	56.824
4900.00	9.385	41282.	8.425	65.422	279287.	56.997
5000.00	9.402	42221.	8.444	65.612	285839.	57.168
5100.00	9.420	43162.	8.463	65.798	292409.	57.335
5200.00	9.437	44105.	8.482	65.981	298998.	57.500
5300.00	9.453	45049.	8.500	66.161	305606.	57.661
5400.00	9.470	45996.	8.518	66.338	312231.	57.820
5500.00	9.486	46943.	8.535	66.512	318873.	57.977
5600.00	9.502	47893.	8.552	66.683	325533.	58.131
5700.00	9.518	48844.	8.569	66.851	332210.	58.282
5800.00	9.534	49796.	8.586	67.017	338903.	58.432
5900.00	9.549	50750.	8.602	67.180	345613.	58.578
6000.00	9.564	51706.	8.618	67.341	352339.	58.723

TABLE 53

MOLAR THERMODYNAMIC PROPERTIES FOR NITRORYL (HNO)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 31.01407 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.157	23.8	79.8252	-10.289	26.859	90.0851

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.96	7.950	43.975	3602.5	36.025
200.00	7.995	1590.9	7.955	49.491	8307.2	41.536
298.15	8.279	2386.9	8.006	52.726	13333.	44.719
300.00	8.287	2401.9	8.006	52.778	13432.	44.772
400.00	8.788	3254.8	8.137	55.227	18836.	47.090
500.00	9.342	4161.8	8.324	57.248	24462.	48.925
600.00	9.869	5121.7	8.536	58.998	30277.	50.462
700.00	10.344	6133.7	8.762	60.556	36255.	51.794
800.00	10.765	7189.6	8.987	61.965	42382.	52.978
900.00	11.133	8284.6	9.205	63.255	48645.	54.050
1000.00	11.453	9414.5	9.415	64.445	55030.	55.030
1100.00	11.730	10573.	9.612	65.550	61531.	55.937
1200.00	11.969	11759.	9.800	66.581	68137.	56.781
1300.00	12.176	12966.	9.974	67.548	74846.	57.574
1400.00	12.355	14193.	10.138	68.457	81646.	58.319
1500.00	12.510	15437.	10.291	69.315	88535.	59.023
1600.00	12.645	16695.	10.434	70.126	95507.	59.692
1700.00	12.763	17965.	10.568	70.896	102559.	60.329
1800.00	12.866	19247.	10.693	71.629	109686.	60.937
1900.00	12.957	20538.	10.809	72.327	116884.	61.518
2000.00	13.037	21838.	10.919	72.994	124151.	62.075
2100.00	13.107	23146.	11.022	73.631	131480.	62.609
2200.00	13.170	24460.	11.118	74.243	138875.	63.125
2300.00	13.226	25780.	11.209	74.830	146330.	63.622
2400.00	13.276	27105.	11.294	75.394	153842.	64.101
2500.00	13.321	28435.	11.374	75.936	161406.	64.562
2600.00	13.362	29769.	11.449	76.460	169028.	65.011
2700.00	13.398	31106.	11.521	76.965	176699.	65.444
2800.00	13.431	32448.	11.589	77.453	184420.	65.864
2900.00	13.462	33793.	11.653	77.925	192189.	66.272
3000.00	13.489	35140.	11.713	78.381	200003.	66.668
3100.00	13.514	36491.	11.771	78.824	207863.	67.053
3200.00	13.537	37843.	11.826	79.254	215770.	67.428
3300.00	13.558	39198.	11.878	79.671	223716.	67.793
3400.00	13.577	40555.	11.928	80.076	231703.	68.148
3500.00	13.595	41914.	11.975	80.469	239728.	68.494
3600.00	13.611	43274.	12.021	80.853	247797.	68.832
3700.00	13.627	44636.	12.064	81.226	255900.	69.162
3800.00	13.641	46000.	12.105	81.590	264042.	69.485
3900.00	13.654	47365.	12.145	81.944	272217.	69.799
4000.00	13.666	48731.	12.183	82.290	280429.	70.107
4100.00	13.677	50097.	12.219	82.628	288677.	70.409
4200.00	13.688	51465.	12.254	82.957	296953.	70.703
4300.00	13.698	52835.	12.287	83.279	305264.	70.992
4400.00	13.707	54205.	12.319	83.595	313612.	71.275
4500.00	13.716	55576.	12.350	83.903	321986.	71.553
4600.00	13.724	56948.	12.380	84.204	330389.	71.824
4700.00	13.731	58321.	12.409	84.499	338823.	72.090
4800.00	13.738	59695.	12.436	84.789	347291.	72.352
4900.00	13.745	61069.	12.463	85.072	355783.	72.609
5000.00	13.751	62444.	12.489	85.350	364305.	72.861
5100.00	13.757	63819.	12.513	85.622	372852.	73.108
5200.00	13.763	65196.	12.538	85.889	381426.	73.351
5300.00	13.769	66572.	12.561	86.152	390032.	73.591
5400.00	13.774	67949.	12.583	86.409	398658.	73.826
5500.00	13.778	69327.	12.605	86.662	407313.	74.057
5600.00	13.783	70704.	12.626	86.910	415990.	74.284
5700.00	13.787	72083.	12.646	87.154	424692.	74.507
5800.00	13.791	73462.	12.666	87.394	433421.	74.728
5900.00	13.795	74841.	12.685	87.630	442173.	74.945
6000.00	13.799	76221.	12.704	87.862	450948.	75.158

TABLE 54

MOLAR THERMODYNAMIC PROPERTIES FOR NITROUS ACID CIS (HNO_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 47.01357 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_p^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-3.159	-18.64	-62.518	-27.9010	-10.27	-34.4457

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_p^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.027	794.96	7.950	49.727	4177.7	41.777
200.00	9.238	1648.9	8.245	55.592	9469.5	47.348
298.15	10.839	2634.9	8.837	59.583	15130.	50.746
300.00	10.868	2654.9	8.850	59.650	15240.	50.800
400.00	12.274	3814.8	9.537	62.976	21376.	53.439
500.00	13.411	5100.7	10.201	65.842	27820.	55.640
600.00	14.317	6488.7	10.814	68.371	34534.	57.556
700.00	15.043	7958.6	11.369	70.633	41485.	59.264
800.00	15.636	9493.5	11.867	72.682	48652.	60.815
900.00	16.130	11082.	12.314	74.553	56015.	62.239
1000.00	16.547	12716.	12.716	76.275	63559.	63.559
1100.00	16.904	14389.	13.081	77.869	71267.	64.788
1200.00	17.212	16096.	13.413	79.354	79129.	65.941
1300.00	17.479	17831.	13.716	80.742	87133.	67.026
1400.00	17.711	19590.	13.993	82.046	95274.	68.053
1500.00	17.914	21372.	14.248	83.275	103540.	69.027
1600.00	18.092	23173.	14.483	84.438	111928.	69.955
1700.00	18.249	24990.	14.700	85.539	120426.	70.839
1800.00	18.388	26822.	14.901	86.586	129033.	71.685
1900.00	18.510	28667.	15.088	87.584	137742.	72.496
2000.00	18.619	30523.	15.262	88.536	146548.	73.274
2100.00	18.716	32390.	15.424	89.447	155447.	74.023
2200.00	18.803	34266.	15.576	90.319	164437.	74.744
2300.00	18.881	36150.	15.717	91.157	173512.	75.440
2400.00	18.951	38042.	15.851	91.962	182668.	76.112
2500.00	19.014	39941.	15.976	92.737	191902.	76.761
2600.00	19.072	41845.	16.094	93.484	201214.	77.390
2700.00	19.124	43755.	16.205	94.204	210597.	77.999
2800.00	19.171	45670.	16.311	94.901	220054.	78.591
2900.00	19.214	47589.	16.410	95.574	229577.	79.164
3000.00	19.253	49513.	16.504	96.226	239166.	79.722
3100.00	19.289	51439.	16.593	96.858	248821.	80.265
3200.00	19.322	53369.	16.678	97.471	258538.	80.793
3300.00	19.352	55303.	16.759	98.066	268315.	81.308
3400.00	19.380	57240.	16.835	98.644	278150.	81.809
3500.00	19.406	59179.	16.908	99.207	288046.	82.299
3600.00	19.430	61121.	16.978	99.754	297993.	82.776
3700.00	19.452	63065.	17.045	100.29	307993.	83.241
3800.00	19.472	65012.	17.108	100.80	318047.	83.697
3900.00	19.492	66960.	17.169	101.31	328153.	84.142
4000.00	19.509	68910.	17.227	101.80	338310.	84.578
4100.00	19.526	70861.	17.283	102.29	348515.	85.004
4200.00	19.541	72815.	17.337	102.76	358768.	85.421
4300.00	19.556	74770.	17.388	103.22	369066.	85.829
4400.00	19.569	76726.	17.438	103.67	379412.	86.230
4500.00	19.582	78684.	17.485	104.11	389801.	86.622
4600.00	19.594	80643.	17.531	104.54	400231.	87.007
4700.00	19.605	82603.	17.575	104.96	410708.	87.385
4800.00	19.616	84564.	17.617	105.37	421225.	87.755
4900.00	19.626	86526.	17.658	105.78	431780.	88.118
5000.00	19.635	88489.	17.698	106.17	442380.	88.476
5100.00	19.644	90452.	17.736	106.56	453017.	88.827
5200.00	19.652	92417.	17.773	106.94	463690.	89.171
5300.00	19.660	94383.	17.808	107.32	474405.	89.510
5400.00	19.668	96349.	17.842	107.69	485153.	89.843
5500.00	19.675	98317.	17.876	108.05	495939.	90.171
5600.00	19.682	100285.	17.908	108.40	506764.	90.494
5700.00	19.688	102253.	17.939	108.75	517620.	90.810
5800.00	19.694	104222.	17.969	109.09	528515.	91.123
5900.00	19.700	106192.	17.999	109.43	539443.	91.431
6000.00	19.706	108163.	18.027	109.76	550400.	91.733

TABLE 55

MOLAR THERMODYNAMIC PROPERTIES FOR NITROUS ACID TRANS (HNO_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 47.01357 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.947	-19.15	-64.229	-27.946	-10.82	-36.2902

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.027	794.96	7.950	49.614	4166.4	41.664
200.00	9.328	1651.9	8.260	55.501	9448.3	47.242
298.15	10.999	2650.9	8.891	59.543	15102.	50.652
300.00	11.028	2670.9	8.903	59.611	15212.	50.708
400.00	12.434	3846.8	9.617	62.984	21347.	53.367
500.00	13.542	5147.7	10.295	65.883	27794.	55.587
600.00	14.413	6547.7	10.913	68.432	34511.	57.519
700.00	15.109	8024.6	11.464	70.708	41471.	59.245
800.00	15.676	9565.5	11.957	72.763	48645.	60.806
900.00	16.148	11157.	12.397	74.638	56017.	62.241
1000.00	16.549	12792.	12.792	76.361	63569.	63.569
1100.00	16.894	14465.	13.150	77.955	71285.	64.805
1200.00	17.192	16169.	13.474	79.438	79156.	65.964
1300.00	17.453	17902.	13.771	80.825	87170.	67.054
1400.00	17.681	19659.	14.042	82.127	95319.	68.085
1500.00	17.881	21438.	14.292	83.353	103591.	69.061
1600.00	18.058	23235.	14.522	84.513	111986.	69.991
1700.00	18.214	25049.	14.735	85.613	120493.	70.878
1800.00	18.353	26877.	14.931	86.658	129107.	71.726
1900.00	18.476	28719.	15.115	87.654	137823.	72.539
2000.00	18.586	30571.	15.286	88.604	146636.	73.318
2100.00	18.684	32435.	15.445	89.514	155543.	74.068
2200.00	18.772	34308.	15.595	90.384	164538.	74.790
2300.00	18.851	36189.	15.734	91.220	173618.	75.486
2400.00	18.922	38078.	15.866	92.024	182780.	76.159
2500.00	18.986	39973.	15.989	92.798	192023.	76.809
2600.00	19.045	41875.	16.106	93.544	201340.	77.439
2700.00	19.098	43782.	16.215	94.263	210729.	78.048
2800.00	19.146	45695.	16.320	94.959	220191.	78.640
2900.00	19.190	47612.	16.418	95.632	229722.	79.214
3000.00	19.230	49533.	16.511	96.283	239317.	79.772
3100.00	19.267	51457.	16.599	96.914	248976.	80.315
3200.00	19.301	53386.	16.683	97.526	258697.	80.843
3300.00	19.333	55317.	16.763	98.121	268482.	81.358
3400.00	19.361	57252.	16.839	98.698	278321.	81.859
3500.00	19.388	59190.	16.911	99.260	288220.	82.349
3600.00	19.413	61130.	16.981	99.807	298175.	82.826
3700.00	19.435	63072.	17.046	100.34	308182.	83.293
3800.00	19.457	65017.	17.110	100.86	318240.	83.747
3900.00	19.476	66964.	17.170	101.36	328352.	84.193
4000.00	19.495	68913.	17.228	101.86	338515.	84.629
4100.00	19.512	70862.	17.284	102.34	348723.	85.054
4200.00	19.528	72814.	17.337	102.81	358983.	85.472
4300.00	19.543	74768.	17.388	103.27	369283.	85.880
4400.00	19.557	76723.	17.437	103.72	379635.	86.281
4500.00	19.570	78679.	17.484	104.16	390026.	86.673
4600.00	19.583	80637.	17.530	104.59	400467.	87.058
4700.00	19.594	82596.	17.574	105.01	410945.	87.435
4800.00	19.605	84556.	17.616	105.42	421469.	87.806
4900.00	19.616	86517.	17.656	105.83	432029.	88.169
5000.00	19.625	88479.	17.696	106.22	442630.	88.526
5100.00	19.635	90441.	17.734	106.61	453273.	88.877
5200.00	19.643	92405.	17.770	106.99	463956.	89.222
5300.00	19.651	94370.	17.806	107.37	474673.	89.561
5400.00	19.659	96336.	17.840	107.73	485425.	89.894
5500.00	19.667	98302.	17.873	108.09	496218.	90.221
5600.00	19.674	100269.	17.905	108.45	507043.	90.543
5700.00	19.680	102237.	17.936	108.80	517909.	90.861
5800.00	19.687	104206.	17.967	109.14	528804.	91.173
5900.00	19.693	106175.	17.996	109.48	539737.	91.481
6000.00	19.699	108145.	18.024	109.81	550700.	91.783

TABLE 56

MOLAR THERMODYNAMIC PROPERTIES FOR NITRIC ACID (HNO_3)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 63.01297 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	- 4.709	-32.28	-108.2671	-48.357	-17.87	-59.9359

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.107	796.96	7.970	53.000	4503.1	45.031
200.00	10.109	1691.9	8.460	59.126	10133.	50.666
298.15	12.747	2814.9	9.441	63.660	16165.	54.218
300.00	12.794	2838.9	9.463	63.739	16283.	54.276
400.00	15.102	4237.8	10.594	67.747	22861.	57.152
500.00	16.929	5842.7	11.685	71.321	29818.	59.636
600.00	18.347	7609.6	12.683	74.539	37114.	61.857
700.00	19.450	9501.5	13.574	77.454	44716.	63.881
800.00	20.324	11492.	14.366	80.110	52596.	65.744
900.00	21.030	13561.	15.068	82.546	60730.	67.478
1000.00	21.612	15694.	15.694	84.793	69099.	69.099
1100.00	22.097	17880.	16.255	86.876	77683.	70.621
1200.00	22.507	20111.	16.759	88.817	86469.	72.057
1300.00	22.857	22380.	17.215	90.632	95442.	73.417
1400.00	23.158	24681.	17.629	92.337	104592.	74.708
1500.00	23.418	27010.	18.006	93.944	113907.	75.938
1600.00	23.645	29364.	18.352	95.463	123378.	77.111
1700.00	23.842	31737.	18.669	96.903	132998.	78.234
1800.00	24.016	34130.	18.961	98.271	142758.	79.310
1900.00	24.169	36540.	19.232	99.573	152649.	80.341
2000.00	24.305	38964.	19.482	100.82	162670.	81.335
2100.00	24.425	41401.	19.715	102.00	172809.	82.290
2200.00	24.533	43849.	19.931	103.14	183068.	83.213
2300.00	24.629	46307.	20.133	104.24	193438.	84.103
2400.00	24.715	48774.	20.322	105.29	203915.	84.964
2500.00	24.792	51249.	20.500	106.30	214495.	85.798
2600.00	24.862	53732.	20.666	107.27	225171.	86.604
2700.00	24.926	56221.	20.823	108.21	235947.	87.388
2800.00	24.983	58717.	20.970	109.12	246815.	88.148
2900.00	25.036	61218.	21.110	110.00	257769.	88.886
3000.00	25.084	63724.	21.241	110.85	268813.	89.604
3100.00	25.128	66235.	21.366	111.67	279937.	90.302
3200.00	25.168	68750.	21.484	112.47	291146.	90.983
3300.00	25.205	71268.	21.596	113.24	302431.	91.646
3400.00	25.239	73790.	21.703	114.00	313794.	92.292
3500.00	25.270	76315.	21.804	114.73	325230.	92.923
3600.00	25.299	78844.	21.901	115.44	336737.	93.538
3700.00	25.326	81375.	21.993	116.13	348318.	94.140
3800.00	25.351	83909.	22.081	116.81	359962.	94.727
3900.00	25.374	86446.	22.166	117.47	371676.	95.302
4000.00	25.396	88984.	22.246	118.11	383457.	95.864
4100.00	25.416	91524.	22.323	118.74	395298.	96.414
4200.00	25.434	94067.	22.397	119.35	407203.	96.953
4300.00	25.452	96611.	22.468	119.95	419170.	97.481
4400.00	25.468	99157.	22.536	120.53	431192.	97.998
4500.00	25.484	101705.	22.601	121.11	443276.	98.506
4600.00	25.498	104254.	22.664	121.67	455414.	99.003
4700.00	25.512	106805.	22.724	122.21	467605.	99.490
4800.00	25.525	109357.	22.783	122.75	479857.	99.970
4900.00	25.537	111909.	22.839	123.28	492157.	100.44
5000.00	25.548	114463.	22.893	123.79	504511.	100.90
5100.00	25.559	117018.	22.945	124.30	516916.	101.36
5200.00	25.569	119575.	22.995	124.80	529373.	101.80
5300.00	25.579	122132.	23.044	125.28	541877.	102.24
5400.00	25.588	124691.	23.091	125.76	554428.	102.67
5500.00	25.596	127250.	23.136	126.23	567030.	103.10
5600.00	25.604	129810.	23.180	126.69	579675.	103.51
5700.00	25.612	132370.	23.223	127.15	592365.	103.92
5800.00	25.620	134932.	23.264	127.59	605105.	104.33
5900.00	25.627	137494.	23.304	128.03	617886.	104.73
6000.00	25.633	140057.	23.343	128.46	630706.	105.12

TABLE 57

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROXYL (HO)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 17.00737 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.184	9.31	31.225	3.776	8.18	27.435

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.798	724.90	7.249	35.725	2847.6	28.476
200.00	7.356	1480.9	7.404	40.984	6715.9	33.579
298.15	7.167	2192.1	7.352	43.880	10891.	36.527
300.00	7.165	2205.4	7.351	43.924	10972.	36.573
400.00	7.087	2917.4	7.293	45.973	15472.	38.679
500.00	7.055	3624.2	7.248	47.550	20151.	40.302
600.00	7.057	4329.6	7.216	48.836	24972.	41.620
700.00	7.090	5036.6	7.195	49.926	29912.	42.731
800.00	7.150	5748.4	7.186	50.876	34953.	43.691
900.00	7.233	6467.4	7.186	51.723	40084.	44.537
1000.00	7.332	7195.6	7.196	52.490	45295.	45.295
1100.00	7.439	7934.0	7.213	53.194	50579.	45.981
1200.00	7.549	8683.4	7.236	53.846	55932.	46.610
1300.00	7.659	9443.8	7.264	54.455	61347.	47.190
1400.00	7.766	10215.	7.296	55.026	66822.	47.730
1500.00	7.867	10997.	7.331	55.565	72351.	48.234
1600.00	7.963	11788.	7.368	56.076	77934.	48.709
1700.00	8.053	12589.	7.405	56.562	83566.	49.156
1800.00	8.137	13399.	7.444	57.024	89245.	49.581
1900.00	8.214	14216.	7.482	57.467	94970.	49.984
2000.00	8.286	15041.	7.521	57.890	100738.	50.369
2100.00	8.353	15873.	7.559	58.296	106547.	50.737
2200.00	8.415	16712.	7.596	58.686	112397.	51.089
2300.00	8.472	17556.	7.633	59.061	118284.	51.428
2400.00	8.526	18406.	7.669	59.423	124208.	51.753
2500.00	8.576	19261.	7.705	59.772	130168.	52.067
2600.00	8.622	20121.	7.739	60.109	136162.	52.370
2700.00	8.665	20986.	7.772	60.435	142190.	52.663
2800.00	8.706	21854.	7.805	60.751	148249.	52.946
2900.00	8.744	22727.	7.837	61.057	154340.	53.221
3000.00	8.780	23603.	7.868	61.354	160460.	53.487
3100.00	8.814	24483.	7.898	61.643	166610.	53.745
3200.00	8.846	25366.	7.927	61.923	172788.	53.996
3300.00	8.876	26252.	7.955	62.196	178994.	54.241
3400.00	8.905	27141.	7.983	62.461	185227.	54.479
3500.00	8.933	28033.	8.009	62.720	191486.	54.710
3600.00	8.959	28927.	8.035	62.972	197771.	54.936
3700.00	8.984	29824.	8.061	63.218	204081.	55.157
3800.00	9.008	30724.	8.085	63.458	210414.	55.372
3900.00	9.031	31626.	8.109	63.692	216772.	55.583
4000.00	9.053	32530.	8.133	63.921	223153.	55.788
4100.00	9.074	33437.	8.155	64.145	229556.	55.989
4200.00	9.095	34345.	8.177	64.363	235981.	56.186
4300.00	9.115	35256.	8.199	64.578	242426.	56.379
4400.00	9.134	36168.	8.220	64.787	248897.	56.567
4500.00	9.153	37082.	8.241	64.993	255386.	56.752
4600.00	9.171	37999.	8.261	65.194	261895.	56.934
4700.00	9.189	38917.	8.280	65.392	268425.	57.112
4800.00	9.206	39836.	8.299	65.585	274973.	57.286
4900.00	9.223	40758.	8.318	65.775	281542.	57.457
5000.00	9.239	41681.	8.336	65.962	288128.	57.626
5100.00	9.255	42606.	8.354	66.145	294734.	57.791
5200.00	9.271	43532.	8.372	66.325	301357.	57.953
5300.00	9.286	44460.	8.389	66.502	307999.	58.113
5400.00	9.301	45389.	8.405	66.675	314657.	58.270
5500.00	9.316	46320.	8.422	66.846	321334.	58.424
5600.00	9.330	47252.	8.438	67.014	328027.	58.576
5700.00	9.344	48186.	8.454	67.179	334736.	58.726
5800.00	9.358	49121.	8.469	67.342	341462.	58.873
5900.00	9.372	50058.	8.484	67.502	348205.	59.018
6000.00	9.386	50995.	8.499	67.660	354963.	59.160

TABLE 58

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROXYL UNIPOSITIVE ION (HO^+)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 17.00682 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	4.954	317.5	106.489	8.540	312.252	104.7298

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.962	679.83	6.798	36.049	2925.0	29.250
200.00	6.965	1376.1	6.881	40.875	6798.8	33.994
298.15	6.969	2059.9	6.909	43.656	10956.	36.747
300.00	6.969	2072.8	6.909	43.700	11037.	36.790
400.00	6.982	2770.2	6.926	45.706	15512.	38.780
500.00	7.020	3470.0	6.940	47.267	20164.	40.327
600.00	7.095	4175.4	6.959	48.553	24956.	41.594
700.00	7.204	4890.1	6.986	49.655	29868.	42.669
800.00	7.337	5617.0	7.021	50.625	34883.	43.604
900.00	7.480	6357.7	7.064	51.497	39990.	44.433
1000.00	7.625	7113.0	7.113	52.293	45180.	45.180
1100.00	7.765	7882.6	7.166	53.026	50446.	45.860
1200.00	7.897	8665.8	7.221	53.708	55783.	46.486
1300.00	8.019	9461.7	7.278	54.345	61186.	47.066
1400.00	8.131	10269.	7.335	54.943	66651.	47.608
1500.00	8.233	11088.	7.392	55.508	72174.	48.116
1600.00	8.326	11916.	7.447	56.042	77752.	48.595
1700.00	8.410	12752.	7.501	56.549	83381.	49.048
1800.00	8.487	13597.	7.554	57.032	89061.	49.478
1900.00	8.557	14450.	7.605	57.493	94787.	49.888
2000.00	8.621	15308.	7.654	57.934	100559.	50.279
2100.00	8.680	16174.	7.702	58.356	106373.	50.654
2200.00	8.734	17044.	7.747	58.761	112229.	51.013
2300.00	8.785	17920.	7.791	59.150	118125.	51.359
2400.00	8.831	18801.	7.834	59.525	124059.	51.691
2500.00	8.875	19686.	7.875	59.886	130029.	52.012
2600.00	8.916	20576.	7.914	60.235	136036.	52.321
2700.00	8.954	21470.	7.952	60.572	142076.	52.621
2800.00	8.990	22367.	7.988	60.899	148150.	52.911
2900.00	9.024	23267.	8.023	61.215	154255.	53.192
3000.00	9.056	24171.	8.057	61.521	160392.	53.464
3100.00	9.087	25079.	8.090	61.819	166559.	53.729
3200.00	9.117	25989.	8.122	62.108	172756.	53.986
3300.00	9.145	26902.	8.152	62.389	178981.	54.237
3400.00	9.172	27818.	8.182	62.662	185233.	54.480
3500.00	9.198	28736.	8.210	62.928	191513.	54.718
3600.00	9.223	29657.	8.238	63.188	197819.	54.950
3700.00	9.247	30581.	8.265	63.441	204150.	55.176
3800.00	9.271	31507.	8.291	63.688	210507.	55.396
3900.00	9.293	32435.	8.317	63.929	216888.	55.612
4000.00	9.316	33365.	8.341	64.164	223292.	55.823
4100.00	9.337	34298.	8.365	64.395	229720.	56.029
4200.00	9.358	35233.	8.389	64.620	236171.	56.231
4300.00	9.379	36170.	8.412	64.840	242644.	56.429
4400.00	9.399	37109.	8.434	65.056	249139.	56.622
4500.00	9.419	38049.	8.455	65.268	255655.	56.812
4600.00	9.438	38992.	8.477	65.475	262192.	56.998
4700.00	9.457	39937.	8.497	65.678	268750.	57.181
4800.00	9.476	40884.	8.517	65.877	275328.	57.360
4900.00	9.495	41832.	8.537	66.073	281925.	57.536
5000.00	9.513	42783.	8.557	66.265	288542.	57.708
5100.00	9.531	43735.	8.575	66.454	295178.	57.878
5200.00	9.549	44689.	8.594	66.639	301833.	58.045
5300.00	9.566	45645.	8.612	66.821	308506.	58.209
5400.00	9.583	46602.	8.630	67.000	315197.	58.370
5500.00	9.601	47561.	8.648	67.176	321906.	58.528
5600.00	9.617	48522.	8.665	67.349	328632.	58.684
5700.00	9.634	49485.	8.682	67.519	335376.	58.838
5800.00	9.651	50449.	8.698	67.687	342136.	58.989
5900.00	9.667	51415.	8.714	67.852	348913.	59.138
6000.00	9.684	52383.	8.730	68.015	355706.	59.284

TABLE 59

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROXYL UNINEGATIVE (HO^-)
IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 17.00792 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-4.986	-33.67	-112.9297	- 3.864	-33.247	-111.5104

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.961	677.67	6.777	33.623	2684.6	26.846
200.00	6.962	1373.8	6.869	38.448	6315.8	31.579
298.15	6.965	2057.3	6.900	41.228	10235.	34.328
300.00	6.965	2070.1	6.900	41.272	10311.	34.371
400.00	6.969	2766.8	6.917	43.276	14543.	36.359
500.00	6.978	3464.0	6.928	44.831	18952.	37.903
600.00	7.002	4162.9	6.938	46.105	23500.	39.167
700.00	7.047	4865.1	6.950	47.188	28166.	40.238
800.00	7.116	5573.1	6.966	48.133	32933.	41.167
900.00	7.204	6289.0	6.988	48.976	37790.	41.989
1000.00	7.306	7014.4	7.014	49.740	42726.	42.726
1100.00	7.415	7750.4	7.046	50.442	47736.	43.396
1200.00	7.527	8497.5	7.081	51.092	52813.	44.011
1300.00	7.638	9255.7	7.120	51.699	57953.	44.579
1400.00	7.745	10025.	7.161	52.269	63151.	45.108
1500.00	7.848	10805.	7.203	52.807	68405.	45.604
1600.00	7.944	11594.	7.246	53.316	73712.	46.070
1700.00	8.034	12393.	7.290	53.801	79068.	46.510
1800.00	8.118	13201.	7.334	54.262	84471.	46.928
1900.00	8.195	14017.	7.377	54.703	89919.	47.326
2000.00	8.267	14840.	7.420	55.125	95411.	47.706
2100.00	8.334	15670.	7.462	55.530	100944.	48.069
2200.00	8.396	16506.	7.503	55.919	106517.	48.417
2300.00	8.453	17349.	7.543	56.294	112127.	48.751
2400.00	8.506	18197.	7.582	56.655	117775.	49.073
2500.00	8.555	19050.	7.620	57.003	123458.	49.383
2600.00	8.601	19908.	7.657	57.340	129175.	49.683
2700.00	8.644	20770.	7.693	57.665	134925.	49.972
2800.00	8.685	21636.	7.727	57.980	140708.	50.253
2900.00	8.722	22507.	7.761	58.286	146521.	50.525
3000.00	8.758	23381.	7.794	58.582	152365.	50.788
3100.00	8.791	24258.	7.825	58.870	158237.	51.044
3200.00	8.823	25139.	7.856	59.149	164138.	51.293
3300.00	8.853	26023.	7.886	59.421	170067.	51.535
3400.00	8.881	26910.	7.915	59.686	176022.	51.771
3500.00	8.908	27799.	7.943	59.944	182004.	52.001
3600.00	8.934	28691.	7.970	60.195	188011.	52.225
3700.00	8.958	29586.	7.996	60.440	194042.	52.444
3800.00	8.982	30483.	8.022	60.679	200098.	52.657
3900.00	9.004	31382.	8.047	60.913	206178.	52.866
4000.00	9.026	32284.	8.071	61.141	212281.	53.070
4100.00	9.047	33187.	8.094	61.364	218406.	53.270
4200.00	9.067	34093.	8.117	61.582	224554.	53.465
4300.00	9.086	35001.	8.140	61.796	230723.	53.656
4400.00	9.105	35910.	8.161	62.005	236913.	53.844
4500.00	9.123	36821.	8.183	62.210	243123.	54.027
4600.00	9.140	37735.	8.203	62.411	249355.	54.208
4700.00	9.157	38650.	8.223	62.607	255605.	54.384
4800.00	9.174	39566.	8.243	62.800	261876.	54.557
4900.00	9.190	40484.	8.262	62.990	268165.	54.728
5000.00	9.206	41404.	8.281	63.176	274474.	54.895
5100.00	9.221	42326.	8.299	63.358	280800.	55.059
5200.00	9.236	43248.	8.317	63.537	287145.	55.220
5300.00	9.251	44173.	8.334	63.713	293508.	55.379
5400.00	9.266	45099.	8.352	63.886	299888.	55.535
5500.00	9.280	46026.	8.368	64.057	306285.	55.688
5600.00	9.294	46955.	8.385	64.224	312699.	55.839
5700.00	9.307	47885.	8.401	64.388	319130.	55.988
5800.00	9.321	48816.	8.417	64.550	325577.	56.134
5900.00	9.334	49749.	8.432	64.710	332040.	56.278
6000.00	9.347	50683.	8.447	64.867	338518.	56.420

TABLE 60

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROPEROXYL (HO_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 33.00677 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL
298.15	-2.183	5.	16.77	-10.2250	8.049	26.9958

