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THERMODYNAMICS OF THE GASEOUS HYDROXIDES

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THERMODYNAMICS OF THE GASEOUS HYDROXIDES

Abstract

Both the bond energies and the free energies of formation of the unknown gaseous mono- and dihydroxides have been estimated. By using such experimental hydroxide bond energies as are available in the literature, we developed a correlation scheme for estimating the bond energies of the unknown hydroxides by analogy with the bond energies of the corresponding mono- and dihalides, which are much better known. Estimated molecular constants were used to compute the thermodynamic functions of the unknown hydroxides between 298 and 3000°K. Then the thermodynamic functions were used to calculate the free energies of formation of the unknown hydroxides. Next, the

free energies of formation were used to calculate the partial pressures of the unknown hydroxides in equilibrium with their condensed-oxide or -element phases. (These calculations were based on 1 atm each of oxygen and water and were done at intervals of 500°K between 500 and 2500°K.) The resulting volatilities are useful in predicting whether the unknown mono- and dihydroxides are likely to be important in reactions between the corresponding condensed oxides and water vapor. A tabulation of both the known and the estimated thermodynamic properties of the gaseous mono- and dihydroxides is included at the end of this report.

Introduction

If peaceful nuclear explosions are to be used effectively, it is essential for us to understand and accurately predict the significant chemical reactions that occur in such explosions. Most of these reactions involve water and oxygen, and knowledge of them is necessary before we can improve our understanding of how the elements are distributed between their vapor and condensed phases and how this distribution is affected by temperature and pressure.

Earth materials exist mainly as oxides and are usually associated both chemi-

cally and physically with considerable amounts of water. When water vapor is present at high temperatures, many elements form stable gaseous hydroxides. Since such reactions may have a profound effect on the disposition of the fission products and emplacement materials around a nuclear explosive, it is important to have a means of evaluating them. Equilibrium thermodynamics is useful for predicting the reactions of earth materials even under the extreme conditions that exist in nuclear explosions.

In order to improve our understanding of and our ability to predict the chemical reactions that occur in the presence of water, it would be desirable to have a tabulation of the thermodynamic properties of the gaseous mono- and dihydroxides at high temperatures. No such tabulation exists, although there is a considerable and growing literature on the subject. (Many of the reported studies are discussed by Elliott¹ and by Glemser and Wendlandt.²) Thus, the purpose of our work was 1) to collect from the recent literature certain thermodynamic data on the known gaseous mono- and dihydroxides, 2) to estimate similar data for the unknown gaseous mono- and dihydroxides, and 3) to use the resulting body of information to calculate the volatilities of the corresponding condensed oxides in the presence of water vapor.

It is likely that there are many hydroxides that have not been observed experimentally, whether for lack of experimental work or because of low concentrations. Other hydroxides are known to exist, but quantitative thermodynamic data have not been obtained.

For still other hydroxides, thermodynamic data have been obtained, but they are either inaccurate or they cover a limited range of temperatures. We felt that the thermodynamic properties of the unknown gaseous mono- and dihydroxides could be estimated with enough accuracy to indicate which of the hydroxides are stable enough to be significant and which are likely to be experimentally observable with present instruments and techniques.

Several authors have suggested that in many ways the gaseous mono- and dihydroxides can be regarded as analogous to the gaseous mono- and dihalides, whose properties are much better known.³⁻⁵ Although the M-OH bond energy is not expected to be the same as the M-X bond energy, it is thought that the bond energies of corresponding hydroxides and halides can be correlated. A scheme similar to this has been used by O'Brien et al.⁶

It should be noted that by themselves the mono- and dihydroxides may not be adequate for explaining or predicting the volatilities of many materials. A number of materials are known in which either other hydroxides or oxyhydroxides predominate.

Calculational Procedures

The method we used to estimate the thermodynamic properties of the unknown gaseous mono- and dihydroxides consisted of the following steps. First, we estimated the M-OH bond energies at 298°K in the reactions

and

Both the estimated and the known bond energies are listed in Tables 1 and 2 and are plotted in Figs. 1 and 2.*

*The tables referred to in this report are contained in Appendix A, which starts on p. 12, and the figures are contained in Appendix B, which starts on p. 133.

Tables 1 and 2 also list the bond energies of the gaseous mono- and dihalides for comparison with the bond energies of the corresponding hydroxides. The halide bond energies were collected from many sources, particularly JANAF,⁷ Hildenbrand,⁸ Feber,⁹ and Kent et al.¹⁰ The resulting compilation was not complete, so many of the halide values in Tables 1 and 2 are also estimates.

In addition, the experimental data on the gaseous hydroxides of the heavy elements turned out to be especially scanty. Thus, the bond energies of these hydroxides were generally assumed to be approximately equal to the bond energies of the corresponding chlorides. In estimating the trend with position in the periodic table, we found the fluoride data to be the most valuable, partly because these data are more abundant than the data on the other halides.

The next step in estimating the free energies of formation of the unknown gaseous mono- and dihydroxides was to derive free-energy functions between 298 and 3000°K. Since the thermodynamic functions of the gaseous elements are fairly well known, it was possible to calculate the free energies of formation by means of the expressions

$$\begin{aligned} \Delta G_{f,T,MOH(g)}^{\circ} &= \Delta G_{f,T,M(g)}^{\circ} \\ &+ \Delta G_{f,T,OH(g)}^{\circ} - \Delta H_{298}^{\circ} \\ &- T\Delta \left(\frac{G_T^{\circ} - H_{298}}{T} \right) \end{aligned} \quad (3)$$

and

$$\Delta G_{f,T,M(OH)_2(g)}^{\circ} = \Delta G_{f,T,M(g)}^{\circ}$$

$$\begin{aligned} &+ 2\Delta G_{f,T,OH(g)}^{\circ} - \Delta H_{298}^{\circ} \\ &- T\Delta \left(\frac{G_T^{\circ} - H_{298}}{T} \right). \end{aligned} \quad (4)$$

Both the estimated and the known free energies of formation are listed in Tables 3 and 4. The thermodynamic functions for OH(g) were taken from the JANAF tabulation.⁷ The free energies of formation and free-energy functions for M(g) were either taken from standard sources or estimated by extrapolation and interpolation.

Free energies of formation have not been measured for many of the gaseous actinides. However, by comparing the free energies of formation of the actinide and lanthanide pairs thorium-cerium, uranium-neodymium, and plutonium-samarium as a function of temperature, we observed that the difference in the free energies of formation did not differ greatly from one pair to the next and that the average difference decreased regularly between 298 and 3000°K. Thus, the average difference was used to estimate the free energies of formation of the actinides through americium and of the lanthanide promethium. The actinides having atomic numbers of 97 through 104 were estimated to have free energies of formation equal to those of the corresponding lanthanides and hafnium. All of the elements through atomic number 104 were included in the calculations except for the inert gases and, in the case of the dihydroxides, the alkali metals and halides.

The method we used to estimate the remaining thermodynamic properties of the unknown gaseous mono- and dihydrox-

ides consisted of estimating molecular constants for a rigid-rotator, harmonic-oscillator model and calculating the translational, rotational, vibrational, and electronic contributions (see Tables 3 and 4). Most of the estimated constants are actually values that have been measured for the corresponding fluorides. Few such measurements have been made for the hydroxides.

The translational contributions were, as usual, calculated with the Sackur-Tetrode equation.

For the rotational contributions, we assumed that the O-H internuclear distances were $0.96 \text{ \AA}$ (as they are in HOH) and that the M-O internuclear distances were the same as the M-F internuclear distances in the corresponding fluorides. Those distances that were not available in the literature were estimated by extrapolation and interpolation. At present, there is no entirely satisfactory means of determining the M-O-H and O-M-O bond angles in the gaseous mono- and dihydroxides, although there is evidence that NaOH, KOH, RbOH, and CsOH are linear.^{11,12} Calculations performed between 110 and 180 deg show that the rotational contribution is relatively insensitive to the bond angle except near 180 deg. Thus, the angle chosen to represent the nonlinear case is not critical, and we arbitrarily selected 120 deg. We then used Walsh's correlations^{13,14} to estimate whether the various hydroxides were linear or nonlinear. The dihydroxides were assumed to be electronically equivalent to the corresponding difluorides so that the correlation for AB_2 molecules would be valid. In addition, the hydrogen atoms in the dihydrox-

ides were assumed to be on opposite sides of the O-M-O plane and at 60-deg angles to the O-H plane. From these assumptions, either the moment of inertia or the product of the moments was calculated for each hydroxide.¹⁵ This allowed the rotational contribution to be readily calculated.

For the vibrational contributions in the monohydroxides, we assumed that the O-H stretching frequencies were 3700 cm^{-1} (as they are in HOH) and that the M-O stretching frequencies were the same as the M-F stretching frequencies in the corresponding monofluorides. Those frequencies that were not available in the literature were calculated from the internuclear distances, using Badger's rule.¹⁶ (The constants we used in applying this rule are listed in Table 5.) To estimate the M-O-H bending frequencies in the linear monohydroxides, we assumed that the ratio of the bending-force constant to the stretching-force constant was 0.122, which is the average ratio found in the alkali monohydroxides by Acquista and Abramowitz.¹¹ To estimate the M-O-H bending frequencies in the nonlinear monohydroxides, we assumed that the ratio of the bending-force constant to the stretching-force constant was 0.162, which is the ratio found in FOH by Noble and Pimentel.¹⁷

For the vibrational contributions in the dihydroxides, we assumed that, like the monohydroxides, the O-H stretching frequencies were 3700 cm^{-1} . The M-O stretching frequencies in the dihydroxides were calculated from the M-F stretching frequencies in the corresponding monofluorides by means of the valence-force-field approximation.¹⁹ To estimate the

O-M-C bending frequencies in the dihydroxides, we assumed that the ratio of the bending-force constant to the stretching-force constant was 0.005 in the linear dihydroxides and 0.033 in the nonlinear dihydroxides. These are the ratios found in the dihalides by Brewer et al.¹⁸ In addition, the torsional modes in the dihydroxides were estimated to be equivalent to the O-M-O bending modes, with both modes adding up to three in each case.

The electronic contributions in both the mono- and the dihydroxides were assumed to be the same as those of the ground states of the corresponding M^{+1} and M^{+2} ions. These ground states are fairly well known.¹⁸ The electronic configurations were either taken from Moore²⁰ and Wybourne²¹ or estimated from other elements in the same group.

Because of the importance of the thermodynamic functions of HOH, the values assigned to these functions in Table 3 are JANAF values,⁷ which include anharmonic contributions and thus are more precise than the values calculated with our rigid-rotator, harmonic-oscillator model. The model values of ΔG_f° differ from the JANAF values by 25 cal at 298°K and by 344 cal at 3000°K.

Besides estimating the free energies of formation of the unknown gaseous mono- and dihydroxides, we also estimated the free energies of formation of various other unknown gaseous hydroxides (see Table 6). In making the additional estimates, we used the relevant JANAF data⁷ without change. However, some of the data in the other literature have not been critically evaluated, so we used them only as a basis for extrapolation.

In making the extrapolations, we usually assumed that ΔH_f° and ΔS_f° were constant. Where the extrapolations covered a range of more than 250°K, the resulting free energies of formation are indicated in Table 6 by parentheses. In calculating the free energies of formation of $Rb_2(OH)_2$, we used data not only from Ref. 4 but also from Ref. 7 (for NaOH(g) and $Na_2(OH)_2$) and Table 3 (for RbOH).

Having obtained all of the above information, we were then able to calculate the equilibria of the various gaseous hydroxides with water vapor, oxygen, and the corresponding condensed oxides. The equilibria were calculated at 500°K intervals between 500 and 2500°K by means of the expression

All of the calculations were performed on the basis of 1 g-atom of element M, so in the above equation x is the O/M ratio in $MO_x(s,1)$, y is the O/M ratio in $MO_y(OH)_z(g)$, and z is the OH/M ratio in $MO_y(OH)_z(g)$. The symbol n is the number of units per molecule if the hydroxide in question is polymeric (like $Na_2(OH)_2$, for example).

At each temperature of interest, we calculated the partial pressure of each hydroxide in equilibrium with the corresponding stable condensed oxide and 1 atm each of water vapor and oxygen. Under these conditions, the partial pressure is, of course, equal to the equilibrium constant (K). We did not perform calculations at intervals of less than 500°K because of the large amount of data

involved, and we did not perform calculations at temperatures of more than 2500°K because of the sparse data on the condensed oxides. However, extrapolations and interpolations can easily be made from plots of $\Delta G_f^\circ/T$ versus $1/T$. The results of the equilibrium calculations are listed in Tables 7 through 11 and are plotted in Figs. 3 through 12.

In addition to the data on the gaseous hydroxides, the equilibrium calculations also required data on the free energies of formation of all possible condensed ox-

ides as well as a determination of the phase of each element in equilibrium with some oxygen pressure at the temperatures of interest. These data were taken from a number of sources,^{7,22-29} particularly Ref. 27. The free energies of formation of the sesquioxides of curium through lawrencium were all assumed to be equal to the average of the free energies of formation of Ac_2O_3 and Am_2O_3 , and the free energy of formation of the sesquioxide of element 104 was extrapolated from the corresponding data on ZrO_2 and HfO_2 .

Discussion

The foregoing calculations indicate the conditions under which particular hydroxides might be observed. For example, consider the monohydroxide $AlOH$, which has been observed at 2000°K.⁷ The log-K value of this hydroxide is indicated in Fig. 6 by a horizontal dashed line. If we assume that this value indicates the approximate limit at which partial pressures can be observed, then there appear to be two principal areas in the periodic table where monohydroxides can be expected. The first area consists of the alkali metals and alkaline earths, and the second area consists largely of the transition metals: boron, chromium through arsenic, technetium through tin, europium, osmium through gold, and radium. In support of this concept, note the recent observation of $SnOH$.³⁰

As for the dihydroxides, few have actually been observed. Of those that have, $Fe(OH)_2$ has the lowest partial pressure at 2000°K. The log-K value of

this hydroxide is indicated in Fig. 11 by a horizontal dashed line. According to this figure, it appears that we might expect to observe similar hydroxides of the alkaline earths as well as manganese through arsenic, cadmium through tin, polonium, and radium.

The equilibrium constants of most of the remaining hydroxides are many orders of magnitude lower, so the likelihood of observing these hydroxides is correspondingly slight. Competing reactions that are energetically more favorable may, of course, make it difficult to observe even relatively stable hydroxides.

It should be emphasized again that the partial pressures of the mono- and dihydroxides do not necessarily represent the total volatilities of oxides reacting with water vapor and oxygen. Many other, and possibly more important, hydroxides are thought to exist. The Group VIB elements are especially interesting in this regard, for they illustrate how

hydroxyl groups can be substituted for oxygen atoms in gaseous oxides to form important gaseous oxyhydroxides such as $\text{WO}_2(\text{OH})_2$.

As a final consideration, the accuracy of the estimated data in this report should be described. The principal errors are as follows. The errors in the bond energies are generally about ± 15 kcal/mole. The errors in the rotational and vibrational contributions are about ± 1 gibb/mole for the monohydroxides and ± 3 gibbs/mole for the dihydroxides. These values are equivalent to 2 and 6 kcal/mole respectively at 2000°K. The

errors in the electronic contributions are not known but are believed to be on the order of ± 2 gibbs/mole, or 4 kcal/mole at 2000°K. The root of the sum of the squares of the above errors is 16 kcal/mole for the monohydroxides and 17 kcal/mole for the dihydroxides. These values correspond to errors in the equilibrium constants of about a factor of 65 at 2000°K. There are additional errors for a number of individual hydroxides, for as mentioned previously, there are cases in which thermodynamic functions have been estimated for gaseous elements and condensed oxides.

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Appendix A:

Tables of Thermodynamic Data

Table 1. Bond energies (in kcal/mole) of the gaseous monohalides and -hydroxides at 298°K. The known values are taken from the indicated references, and the estimated values are enclosed in parentheses. The reactions involved are $MX(g) = M(g) + X(g)$ and $MOH(g) = M(g) + OH(g)$.

ELEMENT								ELEMENT							
M	HF	REF	MCL	REF	MOR	REF	MOH	REF	M	HF	REF	MCL	REF	MOR	REF
H	136	7	103	7	88	7	119	7	CU	88	16	86	9	79	9 (88)
LI	137	10	114	7	100	7	107	7	7A	87	9	89	9	58	9 (65)
EE	136	9	92	8	55	7	113	7	6A	138	10	114	9	180	9 (182) 38
B	181	6	128	7	104	7 (148)			CE	119	8	90	9	88	9 (85)
C	129	7	80	7	68	31	90	31	AS	(110)		(85)		(70)	9 (89)
N	72	7 (65)	64	7	69	7 (68)			SE	68	39	(65)		(50)	9 (65)
O	52	7	64	7	55	32	64	7	BR	60	8	52	9	46	9 39
F	38	7	60	7	60	8	59	7	RB	116	9	101	9	98	9 40
NA	114	7	98	7	97	7	82	7	SR	127	8	110	9	99	9 36
MG	108	8	90	33	74	34	97	7	Y	143	9	127	9	116	9 (120)
AL	160	8	117	7	101	7	138	7	ZR	148	8	128	7	125	9 (127)
SI	132	8	119	7	91	32	(105)		HB	140	10	130	9	120	9 (119)
P	113	7	74	7	64	7 (71)			WD	120	9	105	9	92	9 (92)
S	77	35 (65)			(60)				TC	100	10	(90)		(80)	9 (85)
CL	60	8	58	7	52	9	60	7	RU	100	10	91	9	81	9 (85)
K	118	9	101	9	91	9	87	7	WH	100	10	85	9	72	9 (80)
CA	127	5	97	7	97	9	104	36	PD	89	9	78	9	70	9 (75)
SC	145	10	117	9	105	9 (115)			AC	70	10	75	9	69	9 (70)
YZ	140	8	114	9	107	9 (110)			CO	74	10	69	9	61	9 (65)
V	140	10	112	9	102	9 (105)			IN	121	10	104	9	91	9 38
CR	106	10	86	9	77	9 (80)			SN	100	41	85	9	78	9 (80)
PH	101	4	85	9	74	9 73	37		SB	104	32	85	32	74	32 (80)
FE	103	10	90	9	79	9 (79)			TE	(70)		(55)		(60)	9 (55)
CO	105	9	89	9	78	9 (78)			I	46	9	50	9	42	9 39
NI	104	9	88	9	78	9 (78)			CS	120	9	106	9	96	9 40
BA	136	8	120	9	109	9	114	36	HG	40	10	25	9	16	9 (20)
LA	150	10	124	34	111	34 (125)			YL	101	10	88	9	79	9 38
CE	150	10	(129)		(95)	(125)			PS	55	41	72	7	62	9 (65)
FR	140	10	(125)		(91)	(120)			BI	60	44	72	9	63	9 (65)
IO	130	9	(122)		(87)	(120)			PO	(65)		(50)		(55)	9 (60)
PM	(128)		(118)		(93)	(115)			AT	(50)		(50)		(40)	9 (53)
SM	127	42	(112)		(78)	(110)			FR	(120)		(105)		(95)	9 (98)
EU	126	42	(109)		(75)	(105)			RA	(135)		(120)		(110)	9 (118)
GD	141	42	(126)		(92)	(120)			AC	(132)		(121)		(107)	9 (117)
YB	134	36	(124)		(91)	(120)			TH	(155)		(125)		(113)	9 (121)
OY	126	43	(116)		(93)	(110)			PA	(149)		(123)		(107)	9 (117)
MO	130	43	(116)		(93)	(110)			U	(140)		(117)		(102)	9 (114)
TR	136	43	(117)		(84)	(110)			NP	(132)		(112)		(98)	9 (107)
TH	(128)		(109)		(77)	(105)			PU	527	65	(108)		(93)	9 (107)
YB	(121)		(102)		(70)	(100)			AN	(134)		(107)		(92)	9 (107)
LU	(142)		(124)		(92)	(120)			CM	(153)		(121)		(107)	9 (117)
HF	150	10	(145)		(135)	(140)			BK	(158)		(119)		(104)	9 (115)
TA	150	10	(137)		(125)	(138)			CF	(139)		(107)		(93)	9 (103)
W	120	10	(127)		(118)	(125)			ES	(144)		(111)		(97)	9 (109)
FE	120	10	(105)		(92)	(100)			FW	(149)		(117)		(103)	9 (112)
CS	108	10	(138)		(95)	(92)			WD	(143)		(110)		(96)	9 (107)
IR	108	10	(90)		(75)	(80)			NO	(136)		(105)		(91)	9 (105)
FI	40	10	(80)		(65)	(70)			LW	(140)		(126)		(112)	9 (121)
AU	60	29	65	9	60	9 (65)			OK	(149)		(145)		(135)	9 (140)

Table 2. Sum of the bond energies (in kcal/mole) of the gaseous dihalides and -hydroxides at 298°K. The known values are taken from the indicated references, and the estimated values are enclosed in parentheses. The reactions involved are $MX_2(g) = M(g) + 2X(g)$ and $M(OH)_2(g) = M(g) + 2OH(g)$.