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.86	7.949	45.616	3766.7	37.667
200.00	8.003	1591.1	7.955	51.133	8635.4	43.177
298.15	8.337	2390.3	8.017	54.380	13823.	46.362
300.00	8.347	2405.8	8.019	54.431	13924.	46.412
400.00	8.907	3267.7	8.169	56.907	19495.	48.738
500.00	9.479	4187.4	8.375	58.957	25291.	50.582
600.00	9.979	5160.9	8.602	60.730	31277.	52.129
700.00	10.405	6180.7	8.830	62.302	37430.	53.472
800.00	10.769	7239.9	9.050	63.715	43732.	54.665
900.00	11.086	8333.0	9.259	65.002	50169.	55.744
1000.00	11.365	9455.8	9.456	66.185	56729.	56.729
1100.00	11.612	10605.	9.641	67.280	63403.	57.639
1200.00	11.830	11777.	9.814	68.300	70183.	58.486
1300.00	12.024	12970.	9.977	69.255	77061.	59.278
1400.00	12.196	14181.	10.129	70.152	84032.	60.023
1500.00	12.349	15409.	10.272	70.999	91090.	60.727
1600.00	12.485	16651.	10.407	71.801	98230.	61.394
1700.00	12.606	17905.	10.532	72.561	105449.	62.029
1800.00	12.713	19171.	10.651	73.285	112741.	62.634
1900.00	12.809	20447.	10.762	73.975	120105.	63.213
2000.00	12.895	21733.	10.866	74.634	127535.	63.768
2100.00	12.972	23026.	10.965	75.265	135030.	64.300
2200.00	13.041	24327.	11.058	75.870	142587.	64.812
2300.00	13.103	25634.	11.145	76.451	150204.	65.306
2400.00	13.159	26947.	11.228	77.010	157877.	65.782
2500.00	13.210	28266.	11.306	77.548	165605.	66.242
2600.00	13.256	29589.	11.380	78.067	173386.	66.687
2700.00	13.298	30917.	11.451	78.568	181218.	67.118
2800.00	13.336	32248.	11.517	79.053	189099.	67.535
2900.00	13.371	33584.	11.581	79.521	197028.	67.941
3000.00	13.402	34922.	11.641	79.975	205003.	68.334
3100.00	13.432	36264.	11.696	80.415	213022.	68.717
3200.00	13.458	37609.	11.753	80.842	221085.	69.089
3300.00	13.483	38956.	11.805	81.256	229190.	69.452
3400.00	13.506	40305.	11.854	81.659	237336.	69.805
3500.00	13.527	41657.	11.902	82.051	245522.	70.149
3600.00	13.546	43011.	11.947	82.432	253746.	70.485
3700.00	13.565	44366.	11.991	82.804	262008.	70.813
3800.00	13.581	45723.	12.032	83.166	270307.	71.133
3900.00	13.597	47082.	12.072	83.519	278641.	71.446
4000.00	13.612	48443.	12.111	83.863	287010.	71.752
4100.00	13.625	49805.	12.147	84.199	295413.	72.052
4200.00	13.638	51168.	12.183	84.528	303850.	72.345
4300.00	13.650	52532.	12.217	84.849	312319.	72.632
4400.00	13.661	53898.	12.249	85.163	320819.	72.913
4500.00	13.671	55264.	12.281	85.470	329351.	73.189
4600.00	13.681	56632.	12.311	85.771	337913.	73.459
4700.00	13.690	58001.	12.341	86.065	346505.	73.724
4800.00	13.699	59370.	12.369	86.353	355126.	73.985
4900.00	13.707	60740.	12.396	86.636	363775.	74.240
5000.00	13.715	62111.	12.422	86.913	372453.	74.491
5100.00	13.722	63483.	12.448	87.185	381158.	74.737
5200.00	13.729	64856.	12.472	87.451	389890.	74.979
5300.00	13.736	66229.	12.496	87.713	398648.	75.217
5400.00	13.742	67603.	12.519	87.969	407432.	75.450
5500.00	13.748	68977.	12.541	88.222	416241.	75.680
5600.00	13.753	70353.	12.563	88.469	425076.	75.906
5700.00	13.759	71728.	12.584	88.713	433935.	76.129
5800.00	13.764	73104.	12.604	88.952	442818.	76.348
5900.00	13.768	74481.	12.624	89.188	451726.	76.564
6000.00	13.773	75858.	12.643	89.419	460656.	76.776

TABLE 61

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS MONOHYDRIDE (HP)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 31.98177 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-0.198	59.2	198.556	29.840	51.463	172.6069

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.956	694.97	6.950	42.810	3586.0	35.860
200.00	6.971	1390.9	6.955	47.633	8135.6	40.678
298.15	7.096	2079.9	6.976	50.434	12957.	43.458
300.00	7.100	2092.9	6.976	50.478	13051.	43.502
400.00	7.355	2814.9	7.037	52.553	18206.	45.516
500.00	7.636	3564.8	7.130	54.225	23548.	47.096
600.00	7.885	4340.8	7.235	55.640	29043.	48.406
700.00	8.088	5139.7	7.342	56.871	34670.	49.529
800.00	8.249	5957.7	7.447	57.962	40412.	50.515
900.00	8.376	6788.7	7.543	58.941	46258.	51.398
1000.00	8.476	7631.6	7.632	59.829	52197.	52.197
1100.00	8.557	8483.6	7.712	60.641	58221.	52.929
1200.00	8.623	9342.5	7.785	61.389	64324.	53.603
1300.00	8.678	10207.	7.852	62.081	70498.	54.229
1400.00	8.723	11077.	7.912	62.726	76739.	54.813
1500.00	8.762	11951.	7.968	63.329	83042.	55.361
1600.00	8.794	12829.	8.018	63.896	89404.	55.877
1700.00	8.823	13710.	8.065	64.430	95820.	56.365
1800.00	8.848	14594.	8.108	64.935	102288.	56.827
1900.00	8.870	15479.	8.147	65.414	108807.	57.267
2000.00	8.889	16367.	8.184	65.869	115370.	57.685
2100.00	8.907	17257.	8.218	66.303	121978.	58.085
2200.00	8.923	18149.	8.250	66.718	128630.	58.468
2300.00	8.938	19042.	8.279	67.115	135322.	58.835
2400.00	8.951	19936.	8.307	67.496	142053.	59.189
2500.00	8.964	20832.	8.333	67.861	148820.	59.528
2600.00	8.975	21729.	8.357	68.213	155624.	59.855
2700.00	8.986	22627.	8.380	68.552	162462.	60.171
2800.00	8.996	23526.	8.402	68.879	169334.	60.476
2900.00	9.006	24426.	8.423	69.195	176238.	60.772
3000.00	9.015	25327.	8.442	69.500	183172.	61.057
3100.00	9.024	26229.	8.461	69.796	190137.	61.335
3200.00	9.032	27132.	8.479	70.082	197132.	61.604
3300.00	9.041	28036.	8.496	70.360	204154.	61.865
3400.00	9.048	28940.	8.512	70.630	211204.	62.119
3500.00	9.056	29845.	8.527	70.892	218279.	62.365
3600.00	9.063	30750.	8.542	71.147	225380.	62.606
3700.00	9.070	31657.	8.556	71.396	232509.	62.840
3800.00	9.077	32564.	8.570	71.638	239662.	63.069
3900.00	9.084	33473.	8.583	71.874	246837.	63.292
4000.00	9.090	34381.	8.595	72.104	254036.	63.509
4100.00	9.097	35291.	8.608	72.328	261255.	63.721
4200.00	9.103	36201.	8.619	72.548	268502.	63.929
4300.00	9.109	37111.	8.630	72.762	275767.	64.132
4400.00	9.116	38023.	8.642	72.971	283051.	64.330
4500.00	9.122	38934.	8.652	73.176	290359.	64.524
4600.00	9.127	39847.	8.662	73.377	297689.	64.715
4700.00	9.133	40760.	8.672	73.573	305035.	64.901
4800.00	9.139	41673.	8.682	73.765	312401.	65.083
4900.00	9.145	42588.	8.691	73.954	319788.	65.263
5000.00	9.150	43502.	8.700	74.139	327195.	65.439
5100.00	9.156	44418.	8.709	74.320	334616.	65.611
5200.00	9.161	45334.	8.718	74.498	342057.	65.780
5300.00	9.167	46250.	8.726	74.672	349513.	65.946
5400.00	9.172	47167.	8.735	74.844	356992.	66.110
5500.00	9.178	48084.	8.742	75.012	364484.	66.270
5600.00	9.183	49003.	8.750	75.178	371996.	66.428
5700.00	9.188	49921.	8.758	75.340	379519.	66.582
5800.00	9.194	50839.	8.765	75.500	387062.	66.735
5900.00	9.199	51759.	8.773	75.657	394618.	66.884
6000.00	9.204	52679.	8.780	75.812	402194.	67.032

TABLE 62

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR MONOHYDRIDE (HS)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 33.07197 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-1.119	34.10	114.3714	23.509	27.08	90.8263

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.169	654.97	6.550	38.440	3189.0	31.890
200.00	7.770	812.96	4.065	43.640	7915.0	39.575
298.15	7.728	2171.9	7.286	46.743	11764.	39.456
300.00	7.724	2185.9	7.286	46.791	11851.	39.504
400.00	7.563	2949.9	7.375	48.989	16646.	41.614
500.00	7.470	3700.8	7.402	50.665	21632.	43.264
600.00	7.463	4446.8	7.411	52.025	26768.	44.614
700.00	7.521	5195.7	7.422	53.179	32030.	45.757
800.00	7.618	5952.7	7.441	54.189	37399.	46.748
900.00	7.734	6719.7	7.466	55.093	42864.	47.627
1000.00	7.855	7499.6	7.500	55.914	48415.	48.415
1100.00	7.973	8290.6	7.537	56.668	54044.	49.131
1200.00	8.084	9093.5	7.578	57.367	59747.	49.789
1300.00	8.187	9907.5	7.621	58.018	65516.	50.397
1400.00	8.281	10730.	7.665	58.628	71349.	50.963
1500.00	8.367	11563.	7.709	59.203	77241.	51.494
1600.00	8.444	12403.	7.752	59.745	83189.	51.993
1700.00	8.514	13251.	7.795	60.259	89189.	52.464
1800.00	8.577	14106.	7.837	60.748	95240.	52.911
1900.00	8.635	14966.	7.877	61.213	101338.	53.336
2000.00	8.687	15833.	7.917	61.657	107481.	53.740
2100.00	8.735	16704.	7.954	62.082	113668.	54.128
2200.00	8.780	17579.	7.991	62.490	119899.	54.499
2300.00	8.820	18458.	8.025	62.880	126166.	54.855
2400.00	9.092	19351.	8.063	63.260	132473.	55.197
2500.00	8.893	20249.	8.100	63.627	138818.	55.527
2600.00	8.926	21138.	8.130	63.975	145197.	55.845
2700.00	8.957	22032.	8.160	64.313	151613.	56.153
2800.00	8.986	22929.	8.189	64.639	158060.	56.450
2900.00	9.013	23829.	8.217	64.955	164540.	56.738
3000.00	9.039	24731.	8.244	65.261	171051.	57.017
3100.00	9.063	25637.	8.270	65.558	177592.	57.288
3200.00	9.086	26544.	8.295	65.846	184163.	57.551
3300.00	9.108	27454.	8.319	66.126	190761.	57.806
3400.00	9.130	28366.	8.343	66.398	197387.	58.055
3500.00	9.150	29280.	8.366	66.663	204040.	58.297
3600.00	9.170	30195.	8.388	66.921	210719.	58.533
3700.00	9.189	31113.	8.409	67.172	217422.	58.763
3800.00	9.207	32032.	8.430	67.418	224155.	58.988
3900.00	9.225	32954.	8.450	67.657	230906.	59.207
4000.00	9.242	33877.	8.469	67.891	237685.	59.421
4100.00	9.259	34802.	8.488	68.119	244484.	59.630
4200.00	9.275	35729.	8.507	68.343	251310.	59.836
4300.00	9.291	36657.	8.525	68.561	258153.	60.036
4400.00	9.306	37587.	8.543	68.775	265021.	60.232
4500.00	9.321	38519.	8.560	68.984	271907.	60.424
4600.00	9.336	39451.	8.576	69.189	278816.	60.612
4700.00	9.351	40386.	8.593	69.390	285745.	60.797
4800.00	9.365	41322.	8.609	69.587	292693.	60.978
4900.00	9.379	42259.	8.624	69.780	299661.	61.155
5000.00	9.392	43197.	8.639	69.970	306651.	61.330
5100.00	9.407	44137.	8.654	70.155	313656.	61.501
5200.00	9.420	45079.	8.669	70.338	320681.	61.669
5300.00	9.431	46021.	8.683	70.517	327722.	61.834
5400.00	9.440	46965.	8.697	70.694	334785.	61.997
5500.00	9.456	47910.	8.711	70.867	341861.	62.157
5600.00	9.470	48856.	8.724	71.038	348960.	62.314
5700.00	9.481	49804.	8.737	71.205	356067.	62.468
5800.00	9.490	50751.	8.750	71.370	363197.	62.620
5900.00	9.504	51701.	8.763	71.533	370346.	62.770

TABLE 63

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN DIATOMIC (REF. ST.) (H_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 2.01594 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	5.393	758.96	7.590	24.386	1679.6	16.796
200.00	6.518	1361.9	6.810	28.519	4341.8	21.709
298.15	6.892	2023.9	6.788	31.206	7280.1	24.417
300.00	6.894	2036.9	6.790	31.249	7337.9	24.460
400.00	6.975	2730.9	6.827	33.245	10567.	26.418
500.00	6.993	3429.8	6.860	34.804	13972.	27.945
600.00	7.009	4129.8	6.883	36.080	17518.	29.197
700.00	7.036	4831.8	6.903	37.163	21182.	30.261
800.00	7.087	5537.7	6.922	38.105	24946.	31.183
900.00	7.148	6249.7	6.944	38.944	28800.	32.000
1000.00	7.219	6967.7	6.968	39.700	32732.	32.732
1100.00	7.300	7693.6	6.994	40.392	36738.	33.398
1200.00	7.390	8427.6	7.023	41.031	40810.	34.008
1300.00	7.490	9171.5	7.055	41.626	44942.	34.571
1400.00	7.600	9925.5	7.090	42.185	49133.	35.095
1500.00	7.720	10691.	7.128	42.714	53379.	35.586
1600.00	7.823	11469.	7.168	43.215	57674.	36.046
1700.00	7.921	12256.	7.210	43.693	62021.	36.483
1800.00	8.016	13053.	7.252	44.148	66413.	36.896
1900.00	8.108	13859.	7.294	44.584	70850.	37.289
2000.00	8.195	14674.	7.337	45.002	75329.	37.665
2100.00	8.279	15498.	7.380	45.404	79850.	38.024
2200.00	8.358	16330.	7.423	45.791	84409.	38.368
2300.00	8.434	17169.	7.465	46.164	89007.	38.699
2400.00	8.506	18016.	7.507	46.525	93643.	39.018
2500.00	8.575	18871.	7.548	46.873	98311.	39.324
2600.00	8.639	19731.	7.589	47.211	103017.	39.622
2700.00	8.700	20598.	7.629	47.538	107754.	39.909
2800.00	8.757	21471.	7.668	47.855	112522.	40.186
2900.00	8.810	22349.	7.707	48.164	117326.	40.457
3000.00	8.859	23233.	7.744	48.463	122155.	40.718
3100.00	8.911	24121.	7.781	48.754	127015.	40.973
3200.00	8.962	25015.	7.817	49.038	131905.	41.220
3300.00	9.012	25914.	7.853	49.315	136824.	41.462
3400.00	9.061	26817.	7.887	49.584	141767.	41.696
3500.00	9.110	27726.	7.922	49.848	146741.	41.926
3600.00	9.158	28639.	7.955	50.104	151738.	42.149
3700.00	9.205	29558.	7.989	50.356	156761.	42.368
3800.00	9.252	30479.	8.021	50.602	161810.	42.582
3900.00	9.297	31407.	8.053	50.843	166882.	42.790
4000.00	9.342	32339.	8.085	51.079	171978.	42.995
4100.00	9.386	33275.	8.116	51.310	177097.	43.194
4200.00	9.429	34216.	8.147	51.537	182241.	43.391
4300.00	9.472	35161.	8.177	51.759	187404.	43.582
4400.00	9.514	36110.	8.207	51.977	192590.	43.771
4500.00	9.555	37064.	8.236	52.191	197797.	43.955
4600.00	9.595	38021.	8.265	52.402	203030.	44.137
4700.00	9.634	38983.	8.294	52.609	208281.	44.315
4800.00	9.673	39948.	8.323	52.812	213551.	44.490
4900.00	9.711	40917.	8.350	53.012	218844.	44.662
5000.00	9.748	41890.	8.378	53.208	224152.	44.830
5100.00	9.785	42867.	8.405	53.402	229485.	44.997
5200.00	9.822	43847.	8.432	53.592	234833.	45.160
5300.00	9.859	44831.	8.459	53.780	240205.	45.322
5400.00	9.895	45819.	8.485	53.964	245589.	45.479
5500.00	9.930	46810.	8.511	54.146	250995.	45.635
5600.00	9.965	47805.	8.537	54.325	256417.	45.789
5700.00	9.999	48803.	8.562	54.502	261860.	45.940
5800.00	10.033	49805.	8.587	54.676	267318.	46.089
5900.00	10.066	50809.	8.612	54.848	272795.	46.236
6000.00	10.099	51817.	8.636	55.017	278286.	46.381

TABLE 64

MOLAR THERMODYNAMIC PROPERTIES FOR AMIDOGEN (H_2N)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 16.02264 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.273	41.	137.514	-7.605	42.974	144.1347

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.86	7.949	37.790	2984.1	29.841
200.00	7.953	1589.8	7.949	43.300	7070.2	35.351
298.15	8.024	2373.0	7.959	46.485	11487.	38.526
300.00	8.026	2387.8	7.959	46.535	11573.	38.575
400.00	8.219	3199.2	7.998	48.868	16348.	40.870
500.00	8.491	4034.3	8.069	50.730	21331.	42.661
600.00	8.804	4898.8	8.165	52.305	26484.	44.141
700.00	9.141	5796.0	8.280	53.688	31785.	45.408
800.00	9.491	6727.5	8.409	54.931	37217.	46.522
900.00	9.840	7694.1	8.549	56.069	42768.	47.520
1000.00	10.179	8695.2	8.695	57.123	48428.	48.428
1100.00	10.500	9729.4	8.845	58.109	54190.	49.264
1200.00	10.798	10795.	8.995	59.035	60048.	50.040
1300.00	11.071	11888.	9.145	59.911	65996.	50.766
1400.00	11.318	13008.	9.291	60.740	72029.	51.449
1500.00	11.542	14151.	9.434	61.529	78142.	52.095
1600.00	11.742	15315.	9.572	62.280	84333.	52.708
1700.00	11.922	16499.	9.705	62.998	90597.	53.293
1800.00	12.084	17699.	9.833	63.684	96932.	53.851
1900.00	12.228	18915.	9.955	64.341	103333.	54.386
2000.00	12.358	20144.	10.072	64.972	109799.	54.900
2100.00	12.475	21386.	10.184	65.578	116327.	55.394
2200.00	12.580	22639.	10.290	66.160	122914.	55.870
2300.00	12.674	23902.	10.392	66.722	129558.	56.330
2400.00	12.760	25174.	10.489	67.263	136258.	56.774
2500.00	12.837	26454.	10.581	67.785	143010.	57.204
2600.00	12.908	27741.	10.670	68.290	149814.	57.621
2700.00	12.972	29035.	10.754	68.779	156668.	58.025
2800.00	13.030	30335.	10.834	69.252	163569.	58.418
2900.00	13.083	31641.	10.911	69.710	170517.	58.799
3000.00	13.132	32951.	10.984	70.154	177511.	59.170
3100.00	13.177	34267.	11.054	70.585	184548.	59.532
3200.00	13.218	35587.	11.121	71.004	191627.	59.884
3300.00	13.256	36910.	11.185	71.412	198748.	60.227
3400.00	13.290	38238.	11.246	71.808	205909.	60.562
3500.00	13.323	39568.	11.305	72.194	213110.	60.888
3600.00	13.353	40902.	11.362	72.569	220348.	61.208
3700.00	13.380	42239.	11.416	72.936	227623.	61.520
3800.00	13.406	43578.	11.468	73.293	234935.	61.825
3900.00	13.430	44920.	11.518	73.641	242281.	62.123
4000.00	13.452	46264.	11.566	73.982	249663.	62.416
4100.00	13.473	47610.	11.612	74.314	257078.	62.702
4200.00	13.493	48959.	11.657	74.639	264525.	62.982
4300.00	13.511	50309.	11.700	74.957	272005.	63.257
4400.00	13.528	51661.	11.741	75.268	279516.	63.526
4500.00	13.544	53014.	11.781	75.572	287058.	63.791
4600.00	13.559	54370.	11.819	75.870	294630.	64.050
4700.00	13.573	55726.	11.857	76.161	302232.	64.305
4800.00	13.586	57084.	11.893	76.447	309863.	64.555
4900.00	13.599	58443.	11.927	76.728	317521.	64.800
5000.00	13.611	59804.	11.961	77.002	325208.	65.042
5100.00	13.622	61166.	11.993	77.272	332922.	65.279
5200.00	13.633	62528.	12.025	77.537	340662.	65.512
5300.00	13.643	63892.	12.055	77.796	348429.	65.741
5400.00	13.652	65257.	12.085	78.051	356221.	65.967
5500.00	13.661	66622.	12.113	78.302	364039.	66.189
5600.00	13.670	67989.	12.141	78.548	371882.	66.407
5700.00	13.678	69356.	12.168	78.790	379748.	66.623
5800.00	13.686	70725.	12.194	79.028	387639.	66.834
5900.00	13.693	72093.	12.219	79.262	395554.	67.043
6000.00	13.700	73463.	12.244	79.492	403492.	67.249

TABLE 65

MOLAR THERMODYNAMIC PROPERTIES FOR DIIMIDE (H_2N_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 30.02934 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-5.117	50.9	170.7186	-24.754	58.278	195.4644

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.87	7.949	43.352	3540.3	35.403
200.00	8.095	1593.9	7.970	48.886	8183.2	40.916
298.15	8.736	2415.7	8.102	52.220	13154.	44.118
300.00	8.753	2431.9	8.106	52.274	13250.	44.168
400.00	9.784	3357.1	8.393	54.929	18614.	46.536
500.00	10.877	4390.5	8.781	57.230	24225.	48.449
600.00	11.882	5529.4	9.216	59.304	30053.	50.088
700.00	12.769	6762.9	9.661	61.204	36080.	51.542
800.00	13.547	8079.5	10.099	62.961	42289.	52.861
900.00	14.230	9469.1	10.521	64.597	48668.	54.075
1000.00	14.830	10923.	10.923	66.128	55205.	55.205
1100.00	15.356	12433.	11.302	67.566	61890.	56.264
1200.00	15.817	13992.	11.660	68.923	68715.	57.263
1300.00	16.221	15594.	11.995	70.205	75672.	58.210
1400.00	16.576	17234.	12.310	71.420	82754.	59.110
1500.00	16.887	18908.	12.605	72.575	89954.	59.970
1600.00	17.160	20610.	12.882	73.674	97267.	60.792
1700.00	17.401	22339.	13.140	74.721	104687.	61.581
1800.00	17.614	24090.	13.383	75.722	112210.	62.339
1900.00	17.802	25861.	13.611	76.680	119830.	63.069
2000.00	17.970	27649.	13.825	77.597	127545.	63.772
2100.00	18.119	29454.	14.026	78.477	135349.	64.452
2200.00	18.252	31273.	14.215	79.323	143239.	65.109
2300.00	18.371	33104.	14.393	80.137	151212.	65.744
2400.00	18.478	34946.	14.561	80.922	159265.	66.361
2500.00	18.575	36799.	14.720	81.678	167396.	66.958
2600.00	18.662	38661.	14.870	82.408	175600.	67.539
2700.00	18.741	40531.	15.012	83.114	183876.	68.102
2800.00	18.813	42409.	15.146	83.797	192222.	68.651
2900.00	18.878	44294.	15.274	84.458	200635.	69.185
3000.00	18.938	46184.	15.395	85.099	209113.	69.704
3100.00	18.992	48081.	15.510	85.721	217654.	70.211
3200.00	19.043	49983.	15.620	86.325	226257.	70.705
3300.00	19.089	51889.	15.724	86.912	234919.	71.187
3400.00	19.131	53800.	15.824	87.482	243638.	71.658
3500.00	19.170	55715.	15.919	88.037	252415.	72.118
3600.00	19.206	57634.	16.010	88.578	261245.	72.568
3700.00	19.240	59557.	16.096	89.104	270130.	73.008
3800.00	19.271	61482.	16.179	89.618	279066.	73.438
3900.00	19.300	63411.	16.259	90.119	288053.	73.860
4000.00	19.326	65342.	16.335	90.608	297089.	74.272
4100.00	19.352	67276.	16.409	91.085	306174.	74.677
4200.00	19.375	69212.	16.479	91.552	315306.	75.073
4300.00	19.397	71151.	16.547	92.008	324484.	75.461
4400.00	19.417	73091.	16.612	92.454	333707.	75.843
4500.00	19.436	75034.	16.674	92.891	342975.	76.217
4600.00	19.454	76979.	16.735	93.318	352285.	76.584
4700.00	19.471	78925.	16.793	93.737	361638.	76.944
4800.00	19.487	80873.	16.849	94.147	371032.	77.298
4900.00	19.502	82822.	16.903	94.549	380467.	77.646
5000.00	19.517	84773.	16.955	94.943	389942.	77.988
5100.00	19.530	86726.	17.005	95.330	399455.	78.325
5200.00	19.543	88679.	17.054	95.709	409007.	78.655
5300.00	19.554	90634.	17.101	96.081	418597.	78.981
5400.00	19.566	92590.	17.146	96.447	428223.	79.301
5500.00	19.577	94547.	17.190	96.806	437886.	79.616
5600.00	19.587	96506.	17.233	97.159	447584.	79.926
5700.00	19.596	98465.	17.275	97.506	457318.	80.231
5800.00	19.606	100425.	17.315	97.847	467085.	80.532
5900.00	19.614	102386.	17.354	98.182	476887.	80.828
6000.00	19.623	104348.	17.391	98.512	486721.	81.120

TABLE 66

MOLAR THERMODYNAMIC PROPERTIES FOR WATER (H_2O)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 18.01534 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMAION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	- 2.377	-57.796	-193.8477	-10.603	-54.635	-183.2457

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.961	785.96	7.860	36.394	2853.5	28.535
200.00	7.969	1582.9	7.915	41.914	6799.9	33.999
298.15	8.025	2366.9	7.939	45.104	11081.	37.166
300.00	8.027	2381.9	7.940	45.153	11164.	37.213
400.00	8.186	3191.8	7.980	47.482	15801.	39.502
500.00	8.415	4020.8	8.042	49.332	20645.	41.290
600.00	8.676	4875.8	8.126	50.888	25657.	42.762
700.00	8.954	5756.7	8.224	52.246	30816.	44.023
800.00	9.246	6666.7	8.333	53.461	36102.	45.128
900.00	9.547	7606.6	8.452	54.567	41504.	46.115
1000.00	9.851	8575.6	8.576	55.589	47014.	47.014
1100.00	10.151	9576.5	8.706	56.542	52620.	47.836
1200.00	10.443	10606.	8.839	57.438	58319.	48.599
1300.00	10.722	11664.	8.973	58.285	64106.	49.312
1400.00	10.986	12750.	9.107	59.089	69974.	49.982
1500.00	11.232	13861.	9.241	59.856	75923.	50.615
1600.00	11.461	14996.	9.373	60.588	81945.	51.215
1700.00	11.673	16153.	9.502	61.290	88040.	51.788
1800.00	11.868	17330.	9.628	61.962	94201.	52.334
1900.00	12.047	18526.	9.751	62.609	100431.	52.858
2000.00	12.213	19739.	9.870	63.231	106723.	53.361
2100.00	12.365	20968.	9.985	63.831	113077.	53.846
2200.00	12.504	22212.	10.096	64.409	119487.	54.312
2300.00	12.633	23469.	10.204	64.968	125957.	54.764
2400.00	12.752	24738.	10.307	65.508	132481.	55.200
2500.00	12.862	26019.	10.407	66.031	139058.	55.623
2600.00	12.964	27311.	10.504	66.538	145687.	56.034
2700.00	13.058	28612.	10.597	67.029	152366.	56.432
2800.00	13.145	29922.	10.686	67.505	159091.	56.818
2900.00	13.227	31240.	10.773	67.968	165866.	57.195
3000.00	13.303	32566.	10.855	68.418	172686.	57.562
3100.00	13.373	33900.	10.936	68.855	179549.	57.919
3200.00	13.440	35241.	11.013	69.281	186456.	58.268
3300.00	13.502	36588.	11.087	69.695	193404.	58.607
3400.00	13.561	37942.	11.159	70.098	200393.	58.939
3500.00	13.616	39301.	11.229	70.492	207423.	59.264
3600.00	13.668	40665.	11.296	70.877	214494.	59.582
3700.00	13.717	42034.	11.361	71.252	221600.	59.892
3800.00	13.763	43408.	11.423	71.618	228742.	60.195
3900.00	13.807	44787.	11.484	71.976	235921.	60.493
4000.00	13.849	46170.	11.542	72.327	243140.	60.785
4100.00	13.889	47557.	11.599	72.669	250388.	61.070
4200.00	13.926	48948.	11.654	73.004	257671.	61.350
4300.00	13.962	50341.	11.707	73.332	264988.	61.625
4400.00	13.996	51739.	11.759	73.654	272340.	61.895
4500.00	14.029	53141.	11.809	73.969	279721.	62.160
4600.00	14.060	54545.	11.858	74.277	287130.	62.420
4700.00	14.090	55953.	11.905	74.580	294574.	62.675
4800.00	14.119	57364.	11.951	74.877	302047.	62.926
4900.00	14.147	58777.	11.995	75.168	309547.	63.173
5000.00	14.173	60193.	12.039	75.455	317083.	63.417
5100.00	14.200	61612.	12.081	75.736	324643.	63.655
5200.00	14.227	63033.	12.122	76.012	332231.	63.890
5300.00	14.253	64457.	12.162	76.283	339844.	64.122
5400.00	14.278	65884.	12.201	76.549	347482.	64.348
5500.00	14.302	67313.	12.239	76.812	355154.	64.573
5600.00	14.327	68745.	12.276	77.070	362848.	64.794
5700.00	14.350	70178.	12.312	77.323	370563.	65.011
5800.00	14.374	71614.	12.347	77.573	378310.	65.226
5900.00	14.397	73053.	12.382	77.819	386079.	65.437
6000.00	14.421	74494.	12.416	78.061	393872.	65.645

TABLE 67

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN PEROXIDE (H_2O_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 34.01474 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL
298.15	-3.608	-32.58	-109.2733	-24.551	-25.25	-84.6885

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.013	795.96	7.960	44.556	3659.6	36.596
200.00	8.813	1716.9	8.585	50.313	8345.8	41.729
298.15	10.304	2593.9	8.700	55.657	14000.	46.956
300.00	10.329	2612.9	8.710	55.721	14103.	47.012
400.00	11.579	3709.8	9.275	58.869	19838.	49.595
500.00	12.559	4918.8	9.838	61.562	25862.	51.724
600.00	13.309	6214.7	10.358	63.922	32138.	53.564
700.00	13.859	7573.6	10.819	66.016	38637.	55.196
800.00	14.299	8982.6	11.228	67.897	45335.	56.668
900.00	14.689	10432.	11.592	69.604	52211.	58.012
1000.00	15.019	11918.	11.918	71.169	59251.	59.251
1100.00	15.329	13436.	12.215	72.615	66441.	60.401
1200.00	15.609	14983.	12.486	73.961	73770.	61.475
1300.00	15.869	16557.	12.736	75.221	81230.	62.485
1400.00	16.109	18156.	12.969	76.406	88813.	63.438
1500.00	16.329	19778.	13.185	77.525	96510.	64.340

TABLE 68

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN SULFATE (H_2O_4S)

LIQUID

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 98.07754 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	6.845	-194.548	-652.5139	-99.353	-164.942	-553.2181

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_N^0)$ CAL/MOL	$(H_T^0-H_N^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_N^0)$ CAL/MOL	$-(G_T^0-H_N^0)/T$ CAL/DEG MOL
298.15	33.178	0.	0.	37.488	11177.	37.488
300.00	33.298	60.997	0.203	37.694	11247.	37.491
400.00	36.698	3611.8	9.030	47.884	15542.	38.854
500.00	38.698	7387.6	14.775	56.300	20762.	41.525
600.00	39.998	11328.	18.881	63.482	26761.	44.601
700.00	41.098	15384.	21.977	69.733	33429.	47.755
800.00	41.998	19541.	24.426	75.281	40684.	50.855
900.00	42.698	23778.	26.420	80.270	48465.	53.850
1000.00	43.198	28074.	28.074	84.797	56723.	56.723
1100.00	43.498	32410.	29.464	88.930	65412.	59.466
1200.00	43.598	36767.	30.639	92.719	74496.	62.080
1300.00	43.598	41127.	31.636	96.209	83945.	64.573
1400.00	43.598	45487.	32.491	99.440	93729.	66.950
1500.00	43.598	49847.	33.231	102.45	103825.	69.217
1600.00	43.598	54206.	33.879	105.26	114212.	71.383
1700.00	43.598	58566.	34.451	107.91	124873.	73.455
1800.00	43.598	62926.	34.959	110.40	135790.	75.439
1900.00	43.598	67286.	35.413	112.75	146948.	77.341
2000.00	43.598	71645.	35.823	114.99	158335.	79.168

N=298.15 DEG K

TABLE 69

MOLAR THERMODYNAMIC PROPERTIES FOR HYDROGEN SULFIDE (H_2S)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 34.07994 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.9010	-4.93	-16.535	10.3120	-8.02	-26.8990