ELEMENT								ELEMENT									
M	MF2	REF	M(Cl)2	REF	M(Br)2	REF	M(OH)2	REF	M	MF2	REF	M(Cl)2	REF	M(Br)2	REF	M(OH)2	REF
EE	306	7	219	46	189	7	253	7	GE	230	9	188	58	164	58	(185)	
B	300	7	211	7	171	7	266	7	AS	215	9	185	9	139	9	(178)	
C	252	7	154	7	(100)		(200)		SE	167	9	117	9	95	9	(120)	
H	151	7	129	6	(50)		(145)		SR	264	9	220	9	194	9	212	34
O	102	7	95	7	(20)		(98)		Y	287	47	250	9	220	9	(238)	
PG	246	7	167	7	115	7	(195)		ZR	319	7	251	7	243	7	(263)	
AL	281	7	211	7	(150)		(250)		NB	320	9	278	9	241	9	(275)	
SI	294	7	206	7	(145)		(240)		MO	264	9	214	9	191	9	(220)	
P	222	7	144	6	(95)		(190)		TC	(210)		(189)		(166)		(190)	
S	179	5	154	6	(100)		(160)		RU	203	9	173	9	151	9	(176)	
CA	268	7	213	7	191	7	204	35	RH	191	9	161	9	137	9	(165)	
SC	281	47	233	7	205	7	(250)		PD	146	9	116	9	95	9	(120)	
TI	296	48	241	9	220	7	(240)		AG	120	9	98	9	76	9	(100)	
V	276	9	233	25	204	9	(235)		CJ	156	9	134	9	116	9	(135)	
CR	224	9	184	9	155	9	(185)		IN	225	9	175	9	153	9	(180)	
MN	219	9	188	9	159	9	(190)		SM	229	9	184	9	157	9	(185)	
FE	230	7	192	9	163	9	196	49	SB	(223)		(168)		(144)		(165)	
CO	224	7	180	9	155	9	184	49	TE	187	9	136	9	(115)		(140)	
NI	221	9	177	9	149	9	182	49	BA	275	9	229	9	205	9	213	36
CU	180	9	140	9	123	9	(145)		LA	(313)		(270)		(220)		(270)	
ZN	191	9	153	9	128	9	(150)		CE	(305)		(244)		(212)		(244)	
GA	245	9	187	9	161	9	(190)		PR	(293)		(236)		(205)		(236)	
ND	(272)		(230)		(198)		(230)		TL	(198)		(148)		(120)		(145)	
FM	(267)		(221)		(193)		(221)		PH	186	9	145	9	124	9	(150)	
SM	265	42	228	9	201	9	(228)		BI	(190)		(140)		(116)		(140)	
EU	264	42	229	9	202	9	(229)		PO	(150)		(110)		(95)		(110)	
GO	284	42	(236)		(205)		(236)		RA	(200)		(240)		(230)		(240)	
TB	(282)		(236)		(202)		(236)		AC	(304)		(262)		(224)		(262)	
CY	(263)		(217)		(196)		(217)		TH	312	33	(237)		(211)		(237)	
HO	(271)		(218)		(196)		(218)		PA	(291)		(231)		(203)		(231)	
ER	(283)		(219)		(198)		(219)		U	(283)		(226)		(195)		(226)	
TM	(268)		(204)		(174)		(204)		NP	(276)		(211)		(183)		(211)	
YB	253	9	206	9	180	9	(206)		PU	262	33	(202)		(174)		(202)	
LU	(290)		(232)		(202)		(232)		AM	(263)		(207)		(170)		(207)	
HF	132	9	282	9	255	9	(290)		CM	(287)		(226)		(187)		(226)	
TA	110	9	261	9	231	9	(280)		BK	(281)		(221)		(182)		(221)	
W	389	9	240	9	215	9	(253)		CF	(261)		(200)		(160)		(200)	
RE	(234)		(210)		(165)		(220)		ES	(269)		(209)		(180)		(209)	
OS	(220)		(200)		(170)		(200)		FM	(280)		(219)		(191)		(219)	
IR	(215)		(175)		(155)		(175)		MD	(267)		(207)		(170)		(207)	
FT	(173)		(143)		(125)		(150)		NO	(255)		(195)		(166)		(195)	
AU	147	9	122	9	106	9	(125)		LW	(280)		(220)		(187)		(220)	
HG	123	7	107	9	88	9	(110)		OL	(330)		(280)		(255)		(280)	

Table 3. Thermodynamic functions of the gaseous monohydroxides. The known values are taken from the indicated references, and the estimated values are enclosed in parentheses.

TABLE 3.001 THERMODYNAMIC FUNCTIONS FOR MOH (G)

(TAKEN FROM JANAF TABLES) (4)

.....FUNCTIONS FOR H IDEAL..... MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.25	45.106	45.186	0.	-54636.	27.392	48585.
500.	8.425	49.334	46.026	1654.	-92361.	27.955	46121.
1000.	9.551	55.592	49.382	6209.	-46346.	29.917	39562.
1500.	11.237	59.859	52.195	11495.	-39297.	31.438	32645.
2000.	12.214	63.234	54.548	17373.	-22401.	32.621	25538.
2500.	12.863	66.134	56.577	23653.	-25439.	33.581	18316.
3000.	13.314	69.421	58.354	31291.	-14438.	34.388	11038.

TABLE 3.002 THERMODYNAMIC FUNCTIONS FOR LI OH (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.592
BOND ANGLE, DEGREES	(190.)
I, G ^{CM} *2	1.171237E-39
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.
H-O STRETCH FREQUENCY, WAVE NOS.	914.
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.38889)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1409.)
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.05960)
HEAT OF DISSOCIATION AT 298K TO M(G) AND O ⁺ (G), CAL/MOL	186685.
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7

.....FUNCTIONS FOR LI IDEAL..... MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.326	48.303	48.303	0.	-59157.	33.143	38682.
500.	11.658	54.816	49.533	2241.	-59191.	33.786	29464.
1000.	12.918	62.514	54.110	8484.	-57988.	35.669	13964.
1500.	13.587	67.851	57.853	14996.	-56126.	37.189	2972.
2000.	13.954	71.803	60.868	21878.	-46370.	38.772	0.
2500.	14.224	74.949	63.340	28922.	-33689.	39.333	0.
3000.	14.411	77.561	65.532	36887.	-21029.	40.144	0.

TABLE 3.003 THERMODYNAMIC FUNCTIONS FOR BOM (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.361	7
BOND ANGLE, DEGREES	(180.)	
I_e , cm^{-1}	$8.213572E-49$	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
M-O STRETCH FREQUENCY, WAVE NOS.	1265.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(5.26693)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(579.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.11595)	
HEAT OF DISSOCIATION AT 298K TO P(G) AND O(HG), CAL/MOL	112647.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR BE IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.273	49.234	49.234	0.	-26588.	32.545	69231.
500.	10.159	53.453	49.351	2651.	-27772.	33.183	63893.
1000.	12.514	61.575	53.619	7956.	-29967.	36.070	48815.
1500.	13.352	66.820	57.195	14438.	-31691.	36.591	33318.
2000.	13.164	70.737	60.111	21253.	-32253.	37.773	19884.
2500.	14.175	73.967	62.550	28269.	-32477.	39.734	6661.
3000.	14.370	76.470	64.667	35409.	-26246.	39.541	8.

TABLE 3.004 THERMODYNAMIC FUNCTIONS FOR BOM (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.265	7
BOND ANGLE, DEGREES	(180.)	
I_e , cm^{-1}	$1.125541E-39$	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
M-O STRETCH FREQUENCY, WAVE NOS.	1410.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(7.34092)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(662.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.16150)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND O(HG), CAL/MOL	(149009.1)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR B IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.964	47.483	47.483	0.	-7471.	36.649	122291.
500.	10.510	52.419	48.475	1972.	-8585.	37.212	115883.
1000.	12.346	60.366	52.619	7757.	-11856.	39.175	97125.
1500.	13.272	65.564	56.109	14182.	-13148.	40.696	79369.
2000.	13.917	69.464	58.981	20966.	-14964.	41.978	61935.
2500.	14.144	72.585	61.400	27963.	-16432.	42.839	44857.
3000.	14.348	75.193	63.497	35089.	-16699.	43.646	29883.

TABLE 3.005 THERMODYNAMIC FUNCTIONS FOR COH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.267	7
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² CM ²	4.292327-118	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
M-O STRETCH FREQUENCY, WAVE NOS.	1305.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(6.72621)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1716.1)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(1.08997)	
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG), CAL/MOL	90000.	31
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR C IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.127	53.544	53.544	0.	86773.	37.761	160033.
500.	8.991	57.937	54.492	1722.	84406.	38.325	152546.
1000.	10.942	64.828	58.078	6750.	79082.	40.230	133616.
1500.	12.051	69.495	61.146	12524.	74273.	41.811	114692.
2000.	12.605	73.057	63.696	18722.	69780.	42.995	95876.
2500.	13. 58	75.931	65.865	25166.	65514.	44.958	77168.
3000.	13.290	78.334	67.746	31757.	61437.	44.771	58549.

TABLE 3.005 THERMODYNAMIC FUNCTIONS FOR NOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.510	7
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² CM ²	9.987248-115	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
M-O STRETCH FREQUENCY, WAVE NOS.	1115.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(5.133470)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1637.1)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.86422)	
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG), CAL/MOL	(68000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR N IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.282	53.238	53.238	0.	57359.	36.614	188378.
500.	9.257	57.741	54.201	1766.	59442.	37.177	180814.
1000.	11.114	64.795	57.887	6908.	65817.	39.140	145810.
1500.	12.145	69.515	61.018	12747.	70763.	40.660	107174.
2000.	12.742	73.099	63.603	18982.	76560.	41.843	82784.
2500.	13.096	75.983	65.804	25448.	82374.	42.863	74763.
3000.	13.316	78.392	67.707	32056.	90216.	43.611	66683.

TABLE 3.007 THERMODYNAMIC FUNCTIONS FOR COH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	1.300	7
BOND ANGLE, DEGREES	(120.)	
I1*I2*I3, G**3 * CM**6	6.432649-115	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	4.	20
H-O STRETCH FREQUENCY, WAVE NOS.	1056.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(5.13571)	
H-O-H BENDING FREQUENCY, WAVE NOS.	11507.1	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.83199)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	64051.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR O IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.7-1	55.762	55.762	0.	7634.	38.469	55395.
500.	9.425	60.332	56.745	1793.	9532.	39.055	52465.
1000.	11.234	67.496	60.443	7013.	14662.	41.067	44875.
1500.	12.212	72.253	63.656	12096.	19997.	42.611	37032.
2000.	12.783	75.852	66.273	19157.	25403.	43.606	29082.
2500.	13.123	78.744	68.498	25641.	30854.	44.775	21073.
3000.	13.736	81.157	70.404	32260.	36353.	45.588	13031.

TABLE 3.005 THERMODYNAMIC FUNCTIONS FOR FOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	1.409	7
BOND ANGLE, DEGREES	(120.)	
I1*I2*I3, G**3 * CM**6	1.035431-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	5.	20
H-O STRETCH FREQUENCY, WAVE NOS.	884.	17
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.91763)	
H-O-H BENDING FREQUENCY, WAVE NOS.	1393.	17
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.66719)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	59352.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR F IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.579	57.819	57.819	0.	-28824.	37.917	14777.
500.	9.746	61.743	58.835	1854.	-27235.	38.528	11927.
1000.	11.483	69.883	61.887	7195.	-22448.	40.615	4522.
1500.	12.380	73.591	65.131	13141.	-16229.	42.201	-3865.
2000.	12.826	77.510	67.792	19436.	-13521.	43.421	-16733.
2500.	13.158	80.412	70.835	25941.	-8760.	44.466	-18448.
3000.	13.368	82.830	71.972	32575.	-3949.	45.230	-26191.

TABLE 3.609 THERMODYNAMIC FUNCTIONS FOR H₂O (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	1.930	11
BOND ANGLE, DEGREES	110.	11
I, G*CM**2	6.593461E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	431.	11
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	1.07000	11
H-O-H BENDING FREQUENCY, WAVE NOS.	337.	11
BENDING FORCE CONSTANT, DYNE/ANGSTROM	0.02831	11
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	82452.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR H₂O IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.160	54.578	54.578	0.	-47457.	36.714	18475.
500.	12.189	60.804	55.910	2437.	-47945.	37.277	13890.
1000.	13.055	69.613	60.803	9810.	-47233.	39.239	3529.
1500.	13.717	75.017	64.695	15483.	-39772.	40.760	0.
2000.	14.118	78.994	67.794	22399.	-28850.	41.942	0.
2500.	14.274	82.151	70.361	29477.	-17982.	42.903	0.
3000.	14.440	84.770	72.550	36658.	-7150.	43.711	0.

TABLE 3.017 THERMODYNAMIC FUNCTIONS FOR H₂CO (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	1.752	7
BOND ANGLE, DEGREES	(180.)	
I, G*CM**2	5.932795E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
H-C STRETCH FREQUENCY, WAVE NOS.	718.	7
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.88200)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1470.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(1.06340)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	96713.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR H₂CO IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.180	54.294	54.294	0.	-53144.	35.504	27025.
500.	11.779	60.064	55.536	2264.	-55000.	36.067	21504.
1000.	12.578	69.610	60.156	8473.	-57029.	39.029	5557.
1500.	13.536	77.954	67.926	15087.	-54694.	39.550	0.
2000.	13.772	79.442	69.956	21972.	-41456.	40.732	0.
2500.	14.245	81.092	69.479	29031.	-33365.	41.691	0.
3000.	14.419	83.705	71.639	36203.	-22309.	42.500	0.

TABLE 3.011 THERMODYNAMIC FUNCTIONS FOR AL₃ (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.655	7
BOND ANGLE, DEGREES	(180.)	
I, G*CM**2	5.485481E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	802.	7
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(3.74841)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(523.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(3.08246)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND O(G), CAL/MOL	139492.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR AL IDEAL.....
 MONATOMIC GAS
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T K	C _P , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.110	52.602	52.602	0.	-44712.	39.304	69308.
500.	11.561	59.212	52.305	2203.	-45725.	39.878	61787.
1000.	12.05	66.591	59.334	8347.	-47366.	41.864	46342.
1500.	13.02	72.014	62.057	14935.	-47167.	43.395	32735.
2000.	13.952	75.965	65.051	21808.	-46969.	44.583	19573.
2500.	14.232	79.111	67.567	28859.	-46990.	45.547	5739.
3000.	14.410	81.723	69.715	36023.	-38746.	46.357	0.

TABLE 3.012 THERMODYNAMIC FUNCTIONS FOR SiO₂ (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.600	7
BOND ANGLE, DEGREES	(120.)	
I1*I2*I3, G**3 * CM**6	2.350733-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
H-O STRETCH FREQUENCY, WAVE NOS.	457.	7
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(4.34627)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1505.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.70410)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND O(G), CAL/MOL	(106039.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR SI IDEAL.....
 MONATOMIC GAS
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T K	C _P , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.583	56.693	56.693	0.	7584.	40.121	97079.
500.	9.683	61.483	57.707	1843.	5328.	40.713	89882.
1000.	11.343	69.694	61.539	154.	678.	42.734	72229.
1500.	12.766	73.483	64.766	13876.	-3247.	44.284	54892.
2000.	12.414	77.094	67.415	19359.	-4474.	45.491	48867.
2500.	13.144	79.992	69.650	25855.	-4088.	46.479	26726.
3000.	13.350	82.408	71.591	32492.	-3469.	47.318	13499.

TABLE 3.013 THERMODYNAMIC FUNCTIONS FOR POH (G)

			REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.590	7	
BOND ANGLE, DEGREES	(120.)		
I1*I2*I3, G**3 * CM**6	2.461523-117		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20	
H-O STRETCH FREQUENCY, WAVE NOS.	847.	7	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.68817)		
H-O-H BENDING FREQUENCY, WAVE NOS.	(1509.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.71283)		
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(92000.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7		

.....FUNCTIONS FOR P IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.597	55.553	55.553	0.	-5698.	38.380	69798.
500.	9.693	60.269	56.569	1850.	-7517.	39.543	63052.
1000.	11.346	67.564	60.404	7159.	-12560.	41.505	45089.
1500.	12.267	72.354	63.633	13082.	-6246.	43.026	38881.
2000.	12.915	75.965	66.293	19364.	147.	44.210	30986.
2500.	13.144	78.663	68.518	25861.	6579.	45.176	23322.
3000.	13.350	81.279	70.444	32488.	13042.	45.997	16579.

TABLE 3.014 THERMODYNAMIC FUNCTIONS FOR SOH (G)

			REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.610)		
BOND ANGLE, DEGREES	(120.)		
I1*I2*I3, G**3 * CM**6	2.647229-117		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	4.	20	
H-O STRETCH FREQUENCY, WAVE NOS.	(892.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.93857)		
H-O-H BENDING FREQUENCY, WAVE NOS.	(1687.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.88885)		
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(71800.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7		

.....FUNCTIONS FOR S IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.511	55.415	55.415	0.	1985.	40.886	57884.
500.	9.559	60.872	59.443	1827.	251.	40.728	50657.
1000.	11.258	70.294	63.206	7878.	-336.	42.669	37748.
1500.	12.218	75.047	66.402	12968.	-5248.	44.485	30548.
2000.	12.785	79.647	69.071	19231.	10926.	45.725	23232.
2500.	13.125	81.939	71.257	25715.	16644.	46.725	15851.
3000.	13.336	83.952	73.174	32334.	22481.	47.566	8485.

TABLE 3.015 THERMODYNAMIC FUNCTIONS FOR CLOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	1.628	7
BOND ANGLE, DEGREES	(120.)	
$11^{\circ}12'13$, $G^{*}3 \times CM^{*}6$	2.954800-117	
QUANTUM WEIGHT OF GROUND STATE OF $+1 M$	5.	20
H-O STRETCH FREQUENCY, WAVE NOS.	784.	7
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(3.94668)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1443.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.63936)	
HEAT OF DISSOCIATION AT 298K TO $H(G)$ AND $OH(G)$, CAL/MOL	60414.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR CL IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	$-(G-H298)/T$, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H298)/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.717	59.251	59.251	0.	-19768.	39.455	25182.
500.	9.432	64.838	60.291	1878.	-18131.	46.858	22451.
1000.	11.420	71.408	64.168	7240.	-13594.	42.187	15547.
1500.	12.706	76.221	67.428	13190.	-8516.	43.827	8416.
2000.	12.838	79.841	70.097	19487.	-3954.	45.187	1174.
2500.	13.160	82.743	72.346	25993.	955.	46.181	-6133.
3000.	13.361	85.161	74.236	32627.	5983.	46.947	-13407.

TABLE 3.015 THERMODYNAMIC FUNCTIONS FOR KOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	2.188	51
BOND ANGLE, DEGREES	(108.)	
Z , $G^{*}CM^{*}2$	1.887354E-38	
QUANTUM WEIGHT OF GROUND STATE OF $+1 M$	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	485.	7
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(1.18228)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(328.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.82425)	
HEAT OF DISSOCIATION AT 298K TO $H(G)$ AND $OH(G)$, CAL/MOL	87482.	7
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR K IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	$-(G-H298)/T$, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H298)/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.676	56.671	56.671	0.	-36934.	38.297	14588.
500.	12.439	62.938	58.837	2452.	-36748.	38.869	18185.
1000.	13.866	71.767	62.928	8839.	-35456.	48.822	798.
1500.	12.623	77.175	66.878	15517.	-43359.	42.343	0.
2000.	14.821	81.153	69.935	22435.	-34915.	43.526	0.
2500.	14.277	84.311	72.585	29514.	-24338.	44.489	0.
3000.	14.441	86.938	74.698	36696.	-13788.	45.385	0.

TABLE 3.017 THERMODYNAMIC FUNCTIONS FOR CADM (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.010
BOND ANGLE, DEGREES	(180.)
I, G ² CM ²	9.142248E-39
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.
N-O STRETCH FREQUENCY, WAVE NOS.	587.
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.29849)
N-O-H BENDING FREQUENCY, WAVE NOS.	(446.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.05857)
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG), CAL/MOL	104000.
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR CA IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.753	56.448	56.448	0.	-54045.	36.992	34310.
500.	12.07	62.372	57.726	2323.	-55211.	37.556	28930.
1000.	12.947	71.030	62.436	8594.	-57314.	39.510	16358.
1500.	13.568	76.403	66.249	15231.	-57894.	41.038	5340.
2000.	13.990	80.369	69.385	22128.	-52863.	42.220	0.
2500.	14.256	83.522	71.844	29195.	-42521.	43.198	0.
3000.	14.427	86.137	74.014	36369.	-32192.	44.010	0.

TABLE 3.119 THERMODYNAMIC FUNCTIONS FOR SCOH (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.910
BOND ANGLE, DEGREES	(180.)
I, G ² CM ²	4.443654E-39
QUANTUM WEIGHT OF GROUND STATE OF +1 M	3.
N-O STRETCH FREQUENCY, WAVE NOS.	744.
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.01572)
N-O-H BENDING FREQUENCY, WAVE NOS.	(461.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.08399)
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG), CAL/MOL	(115000.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR SC IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.931	55.276	55.276	0.	-17246.	41.748	88342.
500.	11.940	62.287	58.475	2196.	-18479.	42.337	73646.
1000.	12.906	69.334	60.998	8339.	-26891.	44.352	57990.
1500.	13.583	74.667	64.718	14927.	-22654.	45.897	41994.
2000.	13.953	78.619	67.719	21880.	-23192.	47.094	27752.
2500.	14.233	81.765	70.224	28852.	-22349.	48.071	14928.
3000.	14.411	84.377	72.371	36016.	-21654.	48.916	2522.

TABLE 3.013 THERMODYNAMIC FUNCTIONS FOR TIOH (G)

				REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.950			7
BOND ANGLE, DEGREES	(120.)			
$11^{\circ}12'13$, $6^{\circ}3' \pm 0^{\circ}06$	7.140312-117			
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	4.			20
M-O STRETCH FREQUENCY, WAVE NOS.	590.			7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.44075)			
M-O-H BENDING FREQUENCY, WAVE NOS.	(1229.)			
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.39540)			
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(210000.)			
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT				7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT				7

.....FUNCTIONS FOR TI IDEAL.....
 MONATONIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.188	60.597	60.597	0.	8566.	67.866	102344.
500.	10.253	65.625	61.673	1976.	6121.	43.786	95161.
1000.	11.639	73.735	65.731	7503.	1152.	45.833	77796.
1500.	12.19	74.113	64.041	13532.	-2571.	47.436	61326.
2000.	12.505	81.758	71.621	19873.	-5425.	48.692	45528.
2500.	13.264	84.673	74.110	26407.	-6778.	49.748	31841.
3000.	13.392	87.198	76.074	33059.	-7665.	50.659	18753.

TABLE 3.023 THERMODYNAMIC FUNCTIONS FOR VOM (G)

				REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.768)			
BOND ANGLE, DEGREES	(120.)			
$11^{\circ}12'13$, $6^{\circ}3' \pm 0^{\circ}06$	4.923521-117			
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	1.			20
M-O STRETCH FREQUENCY, WAVE NOS.	(697.)			
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.45682)			
M-O-H BENDING FREQUENCY, WAVE NOS.	(1397.)			
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.58881)			
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(105868.)			
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT				23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT				23

.....FUNCTIONS FOR V IDEAL.....
 MONATONIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.451	57.424	57.424	0.	24286.	47.544	111979.
500.	9.949	62.131	58.674	1913.	2712.	48.276	104993.
1000.	11.446	69.749	62.622	7723.	1314.	49.652	84518.
1500.	12.342	74.513	66.747	17334.	1678.	49.769	64722.
2000.	12.459	79.211	70.613	24614.	1474.	49.744	51448.
2500.	13.173	81.117	70.655	28138.	15253.	51.344	35441.
3000.	13.371	83.537	72.614	32769.	14998.	51.692	28246.