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.96	7.950	40.357	3240.7	32.407
200.00	7.978	1589.9	7.950	45.870	7584.0	37.920
298.15	8.172	2380.9	7.986	49.149	12273.	41.163
300.00	8.176	2395.9	7.986	49.200	12364.	41.213
400.00	8.504	3229.8	8.075	51.594	17408.	43.520
500.00	8.889	4098.8	8.198	53.533	22668.	45.336
600.00	9.306	5008.7	8.348	55.190	28105.	46.842
700.00	9.737	5960.7	8.515	56.657	33699.	48.142
800.00	10.161	6955.7	8.695	57.985	39432.	49.291
900.00	10.566	7992.6	8.881	59.206	45293.	50.325
1000.00	10.942	9067.5	9.068	60.339	51271.	51.271
1100.00	11.280	10179.	9.254	61.398	57359.	52.144
1200.00	11.583	11322.	9.435	62.393	63549.	52.957
1300.00	11.852	12495.	9.611	63.331	69836.	53.720
1400.00	12.091	13692.	9.780	64.218	76213.	54.438
1500.00	12.302	14912.	9.941	65.060	82678.	55.118
1600.00	12.490	16152.	10.095	65.860	89224.	55.765
1700.00	12.657	17409.	10.241	66.622	95848.	56.381
1800.00	12.807	18683.	10.379	67.350	102547.	56.971
1900.00	12.940	19970.	10.511	68.046	109317.	57.535
2000.00	13.062	21270.	10.635	68.713	116155.	58.078
2100.00	13.170	22582.	10.753	69.353	123059.	58.599
2200.00	13.269	23904.	10.866	69.968	130025.	59.102
2300.00	13.359	25236.	10.972	70.560	137052.	59.588
2400.00	13.443	26576.	11.073	71.130	144136.	60.057
2500.00	13.519	27924.	11.170	71.680	151277.	60.511
2600.00	13.589	29279.	11.261	72.212	158472.	60.951
2700.00	13.654	30642.	11.349	72.726	165719.	61.377
2800.00	13.714	32010.	11.432	73.224	173016.	61.792
2900.00	13.770	33384.	11.512	73.706	180363.	62.194
3000.00	13.823	34764.	11.588	74.174	187757.	62.586
3100.00	13.873	36149.	11.661	74.628	195197.	62.967
3200.00	13.920	37539.	11.731	75.069	202682.	63.338
3300.00	13.964	38933.	11.798	75.498	210211.	63.700
3400.00	14.006	40331.	11.862	75.916	217782.	64.053
3500.00	14.046	41734.	11.924	76.322	225393.	64.398
3600.00	14.084	43141.	11.984	76.718	233046.	64.735
3700.00	14.121	44551.	12.041	77.105	240737.	65.064
3800.00	14.155	45965.	12.096	77.482	248466.	65.386
3900.00	14.189	47382.	12.149	77.850	256233.	65.701
4000.00	14.222	48803.	12.201	78.210	264036.	66.009
4100.00	14.253	50226.	12.250	78.561	271875.	66.311
4200.00	14.284	51653.	12.298	78.905	279748.	66.607
4300.00	14.313	53083.	12.345	79.241	287655.	66.897
4400.00	14.342	54516.	12.390	79.571	295596.	67.181
4500.00	14.370	55952.	12.434	79.894	303569.	67.460
4600.00	14.396	57390.	12.476	80.210	311574.	67.734
4700.00	14.422	58831.	12.517	80.520	319611.	68.002
4800.00	14.449	60274.	12.557	80.823	327678.	68.266
4900.00	14.474	61721.	12.596	81.122	335775.	68.526
5000.00	14.499	63169.	12.634	81.414	343902.	68.780
5100.00	14.522	64620.	12.671	81.702	352058.	69.031
5200.00	14.547	66074.	12.707	81.984	360242.	69.277
5300.00	14.570	67530.	12.741	82.261	368455.	69.520
5400.00	14.593	68988.	12.776	82.534	376694.	69.758
5500.00	14.615	70448.	12.809	82.802	384961.	69.993
5600.00	14.638	71911.	12.841	83.065	393255.	70.224
5700.00	14.660	73376.	12.873	83.325	401574.	70.452
5800.00	14.681	74843.	12.904	83.580	409919.	70.676
5900.00	14.704	76312.	12.934	83.831	418290.	70.897
6000.00	14.724	77784.	12.964	84.078	426685.	71.114

TABLE 70

MOLAR THERMODYNAMIC PROPERTIES FOR AMMONIA (H_3N)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 17.03061 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔF_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-5.304	-11.02	-36.961	-25.279	-3.94	-13.2147

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.950	794.96	7.950	37.208	2925.9	29.259
200.00	8.064	1592.9	7.965	42.738	6954.7	34.773
298.15	8.515	2403.9	8.063	46.031	11320.	37.968
300.00	8.526	2419.9	8.066	46.083	11405.	38.016
400.00	9.241	3306.8	8.267	48.631	16145.	40.363
500.00	10.035	4270.8	8.542	50.777	21118.	42.236
600.00	10.807	5312.7	8.855	52.676	26293.	43.822
700.00	11.537	6430.7	9.187	54.397	31647.	45.211
800.00	12.224	7618.6	9.523	55.983	37168.	46.460
900.00	12.867	8873.6	9.860	57.461	42841.	47.602
1000.00	13.466	10190.	10.190	58.848	48658.	48.658
1100.00	14.029	11566.	10.514	60.158	54608.	49.644
1200.00	14.549	12995.	10.829	61.402	60687.	50.572
1300.00	15.029	14474.	11.134	62.585	66887.	51.451
1400.00	15.459	15999.	11.428	63.715	73202.	52.287
1500.00	15.849	17565.	11.710	64.795	79628.	53.085
1600.00	16.204	19168.	11.980	65.830	86160.	53.850
1700.00	16.519	20804.	12.238	66.822	92793.	54.584
1800.00	16.761	22469.	12.483	67.773	99523.	55.290
1900.00	16.994	24157.	12.714	68.686	106346.	55.972
2000.00	17.219	25867.	12.934	69.563	113259.	56.629
2100.00	17.428	27600.	13.143	70.408	120258.	57.266
2200.00	17.629	29353.	13.342	71.224	127339.	57.882
2300.00	17.824	31125.	13.533	72.012	134501.	58.479
2400.00	18.013	32917.	13.716	72.774	141741.	59.059
2500.00	18.194	34728.	13.891	73.513	149055.	59.622
2600.00	18.369	36556.	14.060	74.230	156443.	60.170
2700.00	18.536	38401.	14.223	74.927	163901.	60.704
2800.00	18.697	40263.	14.380	75.604	171427.	61.224
2900.00	18.852	42141.	14.531	76.263	179021.	61.731
3000.00	18.999	44033.	14.678	76.904	186679.	62.226
3100.00	19.154	45941.	14.820	77.530	194401.	62.710
3200.00	19.227	47860.	14.956	78.139	202185.	63.183
3300.00	19.340	49788.	15.087	78.732	210028.	63.645
3400.00	19.451	51728.	15.214	79.311	217931.	64.097
3500.00	19.562	53679.	15.337	79.877	225890.	64.540
3600.00	19.671	55640.	15.456	80.429	233906.	64.974
3700.00	19.780	57613.	15.571	80.970	241976.	65.399
3800.00	19.887	59596.	15.683	81.499	250099.	65.816
3900.00	19.993	61590.	15.792	82.017	258275.	66.224
4000.00	20.109	63595.	15.899	82.524	266502.	66.626
4100.00	20.204	65611.	16.003	83.022	274780.	67.019
4200.00	20.307	67637.	16.104	83.510	283106.	67.406
4300.00	20.410	69672.	16.203	83.989	291481.	67.786
4400.00	20.511	71718.	16.300	84.460	299904.	68.160
4500.00	20.612	73775.	16.394	84.922	308373.	68.527
4600.00	20.711	75841.	16.487	85.376	316888.	68.869
4700.00	20.810	77917.	16.578	85.822	325448.	69.244
4800.00	20.907	80003.	16.667	86.261	334052.	69.594
4900.00	21.004	82098.	16.755	86.694	342700.	69.939
5000.00	21.099	84203.	16.841	87.119	351391.	70.278
5100.00	21.194	86318.	16.925	87.538	360124.	70.612
5200.00	21.287	88442.	17.008	87.950	368898.	70.942
5300.00	21.380	90575.	17.090	88.356	377713.	71.267
5400.00	21.471	92718.	17.170	88.757	386569.	71.587
5500.00	21.562	94870.	17.249	89.152	395464.	71.903
5600.00	21.651	97030.	17.327	89.541	404399.	72.214
5700.00	21.739	99200.	17.403	89.925	413372.	72.521
5800.00	21.827	101378.	17.479	90.304	422384.	72.825
5900.00	21.913	103565.	17.553	90.678	431433.	73.124
6000.00	21.999	105761.	17.627	91.047	440519.	73.420

TABLE 71

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHINE (H_3P)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 33.99771 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-6.530	1.3	4.36	-6.37	3.2	10.732

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	794.96	7.950	41.341	3339.1	33.391
200.00	8.111	1593.9	7.970	46.875	7781.0	38.905
298.15	8.868	2422.9	8.126	50.235	12555.	42.109
300.00	8.887	2438.9	8.130	50.290	12648.	42.161
400.00	9.987	3381.8	8.455	52.994	17816.	44.540
500.00	11.109	4436.8	8.874	55.344	23235.	46.471
600.00	12.166	5601.7	9.336	57.465	28877.	48.129
700.00	13.129	6867.7	9.811	59.414	34722.	49.603
800.00	13.984	8223.6	10.279	61.224	40756.	50.944
900.00	14.728	9660.5	10.734	62.915	46963.	52.181
1000.00	15.367	11166.	11.166	64.501	53334.	53.334
1100.00	15.914	12730.	11.573	65.992	59861.	54.419
1200.00	16.379	14346.	11.955	67.398	66531.	55.442
1300.00	16.775	16004.	12.311	68.725	73338.	56.414
1400.00	17.114	17699.	12.642	69.980	80274.	57.338
1500.00	17.404	19426.	12.951	71.171	87331.	58.221
1600.00	17.654	21179.	13.237	72.302	94505.	59.066
1700.00	17.870	22955.	13.503	73.379	101790.	59.876
1800.00	18.057	24752.	13.751	74.406	109180.	60.655
1900.00	18.221	26566.	13.982	75.387	116670.	61.405
2000.00	18.364	28396.	14.198	76.325	124255.	62.127
2100.00	18.490	30238.	14.399	77.224	131932.	62.825
2200.00	18.601	32093.	14.588	78.087	139698.	63.499
2300.00	18.700	33958.	14.764	78.916	147549.	64.152
2400.00	18.788	35832.	14.930	79.714	155481.	64.784
2500.00	18.867	37715.	15.086	80.483	163492.	65.397
2600.00	18.938	39606.	15.233	81.224	171576.	65.991
2700.00	19.001	41503.	15.371	81.940	179735.	66.568
2800.00	19.059	43406.	15.502	82.632	187963.	67.130
2900.00	19.111	45315.	15.626	83.302	196261.	67.676
3000.00	19.158	47228.	15.743	83.951	204625.	68.208
3100.00	19.201	49146.	15.853	84.580	213052.	68.726
3200.00	19.241	51068.	15.959	85.190	221539.	69.231
3300.00	19.277	52994.	16.059	85.783	230089.	69.724
3400.00	19.310	54923.	16.154	86.359	238696.	70.205
3500.00	19.340	56856.	16.245	86.919	247359.	70.674
3600.00	19.368	58791.	16.331	87.464	256078.	71.133
3700.00	19.394	60729.	16.413	87.995	264851.	71.581
3800.00	19.418	62670.	16.492	88.513	273678.	72.021
3900.00	19.440	64613.	16.567	89.017	282552.	72.449
4000.00	19.461	66558.	16.639	89.510	291480.	72.870
4100.00	19.480	68506.	16.709	89.990	300455.	73.282
4200.00	19.498	70454.	16.775	90.459	309475.	73.685
4300.00	19.515	72404.	16.838	90.918	318545.	74.080
4400.00	19.531	74357.	16.899	91.367	327659.	74.468
4500.00	19.545	76311.	16.958	91.806	336818.	74.848
4600.00	19.559	78266.	17.014	92.236	346021.	75.222
4700.00	19.572	80223.	17.069	92.657	355267.	75.589
4800.00	19.584	82181.	17.121	93.069	364552.	75.948
4900.00	19.595	84140.	17.171	93.473	373879.	76.302
5000.00	19.606	86100.	17.220	93.869	383247.	76.649
5100.00	19.616	88061.	17.267	94.257	392657.	76.991
5200.00	19.626	90022.	17.312	94.639	402102.	77.327
5300.00	19.635	91985.	17.356	95.012	411580.	77.657
5400.00	19.643	93949.	17.398	95.380	421104.	77.982
5500.00	19.651	95914.	17.439	95.740	430657.	78.301
5600.00	19.659	97880.	17.479	96.094	440247.	78.616
5700.00	19.666	99846.	17.517	96.442	449874.	78.925
5800.00	19.673	101813.	17.554	96.784	459535.	79.230
5900.00	19.680	103781.	17.590	97.121	469234.	79.531
6000.00	19.686	105750.	17.625	97.452	478963.	79.827

TABLE 72

MOLAR THERMODYNAMIC PROPERTIES FOR ORTHO-PHOSPHORIC ACID (H_3O_4P)

LIQUID

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 97.99531 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	18.448	-302.8	-1015.591	-115.2720	-264.440	-886.9448

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
298.15	47.998	0.	0.	34.991	10433.	34.991
300.00	47.998	88.996	0.297	35.287	10497.	34.991
400.00	47.998	4888.8	12.222	49.096	14749.	36.874
500.00	47.998	9688.5	19.377	59.806	20214.	40.429
600.00	47.998	14488.	24.147	68.558	26646.	44.410
700.00	47.998	19288.	27.554	75.956	33881.	48.402
800.00	47.998	24088.	30.110	82.365	41804.	52.255
900.00	47.998	28888.	32.097	88.019	50329.	55.921
1000.00	47.998	33687.	33.687	93.075	59388.	59.388
1100.00	47.998	38487.	34.988	97.650	68928.	62.662
1200.00	0.480	43287.	36.072	101.83	78905.	65.755
1300.00	47.998	48087.	36.990	105.67	89283.	68.679
1400.00	47.998	52886.	37.776	109.23	100029.	71.450
1500.00	47.998	57686.	38.457	112.54	111118.	74.079
1600.00	47.998	62486.	39.054	115.63	122529.	76.581
1700.00	47.998	67286.	39.580	118.54	134239.	78.964
1800.00	47.998	72085.	40.047	121.29	146233.	81.240
1900.00	47.998	76885.	40.466	123.88	158492.	83.417

N=298.15 DEG K

TABLE 73

MOLAR THERMODYNAMIC PROPERTIES FOR ORTHO-PHOSPHORIC ACID (H_3O_4P)

CRYSTAL

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 97.99531 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-4.553	-305.7	-1025.317	-128.12	-267.5	-897.195

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	10.239	496.98	4.970	8.253	328.28	3.283
200.00	18.129	1922.9	9.615	17.829	1642.9	8.215
298.15	25.383	4058.8	13.613	26.420	3818.3	12.807
300.00	25.479	4105.8	13.686	26.577	3867.2	12.891
400.00	29.998	6890.7	17.227	34.556	6931.9	17.330
500.00	33.248	10063.	20.127	41.623	10748.	21.496
600.00	35.698	13516.	22.527	47.913	15231.	25.385
700.00	37.398	17178.	24.540	53.552	20308.	29.012
800.00	38.798	20994.	26.242	58.646	25923.	32.404
900.00	39.498	24914.	27.682	63.263	32023.	35.581
1000.00	39.998	28889.	28.889	67.450	38561.	38.561
1100.00	40.598	32917.	29.925	71.288	45500.	41.364
1200.00	40.998	36997.	30.831	74.838	52809.	44.007
1300.00	41.398	41117.	31.628	78.136	60460.	46.508
1400.00	41.698	45272.	32.337	81.215	68429.	48.878
1500.00	41.998	49457.	32.971	84.102	76696.	51.131

TABLE 74

MOLAR THERMODYNAMIC PROPERTIES FOR HYDRAZINE (H_4N_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 32.04528 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL
298.15	-6.602	22.80	76.4715	-51.1530	38.07	127.6867

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.214	799.68	7.997	46.623	3662.6	38.626
200.00	9.717	1686.9	8.435	52.714	8855.9	44.280
298.15	12.144	2755.1	9.241	57.027	14248.	47.787
300.00	12.194	2777.6	9.259	57.102	14353.	47.844
400.00	14.747	4127.4	10.318	60.968	20266.	50.666
500.00	16.860	5711.8	11.424	64.449	26536.	53.071
600.00	18.537	7484.8	12.475	67.725	33147.	55.245
700.00	19.909	9409.1	13.442	70.886	40071.	57.245
800.00	21.080	11460.	14.325	73.923	47276.	59.095
900.00	22.110	13621.	15.134	76.867	54748.	60.833
1000.00	23.029	15878.	15.878	79.745	62466.	62.466
1100.00	23.853	18223.	16.567	82.579	70414.	64.013
1200.00	24.591	20646.	17.205	85.387	78578.	65.482
1300.00	25.251	23139.	17.799	88.182	86947.	66.882
1400.00	25.841	25694.	18.353	90.975	95511.	68.223
1500.00	26.366	28305.	18.870	93.776	104259.	69.506
1600.00	26.835	30965.	19.353	96.593	113183.	70.739
1700.00	27.253	33670.	19.806	99.432	122277.	71.928
1800.00	27.625	36414.	20.230	102.30	131527.	73.071
1900.00	27.958	39194.	20.628	105.20	140934.	74.176
2000.00	28.257	42005.	21.002	108.13	150485.	75.243
2100.00	28.524	44844.	21.354	111.09	160180.	76.277
2200.00	28.764	47709.	21.686	114.08	170010.	77.277
2300.00	28.981	50596.	21.998	117.10	179971.	78.248
2400.00	29.176	53504.	22.293	120.15	190059.	79.191
2500.00	29.353	56431.	22.572	123.23	200267.	80.107
2600.00	29.513	59374.	22.836	126.33	210593.	80.997
2700.00	29.659	62333.	23.086	129.45	221032.	81.864
2800.00	29.792	65306.	23.323	132.60	231581.	82.708
2900.00	29.913	68291.	23.549	135.78	242237.	83.530
3000.00	30.024	71288.	23.763	138.99	252996.	84.332
3100.00	30.126	74296.	23.966	142.22	263855.	85.115
3200.00	30.220	77313.	24.160	145.48	274811.	85.879
3300.00	30.306	80339.	24.345	148.76	285862.	86.625
3400.00	30.385	83374.	24.522	152.08	297004.	87.354
3500.00	30.459	86416.	24.690	155.42	308235.	88.068
3600.00	30.527	89465.	24.851	158.78	319555.	88.765
3700.00	30.590	92521.	25.006	162.17	330959.	89.448
3800.00	30.648	95583.	25.153	165.58	342445.	90.117
3900.00	30.703	98651.	25.295	169.02	354012.	90.772
4000.00	30.754	101724.	25.431	172.48	365658.	91.415
4100.00	30.801	104801.	25.561	175.97	377381.	92.044
4200.00	30.845	107884.	25.687	179.48	389179.	92.662
4300.00	30.887	110970.	25.807	183.02	401050.	93.267
4400.00	30.925	114061.	25.923	186.58	412993.	93.862
4500.00	30.962	117155.	26.035	190.17	425007.	94.446
4600.00	30.996	120253.	26.142	193.78	437089.	95.019
4700.00	31.028	123354.	26.246	197.41	449238.	95.583
4800.00	31.059	126459.	26.346	201.06	461454.	96.136
4900.00	31.087	129566.	26.442	204.73	473734.	96.680
5000.00	31.114	132676.	26.535	208.42	486078.	97.216
5100.00	31.140	135789.	26.625	212.13	498484.	97.742
5200.00	31.164	138904.	26.712	215.87	510951.	98.260
5300.00	31.186	142022.	26.797	219.62	523478.	98.769
5400.00	31.208	145141.	26.878	223.39	536064.	99.271
5500.00	31.228	148263.	26.957	227.18	548708.	99.765
5600.00	31.248	151387.	27.033	230.98	561408.	100.25
5700.00	31.266	154513.	27.107	234.80	574164.	100.73
5800.00	31.284	157640.	27.179	238.64	586975.	101.20
5900.00	31.301	160769.	27.249	242.49	599840.	101.67
6000.00	31.316	163900.	27.317	246.44	612758.	102.13

TABLE 75

MOLAR THERMODYNAMIC PROPERTIES FOR HYDRAZINE (H_4N_2)

LIQUID

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 32.04528 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	2.876	12.10	40.5834	-79.1310	35.67	119.6371

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
298.15	23.622	0.	0.	29.049	8660.8	29.049
300.00	23.649	43.998	0.147	29.195	8714.4	29.048
400.00	25.659	2502.9	6.257	36.254	11999.	29.997
500.00	27.859	5178.7	10.357	42.216	15929.	31.856
600.00	30.058	8074.6	13.458	47.490	20419.	34.032

N=298.15 DEG K

TABLE 76

MOLAR THERMODYNAMIC PROPERTIES FOR MONATOMIC NITROGEN (N)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 14.0067 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL
298.15	-1.994	112.979	378.9334	-9.156	108.882	365.1920

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	4.968	496.79	4.968	31.185	2621.7	26.217
200.00	4.968	993.58	4.968	34.628	5932.1	29.661
298.15	4.968	1481.2	4.968	36.612	9434.7	31.644
300.00	4.968	1490.4	4.968	36.643	9502.5	31.675
400.00	4.968	1987.2	4.968	38.072	13242.	33.104
500.00	4.968	2483.9	4.968	39.181	17106.	34.213
600.00	4.968	2980.7	4.968	40.086	21071.	35.118
700.00	4.968	3477.5	4.968	40.852	25119.	35.884
800.00	4.968	3974.3	4.968	41.515	29238.	36.548
900.00	4.968	4471.1	4.968	42.101	33419.	37.133
1000.00	4.968	4967.9	4.968	42.624	37656.	37.656
1100.00	4.968	5464.7	4.968	43.097	41943.	38.130
1200.00	4.968	5961.5	4.968	43.530	46274.	38.562
1300.00	4.968	6458.3	4.968	43.927	50647.	38.960
1400.00	4.968	6955.1	4.968	44.296	55059.	39.328
1500.00	4.968	7451.9	4.968	44.638	59506.	39.670
1600.00	4.968	7948.6	4.968	44.959	63986.	39.991
1700.00	4.968	8445.4	4.968	45.260	68497.	40.292
1800.00	4.968	8942.2	4.968	45.544	73037.	40.576
1900.00	4.968	9439.1	4.968	45.813	77605.	40.845
2000.00	4.969	9935.9	4.968	46.068	82199.	41.100
2100.00	4.970	10433.	4.968	46.310	86818.	41.342
2200.00	4.971	10930.	4.968	46.541	91461.	41.573
2300.00	4.972	11427.	4.968	46.762	96126.	41.794
2400.00	4.974	11924.	4.968	46.974	100813.	42.005
2500.00	4.977	12422.	4.969	47.177	105521.	42.208
2600.00	4.981	12920.	4.969	47.372	110248.	42.403
2700.00	4.987	13418.	4.970	47.560	114995.	42.591
2800.00	4.993	13917.	4.970	47.742	119760.	42.771
2900.00	5.001	14417.	4.971	47.917	124543.	42.946
3000.00	5.010	14917.	4.972	48.087	129343.	43.114
3100.00	5.021	15419.	4.974	48.251	134160.	43.277
3200.00	5.034	15922.	4.976	48.411	138993.	43.435
3300.00	5.049	16426.	4.978	48.566	143842.	43.589
3400.00	5.066	16932.	4.980	48.717	148706.	43.737
3500.00	5.085	17439.	4.983	48.864	153585.	43.882
3600.00	5.106	17949.	4.986	49.008	158479.	44.022
3700.00	5.129	18460.	4.989	49.148	163387.	44.159
3800.00	5.154	18974.	4.993	49.285	168309.	44.292
3900.00	5.181	19491.	4.998	49.419	173244.	44.421
4000.00	5.211	20011.	5.003	49.551	178192.	44.548
4100.00	5.242	20533.	5.008	49.680	183154.	44.672
4200.00	5.275	21059.	5.014	49.806	188128.	44.792
4300.00	5.310	21588.	5.021	49.931	193115.	44.910
4400.00	5.347	22121.	5.028	50.054	198114.	45.026
4500.00	5.386	22658.	5.035	50.174	203126.	45.139
4600.00	5.426	23198.	5.043	50.293	208149.	45.250
4700.00	5.467	23743.	5.052	50.410	213184.	45.358
4800.00	5.510	24292.	5.061	50.526	218231.	45.465
4900.00	5.554	24845.	5.070	50.640	223289.	45.569
5000.00	5.599	25403.	5.081	50.752	228359.	45.672
5100.00	5.645	25965.	5.091	50.864	233440.	45.772
5200.00	5.691	26532.	5.102	50.974	238532.	45.871
5300.00	5.739	27103.	5.114	51.083	243634.	45.969
5400.00	5.787	27679.	5.126	51.190	248748.	46.064
5500.00	5.835	28260.	5.138	51.297	253872.	46.159
5600.00	5.883	28846.	5.151	51.402	259007.	46.251
5700.00	5.932	29437.	5.164	51.507	264153.	46.343
5800.00	5.981	30033.	5.178	51.611	269309.	46.433
5900.00	6.029	30633.	5.192	51.713	274475.	46.521
6000.00	6.077	31239.	5.206	51.815	279651.	46.609

TABLE 77

MOLAR THERMODYNAMIC PROPERTIES FOR NITRIC OXIDE (NO)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 30.0061 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.1430	21.57	72.3461	2.959	20.69	69.3942

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.721	745.96	7.460	42.284	3482.4	34.824
200.00	7.271	1491.9	7.460	47.475	8003.0	40.015
298.15	7.133	2196.9	7.368	50.344	12813.	42.975
300.00	7.132	2209.9	7.366	50.389	12907.	43.023
400.00	7.157	2923.9	7.310	52.441	18053.	45.132
500.00	7.287	3644.8	7.290	54.050	23380.	46.761
600.00	7.466	4382.8	7.305	55.394	28854.	48.090
700.00	7.655	5138.7	7.341	56.559	34453.	49.218
800.00	7.832	5912.7	7.391	57.593	40162.	50.202
900.00	7.988	6703.7	7.449	58.525	45969.	51.077
1000.00	8.123	7509.6	7.510	59.374	51864.	51.864
1100.00	8.238	8327.6	7.571	60.154	57842.	52.583
1200.00	8.336	9156.5	7.630	60.875	63893.	53.245
1300.00	8.419	9994.5	7.688	61.545	70014.	53.857
1400.00	8.491	10840.	7.743	62.172	76200.	54.429
1500.00	8.552	11692.	7.795	62.760	82447.	54.965
1600.00	8.605	12550.	7.844	63.314	88752.	55.470
1700.00	8.651	13413.	7.890	63.837	95109.	55.947
1800.00	8.692	14280.	7.933	64.332	101517.	56.398
1900.00	8.727	15151.	7.974	64.803	107974.	56.828
2000.00	8.759	16025.	8.013	65.252	114478.	57.239
2100.00	8.788	16902.	8.049	65.680	121025.	57.631
2200.00	8.813	17783.	8.083	66.089	127612.	58.005
2300.00	8.837	18665.	8.115	66.481	134240.	58.365
2400.00	8.858	19550.	8.146	66.858	140908.	58.712
2500.00	8.877	20437.	8.175	67.220	147616.	59.045
2600.00	8.895	21325.	8.202	67.568	154361.	59.366
2700.00	8.912	22216.	8.228	67.905	161127.	59.676
2800.00	8.927	23107.	8.252	68.229	167933.	59.976
2900.00	8.941	24001.	8.276	68.542	174770.	60.265
3000.00	8.955	24896.	8.299	68.846	181641.	60.547
3100.00	8.968	25792.	8.320	69.140	188541.	60.820
3200.00	8.980	26689.	8.340	69.424	195467.	61.083
3300.00	8.991	27588.	8.360	69.701	202424.	61.341
3400.00	9.002	28487.	8.378	69.970	209410.	61.591
3500.00	9.012	29388.	8.396	70.230	216419.	61.834
3600.00	9.022	30289.	8.414	70.484	223455.	62.071
3700.00	9.032	31192.	8.430	70.731	230514.	62.301
3800.00	9.041	32095.	8.446	70.972	237600.	62.526
3900.00	9.050	33000.	8.462	71.207	244709.	62.746
4000.00	9.058	33905.	8.476	71.436	251840.	62.960
4100.00	9.066	34811.	8.491	71.660	258996.	63.170
4200.00	9.074	35718.	8.504	71.878	266171.	63.374
4300.00	9.082	36626.	8.518	72.092	273371.	63.575
4400.00	9.090	37535.	8.531	72.301	280591.	63.771
4500.00	9.097	38444.	8.543	72.505	287830.	63.962
4600.00	9.105	39354.	8.555	72.705	295091.	64.150
4700.00	9.112	40265.	8.567	72.901	302371.	64.334
4800.00	9.119	41177.	8.579	73.093	309671.	64.515
4900.00	9.125	42089.	8.590	73.281	316990.	64.692
5000.00	9.132	43002.	8.600	73.466	324330.	64.866
5100.00	9.139	43915.	8.611	73.647	331687.	65.037
5200.00	9.145	44829.	8.621	73.824	339058.	65.203
5300.00	9.152	45744.	8.631	73.998	346447.	65.367
5400.00	9.158	46660.	8.641	74.169	353855.	65.529
5500.00	9.164	47576.	8.650	74.338	361285.	65.688
5600.00	9.170	48493.	8.659	74.503	368726.	65.844
5700.00	9.176	49410.	8.668	74.665	376182.	65.997
5800.00	9.182	50327.	8.677	74.825	383659.	66.148
5900.00	9.188	51245.	8.686	74.982	391150.	66.297
6000.00	9.194	52164.	8.694	75.136	398653.	66.442

TABLE 78

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN DIOXIDE (NO_2)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 46.0055 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-1.717	7.93	26.597	-16.259	12.26	41.120

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.953	794.96	7.950	48.385	4043.5	40.435
200.00	8.218	1599.9	8.000	53.951	9190.3	45.952
298.15	8.837	2434.9	8.167	57.340	14661.	49.173
300.00	8.850	2450.9	8.170	57.395	14768.	49.226
400.00	9.601	3373.8	8.435	60.043	20643.	51.608
500.00	10.326	4370.8	8.742	62.265	26762.	53.523
600.00	10.954	5435.7	9.060	64.205	33087.	55.145
700.00	11.468	6557.7	9.368	65.934	39596.	56.566
800.00	11.880	7725.6	9.657	67.493	46268.	57.836
900.00	12.207	8930.6	9.923	68.912	53090.	58.989
1000.00	12.467	10164.	10.164	70.211	60047.	60.047
1100.00	12.676	11422.	10.384	71.410	67129.	61.026
1200.00	12.846	12699.	10.583	72.520	74325.	61.938
1300.00	12.984	13990.	10.762	73.554	81630.	62.793
1400.00	13.098	15295.	10.925	74.521	89035.	63.596
1500.00	13.192	16610.	11.073	75.428	96532.	64.355
1600.00	13.272	17933.	11.208	76.282	104118.	65.074
1700.00	13.339	19264.	11.332	77.089	111788.	65.757
1800.00	13.397	20601.	11.445	77.853	119535.	66.408
1900.00	13.446	21943.	11.549	78.579	127357.	67.030
2000.00	13.489	23290.	11.645	79.270	135250.	67.625
2100.00	13.526	24641.	11.734	79.929	143210.	68.195
2200.00	13.559	25995.	11.816	80.559	151235.	68.743
2300.00	13.587	27353.	11.892	81.162	159320.	69.269
2400.00	13.613	28713.	11.964	81.741	167466.	69.777
2500.00	13.635	30074.	12.030	82.297	175668.	70.267
2600.00	13.655	31439.	12.092	82.832	183923.	70.740
2700.00	13.673	32805.	12.151	83.348	192233.	71.197
2800.00	13.689	34174.	12.205	83.846	200594.	71.641
2900.00	13.704	35544.	12.257	84.326	209001.	72.069
3000.00	13.717	36915.	12.305	84.791	217457.	72.486
3100.00	13.729	38287.	12.351	85.241	225959.	72.890
3200.00	13.740	39661.	12.394	85.677	234504.	73.283
3300.00	13.750	41035.	12.435	86.100	243094.	73.665
3400.00	13.759	42411.	12.474	86.511	251725.	74.037
3500.00	13.767	43787.	12.511	86.910	260397.	74.399
3600.00	13.775	45164.	12.545	87.298	269108.	74.752
3700.00	13.782	46542.	12.579	87.675	277854.	75.096
3800.00	13.789	47921.	12.611	88.043	286641.	75.432
3900.00	13.795	49300.	12.641	88.401	295463.	75.760
4000.00	13.800	50679.	12.670	88.751	304323.	76.081
4100.00	13.805	52059.	12.697	89.092	313216.	76.394
4200.00	13.810	53440.	12.724	89.424	322138.	76.700
4300.00	13.815	54822.	12.749	89.749	331096.	76.999
4400.00	13.819	56203.	12.773	90.066	340089.	77.293
4500.00	13.823	57586.	12.797	90.377	349113.	77.581
4600.00	13.827	58968.	12.819	90.681	358167.	77.862
4700.00	13.830	60351.	12.841	90.978	367248.	78.138
4800.00	13.833	61734.	12.861	91.269	376359.	78.408
4900.00	13.836	63118.	12.881	91.554	385499.	78.673
5000.00	13.839	64502.	12.900	91.834	394670.	78.934
5100.00	13.842	65886.	12.919	92.108	403867.	79.190
5200.00	13.845	67270.	12.936	92.377	413093.	79.441
5300.00	13.847	68655.	12.954	92.641	422345.	79.688
5400.00	13.849	70039.	12.970	92.900	431622.	79.930
5500.00	13.851	71424.	12.986	93.154	440924.	80.168
5600.00	13.853	72810.	13.002	93.403	450248.	80.401
5700.00	13.855	74195.	13.017	93.649	459606.	80.633
5800.00	13.857	75581.	13.031	93.890	468983.	80.859
5900.00	13.859	76967.	13.045	94.127	478384.	81.082
6000.00	13.861	78353.	13.059	94.360	487809.	81.301