TABLE 3.021 THERMODYNAMIC FUNCTIONS FOR CROM (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.720)	
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² * CM ²	4.544272-117	
QUANTUM WEIGHT OF GROUND STATE OF *1 M	6.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(1759.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.12420)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1518.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.66812)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND C-1(G), CAL/MOL	(80000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR CR IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.741	60.877	60.877	0.	19979.	41.634	84271.
500.	9.409	65.665	61.904	1878.	17142.	42.197	77855.
1000.	11.188	73.011	65.749	7223.	11307.	44.169	59682.
1500.	12.287	77.814	69.040	13168.	6556.	45.684	43808.
2000.	12.827	81.429	71.704	19458.	2778.	46.899	27188.
2500.	13.152	84.329	73.949	25951.	540.	47.967	12531.
3000.	13.356	86.747	75.886	32502.	583.	48.867	0.

TABLE 3.022 THERMODYNAMIC FUNCTIONS FOR MNCH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.720)	
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² * CM ²	4.665389-117	
QUANTUM WEIGHT OF GROUND STATE OF *1 M	7.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(1754.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.12420)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1589.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.66812)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	73800.	37
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR MN IDEAL.....
 MONATOMIC GAS

T K	Cp, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.758	61.339	61.339	0.	-582.	41.448	56978.
500.	9.116	66.131	62.371	1888.	-2972.	42.868	50248.
1000.	11.358	73.458	66.254	7227.	-7658.	44.838	34328.
1500.	12.288	77.234	69.587	13165.	-10595.	45.548	19778.
2000.	12.877	81.999	72.172	19455.	-11077.	46.738	7588.
2500.	13.152	84.799	74.417	25957.	-6783.	47.698	0.
3000.	13.356	87.217	76.354	32507.	5257.	48.588	0.

TABLE 3.023 THERMODYNAMIC FUNCTIONS FOR FE(OH) (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.720)	
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² CM ²	4.701031-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	10.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(753.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.12420)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1509.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.65812)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(79000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR FE IDEAL.....
 . PHONONIC GAS .
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T K	CP, GI8BS/MOL	S GI8BS/MOL	-(G-H298)/T, GI8BS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GI8BS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.753	62.094	62.094	0.	25380.	43.112	88593.
500.	9.418	66.887	63.127	1880.	22502.	43.505	81219.
1000.	11.391	74.235	67.010	7229.	16345.	46.141	63468.
1500.	12.249	79.041	70.264	13166.	12390.	47.878	46998.
2000.	12.827	82.657	72.929	19457.	10450.	49.187	31827.
2500.	13.152	85.557	75.174	25958.	9335.	50.257	17514.
3000.	13.356	87.974	77.111	32589.	8502.	51.169	3869.

TABLE 3.024 THERMODYNAMIC FUNCTIONS FOR COOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.720)	
BOND ANGLE, DEGREES	(108.)	
$I_1^2 I_2^2 I_3$, G ² CM ²	3.888946E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	9.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(748.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.12420)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(556.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.89873)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(78880.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR CO IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GI8BS/MOL	S GI8BS/MOL	-(G-H298)/T, GI8BS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GI8BS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.946	57.774	57.774	0.	38760.	42.879	91756.
500.	11.555	63.371	58.974	2198.	28796.	43.527	84578.
1000.	12.866	71.848	63.498	8342.	24756.	45.988	67188.
1500.	13.584	77.174	67.228	14932.	21721.	47.787	58287.
2000.	13.953	81.126	70.223	21885.	20869.	49.271	44658.
2500.	14.233	84.272	72.729	28557.	20156.	50.699	28810.
3000.	14.411	86.684	74.877	36821.	19480.	51.583	5781.

TABLE 3.025 THERMODYNAMIC FUNCTIONS FOR NI(OH) (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.720)	
BOND ANGLE, DEGREES	(180.)	
I, G*CM**2	7.363760E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	6.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(748.)	
STRETCHING FORCE CONSTANT, *DYNE/ANGSTROM	14.12429)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(556.)	
BENDING FORCE CONSTANT, *DYNE/ANGSTROM	(0.09073)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(74000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR NI IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	9.946	58.271	58.271	0.	31001.	43.518	91954.
500.	11.555	63.367	59.470	2199.	26953.	44.159	84665.
1000.	12.607	72.336	63.994	8342.	24330.	46.452	118.
1500.	13.504	77.670	67.716	14931.	21675.	48.250	50890.
2000.	13.953	81.621	70.719	21804.	19360.	49.637	34226.
2500.	14.233	84.767	73.225	28856.	16434.	50.747	19215.
3000.	14.411	87.379	75.372	35020.	17983.	51.676	5252.

TABLE 3.026 THERMODYNAMIC FUNCTIONS FOR CU(OH) (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.743	7
BOND ANGLE, DEGREES	(180.)	
I, G*CM**2	3.184993E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	622.	7
STRETCHING FORCE CONSTANT, *DYNE/ANGSTROM	(2.89971)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(469.)	
BENDING FORCE CONSTANT, *DYNE/ANGSTROM	(0.06379)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(80000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR CU IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	10.576	53.755	53.755	0.	8778.	39.744	71510.
500.	11.915	59.610	55.416	2247.	7731.	40.387	65142.
1000.	12.919	68.238	59.657	8543.	5627.	42.269	49791.
1500.	13.555	73.596	63.432	15178.	4292.	43.790	35247.
2000.	13.993	77.558	66.577	22662.	4141.	44.975	21939.
2500.	14.252	80.710	69.059	29126.	4257.	45.944	8932.
3000.	14.424	83.325	71.225	36298.	4466.	46.774	0.

TABLE 3.027 THERMODYNAMIC FUNCTIONS FOR ZHON (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.810	52
BOND ANGLE, DEGREES	(180.)	
I, G ^{CM} **2	8.238851E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
N-O STRETCH FREQUENCY, WAVE NOS.	(611.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.81953)	
N-O-H BENDING FREQUENCY, WAVE NOS.	(470.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.68193)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND O ₂ (G), CAL/MOL	(65009.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR ZH IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.093	57.154	57.154	0.	-26380.	38.452	22750.
500.	11.729	63.018	58.417	2300.	-27698.	39.814	17860.
1000.	12.023	71.643	63.094	8550.	-29543.	40.977	4328.
1500.	13.057	77.010	66.891	15178.	-23004.	42.568	0.
2000.	13.184	80.973	69.939	22072.	-12189.	43.698	0.
2500.	14.253	84.125	72.471	29136.	-1434.	44.658	0.
3000.	14.425	86.746	74.677	36388.	9258.	45.458	0.

TABLE 3.028 THERMODYNAMIC FUNCTIONS FOR GAON (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.778	54
BOND ANGLE, DEGREES	(180.)	
I, G ^{CM} **2	8.142236E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
N-O STRETCH FREQUENCY, WAVE NOS.	545.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.24377)	
N-O-H BENDING FREQUENCY, WAVE NOS.	(416.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.84936)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	18288.	38
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR GA IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.921	56.368	56.368	0.	-27312.	40.376	58218.
500.	12.121	62.388	57.667	2350.	-28457.	41.881	58880.
1000.	12.980	71.884	62.429	8650.	-29644.	43.575	37950.
1500.	13.422	76.466	66.262	15188.	-29456.	45.483	25250.
2000.	13.468	80.435	69.331	22209.	-29159.	46.769	12740.
2500.	14.362	83.549	71.874	29279.	-28470.	47.849	480.
3000.	14.431	86.286	74.854	36456.	-16992.	48.738	0.

TABLE 3.023 THERMODYNAMIC FUNCTIONS FOR GE OH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.740	55
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² * CM ² * G	5.468875-117	
QUANTUM WEIGHT OF GROUND STATE OF *1 M	2.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(700.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.77699)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1450.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.61089)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(85000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR GE IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.567	59.726	59.726	0.	10356.	40.103	79768.
500.	9.937	64.582	60.772	1905.	6098.	40.942	73070.
1000.	11.453	71.997	64.700	7297.	3483.	41.759	56178.
1500.	12.322	76.20	67.991	13258.	1767.	45.782	41482.
2000.	12.947	80.445	70.662	19562.	1946.	47.272	28428.
2500.	13.165	83.347	72.918	26071.	2673.	41.446	15540.
3000.	13.365	85.766	74.863	32708.	3195.	40.415	2720.

TABLE 3.030 THERMODYNAMIC FUNCTIONS FOR AS OH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.698)	
BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, G ² * CM ² * G	4.833959-117	
QUANTUM WEIGHT OF GROUND STATE OF *1 M	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(802.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.97504)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1539.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.80596)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(88000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	24	

.....FUNCTIONS FOR AS IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.642	56.192	56.192	0.	-4486.	41.618	55098.
500.	9.656	62.912	59.218	1651.	-6118.	42.108	52453.
1000.	11.282	70.162	63.034	7128.	-13983.	44.140	31657.
1500.	12.228	74.931	66.248	13825.	-7581.	45.668	24718.
2000.	12.790	78.533	68.897	19292.	-1691.	46.850	17678.
2500.	13.127	81.427	71.115	25778.	5436.	47.928	10561.
3000.	13.338	83.948	73.041	32398.	11994.	48.648	3376.

TABLE 3.031 THERMODYNAMIC FUNCTIONS FOR SEOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.760)	
BOND ANGLE, DEGREES	(120.)	
I1*I2*I3, G**3 * CM**6	5.919093-117	
QUANTUM WEIGHT OF GROUND STATE OF *1 M	4.	20
M-O STRETCH FREQUENCY, WAVE NOS.	(665.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(3.45682)	
M-O-M BENDING FREQUENCY, WAVE NOS.	(1395.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.55001)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(65000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		24

....FUNCTIONS FOR SE IDEAL....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.953	61.431	61.431	0.	-9444.	42.218	39841.
500.	10.031	66.336	62.468	1924.	-11446.	42.780	33465.
1000.	11.504	73.803	66.451	7352.	-13526.	44.828	19851.
1500.	12.348	78.641	69.752	13332.	-8155.	46.468	13281.
2000.	12.963	82.270	72.447	19546.	-2717.	47.770	6331.
2500.	13.176	85.177	74.712	26162.	2796.	48.840	-636.
3000.	13.373	87.597	76.663	32803.	8307.	49.733	-7713.

TABLE 3.032 THERMODYNAMIC FUNCTIONS FOR BROH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	1.756	7
BOND ANGLE, DEGREES	(120.)	
I1*I2*I3, G**3 * CM**6	5.893947-117	
QUANTUM WEIGHT OF GROUND STATE OF *1 M	5.	20
M-O STRETCH FREQUENCY, WAVE NOS.	673.	7
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(3.54819)	
M-O-M BENDING FREQUENCY, WAVE NOS.	(1412.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.57431)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	56000.	39
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR BR IDEAL....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.931	61.887	61.887	0.	-28841.	41.805	19700.
500.	10.086	66.779	62.941	1919.	-19572.	42.368	16771.
1000.	11.490	74.232	66.895	7337.	-15032.	44.335	10274.
1500.	12.341	79.865	70.191	13312.	-10263.	45.850	3620.
2000.	12.859	82.692	72.881	19622.	-5414.	47.102	-3162.
2500.	13.173	85.598	75.144	26137.	-523.	48.110	-10052.
3000.	13.371	88.119	77.094	32776.	4404.	48.964	-17027.

TABLE 3.033 THERMODYNAMIC FUNCTIONS FOR RBOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.300	56
BOND ANGLE, DEGREES	180.	11
I, G*CM**2	1.335659E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
M-O STRETCH FREQUENCY, WAVE NOS.	354.	11
STRETCHING FORCE CONSTANT, MDTNF/ANGSTROM	1.05000	11
M-O-H BENDING FREQUENCY, WAVE NOS.	309.	11
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	0.02063	11
HEAT OF DISSOCIATION AT 298K TO M(G) AND O(G), CAL/MOL	83000.	40
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR RB IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.914	59.361	59.361	0.	-54263.	40.630	12976.
500.	12.517	65.694	60.737	2474.	-54027.	41.190	8501.
1000.	13.187	74.546	65.662	8878.	-52259.	43.150	0.
1500.	13.632	79.953	69.579	15562.	-41765.	44.680	0.
2000.	14.126	83.933	72.691	22493.	-31356.	45.860	0.
2500.	14.280	87.092	75.766	29564.	-20977.	46.830	0.
3000.	14.443	89.711	77.662	36748.	-10615.	47.650	0.

TABLE 3.034 THERMODYNAMIC FUNCTIONS FOR SROH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.997	57
BOND ANGLE, DEGREES	(180.)	
I, G*CM**2	1.092739E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
M-O STRETCH FREQUENCY, WAVE NOS.	(507.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.04638)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(419.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.04502)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND O(G), CAL/MOL	103000.	36
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR SR IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.147	54.951	58.951	0.	-56203.	39.323	31203.
500.	12.156	64.989	60.256	2366.	-57359.	39.885	25883.
1000.	12.990	73.707	65.029	8678.	-59389.	41.844	13538.
1500.	13.488	79.592	68.873	15329.	-55597.	43.369	3076.
2000.	14.001	83.162	71.946	22234.	-52481.	44.552	0.
2500.	14.164	85.217	74.495	29305.	-42734.	45.516	0.
3000.	14.322	86.834	76.671	36482.	-32179.	46.340	0.

TABLE 3.035 THERMODYNAMIC FUNCTIONS FOR YOH (G)

			REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.040	52	
BOND ANGLE, DEGREES	(180.)		
I, G*CM**2	1.097855F-35		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20	
M-O STRETCH FREQUENCY, WAVE NOS.	644.	53	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.38773)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(538.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.07277)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND O(G), CAL/MOL	(120000.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23	

.....FUNCTIONS FOR Y IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.127	56.798	66.798	0.	-18590.	42.678	92490.
500.	11.733	62.426	57.936	2245.	-11639.	43.578	85680.
1000.	12.865	70.972	62.531	8441.	-13567.	45.868	69650.
1500.	13.521	76.322	66.289	15858.	-14870.	47.560	54640.
2000.	13.64	80.279	69.313	21933.	-15748.	48.848	39980.
2500.	14.143	83.428	71.837	28991.	-14966.	49.878	26829.
3000.	14.418	86.642	74.949	36168.	-13736.	50.768	14138.

TABLE 3.035 THERMODYNAMIC FUNCTIONS FOR ZROH (G)

			REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.980	7	
BOND ANGLE, DEGREES	(120.)		
I1*I2*I3, G**3 * CM**6	8.398852-117		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	4.	20	
M-O STRETCH FREQUENCY, WAVE NOS.	620.	7	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.15828)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(1380.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.51164)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND O(G), CAL/MOL	(127000.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7	

.....FUNCTIONS FOR ZR IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.134	62.191	62.191	0.	26931.	43.315	138163.
500.	10.892	67.133	63.256	1938.	24626.	44.834	121284.
1000.	11.529	74.629	67.243	7387.	19981.	46.817	114392.
1500.	12.361	79.274	70.557	13375.	16656.	48.555	98677.
2000.	12.471	83.186	73.259	19654.	-6317.	49.877	82842.
2500.	13.181	86.114	75.529	26213.	12634.	51.345	66781.
3000.	13.376	88.436	77.484	32855.	11959.	52.439	52279.

TABLE 3.037 THERMODYNAMIC FUNCTIONS FOR NOOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.030)	
BOND ANGLE, DEGREES	(120.)	
$11^{\circ}12'13$, $G^{\circ}3 \pm CH^{\circ}6$	7.270794-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 N	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(711.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(4.06362)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1539.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.63031)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(115000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR NO IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
250.	0.021	59.221	59.221	0.	63703.	44.490	151759.
300.	0.044	64.048	60.268	1090.	61903.	45.299	154440.
1000.	11.399	71.399	64.196	7242.	50720.	48.018	136220.
1500.	12.206	76.201	67.414	13179.	39561.	50.006	110071.
2000.	12.026	77.16	70.881	19469.	33327.	51.510	100100.
2500.	12.191	82.116	72.320	25969.	31531.	52.711	87935.
3000.	12.399	85.133	74.266	32600.	30792.	53.730	69540.

TABLE 3.035 THERMODYNAMIC FUNCTIONS FOR NOOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.030)	
BOND ANGLE, DEGREES	(120.)	
$11^{\circ}12'13$, $G^{\circ}3 \pm CH^{\circ}6$	7.349936-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 N	6.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(710.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(4.06362)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1539.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.63031)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(95000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR NO IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
250.	0.024	62.074	62.074	0.	67039.	43.460	146361.
300.	0.050	67.695	63.913	1091.	64040.	44.023	139042.
1000.	11.392	75.056	67.011	7243.	57700.	45.906	121279.
1500.	12.207	79.057	71.070	13181.	52204.	47.506	103904.
2000.	12.026	83.472	73.737	19470.	47202.	48.691	87867.
2500.	12.191	86.372	75.083	25971.	42917.	49.461	70609.
3000.	12.399	88.769	77.422	32601.	39437.	50.495	54457.

TABLE 3.033 THERMODYNAMIC FUNCTIONS FOR TCOM (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.038)	
BOND ANGLE, DEGREES	(120.)	
$15^\circ 12' 13$, $6^{00} 3''$ CH ⁰⁰⁰	7.4418243-117	
QUANTUM WEIGHT OF GROUND STATE OF $\frac{1}{2}$ H	7.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(789.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.06362)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1539.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.65831)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(85889.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	25	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	25	

.....FUNCTIONS FOR TC IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	8.920	63.271	63.271	0.	74967.	43.250	164490.
300.	9.853	68.094	64.311	1891.	72124.	43.815	127420.
1000.	11.391	75.453	60.289	7244.	66183.	45.893	128245.
1500.	12.287	80.256	71.460	13182.	61182.	47.730	102190.
2000.	12.826	83.872	74.136	19472.	56189.	49.304	86242.
2500.	13.151	86.772	76.392	25973.	53275.	50.615	69600.
3000.	13.355	89.199	78.321	32603.	51124.	51.724	54290.

TABLE 3.040 THERMODYNAMIC FUNCTIONS FOR RUOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.038)	
BOND ANGLE, DEGREES	(120.)	
$15^\circ 12' 13$, $6^{00} 3''$ CH ⁰⁰⁰	7.442600-117	
QUANTUM WEIGHT OF GROUND STATE OF $\frac{1}{2}$ H	10.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(787.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.06362)	
O-O-H BENDING FREQUENCY, WAVE NOS.	(1539.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.65831)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(85889.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	25	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	25	

.....FUNCTIONS FOR RU IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	8.820	64.840	64.840	0.	74385.	44.550	163788.
300.	9.894	69.063	65.880	1892.	71544.	45.160	126160.
1000.	11.392	76.224	64.978	7245.	64516.	47.089	117440.
1500.	12.287	81.827	72.230	13183.	57988.	49.230	90037.
2000.	12.826	84.642	74.906	19473.	52315.	50.690	80640.
2500.	13.151	87.562	77.152	25974.	47324.	51.890	62172.
3000.	13.355	89.959	79.891	32604.	43937.	52.930	45260.

TABLE 3.041 THERMODYNAMIC FUNCTIONS FOR HMON (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.038)
BOND ANGLE, DEGREES	(180.)
$I, \text{G}^2\text{CM}^2$	$9.123647\text{E}-39$
QUANTUM WEIGHT OF GROUND STATE OF $+1 \text{ H}$	9.
H-O STRETCH FREQUENCY, WAVE NOS.	(786.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.86362)
H-O-H BENDING FREQUENCY, WAVE NOS.	(567.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.88948)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(8188.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR OH IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.976	68.075	68.075	0.	58649.	44.387	122118.
500.	11.584	68.488	62.078	2285.	56117.	44.966	114739.
1000.	12.818	74.978	66.612	8258.	58529.	47.117	96778.
1500.	13.589	80.387	78.348	14951.	47119.	49.918	79177.
2000.	13.956	84.288	73.347	21026.	42254.	50.886	61876.
2500.	14.235	87.487	75.855	28879.	37944.	51.587	49548.
3000.	14.412	89.819	78.884	36844.	35779.	52.417	38120.

TABLE 3.042 THERMODYNAMIC FUNCTIONS FOR PDOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.038)
BOND ANGLE, DEGREES	(180.)
$I, \text{G}^2\text{CM}^2$	$9.198814\text{E}-39$
QUANTUM WEIGHT OF GROUND STATE OF $+1 \text{ H}$	9.
H-O STRETCH FREQUENCY, WAVE NOS.	(784.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.86362)
H-O-H BENDING FREQUENCY, WAVE NOS.	(567.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.88948)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(75888.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR PD IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.379	68.171	68.171	0.	15532.	39.989	75138.
500.	11.506	65.785	61.375	2285.	13481.	40.470	68990.
1000.	12.819	74.269	65.910	8359.	9124.	42.448	54248.
1500.	13.589	79.686	69.638	14952.	5131.	43.998	44828.
2000.	13.956	83.559	72.645	21028.	2076.	45.388	26468.
2500.	14.235	86.786	75.153	28881.	185.	46.518	13683.
3000.	14.412	89.318	77.383	36846.	-1500.	47.648	688.

TABLE 3.043 THERMODYNAMIC FUNCTIONS FOR AGOH (G)

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.830)	
BOND ANGLE, DEGREES	(180.)	
$I, \text{G}^2\text{CM}^2$	4.795151E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(784.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.85362)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(567.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.81948)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(78888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

REFERENCE

.....FUNCTIONS FOR AG IDEAL.....
MONATONIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.188	55.354	55.354	0.	6876.	41.318	51428.
500.	11.587	68.969	56.552	2286.	5216.	41.883	52610.
700.	12.819	69.453	61.893	8368.	3658.	43.847	37650.
1000.	13.589	70.798	64.821	14953.	3261.	45.367	23048.
2000.	13.956	70.743	67.829	21924.	3748.	46.558	11888.
2500.	14.235	81.590	70.337	26812.	6846.	47.510	0.
3000.	14.412	84.502	72.445	36847.	19321.	48.328	0.