TABLE 79

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN DIOXIDE UNINEGATIVE ION (NO_2^-)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 46.00605 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-6.449	-85.7	-287.4378	-20.360	-79.775	-267.5676

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.953	794.91	7.949	47.516	3956.7	39.567
200.00	8.251	1600.3	8.002	53.087	9017.2	45.086
298.15	9.016	2445.1	8.201	56.514	14405.	48.313
300.00	9.033	2461.8	8.206	56.570	14509.	48.364
400.00	9.951	3411.2	8.528	59.295	20307.	50.767
500.00	10.765	4448.4	8.897	61.606	26354.	52.709
600.00	11.411	5558.6	9.264	63.628	32618.	54.364
700.00	11.904	6725.5	9.608	65.426	39073.	55.818
800.00	12.278	7935.5	9.919	67.041	45697.	57.122
900.00	12.564	9178.2	10.198	68.504	52476.	58.306
1000.00	12.784	10446.	10.446	69.840	59394.	59.394
1100.00	12.957	11734.	10.667	71.067	66440.	60.400
1200.00	13.094	13036.	10.864	72.201	73604.	61.337
1300.00	13.205	14352.	11.040	73.253	80878.	62.214
1400.00	13.295	15677.	11.198	74.235	88253.	63.038
1500.00	13.369	17010.	11.340	75.155	95723.	63.815
1600.00	13.431	18350.	11.469	76.020	103282.	64.551
1700.00	13.483	19696.	11.586	76.836	110925.	65.250
1800.00	13.527	21046.	11.692	77.608	118647.	65.915
1900.00	13.565	22401.	11.790	78.340	126445.	66.550
2000.00	13.597	23759.	11.880	79.037	134314.	67.157
2100.00	13.625	25120.	11.962	79.701	142251.	67.739
2200.00	13.650	26484.	12.038	80.335	150253.	68.297
2300.00	13.671	27850.	12.109	80.942	158317.	68.834
2400.00	13.690	29218.	12.174	81.525	166441.	69.350
2500.00	13.707	30588.	12.235	82.084	174622.	69.849
2600.00	13.722	31960.	12.292	82.622	182857.	70.330
2700.00	13.735	33332.	12.345	83.140	191145.	70.795
2800.00	13.747	34707.	12.395	83.640	199484.	71.244
2900.00	13.758	36082.	12.442	84.122	207873.	71.680
3000.00	13.768	37458.	12.486	84.589	216308.	72.103
3100.00	13.777	38835.	12.528	85.040	224790.	72.513
3200.00	13.785	40214.	12.567	85.478	233316.	72.911
3300.00	13.792	41592.	12.604	85.902	241885.	73.299
3400.00	13.799	42972.	12.639	86.314	250496.	73.675
3500.00	13.805	44352.	12.672	86.714	259147.	74.042
3600.00	13.811	45733.	12.704	87.103	267838.	74.400
3700.00	13.816	47114.	12.734	87.482	276568.	74.748
3800.00	13.821	48496.	12.762	87.850	285334.	75.088
3900.00	13.825	49879.	12.789	88.209	294137.	75.420
4000.00	13.830	51261.	12.815	88.559	302976.	75.744
4100.00	13.833	52644.	12.840	88.901	311849.	76.061
4200.00	13.837	54028.	12.864	89.234	320756.	76.370
4300.00	13.840	55412.	12.886	89.560	329696.	76.673
4400.00	13.843	56796.	12.908	89.878	338668.	76.970
4500.00	13.846	58181.	12.929	90.189	347671.	77.260
4600.00	13.849	59565.	12.949	90.494	356705.	77.545
4700.00	13.852	60950.	12.968	90.791	365770.	77.823
4800.00	13.854	62336.	12.987	91.083	374863.	78.097
4900.00	13.856	63721.	13.004	91.369	383986.	78.364
5000.00	13.858	65107.	13.021	91.649	393137.	78.627
5100.00	13.860	66493.	13.038	91.923	402316.	78.885
5200.00	13.862	67879.	13.054	92.192	411521.	79.139
5300.00	13.864	69265.	13.069	92.456	420754.	79.388
5400.00	13.866	70652.	13.084	92.716	430013.	79.632
5500.00	13.867	72038.	13.098	92.970	439297.	79.872
5600.00	13.869	73425.	13.112	93.220	448606.	80.108
5700.00	13.870	74812.	13.125	93.465	457941.	80.340
5800.00	13.872	76199.	13.138	93.707	467299.	80.569
5900.00	13.873	77587.	13.150	93.944	476682.	80.794
6000.00	13.874	78974.	13.162	94.177	486088.	81.015

TABLE 80

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN TRIOXIDE (NO_3)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 62.0049 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-2.871	13.0	43.602	-36.033	23.7	79.4898

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.970	794.96	7.950	50.610	4266.1	42.661
200.00	9.020	1628.9	8.145	56.351	9641.3	48.207
298.15	11.217	2618.9	8.784	60.349	15374.	51.564
300.00	11.259	2639.9	8.800	60.419	15486.	51.619
400.00	13.367	3874.8	9.687	63.958	21708.	54.271
500.00	14.961	5295.7	10.591	67.122	28265.	56.530
600.00	16.104	6851.7	11.419	69.957	35122.	58.537
700.00	16.919	8505.6	12.151	72.503	42247.	60.353
800.00	17.510	10228.	12.786	74.803	49614.	62.018
900.00	17.948	12002.	13.336	76.892	57201.	63.556
1000.00	18.278	13814.	13.814	78.801	64987.	64.987
1100.00	18.532	15655.	14.232	80.555	72955.	66.323
1200.00	18.731	17519.	14.599	82.177	81093.	67.578
1300.00	18.890	19400.	14.923	83.683	89388.	68.760
1400.00	19.018	21296.	15.211	85.088	97827.	69.876
1500.00	19.123	23203.	15.469	86.403	106401.	70.934
1600.00	19.210	25120.	15.700	87.640	115104.	71.940
1700.00	19.283	27045.	15.909	88.807	123927.	72.898
1800.00	19.345	28977.	16.098	89.911	132862.	73.812
1900.00	19.397	30913.	16.270	90.958	141908.	74.688
2000.00	19.442	32855.	16.428	91.954	151053.	75.527
2100.00	19.481	34801.	16.572	92.904	160298.	76.332
2200.00	19.515	36751.	16.705	93.811	169634.	77.106
2300.00	19.545	38704.	16.828	94.679	179058.	77.851
2400.00	19.571	40660.	16.942	95.511	188567.	78.570
2500.00	19.594	42619.	17.048	96.311	198159.	79.264
2600.00	19.615	44579.	17.146	97.080	207830.	79.934
2700.00	19.633	46542.	17.238	97.820	217573.	80.582
2800.00	19.650	48506.	17.323	98.535	227393.	81.212
2900.00	19.665	50471.	17.404	99.225	237281.	81.821
3000.00	19.678	52438.	17.479	99.892	247238.	82.413
3100.00	19.690	54407.	17.551	100.54	257257.	82.986
3200.00	19.701	56376.	17.618	101.16	267342.	83.544
3300.00	19.711	58347.	17.681	101.77	277490.	84.088
3400.00	19.720	60319.	17.741	102.36	287694.	84.616
3500.00	19.729	62291.	17.797	102.93	297960.	85.131
3600.00	19.737	64265.	17.851	103.48	308281.	85.633
3700.00	19.744	66239.	17.902	104.03	318657.	86.123
3800.00	19.750	68214.	17.951	104.55	329087.	86.602
3900.00	19.756	70188.	17.997	105.07	339568.	87.069
4000.00	19.762	72164.	18.041	105.57	350098.	87.525
4100.00	19.767	74141.	18.083	106.05	360679.	87.970
4200.00	19.772	76118.	18.123	106.53	371311.	88.407
4300.00	19.777	78095.	18.162	107.00	381986.	88.834
4400.00	19.781	80073.	18.198	107.45	392710.	89.252
4500.00	19.785	82052.	18.234	107.89	403474.	89.661
4600.00	19.789	84031.	18.268	108.33	414285.	90.062
4700.00	19.792	86010.	18.300	108.76	425141.	90.456
4800.00	19.795	87989.	18.331	109.17	436035.	90.841
4900.00	19.798	89969.	18.361	109.58	446976.	91.220
5000.00	19.801	91948.	18.390	109.98	457954.	91.591
5100.00	19.804	93928.	18.417	110.37	468971.	91.955
5200.00	19.807	95909.	18.444	110.76	480030.	92.313
5300.00	19.809	97890.	18.470	111.13	491122.	92.665
5400.00	19.811	99871.	18.495	111.50	502253.	93.010
5500.00	19.814	101852.	18.519	111.87	513424.	93.350
5600.00	19.816	103834.	18.542	112.23	524628.	93.684
5700.00	19.818	105816.	18.564	112.58	535870.	94.012
5800.00	19.819	107798.	18.586	112.92	547140.	94.335
5900.00	19.821	109780.	18.607	113.26	558451.	94.653
6000.00	19.823	111761.	18.627	113.59	569793.	94.965

TABLE 81

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS NITRIDE (NP)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 44.9805 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL
298.15	-5.448	25.0	83.85	22.120	18.353	61.8914

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.949	793.96	7.940	42.027	3408.7	34.087
200.00	8.019	1590.9	7.955	47.548	7918.6	39.593
298.15	8.312	2390.9	8.019	50.797	12754.	42.777
300.00	8.319	2405.9	8.020	50.848	12849.	42.829
400.00	8.732	3257.8	8.145	53.297	18061.	45.153
500.00	9.185	4153.8	8.308	55.294	23493.	46.987
600.00	9.656	5095.7	8.493	57.010	29110.	48.517
700.00	10.120	6084.7	8.692	58.533	34888.	49.841
800.00	10.556	7118.6	8.898	59.914	40813.	51.016
900.00	10.950	8194.6	9.105	61.180	46867.	52.075
1000.00	11.295	9307.5	9.308	62.353	53045.	53.045
1100.00	11.603	10453.	9.503	63.444	59335.	53.941
1200.00	11.865	11626.	9.689	64.465	65731.	54.776
1300.00	12.091	12825.	9.866	65.424	72225.	55.558
1400.00	12.285	14044.	10.032	66.328	78814.	56.296
1500.00	12.453	15281.	10.187	67.181	85490.	56.993
1600.00	12.598	16534.	10.334	67.990	92249.	57.656
1700.00	12.723	17800.	10.471	68.757	99086.	58.286
1800.00	12.833	19078.	10.599	69.488	105999.	58.889
1900.00	12.929	20366.	10.719	70.183	112983.	59.465
2000.00	13.013	21664.	10.832	70.849	120035.	60.017
2100.00	13.087	22969.	10.938	71.485	127151.	60.548
2200.00	13.153	24281.	11.037	72.096	134331.	61.060
2300.00	13.212	25599.	11.130	72.682	141571.	61.552
2400.00	13.264	26923.	11.218	73.245	148866.	62.028
2500.00	13.310	28252.	11.301	73.788	156219.	62.488
2600.00	13.352	29585.	11.379	74.311	163625.	62.933
2700.00	13.390	30922.	11.453	74.815	171079.	63.362
2800.00	13.424	32262.	11.522	75.303	178587.	63.781
2900.00	13.455	33607.	11.589	75.775	186141.	64.186
3000.00	13.483	34954.	11.651	76.231	193739.	64.580
3100.00	13.509	36303.	11.711	76.674	201387.	64.963
3200.00	13.532	37656.	11.768	77.103	209074.	65.336
3300.00	13.554	39010.	11.821	77.520	216806.	65.699
3400.00	13.574	40366.	11.872	77.925	224579.	66.053
3500.00	13.592	41725.	11.921	78.319	232392.	66.398
3600.00	13.609	43085.	11.968	78.702	240243.	66.734
3700.00	13.624	44447.	12.013	79.075	248131.	67.062
3800.00	13.638	45810.	12.055	79.438	256055.	67.383
3900.00	13.652	47175.	12.096	79.793	264018.	67.697
4000.00	13.664	48540.	12.135	80.139	272016.	68.004
4100.00	13.675	49908.	12.173	80.476	280044.	68.303
4200.00	13.686	51275.	12.208	80.806	288110.	68.598
4300.00	13.696	52644.	12.243	81.128	296206.	68.885
4400.00	13.706	54014.	12.276	81.443	304335.	69.167
4500.00	13.714	55385.	12.308	81.751	312494.	69.443
4600.00	13.722	56757.	12.339	82.053	320686.	69.714
4700.00	13.730	58130.	12.368	82.348	328905.	69.980
4800.00	13.737	59503.	12.396	82.637	337154.	70.240
4900.00	13.744	60878.	12.424	82.921	345434.	70.497
5000.00	13.751	62252.	12.450	83.198	353737.	70.747
5100.00	13.757	63628.	12.476	83.471	362073.	70.995
5200.00	13.762	65004.	12.501	83.738	370433.	71.237
5300.00	13.768	66381.	12.525	84.000	378818.	71.475
5400.00	13.773	67758.	12.548	84.258	387234.	71.710
5500.00	13.778	69135.	12.570	84.510	395667.	71.940
5600.00	13.782	70513.	12.592	84.759	404136.	72.167
5700.00	13.787	71891.	12.613	85.003	412624.	72.390
5800.00	13.791	73270.	12.633	85.243	421138.	72.610
5900.00	13.795	74649.	12.652	85.478	429669.	72.825
6000.00	13.799	76029.	12.672	85.710	438229.	73.038

TABLE 82

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN (REF. ST.) (N_2)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

1 GRAM MOLECULAR WT.= 28.0134 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.956	692.97	6.930	38.168	3123.8	31.238
200.00	6.957	1388.9	6.945	42.990	7209.0	36.045
298.15	6.961	2071.9	6.949	45.768	11574.	38.819
300.00	6.961	2084.9	6.950	45.811	11658.	38.861
400.00	6.990	2781.9	6.955	47.816	16344.	40.861
500.00	7.069	3484.8	6.970	49.384	21207.	42.414
600.00	7.196	4196.8	6.995	50.682	26213.	43.688
700.00	7.350	4924.8	7.035	51.803	31338.	44.768
800.00	7.512	5667.7	7.085	52.795	36569.	45.711
900.00	7.670	6426.7	7.141	53.689	41894.	46.549
1000.00	7.815	7200.6	7.201	54.504	47304.	47.304
1100.00	7.945	7988.7	7.262	55.255	52792.	47.993
1200.00	8.061	8789.1	7.324	55.952	58353.	48.627
1300.00	8.162	9600.3	7.385	56.601	63981.	49.216
1400.00	8.252	10421.	7.444	57.209	69672.	49.765
1500.00	8.330	11250.	7.500	57.781	75421.	50.281
1600.00	8.398	12087.	7.554	58.321	81227.	50.767
1700.00	8.458	12929.	7.606	58.832	87085.	51.226
1800.00	8.512	13778.	7.654	59.317	92992.	51.662
1900.00	8.559	14632.	7.701	59.778	98947.	52.078
2000.00	8.601	15490.	7.745	60.218	104947.	52.474
2100.00	8.638	16351.	7.786	60.639	110990.	52.853
2200.00	8.672	17217.	7.826	61.042	117074.	53.216
2300.00	8.703	18086.	7.863	61.428	123198.	53.564
2400.00	8.731	18957.	7.899	61.799	129360.	53.900
2500.00	8.756	19832.	7.933	62.156	135557.	54.223
2600.00	8.779	20708.	7.965	62.499	141790.	54.535
2700.00	8.800	21587.	7.995	62.831	148057.	54.836
2800.00	8.820	22468.	8.024	63.152	154356.	55.127
2900.00	8.838	23351.	8.052	63.461	160687.	55.409
3000.00	8.855	24236.	8.079	63.761	167048.	55.683
3100.00	8.871	25122.	8.104	64.052	173439.	55.948
3200.00	8.886	26010.	8.128	64.334	179858.	56.206
3300.00	8.900	26899.	8.151	64.607	186305.	56.456
3400.00	8.914	27790.	8.173	64.873	192779.	56.700
3500.00	8.927	28682.	8.195	65.132	199280.	56.937
3600.00	8.939	29575.	8.215	65.383	205805.	57.168
3700.00	8.950	30469.	8.235	65.628	212356.	57.394
3800.00	8.962	31365.	8.254	65.867	218931.	57.613
3900.00	8.972	32262.	8.272	66.100	225529.	57.828
4000.00	8.983	33159.	8.290	66.328	232151.	58.038
4100.00	8.993	34058.	8.307	66.549	238795.	58.243
4200.00	9.002	34958.	8.323	66.766	245460.	58.443
4300.00	9.012	35858.	8.339	66.978	252148.	58.639
4400.00	9.021	36760.	8.355	67.185	258856.	58.831
4500.00	9.030	37663.	8.369	67.388	265585.	59.019
4600.00	9.039	38566.	8.384	67.587	272333.	59.203
4700.00	9.048	39470.	8.398	67.781	279102.	59.383
4800.00	9.057	40376.	8.412	67.972	285889.	59.560
4900.00	9.066	41282.	8.425	68.159	292696.	59.734
5000.00	9.074	42189.	8.438	68.342	299521.	59.904
5100.00	9.083	43096.	8.450	68.522	306364.	60.071
5200.00	9.091	44005.	8.463	68.698	313225.	60.236
5300.00	9.100	44915.	8.474	68.871	320104.	60.397
5400.00	9.109	45825.	8.486	69.042	326999.	60.555
5500.00	9.118	46736.	8.497	69.209	333912.	60.711
5600.00	9.127.	47648.	8.509	69.373	340841.	60.864
5700.00	9.136	48562.	8.520	69.535	347786.	61.015
5800.00	9.145	49476.	8.530	69.694	354748.	61.163
5900.00	9.155	50391.	8.541	69.850	361725.	61.309
6000.00	9.165	51306.	8.551	70.004	368718.	61.453

TABLE 83

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR NITRIDE (NS)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 46.0707 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL
298.15	-1.282	63.	211.302	22.537	56.275	188.7464

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.720	719.96	7.200	44.612	3741.2	37.412
200.00	7.697	1497.9	7.490	50.008	8503.8	42.519
298.15	7.599	2245.9	7.533	53.052	13572.	45.520
300.00	7.600	2259.9	7.533	53.099	13670.	45.566
400.00	7.742	3025.8	7.565	55.302	19095.	47.738
500.00	7.951	3810.8	7.622	57.052	24715.	49.431
600.00	8.146	4615.8	7.693	58.519	30496.	50.826
700.00	8.306	5438.7	7.770	59.787	36412.	52.017
800.00	8.433	6275.7	7.845	60.905	42448.	53.060
900.00	8.534	7123.6	7.915	61.904	48590.	53.989
1000.00	8.614	7981.6	7.982	62.808	54826.	54.826
1100.00	8.678	8845.6	8.041	63.632	61149.	55.590
1200.00	8.731	9716.5	8.097	64.389	67550.	56.292
1300.00	8.775	10591.	8.147	65.090	74025.	56.942
1400.00	8.812	11471.	8.194	65.741	80566.	57.547
1500.00	8.843	12353.	8.236	66.351	87173.	58.115
1600.00	8.871	13239.	8.275	66.922	93835.	58.647
1700.00	8.895	14127.	8.310	67.461	100556.	59.150
1800.00	8.916	15018.	8.343	67.970	107327.	59.626
1900.00	8.935	15911.	8.374	68.452	114147.	60.077
2000.00	8.952	16805.	8.403	68.911	121016.	60.508
2100.00	8.968	17701.	8.429	69.348	127929.	60.918
2200.00	8.982	18598.	8.454	69.766	134886.	61.312
2300.00	8.996	19497.	8.477	70.164	141881.	61.688
2400.00	9.008	20398.	8.499	70.547	148916.	62.048
2500.00	9.020	21299.	8.520	70.915	155990.	62.396
2600.00	9.032	22202.	8.539	71.269	163099.	62.730
2700.00	9.042	23105.	8.557	71.610	170243.	63.053
2800.00	9.052	24010.	8.575	71.939	177421.	63.364
2900.00	9.062	24916.	8.592	72.257	184631.	63.666
3000.00	9.072	25823.	8.608	72.565	191873.	63.958
3100.00	9.081	26730.	8.622	72.862	199144.	64.240
3200.00	9.089	27639.	8.637	73.151	206446.	64.514
3300.00	9.098	28548.	8.651	73.431	213776.	64.781
3400.00	9.106	29458.	8.664	73.702	221130.	65.038
3500.00	9.114	30368.	8.677	73.966	228514.	65.290
3600.00	9.122	31280.	8.689	74.223	235923.	65.534
3700.00	9.130	32193.	8.701	74.473	243358.	65.772
3800.00	9.138	33106.	8.712	74.717	250819.	66.005
3900.00	9.145	34020.	8.723	74.954	258301.	66.231
4000.00	9.153	34935.	8.734	75.186	265810.	66.452
4100.00	9.160	35851.	8.744	75.412	273339.	66.668
4200.00	9.167	36767.	8.754	75.633	280892.	66.879
4300.00	9.174	37684.	8.764	75.849	288467.	67.085
4400.00	9.181	38602.	8.773	76.060	296063.	67.287
4500.00	9.188	39521.	8.782	76.266	303677.	67.484
4600.00	9.195	40440.	8.791	76.468	311314.	67.677
4700.00	9.202	41360.	8.800	76.666	318971.	67.866
4800.00	9.209	42280.	8.808	76.860	326649.	68.052
4900.00	9.216	43201.	8.816	77.050	334345.	68.234
5000.00	9.222	44123.	8.825	77.236	342058.	68.412
5100.00	9.229	45046.	8.832	77.419	349792.	68.587
5200.00	9.236	45969.	8.840	77.598	357542.	68.758
5300.00	9.242	46893.	8.848	77.774	365310.	68.926
5400.00	9.249	47818.	8.855	77.947	373097.	69.092
5500.00	9.255	48743.	8.862	78.116	380896.	69.254
5600.00	9.262	49669.	8.869	78.283	388717.	69.414
5700.00	9.268	50594.	8.876	78.447	396554.	69.571
5800.00	9.275	51521.	8.883	78.609	404411.	69.726
5900.00	9.281	52449.	8.890	78.767	412276.	69.877
6000.00	9.288	53378.	8.896	78.923	420160.	70.027

TABLE 84

MOLAR THERMODYNAMIC PROPERTIES FOR DINITROGEN MONOXIDE (N_2O)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 44.0128 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-1.268	19.61	65.7719	-17.721	24.90	83.5145

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.015	695.97	6.960	43.986	3702.6	37.026
200.00	8.033	1440.9	7.205	49.106	8380.2	41.901
298.15	9.230	2289.9	7.680	52.543	13376.	44.863
300.00	9.250	2306.9	7.690	52.600	13473.	44.911
400.00	10.200	3281.8	8.205	55.397	18877.	47.193
500.00	10.952	4340.8	8.682	57.758	24538.	49.077
600.00	11.564	5467.7	9.113	59.810	30418.	50.697
700.00	12.069	6649.7	9.500	61.632	36493.	52.132
800.00	12.485	7876.6	9.848	63.272	42739.	53.424
900.00	12.829	9144.5	10.161	64.763	49142.	54.602
1000.00	13.112	10442.	10.442	66.130	55687.	55.687
1100.00	13.347	11765.	10.696	67.391	62364.	56.695
1200.00	13.543	13110.	10.925	68.562	69164.	57.636
1300.00	13.706	14473.	11.133	69.652	76074.	58.518
1400.00	13.844	15851.	11.322	70.672	83090.	59.350
1500.00	13.960	17241.	11.494	71.631	90206.	60.137
1600.00	14.059	18642.	11.651	72.536	97416.	60.885
1700.00	14.144	20053.	11.796	73.391	104712.	61.595
1800.00	14.217	21471.	11.928	74.201	112091.	62.273
1900.00	14.281	22896.	12.050	74.972	119551.	62.922
2000.00	14.336	24327.	12.163	75.706	127086.	63.543
2100.00	14.384	25765.	12.268	76.407	134692.	64.139
2200.00	14.427	27204.	12.365	77.077	142366.	64.712
2300.00	14.465	28648.	12.455	77.719	150106.	65.264
2400.00	14.498	30096.	12.540	78.335	157908.	65.795
2500.00	14.528	31547.	12.619	78.928	165773.	66.309
2600.00	14.555	33001.	12.693	79.498	173694.	66.805
2700.00	14.579	34456.	12.762	80.048	181671.	67.286
2800.00	14.601	35917.	12.828	80.579	189704.	67.751
2900.00	14.620	37378.	12.889	81.091	197786.	68.202
3000.00	14.638	38841.	12.947	81.587	205920.	68.640
3100.00	14.654	40306.	13.002	82.068	214104.	69.066
3200.00	14.669	41772.	13.054	82.533	222333.	69.479
3300.00	14.683	43240.	13.103	82.985	230610.	69.882
3400.00	14.695	44709.	13.150	83.423	238929.	70.273
3500.00	14.706	46179.	13.194	83.849	247292.	70.655
3600.00	14.717	47651.	13.236	84.264	255699.	71.028
3700.00	14.726	49123.	13.276	84.667	264144.	71.390
3800.00	14.735	50595.	13.315	85.060	272632.	71.745
3900.00	14.744	52069.	13.351	85.443	281157.	72.092
4000.00	14.751	53544.	13.386	85.816	289719.	72.430
4100.00	14.759	55020.	13.420	86.181	298321.	72.761
4200.00	14.765	56496.	13.451	86.537	306958.	73.085
4300.00	14.771	57973.	13.482	86.884	315627.	73.402
4400.00	14.777	59450.	13.511	87.224	324334.	73.712
4500.00	14.783	60926.	13.540	87.556	333072.	74.016
4600.00	14.788	62407.	13.567	87.881	341844.	74.314
4700.00	14.793	63886.	13.593	88.199	350648.	74.606
4800.00	14.797	65366.	13.618	88.511	359485.	74.893
4900.00	14.801	66846.	13.642	88.816	368351.	75.174
5000.00	14.805	68326.	13.665	89.115	377247.	75.449
5100.00	14.809	69807.	13.688	89.408	386172.	75.720
5200.00	14.813	71287.	13.709	89.696	395129.	75.986
5300.00	14.816	72769.	13.730	89.977	404111.	76.247
5400.00	14.819	74251.	13.750	90.254	413123.	76.504
5500.00	14.822	75733.	13.770	90.526	422162.	76.757
5600.00	14.825	77215.	13.788	90.793	431226.	77.005
5700.00	14.828	78698.	13.807	91.055	440318.	77.249
5800.00	14.830	80181.	13.824	91.313	449437.	77.489
5900.00	14.833	81664.	13.841	91.567	458584.	77.726
6000.00	14.835	83148.	13.858	91.816	467751.	77.958

TABLE 85

MOLAR THERMODYNAMIC PROPERTIES FOR DINITROGEN TRIOXIDE (N_2O_3)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 76.0116 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-1.9810	20.01	67.1135	45.360	33.32	111.7552

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
298.15	15.682	0.	0.	73.911	22037.	73.911
300.00	15.717	28.999	0.097	74.008	22173.	73.912
373.15	16.976	1225.3	3.294	77.575	27721.	74.281
400.00	17.384	1686.9	4.217	78.767	29820.	74.550
500.00	18.730	3495.8	6.992	82.797	37903.	75.805
600.00	19.820	5424.7	9.041	86.312	46362.	77.270
700.00	20.692	7452.6	10.647	89.435	55152.	78.788
800.00	21.385	9557.5	11.947	92.244	64238.	80.297
900.00	21.936	11724.	13.027	94.796	73592.	81.769
1000.00	22.375	13940.	13.940	97.131	83191.	83.191
1100.00	22.728	16196.	14.724	99.281	93013.	84.557
1200.00	23.014	18484.	15.403	101.27	103042.	85.868
1300.00	23.249	20797.	15.998	103.12	113262.	87.125
1400.00	23.443	23132.	16.523	104.85	123662.	88.330
1500.00	23.605	25485.	16.990	106.48	134229.	89.486
1600.00	23.741	27852.	17.408	108.00	144954.	90.596
1700.00	23.856	30232.	17.784	109.45	155827.	91.663
1800.00	23.955	32623.	18.124	110.81	166841.	92.689
1900.00	24.040	35023.	18.433	112.11	177988.	93.678
2000.00	24.113	37431.	18.715	113.35	189261.	94.631
2100.00	24.177	39845.	18.974	114.52	200655.	95.550
2200.00	24.233	42266.	19.212	115.65	212164.	96.438
2300.00	24.282	44691.	19.431	116.73	223785.	97.297
2400.00	24.326	47122.	19.634	117.76	235508.	98.128
2500.00	24.365	49556.	19.823	118.76	247335.	98.934
2600.00	24.399	51995.	19.998	119.71	259258.	99.715
2700.00	24.430	54436.	20.162	120.63	271276.	100.47
2800.00	24.458	56881.	20.315	121.52	283384.	101.21
2900.00	24.483	59328.	20.458	122.38	295580.	101.92
3000.00	24.506	61777.	20.592	123.21	307859.	102.62
3100.00	24.526	64229.	20.719	124.02	320221.	103.30
3200.00	24.545	66682.	20.838	124.80	332662.	103.96
3300.00	24.562	69138.	20.951	125.55	345179.	104.60
3400.00	24.578	71595.	21.057	126.28	357771.	105.23
3500.00	24.593	74053.	21.158	127.00	370435.	105.84
3600.00	24.606	76513.	21.254	127.69	383170.	106.44
3700.00	24.618	78974.	21.344	128.36	395973.	107.02
3800.00	24.629	81437.	21.431	129.02	408842.	107.59
3900.00	24.640	83900.	21.513	129.66	421776.	108.15
4000.00	24.650	86365.	21.591	130.28	434774.	108.69
4100.00	24.659	88830.	21.666	130.89	447833.	109.23
4200.00	24.667	91296.	21.737	131.49	460952.	109.75
4300.00	24.675	93764.	21.805	132.07	474130.	110.26
4400.00	24.682	96231.	21.871	132.64	487365.	110.76
4500.00	24.689	98700.	21.933	133.19	500656.	111.26
4600.00	24.695	101169.	21.993	133.73	514003.	111.74
4700.00	24.701	103639.	22.051	134.26	527403.	112.21
4800.00	24.707	106109.	22.106	134.78	540855.	112.68
4900.00	24.712	108580.	22.159	135.29	554359.	113.13
5000.00	24.717	111052.	22.210	135.79	567913.	113.58
5100.00	24.722	113524.	22.260	136.28	581517.	114.02
5200.00	24.727	115996.	22.307	136.76	595170.	114.46
5300.00	24.731	118469.	22.353	137.23	608869.	114.88
5400.00	24.735	120942.	22.397	137.70	622616.	115.30
5500.00	24.738	123416.	22.439	138.15	636408.	115.71
5600.00	24.742	125890.	22.480	138.60	650246.	116.12
5700.00	24.745	128364.	22.520	139.03	664127.	116.51
5800.00	24.749	130839.	22.558	139.46	678052.	116.91
5900.00	24.752	133314.	22.596	139.89	692020.	117.29
6000.00	24.755	135789.	22.632	140.30	706029.	117.67

N=298.15 DEG K

TABLE 86

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN TETROXIDE (N_2O_4)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 60.0122 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.642	2.19	7.3452	-71.1043	23.38	78.4165

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	11.056	956.95	9.570	57.135	4756.6	47.566
200.00	15.106	2263.9	11.319	66.034	10943.	54.714
298.15	18.464	3918.8	13.144	72.720	17763.	59.577
300.00	18.519	3952.8	13.176	72.834	17898.	59.658
400.00	21.156	5941.7	14.854	78.538	25474.	63.684
500.00	23.232	8165.6	16.331	83.492	33580.	67.161
600.00	24.859	10573.	17.622	87.877	42152.	70.254
700.00	26.126	13125.	18.750	91.808	51141.	73.058
800.00	27.112	15789.	19.737	95.364	60502.	75.628
900.00	27.883	18541.	20.601	98.604	70203.	78.003
1000.00	28.491	21361.	21.361	101.57	80213.	80.213
1100.00	28.976	24235.	22.032	104.31	90509.	82.281
1200.00	29.366	27153.	22.627	106.85	101069.	84.224
1300.00	29.683	30105.	23.158	109.22	111875.	86.057
1400.00	29.945	33087.	23.634	111.42	122907.	87.791
1500.00	30.161	36093.	24.062	113.50	134154.	89.436
1600.00	30.343	39118.	24.449	115.45	145604.	91.002
1700.00	30.497	42161.	24.801	117.30	157241.	92.495
1800.00	30.628	45217.	25.120	119.04	169059.	93.922
1900.00	30.741	48286.	25.413	120.70	181046.	95.287
2000.00	30.838	51364.	25.682	122.28	193197.	96.599
2100.00	30.923	54453.	25.930	123.79	205501.	97.858
2200.00	30.997	57549.	26.159	125.23	217952.	99.069
2300.00	31.062	60652.	26.370	126.61	230543.	100.24
2400.00	31.119	63761.	26.567	127.93	243273.	101.36
2500.00	31.170	66876.	26.750	129.20	256128.	102.45
2600.00	31.216	69995.	26.921	130.43	269111.	103.50
2700.00	31.257	73119.	27.081	131.60	282213.	104.52
2800.00	31.293	76246.	27.231	132.74	295430.	105.51
2900.00	31.327	79378.	27.372	133.84	308759.	106.47
3000.00	31.356	82512.	27.504	134.90	322195.	107.40
3100.00	31.384	85649.	27.629	135.93	335738.	108.30
3200.00	31.408	88789.	27.746	136.93	349382.	109.18
3300.00	31.431	91930.	27.858	137.90	363123.	110.04
3400.00	31.452	95075.	27.963	138.83	376961.	110.87
3500.00	31.471	98221.	28.063	139.75	390890.	111.68
3600.00	31.488	101369.	28.158	140.63	404906.	112.47
3700.00	31.504	104519.	28.248	141.49	419012.	113.25
3800.00	31.519	107670.	28.334	142.34	433207.	114.00
3900.00	31.533	110822.	28.416	143.15	447481.	114.74
4000.00	31.545	113976.	28.494	143.95	461835.	115.46
4100.00	31.557	117131.	28.569	144.73	476269.	116.16
4200.00	31.568	120288.	28.640	145.49	490781.	116.85
4300.00	31.578	123445.	28.708	146.24	505369.	117.53
4400.00	31.588	126604.	28.774	146.96	520028.	118.19
4500.00	31.597	129763.	28.836	147.67	534760.	118.84
4600.00	31.605	132923.	28.896	148.37	549563.	119.47
4700.00	31.613	136084.	28.954	149.05	564435.	120.09
4800.00	31.621	139246.	29.010	149.71	579369.	120.70
4900.00	31.628	142408.	29.063	150.36	594373.	121.30
5000.00	31.634	145572.	29.114	151.00	609446.	121.89
5100.00	31.640	148736.	29.164	151.63	624574.	122.47
5200.00	31.646	151899.	29.211	152.24	639771.	123.03
5300.00	31.652	155064.	29.257	152.85	655021.	123.59
5400.00	31.657	158230.	29.302	153.44	670337.	124.14
5500.00	31.662	161396.	29.345	154.02	685710.	124.67
5600.00	31.666	164563.	29.386	154.59	701143.	125.20
5700.00	31.671	167730.	29.426	155.15	716627.	125.72
5800.00	31.675	170896.	29.465	155.70	732171.	126.24
5900.00	31.679	174064.	29.502	156.24	747770.	126.74
6000.00	31.683	177232.	29.539	156.78	763419.	127.24

TABLE 87

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN TETROXIDE (N_2O_4)

LIQUID

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 60.0122 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	13.057	-4.66	-15.629	-93.768	23.29	78.1146

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	26.979	0.	0.	17.416	1741.6	17.416
200.00	30.478	2872.9	14.364	37.190	4565.2	22.826
298.15	34.058	6033.7	20.237	50.004	8875.1	29.767
300.00	34.138	6096.7	20.322	50.215	8966.0	29.893
400.00	38.438	9725.5	24.314	60.625	14524.	36.311
500.00	42.738	13784.	27.569	69.665	21048.	42.096

TABLE 88

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN TETROXIDE (N_2O_4)

CRYSTAL

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 60.0122 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	8.082	-8.373	-28.083	-107.840	23.785	78.3296

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	14.507	772.96	7.730	13.414	568.47	5.685
200.00	21.916	2603.9	13.019	25.812	2558.5	12.792
298.15	29.182	5111.7	17.145	35.918	5597.2	18.773
300.00	29.319	5165.7	17.219	36.099	5664.0	18.880
400.00	36.718	8501.6	21.254	45.646	9756.7	24.392
500.00	39.998	12372.	24.745	54.268	14762.	29.524

TABLE 89

MOLAR THERMODYNAMIC PROPERTIES FOR NITROGEN PENTOXIDE (N_2O_5)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 76.0116 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-4.301	2.7	9.055	-83.2	27.5	92.235

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
298.15	23.016	0.	0.	82.797	24686.	82.797
300.00	23.088	42.998	0.143	82.940	24839.	82.797
400.00	26.493	2529.9	6.325	90.072	33499.	83.748
500.00	28.964	5310.7	10.621	96.265	42822.	85.644
600.00	30.682	8297.6	13.829	101.71	52727.	87.879
700.00	31.889	11430.	16.329	106.53	63143.	90.204
800.00	32.742	14663.	18.329	110.85	74017.	92.521
900.00	33.363	17970.	19.967	114.74	85300.	94.777
1000.00	33.804	21330.	21.330	118.28	96953.	96.953
1100.00	34.135	24727.	22.479	121.52	108946.	99.041
1200.00	34.408	28155.	23.462	124.50	121249.	101.04
1300.00	34.610	31606.	24.313	127.27	133839.	102.95
1400.00	34.780	35076.	25.054	129.84	146696.	104.78
1500.00	34.911	38561.	25.707	132.24	159801.	106.53
1600.00	35.025	42056.	26.286	134.50	173139.	108.21
1700.00	35.103	45564.	26.803	136.62	186696.	109.82
1800.00	35.175	49078.	27.266	138.63	200460.	111.37
1900.00	35.240	52599.	27.684	140.54	214419.	112.85
2000.00	35.300	56126.	28.063	142.34	228564.	114.28
2100.00	35.334	59658.	28.409	144.07	242885.	115.66
2200.00	35.366	63193.	28.724	145.71	257375.	116.99
2300.00	35.397	66731.	29.014	147.29	272025.	118.27
2400.00	35.426	70272.	29.280	148.79	286830.	119.51
2500.00	35.453	73816.	29.527	150.24	301782.	120.71
2600.00	35.478	77363.	29.755	151.63	316875.	121.88
2700.00	35.502	80912.	29.967	152.97	332106.	123.00
2800.00	35.524	84463.	30.165	154.26	347468.	124.10
2900.00	35.544	88017.	30.351	155.51	362957.	125.16
3000.00	35.563	91572.	30.524	156.71	378568.	126.19
3100.00	35.574	95129.	30.687	157.88	394298.	127.19
3200.00	35.585	98687.	30.840	159.01	410143.	128.17
3300.00	35.595	102246.	30.984	160.10	426099.	129.12
3400.00	35.605	105806.	31.119	161.17	442162.	130.05
3500.00	35.615	109367.	31.248	162.20	458331.	130.95
3600.00	35.623	112929.	31.369	163.20	474601.	131.83
3700.00	35.632	116492.	31.484	164.18	490971.	132.69
3800.00	35.640	120055.	31.593	165.13	507436.	133.54
3900.00	35.647	123620.	31.697	166.06	523996.	134.36
4000.00	35.654	127185.	31.796	166.96	540646.	135.16
4100.00	35.659	130750.	31.890	167.84	557386.	135.95
4200.00	35.664	134316.	31.980	168.70	574213.	136.72
4300.00	35.669	137883.	32.066	169.54	591125.	137.47
4400.00	35.674	141450.	32.148	170.36	608120.	138.21
4500.00	35.678	145018.	32.226	171.16	625196.	138.93
4600.00	35.682	148586.	32.301	171.94	642351.	139.64
4700.00	35.686	152154.	32.373	172.71	659584.	140.34
4800.00	35.690	155723.	32.442	173.46	676893.	141.02
4900.00	35.694	159292.	32.509	174.20	694276.	141.69
5000.00	35.697	162862.	32.572	174.92	711732.	142.35
5100.00	35.700	166432.	32.634	175.63	729259.	142.99
5200.00	35.703	170002.	32.693	176.32	746856.	143.63
5300.00	35.706	173572.	32.749	177.00	764522.	144.25
5400.00	35.709	177143.	32.804	177.67	782256.	144.86
5500.00	35.711	180714.	32.857	178.32	800055.	145.46
5600.00	35.713	184285.	32.908	178.97	817919.	146.06
5700.00	35.715	187857.	32.957	179.60	835848.	146.64
5800.00	35.717	191428.	33.005	180.22	853839.	147.21
5900.00	35.719	195000.	33.051	180.83	871891.	147.78
6000.00	35.720	198572.	33.095	181.43	890004.	148.33

N=298.15 DEG K

TABLE 90

MOLAR THERMODYNAMIC PROPERTIES FOR TRIPHOSPHORUS PENTANITRIDE (N_5P_3)

CRYSTAL

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 162.9549 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	3.0055	-71.4	-239.4756	-85.772	-45.656	-153.1302

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
298.15	35.600	0.	0.	43.998	13118.	43.998
300.00	35.643	65.997	0.220	44.218	13199.	43.998
400.00	37.952	3745.8	9.365	54.788	18169.	45.424
500.00	40.270	7656.6	15.313	63.506	24096.	48.193
600.00	42.580	11799.	19.666	71.051	30831.	51.386
700.00	44.895	16173.	23.105	77.789	38279.	54.685
800.00	47.208	20778.	25.972	83.935	46370.	57.962
900.00	49.520	25615.	28.461	89.629	55051.	61.168
1000.00	51.294	30641.	30.641	94.923	64282.	64.282
1100.00	54.725	35928.	32.662	99.960	74028.	67.298
1200.00	55.997	41475.	34.562	104.79	84268.	70.223
1300.00	55.997	47086.	36.220	109.28	94974.	73.057
1400.00	55.997	52665.	37.632	113.43	106111.	75.794
1500.00	55.997	58285.	38.857	117.29	117650.	78.433
1600.00	55.997	63885.	39.928	120.90	129562.	80.976
1700.00	55.997	69485.	40.873	124.30	141823.	83.426
1800.00	55.997	75084.	41.713	127.50	154413.	85.785
1900.00	55.997	80684.	42.465	130.53	167316.	88.061
2000.00	55.997	86284.	43.142	133.40	180515.	90.257
2100.00	55.997	91883.	43.754	136.13	193992.	92.377
2200.00	55.997	97483.	44.311	138.74	207736.	94.426
2300.00	55.997	103083.	44.819	141.22	221735.	96.406
2400.00	55.997	108683.	45.284	143.61	235979.	98.324
2500.00	55.997	114282.	45.713	145.89	250454.	100.18
2600.00	55.997	119882.	46.108	148.09	265154.	101.98
2700.00	55.997	125482.	46.475	150.20	280068.	103.73
2800.00	55.997	131081.	46.815	152.24	295192.	105.43
2900.00	55.997	136681.	47.131	154.21	310514.	107.07
3000.00	55.997	142281.	47.427	156.10	326029.	108.68

N=298.15 DEG K

TABLE 91

MOLAR THERMODYNAMIC PROPERTIES FOR OXYGEN MONATOMIC (O)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 15.9994 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	1.727	59.553	199.7407	13.965	55.388	185.7713

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	5.666	527.97	5.280	32.464	2718.5	27.185
200.00	5.434	1084.9	5.425	36.338	6182.7	30.913
298.15	5.237	1607.9	5.393	38.466	9860.7	33.073
300.00	5.235	1617.9	5.393	38.499	9931.8	33.106
400.00	5.135	2135.9	5.340	39.989	13860.	34.649
500.00	5.081	2645.9	5.292	41.129	17919.	35.837
600.00	5.049	3151.8	5.253	42.052	22079.	36.799
700.00	5.029	3655.8	5.223	42.829	26324.	37.606
800.00	5.015	4157.8	5.197	43.499	30641.	38.302
900.00	5.006	4659.8	5.178	44.090	35021.	38.912
1000.00	4.999	5159.7	5.160	44.617	39457.	39.457
1100.00	4.994	5658.7	5.144	45.093	43943.	39.948
1200.00	4.990	6158.7	5.132	45.527	48473.	40.394
1300.00	4.987	6656.7	5.121	45.926	53047.	40.805
1400.00	4.984	7155.6	5.111	46.296	57658.	41.185
1500.00	4.982	7653.6	5.102	46.640	62306.	41.537
1600.00	4.981	8151.6	5.095	46.961	66985.	41.866
1700.00	4.979	8649.6	5.088	47.263	71697.	42.175
1800.00	4.979	9147.5	5.082	47.548	76438.	42.466
1900.00	4.978	9645.5	5.077	47.817	81206.	42.740
2000.00	4.978	10143.	5.072	48.072	86000.	43.000
2100.00	4.978	10641.	5.067	48.315	90819.	43.247
2200.00	4.979	11139.	5.063	48.547	95663.	43.483
2300.00	4.980	11636.	5.059	48.768	100529.	43.708
2400.00	4.981	12134.	5.056	48.980	105417.	43.924
2500.00	4.984	12633.	5.053	49.183	110323.	44.129
2600.00	4.986	13131.	5.051	49.379	115253.	44.328
2700.00	4.990	13630.	5.048	49.567	120199.	44.518
2800.00	4.994	14129.	5.046	49.749	125167.	44.702
2900.00	4.999	14629.	5.045	49.924	130149.	44.879
3000.00	5.004	15129.	5.043	50.093	135151.	45.050
3100.00	5.010	15630.	5.042	50.257	140168.	45.215
3200.00	5.017	16131.	5.041	50.416	145202.	45.375
3300.00	5.025	16633.	5.040	50.570	150249.	45.530
3400.00	5.033	17136.	5.040	50.721	155317.	45.681
3500.00	5.041	17640.	5.040	50.867	160396.	45.827
3600.00	5.050	18144.	5.040	51.009	165490.	45.969
3700.00	5.060	18650.	5.041	51.147	170595.	46.107
3800.00	5.070	19156.	5.041	51.282	175717.	46.241
3900.00	5.081	19664.	5.042	51.414	180852.	46.372
4000.00	5.091	20172.	5.043	51.543	186002.	46.500
4100.00	5.103	20682.	5.044	51.669	191163.	46.625
4200.00	5.114	21193.	5.046	51.792	196335.	46.746
4300.00	5.126	21705.	5.048	51.912	201518.	46.865
4400.00	5.138	22218.	5.050	52.030	206716.	46.981
4500.00	5.150	22733.	5.052	52.146	211926.	47.095
4600.00	5.162	23248.	5.054	52.259	217145.	47.206
4700.00	5.174	23765.	5.056	52.370	222376.	47.314
4800.00	5.186	24283.	5.059	52.479	227618.	47.420
4900.00	5.198	24802.	5.062	52.586	232871.	47.525
5000.00	5.210	25322.	5.064	52.692	238140.	47.628
5100.00	5.222	25844.	5.067	52.795	243413.	47.728
5200.00	5.234	26367.	5.071	52.896	248694.	47.826
5300.00	5.246	26891.	5.074	52.996	253990.	47.923
5400.00	5.258	27416.	5.077	53.094	259294.	48.017
5500.00	5.269	27942.	5.080	53.191	264611.	48.111
5600.00	5.280	28470.	5.084	53.286	269934.	48.202
5700.00	5.292	28999.	5.087	53.380	275269.	48.293
5800.00	5.302	29528.	5.091	53.472	280612.	48.381
5900.00	5.313	30058.	5.095	53.562	285959.	48.468
6000.00	5.323	30590.	5.098	53.652	291323.	48.554

TABLE 92

MOLAR THERMODYNAMIC PROPERTIES FOR OXYGEN UNINEGATIVE ION (O^-)
IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 15.99995 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.357	24.29	81.4686	8.220	21.84	73.2513

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
200.00	5.278	1056.0	5.280	35.629	6069.8	30.349
298.15	5.148	1567.0	5.256	37.709	9676.1	32.454
300.00	5.147	1576.6	5.255	37.741	9745.8	32.486
400.00	5.081	2087.6	5.219	39.212	13597.	33.993
500.00	5.045	2593.7	5.187	40.341	17577.	35.154
600.00	5.023	3097.0	5.162	41.259	21658.	36.097
700.00	5.010	3598.6	5.141	42.032	25824.	36.891
800.00	5.001	4099.1	5.124	42.701	30061.	37.577
900.00	4.994	4598.8	5.110	43.289	34362.	38.179
1000.00	4.989	5097.9	5.098	43.815	38717.	38.717
1100.00	4.986	5596.7	5.088	44.291	43123.	39.203
1200.00	4.983	6095.1	5.079	44.724	47574.	39.645
1300.00	4.981	6593.3	5.072	45.123	52067.	40.051
1400.00	4.979	7091.3	5.065	45.492	56598.	40.427
1500.00	4.978	7589.2	5.059	45.836	61164.	40.776
1600.00	4.977	8086.9	5.054	46.157	65764.	41.102
1700.00	4.976	8584.5	5.050	46.458	70395.	41.409
1800.00	4.975	9082.0	5.046	46.743	75055.	41.697
1900.00	4.974	9579.4	5.042	47.012	79743.	41.970
2000.00	4.974	10077.	5.038	47.267	84457.	42.228
2100.00	4.973	10574.	5.035	47.509	89196.	42.474
2200.00	4.973	11071.	5.032	47.741	93958.	42.708
2300.00	4.972	11569.	5.030	47.962	98744.	42.932
2400.00	4.972	12066.	5.027	48.173	103550.	43.146
2500.00	4.972	12563.	5.025	48.376	108378.	43.351
2600.00	4.971	13060.	5.023	48.571	113225.	43.548
2700.00	4.971	13557.	5.021	48.759	118092.	43.738
2800.00	4.971	14054.	5.019	48.940	122977.	43.920
2900.00	4.971	14551.	5.018	49.114	127880.	44.096
3000.00	4.970	15048.	5.016	49.283	132800.	44.267
3100.00	4.970	15546.	5.015	49.446	137736.	44.431
3200.00	4.970	16043.	5.013	49.604	142689.	44.590
3300.00	4.970	16540.	5.012	49.756	147657.	44.744
3400.00	4.970	17037.	5.011	49.905	152640.	44.894
3500.00	4.970	17534.	5.010	50.049	157638.	45.039
3600.00	4.970	18030.	5.008	50.189	162649.	45.180
3700.00	4.970	18527.	5.007	50.325	167675.	45.318
3800.00	4.969	19024.	5.006	50.458	172714.	45.451
3900.00	4.969	19521.	5.005	50.587	177767.	45.581
4000.00	4.969	20018.	5.005	50.712	182832.	45.708
4100.00	4.969	20515.	5.004	50.835	187909.	45.831
4200.00	4.969	21012.	5.003	50.955	192998.	45.952
4300.00	4.969	21509.	5.002	51.072	198100.	46.070
4400.00	4.969	22006.	5.001	51.186	203213.	46.185
4500.00	4.969	22503.	5.001	51.298	208337.	46.297
4600.00	4.969	23000.	5.000	51.407	213472.	46.407
4700.00	4.969	23497.	4.999	51.514	218618.	46.515
4800.00	4.969	23994.	4.999	51.618	223775.	46.620
4900.00	4.969	24490.	4.998	51.721	228942.	46.723
5000.00	4.969	24987.	4.997	51.821	234119.	46.824
5100.00	4.969	25484.	4.997	51.920	239306.	46.923
5200.00	4.969	25981.	4.996	52.016	244503.	47.020
5300.00	4.969	26478.	4.996	52.111	249709.	47.115
5400.00	4.969	26975.	4.995	52.204	254925.	47.208
5500.00	4.969	27472.	4.995	52.295	260150.	47.300
5600.00	4.969	27969.	4.994	52.384	265384.	47.390
5700.00	4.969	28465.	4.994	52.472	270627.	47.478
5800.00	4.969	28962.	4.993	52.559	275878.	47.565
5900.00	4.969	29459.	4.993	52.644	281138.	47.651
6000.00	4.969	29956.	4.993	52.727	286407.	47.735

TABLE 93

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS MONOXIDE (OP)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 46.9732 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-0.987	-1.46	-4.8968	23.265	-8.391	-28.1434

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.722	718.96	7.190	44.779	3758.9	37.589
200.00	7.693	1497.9	7.490	50.174	8537.0	42.685
298.15	7.587	2244.9	7.529	53.216	13621.	45.685
300.00	7.588	2258.9	7.530	53.263	13720.	45.734
400.00	7.724	3022.8	7.557	55.461	19162.	47.904
500.00	7.931	3805.8	7.612	57.207	24798.	49.596
600.00	8.126	4608.8	7.681	58.670	30593.	50.989
700.00	8.287	5429.7	7.757	59.935	36525.	52.178
800.00	8.415	6264.7	7.831	61.051	42576.	53.220
900.00	8.516	7111.6	7.902	62.048	48731.	54.146
1000.00	8.597	7967.6	7.968	62.950	54982.	54.982
1100.00	8.662	8830.6	8.028	63.772	61318.	55.744
1200.00	8.715	9699.5	8.083	64.528	67734.	56.445
1300.00	8.759	10573.	8.133	65.227	74221.	57.093
1400.00	8.796	11450.	8.179	65.878	80778.	57.699
1500.00	8.827	12332.	8.222	66.486	87396.	58.264
1600.00	8.854	13216.	8.260	67.056	94073.	58.795
1700.00	8.878	14102.	8.295	67.594	100807.	59.298
1800.00	8.899	14991.	8.328	68.102	107592.	59.773
1900.00	8.917	15882.	8.359	68.584	114427.	60.225
2000.00	8.934	16775.	8.388	69.041	121306.	60.653
2100.00	8.949	17669.	8.414	69.478	128234.	61.064
2200.00	8.963	18564.	8.438	69.894	135202.	61.455
2300.00	8.976	19461.	8.461	70.292	142212.	61.831
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2500.00	8.999	21259.	8.504	71.041	156345.	62.538
2600.00	9.010	22159.	8.523	71.395	163469.	62.873
2700.00	9.020	23061.	8.541	71.735	170625.	63.194
2800.00	9.029	23963.	8.558	72.063	177815.	63.505
2900.00	9.038	24867.	8.575	72.380	185036.	63.806
3000.00	9.047	25771.	8.590	72.687	192291.	64.097
3100.00	9.056	26676.	8.605	72.983	199573.	64.378
3200.00	9.064	27582.	8.619	73.271	206887.	64.652
3300.00	9.071	28489.	8.633	73.550	214227.	64.917
3400.00	9.079	29396.	8.646	73.821	221597.	65.176
3500.00	9.086	30304.	8.658	74.084	226991.	65.426
3600.00	9.094	31213.	8.670	74.340	236412.	65.670
3700.00	9.101	32122.	8.682	74.590	243862.	65.909
3800.00	9.108	33033.	8.693	74.832	251329.	66.139
3900.00	9.115	33944.	8.704	75.069	258826.	66.366
4000.00	9.121	34856.	8.714	75.300	266345.	66.586
4100.00	9.128	35768.	8.724	75.525	273885.	66.801
4200.00	9.134	36681.	8.734	75.745	281449.	67.012
4300.00	9.141	37595.	8.743	75.960	289034.	67.217
4400.00	9.147	38509.	8.752	76.170	296640.	67.418
4500.00	9.153	39424.	8.761	76.376	304269.	67.615
4600.00	9.159	40340.	8.770	76.577	311915.	67.808
4700.00	9.165	41256.	8.778	76.774	319583.	67.996
4800.00	9.172	42173.	8.786	76.967	327269.	68.181
4900.00	9.178	43091.	8.794	77.157	334979.	68.363
5000.00	9.183	44009.	8.802	77.342	342702.	68.540
5100.00	9.189	44927.	8.809	77.524	350446.	68.715
5200.00	9.195	45846.	8.816	77.702	358205.	68.886
5300.00	9.201	46766.	8.824	77.878	365988.	69.054
5400.00	9.207	47687.	8.831	78.050	373784.	69.219
5500.00	9.213	48608.	8.838	78.219	381597.	69.381
5600.00	9.218	49529.	8.844	78.385	389428.	69.541
5700.00	9.224	50450.	8.851	78.548	397274.	69.697
5800.00	9.230	51373.	8.857	78.708	405133.	69.851
5900.00	9.235	52296.	8.864	78.866	413013.	70.002
6000.00	9.241	53220.	8.870	79.022	420912.	70.152

TABLE 94

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR MONOXIDE (OS)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 48.0634 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-1.727	1.496	5.0175	20.886	-4.742	-15.9046

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.956	694.88	6.949	45.364	3841.5	38.415
200.00	6.995	1391.5	6.957	50.191	8646.7	43.234
298.15	7.211	2087.2	7.000	53.018	13720.	46.018
300.00	7.217	2100.5	7.002	53.063	13818.	46.061
400.00	7.543	2838.3	7.096	55.183	19235.	48.087
500.00	7.845	3608.2	7.216	56.900	24842.	49.683
600.00	8.087	4405.3	7.342	58.353	30606.	51.010
700.00	8.272	5223.7	7.462	59.614	36506.	52.151
800.00	8.412	6058.2	7.573	60.728	42524.	53.155
900.00	8.520	6905.0	7.672	61.725	48648.	54.053
1000.00	8.604	7761.4	7.761	62.627	54866.	54.866
1100.00	8.671	8625.3	7.841	63.451	61170.	55.609
1200.00	8.725	9495.2	7.913	64.208	67554.	56.295
1300.00	8.770	10370.	7.977	64.908	74010.	56.931
1400.00	8.807	11249.	8.035	65.559	80534.	57.524
1500.00	8.839	12131.	8.088	66.168	87120.	58.080
1600.00	8.866	13017.	8.135	66.739	93766.	58.604
1700.00	8.890	13905.	8.179	67.277	100467.	59.098
1800.00	8.911	14795.	8.219	67.786	107221.	59.567
1900.00	8.930	15687.	8.256	68.269	114024.	60.012
2000.00	8.947	16581.	8.290	68.727	120874.	60.437
2100.00	8.963	17476.	8.322	69.164	127768.	60.842
2200.00	8.977	18373.	8.351	69.581	134706.	61.230
2300.00	8.990	19272.	8.379	69.981	141684.	61.602
2400.00	9.003	20171.	8.405	70.364	148701.	61.959
2500.00	9.014	21072.	8.429	70.731	155756.	62.302
2600.00	9.025	21974.	8.452	71.085	162847.	62.633
2700.00	9.036	22877.	8.473	71.426	169973.	62.953
2800.00	9.045	23781.	8.493	71.755	177132.	63.261
2900.00	9.055	24686.	8.512	72.072	184323.	63.560
3000.00	9.064	25592.	8.531	72.379	191546.	63.849
3100.00	9.073	26499.	8.548	72.677	198799.	64.129
3200.00	9.081	27407.	8.565	72.965	206081.	64.400
3300.00	9.090	28315.	8.580	73.244	213391.	64.664
3400.00	9.098	29225.	8.595	73.516	220730.	64.920
3500.00	9.106	30135.	8.610	73.780	228094.	65.170
3600.00	9.113	31046.	8.624	74.036	235485.	65.413
3700.00	9.121	31957.	8.637	74.286	242901.	65.649
3800.00	9.128	32870.	8.650	74.530	250342.	65.880
3900.00	9.135	33783.	8.662	74.767	257807.	66.104
4000.00	9.143	34697.	8.674	74.998	265295.	66.324
4100.00	9.150	35612.	8.686	75.224	272807.	66.538
4200.00	9.157	36527.	8.697	75.445	280340.	66.748
4300.00	9.163	37443.	8.708	75.660	287895.	66.952
4400.00	9.170	38360.	8.718	75.871	295472.	67.153
4500.00	9.177	39277.	8.728	76.077	303069.	67.349
4600.00	9.184	40195.	8.738	76.279	310687.	67.541
4700.00	9.190	41114.	8.748	76.476	318325.	67.729
4800.00	9.197	42033.	8.757	76.670	325982.	67.913
4900.00	9.203	42953.	8.766	76.860	333659.	68.094
5000.00	9.210	43874.	8.775	77.046	341354.	68.271
5100.00	9.216	44795.	8.783	77.228	349068.	68.445
5200.00	9.222	45717.	8.792	77.407	356800.	68.615
5300.00	9.229	46639.	8.800	77.583	364549.	68.783
5400.00	9.235	47563.	8.808	77.755	372316.	68.947
5500.00	9.241	48486.	8.816	77.925	380100.	69.109
5600.00	9.248	49411.	8.823	78.091	387901.	69.268
5700.00	9.254	50336.	8.831	78.255	395718.	69.424
5800.00	9.260	51262.	8.838	78.416	403552.	69.578
5900.00	9.266	52188.	8.845	78.574	411401.	69.729
6000.00	9.272	53115.	8.852	78.730	419267.	69.878

TABLE 95

MOLAR THERMODYNAMIC PROPERTIES GOR DISULFUR MONOXIDE (OS_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 80.1274 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.796	-13.5	-45.279	26.230	-20.663	-69.3037

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.194	799.17	7.992	53.772	4578.1	45.781
200.00	9.423	1677.8	8.389	59.813	10285.	51.424
298.15	10.543	2659.7	8.921	63.793	16360.	54.872
300.00	10.562	2679.2	8.931	63.858	16478.	54.927
400.00	11.423	3780.8	9.452	67.021	23028.	57.569
500.00	12.041	4955.7	9.911	69.640	29864.	59.729
600.00	12.476	6182.8	10.305	71.876	36943.	61.571
700.00	12.786	7446.8	10.638	73.824	44230.	63.186
800.00	13.010	8737.2	10.921	75.547	51700.	64.625
900.00	13.176	10047.	11.163	77.089	59333.	65.926
1000.00	13.302	11371.	11.371	78.484	67113.	67.113
1100.00	13.399	12706.	11.551	79.757	75026.	68.206
1200.00	13.475	14050.	11.708	80.926	83061.	69.217
1300.00	13.535	15401.	11.847	82.007	91208.	70.160
1400.00	13.584	16757.	11.969	83.012	99460.	71.043
1500.00	13.624	18117.	12.078	83.951	107808.	71.872
1600.00	13.657	19481.	12.176	84.831	116248.	72.655
1700.00	13.685	20849.	12.264	85.660	124773.	73.396
1800.00	13.709	22218.	12.343	86.443	133378.	74.099
1900.00	13.729	23590.	12.416	87.184	142060.	74.768
2000.00	13.746	24964.	12.482	87.889	150814.	75.407
2100.00	13.761	26339.	12.543	88.560	159637.	76.018
2200.00	13.774	27716.	12.598	89.200	168525.	76.602
2300.00	13.785	29094.	12.650	89.813	177476.	77.163
2400.00	13.795	30473.	12.697	90.400	186487.	77.703
2500.00	13.804	31853.	12.741	90.963	195555.	78.222
2600.00	13.812	33234.	12.782	91.505	204679.	78.723
2700.00	13.819	34615.	12.820	92.026	213855.	79.206
2800.00	13.825	35998.	12.856	92.529	223083.	79.673
2900.00	13.831	37380.	12.890	93.014	232361.	80.124
3000.00	13.836	38764.	12.921	93.483	241686.	80.562
3100.00	13.841	40148.	12.951	93.937	251057.	80.986
3200.00	13.845	41532.	12.979	94.376	260473.	81.398
3300.00	13.849	42916.	13.005	94.802	269932.	81.797
3400.00	13.852	44302.	13.030	95.216	279433.	82.186
3500.00	13.856	45687.	13.053	95.617	288974.	82.564
3600.00	13.858	47073.	13.076	96.008	298556.	82.932
3700.00	13.861	48459.	13.097	96.388	308176.	83.291
3800.00	13.864	49845.	13.117	96.757	317833.	83.640
3900.00	13.866	51231.	13.136	97.117	327527.	83.981
4000.00	13.868	52618.	13.155	97.469	337256.	84.314
4100.00	13.870	54005.	13.172	97.811	347020.	84.639
4200.00	13.872	55392.	13.189	98.145	356818.	84.957
4300.00	13.874	56779.	13.205	98.472	366649.	85.267
4400.00	13.875	58167.	13.220	98.791	376512.	85.571
4500.00	13.877	59554.	13.234	99.103	386407.	85.868
4600.00	13.878	60942.	13.248	99.408	396332.	86.159
4700.00	13.880	62330.	13.262	99.706	406288.	86.444
4800.00	13.881	63718.	13.275	99.998	416273.	86.724
4900.00	13.882	65106.	13.287	100.28	426288.	86.997
5000.00	13.883	66495.	13.299	100.56	436330.	87.266
5100.00	13.884	67883.	13.310	100.84	446400.	87.529
5200.00	13.885	69271.	13.321	101.11	456498.	87.788
5300.00	13.886	70660.	13.332	101.37	466622.	88.042
5400.00	13.887	72049.	13.342	101.63	476772.	88.291
5500.00	13.888	73437.	13.352	101.89	486949.	88.536
5600.00	13.889	74826.	13.362	102.14	497150.	88.777
5700.00	13.889	76215.	13.371	102.38	507376.	89.013
5800.00	13.890	77604.	13.380	102.63	517627.	89.246
5900.00	13.891	78993.	13.389	102.86	527901.	89.475
6000.00	13.891	80382.	13.397	103.10	538199.	89.700