TABLE 3.044 THERMODYNAMIC FUNCTIONS FOR COOH (G)

INTERNUCLEAR DISTANCE, ANGSTROMS	1.978	
BOND ANGLE, DEGREES	(180.)	
$I, \text{G}^2\text{CM}^2$	6.495826E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(524.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.26346)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(438.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.86988)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(45888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

REFERENCE

.....FUNCTIONS FOR CO IDEAL.....
MONATONIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	18.927	57.657	57.657	0.	-18374.	48.865	18485.
500.	12.899	63.658	58.951	2369.	-11262.	49.620	12954.
1000.	12.974	72.345	63.788	8648.	-11944.	42.591	589.
1500.	13.581	77.726	67.532	15292.	-1558.	44.118	0.
2000.	13.997	81.695	70.598	22194.	9718.	45.380	0.
2500.	14.261	84.849	73.144	29263.	26985.	46.260	0.
3000.	14.438	87.465	75.319	36439.	32874.	47.070	0.

TABLE 3.045 THERMODYNAMIC FUNCTIONS FOR INOH (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.970
BOND ANGLE, DEGREES	(128.)
$I, \text{G}^2\text{CM}^2$	1.855966E-38
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	2.
N-O STRETCH FREQUENCY, WAVE NOS.	464.
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.78167)
N-O-M BENDING FREQUENCY, WAVE NOS.	(388.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.83928)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	86800.
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR IN IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	$-(G-H298)/T$, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H298)/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.274	58.556	58.556	0.	-19597.	41.587	49746.
500.	12.263	64.677	59.889	2390.	-28578.	42.877	46388.
1000.	13.028	73.437	64.659	8730.	-21189.	44.190	32158.
1500.	13.682	78.832	68.565	15480.	-21226.	45.972	28888.
2000.	14.009	82.584	71.649	22310.	-21037.	47.413	2138.
2500.	14.269	85.968	74.287	29384.	-16952.	48.588	0.
3000.	14.436	88.578	75.390	36563.	-4678.	49.588	0.

TABLE 3.046 THERMODYNAMIC FUNCTIONS FOR SHOH (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.958
BOND ANGLE, DEGREES	(128.)
$I_1^2 I_2^2 I_3, \text{G}^2\text{CM}^2$	1.887324E-38
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	2.
N-O STRETCH FREQUENCY, WAVE NOS.	1542.
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.44445)
N-O-M BENDING FREQUENCY, WAVE NOS.	(1228.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(9.39488)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(86800.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR SH IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	$-(G-H298)/T$, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H298)/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.291	61.836	61.836	0.	-1112.	48.248	63888.
500.	10.391	66.917	62.932	1992.	-7777.	48.859	58328.
1000.	11.657	74.998	67.814	7534.	-4118.	49.288	46378.
1500.	12.427	79.333	70.356	13571.	-4631.	49.438	34228.
2000.	12.918	83.888	73.123	19915.	-4688.	49.538	22888.
2500.	13.287	85.994	75.416	26458.	-4746.	49.592	9788.
3000.	13.594	88.421	77.387	33184.	-1368.	49.668	0.

TABLE 3.867 THERMODYNAMIC FUNCTIONS FOR SBOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.988)
BOND ANGLE, DEGREES	(120.)
$11^{\circ}12'13$, $6^{\circ}03' \times 10^{-6}$	9.086778-117
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	1.
H-O STRETCH FREQUENCY, WAVE NOS.	(539.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.91959)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1342.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.48436)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(75888.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	24

.....FUNCTIONS FOR SB IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.111	68.387	68.387	8.	-5579.	43.868	53117.
500.	10.165	65.289	61.381	1954.	-7239.	43.630	46693.
1000.	11.564	72.823	65.395	7429.	-9774.	45.590	31777.
1500.	12.379	77.679	68.726	13438.	-9298.	47.110	19831.
2000.	12.482	81.315	71.437	19756.	-7961.	48.380	8188.
2500.	13.188	84.225	73.714	26279.	-1741.	49.288	1230.
3000.	13.181	86.646	75.673	32925.	4482.	50.120	-5759.

TABLE 3.868 THERMODYNAMIC FUNCTIONS FOR TEON (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.936)
BOND ANGLE, DEGREES	(120.)
$11^{\circ}12'13$, $6^{\circ}03' \times 10^{-6}$	9.773978-117
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	4.
H-O STRETCH FREQUENCY, WAVE NOS.	(562.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.90088)
H-O-H BENDING FREQUENCY, WAVE NOS.	(782.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.16298)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(65888.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	24

.....FUNCTIONS FOR TE IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.743	63.526	63.526	8.	-12482.	43.648	37831.
500.	10.888	60.882	64.881	2191.	-14586.	44.210	31706.
1000.	11.199	76.787	68.996	7831.	-17863.	46.180	17639.
1500.	12.068	81.742	72.440	13982.	-14884.	47.718	8631.
2000.	12.921	85.416	75.244	20242.	-14824.	48.610	2294.
2500.	13.253	88.346	77.681	26948.	-8823.	49.940	-4217.
3000.	13.427	90.777	79.564	33579.	-387.	50.810	-10096.

TABLE 3.049 THERMODYNAMIC FUNCTIONS FOR ION (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.986	7
BOND ANGLE, DEGREES	(120.)	
I_2 , $G^{\circ}K = CH^{\circ}K$	9.291982-117	
QUANTUM WEIGHT OF GROUND STATE OF 1H	5.	20
H-O STRETCH FREQUENCY, WAVE NOS.	612.	7
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(3.13886)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1377.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(9.58337)	
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG), CAL/MOL	56288.	39
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR I IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.669	63.611	63.611	0.	-23344.	63.164	15589.
500.	10.125	68.768	64.618	1944.	-24588.	65.747	17023.
1000.	12.537	76.075	68.675	7299.	-19937.	65.789	1779.
1500.	12.765	80.922	71.995	13381.	-15155.	67.238	-591.
2000.	12.873	84.559	74.699	19711.	-10292.	68.416	-7831.
2500.	13.182	87.463	76.471	24231.	-5364.	69.385	-13632.
3000.	13.377	89.365	78.427	32874.	-438.	70.295	-20691.

TABLE 3.050 THERMODYNAMIC FUNCTIONS FOR CSOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.460	51
BOND ANGLE, DEGREES	100.	12
I_2 , $G^{\circ}K = CH^{\circ}K$	1.944431E-30	
QUANTUM WEIGHT OF GROUND STATE OF 1H	1.	20
H-O STRETCH FREQUENCY, WAVE NOS.	336.	12
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(3.95896)	
H-O-H BENDING FREQUENCY, WAVE NOS.	306.	12
BENDING FORCE CONSTANT, DYNE/ANGSTROM	5.02819	12
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG), CAL/MOL	91888.	40
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR CS IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.083	69.899	69.899	0.	-63957.	61.940	12159.
500.	12.927	67.239	67.279	2440.	-67784.	62.518	8237.
1000.	13.792	74.101	67.213	4898.	-68479.	64.060	0.
1500.	13.474	81.517	71.133	15979.	-58125.	65.990	0.
2000.	14.27	85.497	74.740	22448.	-39431.	67.100	0.
2500.	14.791	88.857	76.025	29579.	-29579.	68.150	0.
3000.	14.644	91.274	74.021	36763.	-19184.	69.980	0.

TABLE 3.051 THERMODYNAMIC FUNCTIONS FOR BaO (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	2.488	5	
BOND ANGLE, DEGREES	(180.)		
I_0 , CPM ²	8.313234E-39		
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	2.	20	
M-O STRETCH FREQUENCY, WAVE NOS.	(299.)		
STRETCHING FORCE CONSTANT, NDTN/ANGSTROM	(0.75325)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(277.)		
BENDING FORCE CONSTANT, NDTN/ANGSTROM	(0.81657)		
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG, CAL/MOL	114889.	76	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7	

.....FUNCTIONS FOR BA IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H2991)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	12.165	61.669	51.669	0.	-57599.	48.663	35129.
500.	17.461	64.871	67.664	2586.	-64702.	41.226	30874.
1000.	23.112	76.964	69.832	4932.	-68591.	43.188	26999.
1500.	23.643	92.184	71.947	15624.	-66175.	46.721	18124.
2000.	14.32	86.166	75.691	22559.	-65376.	45.931	1930.
2500.	14.44	99.926	77.671	24634.	-67546.	47.689	0.
3000.	14.46	92.146	79.679	36819.	-47678.	48.643	0.

TABLE 3.052 THERMODYNAMIC FUNCTIONS FOR LaO (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.168)		
BOND ANGLE, DEGREES	(180.)		
I_0 , CPM ²	1.317648E-38		
QUANTUM WEIGHT OF GROUND STATE OF ± 1 M	2.	20	
M-O STRETCH FREQUENCY, WAVE NOS.	566.	53	
STRETCHING FORCE CONSTANT, NDTN/ANGSTROM	(2.71275)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(497.)		
BENDING FORCE CONSTANT, NDTN/ANGSTROM	(0.85966)		
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG, CAL/MOL	(125888.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23	

.....FUNCTIONS FOR LA IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H2991)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	10.549	61.761	61.761	0.	-17725.	43.549	91259.
500.	11.921	67.547	63.882	2298.	-19143.	44.210	85248.
1000.	12.922	76.220	67.675	6546.	-22111.	46.668	70650.
1500.	13.557	81.557	71.471	15174.	-23733.	48.729	56810.
2000.	13.984	89.550	74.516	22667.	-24547.	50.399	43380.
2500.	14.252	98.782	77.849	29131.	-25934.	51.748	30429.
3000.	14.624	91.317	79.215	36394.	-25166.	52.970	16750.

TABLE 3.85T THERMODYNAMIC FUNCTIONS FOR GEOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.110)	
BOND ANGLE, DEGREES	(130.1)	
$I, \text{G}^\circ\text{CM}^2$	1.252042E-38	21
QUANTUM WEIGHT OF GROUND STATE OF $v_1 =$	8.	
H-O STRETCH FREQ, WAVE NOS.	(463.1)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(1.81717)	
H-O-H BENDING FREQ, WAVE NOS.	(485.1)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.83999)	
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG, CAL/MOL	(125888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	58	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	59	

.....FUNCTIONS FOR GE IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
278.	11.205	63.485	63.485	0.	-19337.	45.487	88964.
500.	12.732	69.563	64.725	2389.	-28339.	46.456	83832.
1000.	13.812	78.251	64.538	8721.	-24998.	49.838	71248.
1500.	13.598	83.643	73.399	15388.	-26780.	51.378	59668.
2000.	14.067	87.615	76.471	22248.	-19988.	53.324	46888.
2500.	14.267	91.771	79.826	29362.	-18542.	54.965	33497.
3000.	14.435	93.388	81.285	36540.	-16981.	56.365	20998.

TABLE 3.85- THERMODYNAMIC FUNCTIONS FOR PROM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.899)	
BOND ANGLE, DEGREES	(180.)	
$I, \text{G}^\circ\text{CM}^2$	1.219346E-39	21
QUANTUM WEIGHT OF GROUND STATE OF $v_1 =$	9.	
H-O STRETCH FREQ, WAVE NOS.	(469.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.82441)	
H-O-H BENDING FREQ, WAVE NOS.	(424.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.84453)	
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG, CAL/MOL	(128888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	64	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR PR IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.164	63.394	63.394	0.	-38217.	45.339	73728.
500.	12.186	69.448	64.782	2369.	-24539.	45.936	61988.
1000.	12.993	78.162	69.479	8643.	-31957.	48.197	56978.
1500.	13.589	83.548	73.324	15334.	-33425.	50.042	42848.
2000.	14.382	87.518	76.394	22241.	-23361.	51.612	30885.
2500.	14.764	91.673	79.948	29313.	-12148.	52.859	19979.
3000.	14.433	93.290	81.127	36498.	-32412.	53.986	7838.

TABLE 3.355 THERMODYNAMIC FUNCTIONS FOR MOOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.050)	
BOND ANGLE, DEGREES	(110.1)	
I, G*CM**2	1.185017E-39	
QUANTUM WEIGHT OF GROUND STATE OF *1 H	5.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(516.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.26346)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(446.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.04980)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(120000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR NO IDEAL....
MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.919	62.966	62.966	0.	-34959.	45.240	68870.
500.	12.091	68.953	68.259	2347.	-36331.	45.870	63220.
1000.	12.972	77.646	69.004	8641.	-37413.	48.240	49780.
1500.	13.560	83.826	72.835	15237.	-37955.	50.210	37400.
2000.	13.997	86.994	75.930	22188.	-36574.	51.770	26380.
2500.	14.261	90.148	78.445	29258.	-34199.	53.040	16880.
3000.	14.430	92.764	80.620	36433.	-31570.	54.180	6170.

TABLE 3.356 THERMODYNAMIC FUNCTIONS FOR PMOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.020)	
BOND ANGLE, DEGREES	(100.)	
I, G*CM**2	4.589571E-39	
QUANTUM WEIGHT OF GROUND STATE OF *1 H	5.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(546.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.54222)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(469.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.05593)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(115000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		68
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		EST

.....FUNCTIONS FOR PM IDEAL....
MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.739	59.353	59.953	0.	-52312.	(44.679)	(45796.)
500.	12.107	65.074	61.238	2322.	-50792.	(45.366)	(42196.)
1000.	12.947	74.932	65.939	8594.	-47343.	(47.931)	(32411.)
1500.	13.569	79.966	69.752	15231.	-43748.	(50.826)	(22258.)
2000.	13.998	83.472	72.888	22128.	-39475.	(51.699)	(12436.)
2500.	14.257	87.325	75.347	29195.	-36156.	(53.070)	(1422.)
3000.	14.427	89.648	77.517	36369.	-32871.	(54.220)	(0.)

TABLE 3.57 THERMODYNAMIC FUNCTIONS FOR SHOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.990)	
BOND ANGLE, DEGREES	(180.)	
I, GCM**2	1.127044E-19	
QUANTUM WEIGHT OF GROUND STATE OF μ_1	9.	21
M-O STRETCH FREQUENCY, WAVE NOS.	(549.)	
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(2.86870)	
M-O-M BENDING FREQUENCY, WAVE NOS.	(495.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.06311)	
HEAT OF DISSOCIATION AT 298K TO HIG AND O-HIG, CAL/MOL	(110000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR SH IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.552	59.909	59.804	0.	-52334.	43.722	41317.
500.	11.910	65.057	61.068	2295.	-52456.	44.565	35862.
1000.	12.119	74.276	65.737	1549.	-52103.	47.439	22941.
1500.	13.556	79.642	69.530	15167.	-49948.	49.676	11351.
2000.	13.983	83.605	72.575	22660.	-45938.	51.379	1248.
2500.	14.152	86.756	75.107	29123.	-32352.	52.720	0.
3000.	14.424	89.371	77.272	36295.	-18537.	53.820	0.

TABLE 3.58 THERMODYNAMIC FUNCTIONS FOR EUOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.960)	
BOND ANGLE, DEGREES	(180.)	
I, GCM**2	1.096041E-19	
QUANTUM WEIGHT OF GROUND STATE OF μ_1	9.	21
M-O STRETCH FREQUENCY, WAVE NOS.	(617.)	
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(3.25356)	
M-O-M BENDING FREQUENCY, WAVE NOS.	(523.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(3.07159)	
HEAT OF DISSOCIATION AT 298K TO HIG AND OHIG, CAL/MOL	(105010.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR EU IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.146	62.658	62.664	0.	-54551.	45.097	34212.
500.	11.400	67.335	67.804	2264.	-55031.	46.660	29100.
1000.	12.116	76.939	64.431	6678.	-55427.	47.622	17128.
1500.	13.540	82.245	77.272	15894.	-54368.	49.142	6947.
2000.	13.976	85.224	75.274	21981.	-49502.	50.330	0.
2500.	14.146	87.374	77.754	29041.	-34331.	51.300	0.
3000.	14.420	91.999	79.914	36211.	-26544.	52.130	0.

TABLE 3.059 THERMODYNAMIC FUNCTIONS FOR COOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.100)	
BOND ANGLE, DEGREES	(140.)	
I, G ^{CM} ²	6.370081E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	6.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(469.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.84285)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(411.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.6442)	
HEAT OF DISSOCIATION AT 298° TO HIG AND O+(G), CAL/MOL	(128000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		61

.....FUNCTIONS FOR GD IDEAL.....
 : MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.167	61.738	61.774	0.	-21178.	46.420	81932.
500.	12.214	67.821	63.054	2363.	-21210.	47.160	76794.
1000.	13.067	76.562	47.852	5711.	-21889.	49.690	63899.
1500.	13.596	81.953	71.708	15365.	-22617.	51.578	51886.
2000.	14.085	85.924	74.747	22275.	-23134.	53.810	39189.
2500.	14.267	89.086	77.241	29348.	-19549.	54.193	25214.
3000.	14.434	91.697	79.922	36526.	-16771.	55.228	12314.

TABLE 3.060 THERMODYNAMIC FUNCTIONS FOR TCOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.078)	
BOND ANGLE, DEGREES	(118.)	
I, G ^{CM} ²	1.222309E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	17.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(495.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.89999)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(431.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.84628)	
HEAT OF DISSOCIATION AT 298° TO HIG AND O+(G), CAL/MOL	(128000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		60
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		61

.....FUNCTIONS FOR TO IDEAL.....
 : MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.721	64.925	64.925	0.	-23746.	49.552	79690.
500.	12.145	70.954	66.229	2363.	-24164.	49.212	74481.
1000.	12.937	79.658	70.996	5672.	-25149.	51.587	61186.
1500.	13.487	85.893	74.838	15322.	-25728.	53.321	47972.
2000.	14.061	89.822	77.904	22227.	-26220.	54.767	36798.
2500.	14.263	92.177	80.458	29298.	-24974.	55.964	23143.
3000.	14.432	94.793	82.635	36474.	-24593.	56.986	10241.

TABLE 3.651 THERMODYNAMIC FUNCTIONS FOR DYOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.848)	
BOND ANGLE, DEGREES	(118.1)	
$I, \text{C}^{12}\text{H}^{16}\text{O}_2$	1.198905E-39	
QUANTUM WEIGHT OF GROUND STATE OF $+1 \text{ M}$	19.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(523.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.35163)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(453.)	
BENDING FORCE CONSTANT, NDYNE/ANGSTROM	(3.65174)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND O(HG) , CAL/MOL	(118839.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		60
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		73

.....FUNCTIONS FOR DY IDEAL.....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	18.561	64.941	64.841	0.	-32345.	46.796	61898.
500.	12.768	70.810	66.129	2348.	-31943.	47.357	59588.
1000.	12.965	79.492	70.864	8628.	-36636.	49.324	46158.
1500.	13.877	84.871	74.610	15271.	-38861.	50.876	28288.
2000.	13.995	88.038	77.753	22172.	-38431.	52.119	17938.
2500.	14.768	91.992	80.296	29248.	-36814.	53.167	7896.
3000.	14.629	94.688	82.469	36419.	-33368.	54.876	0.

TABLE 3.662 THERMODYNAMIC FUNCTIONS FOR HDOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.818)	
BOND ANGLE, DEGREES	(118.1)	
$I, \text{C}^{12}\text{H}^{16}\text{O}_2$	4.515328E-39	
QUANTUM WEIGHT OF GROUND STATE OF $+1 \text{ M}$	17.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(554.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.64527)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(477.)	
BENDING FORCE CONSTANT, NDYNE/ANGSTROM	(3.03928)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND O(HG) , CAL/MOL	(118888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		73
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		73

.....FUNCTIONS FOR HO IDEAL.....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	18.585	62.634	62.634	0.	-29983.	46.718	63317.
500.	11.980	69.535	63.986	2314.	-30771.	47.281	57998.
1000.	12.939	77.182	68.684	9579.	-32114.	49.244	43992.
1500.	13.965	82.554	72.412	15213.	-32587.	50.774	31867.
2000.	13.928	86.519	75.464	22109.	-32174.	51.986	19588.
2500.	14.255	89.671	78.081	29175.	-30164.	52.990	9258.
3000.	14.426	92.296	80.170	36348.	-27093.	53.866	0.

TABLE 3.363 THERMODYNAMIC FUNCTIONS FOR ERON (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.940)	
BOND ANGLE, DEGREES	(180.)	
I, C ² CM ²	1.127771E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	16.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(589.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.95289)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(596.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.66579)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(118889.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR ER IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.451	63.901	63.401	0.	-26593.	46.347	67195.
500.	11.879	69.726	65.155	2286.	-27704.	46.918	61473.
1000.	12.910	78.732	69.810	8532.	-29766.	49.874	47816.
1500.	13.751	85.695	73.598	15146.	-31169.	50.486	35336.
2000.	13.988	87.637	76.634	22037.	-31341.	51.624	23372.
2500.	14.250	89.038	79.168	29100.	-30735.	52.641	12359.
3000.	14.423	93.623	81.332	36271.	-29167.	53.929	2723.

TABLE 3.064 THERMODYNAMIC FUNCTIONS FOR YMOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.938)	
BOND ANGLE, DEGREES	(180.)	
I, C ² CM ²	1.896319E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	9.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(627.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.39788)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(535.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.87474)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(185886.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR YH IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.260	62.792	62.792	0.	-43584.	45.412	47232.
500.	12.764	69.533	64.826	2253.	-43360.	45.915	41722.
1000.	12.875	77.891	68.633	8458.	-43952.	47.937	28590.
1500.	13.535	82.444	72.399	15078.	-44734.	49.459	16092.
2000.	13.971	86.483	75.425	21955.	-44682.	50.643	4576.
2500.	14.244	89.552	77.946	29014.	-37685.	51.627	0.
3000.	14.439	92.166	80.105	36183.	-26144.	52.492	0.

TABLE 3.365 THERMODYNAMIC FUNCTIONS FOR YBOM (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.920)	
BOND ANGLE, DEGREES	(188.)	
I, G ^{CM} ²	1.066425E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(670.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(3.88170)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(565.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(3.82540)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(189800.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR YB IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	18.150	59.617	59.617	0.	-55715.	41.352	28285.
500.	11.637	65.263	60.929	2217.	-56598.	41.515	22915.
1000.	12.924	73.766	69.381	8385.	-57968.	43.877	10298.
1500.	12.516	75.188	69.119	14983.	-57180.	45.357	0.
2000.	13.461	83.462	72.132	21861.	-45.77.	46.598	0.
2500.	14.238	88.210	74.643	28916.	-34645.	47.548	0.
3000.	14.414	88.822	76.795	36882.	-23485.	48.368	0.