TABLE 96

MOLAR THERMODYNAMIC PROPERTIES FOR OXYGEN DIATOMIC (REF. ST.) (O_2)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 31.9988 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.958	693.97	6.940	41.393	3445.3	34.453
200.00	6.961	1389.9	6.950	46.216	7853.2	39.266
298.15	7.020	2074.9	6.959	49.002	12535.	42.042
300.00	7.023	2087.9	6.960	49.045	12625.	42.085
400.00	7.196	2798.9	6.997	51.088	17637.	44.091
500.00	7.431	3529.8	7.060	52.719	22830.	45.660
600.00	7.670	4284.8	7.141	54.095	28172.	46.954
700.00	7.883	5062.7	7.232	55.294	33643.	48.062
800.00	8.063	5860.7	7.326	56.358	39226.	49.032
900.00	8.212	6674.7	7.416	57.317	44911.	49.901
1000.00	8.336	7501.6	7.502	58.189	50687.	50.687
1100.00	8.439	8340.5	7.582	58.989	56547.	51.406
1200.00	8.527	9188.8	7.657	59.727	62483.	52.069
1300.00	8.604	10045.	7.727	60.412	68490.	52.685
1400.00	8.674	10909.	7.792	61.052	74564.	53.260
1500.00	8.738	11780.	7.853	61.653	80700.	53.800
1600.00	8.800	12657.	7.911	62.219	86894.	54.308
1700.00	8.858	13540.	7.965	62.754	93142.	54.790
1800.00	8.916	14428.	8.016	63.262	99443.	55.246
1900.00	8.973	15323.	8.065	63.746	105794.	55.681
2000.00	9.029	16223.	8.111	64.207	112192.	56.096
2100.00	9.084	17128.	8.156	64.649	118635.	56.493
2200.00	9.139	18040.	8.200	65.073	125121.	56.873
2300.00	9.194	18956.	8.242	65.480	131649.	57.239
2400.00	9.248	19878.	8.283	65.873	138217.	57.590
2500.00	9.301	20806.	8.322	66.251	144823.	57.929
2600.00	9.354	21738.	8.361	66.617	151466.	58.256
2700.00	9.405	22676.	8.399	66.971	158146.	58.573
2800.00	9.455	23619.	8.435	67.314	164860.	58.879
2900.00	9.503	24567.	8.471	67.647	171608.	59.175
3000.00	9.551	25520.	8.507	67.970	178389.	59.463
3100.00	9.596	26477.	8.541	68.284	185202.	59.743
3200.00	9.640	27439.	8.575	68.589	192046.	60.014
3300.00	9.682	28405.	8.608	68.886	198920.	60.279
3400.00	9.723	29375.	8.640	69.176	205823.	60.536
3500.00	9.762	30349.	8.671	69.458	212754.	60.787
3600.00	9.799	31327.	8.702	69.734	219714.	61.032
3700.00	9.835	32309.	8.732	70.003	226701.	61.271
3800.00	9.869	33294.	8.762	70.265	233714.	61.504
3900.00	9.901	34283.	8.790	70.522	240754.	61.732
4000.00	9.932	35274.	8.819	70.773	247819.	61.955
4100.00	9.961	36269.	8.846	71.019	254908.	62.173
4200.00	9.988	37266.	8.873	71.259	262022.	62.386
4300.00	10.014	38266.	8.899	71.494	269160.	62.595
4400.00	10.038	39269.	8.925	71.725	276321.	62.800
4500.00	10.061	40274.	8.950	71.951	283505.	63.001
4600.00	10.083	41281.	8.974	72.172	290711.	63.198
4700.00	10.103	42291.	8.998	72.389	297939.	63.391
4800.00	10.122	43302.	9.021	72.602	305189.	63.581
4900.00	10.139	44315.	9.044	72.811	312459.	63.767
5000.00	10.155	45330.	9.066	73.016	319751.	63.950
5100.00	10.171	46346.	9.087	73.217	327062.	64.130
5200.00	10.186	47364.	9.108	73.415	334394.	64.307
5300.00	10.199	48383.	9.129	73.609	341745.	64.480
5400.00	10.212	49404.	9.149	73.800	349116.	64.651
5500.00	10.224	50426.	9.168	73.987	356505.	64.819
5600.00	10.236	51449.	9.187	74.172	363913.	64.984
5700.00	10.246	52473.	9.206	74.353	371339.	65.147
5800.00	10.257	53498.	9.224	74.531	378784.	65.308
5900.00	10.266	54524.	9.241	74.707	386246.	65.465
6000.00	10.275	55552.	9.259	74.879	393725.	65.621

TABLE 97

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS DIOXIDE (O_2P)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 62.9726 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-2.187	-71.	-238.134	5.711	-73.066	-244.2751

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.016	795.96	7.960	51.129	4317.0	43.170
200.00	8.802	1630.9	8.155	56.887	9746.5	48.733
298.15	9.897	2547.9	8.546	60.604	15521.	52.057
300.00	9.917	2565.9	8.553	60.665	15634.	52.112
400.00	10.912	3609.8	9.025	63.660	21854.	54.635
500.00	11.658	4739.8	9.480	66.180	28350.	56.700
600.00	12.188	5933.7	9.890	68.355	35079.	58.465
700.00	12.565	7172.6	10.247	70.263	42012.	60.017
800.00	12.836	8443.6	10.554	71.960	49125.	61.406
900.00	13.037	9737.5	10.819	73.484	56398.	62.665
1000.00	13.197	11049.	11.049	74.866	63817.	63.817
1100.00	13.303	12374.	11.249	76.128	71367.	64.879
1200.00	13.394	13709.	11.424	77.290	79039.	65.866
1300.00	13.466	15052.	11.579	78.365	86822.	66.786
1400.00	13.524	16402.	11.716	79.365	94709.	67.649
1500.00	13.572	17757.	11.838	80.300	102693.	68.462
1600.00	13.611	19116.	11.948	81.177	110767.	69.229
1700.00	13.644	20479.	12.046	82.004	118928.	69.957
1800.00	13.672	21845.	12.136	82.784	127166.	70.648
1900.00	13.696	23213.	12.217	83.524	135482.	71.307
2000.00	13.716	24584.	12.292	84.227	143870.	71.935
2100.00	13.734	25957.	12.360	84.897	152326.	72.536
2200.00	13.749	27331.	12.423	85.536	160848.	73.113
2300.00	13.762	28707.	12.481	86.148	169433.	73.667
2400.00	13.774	30083.	12.535	86.734	178077.	74.199
2500.00	13.785	31461.	12.585	87.296	186778.	74.711
2600.00	13.794	32840.	12.631	87.837	195535.	75.206
2700.00	13.802	34220.	12.674	88.358	204345.	75.683
2800.00	13.810	35600.	12.714	88.860	213207.	76.145
2900.00	13.817	36982.	12.752	89.345	222117.	76.592
3000.00	13.823	38364.	12.788	89.813	231073.	77.024
3100.00	13.828	39747.	12.822	90.266	240079.	77.445
3200.00	13.833	41130.	12.853	90.705	249128.	77.852
3300.00	13.838	42513.	12.883	91.131	258221.	78.249
3400.00	13.842	43897.	12.911	91.544	267354.	78.634
3500.00	13.846	45282.	12.938	91.945	276527.	79.008
3600.00	13.849	46667.	12.963	92.335	285741.	79.372
3700.00	13.852	48052.	12.987	92.715	294995.	79.728
3800.00	13.855	49437.	13.010	93.084	304284.	80.075
3900.00	13.858	50822.	13.031	93.444	313610.	80.413
4000.00	13.861	52208.	13.052	93.795	322973.	80.743
4100.00	13.863	53594.	13.072	94.138	332373.	81.067
4200.00	13.865	54981.	13.091	94.472	341802.	81.382
4300.00	13.867	56368.	13.109	94.798	351264.	81.689
4400.00	13.869	57755.	13.126	95.117	360761.	81.991
4500.00	13.871	59142.	13.143	95.429	370289.	82.287
4600.00	13.872	60529.	13.158	95.733	379844.	82.575
4700.00	13.874	61916.	13.174	96.032	389435.	82.859
4800.00	13.876	63304.	13.188	96.324	399052.	83.136
4900.00	13.877	64692.	13.202	96.610	408698.	83.408
5000.00	13.878	66079.	13.216	96.890	418372.	83.674
5100.00	13.879	67467.	13.229	97.165	428076.	83.936
5200.00	13.881	68856.	13.241	97.435	437807.	84.194
5300.00	13.882	70243.	13.253	97.699	447562.	84.446
5400.00	13.883	71631.	13.265	97.959	457348.	84.694
5500.00	13.884	73020.	13.276	98.214	467157.	84.938
5600.00	13.885	74408.	13.287	98.464	476991.	85.177
5700.00	13.885	75797.	13.298	98.710	486850.	85.412
5800.00	13.886	77185.	13.308	98.951	496731.	85.643
5900.00	13.887	78574.	13.318	99.188	506635.	85.870

TABLE 98

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR DIOXIDE (OS_2)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 64.0628 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_f^0 KCAL/MOL	$\Delta H_f^0/T$ CAL/DEG MOL	ΔS_f^0 CAL/DEG MOL	ΔG_f^0 KCAL/MOL	$\Delta G_f^0/T$ CAL/DEG MOL
298.15	-2.891	-70.944	-237.947	2.662	-71.749	-240.6473

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.013	796.96	7.970	49.930	4196.0	41.960
200.00	8.693	1628.9	8.145	55.667	9504.5	47.523
298.15	9.530	2521.9	8.458	59.295	15157.	50.837
300.00	9.547	2539.9	8.466	59.354	15266.	50.888
400.00	10.394	3537.8	8.845	62.219	21350.	53.374
500.00	11.131	4614.8	9.230	64.620	27695.	55.390
600.00	11.722	5758.7	9.598	66.704	34263.	57.106
700.00	12.179	6954.7	9.935	68.547	41028.	58.611
800.00	12.531	8190.6	10.238	70.196	47967.	59.958
900.00	12.805	9458.5	10.509	71.689	55062.	61.180
1000.00	13.021	10750.	10.750	73.050	62300.	62.300
1100.00	13.193	12061.	10.965	74.299	69668.	63.334
1200.00	13.334	13387.	11.156	75.454	77158.	64.298
1300.00	13.450	14727.	11.329	76.526	84757.	65.198
1400.00	13.548	16077.	11.484	77.526	92459.	66.042
1500.00	13.631	17436.	11.624	78.464	100260.	66.840
1600.00	13.703	18803.	11.752	79.346	108151.	67.594
1700.00	13.766	20177.	11.869	80.179	116127.	68.310
1800.00	13.821	21556.	11.976	80.967	124185.	68.991
1900.00	13.871	22941.	12.074	81.716	132319.	69.642
2000.00	13.916	24330.	12.165	82.429	140528.	70.264
2100.00	13.957	25724.	12.249	83.109	148805.	70.859
2200.00	13.994	27122.	12.328	83.759	157148.	71.431
2300.00	14.029	28523.	12.401	84.382	165556.	71.981
2400.00	14.062	29928.	12.470	84.980	174024.	72.510
2500.00	14.092	31335.	12.534	85.554	182549.	73.020
2600.00	14.121	32745.	12.594	86.108	191135.	73.513
2700.00	14.148	34159.	12.652	86.641	199771.	73.989
2800.00	14.174	35575.	12.705	87.156	208461.	74.450
2900.00	14.199	36994.	12.757	87.654	217201.	74.897
3000.00	14.223	38415.	12.805	88.136	225992.	75.331
3100.00	14.246	39839.	12.851	88.603	234829.	75.751
3200.00	14.269	41265.	12.895	89.055	243710.	76.159
3300.00	14.290	42693.	12.937	89.495	252639.	76.557
3400.00	14.311	44123.	12.977	89.922	261610.	76.944
3500.00	14.332	45555.	13.016	90.336	270623.	77.321
3600.00	14.352	46989.	13.052	90.740	279677.	77.688
3700.00	14.372	48426.	13.088	91.133	288768.	78.045
3800.00	14.391	49864.	13.122	91.517	297903.	78.395
3900.00	14.410	51303.	13.155	91.891	307073.	78.737
4000.00	14.429	52745.	13.186	92.256	316280.	79.070
4100.00	14.447	54189.	13.217	92.613	325526.	79.396
4200.00	14.466	55635.	13.246	92.961	334802.	79.715
4300.00	14.484	57082.	13.275	93.302	344118.	80.027
4400.00	14.501	58532.	13.303	93.635	353463.	80.333
4500.00	14.519	59983.	13.330	93.961	362843.	80.632
4600.00	14.536	61436.	13.356	94.280	372253.	80.925
4700.00	14.553	62890.	13.381	94.593	381699.	81.212
4800.00	14.571	64347.	13.406	94.900	391174.	81.495
4900.00	14.587	65805.	13.430	95.200	400676.	81.771
5000.00	14.604	67264.	13.453	95.495	410212.	82.042
5100.00	14.621	68726.	13.476	95.785	419779.	82.310
5200.00	14.638	70188.	13.498	96.069	429371.	82.571
5300.00	14.654	71652.	13.519	96.348	438993.	82.829
5400.00	14.671	73119.	13.541	96.622	448640.	83.082
5500.00	14.687	74587.	13.561	96.891	458314.	83.330
5600.00	14.703	76056.	13.581	97.156	468018.	83.575
5700.00	14.719	77528.	13.601	97.416	477744.	83.815
5800.00	14.735	79000.	13.621	97.672	487498.	84.051
5900.00	14.752	80475.	13.640	97.925	497283.	84.285
6000.00	14.768	81951.	13.658	98.173	507088.	84.515

TABLE 99

MOLAR THERMODYNAMIC PROPERTIES FOR OZONE (O_3)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 47.9982 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL	CAL / DEG MOL	KCAL / MOL	CAL / DEG MOL
298.15	-1.152	34.1	114.371	-16.426	39.0	130.806

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL	CAL / DEG MOL	CAL / MOL	CAL / DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.957	2471.9	24.719	47.962	2324.3	23.243
200.00	8.379	1604.9	8.025	53.561	9107.3	45.537
298.15	9.378	2473.9	8.298	57.077	14544.	48.780
300.00	9.400	2490.9	8.303	57.135	14650.	48.832
400.00	10.454	3485.8	8.715	59.989	20510.	51.274
500.00	11.295	4574.8	9.150	62.416	26633.	53.266
600.00	11.915	5736.7	9.561	64.533	32983.	54.972
700.00	12.368	6952.7	9.932	66.406	39531.	56.473
800.00	12.703	8206.6	10.258	68.080	46257.	57.821
900.00	12.955	9490.5	10.545	69.592	53142.	59.046
1000.00	13.150	10796.	10.796	70.967	60171.	60.171
1100.00	13.302	12119.	11.018	72.228	67332.	61.211
1200.00	13.425	13455.	11.213	73.391	74614.	62.179
1300.00	13.525	14803.	11.387	74.469	82007.	63.082
1400.00	13.610	16160.	11.543	75.475	89505.	63.932
1500.00	13.681	17525.	11.683	76.416	97099.	64.733
1600.00	13.742	18896.	11.810	77.301	104786.	65.491
1700.00	13.795	20273.	11.925	78.136	112558.	66.211
1800.00	13.842	21655.	12.031	78.926	120412.	66.896
1900.00	13.884	23042.	12.127	79.676	128343.	67.549
2000.00	13.921	24432.	12.216	80.389	136346.	68.173
2100.00	13.956	25826.	12.298	81.069	144419.	68.771
2200.00	13.987	27223.	12.374	81.719	152559.	69.345
2300.00	14.016	28623.	12.445	82.341	160761.	69.896
2400.00	14.044	30026.	12.511	82.939	169027.	70.428
2500.00	14.069	31431.	12.573	83.512	177348.	70.939
2600.00	14.093	32840.	12.631	84.065	185728.	71.434
2700.00	14.116	34250.	12.685	84.597	194161.	71.911
2800.00	14.138	35663.	12.737	85.111	202647.	72.374
2900.00	14.159	37078.	12.786	85.607	211181.	72.821
3000.00	14.179	38495.	12.832	86.088	219768.	73.256
3100.00	14.198	39914.	12.875	86.553	228399.	73.677
3200.00	14.217	41335.	12.917	87.004	237077.	74.086
3300.00	14.235	42757.	12.957	87.442	245801.	74.485
3400.00	14.253	44182.	12.995	87.867	254565.	74.872
3500.00	14.271	45608.	13.031	88.281	263374.	75.250
3600.00	14.287	47036.	13.065	88.683	272222.	75.617
3700.00	14.304	48466.	13.099	89.075	281110.	75.976
3800.00	14.320	49897.	13.131	89.456	290034.	76.325
3900.00	14.336	51329.	13.161	89.829	299002.	76.667
4000.00	14.352	52764.	13.191	90.191	308002.	77.000
4100.00	14.368	54200.	13.220	90.545	317036.	77.326
4200.00	14.383	55637.	13.247	90.892	326111.	77.645
4300.00	14.398	57076.	13.274	91.230	335215.	77.957
4400.00	14.413	58517.	13.299	91.562	344358.	78.263
4500.00	14.428	59959.	13.324	91.886	353530.	78.562
4600.00	14.443	61403.	13.348	92.203	362733.	78.855
4700.00	14.457	62848.	13.372	92.514	371970.	79.142
4800.00	14.472	64295.	13.395	92.818	381233.	79.424
4900.00	14.486	65743.	13.417	93.117	390532.	79.700
5000.00	14.500	67192.	13.438	93.410	399860.	79.972
5100.00	14.514	68643.	13.459	93.697	409214.	80.238
5200.00	14.528	70094.	13.480	93.979	418598.	80.500
5300.00	14.542	71548.	13.500	94.256	428010.	80.757
5400.00	14.556	73003.	13.519	94.528	437449.	81.009
5500.00	14.570	74459.	13.538	94.795	446915.	81.257
5600.00	14.584	75917.	13.557	95.058	456409.	81.502
5700.00	14.597	77376.	13.575	95.316	465926.	81.741
5800.00	14.611	78836.	13.592	95.570	475471.	81.978
5900.00	14.624	80298.	13.610	95.820	485041.	82.210
6000.00	14.638	81762.	13.627	96.066	494635.	82.439

TABLE 100

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR TRIOXIDE (OS_3)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 80.0622 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.9040	-94.58	-31.722	-19.7930	-88.69	-297.4662

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.144	797.51	7.975	50.730	4275.5	42.755
200.00	10.118	1701.7	8.509	56.917	9681.7	48.408
298.15	12.108	2795.7	9.377	61.341	15493.	51.964
300.00	12.142	2818.1	9.394	61.416	15607.	52.022
400.00	13.784	4117.4	10.293	65.142	21939.	54.849
500.00	15.081	5563.3	11.127	68.363	28618.	57.237
600.00	16.074	7123.4	11.872	71.205	35600.	59.333
700.00	16.823	8770.0	12.529	73.742	42849.	61.213
800.00	17.390	10482.	13.102	76.027	50340.	62.924
900.00	17.822	12244.	13.604	78.101	58048.	64.497
1000.00	18.157	14043.	14.043	79.997	65954.	65.954
1100.00	18.419	15872.	14.430	81.740	74042.	67.311
1200.00	18.627	17725.	14.771	83.352	82297.	68.581
1300.00	18.795	19597.	15.074	84.850	90708.	69.776
1400.00	18.932	21483.	15.345	86.248	99264.	70.903
1500.00	19.045	23382.	15.588	87.558	107955.	71.970
1600.00	19.139	25291.	15.807	88.790	116773.	72.983
1700.00	19.218	27209.	16.006	89.953	125711.	73.948
1800.00	19.285	29135.	16.186	91.054	134762.	74.868
1900.00	19.343	31066.	16.351	92.098	143920.	75.747
2000.00	19.393	33003.	16.502	93.091	153180.	76.590
2100.00	19.435	34944.	16.640	94.039	162537.	77.398
2200.00	19.473	36890.	16.768	94.944	171986.	78.175
2300.00	19.506	38839.	16.886	95.810	181524.	78.923
2400.00	19.535	40791.	16.996	96.641	191147.	79.644
2500.00	19.561	42746.	17.098	97.439	200851.	80.340
2600.00	19.584	44703.	17.193	98.206	210633.	81.013
2700.00	19.604	46662.	17.282	98.946	220491.	81.663
2800.00	19.622	48624.	17.366	99.659	230422.	82.293
2900.00	19.639	50587.	17.444	100.35	240422.	82.904
3000.00	19.654	52551.	17.517	101.01	250491.	83.497
3100.00	19.668	54518.	17.586	101.66	260624.	84.072
3200.00	19.680	56485.	17.652	102.28	270822.	84.632
3300.00	19.691	58454.	17.713	102.89	281080.	85.176
3400.00	19.702	60423.	17.772	103.48	291399.	85.706
3500.00	19.711	62394.	17.827	104.05	301775.	86.222
3600.00	19.720	64365.	17.879	104.60	312208.	86.724
3700.00	19.728	66338.	17.929	105.14	322696.	87.215
3800.00	19.735	68311.	17.977	105.67	333236.	87.694
3900.00	19.742	70285.	18.022	106.18	343829.	88.161
4000.00	19.748	72259.	18.065	106.68	354473.	88.618
4100.00	19.754	74234.	18.106	107.17	365165.	89.065
4200.00	19.760	76210.	18.145	107.65	375906.	89.502
4300.00	19.765	78186.	18.183	108.11	386694.	89.929
4400.00	19.769	80163.	18.219	108.57	397528.	90.347
4500.00	19.774	82140.	18.253	109.01	408407.	90.757
4600.00	19.778	84118.	18.286	109.45	419330.	91.159
4700.00	19.782	86096.	18.318	109.87	430296.	91.552
4800.00	19.786	88074.	18.349	110.29	441304.	91.938
4900.00	19.789	90053.	18.378	110.70	452353.	92.317
5000.00	19.792	92032.	18.406	111.09	463443.	92.689
5100.00	19.795	94011.	18.434	111.49	474572.	93.053
5200.00	19.798	95991.	18.460	111.87	485740.	93.411
5300.00	19.801	97971.	18.485	112.25	496946.	93.763
5400.00	19.804	99951.	18.509	112.62	508189.	94.109
5500.00	19.806	101932.	18.533	112.98	519469.	94.449
5600.00	19.808	103912.	18.556	113.34	530785.	94.783
5700.00	19.811	105893.	18.578	113.69	542137.	95.112
5800.00	19.813	107875.	18.599	114.03	553523.	95.435
5900.00	19.815	109856.	18.620	114.37	564944.	95.753
6000.00	19.816	111837.	18.640	114.71	576398.	96.066

TABLE 101

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS TRIOXIDE DIMERIC (O_6P_4)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 219.8916 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-6.910	-512.5	-1718.925	-86.226	-486.831	-1632.336

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	11.238	859.96	8.600	59.173	5057.3	50.573
200.00	24.209	2623.9	13.119	70.880	11552.	57.761
298.15	34.400	5533.7	18.560	82.580	19088.	64.021
300.00	34.554	5597.7	18.659	82.794	19240.	64.135
400.00	41.166	9409.5	23.524	93.714	28076.	70.190
500.00	45.317	13749.	27.499	103.38	37941.	75.882
600.00	47.994	18424.	30.707	111.90	48714.	81.190
700.00	49.797	23319.	33.313	119.44	60288.	86.125
800.00	51.033	28364.	35.454	126.17	72575.	90.718
900.00	51.928	33513.	37.237	132.24	85500.	95.000
1000.00	52.591	38741.	38.741	137.75	99004.	99.004
1100.00	53.093	44027.	40.024	142.78	113033.	102.76
1200.00	53.482	49357.	41.130	147.42	127547.	106.29
1300.00	53.790	54720.	42.093	151.71	142506.	109.62
1400.00	54.037	60112.	42.937	155.71	157880.	112.77
1500.00	54.238	65527.	43.684	159.44	173638.	115.76
1600.00	54.403	70958.	44.349	162.95	189761.	118.60
1700.00	54.541	76406.	44.945	166.25	206222.	121.31
1800.00	54.658	81866.	45.481	169.37	223005.	123.89
1900.00	54.757	87337.	45.967	172.33	240091.	126.36
2000.00	54.842	92817.	46.409	175.14	257465.	128.73
2100.00	54.915	98305.	46.812	177.82	275115.	131.01
2200.00	54.978	103800.	47.182	180.37	293025.	133.19
2300.00	55.034	109301.	47.522	182.82	311187.	135.30
2400.00	55.083	114806.	47.836	185.16	329587.	137.33
2500.00	55.126	120317.	48.127	187.41	348217.	139.29
2600.00	55.165	125832.	48.397	189.58	367067.	141.18
2700.00	55.199	131349.	48.648	191.66	386128.	143.01
2800.00	55.230	136871.	48.883	193.67	405395.	144.78
2900.00	55.257	142396.	49.102	195.61	424859.	146.50
3000.00	55.282	147923.	49.308	197.48	444515.	148.17
3100.00	55.305	153452.	49.501	199.29	464353.	149.79
3200.00	55.325	158984.	49.683	201.05	484369.	151.37
3300.00	55.344	164517.	49.854	202.75	504561.	152.90
3400.00	55.361	170052.	50.015	204.40	524920.	154.39
3500.00	55.377	175589.	50.168	206.01	545441.	155.84
3600.00	55.391	181128.	50.313	207.57	566119.	157.26
3700.00	55.404	186668.	50.451	209.09	586953.	158.64
3800.00	55.416	192208.	50.581	210.56	607937.	159.98
3900.00	55.428	197751.	50.705	212.00	629062.	161.30
4000.00	55.438	203294.	50.823	213.41	650335.	162.58
4100.00	55.448	208839.	50.936	214.78	671744.	163.84
4200.00	55.457	214384.	51.044	216.11	693287.	165.07
4300.00	55.465	219930.	51.147	217.42	714968.	166.27
4400.00	55.473	225477.	51.245	218.69	736773.	167.45
4500.00	55.481	231024.	51.339	219.94	758706.	168.60
4600.00	55.487	236573.	51.429	221.16	780758.	169.73
4700.00	55.494	242122.	51.515	222.35	802937.	170.84
4800.00	55.500	247672.	51.598	223.52	825228.	171.92
4900.00	55.505	253222.	51.678	224.67	847640.	172.99
5000.00	55.511	258773.	51.755	225.79	870160.	174.03
5100.00	55.516	264324.	51.828	226.89	892793.	175.06
5200.00	55.521	269877.	51.899	227.96	915539.	176.07
5300.00	55.525	275428.	51.968	229.02	938386.	177.05
5400.00	55.529	280981.	52.034	230.06	961340.	178.03
5500.00	55.533	286535.	52.097	231.08	984397.	178.98
5600.00	55.537	292087.	52.158	232.08	1007557.	179.92
5700.00	55.541	297642.	52.218	233.06	1030813.	180.84
5800.00	55.544	303196.	52.275	234.03	1054168.	181.75
5900.00	55.547	308751.	52.331	234.98	1077621.	182.65
6000.00	55.550	314305.	52.384	235.91	1101162.	183.53

TABLE 102

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS PENTOXIDE DIMERIC ($O_{10}P_4$)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 283.8892 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-10.2310	-702.7	-2356.855	-170.289	-623.077	-2089.810

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	16.835	1053.2	10.532	64.365	5383.3	53.833
200.00	32.688	3549.0	17.745	81.031	12657.	63.286
298.15	45.125	7397.4	24.811	96.521	21380.	71.710
300.00	45.324	7481.1	24.937	96.801	21559.	71.864
400.00	54.375	12493.	31.233	111.16	31970.	79.924
500.00	60.660	18264.	36.528	124.01	43740.	87.480
600.00	65.040	24562.	40.937	135.48	56725.	94.542
700.00	68.146	31230.	44.614	145.75	70796.	101.14
800.00	70.396	38163.	47.703	155.01	85842.	107.30
900.00	72.064	45290.	50.322	163.40	101768.	113.08
1000.00	73.326	52562.	52.562	171.06	118497.	118.50
1100.00	74.300	59945.	54.496	178.10	135959.	123.60
1200.00	75.066	67415.	56.179	184.59	154098.	128.41
1300.00	75.677	74953.	57.656	190.63	172863.	132.97
1400.00	76.172	82547.	58.962	196.25	192210.	137.29
1500.00	76.578	90185.	60.123	201.52	212102.	141.40
1600.00	76.914	97860.	61.162	206.48	232504.	145.32
1700.00	77.196	105566.	62.098	211.15	253388.	149.05
1800.00	77.435	113298.	62.943	215.57	274726.	152.63
1900.00	77.639	121052.	63.711	219.76	296494.	156.05
2000.00	77.813	128825.	64.412	223.75	318671.	159.34
2100.00	77.965	136614.	65.054	227.55	341237.	162.49
2200.00	78.097	144417.	65.644	231.18	364175.	165.53
2300.00	78.212	152232.	66.188	234.65	387468.	168.46
2400.00	78.314	160059.	66.691	237.98	411101.	171.29
2500.00	78.404	167895.	67.158	241.18	435060.	174.02
2600.00	78.485	175739.	67.592	244.26	459333.	176.67
2700.00	78.556	183592.	67.997	247.22	483908.	179.23
2800.00	78.621	191450.	68.375	250.08	508774.	181.70
2900.00	78.678	199315.	68.729	252.84	533921.	184.11
3000.00	78.731	207186.	69.062	255.51	559339.	186.45
3100.00	78.778	215061.	69.375	258.09	585019.	188.72
3200.00	78.821	222941.	69.669	260.59	610954.	190.92
3300.00	78.860	230826.	69.947	263.02	637135.	193.07
3400.00	78.896	238713.	70.210	265.37	663556.	195.16
3500.00	78.929	246605.	70.459	267.66	690208.	197.20
3600.00	78.960	254499.	70.694	269.88	717086.	199.19
3700.00	78.987	262397.	70.918	272.05	744183.	201.13
3800.00	79.013	270297.	71.131	274.16	771493.	203.02
3900.00	79.037	278199.	71.333	276.21	799012.	204.87
4000.00	79.059	286104.	71.526	278.21	826733.	206.68
4100.00	79.079	294011.	71.710	280.16	854652.	208.45
4200.00	79.098	301920.	71.886	282.07	882764.	210.18
4300.00	79.116	309830.	72.054	283.93	911064.	211.88
4400.00	79.133	317743.	72.214	285.75	939548.	213.53
4500.00	79.148	325657.	72.368	287.53	968212.	215.16
4600.00	79.163	333573.	72.516	289.27	997052.	216.75
4700.00	79.176	341489.	72.657	290.97	1026064.	218.31
4800.00	79.189	349408.	72.793	292.64	1055245.	219.84
4900.00	79.201	357327.	72.924	294.27	1084591.	221.35
5000.00	79.212	365248.	73.050	295.87	1114098.	222.82
5100.00	79.223	373170.	73.171	297.44	1143763.	224.27
5200.00	79.233	381092.	73.287	298.98	1173584.	225.69
5300.00	79.242	389016.	73.399	300.49	1203558.	227.09
5400.00	79.251	396941.	73.508	301.97	1233680.	228.46
5500.00	79.259	404866.	73.612	303.42	1263950.	229.81
5600.00	79.267	412793.	73.713	304.85	1294364.	231.14
5700.00	79.275	420720.	73.810	306.25	1324919.	232.44
5800.00	79.282	428648.	73.905	307.63	1355613.	233.73
5900.00	79.289	436576.	73.996	308.99	1386445.	234.99
6000.00	79.296	444505.	74.084	310.32	1417410.	236.24

TABLE 103

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS PENTOXIDE DIMERIC ($O_{10}P_4$)

CRYSTAL

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 283.8892 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-4.759	-713.2	-239.207	-212.1330	-644.8	-216.265