TABLE 3.365 THERMODYNAMIC FUNCTIONS FOR LUOH (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.988)	
BOND ANGLE, DEGREES	(180.)	
I, G ^{CM} ²	1.045344E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(701.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(4.25789)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(598.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.89366)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(128888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR LU IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.186	58.192	58.192	0.	-10843.	44.152	92671.
500.	11.534	61.678	59.296	2191.	-11848.	44.713	86388.
1000.	12.883	72.146	63.810	8330.	-12976.	46.338	70858.
1500.	13.582	77.473	67.525	14513.	-14123.	48.688	55883.
2000.	13.752	81.424	70.529	21793.	-14574.	50.848	41148.
2500.	14.232	84.578	73.873	28842.	-13302.	51.177	28225.
3000.	14.410	87.182	75.190	36005.	-11413.	52.159	15938.

TABLE 3.067 THERMODYNAMIC FUNCTIONS FOR HFOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.988)	
BOND ANGLE, DEGREES	(120.)	
11*12*13, C**3 * CM**6	9.632599-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	4.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(781.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(4.25709)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1581.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.68885)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND O(HG), CAL/MOL	(148800.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR HF IDEAL.....
 : MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.929	64.301	64.301	0.	13468.	44.642	137794.
500.	9.915	64.414	65.040	1887.	10984.	45.288	138956.
1000.	11.753	76.144	64.925	7219.	6739.	47.265	144449.
1500.	12.764	80.935	72.173	13142.	2447.	49.889	98251.
2000.	12.712	84.545	74.833	19423.	-1181.	50.472	82316.
2500.	13.142	87.442	77.074	25914.	-3349.	51.719	66427.
3000.	13.148	89.858	74.010	32544.	-3999.	52.799	52413.

TABLE 3.068 THERMODYNAMIC FUNCTIONS FOR TAOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.858)	
BOND ANGLE, DEGREES	(128.)	
11*12*13, C**3 * CM**6	8.872955-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	3.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(791.)	
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(5.43372)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1787.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.85826)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND O(HG), CAL/MOL	(138800.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR TAO IDEAL.....
 : MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.140	63.270	63.270	0.	62448.	44.241	176667.
500.	9.578	67.971	64.294	1843.	60011.	44.812	169384.
1000.	11.189	75.152	68.882	7070.	55172.	46.938	153862.
1500.	12.171	79.491	71.271	12938.	51182.	48.775	136343.
2000.	12.754	83.479	73.892	19174.	47701.	50.326	119528.
2500.	13.103	86.366	76.108	25646.	44586.	51.656	102602.
3000.	13.321	87.776	78.024	32256.	41320.	52.826	85602.

TABLE 3.663 THERMODYNAMIC FUNCTIONS FOR MON (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.638	7
BOND ANGLE, DEGREES	(126.)	
$12^{\circ}12'13$, $G^{\circ}3 \times CH^{\circ}6$	8.924162-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	20
H-O STRETCH FREQUENCY, WAVE NOS.	726.	7
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(4.58342)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1634.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(9.74258)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(115880.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR M IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.775	62.533	62.533	0.	91936.	61.551	191745.
500.	9.759	67.317	63.965	1076.	80221.	62.157	184971.
1000.	11.321	74.614	67.438	7105.	43538.	64.762	167952.
1500.	12.247	79.395	70.665	13896.	70465.	67.250	158286.
2000.	12.881	83.881	73.315	19378.	74292.	69.265	132087.
2500.	13.135	85.697	75.552	25061.	78310.	70.873	113995.
3000.	13.343	88.311	77.683	32486.	66474.	72.196	93736.

TABLE 3.673 THERMODYNAMIC FUNCTIONS FOR NEON (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.858)	
BOND ANGLE, DEGREES	(128.)	
$12^{\circ}12'13$, $G^{\circ}3 \times CH^{\circ}6$	8.915779-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	7.	20
H-O STRETCH FREQUENCY, WAVE NOS.	(798.)	
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(5.43372)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1787.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(9.88826)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(188880.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR NE IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.642	65.837	65.837	0.	98481.	65.138	175298.
500.	9.779	69.739	68.452	1045.	87413.	65.788	168845.
1000.	11.190	76.920	69.850	7078.	41584.	67.674	152518.
1500.	12.171	81.660	73.039	12931.	76249.	69.168	133645.
2000.	12.754	85.248	75.661	19175.	71624.	70.368	116928.
2500.	13.183	88.135	77.876	25647.	67493.	71.348	100728.
3000.	13.321	90.565	79.792	32257.	63592.	72.176	84948.

TABLE 3.071 THERMODYNAMIC FUNCTIONS FOR OSM (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS		(1.070)	
BOND ANGLE, DEGREES		(120.)	
11°12'13, G°°3 + CH°°6		4.334023-117	
QUANTUM WEIGHT OF GROUND STATE OF +1 M		10.	20
H-O STRETCH FREQUENCY, WAVE NOS.		(1751.)	
STRETCHING FORCE CONSTANT, MOYNE/ANGSTROM		(4.91559)	
H-O-H BENDING FREQUENCY, WAVE NOS.		(1700.)	
BENDING FORCE CONSTANT, MOYNE/ANGSTROM		(0.79669)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL		(92000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT			29
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT			29

.....FUNCTIONS FOR OS IDEAL.....
MONATOMIC GAS

T K	C ^o , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	0.719	65.016	65.044	0.	99970.	46.002	176010.
500.	9.677	70.634	64.911	1462.	96120.	46.955	168150.
1000.	11.740	77.079	70.746	7133.	10317.	48.956	149739.
1500.	12.312	82.646	76.940	13020.	92731.	50.173	131629.
2000.	12.786	86.230	76.590	19200.	7676.	51.540	119212.
2500.	13.120	89.129	76.074	25762.	70309.	52.077	99660.
3000.	13.323	91.542	69.740	32300.	65627.	54.697	76990.

TABLE 3.072 THERMODYNAMIC FUNCTIONS FOR IRON (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS		(1.090)	
BOND ANGLE, DEGREES		(100.)	
I, G°CH°°2		1.835901E-30	
QUANTUM WEIGHT OF GROUND STATE OF +1 M		(17.)	
H-O STRETCH FREQUENCY, WAVE NOS.		(719.)	
STRETCHING FORCE CONSTANT, MOYNE/ANGSTROM		(4.96309)	
H-O-H BENDING FREQUENCY, WAVE NOS.		(643.)	
BENDING FORCE CONSTANT, MOYNE/ANGSTROM		(0.89419)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL		(88002.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT			23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT			23

.....FUNCTIONS FOR IR IDEAL.....
MONATOMIC GAS

T K	C ^o , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.006	63.910	63.910	0.	44922.	46.256	148746.
500.	11.095	69.453	65.047	2170.	31985.	46.619	141100.
1000.	12.700	77.094	69.591	8303.	75320.	48.017	122040.
1500.	13.495	83.222	73.230	14086.	61774.	50.452	100060.
2000.	13.940	87.372	76.294	21786.	63639.	51.805	87110.
2500.	14.230	90.317	76.795	28085.	50064.	52.956	69550.
3000.	14.489	92.920	64.939	35960.	53690.	53.965	52500.

TABLE 3.373 THERMODYNAMIC FUNCTIONS FOR PTOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.913)
BOND ANGLE, DEGREES	(103.)
I, G ² CM ²	1.8611627-35
QUANTUM WEIGHT OF GROUND STATE OF ⁴¹ W	6.
M-O STRETCH FREQUENCY, WAVE NOS.	(682.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(4.66162)
M-O-H BENDING FREQUENCY, WAVE NOS.	(579.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.64948)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(78889.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR PT IDEAL.....
 : MONATOMIC GAS :
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T K	C _P , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.976	62.657	62.657	0.	78375.	63.963	126230.
500.	13.909	67.672	63.261	2206.	60613.	66.680	116980.
1000.	12.121	76.157	67.797	4361.	63639.	60.162	99020.
1500.	13.510	81.095	71.525	16355.	55206.	59.006	81430.
2000.	13.957	85.140	74.533	21838.	53109.	62.354	64220.
2500.	14.635	88.595	77.841	28883.	52547.	63.641	40435.
3000.	14.412	91.207	79.191	36249.	50326.	64.353	33020.

TABLE 3.374 THERMODYNAMIC FUNCTIONS FOR AUOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.924)
BOND ANGLE, DEGREES	(100.)
I, G ² CM ²	1.873764E-35
QUANTUM WEIGHT OF GROUND STATE OF ⁴¹ W	1.
M-O STRETCH FREQUENCY, WAVE NOS.	(666.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(1.88170)
M-O-H BENDING FREQUENCY, WAVE NOS.	(566.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.08548)
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(65883.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR AU IDEAL.....
 : MONATOMIC GAS :
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T K	C _P , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.157	58.612	58.612	0.	29667.	63.129	77020.
500.	11.637	64.261	59.823	2219.	28333.	63.683	71460.
1000.	12.436	72.766	64.379	4380.	25679.	65.654	56150.
1500.	13.517	78.109	68.114	14907.	23844.	67.165	41650.
2000.	13.961	82.063	71.131	21865.	23047.	68.356	28290.
2500.	14.238	85.211	73.643	28920.	22477.	69.340	15120.
3000.	14.414	87.823	74.705	36086.	22167.	69.187	2110.

TABLE 3.875 THERMODYNAMIC FUNCTIONS FOR HCOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.888)	
BOND ANGLE, DEGREES	(180.)	
I, CCM ²	1.155465E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	28
H-O STRETCH FREQUENCY, WAVE NOS.	491.	7
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.11153)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(429.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.84645)	
HEAT OF DISSOCIATION AT 298K TO HIG(AND OHIG), CAL/MOL	(28338.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR H2 IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.53	61.241	61.241	0.	3257.	61.794	7689.
500.	12.161	67.242	62.547	2367.	2743.	62.737	2934.
1000.	12.992	74.022	67.321	8631.	10252.	64.319	0.
1500.	13.49	81.388	71.166	15332.	28594.	65.948	0.
2000.	14.072	88.358	76.239	22738.	50672.	67.822	0.
2500.	14.724	94.513	76.749	29339.	61993.	67.983	0.
3000.	14.73	95.129	74.947	36455.	51200.	68.798	0.

TABLE 3.875 THERMODYNAMIC FUNCTIONS FOR TLOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	2.884	54
BOND ANGLE, DEGREES	(180.)	
I, CCM ²	1.252225E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	28
H-O STRETCH FREQUENCY, WAVE NOS.	475.	54
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(1.97992)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(420.)	
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.64354)	
HEAT OF DISSOCIATION AT 298K TO HIG(AND OHIG), CAL/MOL	78888.	38
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR TL IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.114	60.155	60.155	0.	-18361.	63.238	35240.
500.	12.198	66.219	61.467	2376.	-19289.	63.758	29688.
1000.	13.408	74.951	66.244	8697.	-19939.	65.769	17419.
1500.	13.952	80.339	70.105	15352.	-19814.	67.278	5893.
2000.	14.004	84.316	73.151	22258.	-14796.	68.488	0.
2500.	14.265	87.465	75.733	29338.	-2578.	69.468	0.
3000.	14.433	90.182	77.913	36508.	9041.	50.328	0.

TABLE 3.077 THERMODYNAMIC FUNCTIONS FOR PbO (G)

			REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.070	44	
BOND ANGLE, DEGREES	(120.)		
$11^{\circ}12'13$, $6^{\circ}03'00$ CH ⁰⁰⁰	1.412215-116		
QUANTUM WEIGHT OF GROUND STATE OF ^{21}Pb	2.	20	
H-O STRETCH FREQUENCY, WAVE NOS.	574.	10	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.49293)		
H-O-H BENDING FREQUENCY, WAVE NOS.	(1373.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.46866)		
HEAT OF DISSOCIATION AT 298K TO H_2O AND O_2 , CAL/MOL	(65889.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7		

.....FUNCTIONS FOR Pb IDEAL.....
POLYATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	$-(G-H_{298})/T$, GIBBS/MOL	H-H ₂₉₈ , CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H_{298})/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.152	63.595	63.595	0.	-11151.	61.998	11874.
500.	10.166	68.507	64.672	1957.	-12534.	62.453	33612.
1000.	11.954	76.116	68.888	7420.	-12997.	64.616	22821.
1500.	12.173	80.968	72.818	13429.	-14392.	65.968	11162.
2000.	12.075	84.683	74.729	19748.	-14317.	67.145	544.
2500.	13.185	87.512	77.004	26270.	-3985.	68.165	0.
3000.	13.179	89.935	78.563	32915.	7182.	69.077	0.

TABLE 3.078 THERMODYNAMIC FUNCTIONS FOR BiO (G)

			REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.118	44	
BOND ANGLE, DEGREES	(124.)		
$11^{\circ}12'13$, $6^{\circ}03'00$ CH ⁰⁰⁰	1.525835-116		
QUANTUM WEIGHT OF GROUND STATE OF ^{21}Bi	1.	20	
H-O STRETCH FREQUENCY, WAVE NOS.	(455.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.81717)		
H-O-H BENDING FREQUENCY, WAVE NOS.	(1898.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.29439)		
HEAT OF DISSOCIATION AT 298K TO H_2O AND O_2 , CAL/MOL	(65888.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23		

.....FUNCTIONS FOR Bi IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	$-(G-H_{298})/T$, GIBBS/MOL	H-H ₂₉₈ , CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H_{298})/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.526	62.645	62.645	0.	-6723.	64.670	40198.
500.	10.559	67.659	63.777	2008.	-10335.	65.230	33993.
1000.	11.765	75.625	67.958	7676.	-11062.	67.280	21634.
1500.	12.081	80.561	71.375	13749.	-10619.	68.720	9788.
2000.	12.042	84.208	74.163	20114.	-8179.	69.980	0.
2500.	13.227	87.121	76.456	26662.	4149.	50.870	0.
3000.	13.409	89.549	78.441	33324.	16536.	51.680	0.

TABLE 3.073 THERMODYNAMIC FUNCTIONS FOR POOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS (12.060)
 BOND ANGLE, DEGREES (120.1)
 $11^{\circ}12'13$, $G^{\circ}3 \times 10^{11}$ (1.75763-116)
 QUANTUM WEIGHT OF GROUND STATE OF ν_1 M (4.1)
 $H-O$ STRETCH FREQUENCY, WAVE NOS. (4980)
 STRETCHING FORCE CONSTANT, DYNE/ANGSTROM (12.17933)
 $H-O-H$ BENDING FREQUENCY, WAVE NOS. (1189.1)
 BENDING FORCE CONSTANT, DYNE/ANGSTROM (0.35310)
 HEAT OF DISSOCIATION AT 298.15 K (L AND 60835.1)
 O(IG), CAL/MOL

REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24

.....FUNCTIONS FOR PO IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.415	65.152	65.152	0.	-19169.	45.138	25467.
500.	10.446	70.322	66.291	2015.	-20474.	45.728	19576.
1000.	11.697	77.999	70.410	7599.	-21429.	47.859	7977.
1500.	12.447	82.594	73.032	13638.	-19965.	49.378	0.
2000.	12.922	85.545	76.551	19990.	-4675.	50.568	0.
2500.	13.216	89.463	78.851	26530.	4411.	52.538	0.
3000.	13.470	91.890	80.826	33156.	16317.	52.358	0.

TABLE 3.083 THERMODYNAMIC FUNCTIONS FOR ATOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS (12.050)
 BOND ANGLE, DEGREES (120.)
 $11^{\circ}12'13$, $G^{\circ}3 \times 10^{11}$ (1.361671-116)
 QUANTUM WEIGHT OF GROUND STATE OF ν_1 M (5.)
 $H-O$ STRETCH FREQUENCY, WAVE NOS. (597.)
 STRETCHING FORCE CONSTANT, DYNE/ANGSTROM (12.26346)
 $H-O-H$ BENDING FREQUENCY, WAVE NOS. (1289.)
 BENDING FORCE CONSTANT, DYNE/ANGSTROM (0.38664)
 HEAT OF DISSOCIATION AT 298 K TO H(G) AND (53808.)
 OH(G), CAL/MOL

REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24

.....FUNCTIONS FOR AT IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	9.381	65.588	65.588	0.	-26782.	44.688	13832.
500.	10.413	70.781	66.685	2080.	-26749.	45.259	7825.
1000.	11.681	76.362	70.791	7571.	-24144.	47.210	-717.
1500.	12.429	81.252	74.176	13614.	-14472.	49.720	-4676.
2000.	12.917	86.982	76.921	19963.	-10315.	49.920	-13120.
2500.	13.211	89.210	79.214	26580.	-10144.	50.870	-15337.
3000.	13.497	92.245	81.243	33156.	-5424.	51.640	-25789.

TABLE 3.051 THERMODYNAMIC FUNCTIONS FOR FROM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS (2.400)
 BOND ANGLE, DEGREES (180.)
 I, G*CM**2 6.262918F-39
 QUANTUM WEIGHT OF GROUND STATE OF +1 M (1.)
 M-O STRETCH FREQUENCY, WAVE NOS. (304.)
 STRETCHING FORCE CONSTANT, *DYNE/ANGSTROM (0.83845)
 M-O-H BENDING FREQUENCY, WAVE NOS. (292.)
 BENDING FORCE CONSTANT, *DYNE/ANGSTROM (0.81845)
 HEAT OF DISSOCIATION AT 298K TO M(G) AND (90000.)
 DM(G), CAL/MOL
 REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24

.....FUNCTIONS FOR FR IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.751	61.366	61.366	0.	-62742.	43.480	11145.
500.	12.572	67.743	62.755	2494.	-62311.	44.050	7398.
1000.	13.104	76.624	67.799	8915.	-58445.	46.810	0.
1500.	13.640	82.041	71.638	15605.	-475.9.	47.530	0.
2000.	14.030	86.023	74.758	22529.	-36771.	48.720	0.
2500.	14.282	89.153	77.338	29612.	-25982.	49.700	0.
3000.	14.445	91.802	79.537	36797.	-15208.	50.530	0.

TABLE 3.052 THERMODYNAMIC FUNCTIONS FOR RADH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS (2.300)
 BOND ANGLE, DEGREES (180.)
 I, G*CM**2 9.816908E-39
 QUANTUM WEIGHT OF GROUND STATE OF +1 M 2. 20
 M-O STRETCH FREQUENCY, WAVE NOS. (355.)
 STRETCHING FORCE CONSTANT, *DYNE/ANGSTROM (1.11597)
 M-O-H BENDING FREQUENCY, WAVE NOS. (330.)
 BENDING FORCE CONSTANT, *DYNE/ANGSTROM (1.02455)
 HEAT OF DISSOCIATION AT 298K TO M(G) AND (110030.)
 DM(G), CAL/MOL
 REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24

.....FUNCTIONS FOR RA IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.750	61.441	61.441	0.	-63104.	42.158	31201.
500.	12.472	67.734	62.809	2463.	-63373.	42.710	26232.
1000.	13.078	76.577	67.715	8858.	-64725.	44.688	19057.
1500.	13.628	81.957	71.628	15539.	-64038.	46.200	5521.
2000.	14.024	85.566	74.737	22458.	-59387.	47.390	0.
2500.	14.278	89.125	77.309	29519.	-49234.	48.370	0.
3000.	14.442	91.743	79.593	36722.	-39055.	49.210	0.

TABLE 3.993 THERMODYNAMIC FUNCTIONS FOR ACOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.200)
BOND ANGLE, DEGREES	(180.)
I, G ² CM ²	7.480665E-39
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.
M-O STRETCH FREQUENCY, WAVE NOS.	(416.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.53093)
M-O-M BENDING FREQUENCY, WAVE NOS.	(378.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.03368)
HEAT OF DISSOCIATION AT 298K TO 4(G) AND OH(G), CAL/MOL	(11700.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	62
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	75

.....FUNCTIONS FOR AC IDEAL.....
 . MONATOMIC GAS .
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T K	C _P , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.421	59.908	59.908	0.	-10255.	39.949	91250.
500.	12.330	65.084	61.247	2419.	-11208.	42.424	85260.
1000.	13.39	74.371	66.095	8777.	-13113.	46.878	70650.
1500.	13.510	80.271	69.974	15444.	-14137.	48.288	56610.
2000.	14.014	84.246	73.067	22358.	-14576.	49.936	43880.
2500.	14.272	87.403	75.679	29434.	-14849.	51.234	30825.
3000.	14.428	90.021	77.816	36614.	-14911.	52.322	16750.

TABLE 3.984 THERMODYNAMIC FUNCTIONS FOR THOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.200)
BOND ANGLE, DEGREES	(180.)
I, G ² CM ²	1.412996E-38
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.
M-O STRETCH FREQUENCY, WAVE NOS.	(416.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.53083)
M-O-M BENDING FREQUENCY, WAVE NOS.	(378.)
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.03368)
HEAT OF DISSOCIATION AT 298K TO 4(G) AND OH(G), CAL/MOL	(12180.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR TH IDEAL.....
 . MONATOMIC GAS .
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T K	C _P , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.422	63.988	63.988	0.	22672.	45.424	127761.
500.	12.331	70.165	65.324	2419.	28541.	45.989	121267.
1000.	13.839	78.952	70.175	8777.	15680.	48.821	105580.
1500.	13.610	84.351	74.855	15445.	12215.	49.769	91031.
2000.	14.14	88.326	77.147	22358.	9433.	51.338	76746.
2500.	14.272	91.493	79.710	29434.	8318.	52.702	63716.
3000.	14.438	94.101	81.896	36615.	7082.	53.985	50956.

TABLE 3.055 THERMODYNAMIC FUNCTIONS FOR PAOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.150)	
BOND ANGLE, DEGREES	(120.)	
I, G*CM**2	5.227907E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	9.	21
M-O STRETCH FREQUENCY, WAVE NOS.	(457.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.81717)	
M-O-M BENDING FREQUENCY, WAVE NOS.	(408.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.03998)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(117000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	60	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR PA IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.213	61.269	63.269	0.	14987.	(47.419)	(115227.)
500.	12.236	69.370	64.590	2390.	14926.	(49.061)	(109347.)
1000.	13.013	78.120	69.396	8723.	12681.	(50.298)	(95533.)
1500.	13.568	83.512	73.257	15382.	9573.	(51.992)	(79887.)
2000.	14.007	87.484	76.339	22291.	8362.	(53.314)	(66185.)
2500.	14.268	90.640	78.894	29365.	8371.	(54.391)	(53515.)
3000.	14.435	93.257	81.076	36543.	7296.	(55.298)	(39810.)