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.147	0.184	0.037	0.049	0.062	0.012
10.00	1.073	2.809	0.281	0.377	0.964	0.096
15.00	2.805	12.331	0.822	1.126	4.553	0.304
20.00	4.554	30.827	1.541	2.178	12.727	0.636
25.00	6.060	57.471	2.299	3.361	26.542	1.062
30.00	7.259	90.914	3.030	4.577	46.386	1.546
35.00	8.223	129.70	3.706	5.771	72.269	2.065
40.00	8.992	172.81	4.320	6.921	104.02	2.600
45.00	9.658	219.45	4.877	8.019	141.39	3.142
50.00	10.314	269.38	5.388	9.070	184.13	3.683
55.00	10.990	322.63	5.866	10.085	232.03	4.219
60.00	11.684	379.31	6.322	11.071	284.93	4.749
65.00	12.407	439.52	6.762	12.034	342.70	5.272
70.00	13.177	503.46	7.192	12.981	405.24	5.789
75.00	13.997	571.38	7.618	13.918	472.49	6.300
80.00	14.855	643.49	8.044	14.849	544.41	6.805
85.00	15.743	719.97	8.470	15.776	620.98	7.306
90.00	16.660	800.97	8.900	16.702	702.17	7.802
95.00	17.602	886.61	9.333	17.627	787.99	8.295
100.00	18.565	977.02	9.770	18.555	878.45	8.784
105.00	19.542	1072.3	10.212	19.484	973.54	9.272
110.00	20.526	1172.5	10.659	20.416	1073.3	9.757
115.00	21.514	1277.6	11.109	21.350	1177.7	10.241
120.00	22.504	1387.6	11.563	22.287	1286.8	10.723
125.00	23.495	1502.6	12.021	23.225	1400.6	11.205
130.00	24.482	1622.5	12.481	24.166	1519.1	11.685
135.00	25.462	1747.4	12.944	25.108	1642.2	12.165
140.00	26.432	1877.1	13.408	26.052	1770.1	12.644
145.00	27.388	2011.7	13.874	26.996	1902.8	13.122
150.00	28.331	2151.0	14.340	27.941	2040.1	13.601
155.00	29.260	2295.0	14.806	28.885	2182.2	14.078
160.00	30.175	2443.6	15.272	29.828	2328.9	14.556
165.00	31.075	2596.7	15.738	30.771	2480.4	15.033
170.00	31.962	2754.3	16.202	31.712	2636.7	15.510
175.00	32.832	2916.3	16.665	32.651	2797.6	15.986
180.00	33.686	3082.6	17.126	33.588	2963.2	16.462
185.00	34.524	3253.1	17.584	34.522	3133.4	16.937
190.00	35.345	3427.8	18.041	35.454	3308.4	17.412
195.00	36.152	3606.6	18.495	36.382	3488.0	17.887
200.00	36.945	3789.3	18.947	37.307	3672.2	18.361
205.00	37.728	3976.0	19.395	38.229	3861.0	18.834
210.00	38.502	4166.6	19.841	39.148	4054.5	19.307
215.00	39.268	4361.0	20.284	40.063	4252.5	19.779
220.00	40.028	4559.2	20.724	40.974	4455.1	20.250
225.00	40.783	4761.3	21.161	41.882	4662.2	20.721
230.00	41.533	4967.1	21.596	42.787	4873.9	21.191
235.00	42.276	5176.6	22.028	43.688	5090.1	21.660
240.00	43.012	5389.8	22.458	44.586	5310.8	22.128
245.00	43.740	5606.7	22.884	45.480	5536.0	22.596
250.00	44.457	5827.2	23.309	46.371	5765.6	23.062
255.00	45.163	6051.2	23.730	47.258	5999.7	23.528
260.00	45.855	6278.8	24.149	48.142	6238.2	23.993
265.00	46.534	6509.8	24.565	49.022	6481.1	24.457
270.00	47.198	6744.1	24.978	49.898	6728.4	24.920
275.00	47.848	6981.7	25.388	50.770	6980.0	25.382
280.00	48.482	7222.6	25.795	51.638	7236.1	25.843
285.00	49.101	7466.5	26.198	52.502	7496.4	26.303
290.00	49.706	7713.6	26.598	53.361	7761.1	26.762
295.00	50.298	7963.6	26.995	54.216	8030.0	27.220
298.15	50.663	8122.6	27.243	54.752	8201.6	27.508
300.00	50.875	8216.5	27.388	55.066	8303.2	27.677
310.00	51.993	8730.9	28.164	56.752	8862.3	28.588
320.00	53.064	9256.2	28.926	58.420	9438.2	29.494
330.00	54.089	9792.0	29.673	60.069	10031.	30.396

TABLE 104

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS (P)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 30.9738 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.096	79.8	253.6663	29.162	66.932	224.4899

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	4.968	496.98	4.970	33.550	2858.1	28.581
200.00	4.968	992.95	4.965	36.994	6405.9	32.029
298.15	4.968	1480.9	4.967	38.978	10140.	34.010
300.00	4.968	1489.9	4.966	39.009	10213.	34.043
400.00	4.968	1986.9	4.967	40.438	14188.	35.471
500.00	4.968	2483.9	4.968	41.546	18289.	36.578
600.00	4.968	2980.9	4.968	42.452	22490.	37.484
700.00	4.968	3476.8	4.967	43.218	26776.	38.251
800.00	4.968	3973.8	4.967	43.881	31131.	38.914
900.00	4.968	4470.8	4.968	44.467	35549.	39.499
1000.00	4.968	4967.8	4.968	44.990	40022.	40.022
1100.00	4.969	5464.7	4.968	45.464	44545.	40.496
1200.00	4.969	5961.7	4.968	45.896	49113.	40.928
1300.00	4.971	6458.7	4.968	46.294	53723.	41.325
1400.00	4.974	6955.7	4.968	46.662	58371.	41.693
1500.00	4.979	7452.6	4.968	47.006	63056.	42.037
1600.00	4.987	7951.6	4.970	47.327	67771.	42.357
1700.00	4.999	8450.6	4.971	47.630	72520.	42.659
1800.00	5.015	8951.6	4.973	47.916	77297.	42.943
1900.00	5.036	9453.5	4.976	48.188	82103.	43.212
2000.00	5.062	9958.5	4.979	48.447	86935.	43.467
2100.00	5.094	10466.	4.984	48.694	91790.	43.710
2200.00	5.132	10977.	4.990	48.932	96672.	43.942
2300.00	5.175	11492.	4.997	49.161	101577.	44.164
2400.00	5.225	12012.	5.005	49.382	106503.	44.376
2500.00	5.279	12537.	5.015	49.597	111454.	44.582
2600.00	5.339	13068.	5.026	49.805	116423.	44.778
2700.00	5.403	13605.	5.039	50.007	121415.	44.968
2800.00	5.471	14149.	5.053	50.204	126423.	45.151
2900.00	5.542	14700.	5.069	50.398	131455.	45.329
3000.00	5.617	15257.	5.086	50.587	136505.	45.502
3100.00	5.693	15823.	5.104	50.772	141571.	45.668
3200.00	5.772	16396.	5.124	50.954	146658.	45.831
3300.00	5.851	16977.	5.145	51.133	151763.	45.989
3400.00	5.931	17566.	5.167	51.309	156886.	46.143
3500.00	6.011	18163.	5.189	51.482	162025.	46.293
3600.00	6.090	18769.	5.214	51.652	167180.	46.439
3700.00	6.168	19381.	5.238	51.820	172354.	46.582
3800.00	6.245	20002.	5.264	51.986	177546.	46.723
3900.00	6.320	20630.	5.290	52.149	182753.	46.860
4000.00	6.393	21266.	5.316	52.310	187976.	46.994
4100.00	6.464	21909.	5.344	52.469	193216.	47.126
4200.00	6.532	22559.	5.371	52.625	198468.	47.254
4300.00	6.597	23215.	5.399	52.780	203741.	47.382
4400.00	6.659	23878.	5.427	52.932	209025.	47.506
4500.00	6.718	24547.	5.455	53.082	214324.	47.628
4600.00	6.773	25222.	5.483	53.231	219642.	47.748
4700.00	6.825	25901.	5.511	53.377	224973.	47.867
4800.00	6.874	26586.	5.539	53.521	230317.	47.983
4900.00	6.919	27276.	5.566	53.663	235675.	48.097
5000.00	6.961	27970.	5.594	53.803	241047.	48.209
5100.00	6.999	28668.	5.621	53.942	246438.	48.321
5200.00	7.034	29370.	5.648	54.078	251838.	48.430
5300.00	7.065	30074.	5.674	54.212	257251.	48.538
5400.00	7.094	30782.	5.700	54.345	262682.	48.645
5500.00	7.119	31492.	5.726	54.475	268122.	48.749
5600.00	7.141	32205.	5.751	54.603	273573.	48.852
5700.00	7.160	32921.	5.776	54.730	279041.	48.955
5800.00	7.177	33637.	5.800	54.855	284523.	49.056
5900.00	7.191	34356.	5.823	54.978	290015.	49.155
6000.00	7.202	35076.	5.846	55.098	295513.	49.252

TABLE 105

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS (P)

LIQUID

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 30.9738 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL
298.15	0.594	4.322	14.4959	0.431	2.891	9.6964

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL
298.15	6.292	0.	0.	10.248	3055.	10.248
300.00	6.292	11.999	0.040	10.287	3074.2	10.247
400.00	6.292	640.97	1.602	12.097	4198.0	10.495
500.00	6.292	1269.9	2.540	13.501	5480.7	10.961
600.00	6.292	1898.9	3.165	14.648	6890.1	11.483
700.00	6.292	2527.9	3.611	15.618	8404.9	12.007
800.00	6.292	3157.8	3.947	16.458	10009.	12.511
900.00	6.292	3786.8	4.208	17.199	11692.	12.992
1000.00	6.292	4415.8	4.416	17.862	13446.	13.446
1100.00	6.292	5044.7	4.586	18.462	15264.	13.876
1200.00	6.292	5673.7	4.728	19.009	17137.	14.281
1300.00	6.292	6303.7	4.849	19.513	19063.	14.664
1400.00	6.292	6932.7	4.952	19.979	21038.	15.027
1500.00	6.292	7561.6	5.041	20.413	23058.	15.372
1600.00	6.292	8190.6	5.119	20.820	25121.	15.701
1700.00	6.292	8819.6	5.188	21.201	27222.	16.013
1800.00	6.292	9449.5	5.250	21.561	29360.	16.311
1900.00	6.292	10078.	5.304	21.901	31533.	16.596
2000.00	6.292	10707.	5.354	22.224	33740.	16.870
2100.00	6.292	11336.	5.398	22.531	35978.	17.133
2200.00	6.292	11965.	5.439	22.823	38245.	17.384
2300.00	6.292	12595.	5.476	23.103	40541.	17.627
2400.00	6.292	13224.	5.510	23.371	42866.	17.861
2500.00	6.292	13853.	5.541	23.628	45216.	18.086
2600.00	6.292	14482.	5.570	23.874	47590.	18.304
2700.00	6.292	15111.	5.597	24.112	49991.	18.515
2800.00	6.292	15741.	5.622	24.341	52413.	18.719
2900.00	6.292	16370.	5.645	24.561	54856.	18.916
3000.00	6.292	16999.	5.666	24.775	57325.	19.108

N=298.15 DEG K

TABLE 106

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS RED (P)

CRYSTAL

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 30.9738 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-0.634	-4.2	-14.086	-4.368	-2.9	-9.7266

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	2.085	90.995	0.910	1.494	58.397	0.584
200.00	4.074	408.98	2.045	3.619	314.78	1.574
298.15	5.069	861.96	2.891	5.450	762.96	2.559
300.00	5.079	870.96	2.903	5.481	773.26	2.578
400.00	5.540	1403.9	3.510	7.009	1399.5	3.499
500.00	5.852	1973.9	3.948	8.282	2166.9	4.334
600.00	6.165	2574.9	4.291	9.376	3050.4	5.084
700.00	6.500	3207.8	4.583	10.350	4037.5	5.768
800.00	6.840	3874.8	4.844	11.240	5117.5	6.397
900.00	7.180	4575.8	5.084	12.066	6284.0	6.982
1000.00	7.520	5310.7	5.311	12.840	7529.6	7.530
1100.00	7.860	6079.7	5.527	13.572	8849.9	8.045
1200.00	8.200	6882.7	5.736	14.271	10243.	8.536
1300.00	8.540	7719.6	5.938	14.941	11704.	9.003
1400.00	8.880	8590.6	6.136	15.586	13230.	9.450
1500.00	9.220	9495.5	6.330	16.210	14820.	9.880
1600.00	9.560	10434.	6.522	16.816	16471.	10.295
1700.00	9.900	11407.	6.710	17.406	18183.	10.696
1800.00	10.239	12414.	6.897	17.981	19952.	11.084
1900.00	10.579	13455.	7.082	18.544	21778.	11.462
2000.00	10.919	14530.	7.265	19.095	23660.	11.830

TABLE 107

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS WHITE (P) (REF. ST.)

CRYSTAL

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 30.9738 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	3.281	211.99	2.120	4.277	212.69	2.127
200.00	5.641	752.96	3.765	7.678	782.56	3.913
298.15	5.698	1280.9	4.296	9.818	1646.3	5.522
300.00	5.705	1291.9	4.306	9.853	1663.8	5.546
400.00	6.050	1879.9	4.700	11.542	2737.1	6.843
500.00	6.330	2498.9	4.998	12.924	3963.3	7.927
600.00	6.330	3131.8	5.220	14.078	5315.1	8.859
700.00	6.330	3764.8	5.378	15.053	6772.5	9.675
800.00	6.330	4397.8	5.497	15.899	8321.6	10.402
900.00	6.330	5030.7	5.590	16.644	9949.0	11.054
1000.00	6.330	5663.7	5.664	17.311	11647.	11.647
1100.00	6.330	6296.7	5.724	17.915	13410.	12.191
1200.00	6.330	6929.7	5.775	18.465	15228.	12.690
1300.00	6.330	7562.6	5.817	18.972	17101.	13.155
1400.00	6.330	8195.6	5.854	19.441	19022.	13.587
1500.00	6.330	8828.6	5.886	19.878	20988.	13.992

TABLE 108

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS SULFIDE (PS)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 63.03780 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	9.057	14.38	48.2305	25.500	6.7759	22.7264

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	7.371	703.96	7.040	47.347	4030.7	40.307
200.00	8.117	1484.9	7.425	52.726	9060.3	45.302
298.15	8.423	2297.9	7.707	56.030	14407.	48.321
300.00	8.427	2313.9	7.713	56.082	14511.	48.369
400.00	8.605	3165.8	7.915	58.533	20247.	50.618
500.00	8.718	4031.8	8.064	60.466	26201.	52.402
600.00	8.792	4907.8	8.180	62.063	32330.	53.883
700.00	8.844	5789.7	8.271	63.422	38606.	55.151
800.00	8.882	6676.7	8.346	64.606	45008.	56.260
900.00	8.911	7565.6	8.406	65.653	51522.	57.246
1000.00	8.935	8458.6	8.459	66.594	58135.	58.135
1100.00	8.954	9352.5	8.502	67.446	64838.	58.943
1200.00	8.971	10248.	8.540	68.226	71622.	59.685
1300.00	8.985	11146.	8.574	68.945	78481.	60.370
1400.00	8.998	12045.	8.604	69.611	85409.	61.007
1500.00	9.010	12946.	8.631	70.231	92401.	61.601
1600.00	9.021	13847.	8.655	70.813	99454.	62.159
1700.00	9.032	14750.	8.677	71.360	106562.	62.684
1800.00	9.041	15654.	8.697	71.877	113725.	63.181
1900.00	9.051	16558.	8.715	72.366	120938.	63.652
2000.00	9.060	17464.	8.732	72.830	128197.	64.098
2100.00	9.068	18370.	8.748	73.273	135504.	64.526
2200.00	9.077	19277.	8.762	73.695	142853.	64.933
2300.00	9.085	20186.	8.777	74.098	150240.	65.322
2400.00	9.093	21094.	8.789	74.485	157671.	65.696
2500.00	9.101	22004.	8.802	74.856	165137.	66.055
2600.00	9.109	22915.	8.813	75.214	172642.	66.401
2700.00	9.116	23826.	8.824	75.557	180179.	66.733
2800.00	9.124	24738.	8.835	75.889	187752.	67.054
2900.00	9.132	25651.	8.845	76.209	195356.	67.364
3000.00	9.139	26564.	8.855	76.519	202994.	67.665
3100.00	9.146	27478.	8.864	76.819	210662.	67.955
3200.00	9.154	28393.	8.873	77.109	218357.	68.236
3300.00	9.161	29309.	8.881	77.391	226082.	68.510
3400.00	9.168	30225.	8.890	77.665	233836.	68.775
3500.00	9.176	31142.	8.898	77.931	241616.	69.033
3600.00	9.183	32060.	8.906	78.189	249420.	69.283
3700.00	9.190	32978.	8.913	78.441	257254.	69.528
3800.00	9.197	33898.	8.921	78.686	265109.	69.765
3900.00	9.204	34818.	8.928	78.925	272989.	69.997
4000.00	9.211	35739.	8.935	79.158	280893.	70.223
4100.00	9.218	36660.	8.942	79.386	288823.	70.445
4200.00	9.225	37582.	8.948	79.608	296772.	70.660
4300.00	9.233	38505.	8.955	79.825	304742.	70.870
4400.00	9.240	39429.	8.961	80.038	312738.	71.077
4500.00	9.247	40353.	8.967	80.245	320749.	71.278
4600.00	9.254	41278.	8.973	80.449	328787.	71.476
4700.00	9.261	42204.	8.980	80.648	336842.	71.668
4800.00	9.268	43130.	8.985	80.843	344916.	71.858
4900.00	9.275	44057.	8.991	81.034	353010.	72.043
5000.00	9.282	44985.	8.997	81.221	361120.	72.224
5100.00	9.289	45914.	9.003	81.405	369251.	72.402
5200.00	9.295	46843.	9.008	81.586	377404.	72.578
5300.00	9.302	47773.	9.014	81.763	385571.	72.749
5400.00	9.309	48703.	9.019	81.937	393757.	72.918
5500.00	9.316	49635.	9.024	82.108	401959.	73.083
5600.00	9.323	50566.	9.030	82.275	410173.	73.245
5700.00	9.330	51498.	9.035	82.441	418415.	73.406
5800.00	9.337	52432.	9.040	82.603	426664.	73.563
5900.00	9.344	53366.	9.045	82.763	434935.	73.718
6000.00	9.351	54300.	9.050	82.920	443219.	73.870

TABLE 109

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS DIATOMIC (P_2)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 61.94760 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.739	34.5	115.713	32.471	24.8	83.1792

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.960	694.97	6.950	44.277	3732.7	37.327
200.00	7.195	1398.9	6.995	49.149	8430.8	42.154
298.15	7.657	2127.9	7.137	52.107	13408.	44.970
300.00	7.665	2141.9	7.140	52.154	13504.	45.015
400.00	8.050	2928.9	7.322	54.415	18837.	47.093
500.00	8.311	3747.8	7.496	56.241	24373.	48.746
600.00	8.485	4587.8	7.646	57.773	30076.	50.127
700.00	8.604	5442.7	7.775	59.090	35920.	51.315
800.00	8.690	6307.7	7.885	60.245	41888.	52.360
900.00	8.752	7179.6	7.977	61.272	47965.	53.295
1000.00	8.800	8057.6	8.058	62.197	54139.	54.139
1100.00	8.836	8939.6	8.127	63.038	60402.	54.911
1200.00	8.868	9824.5	8.187	63.808	66745.	55.621
1300.00	8.893	10712.	8.240	64.519	73162.	56.278
1400.00	8.914	11603.	8.288	65.179	79647.	56.891
1500.00	8.933	12495.	8.330	65.794	86195.	57.463
1600.00	8.949	13389.	8.368	66.371	92804.	58.002
1700.00	8.963	14285.	8.403	66.914	99468.	58.511
1800.00	8.976	15182.	8.435	67.427	106186.	58.992
1900.00	8.987	16080.	8.463	67.913	112954.	59.449
2000.00	8.998	16979.	8.490	68.374	119768.	59.884
2100.00	9.008	17879.	8.514	68.813	126627.	60.299
2200.00	9.018	18781.	8.537	69.232	133528.	60.695
2300.00	9.026	19683.	8.558	69.633	140472.	61.075
2400.00	9.035	20586.	8.577	70.017	147456.	61.440
2500.00	9.043	21490.	8.596	70.386	154476.	61.791
2600.00	9.051	22395.	8.613	70.741	161533.	62.128
2700.00	9.058	23300.	8.630	71.082	168623.	62.453
2800.00	9.066	24206.	8.645	71.412	175749.	62.768
2900.00	9.073	25113.	8.660	71.730	182905.	63.071
3000.00	9.080	26021.	8.674	72.038	190094.	63.365
3100.00	9.087	26929.	8.687	72.336	197314.	63.650
3200.00	9.093	27838.	8.699	72.624	204560.	63.925
3300.00	9.100	28748.	8.711	72.904	211837.	64.193
3400.00	9.106	29658.	8.723	73.176	219142.	64.454
3500.00	9.113	30568.	8.734	73.440	226473.	64.706
3600.00	9.119	31480.	8.745	73.697	233830.	64.953
3700.00	9.125	32392.	8.755	73.947	241213.	65.193
3800.00	9.131	33305.	8.765	74.190	248618.	65.426
3900.00	9.137	34218.	8.774	74.427	256048.	65.653
4000.00	9.143	35132.	8.783	74.659	263505.	65.876
4100.00	9.149	36047.	8.792	74.885	270982.	66.093
4200.00	9.155	36962.	8.801	75.105	278480.	66.305
4300.00	9.161	37878.	8.809	75.321	286003.	66.512
4400.00	9.167	38794.	8.817	75.531	293543.	66.714
4500.00	9.173	39711.	8.825	75.737	301106.	66.913
4600.00	9.178	40629.	8.832	75.939	308691.	67.107
4700.00	9.184	41547.	8.840	76.137	316298.	67.297
4800.00	9.190	42466.	8.847	76.330	323919.	67.483
4900.00	9.196	43385.	8.854	76.520	331564.	67.666
5000.00	9.201	44305.	8.861	76.705	339221.	67.844
5100.00	9.207	45225.	8.868	76.888	346905.	68.021
5200.00	9.213	46146.	8.874	77.066	354598.	68.192
5300.00	9.218	47068.	8.881	77.242	362316.	68.361
5400.00	9.224	47990.	8.887	77.414	370047.	68.527
5500.00	9.229	48912.	8.893	77.584	377801.	68.691
5600.00	9.235	49836.	8.899	77.750	385565.	68.851
5700.00	9.241	50758.	8.905	77.914	393352.	69.009
5800.00	9.246	51683.	8.911	78.074	401146.	69.163
5900.00	9.252	52606.	8.917	78.232	408961.	69.315
6000.00	9.257	53533.	8.922	78.388	416795.	69.466

TABLE 110

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS TETRATOMIC (P_4)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 123.9852 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-6.742	14.08	47.224	27.604	5.85	19.6209

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	8.899	811.96	8.120	53.483	4536.4	45.364
200.00	13.293	1922.9	9.615	61.007	10278.	51.392
298.15	16.050	3377.8	11.329	66.890	16565.	55.559
300.00	16.087	3407.8	11.359	66.989	16689.	55.629
400.00	17.509	5094.7	12.737	71.833	23639.	59.097
500.00	18.280	6887.7	13.775	75.831	31028.	62.056
600.00	18.734	8740.6	14.568	79.208	38784.	64.640
700.00	19.021	10629.	15.185	82.119	46854.	66.934
800.00	19.213	12541.	15.677	84.672	55196.	68.995
900.00	19.347	14470.	16.078	86.943	63778.	70.865
1000.00	19.444	16410.	16.410	88.987	72576.	72.576
1100.00	19.517	18358.	16.689	90.843	81570.	74.154
1200.00	19.573	20313.	16.927	92.544	90740.	75.617
1300.00	19.616	22272.	17.132	94.112	100074.	76.980
1400.00	19.651	24236.	17.311	95.567	109558.	78.256
1500.00	19.679	26203.	17.468	96.924	119184.	79.456
1600.00	19.702	28172.	17.607	98.195	128941.	80.588
1700.00	19.721	30142.	17.731	99.390	138821.	81.659
1800.00	19.737	32115.	17.842	100.52	148817.	82.676
1900.00	19.751	34090.	17.942	101.59	158923.	83.644
2000.00	19.763	36065.	18.033	102.60	169133.	84.566
2100.00	19.773	38042.	18.115	103.56	179442.	85.449
2200.00	19.782	40020.	18.191	104.48	189844.	86.293
2300.00	19.789	41999.	18.260	105.36	200335.	87.102
2400.00	19.796	43978.	18.324	106.21	210916.	87.882
2500.00	19.802	45956.	18.383	107.01	221576.	88.631
2600.00	19.807	47939.	18.438	107.79	232317.	89.353
2700.00	19.812	49920.	18.489	108.54	243132.	90.049
2800.00	19.816	51900.	18.536	109.26	254023.	90.723
2900.00	19.820	53882.	18.580	109.95	264983.	91.373
3000.00	19.823	55864.	18.621	110.63	276012.	92.004
3100.00	19.826	57847.	18.660	111.28	287110.	92.616
3200.00	19.829	59830.	18.697	111.91	298267.	93.209
3300.00	19.831	61813.	18.731	112.52	309488.	93.784
3400.00	19.834	63796.	18.763	113.11	320769.	94.344
3500.00	19.836	65780.	18.794	113.68	332108.	94.888
3600.00	19.838	67764.	18.823	114.24	343505.	95.418
3700.00	19.840	69748.	18.851	114.79	354958.	95.935
3800.00	19.841	71731.	18.877	115.31	366463.	96.438
3900.00	19.843	73715.	18.901	115.83	378019.	96.928
4000.00	19.844	75700.	18.925	116.33	389629.	97.407
4100.00	19.846	77684.	18.947	116.82	401287.	97.875
4200.00	19.847	79669.	18.969	117.30	412992.	98.331
4300.00	19.848	81654.	18.989	117.77	424745.	98.778
4400.00	19.849	83639.	19.009	118.22	436543.	99.214
4500.00	19.850	85624.	19.027	118.67	448392.	99.643
4600.00	19.851	87609.	19.045	119.11	460279.	100.06
4700.00	19.852	89594.	19.062	119.53	472212.	100.47
4800.00	19.853	91578.	19.079	119.95	484186.	100.87
4900.00	19.853	93564.	19.095	120.36	496200.	101.27
5000.00	19.854	95549.	19.110	120.76	508256.	101.65
5100.00	19.855	97535.	19.125	121.15	520350.	102.03
5200.00	19.855	99520.	19.138	121.54	532488.	102.40
5300.00	19.856	101506.	19.152	121.92	544659.	102.77
5400.00	19.857	103492.	19.165	122.29	556868.	103.12
5500.00	19.857	105478.	19.178	122.65	569119.	103.48
5600.00	19.858	107464.	19.190	123.01	581403.	103.82
5700.00	19.858	109449.	19.201	123.36	593720.	104.16
5800.00	19.859	111434.	19.213	123.71	606077.	104.50
5900.00	19.859	113420.	19.224	124.05	618462.	104.82
6000.00	19.859	115406.	19.234	124.38	630884.	105.15

TABLE 111

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS SULFIDE DIMERIC (P_4S_3)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 220.0872 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-1.997	-12.942	-43.4099	14.111	-17.1499	-57.5210

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_N^0)$	$(H_T^0-H_N^0)/T$	S_T^0	$-(G_T^0-H_N^0)$	$-(G_T^0-H_N^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
298.15	36.998	0.	0.	76.276	22742.	76.276
300.00	36.998	67.997	0.227	76.505	22884.	76.279
400.00	36.998	3767.8	9.420	87.149	31092.	77.729
500.00	36.998	7467.6	14.935	95.404	40234.	80.469
600.00	36.998	11167.	18.612	102.15	50124.	83.537
700.00	36.998	14867.	21.239	107.85	60630.	86.615
800.00	36.998	18567.	23.209	112.79	71668.	89.586
900.00	36.998	22267.	24.741	117.15	83170.	92.411
1000.00	36.998	25967.	25.967	121.05	95083.	95.083
1100.00	36.998	29667.	26.970	124.58	107367.	97.606
1200.00	36.998	33366.	27.805	127.80	119988.	99.990
1300.00	36.998	37066.	28.512	130.76	132917.	102.24
1400.00	36.998	40766.	29.119	133.50	146132.	104.38
1500.00	36.998	44466.	29.644	136.05	159611.	106.41
1600.00	36.998	48166.	30.103	138.44	173337.	108.34
1700.00	36.998	51865.	30.509	140.68	187294.	110.17
1800.00	36.998	55565.	30.870	142.80	201469.	111.93
1900.00	36.998	59265.	31.192	144.80	215849.	113.60
2000.00	36.998	62965.	31.482	146.69	230424.	115.21
2100.00	36.998	66665.	31.745	148.50	245184.	116.75
2200.00	36.998	70364.	31.984	150.22	260123.	118.24
2300.00	36.998	74064.	32.202	151.87	275226.	119.66
2400.00	36.998	77764.	32.402	153.44	290493.	121.04
2500.00	36.998	81464.	32.586	154.95	305912.	122.36
2600.00	36.998	85164.	32.755	156.40	321482.	123.65
2700.00	36.998	88864.	32.912	157.80	337191.	124.89
2800.00	36.998	92563.	33.058	159.14	353040.	126.09
2900.00	36.998	96263.	33.194	160.44	369019.	127.25
3000.00	36.998	99963.	33.321	161.70	385125.	128.37
3100.00	36.998	103663.	33.440	162.91	401355.	129.47
3200.00	36.998	107363.	33.551	164.08	417706.	130.53
3300.00	36.998	111062.	33.655	165.22	434173.	131.57
3400.00	36.998	114762.	33.754	166.33	450748.	132.57
3500.00	36.998	118462.	33.846	167.40	467437.	133.55
3600.00	36.998	122162.	33.934	168.44	484228.	134.51
3700.00	36.998	125862.	34.017	169.46	501124.	135.44
3800.00	36.998	129562.	34.095	170.44	518120.	136.35
3900.00	36.998	133261.	34.170	171.40	535212.	137.23
4000.00	36.998	136961.	34.240	172.34	552396.	138.10
4100.00	36.998	140661.	34.308	173.25	569678.	138.95
4200.00	36.998	144361.	34.372	174.15	587049.	139.77
4300.00	36.998	148061.	34.435	175.02	604505.	140.58
4400.00	36.998	151760.	34.491	175.87	622051.	141.38
4500.00	36.998	155460.	34.547	176.70	639677.	142.15
4600.00	36.998	159160.	34.600	177.51	657387.	142.91
4700.00	36.998	162860.	34.651	178.31	675179.	143.66
4800.00	36.998	166560.	34.700	179.09	693049.	144.39
4900.00	36.998	170259.	34.747	179.85	710996.	145.10
5000.00	36.998	173959.	34.792	180.60	729021.	145.80
5100.00	36.998	177659.	34.835	181.33	747113.	146.49
5200.00	36.998	181359.	34.877	182.05	765285.	147.17
5300.00	36.998	185059.	34.917	182.75	783521.	147.83
5400.00	36.998	188759.	34.955	183.44	801833.	148.49
5500.00	36.998	192458.	34.992	184.12	820211.	149.13
5600.00	36.998	196158.	35.028	184.79	838659.	149.76
5700.00	36.998	199856.	35.063	185.44	857171.	150.38
5800.00	36.998	203558.	35.096	186.09	875745.	150.99
5900.00	36.998	207256.	35.128	186.72	894388.	151.59
6000.00	36.998	210957.	35.160	187.34	913086.	152.18

N=298.15 DEG K

TABLE 112

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS SULFIDE DIMERIC (P_4S_3)

LIQUID

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 220.0872 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG-MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG-MOL	ΔS_T^0 CAL/DEG-MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG-MOL
298.15	-5.003	-27.899	-93.575	-12.657	-31.673	-106.2321

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG-MOL	$(H_T^0-H_N^0)$ CAL/MOL	$(H_T^0-H_N^0)/T$ CAL/DEG-MOL	S_T^0 CAL/DEG-MOL	$-(G_T^0-H_N^0)$ CAL/MOL	$-(G_T^0-H_N^0)/T$ CAL/DEG-MOL
298.15	43.998	0.	0.	49.508	14761.	49.508
300.00	43.998	80.996	0.270	49.780	14853.	49.510
400.00	43.998	4480.8	11.202	62.437	20494.	51.235
500.00	43.998	8880.6	17.761	72.255	27247.	54.494
600.00	43.998	13280.	22.134	80.277	34886.	58.143
700.00	43.998	17680.	25.257	87.059	43261.	61.801
800.00	43.998	22080.	27.600	92.934	52268.	65.334
900.00	43.998	26480.	29.422	98.116	61825.	68.694
1000.00	43.998	30879.	30.879	102.75	71872.	71.872
1100.00	43.998	35279.	32.072	106.95	82361.	74.874
1200.00	43.998	39679.	33.066	110.77	93249.	77.708
1300.00	43.998	44079.	33.907	114.30	104505.	80.389
1400.00	43.998	48479.	34.628	117.56	116100.	82.929
1500.00	43.998	52878.	35.252	120.59	128008.	85.339
1600.00	43.998	57278.	35.799	123.43	140211.	87.632
1700.00	43.998	61678.	36.281	126.10	152690.	89.818
1800.00	43.998	66078.	36.710	128.61	165427.	91.904
1900.00	43.998	70477.	37.093	130.99	178406.	93.898
2000.00	43.998	74877.	37.439	133.25	191619.	95.810
2100.00	43.998	79277.	37.751	135.40	205053.	97.644
2200.00	43.998	83677.	38.035	137.44	218696.	99.407
2300.00	43.998	88077.	38.294	139.40	232539.	101.10
2400.00	43.998	92476.	38.532	141.27	246571.	102.74
2500.00	43.998	96876.	38.750	143.07	260791.	104.32
2600.00	43.998	101276.	38.952	144.79	275183.	105.84
2700.00	43.998	105676.	39.139	146.45	289747.	107.31
2800.00	43.998	110075.	39.313	148.05	304472.	108.74
2900.00	43.998	114475.	39.474	149.60	319355.	110.12
3000.00	43.998	118875.	39.625	151.09	334390.	111.46