TABLE 3.065 THERMODYNAMIC FUNCTIONS FOR UOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.100)	
BOND ANGLE, DEGREES	(120.)	
I, G*CM**2	1.380149E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	10.	21
M-O STRETCH FREQUENCY, WAVE NOS.	(496.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.17963)	
M-O-M BENDING FREQUENCY, WAVE NOS.	(442.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(6.04795)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(114000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR U IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.370	65.027	65.027	0.	16642.	47.724	114355.
500.	12.122	71.038	66.326	2356.	14180.	48.378	107215.
1000.	12.981	79.742	71.094	8659.	9132.	50.680	90358.
1500.	13.584	85.125	74.921	15307.	6207.	52.364	75459.
2000.	13.999	89.894	77.989	22210.	4808.	53.825	61830.
2500.	14.262	92.268	80.536	29280.	4197.	55.108	48659.
3000.	14.431	94.865	82.713	36456.	4182.	56.263	35711.

TABLE 3.087 THERMODYNAMIC FUNCTIONS FOR NPOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.080)	
BOND ANGLE, DEGREES	(180.)	
I, G ² CM ²	6.639592E-39	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	9.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(515.)	
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(2.35163)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(457.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.05174)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(112000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	60	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	87	

.....FUNCTIONS FOR NP IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/FOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/FOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/FOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.861	63.333	63.333	0.	-8053.	47.229	87363.
500.	12.069	69.301	64.621	2340.	-7926.	47.796	82643.
1000.	12.965	77.984	69.356	8628.	-7256.	49.872	70974.
1500.	13.577	83.363	73.192	15271.	-6383.	51.668	59305.
2000.	13.995	87.331	76.249	22172.	-5147.	53.280	47636.
2500.	14.260	90.484	78.788	29241.	-3802.	54.515	35967.
3000.	14.429	93.100	80.962	36416.	-1919.	55.649	24299.

TABLE 3.089 THERMODYNAMIC FUNCTIONS FOR PUOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.080)	
BOND ANGLE, DEGREES	(180.)	
I, G ² CM ²	1.270923E-35	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(515.)	
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(2.35163)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(457.)	
BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.05174)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(107080.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR PU IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/FOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/FOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/FOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.861	61.658	61.658	0.	-16170.	42.317	75150.
500.	12.069	67.627	62.946	2340.	-17605.	42.589	69489.
1000.	12.965	76.310	67.651	8628.	-19179.	45.098	57250.
1500.	13.577	81.688	71.507	15271.	-18951.	47.157	45992.
2000.	13.995	85.656	74.570	22172.	-18034.	49.033	34738.
2500.	14.260	88.810	77.117	29241.	-16522.	50.731	23324.
3000.	14.429	91.426	79.267	36416.	-14519.	52.254	11760.

TABLE 3.189 THERMODYNAMIC FUNCTIONS FOR AMOH (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.050)		
BOND ANGLE, DEGREES	(190.)		
I, G ⁰ CM ²	5.043857E-39		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	9.	21	
M-O STRETCH FREQUENCY, WAVE NOS.	(515.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.35163)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(457.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.05174)		
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(107000.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	60		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23		

.....FUNCTIONS FOR AN IDEAL.....
 MONATOMIC GAS

T K	C ⁰ , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.862	62.857	62.857	0.	-35440.	46.472	55000.
500.	12.169	69.826	64.146	2340.	-35147.	47.825	50465.
1000.	12.966	77.509	68.841	8629.	-34400.	48.997	39230.
1500.	13.577	82.888	72.707	15272.	-33281.	50.518	20500.
2000.	13.395	86.956	75.770	22172.	-31433.	51.700	10400.
2500.	14.260	90.109	78.313	29241.	-29714.	52.662	8300.
3000.	14.430	92.625	80.487	36416.	-26215.	53.475	0.

TABLE 3.093 THERMODYNAMIC FUNCTIONS FOR CMOH (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.250)		
BOND ANGLE, DEGREES	(100.)		
I, G ⁰ CM ²	1.462421E-39		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	8.	21	
M-O STRETCH FREQUENCY, WAVE NOS.	(383.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.38161)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(353.)		
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(9.02064)		
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(117800.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	60		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST		

.....FUNCTIONS FOR CM IDEAL.....
 MONATOMIC GAS

T K	C ⁰ , GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.501	65.948	65.948	0.	-25341.	47.964	(76143.)
500.	12.489	72.199	67.384	2443.	-25817.	47.788	(71797.)
1000.	13.860	81.447	72.196	8922.	-24781.	50.279	(68952.)
1500.	13.626	86.413	76.081	15497.	-24171.	52.174	(58107.)
2000.	14.049	90.396	79.183	22413.	-23550.	53.624	(39262.)
2500.	14.275	93.548	81.751	29492.	-22802.	54.786	(24417.)
3000.	14.440	96.166	83.941	36674.	-22105.	55.749	(17572.)

TABLE 3.091 THERMODYNAMIC FUNCTIONS FOR BKOH (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.200)		
BOND ANGLE, DEGREES	(180.)		
I, G ⁰ CM ²	1.425595E-39		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	17.	21	
M-D STRETCH FREQUENCY, WAVE NOS.	(415.)		
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(1.53863)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(374.)		
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.03368)		
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(115000.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST		

.....FUNCTIONS FOR BK IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.424	67.059	67.059	0.	-19372.	(49.552)	(84000.)
500.	12.331	73.236	64.394	2419.	-20550.	(49.242)	(74000.)
1000.	13.039	82.024	73.246	8777.	-22485.	(51.567)	(61000.)
1500.	13.610	87.423	77.126	15445.	-24125.	(53.321)	(48000.)
2000.	14.144	91.398	80.219	22359.	-25698.	(54.767)	(35000.)
2500.	14.272	94.555	82.741	29435.	-25929.	(55.964)	(23000.)
3000.	14.438	97.173	84.968	36615.	-27132.	(56.984)	(10000.)

TABLE 3.092 THERMODYNAMIC FUNCTIONS FOR CFOM (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.230)		
BOND ANGLE, DEGREES	(180.)		
I, G ⁰ CM ²	7.551318E-39		
QUANTUM WEIGHT OF GROUND STATE OF +1 M	18.	21	
M-D STRETCH FREQUENCY, WAVE NOS.	(395.)		
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(1.38741)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(363.)		
BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.03052)		
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(183000.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST		

.....FUNCTIONS FOR CF IDEAL.....
MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.524	66.136	66.136	0.	-26321.	(46.794)	(61000.)
500.	12.380	72.353	67.485	2434.	-25121.	(47.357)	(55000.)
1000.	13.053	81.159	72.354	8805.	-30776.	(49.324)	(42000.)
1500.	13.616	86.562	75.244	15477.	-34472.	(50.874)	(28000.)
2000.	14.127	90.539	79.342	22393.	-34140.	(52.119)	(18000.)
2500.	14.274	93.696	81.948	29478.	-33739.	(53.167)	(8000.)
3000.	14.448	96.314	84.097	36652.	-33244.	(54.078)	(-2000.)

TABLE 3.093 THERMODYNAMIC FUNCTIONS FOR ESOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.220)	
BOND ANGLE, DEGREES	(130.)	
I, 6°CM^2	1.447670E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	17.	21
N-O STRETCH FREQUENCY, WAVE NOS.	(401.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.43314)	
N-O-H BENDING FREQUENCY, WAVE NOS.	(368.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.63153)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(189000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR ES IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.459	67.385	67.385	0.	-38692.	(66.719)	(63000.)
500.	12.365	73.509	68.651	2429.	-31741.	(67.281)	(58000.)
1000.	13.48	82.310	73.513	8796.	-36015.	(69.244)	(44000.)
1500.	13.614	87.712	77.400	15467.	-35356.	(50.774)	(31000.)
2000.	14.816	91.687	88.496	22382.	-40719.	(51.984)	(28000.)
2500.	14.273	94.845	83.861	29459.	-42064.	(52.998)	(9800.)
3000.	14.439	97.463	85.250	36648.	-41331.	(53.866)	(0.)

TABLE 3.094 THERMODYNAMIC FUNCTIONS FOR FMOM (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.210)	
BOND ANGLE, DEGREES	(100.)	
I, 6°CM^2	1.434959E-38	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	14.	21
N-O STRETCH FREQUENCY, WAVE NOS.	(408.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.48091)	
N-O-H BENDING FREQUENCY, WAVE NOS.	(373.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.03258)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(112000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR FM IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.462	66.821	66.821	0.	-29658.	(46.347)	(67000.)
500.	12.748	73.012	68.164	2424.	-31684.	(46.918)	(61000.)
1000.	13.744	81.807	73.020	8797.	-34992.	(48.874)	(48000.)
1500.	13.612	87.208	76.903	15457.	-38163.	(50.486)	(35000.)
2000.	14.45	91.183	79.999	22371.	-48441.	(51.624)	(23000.)
2500.	14.273	94.348	82.561	29447.	-48687.	(52.641)	(13000.)
3000.	14.439	96.958	84.749	36628.	-48948.	(53.529)	(3000.)

TABLE 3.095 THERMODYNAMIC FUNCTIONS FOR MOOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.220)	
BOND ANGLE, DEGREES	(190.)	
I, G ^{CM} *2	5.761204E-39	21
QUANTUM WEIGHT OF GROUND STATE OF +1 M	9.	
M-O STRETCH FREQUENCY, WAVE NOS.	(401.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.43314)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(368.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.03153)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(107800.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR NO IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.459	64.231	64.231	0.	-44165.	(45.442)	(47888.)
500.	12.365	70.435	65.577	2429.	-44858.	(45.975)	(42888.)
1000.	13.048	79.236	77.444	8796.	-47249.	(47.937)	(29988.)
1500.	13.614	84.638	74.327	15467.	-49720.	(49.458)	(16888.)
2000.	14.016	88.614	77.423	22382.	-52254.	(50.643)	(5888.)
2500.	14.273	91.771	79.998	29459.	-44788.	(51.627)	(0.)
3000.	14.439	94.396	82.176	36648.	-42262.	(52.482)	(-5008.)

TABLE 3.096 THERMODYNAMIC FUNCTIONS FOR MOOH (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.228)	
BOND ANGLE, DEGREES	(186.)	
I, G ^{CM} *2	1.446937E-38	21
QUANTUM WEIGHT OF GROUND STATE OF +1 M	2.	
M-O STRETCH FREQUENCY, WAVE NOS.	(401.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.43314)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(368.)	
BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.03153)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND OH(G), CAL/MOL	(103800.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR NO IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.499	63.061	63.061	0.	-60026.	(41.352)	(28888.)
500.	12.365	69.265	64.407	2429.	-61303.	(41.915)	(23888.)
1000.	13.048	78.066	69.270	8796.	-65139.	(43.877)	(18888.)
1500.	13.614	83.468	73.157	15467.	-66857.	(45.397)	(0.)
2000.	14.016	87.444	76.253	22382.	-57828.	(46.598)	(0.)
2500.	14.273	90.601	78.818	29459.	-48881.	(47.548)	(0.)
3000.	14.439	93.220	81.896	36648.	-39118.	(48.368)	(0.)

TABLE 3.997 THERMODYNAMIC FUNCTIONS FOR LNH_4 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.220)	
BOND ANGLE, DEGREES	(100.)	
$I, \text{G}^2\text{CM}^2$	$1.447529\text{E}-38$	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	1.	21
H-O STRETCH FREQUENCY, WAVE NOS.	(401.)	
STRETCHING FORCE CONSTANT, NOMME/ANGSTROM	(1.43314)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(369.)	
BENDING FORCE CONSTANT, NOMME/ANGSTROM	(0.03153)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(121009.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR LNH_4 IDEAL.....
 MONATOMIC GAS

T K	C_p , GIBBS/MOL	S GIBBS/MOL	$-(G-H_{298})/T$, GIBBS/MOL	H-H ₂₉₈ , CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H_{298})/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.499	61.707	61.717	0.	-11788.	(44.152)	(93068.)
500.	12.365	67.911	63.853	2429.	-14226.	(44.713)	(86006.)
1000.	13.848	76.712	67.916	8796.	-17832.	(46.830)	(71808.)
1500.	13.614	82.114	71.882	15467.	-21221.	(48.688)	(56908.)
2000.	14.016	86.890	74.899	22322.	-24453.	(50.819)	(41008.)
2500.	14.273	89.247	77.463	29459.	-25683.	(51.177)	(28808.)
3000.	14.439	91.865	79.652	36648.	-25659.	(52.159)	(16808.)

TABLE 3.998 THERMODYNAMIC FUNCTIONS FOR O^+_{40}H (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.908)	
BOND ANGLE, DEGREES	(120.)	
$I_1 I_2 I_3, \text{G}^2\text{CM}^2$	$1.938749\text{E}-116$	
QUANTUM WEIGHT OF GROUND STATE OF +1 M	(4.)	
H-O STRETCH FREQUENCY, WAVE NOS.	(761.)	
STRETCHING FORCE CONSTANT, NOMME/ANGSTROM	(5.16654)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1764.)	
BENDING FORCE CONSTANT, NOMME/ANGSTROM	(0.83698)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND OH(G), CAL/MOL	(140008.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR O^+_{40}H IDEAL.....
 MONATOMIC GAS

T K	C_p , GIBBS/MOL	S GIBBS/MOL	$-(G-H_{298})/T$, GIBBS/MOL	H-H ₂₉₈ , CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	$-(G-H_{298})/T$, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	8.694	65.326	65.026	0.	33369.	(44.642)	(158008.)
500.	9.630	69.756	66.847	1854.	30524.	(45.208)	(151008.)
1000.	11.219	76.966	69.865	7192.	25654.	(47.265)	(135008.)
1500.	12.137	81.714	73.066	12973.	21498.	(49.009)	(119008.)
2000.	12.764	85.337	75.695	19223.	17468.	(50.472)	(103008.)
2500.	13.110	88.195	77.916	25699.	14621.	(51.719)	(87008.)
3000.	13.426	90.606	79.836	32311.	13710.	(52.799)	(73008.)

Table 4. Thermodynamic functions of the gaseous dihydroxides. The known values are taken from the indicated references, and the estimated values are enclosed in parentheses.

TABLE 4.001 THERMODYNAMIC FUNCTIONS FOR BE(OH)2 (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					1.400	5	
O-H-O BOND ANGLE, DEGREES					180.	63	
11°12'13, 6°*3 ° CM**6					3.526487-116		
QUANTUM WEIGHT OF GROUND STATE OF +2H,					1.	23	
STRETCH FREQUENCY FROM M-F, WAVE NOS.					1265.	7	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(5.265)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(0.175)		
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					690.	53	
O-H-O BENDING FREQUENCY, WAVE NOS.					330.	63	
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					1542.	63	
M-O-H BENDING FREQUENCY, WAVE NOS.					(1565.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND					253000.	7	
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTION, FOR GASEOUS ELEMENT						7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						7	
.....FUNCTIONS FOR BE IDEAL.....							
MONATONIC GAS							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	12.749	59.076	59.076	0.	-148789.	37.545	69231.
500.	14.945	66.070	60.564	2753.	-143748.	33.105	63893.
1000.	19.551	78.025	66.515	11509.	-129922.	35.670	48815.
1500.	21.53	86.455	71.825	21945.	-115366.	36.591	33310.
2000.	22.290	92.972	76.324	33267.	-99694.	37.773	1980.
2500.	24.069	99.260	80.202	45144.	-83703.	39.734	6661.
3000.	24.550	132.694	83.592	57300.	-61512.	39.541	0.

TABLE 4.002 THERMODYNAMIC FUNCTIONS FOR B(OH)2 (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					1.295	7	
O-H-O BOND ANGLE, DEGREES					(120.)		
11°12'13, 6°*3 ° CM**6					5.196050-116		
QUANTUM WEIGHT OF GROUND STATE OF +2H,					2.	20	
STRETCH FREQUENCY FROM M-F, WAVE NOS.					1410.	7	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(7.341)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(0.244)		
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(1307.)		
O-H-O BENDING FREQUENCY, WAVE NOS.					(288.)		
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					(1471.)		
M-O-H BENDING FREQUENCY, WAVE NOS.					(1785.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND					266000.	7	
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						7	
.....FUNCTIONS FOR B IDEAL.....							
MONATONIC GAS							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.911	62.317	62.317	0.	-188472.	36.649	122291.
500.	13.365	68.927	63.731	2551.	-104289.	37.212	115063.
1000.	18.857	80.250	69.342	10908.	-92534.	39.175	97125.
1500.	21.562	88.463	74.489	21082.	-80014.	40.696	79389.
2000.	23.050	94.591	77.756	32271.	-67208.	41.878	61935.
2500.	23.910	100.135	82.523	44029.	-54127.	42.879	44857.
3000.	24.437	104.545	85.836	56126.	-39927.	43.646	29403.

TABLE 4.003 THERMODYNAMIC FUNCTIONS FOR C(OH)2 (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.300
O-H-O BOND ANGLE, DEGREES	105.
I ¹ I ² I ³ , 10 ⁻³³ CM ²	5.639554-115
QUANTUM WEIGHT OF GROUND STATE OF ¹² C,	1.
STRETCH FREQUENCY FROM M-F, WAVE NOS.	1399.
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(6.724)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(9.224)
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	1222.
O-H-O BENDING FREQUENCY, WAVE NOS.	668.
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	1102.
M-O-H BENDING FREQUENCY, WAVE NOS.	(1714.)
HEAT OF DISSOCIATION AT 298K TO M(G) AND	(200000.)
2(OH) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7

.....FUNCTIONS FOR C IDEAL.....
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	10.703	57.788	57.788	0.	-3344.	37.761	160033.
500.	13.657	63.927	59.076	2426.	2058.	38.325	152546.
1000.	19.026	75.275	64.508	10766.	15906.	40.290	133616.
1500.	21.685	83.549	69.539	21014.	30265.	41.811	114692.
2000.	23.131	90.005	73.879	32253.	44720.	42.995	95976.
2500.	23.965	95.264	77.667	44045.	59173.	43.958	77168.
3000.	24.476	99.683	80.951	56165.	73519.	44.771	58549.

TABLE 4.004 THERMODYNAMIC FUNCTIONS FOR N(OH)2 (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.370
O-H-O BOND ANGLE, DEGREES	(124.)
I ¹ I ² I ³ , 10 ⁻³³ CM ²	5.133029-116
QUANTUM WEIGHT OF GROUND STATE OF ¹² C,	2.
STRETCH FREQUENCY FROM M-F, WAVE NOS.	1115.
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(5.335)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(10.173)
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	1074.
O-H-O BENDING FREQUENCY, WAVE NOS.	573.
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	931.
M-O-H BENDING FREQUENCY, WAVE NOS.	(1559.)
HEAT OF DISSOCIATION AT 298K TO M(G) AND	(145000.)
2(OH) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7

.....FUNCTIONS FOR N IDEAL.....
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.070	60.144	60.144	0.	-255.	36.614	108870.
500.	14.602	66.742	61.529	2606.	8725.	37.177	106014.
1000.	19.594	79.641	67.304	11333.	31550.	39.140	98510.
1500.	21.995	87.090	72.562	21792.	59129.	40.660	90716.
2000.	23.349	93.617	77.041	33152.	78000.	41.843	82784.
2500.	24.090	98.311	80.903	45021.	106741.	42.903	74763.
3000.	24.365	103.348	84.284	57194.	123304.	43.611	66683.

TABLE 4.005 THERMODYNAMIC FUNCTIONS FOR O(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.412	7
O-H-O BOND ANGLE, DEGREES	(120.)	
$I_1^2 I_2^2 I_3$, $\text{cm}^3 \cdot \text{cm}^{-1}$	1.063542-115	
QUANTUM WEIGHT OF GROUND STATE OF ^{16}O	1.	20
STRETCH FREQUENCY FROM M-F, WAVE NOS.	1056.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(5.136)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.171)	
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	520.	7
O-H-O BENDING FREQUENCY, WAVE NOS.	461.	7
O-H SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	531.	7
O-H-O BENDING FREQUENCY, WAVE NOS.	(1549.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(95880.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR O IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H2981)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H2981)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.472	59.829	59.834	0.	-6087.	70.464	55395.
500.	15.197	66.911	61.311	2750.	3244.	39.055	52465.
1000.	19.023	78.936	67.321	11665.	27129.	41.867	44875.
1500.	22.167	87.582	72.699	22285.	51067.	42.611	37032.
2000.	23.785	94.354	77.259	33687.	74866.	43.886	29082.
2500.	24.133	99.359	81.158	45502.	98342.	44.775	21073.
3000.	24.595	103.303	84.572	57693.	121710.	45.500	13031.

TABLE 4.005 THERMODYNAMIC FUNCTIONS FOR MG(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.880	5
O-H-O BOND ANGLE, DEGREES	150.	63
$I_1^2 I_2^2 I_3$, $\text{cm}^3 \cdot \text{cm}^{-1}$	1.962429-115	
QUANTUM WEIGHT OF GROUND STATE OF ^{24}Mg	1.	20
STRETCH FREQUENCY FROM M-F, WAVE NOS.	710.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.892)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.896)	
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	470.	64
O-H-O BENDING FREQUENCY, WAVE NOS.	242.	64
O-H SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	437.	64
O-H-O BENDING FREQUENCY, WAVE NOS.	(1289.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(195800.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR MG IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H2981)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H2981)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.849	63.829	63.829	0.	-133529.	35.584	27025.
500.	16.742	71.749	65.514	3110.	-128332.	36.867	21594.
1000.	20.623	84.780	72.455	12625.	-114861.	39.829	8557.
1500.	22.325	93.536	77.899	23455.	-95758.	39.558	0.
2000.	23.634	100.182	82.673	35419.	-68269.	40.732	0.
2500.	24.256	105.533	86.727	47015.	-41359.	41.693	0.
3000.	24.710	110.803	90.244	59275.	-24593.	42.500	0.

TABLE 4.007 THERMODYNAMIC FUNCTIONS FOR AL(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.650	7
O-H-O BOND ANGLE, DEGREES	(129.)	
11°12'13, G°°3 * CM°°6	3.354951-115	
QUANTUM WEIGHT OF GROUND STATE OF +2H,	2.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	892.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.748)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.125)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	758.	7
O-H-O BENDING FREQUENCY, WAVE NOS.	236.	7
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	917.	7
H-O-H BENDING FREQUENCY, WAVE NOS.	(1414.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(258000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR AL IDEAL.....

MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.634	65.468	65.468	0.	-146518.	39.384	68383.
500.	16.45	72.954	67.859	2948.	-141916.	39.878	61767.
1000.	20.278	85.569	73.481	12169.	-128687.	41.864	46342.
1500.	22.326	94.211	78.974	22859.	-113463.	43.395	32735.
2000.	23.516	109.812	83.639	34346.	-97926.	44.583	19573.
2500.	24.219	106.141	87.624	46294.	-82226.	45.547	6739.
3000.	24.656	110.599	91.892	58521.	-68564.	46.197	0.

TABLE 4.009 THERMODYNAMIC FUNCTIONS FOR SI(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.591	7
O-H-O BOND ANGLE, DEGREES	140.	63
11°12'13, G°°3 * CM°°6	1.969198-115	
QUANTUM WEIGHT OF GROUND STATE OF +2H,	1.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	858.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.156)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.145)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	843.	63
O-H-O BENDING FREQUENCY, WAVE NOS.	345.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	953.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1588.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(248000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR SI IDEAL.....

MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	12.492	62.293	62.293	0.	-136642.	40.121	97879.
500.	15.621	69.533	63.826	2853.	-131788.	40.713	89882.
1000.	20.814	81.919	70.805	11914.	-88574.	42.734	72229.
1500.	22.207	93.492	75.477	22523.	-76732.	44.284	54892.
2000.	23.444	97.067	80.845	33964.	-53509.	45.491	40867.
2500.	24.172	102.383	84.830	45883.	-48925.	46.476	26726.
3000.	24.622	106.833	87.478	58098.	-23317.	47.318	13499.

TABLE 4.005 THERMODYNAMIC FUNCTIONS FOR P(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.590)
O-H-O BOND ANGLE, DEGREES	(129.1)
11*12*13, G**3 * CM**6	2.939693-115
QUANTUM WEIGHT OF GROUND STATE OF +2H,	2.
STRETCH FREQUENCY FROM H-F, WAVE NOS.	860.
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.411)
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.147)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(837.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(144.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(850.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1599.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(190800.)
2(OH) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7

.....FUNCTIONS FOR P IDEAL.....
 MONATOMIC GAS
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T K	Cp, GIBBS/MOL	S GIBBS/MOL	-(G-H2981)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.178	67.393	67.393	0.	-15783.	38.988	69798.
500.	15.892	74.868	68.945	2941.	-81782.	39.543	63852.
1000.	20.078	87.354	75.245	12058.	-72188.	41.505	45885.
1500.	22.234	95.444	88.812	22698.	-51433.	43.826	38881.
2000.	23.459	102.525	85.450	74149.	-38382.	44.218	31984.
2500.	24.181	107.344	89.414	46074.	-18546.	45.176	23822.
3000.	24.629	112.295	92.867	58285.	9689.	45.997	16579.

TABLE 4.010 THERMODYNAMIC FUNCTIONS FOR Si(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.610)
O-H-O BOND ANGLE, DEGREES	(128.1)
11*12*13, G**3 * CM**6	3.211459-115
QUANTUM WEIGHT OF GROUND STATE OF +2H,	1.
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(892.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.939)
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.164)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(858.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(152.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(984.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1605.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(160800.)
2(OH) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7

.....FUNCTIONS FOR S IDEAL.....
 MONATOMIC GAS
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T K	Cp, GIBBS/MOL	S GIBBS/MOL	-(G-H2981)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	12.969	65.981	65.981	0.	-67982.	48.886	57884.
500.	15.150	73.229	67.463	2883.	-62828.	48.728	58657.
1000.	19.442	85.498	73.641	11857.	-46517.	42.868	37748.
1500.	22.102	94.915	79.083	22397.	-24192.	44.485	30548.
2000.	23.378	100.565	83.667	33797.	-2819.	45.725	23232.
2500.	24.127	105.869	87.594	45689.	19986.	46.725	15831.
3000.	24.791	110.312	91.828	57877.	41682.	47.566	8485.

TABLE 4.011 THERMODYNAMIC FUNCTIONS FOR CA(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.200	65
O-H-O BOND ANGLE, DEGREES	140.	63
$11^{\circ}12'13$, $6^{\circ}03' \times 10^{-6}$	1.377499-114	
QUANTUM WEIGHT OF GROUND STATE OF $+2H$,	1.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	597.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.293)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.077)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	485.	64
O-H-O BENDING FREQUENCY, WAVE NOS.	163.	64
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	554.	64
H-O-H BENDING FREQUENCY, WAVE NOS.	(1269.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	284888.	36
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR CA IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.643	68.538	68.538	0.	-136282.	36.992	34318.
500.	17.373	76.798	76.798	3251.	-131553.	37.556	28938.
1000.	28.819	98.878	77.147	12923.	-118771.	39.519	16358.
1500.	22.628	98.883	83.883	23821.	-104441.	41.838	5348.
2000.	23.689	105.551	67.848	35421.	-84628.	42.228	0.
2500.	24.332	110.912	91.936	47488.	-59637.	43.190	0.
3000.	24.736	115.386	95.482	59714.	-34775.	44.810	0.

TABLE 4.012 THERMODYNAMIC FUNCTIONS FOR SC(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.000)	
O-H-O BOND ANGLE, DEGREES	135.	63
$11^{\circ}12'13$, $6^{\circ}03' \times 10^{-6}$	9.743798-115	
QUANTUM WEIGHT OF GROUND STATE OF $+2H$,	1.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	744.	53
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.316)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.127)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(715.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(129.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	780.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1554.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(258800.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR SC IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.612	71.376	71.376	0.	-135601.	41.745	88342.
500.	16.129	79.833	73.812	3011.	-131804.	42.337	73646.
1000.	28.109	91.596	79.409	12187.	-121051.	44.352	57498.
1500.	22.240	100.193	84.977	22824.	-109459.	45.897	41994.
2000.	23.460	106.774	89.635	34277.	-96719.	47.094	27752.
2500.	24.181	112.093	93.612	46282.	-82786.	48.071	14928.
3000.	24.629	116.545	97.874	58413.	-66341.	48.986	2522.

TABLE 4.013 THERMODYNAMIC FUNCTIONS FOR TI(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.950	7
O-H-O BOND ANGLE, DEGREES	130.	63
$11^{\circ}12'13$, $G^{\circ} \times 10^6$	9.757845-115	
QUANTUM WEIGHT OF GROUND STATE OF $+2M$,	5.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	590.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.441)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.832)	
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	643.	63
O-H-O BENDING FREQUENCY, WAVE NOS.	176.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	753.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1223.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(240688.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR TI IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.925	70.892	70.892	0.	-103062.	43.866	102344.
500.	17.324	71.882	72.590	3146.	-99794.	47.706	95161.
1000.	20.737	92.023	79.293	12731.	-89156.	45.837	77796.
1500.	22.585	100.845	85.079	23603.	-77978.	47.434	61326.
2000.	23.678	107.474	89.079	35198.	-66234.	48.692	48528.
2500.	24.120	112.832	93.492	47201.	-53261.	49.748	31841.
3000.	24.727	117.305	97.482	59471.	-40073.	50.639	16753.

TABLE 4.014 THERMODYNAMIC FUNCTIONS FOR V(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.760	18
O-H-O BOND ANGLE, DEGREES	150.	63
$11^{\circ}12'13$, $G^{\circ} \times 10^6$	3.092562-115	
QUANTUM WEIGHT OF GROUND STATE OF $+2M$,	4.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(897.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.457)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.215)	
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(671.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	150.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	743.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1396.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(235000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR V IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.691	69.765	69.765	0.	-87948.	43.544	111979.
500.	16.518	77.548	71.423	3062.	-84118.	44.226	104593.
1000.	20.414	98.377	77.949	12420.	-73189.	46.352	86510.
1500.	22.422	99.078	83.615	23181.	-61982.	46.369	68722.
2000.	23.566	105.698	88.339	34702.	-50059.	46.784	51488.
2500.	24.252	111.029	92.361	46670.	-35874.	51.344	35441.
3000.	24.679	115.491	95.854	59911.	-23001.	51.892	20246.

TABLE 4.015 THERMODYNAMIC FUNCTIONS FOR CR(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS							
O-H-O BOND ANGLE, DEGREES							
11°12'13, G**3 * CM**6							
QUANTUM WEIGHT OF GROUND STATE OF +2M,							
STRETCH FREQUENCY FROM H-F, WAVE NOS.							
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM							
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM							
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS							
O-H-O BENDING FREQUENCY, WAVE NOS.							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.							
H-O-H BENDING FREQUENCY, WAVE NOS.							
HEAT OF DISSOCIATION AT 298K TO HIG AND							
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT							
.....FUNCTIONS FOR CR IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.686	65.861	65.861	0.	-65863.	41.634	84274.
500.	16.223	73.543	67.581	3821.	-69718.	42.197	77855.
1000.	20.155	86.178	73.929	12249.	-48579.	44.168	59682.
1500.	22.798	94.882	79.522	22919.	-35584.	45.684	43888.
2000.	23.491	101.395	84.199	34392.	-21985.	46.899	27189.
2500.	24.282	106.728	88.188	46338.	-8944.	47.987	12531.
3000.	24.643	111.174	91.658	59549.	10007.	48.807	0.

TABLE 4.015 THERMODYNAMIC FUNCTIONS FOR MN(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS							
O-H-O BOND ANGLE, DEGREES							
11°12'13, G**3 * CM**6							
QUANTUM WEIGHT OF GROUND STATE OF +2M,							
STRETCH FREQUENCY FROM H-F, WAVE NOS.							
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM							
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM							
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS							
O-H-O BENDING FREQUENCY, WAVE NOS.							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.							
H-O-H BENDING FREQUENCY, WAVE NOS.							
HEAT OF DISSOCIATION AT 298K TO M(G) AND							
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT							
.....FUNCTIONS FOR MN IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.573	70.015	70.015	0.	-98644.	41.498	56970.
500.	16.189	77.678	71.658	3814.	-94668.	42.868	50248.
1000.	20.183	90.296	78.066	12231.	-83288.	44.830	34320.
1500.	22.784	98.917	83.653	22897.	-78233.	45.548	19778.
2000.	23.487	105.588	88.325	34367.	-55078.	46.738	7588.
2500.	24.208	110.833	92.311	46383.	-35327.	47.690	0.
3000.	24.642	115.287	95.738	59522.	-8199.	48.588	0.

TABLE 4.017 THERMODYNAMIC FUNCTIONS FOR $\text{Fe}(\text{OH})_2$ (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					1.888	49	
O-H-O BOND ANGLE, DEGREES					180.	63	
$14^{\circ}12'13$, $G^{\circ}3 \times \text{CM}^{\circ}6$					9.545588-116		
QUANTUM WEIGHT OF GROUND STATE OF ^{52}Fe					9.	28	
STRETCH FREQUENCY FROM M-F, WAVE NOS.					(634.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(2.926)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(8.897)		
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(612.)		
O-H-O BENDING FREQUENCY, WAVE NOS.					148.	63	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					753.	63	
H-O-H BENDING FREQUENCY, WAVE NOS.					(1297.)		
HEAT OF DISSOCIATION AT 298K TO $\text{H}(\text{G})$ AND $2(\text{OH})$ (G), CAL/MOL					196488.	49	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						7	
.....FUNCTIONS FOR FE IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.943	73.776	78.776	0.	-73163.	43.112	88593.
500.	16.469	75.718	72.463	3128.	-69622.	43.886	81219.
1000.	20.626	91.757	79.117	12648.	-59488.	46.141	63468.
1500.	22.525	100.514	84.867	23471.	-47731.	47.678	48998.
2000.	23.34	107.151	89.643	35835.	-35873.	49.187	31627.
2500.	24.297	112.512	93.699	47832.	-21264.	50.297	17514.
3000.	24.710	116.981	97.217	59291.	-7816.	51.169	3889.

TABLE 4.018 THERMODYNAMIC FUNCTIONS FOR $\text{Co}(\text{OH})_2$ (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					1.888	49	
O-H-O BOND ANGLE, DEGREES					180.	63	
$11^{\circ}12'13$, $G^{\circ}3 \times \text{CM}^{\circ}6$					9.547517-116		
QUANTUM WEIGHT OF GROUND STATE OF ^{59}Co					18.	28	
STRETCH FREQUENCY FROM M-F, WAVE NOS.					(638.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(2.926)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(8.897)		
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.					(648.)		
O-H-O BENDING FREQUENCY, WAVE NOS.					158.	63	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					746.	63	
H-O-H BENDING FREQUENCY, WAVE NOS.					(1297.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL					183588.	49	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						23	
.....FUNCTIONS FOR CO IDEAL.....							
MONATOMIC GAS							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.948	72.867	78.867	0.	-57498.	42.879	91756.
500.	16.675	78.617	72.568	3129.	-53853.	43.527	84576.
1000.	20.629	91.858	79.215	12643.	-43587.	45.988	67188.
1500.	22.527	100.616	84.967	23475.	-32116.	47.787	58267.
2000.	23.635	107.263	89.743	35839.	-19474.	49.271	34658.
2500.	24.797	112.614	93.898	47836.	-5387.	50.699	20618.
3000.	24.711	117.083	97.318	59295.	8895.	51.583	5781.

TABLE 4.019 THERMODYNAMIC FUNCTIONS FOR NI(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.889	49
O-H-O BOND ANGLE, DEGREES	178.	63
I1*I2*I3, G**3 * CM**6	1.359256-115	
QUANTUM HEIGHT OF GROUND STATE OF +2M,	9.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(638.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.926)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.897)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(609.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	143.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	881.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1297.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	182489.	49
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR NI IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.878	71.338	71.338	0.	-55947.	43.518	91954.
500.	16.814	79.244	73.814	3115.	-52276.	44.159	84665.
1000.	20.606	92.258	79.648	12610.	-41970.	46.432	67118.
1500.	22.516	101.089	85.387	23434.	-38849.	48.258	58898.
2000.	23.628	107.653	90.156	34995.	-18688.	49.637	34226.
2500.	24.293	113.883	94.288	46988.	-9310.	50.747	19512.
3000.	24.788	117.472	97.723	59246.	8390.	51.676	5232.

TABLE 4.020 THERMODYNAMIC FUNCTIONS FOR CU(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.720	14
O-H-O BOND ANGLE, DEGREES	178.	63
I1*I2*I3, G**3 * CM**6	1.119698-115	
QUANTUM HEIGHT OF GROUND STATE OF +2M,	6.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	622.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.908)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.897)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(602.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	168.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	766.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1265.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(145888.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR CU IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.945	69.959	69.959	0.	-39687.	39.744	71510.
500.	16.943	77.931	71.655	3138.	-35645.	40.387	65142.
1000.	20.681	91.121	78.334	12687.	-24765.	42.269	49791.
1500.	22.595	99.795	84.183	23538.	-13857.	43.798	35247.
2000.	23.652	106.448	88.891	35113.	-284.	44.975	21939.
2500.	24.180	111.882	92.955	47117.	12638.	45.944	8932.
3000.	24.719	116.273	96.448	59381.	29523.	46.774	0.

TABLE 4.021 THERMODYNAMIC FUNCTIONS FOR Zn(OH)_2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.810	18
O-H-O BOND ANGLE, DEGREES	170.	63
$11^\circ 12' 13$, $G^\circ \times 3 \times 10^{16}$	1.410697-115	
QUANTUM WEIGHT OF GROUND STATE OF ^{64}Zn	1.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(611.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.811)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.094)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(591.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	169.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	791.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1274.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(150000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR ZN IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.947	66.850	66.840	0.	-92835.	39.452	22750.
500.	16.920	74.844	68.575	3134.	-87934.	19.314	17868.
1000.	26.62	87.916	75.746	12678.	-73441.	49.977	4328.
1500.	22.45	96.644	81.808	23515.	-58596.	42.588	0.
2000.	23.646	103.335	85.792	35006.	-23591.	43.698	0.
2500.	24.704	109.688	89.853	47007.	3219.	44.650	0.
3000.	24.716	113.159	93.375	59358.	29564.	45.450	0.

TABLE 4.022 THERMODYNAMIC FUNCTIONS FOR Ga(OH)_2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.770)	
O-H-O BOND ANGLE, DEGREES	(128.)	
$11^\circ 12' 13$, $G^\circ \times 3 \times 10^{16}$	7.985248-115	
QUANTUM WEIGHT OF GROUND STATE OF ^{69}Ga	2.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	542.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.244)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.075)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(525.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(55.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(540.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1129.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(198880.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR GA IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.975	72.695	72.695	0.	-38735.	40.376	58810.
500.	17.833	81.180	74.586	3337.	-35943.	41.891	58888.
1000.	21.064	94.786	81.521	13186.	-83488.	42.575	37958.
1500.	22.747	103.593	87.478	24173.	-78697.	45.443	25250.
2000.	23.764	110.289	92.378	35822.	-57348.	46.764	12760.
2500.	24.382	115.864	96.516	47871.	-44959.	47.849	0.
3000.	24.770	120.147	100.891	60166.	-28383.	48.758	0.

TABLE 4.023 THERMODYNAMIC FUNCTIONS FOR GE(OH)2 (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.740
O-H-O BOND ANGLE, DEGREES	94.
$I_1 I_2 I_3$, $\text{cm}^3 \cdot \text{CM}^2$	8.372942-115
QUANTUM WEIGHT OF GROUND STATE OF $+2M$, STRETCH FREQUENCY FROM H-F, WAVE NOS.	1. (700.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.771)
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.126)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	655.
O-H-O BENDING FREQUENCY, WAVE NOS.	(123.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	695.
H-O-H BENDING FREQUENCY, WAVE NOS.	(1449.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(185800.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR GE IDEAL.....
MONATONIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
238.	13.851	69.878	69.878	0.	-71224.	48.103	79768.
500.	16.487	77.686	71.538	3374.	-67341.	48.942	73878.
1000.	20.348	91.471	78.864	12487.	-56627.	53.759	56178.
1500.	22.372	99.142	83.728	23134.	-43258.	45.782	41482.
2000.	23.541	115.753	88.434	34638.	-28293.	47.272	28428.
2500.	24.735	111.887	92.449	46596.	-13240.	48.446	15548.
3000.	24.867	115.547	95.937	58838.	1793.	49.415	2728.

TABLE 4.024 THERMODYNAMIC FUNCTIONS FOR AS(OH)2 (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.680)
O-H-O BOND ANGLE, DEGREES	(120.)
$I_1 I_2 I_3$, $\text{cm}^3 \cdot \text{CM}^2$	5.927978-115
QUANTUM WEIGHT OF GROUND STATE OF $+2M$, STRETCH FREQUENCY FROM H-F, WAVE NOS.	2. (802.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.975)
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.166)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(778.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(141.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(798.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1639.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(178000.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	24

.....FUNCTIONS FOR AS IDEAL.....
MONATONIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.252	79.181	79.181	0.	-76530.	41.618	59898.
500.	15.723	77.635	71.773	2931.	-72456.	42.188	52453.
1000.	19.865	89.961	78.019	11942.	-65714.	44.148	31657.
1500.	22.165	93.483	83.491	22488.	-44562.	45.668	24718.
2000.	23.378	105.833	88.889	33888.	-24188.	46.858	17678.
2500.	24.127	110.337	92.825	45788.	-3726.	47.828	10561.
3000.	24.558	114.781	95.458	57988.	16562.	48.648	3378.

TABLE 4.025 THERMODYNAMIC FUNCTIONS FOR SE(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.760)	
O-M-O BOND ANGLE, DEGREES	(129.)	
I1*I2*I3, G**3 * CM**6	7.070303-115	20
QUANTUM WEIGHT OF GROUND STATE OF +2M,	1.	
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(665.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.457)	
O-M-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.115)	
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(646.)	
O-M-O BENDING FREQUENCY, WAVE NOS.	(117.)	
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(661.)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1395.)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND 2(OH) (G), CAL/MOL	(120000.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		24

.....FUNCTIONS FOR SE IDEAL.....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.983	70.263	70.763	0.	-45632.	42.218	39841.
500.	16.641	75.166	71.949	3106.	-41233.	42.780	33465.
1000.	20.770	91.058	75.544	12524.	-27365.	44.820	19951.
1500.	22.438	99.777	84.246	23296.	-6312.	46.460	13281.
2000.	23.581	106.403	88.990	34826.	14503.	47.778	6331.
2500.	24.761	111.744	93.024	46000.	35131.	48.548	-636.
3000.	24.685	116.208	96.527	59675.	55537.	49.730	-7713.

TABLE 4.026 THERMODYNAMIC FUNCTIONS FOR SR(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	2.100	65
O-M-O BOND ANGLE, DEGREES	108.	63
I1*I2*I3, G**3 * CM**6	2.588017-114	
QUANTUM WEIGHT OF GROUND STATE OF +2M,	(1.)	
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(520.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.152)	
O-M-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.072)	
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	641.	64
O-M-O BENDING FREQUENCY, WAVE NOS.	82.	64
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	442.	64
M-O-H BENDING FREQUENCY, WAVE NOS.	(1192.)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND 2(OH) (G), CAL/MOL	202000.	36
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7

.....FUNCTIONS FOR SR IDEAL.....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.259	74.057	74.057	0.	-138261.	39.323	31203.
500.	17.821	82.602	75.847	3358.	-134230.	39.886	25883.
1000.	21.008	96.071	82.913	13178.	-123319.	41.848	13538.
1500.	22.715	104.960	88.864	24144.	-110801.	43.369	3876.
2000.	23.745	111.649	93.758	35781.	-89981.	44.552	8.
2500.	24.369	117.020	97.891	47822.	-66711.	45.516	8.
3000.	24.761	121.506	101.463	60111.	-43730.	46.340	8.