N=298.15 DEG K

TABLE 113

MOLAR THERMODYNAMIC PROPERTIES FOR PHOSPHORUS SULFIDE DIMERIC (P_4S_3)

CRYSTAL

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 220.0872 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-3.997	-27.921	-93.648	-14.1677	-32.145	-107.8148

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
5.00	0.086	0.099	0.020	0.026	0.031	0.006
10.00	0.885	2.062	0.206	0.267	0.613	0.061
15.00	2.494	10.364	0.691	0.919	3.416	0.228
20.00	4.248	27.230	1.361	1.877	10.308	0.515
25.00	5.814	52.506	2.100	2.998	22.455	0.898
30.00	7.092	84.880	2.829	4.175	40.382	1.346
35.00	8.135	123.04	3.516	5.350	64.203	1.834
40.00	9.014	165.97	4.149	6.495	93.830	2.346
45.00	9.779	212.98	4.733	7.602	129.09	2.869
50.00	10.493	263.68	5.274	8.669	169.78	3.396
55.00	11.193	317.89	5.780	9.702	215.72	3.922
60.00	11.896	375.61	6.260	10.706	266.75	4.446
65.00	12.590	436.83	6.720	11.686	322.74	4.965
70.00	13.281	501.50	7.164	12.644	383.58	5.480
75.00	14.004	569.69	7.596	13.585	449.15	5.989
80.00	14.767	641.61	8.020	14.513	519.40	6.493
85.00	15.543	717.38	8.440	15.431	594.26	6.991
90.00	16.305	797.01	8.856	16.341	673.70	7.486
95.00	17.048	880.40	9.267	17.243	757.66	7.975
100.00	17.788	967.49	9.675	18.136	846.11	8.461
105.00	18.537	1058.3	10.079	19.022	939.01	8.943
110.00	19.297	1152.9	10.481	19.902	1036.3	9.421
115.00	20.062	1251.3	10.881	20.776	1138.0	9.896
120.00	20.825	1353.5	11.279	21.646	1244.1	10.367
125.00	21.580	1459.5	11.676	22.512	1354.5	10.836
130.00	22.322	1569.3	12.071	23.373	1469.2	11.301
135.00	23.047	1682.7	12.464	24.229	1588.2	11.764
140.00	23.753	1799.7	12.855	25.080	1711.5	12.225
145.00	24.439	1920.2	13.243	25.925	1839.0	12.683
150.00	25.100	2044.1	13.627	26.765	1970.7	13.138
155.00	25.739	2171.2	14.008	27.599	2106.6	13.591
160.00	26.356	2301.4	14.384	28.426	2246.7	14.042
165.00	26.953	2434.7	14.756	29.246	2390.9	14.490
170.00	27.535	2570.9	15.123	30.059	2539.1	14.936
175.00	28.104	2710.0	15.486	30.866	2691.4	15.380
180.00	28.661	2851.9	15.844	31.665	2847.8	15.821
185.00	29.207	2996.6	16.198	32.458	3008.1	16.260
190.00	29.739	3144.0	16.547	33.244	3172.3	16.697
195.00	30.257	3294.0	16.892	34.023	3340.5	17.131
200.00	30.758	3446.5	17.233	34.795	3512.6	17.563
205.00	31.241	3601.5	17.568	35.561	3688.5	17.992
210.00	31.706	3758.9	17.900	36.319	3868.2	18.420
215.00	32.153	3918.6	18.226	37.071	4051.6	18.845
220.00	32.582	4080.4	18.547	37.815	4238.9	19.268
225.00	32.996	4244.4	18.864	38.552	4429.8	19.688
230.00	33.396	4410.3	19.175	39.281	4624.4	20.106
235.00	33.784	4578.3	19.482	40.004	4822.6	20.522
240.00	34.164	4748.2	19.784	40.719	5024.4	20.935
245.00	34.536	4919.9	20.081	41.427	5229.8	21.346
250.00	34.904	5093.5	20.374	42.129	5436.6	21.755
255.00	35.269	5268.9	20.663	42.823	5651.0	22.161
260.00	35.635	5446.2	20.947	43.512	5866.9	22.565
265.00	36.003	5625.3	21.228	44.194	6086.1	22.967
270.00	36.374	5806.2	21.505	44.871	6308.8	23.366
273.15	36.611	5921.2	21.677	45.294	6450.8	23.616
275.00	36.751	5989.0	21.778	45.541	6534.8	23.763
280.00	37.136	6173.8	22.049	46.207	6764.2	24.158
285.00	37.528	6360.4	22.317	46.868	6996.9	24.550
290.00	37.929	6549.1	22.583	47.524	7232.9	24.941
295.00	38.340	6739.7	22.847	48.176	7472.1	25.329
298.15	38.603	6860.9	23.012	48.584	7624.5	25.573
300.00	38.760	6932.5	23.108	48.824	7714.6	25.715
310.00	39.626	7324.4	23.627	50.109	8209.3	26.482
313.90	39.973	7479.6	23.828	50.606	8405.7	26.778
			PHASE I			
313.90	43.634	9934.6	31.649	58.427	8405.7	26.778
320.00	43.387	10200.	31.875	59.264	8764.6	27.389
330.00	43.341	10633.	32.222	60.597	9363.9	28.375
340.00	43.611	11068.	32.552	61.895	9976.4	29.342
350.00	44.051	11506.	32.874	63.165	10602.	30.291

TABLE 114

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR (REF. ST.) (S)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 32.064 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	3.060	163.99	1.640	2.965	132.49	1.325
200.00	4.639	556.97	2.785	5.622	567.37	2.837
298.15	5.401	1052.9	3.531	7.631	1222.3	4.100
300.00	*5.412	1062.9	3.543	7.665	1236.4	4.121
400.00	7.734	2161.9	5.405	10.673	2107.5	5.269
500.00	9.081	3099.8	6.200	12.767	3283.8	6.568
600.00	8.200	3956.8	6.595	14.332	4642.6	7.738
700.00	7.799	4756.8	6.795	15.600	6163.4	8.805
800.00	4.368	18581.	23.226	31.361	6508.1	8.135
900.00	4.396	19019.	21.132	31.877	9670.6	10.745
1000.00	4.418	19460.	19.460	32.342	12882.	12.882
1100.00	4.435	19903.	18.094	32.763	16137.	14.670
1200.00	4.450	20347.	16.956	33.150	19433.	16.195
1300.00	4.461	20792.	15.994	33.507	22768.	17.514
1400.00	4.471	21239.	15.171	33.838	26135.	18.668
1500.00	4.480	21687.	14.458	34.146	29533.	19.688
1600.00	4.488	22135.	13.834	34.436	32963.	20.602
1700.00	4.495	22584.	13.285	34.708	36420.	21.424
1800.00	4.501	23034.	12.797	34.965	39904.	22.169
1900.00	4.507	23484.	12.360	35.209	43414.	22.849
2000.00	4.513	23935.	11.967	35.440	46948.	23.473
2100.00	4.518	24387.	11.613	35.660	50500.	24.047
2200.00	4.523	24839.	11.290	35.871	54078.	24.581
2300.00	4.528	25292.	10.996	36.072	57674.	25.076
2400.00	4.532	25745.	10.727	36.265	61292.	25.538
2500.00	4.537	26198.	10.479	36.450	64926.	25.971
2600.00	4.541	26652.	10.251	36.628	68582.	26.378
2700.00	4.545	27106.	10.039	36.799	72252.	26.760
2800.00	4.549	27561.	9.843	36.964	75939.	27.121
2900.00	4.553	28016.	9.661	37.124	79644.	27.464
3000.00	4.557	28472.	9.491	37.279	83366.	27.789
3100.00	4.561	28927.	9.331	37.428	87101.	28.097
3200.00	4.565	29384.	9.182	37.573	90850.	28.391
3300.00	4.568	29840.	9.042	37.713	94614.	28.671
3400.00	4.572	30296.	8.911	37.850	98394.	28.939
3500.00	4.575	30754.	8.787	37.982	102183.	29.195
3600.00	4.579	31211.	8.670	38.111	105988.	29.441
3700.00	4.583	31670.	8.560	38.237	109807.	29.678
3800.00	4.586	32128.	8.455	38.359	113636.	29.904
3900.00	4.590	32587.	8.356	38.478	117477.	30.122
4000.00	4.593	33046.	8.262	38.595	121334.	30.333
4100.00	4.596	33505.	8.172	38.708	125198.	30.536
4200.00	4.600	33965.	8.087	38.819	129075.	30.732
4300.00	4.603	34425.	8.006	38.927	132961.	30.921
4400.00	4.607	34886.	7.929	39.033	136859.	31.104
4500.00	4.610	35347.	7.855	39.137	140769.	31.282
4600.00	4.613	35808.	7.784	39.238	144687.	31.454
4700.00	4.617	36269.	7.717	39.337	148615.	31.620
4800.00	4.620	36731.	7.652	39.434	152552.	31.782
4900.00	4.624	37193.	7.590	39.530	156504.	31.940
5000.00	4.627	37656.	7.531	39.623	160459.	32.092
5100.00	4.630	38119.	7.474	39.715	164427.	32.241
5200.00	4.633	38582.	7.420	39.805	168404.	32.385
5300.00	4.637	39045.	7.367	39.893	172388.	32.526
5400.00	4.640	39509.	7.316	39.980	176383.	32.664
5500.00	4.643	39973.	7.268	40.065	180384.	32.797
5600.00	4.647	40438.	7.221	40.149	184396.	32.928
5700.00	4.650	40903.	7.176	40.231	188414.	33.055
5800.00	4.653	41368.	7.132	40.312	192442.	33.180
5900.00	4.656	41833.	7.090	40.391	196474.	33.301
6000.00	4.660	42299.	7.050	40.470	200521.	33.420

TABLE 115

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR MONATOMIC (S)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 32.064 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.256	66.636	223.4971	32.453	56.949	191.0069

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	5.103	498.98	4.990	34.125	2913.6	29.136
200.00	5.589	1035.9	5.180	37.829	6529.9	32.649
298.15	5.655	1590.9	5.336	40.084	10360.	34.747
300.00	5.658	1600.9	5.336	40.119	10435.	34.783
400.00	5.554	2162.9	5.407	41.734	14531.	36.327
500.00	5.436	2711.9	5.424	42.960	18768.	37.536
600.00	5.340	3249.8	5.416	43.942	23115.	38.525
700.00	5.266	3780.8	5.401	44.760	27551.	39.359
800.00	5.211	4303.8	5.380	45.459	32063.	40.079
900.00	5.169	4822.8	5.359	46.070	36640.	40.711
1000.00	5.137	5337.7	5.338	46.613	41275.	41.275
1100.00	5.112	5850.7	5.319	47.101	45960.	41.782
1200.00	5.093	6360.7	5.301	47.545	50693.	42.244
1300.00	5.079	6869.7	5.284	47.952	55467.	42.667
1400.00	5.070	7376.6	5.269	48.329	60283.	43.060
1500.00	5.064	7883.6	5.256	48.678	65133.	43.422
1600.00	5.062	8389.6	5.243	49.005	70018.	43.761
1700.00	5.063	8895.6	5.233	49.312	74934.	44.079
1800.00	5.068	9402.5	5.224	49.601	79878.	44.377
1900.00	5.075	9909.5	5.216	49.875	84852.	44.659
2000.00	5.085	10417.	5.209	50.135	89854.	44.927
2100.00	5.097	10926.	5.203	50.383	94879.	45.180
2200.00	5.112	11436.	5.198	50.621	99931.	45.423
2300.00	5.127	11948.	5.195	50.848	105003.	45.653
2400.00	5.144	12462.	5.193	51.067	110099.	45.875
2500.00	5.162	12977.	5.191	51.277	115216.	46.086
2600.00	5.181	13494.	5.190	51.480	120355.	46.290
2700.00	5.200	14013.	5.190	51.676	125513.	46.486
2800.00	5.219	14534.	5.191	51.866	130692.	46.676
2900.00	5.239	15057.	5.192	52.049	135886.	46.857
3000.00	5.258	15582.	5.194	52.227	141100.	47.033
3100.00	5.277	16109.	5.197	52.400	146332.	47.204
3200.00	5.295	16638.	5.199	52.568	151581.	47.369
3300.00	5.313	17168.	5.202	52.731	156845.	47.529
3400.00	5.331	17700.	5.206	52.890	162127.	47.684
3500.00	5.347	18234.	5.210	53.044	167421.	47.835
3600.00	5.363	18770.	5.214	53.195	172733.	47.981
3700.00	5.378	19307.	5.218	53.342	178060.	48.124
3800.00	5.392	19845.	5.222	53.486	183403.	48.264
3900.00	5.406	20385.	5.227	53.626	188758.	48.399
4000.00	5.419	20926.	5.231	53.763	194127.	48.532
4100.00	5.430	21469.	5.236	53.897	199510.	48.661
4200.00	5.441	22012.	5.241	54.028	204907.	48.787
4300.00	5.451	22557.	5.246	54.156	210315.	48.911
4400.00	5.461	23103.	5.251	54.282	215739.	49.032
4500.00	5.470	23649.	5.255	54.405	221175.	49.150
4600.00	5.477	24197.	5.260	54.525	226619.	49.265
4700.00	5.485	24745.	5.265	54.643	232079.	49.378
4800.00	5.491	25293.	5.269	54.758	237547.	49.489
4900.00	5.497	25843.	5.274	54.872	243031.	49.598
5000.00	5.502	26393.	5.279	54.983	248524.	49.705
5100.00	5.507	26943.	5.283	55.092	254028.	49.809
5200.00	5.511	27494.	5.287	55.199	259542.	49.912
5300.00	5.515	28046.	5.292	55.304	265067.	50.013
5400.00	5.518	28597.	5.296	55.407	270602.	50.112
5500.00	5.521	29149.	5.300	55.508	276147.	50.208
5600.00	5.523	29701.	5.304	55.608	281706.	50.305
5700.00	5.525	30253.	5.308	55.705	287266.	50.398
5800.00	5.526	30805.	5.311	55.802	292847.	50.491
5900.00	5.528	31358.	5.315	55.896	298429.	50.581
6000.00	5.529	31911.	5.319	55.989	304024.	50.671

TABLE 116

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR MONATOMIC (S)

LIQUID

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 32.064 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	2.178	0.34	1.1403	0.813	0.093	0.3109

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
298.15	7.579	0.	0.	8.444	2517.6	8.444
300.00	7.579	13.999	0.047	8.491	2533.2	8.444
400.00	7.734	772.96	1.932	10.673	3496.4	8.741
500.00	9.081	1710.9	3.422	12.767	4672.8	9.346
600.00	8.200	2567.9	4.280	14.332	6031.5	10.052
700.00	7.799	3367.8	4.811	15.600	7552.3	10.789
800.00	7.694	4141.8	5.177	16.633	9164.7	11.456
900.00	7.694	4909.8	5.455	17.539	10875.	12.084
1000.00	7.694	5679.7	5.680	18.349	12669.	12.669
1100.00	7.694	6448.7	5.862	19.083	14543.	13.221
1200.00	7.694	7217.6	6.015	19.752	16485.	13.737
1300.00	7.694	7987.6	6.144	20.368	18491.	14.224
1400.00	7.694	8756.6	6.255	20.938	20557.	14.683
1500.00	7.694	9526.5	6.351	21.469	22677.	15.118
1600.00	7.694	10295.	6.435	21.965	24848.	15.530
1700.00	7.694	11064.	6.508	22.432	27070.	15.923
1800.00	7.694	11834.	6.575	22.872	29335.	16.297
1900.00	7.694	12603.	6.633	23.288	31644.	16.654
2000.00	7.694	13373.	6.687	23.682	33990.	16.995

TABLE 117

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR MONATOMIC (S)

CRYSTAL

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 32.064 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	KCAL/MOL	CAL/DEG-MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL	CAL/DEG-MOL	CAL/MOL	CAL/DEG-MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	3.060	163.99	1.640	2.965	132.49	1.325
200.00	4.639	583.97	2.920	5.622	540.37	2.702
298.15	5.401	1052.9	3.531	7.631	1222.3	4.100
300.00	5.412	1062.9	3.543	7.665	1236.4	4.121
400.00	6.133	1732.9	4.332	9.571	2095.3	5.238
500.00	6.819	2379.9	4.760	11.012	3126.3	6.253
600.00	7.504	3096.8	5.161	12.316	4293.0	7.155
700.00	8.190	3880.8	5.544	13.524	5586.2	7.980
800.00	8.876	4734.8	5.918	14.663	6995.9	8.745
900.00	9.561	5655.7	6.284	15.748	8517.7	9.464
1000.00	10.246	6646.7	6.647	16.791	10144.	10.144
1100.00	10.932	7705.6	7.005	17.799	11873.	10.794
1200.00	11.618	8832.6	7.360	18.780	13704.	11.420
1300.00	12.303	10029.	7.715	19.737	15629.	12.022
1400.00	12.989	11293.	8.067	20.674	17650.	12.607
1500.00	13.675	12627.	8.418	21.594	19764.	13.176
1600.00	14.360	14028.	8.768	22.498	21968.	13.730
1700.00	15.046	15499.	9.117	23.389	24262.	14.272
1800.00	15.732	17038.	9.466	24.269	26646.	14.803
1900.00	16.417	18645.	9.813	25.138	29117.	15.325
2000.00	17.103	20322.	10.161	25.997	31671.	15.836

TABLE 118

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR DIATOMIC (S_2)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 64.128 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T DEG K	ΔC_P^0 CAL/DEG MOL	ΔH_T^0 KCAL/MOL	$\Delta H_T^0/T$ CAL/DEG MOL	ΔS_T^0 CAL/DEG MOL	ΔG_T^0 KCAL/MOL	$\Delta G_T^0/T$ CAL/DEG MOL
298.15	-3.043	30.68	102.9007	39.245	18.90	63.906

STANDARD THERMODYNAMIC FUNCTIONS

T DEG K	C_P^0 CAL/DEG MOL	$(H_T^0-H_0^0)$ CAL/MOL	$(H_T^0-H_0^0)/T$ CAL/DEG MOL	S_T^0 CAL/DEG MOL	$-(G_T^0-H_0^0)$ CAL/MOL	$-(G_T^0-H_0^0)/T$ CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	6.964	695.97	6.960	46.621	3966.1	39.661
200.00	7.265	1402.9	7.015	51.512	8899.6	44.498
298.15	7.759	2140.9	7.181	54.507	14110.	47.325
300.00	7.768	2154.9	7.183	54.555	14212.	47.372
400.00	8.144	2951.9	7.380	56.845	19786.	49.466
500.00	8.389	3779.8	7.560	58.690	25565.	51.130
600.00	8.549	4626.8	7.711	60.235	31514.	52.524
700.00	8.658	5487.7	7.840	61.561	37605.	53.721
800.00	8.735	6357.7	7.947	62.723	43821.	54.776
900.00	8.792	7233.6	8.037	63.755	50146.	55.717
1000.00	8.836	8115.6	8.116	64.684	56568.	56.568
1100.00	8.870	9000.5	8.182	65.528	63080.	57.345
1200.00	8.899	9889.5	8.241	66.301	69671.	58.059
1300.00	8.922	10780.	8.293	67.014	76337.	58.721
1400.00	8.942	11673.	8.338	67.676	83072.	59.337
1500.00	8.960	12568.	8.379	68.293	89871.	59.914
1600.00	8.976	13465.	8.416	68.872	96729.	60.456
1700.00	8.990	14363.	8.449	69.417	103645.	60.968
1800.00	9.002	15263.	8.480	69.931	110612.	61.451
1900.00	9.014	16164.	8.507	70.417	117629.	61.910
2000.00	9.025	17066.	8.533	70.880	124695.	62.347
2100.00	9.036	17969.	8.557	71.320	131804.	62.764
2200.00	9.046	18873.	8.579	71.741	138958.	63.163
2300.00	9.055	19778.	8.599	72.143	146152.	63.544
2400.00	9.064	20684.	8.618	72.529	153387.	63.911
2500.00	9.073	21591.	8.636	72.899	160657.	64.263
2600.00	9.081	22498.	8.653	73.255	167966.	64.602
2700.00	9.090	23407.	8.669	73.598	175309.	64.929
2800.00	9.098	24316.	8.684	73.928	182683.	65.244
2900.00	9.106	25226.	8.699	74.248	190094.	65.550
3000.00	9.113	26137.	8.712	74.557	197535.	65.845
3100.00	9.121	27049.	8.725	74.856	205006.	66.131
3200.00	9.129	27962.	8.738	75.145	212503.	66.407
3300.00	9.136	28875.	8.750	75.426	220032.	66.676
3400.00	9.143	29789.	8.761	75.699	227589.	66.938
3500.00	9.150	30702.	8.772	75.964	235172.	67.192
3600.00	9.158	31618.	8.783	76.222	242781.	67.439
3700.00	9.165	32534.	8.793	76.473	250416.	67.680
3800.00	9.172	33451.	8.803	76.718	258078.	67.915
3900.00	9.179	34368.	8.812	76.956	265761.	68.144
4000.00	9.186	35287.	8.822	77.189	273469.	68.367
4100.00	9.192	36205.	8.831	77.415	281197.	68.585
4200.00	9.199	37125.	8.839	77.637	288951.	68.798
4300.00	9.206	38045.	8.848	77.854	296728.	69.006
4400.00	9.213	38966.	8.856	78.065	304520.	69.209
4500.00	9.220	39888.	8.864	78.272	312336.	69.408
4600.00	9.226	40810.	8.872	78.475	320175.	69.603
4700.00	9.233	41733.	8.879	78.674	328035.	69.795
4800.00	9.240	42657.	8.887	78.868	335910.	69.981
4900.00	9.247	43581.	8.894	79.059	343808.	70.165
5000.00	9.253	44506.	8.901	79.246	351724.	70.345
5100.00	9.260	45432.	8.908	79.429	359656.	70.521
5200.00	9.266	46358.	8.915	79.609	367609.	70.694
5300.00	9.273	47285.	8.922	79.785	375576.	70.863
5400.00	9.280	48213.	8.928	79.959	383566.	71.031
5500.00	9.286	49141.	8.935	80.129	391569.	71.194
5600.00	9.293	50069.	8.941	80.296	399588.	71.355
5700.00	9.299	50999.	8.947	80.461	407628.	71.514
5800.00	9.306	51929.	8.953	80.623	415684.	71.670
5900.00	9.312	52860.	8.959	80.782	423753.	71.823
6000.00	9.319	53791.	8.965	80.938	431836.	71.973

TABLE 119

MOLAR THERMODYNAMIC PROPERTIES FOR SULFUR OCTATOMIC (S_8)

IDEAL GAS

T DEG K=273.15+T DEG C 1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 256.512 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_p^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	-5.912	24.45	82.0053	41.775	11.87	39.8119

STANDARD THERMODYNAMIC FUNCTIONS

T	C_p^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	20.830	1344.6	13.446	70.610	5716.5	57.165
200.00	32.065	4049.4	20.247	88.905	13732.	68.659
298.15	37.295	7486.5	25.110	102.82	23169.	77.709
300.00	37.359	7555.5	25.185	103.05	23359.	77.864
400.00	39.839	11430.	28.575	114.18	34241.	85.604
500.00	41.135	15485.	30.970	123.22	46126.	92.252
600.00	41.885	19639.	32.732	130.79	58837.	98.061
700.00	42.353	23853.	34.075	137.29	72249.	103.21
800.00	42.663	28104.	35.130	142.96	86267.	107.83
900.00	42.879	32382.	35.980	148.00	100820.	112.02
1000.00	43.036	36678.	36.678	152.53	115851.	115.85
1100.00	43.152	40988.	37.262	156.64	131312.	119.37
1200.00	43.241	45308.	37.757	160.40	147166.	122.64
1300.00	43.311	49636.	38.181	163.86	163381.	125.68
1400.00	43.366	53970.	38.550	167.07	179930.	128.52
1500.00	43.411	58309.	38.872	170.06	196788.	131.19
1600.00	43.448	62652.	39.157	172.87	213936.	133.71
1700.00	43.479	66998.	39.411	175.50	231356.	136.09
1800.00	43.504	71347.	39.637	177.99	249032.	138.35
1900.00	43.526	75699.	39.841	180.34	266949.	140.50
2000.00	43.545	80052.	40.026	182.57	285096.	142.55
2100.00	43.561	84408.	40.194	184.70	303461.	144.51
2200.00	43.575	88764.	40.347	186.73	322033.	146.38
2300.00	43.587	93122.	40.488	188.66	340803.	148.18
2400.00	43.597	97482.	40.617	190.52	359763.	149.90
2500.00	43.607	101842.	40.737	192.30	378904.	151.56
2600.00	43.615	106203.	40.847	194.01	398220.	153.16
2700.00	43.622	110565.	40.950	195.65	417704.	154.71
2800.00	43.629	114927.	41.045	197.24	437349.	156.20
2900.00	43.635	119291.	41.135	198.77	457150.	157.64
3000.00	43.640	123654.	41.218	200.25	477102.	159.03
3100.00	43.645	128019.	41.296	201.68	497199.	160.39
3200.00	43.650	132383.	41.370	203.07	517437.	161.70
3300.00	43.654	136749.	41.439	204.41	537811.	162.97
3400.00	43.658	141114.	41.504	205.72	558318.	164.21
3500.00	43.661	145480.	41.566	206.98	578953.	165.42
3600.00	43.664	149846.	41.624	208.21	599713.	166.59
3700.00	43.667	154213.	41.679	209.41	620594.	167.73
3800.00	43.669	158580.	41.731	210.57	641593.	168.84
3900.00	43.672	162947.	41.781	211.71	662707.	169.92
4000.00	43.674	167314.	41.829	212.81	683934.	170.98
4100.00	43.676	171682.	41.874	213.89	705269.	172.02
4200.00	43.678	176049.	41.917	214.94	726711.	173.03
4300.00	43.680	180417.	41.957	215.97	748257.	174.01
4400.00	43.682	184785.	41.997	216.97	769904.	174.98
4500.00	43.683	189154.	42.034	217.96	791651.	175.92
4600.00	43.685	193522.	42.070	218.92	813495.	176.85
4700.00	43.686	197891.	42.104	219.86	835433.	177.75
4800.00	43.687	202259.	42.137	220.78	857465.	178.64
4900.00	43.689	206628.	42.169	221.68	879588.	179.51
5000.00	43.690	210997.	42.199	222.56	901800.	180.36
5100.00	43.691	215366.	42.229	223.42	924099.	181.20
5200.00	43.692	219735.	42.257	224.27	946484.	182.02
5300.00	43.693	224104.	42.284	225.11	968953.	182.82
5400.00	43.694	228474.	42.310	225.92	991505.	183.61
5500.00	43.695	232843.	42.335	226.72	1014137.	184.39
5600.00	43.695	237213.	42.359	227.51	1036849.	185.15
5700.00	43.696	241582.	42.383	228.28	1059639.	185.90
5800.00	43.697	245952.	42.405	229.04	1082506.	186.64
5900.00	43.698	250321.	42.427	229.79	1105447.	187.36
6000.00	43.698	254691.	42.449	230.53	1128463.	188.08

TABLE 120

MOLAR THERMODYNAMIC PROPERTIES FOR ELECTRON GAS (E^-)

IDEAL GAS

T DEG K=273.15+T DEG C

1 CAL=4.1840 JOULES

GRAM MOLECULAR WT.= 0.00055 GRAMS

STANDARD THERMODYNAMIC CHANGES ON FORMATION FROM THE ELEMENTS

T	ΔC_P^0	ΔH_T^0	$\Delta H_T^0/T$	ΔS_T^0	ΔG_T^0	$\Delta G_T^0/T$
DEG K	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL	CAL/DEG MOL	KCAL/MOL	CAL/DEG MOL
298.15	0.000	0.000	0.000	0.000	0.000	0.000

STANDARD THERMODYNAMIC FUNCTIONS

T	C_P^0	$(H_T^0-H_0^0)$	$(H_T^0-H_0^0)/T$	S_T^0	$-(G_T^0-H_0^0)$	$-(G_T^0-H_0^0)/T$
DEG K	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL	CAL/DEG MOL	CAL/MOL	CAL/DEG MOL
0.00	0.000	0.000	0.000	0.000	0.000	0.000
100.00	4.968	496.79	4.968	-0.439	-540.702	-5.407
200.00	4.968	993.58	4.968	3.004	-392.706	-1.964
298.15	4.968	1481.2	4.968	4.988	5.978	0.020
300.00	4.968	1490.4	4.968	5.019	15.234	0.051
400.00	4.968	1987.2	4.968	6.448	591.98	1.480
500.00	4.968	2483.9	4.968	7.556	1294.3	2.589
600.00	4.968	2980.7	4.968	8.462	2096.6	3.494
700.00	4.968	3477.5	4.968	9.228	2982.0	4.260
800.00	4.968	3974.3	4.968	9.891	3938.8	4.923
900.00	4.968	4471.1	4.968	10.476	4957.7	5.509
1000.00	4.968	4967.9	4.968	11.000	6032.0	6.032
1100.00	4.968	5464.7	4.968	11.473	7156.0	6.505
1200.00	4.968	5961.5	4.968	11.906	8325.3	6.938
1300.00	4.968	6458.3	4.968	12.303	9536.0	7.335
1400.00	4.968	6955.1	4.968	12.671	10785.	7.704
1500.00	4.968	7451.8	4.968	13.014	12069.	8.046
1600.00	4.968	7948.6	4.968	13.335	13387.	8.367
1700.00	4.968	8445.4	4.968	13.636	14736.	8.668
1800.00	4.968	8942.2	4.968	13.920	16114.	8.952
1900.00	4.968	9439.0	4.968	14.189	17519.	9.221
2000.00	4.968	9935.8	4.968	14.443	18951.	9.475
2100.00	4.968	10433.	4.968	14.686	20408.	9.718
2200.00	4.968	10929.	4.968	14.917	21888.	9.949
2300.00	4.968	11426.	4.968	15.138	23391.	10.170
2400.00	4.968	11923.	4.968	15.349	24915.	10.381
2500.00	4.968	12420.	4.968	15.552	26460.	10.584
2600.00	4.968	12917.	4.968	15.747	28025.	10.779
2700.00	4.968	13413.	4.968	15.934	29609.	10.966
2800.00	4.968	13910.	4.968	16.115	31212.	11.147
2900.00	4.968	14407.	4.968	16.289	32832.	11.321
3000.00	4.968	14904.	4.968	16.458	34469.	11.490
3100.00	4.968	15400.	4.968	16.621	36123.	11.653
3200.00	4.968	15897.	4.968	16.778	37793.	11.810
3300.00	4.968	16394.	4.968	16.931	39479.	11.963
3400.00	4.968	16891.	4.968	17.079	41179.	12.112
3500.00	4.968	17388.	4.968	17.223	42895.	12.256
3600.00	4.968	17884.	4.968	17.363	44624.	12.396
3700.00	4.968	18381.	4.968	17.500	46367.	12.532
3800.00	4.968	18878.	4.968	17.632	48124.	12.664
3900.00	4.968	19375.	4.968	17.761	49893.	12.793
4000.00	4.968	19872.	4.968	17.887	51676.	12.919
4100.00	4.968	20368.	4.968	18.010	53471.	13.042
4200.00	4.968	20865.	4.968	18.129	55278.	13.161
4300.00	4.968	21362.	4.968	18.246	57096.	13.278
4400.00	4.968	21859.	4.968	18.360	58927.	13.392
4500.00	4.968	22356.	4.968	18.472	60768.	13.504
4600.00	4.968	22852.	4.968	18.581	62621.	13.613
4700.00	4.968	23349.	4.968	18.688	64485.	13.720
4800.00	4.968	23846.	4.968	18.793	66359.	13.825
4900.00	4.968	24343.	4.968	18.895	68243.	13.927
5000.00	4.968	24839.	4.968	18.995	70138.	14.028
5100.00	4.968	25336.	4.968	19.094	72042.	14.126
5200.00	4.968	25833.	4.968	19.190	73956.	14.222
5300.00	4.968	26330.	4.968	19.285	75880.	14.317
5400.00	4.968	26827.	4.968	19.378	77813.	14.410
5500.00	4.968	27323.	4.968	19.469	79756.	14.501
5600.00	4.968	27820.	4.968	19.558	81707.	14.591
5700.00	4.968	28317.	4.968	19.646	83667.	14.678
5800.00	4.968	28814.	4.968	19.733	85636.	14.765
5900.00	4.968	29311.	4.968	19.818	87614.	14.850
6000.00	4.968	29807.	4.968	19.901	89600.	14.933