TABLE 4.027 THERMODYNAMIC FUNCTIONS FOR Y(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	12.060	
O-H-O BOND ANGLE, DEGREES	112.1	
11*12*13, G**3 * CM**6	2.023005-114	
QUANTUM WEIGHT OF GROUND STATE OF *2M,	6.	20
STRETCH FREQUENCY FROM M-F, WAVE NOS.	544.	53
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.308)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.110)	
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(626.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(92.)	
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(639.)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1455.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	1250000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR Y IDEAL.....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.049	75.670	75.670	0.	-124798.	42.870	92090.
500.	16.563	83.556	77.356	3100.	-121406.	43.570	85608.
1000.	20.353	96.362	83.916	12447.	-111698.	45.860	69850.
1500.	22.371	105.034	89.585	23174.	-101231.	47.568	54608.
2000.	23.540	111.645	94.306	34678.	-90420.	48.860	39900.
2500.	24.234	116.979	98.325	46635.	-78085.	49.870	26825.
3000.	24.666	121.430	101.816	58868.	-65397.	50.760	14130.

TABLE 4.028 THERMODYNAMIC FUNCTIONS FOR ZR(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.920	7
O-H-O BOND ANGLE, DEGREES	(120.)	
11*12*13, G**3 * CM**6	1.358640-114	
QUANTUM WEIGHT OF GROUND STATE OF *2M,	5.	20
STRETCH FREQUENCY FROM M-F, WAVE NOS.	628.	7
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.158)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.105)	
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(611.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(110.)	
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(623.)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1356.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	1265000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR ZR IDEAL.....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.152	74.690	74.690	0.	-93300.	43.315	138163.
500.	16.800	82.670	76.394	3130.	-89999.	44.054	131284.
1000.	20.516	95.627	83.037	12591.	-80559.	46.617	114353.
1500.	22.461	104.349	88.763	23379.	-70970.	48.555	95077.
2000.	23.594	110.951	93.522	34518.	-59236.	40.077	82042.
2500.	24.770	116.325	97.565	46899.	-47343.	51.345	66981.
3000.	24.692	120.790	101.074	59146.	-34991.	52.439	52275.

TABLE 4.023 THERMODYNAMIC FUNCTIONS FOR $\text{NO}(\text{OH})_2$ (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS		(1.830)	
O-H-O BOND ANGLE, DEGREES		(120.)	
$11^\circ 12' 13$, $G^{**}3 \cdot \text{CH}^{**}6$		1.036781-114	
QUANTUM WEIGHT OF GROUND STATE OF $+2M$,		4.	28
STRETCH FREQUENCY FROM H-F, WAVE NOS.		(711.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM		(4.064)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM		(0.135)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS		(692.)	
O-H-O BENDING FREQUENCY, WAVE NOS.		(125.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.		(708.)	
H-O-H BENDING FREQUENCY, WAVE NOS.		(1539.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND		(275000.)	
2(OH) (G), CAL/MOL			
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23	

.....FUNCTIONS FOR NO IDEAL.....
 . MONATONIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.662	73.287	73.297	0.	-78966.	44.498	161729.
500.	16.188	80.973	74.929	3022.	-75489.	45.299	154440.
1000.	20.147	93.572	81.248	12224.	-65610.	48.030	136228.
1500.	22.261	102.190	86.930	22875.	-55130.	50.886	118891.
2000.	23.473	109.766	91.593	34336.	-44485.	51.510	100168.
2500.	24.198	114.098	95.581	46266.	-33499.	52.711	82459.
3000.	24.635	118.541	99.047	58481.	-21771.	53.738	65540.

TABLE 4.030 THERMODYNAMIC FUNCTIONS FOR $\text{NO}(\text{OH})_2$ (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS		1.830	7
O-H-O BOND ANGLE, DEGREES		(120.)	
$11^\circ 12' 13$, $G^{**}3 \cdot \text{CH}^{**}6$		1.046856-114	
QUANTUM WEIGHT OF GROUND STATE OF $+2M$,		1.	28
STRETCH FREQUENCY FROM H-F, WAVE NOS.		(710.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM		(4.064)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM		(0.135)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS		(691.)	
O-H-O BENDING FREQUENCY, WAVE NOS.		(125.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.		(703.)	
H-O-H BENDING FREQUENCY, WAVE NOS.		(1539.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND		(220000.)	
2(OH) (G), CAL/MOL			
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		7	

.....FUNCTIONS FOR NO IDEAL.....
 . MONATONIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.669	70.636	70.636	0.	-38931.	43.468	146391.
500.	16.193	79.325	72.279	3023.	-35199.	44.823	139842.
1000.	20.149	90.926	78.699	12226.	-24926.	45.986	121279.
1500.	22.261	99.535	84.283	22876.	-14033.	47.586	103966.
2000.	23.473	106.121	88.951	34339.	-2042.	48.691	87887.
2500.	24.198	111.443	92.935	46270.	6652.	49.661	70689.
3000.	24.635	115.695	96.401	58484.	20920.	50.495	54897.

TABLE 4.031 THERMODYNAMIC FUNCTIONS FOR TC(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.838)	
O-H-O BOND ANGLE, DEGREES	(188.)	
$I_1^2 I_2^2 I_3^2$, CM ²	1.828967-115	
QUANTUM WEIGHT OF GROUND STATE OF +2H,	(5.)	
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(788.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.064)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.135)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	(698.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(124.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(782.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1532.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(19888.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	25	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	25	

.....FUNCTIONS FOR TC IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.676	71.976	71.976	0.	-11184.	43.258	144498.
500.	16.157	79.668	73.519	3824.	-7587.	43.815	137428.
1000.	28.150	92.270	88.842	12229.	2684.	45.893	120245.
1500.	22.262	108.088	85.626	22881.	13528.	47.738	103194.
2000.	23.474	107.465	98.295	34342.	24872.	49.384	86242.
2500.	24.190	112.788	94.279	46273.	36648.	50.615	69588.
3000.	24.635	117.241	97.745	58688.	49876.	51.724	54299.

TABLE 4.032 THERMODYNAMIC FUNCTIONS FOR RU(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.838)	
O-H-O BOND ANGLE, DEGREES	(188.)	
$I_1^2 I_2^2 I_3^2$, CM ²	1.821011-115	
QUANTUM WEIGHT OF GROUND STATE OF +2H,	(9.)	
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(787.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.064)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.135)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	(659.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(124.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(788.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1539.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(176988.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR RU IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.688	72.842	72.842	0.	2285.	44.558	143758.
500.	16.740	80.736	79.486	3025.	5348.	45.168	136168.
1000.	20.151	93.140	88.910	12230.	14438.	47.488	117448.
1500.	22.763	101.750	86.495	22883.	24185.	49.238	98837.
2000.	23.474	105.736	91.164	34345.	34184.	50.698	80448.
2500.	24.190	113.658	95.248	46276.	44454.	51.898	62372.
3000.	24.635	119.111	98.614	58498.	55947.	52.938	45268.

TABLE 4.333 THERMODYNAMIC FUNCTIONS FOR RH(OH)2 (G)

				REFERENCE			
INTERNUCLEAR DISTANCE, ANGSTROMS				(1.838)			
O-H-O BOND ANGLE, DEGREES				(180.)			
I1*I2*I3, CM**3 * CM**6				1.821067-115			
QUANTUM WEIGHT OF GROUND STATE OF +2M,				18.	28		
STRETCH FREQUENCY FROM H-F, WAVE NOS.				(786.)			
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM				(4.064)			
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM				(8.135)			
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS				(689.)			
O-H-O BENDING FREQUENCY, WAVE NOS.				(124.)			
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.				(699.)			
H-O-H BENDING FREQUENCY, WAVE NOS.				(1539.)			
HEAT OF DISSOCIATION AT 298K TO H(G) AND				(165889.)			
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT					23		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT					23		
.....FUNCTIONS FOR RH IDEAL.....							
NONATOMIC GAS							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.684	73.104	73.104	0.	-8561.	44.387	122110.
500.	16.203	90.900	74.749	3826.	-5274.	44.966	114738.
1000.	20.152	93.485	91.173	12232.	4222.	47.117	96770.
1500.	22.263	102.145	86.759	22885.	16970.	49.910	79177.
2000.	23.174	108.602	91.424	34346.	26397.	50.886	61870.
2500.	24.151	113.923	95.412	46278.	37283.	51.587	49540.
3000.	24.625	119.376	98.879	58492.	49974.	52.617	38120.

TABLE 4.834 THERMODYNAMIC FUNCTIONS FOR PD(OH)2 (G)

				REFERENCE			
INTERNUCLEAR DISTANCE, ANGSTROMS				(1.838)			
O-H-O BOND ANGLE, DEGREES				(180.)			
I1*I2*I3, G**3 * CM**6				1.821168-115			
QUANTUM WEIGHT OF GROUND STATE OF +2M,				9.		28	
STRETCH FREQUENCY FROM H-F, WAVE NOS.				(704.)			
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM				(4.064)			
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM				(8.135)			
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS				(687.)			
O-H-O BENDING FREQUENCY, WAVE NOS.				(124.)			
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.				(697.)			
H-O-H BENDING FREQUENCY, WAVE NOS.				(1539.)			
HEAT OF DISSOCIATION AT 298K TO H(G) AND				(120800.)			
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT				23			
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT				23			
.....FUNCTIONS FOR PD IDEAL.....							
NONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.690	72.993	72.993	0.	-11845.	39.988	75138.
500.	16.217	80.692	74.678	3827.	-8287.	40.478	68998.
1000.	20.153	93.293	81.065	12237.	2123.	42.448	54248.
1500.	22.264	101.918	86.651	22886.	13195.	43.998	40828.
2000.	23.175	108.496	91.321	34350.	25830.	45.388	26468.
2500.	24.191	113.818	95.386	46281.	37938.	46.518	13688.
3000.	24.626	119.271	98.772	58496.	58983.	47.668	618.

TABLE 4.035 THERMODYNAMIC FUNCTIONS FOR AG(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (1.930)							
O-H-O BOND ANGLE, DEGREES (180.)							
I1*I2*I3, G**3 * CM**6 1.021209-115							
QUANTUM WEIGHT OF GROUND STATE OF +2M, 6. 20							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (794.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (4.864)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (8.135)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (696.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (124.)							
H-O-H SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (696.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1539.)							
HEAT OF DISSOCIATION AT 298K TO M(G) AND 2(OH) (G), CAL/MOL (100000.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR AG IDEAL.....							
: MONATOMIC GAS :							
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CP, T K GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL	
298. 13.693	72.220	72.220	0.	-7587.	41.318	58826.	
500. 16.269	79.920	73.873	3827.	-3498.	41.883	52510.	
1000. 20.154	92.536	88.380	12235.	7785.	43.847	37650.	
1500. 22.264	101.146	85.887	22889.	28226.	45.367	23640.	
2000. 23.475	107.733	90.557	34351.	33597.	46.558	11800.	
2500. 24.191	113.855	94.542	46282.	48647.	47.510	0.	
3000. 24.636	117.588	98.889	58497.	74574.	49.320	0.	

TABLE 4.035 THERMODYNAMIC FUNCTIONS FOR CO(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS 1.970 10							
O-H-O BOND ANGLE, DEGREES 180. 63							
I1*I2*I3, G**3 * CM**6 1.366747-115							
QUANTUM WEIGHT OF GROUND STATE OF +2M, 1. 20							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (524.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM 3.670 66							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM 0.863 66							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS 572. 66							
O-H-O BENDING FREQUENCY, WAVE NOS. 123. 66							
H-O-H SYMMETRIC STRETCH FREQUENCY, WAVE NOS. 662. 66							
H-O-H BENDING FREQUENCY, WAVE NOS. (1512.)							
HEAT OF DISSOCIATION AT 298K TO M(G) AND 2(OH) (G), CAL/MOL (135000.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR CO IDEAL.....							
: MONATOMIC GAS :							
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CP, T K GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL	
298. 14.018	69.389	69.389	0.	-82362.	40.865	19465.	
500. 16.461	77.162	70.999	3086.	-77338.	40.620	12956.	
1000. 20.267	89.694	77.514	12380.	-62586.	42.591	989.	
1500. 22.322	98.539	83.156	23875.	-36403.	44.110	0.	
2000. 23.509	105.139	87.859	34559.	-9586.	45.380	0.	
2500. 24.214	110.467	91.865	46584.	17214.	46.260	0.	
3000. 24.652	114.923	95.347	58729.	43849.	47.870	0.	

TABLE 4.837 THERMODYNAMIC FUNCTIONS FOR IN(OH)_2 (G)

					REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS					(1.978)	
O-H-O BOND ANGLE, DEGREES					(128.1)	
$11^\circ 12' 13$, $6^\circ 43' \times \text{CM}^{-1}$					1.683886-114	
QUANTUM WEIGHT OF GROUND STATE OF $\pm 2M$,					2.	28
STRETCH FREQUENCY FROM M-F, WAVE NOS.					464.	56
STRETCHING FORCE CONSTANT, HOYNE/ANGSTROM					(1.782)	
O-H-O BENDING FORCE CONSTANT, HOYNE/ANGSTROM					(8.459)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(453.)	
O-H-O BENDING FREQUENCY, WAVE NOS.					(12.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					(459.)	
H-O-H BENDING FREQUENCY, WAVE NOS.					(1853.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH)_2 (G), CAL/MOL					(188889.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT					24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT					23	
.....FUNCTIONS FOR IN IDEAL.....						
NONATOMIC GAS						
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.522	75.738	75.738	0.	-97572.	49748.
500.	16.284	84.485	77.683	3441.	-93496.	44368.
1000.	21.248	98.228	84.740	13438.	-81942.	32158.
1500.	22.838	107.169	98.842	24498.	-78159.	28888.
2000.	23.818	113.885	95.799	36175.	-58827.	8138.
2500.	24.417	119.269	99.971	48245.	-42252.	8.
3000.	24.795	123.757	103.572	60555.	-18397.	8.

TABLE 4.838 THERMODYNAMIC FUNCTIONS FOR SN(OH)_2 (G)

					REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS					2.848	18
O-H-O BOND ANGLE, DEGREES					92.	63
$11^\circ 12' 13$, $6^\circ 43' \times \text{CM}^{-1}$					2.518415-114	
QUANTUM WEIGHT OF GROUND STATE OF $\pm 2M$,					1.	28
STRETCH FREQUENCY FROM M-F, WAVE NOS.					(459.)	
STRETCHING FORCE CONSTANT, HOYNE/ANGSTROM					(1.755)	
O-H-O BENDING FORCE CONSTANT, HOYNE/ANGSTROM					(8.858)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					686.	63
O-H-O BENDING FREQUENCY, WAVE NOS.					281.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					584.	63
H-O-H BENDING FREQUENCY, WAVE NOS.					(1862.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH)_2 (G), CAL/MOL					(185888.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT					23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT					23	
.....FUNCTIONS FOR SN IDEAL.....						
NONATOMIC GAS						
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.649	78.735	78.735	0.	-87321.	63488.
500.	17.441	79.153	72.526	3313.	-82631.	58328.
1000.	21.115	92.714	79.526	13188.	-68368.	46378.
1500.	22.776	101.617	85.487	24195.	-53788.	34228.
2000.	23.743	108.328	98.392	35856.	-38911.	22888.
2500.	24.394	113.698	94.533	47912.	-24326.	9785.
3000.	24.779	118.182	98.111	60213.	-6716.	8.

TABLE 4.833 THERMODYNAMIC FUNCTIONS FOR S8(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (1.988)							
O-H-O BOND ANGLE, DEGREES (129.)							
11°12'13, G**3 * CM**6 1.386912-114							
QUANTUM WEIGHT OF GROUND STATE OF *2M, 2. 28							
STRETCH FREQUENCY FROM N-F, WAVE NOS. (599.)							
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM (2.998)							
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM (8.188)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (585.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (185.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (592.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1342.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (165888.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24							
.....FUNCTIONS FOR S8 IDEAL.....							
MONATONIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.335	73.928	73.928	0.	-78193.	43.868	53117.
500.	17.884	82.883	75.647	3178.	-74425.	43.639	46693.
1000.	28.624	95.871	82.363	12788.	-63488.	45.596	31777.
1500.	22.518	103.826	88.135	23536.	-49821.	47.110	19551.
2000.	23.628	110.478	92.922	35897.	-35525.	48.388	8188.
2500.	24.293	115.828	96.984	47891.	-16882.	49.288	1220.
3000.	24.787	120.239	100.586	59349.	1723.	50.128	-9759.

TABLE 4.848 THERMODYNAMIC FUNCTIONS FOR TE(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (1.938)							
O-H-O BOND ANGLE, DEGREES (129.)							
11°12'13, G**3 * CM**6 1.535751-114							
QUANTUM WEIGHT OF GROUND STATE OF *2M, 1. 28							
STRETCH FREQUENCY FROM N-F, WAVE NOS. (562.)							
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM (2.645)							
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM (8.888)							
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (549.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (99.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (555.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1272.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (148888.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24							
.....FUNCTIONS FOR TE IDEAL.....							
MONATONIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.685	73.188	72.188	0.	-68386.	43.648	37831.
500.	17.388	81.418	74.948	3239.	-64772.	44.218	38786.
1000.	28.787	94.855	81.769	12886.	-51642.	46.188	17439.
1500.	22.683	103.459	87.618	23773.	-34153.	47.718	8631.
2000.	23.679	110.122	92.439	35367.	-14186.	48.938	2299.
2500.	24.326	115.482	96.829	47352.	-69458.	49.948	-4213.
3000.	24.731	119.955	100.871	59653.	25251.	50.818	-18886.

TABLE 4.441 THERMODYNAMIC FUNCTIONS FOR Ba(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	2.468	5
O-H-O BOND ANGLE, DEGREES	108.	63
$11^{\circ}12'13$, $G^{\circ}3 \cdot CH^{\circ}6$	6.751855-114	
QUANTUM WEIGHT OF GROUND STATE OF ^{42}H ,	(1.)	
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(293.)	
STRETCHING FORCE CONSTANT, $NOYME/ANGSTROM$	(0.753)	
O-H-O BENDING FORCE CONSTANT, $NOYME/ANGSTROM$	(0.025)	
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS	398.	64
O-H-O BENDING FREQUENCY, WAVE NOS.	64.	64
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	613.	64
H-O-H BENDING FREQUENCY, WAVE NOS.	(758.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	213888.	36
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR BA IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	17.730	71.045	71.045	0.	-146126.	48.663	35128.
500.	19.582	87.565	88.089	3738.	-142471.	41.225	38674.
1000.	21.755	131.919	87.767	14152.	-132872.	43.188	10999.
1500.	23.184	111.807	94.886	25382.	-119778.	44.713	10124.
2000.	23.961	117.778	99.199	37168.	-106984.	45.931	1078.
2500.	24.509	123.189	103.473	49288.	-87934.	47.889	0.
3000.	24.860	127.691	107.145	61637.	-66666.	49.843	0.

TABLE 4.442 THERMODYNAMIC FUNCTIONS FOR La(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.148)	
O-H-O BOND ANGLE, DEGREES	(120.)	
$11^{\circ}12'13$, $G^{\circ}3 \cdot CH^{\circ}6$	2.043488-114	
QUANTUM WEIGHT OF GROUND STATE OF ^{42}H ,	4.	28
STRETCH FREQUENCY FROM H-F, WAVE NOS.	566.	93
STRETCHING FORCE CONSTANT, $NOYME/ANGSTROM$	(2.712)	
O-H-O BENDING FORCE CONSTANT, $NOYME/ANGSTROM$	(0.898)	
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(554.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(188.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(558.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1358.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(278888.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR LA IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.474	76.781	76.781	0.	-145748.	43.568	91250.
500.	17.160	84.934	78.440	3197.	-141968.	44.218	85260.
1000.	20.634	97.922	85.182	12749.	-131734.	46.668	70658.
1500.	22.621	106.680	90.966	23571.	-119392.	48.728	56818.
2000.	23.630	113.324	95.759	35133.	-106744.	50.390	4388.
2500.	24.293	118.675	99.824	47128.	-93858.	51.788	38825.
3000.	24.788	123.144	103.348	59386.	-80745.	52.978	16758.

TABLE 4.843 THERMODYNAMIC FUNCTIONS FOR CE(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.118)							
O-H-O BOND ANGLE, DEGREES (128.1)							
11°12'13", G°+3 = CH°+6 2.629711-114							
QUANTUM HEIGHT OF GROUND STATE OF +2M, 9. 21							
STRETCH FREQUENCY FROM H-F, HAVE NOS. (453.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (1.317)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (8.861)							
H-O ANTISYMMETRIC STRETCH FREQ., HAVE NOS. (453.)							
O-H-O BENDING FREQUENCY, HAVE NOS. (81.)							
H-O SYMMETRIC STRETCH FREQUENCY, HAVE NOS. (457.)							
H-O-H BENDING FREQUENCY, HAVE NOS. (1899.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (244889.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 58							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 59							
.....FUNCTIONS FOR CE IDEAL.....							
: MONATONIC GAS :							
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:							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.415	79.661	79.661	0.	-122238.	45.887	88964.
500.	18.123	88.337	81.517	3418.	-117811.	46.456	83832.
1000.	21.171	101.996	88.647	13349.	-105853.	49.938	71248.
1500.	22.799	118.914	94.665	24374.	-93119.	51.378	58664.
2000.	23.795	127.621	99.688	36843.	-79889.	53.326	46888.
2500.	24.482	133.882	103.768	48184.	-66264.	54.965	33997.
3000.	24.784	137.487	107.351	60487.	-52411.	56.365	20988.

TABLE 4.844 THERMODYNAMIC FUNCTIONS FOR PR(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.088)							
O-H-O BOND ANGLE, DEGREES (128.1)							
11°12'13", G°+3 = CH°+6 1.699569-115							
QUANTUM HEIGHT OF GROUND STATE OF +2M, 18. 21							
STRETCH FREQUENCY FROM H-F, HAVE NOS. (489.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.824)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (8.867)							
H-O ANTISYMMETRIC STRETCH FREQ., HAVE NOS. (478.)							
O-H-O BENDING FREQUENCY, HAVE NOS. (86.)							
H-O SYMMETRIC STRETCH FREQUENCY, HAVE NOS. (482.)							
H-O-H BENDING FREQUENCY, HAVE NOS. (1151.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (236889.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 60							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR PR IDEAL.....							
: MONATONIC GAS :							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.178	76.773	76.773	0.	-128761.	45.339	73728.
500.	17.879	85.316	78.599	3358.	-123545.	45.936	68988.
1000.	21.860	98.850	85.639	13212.	-109964.	48.197	56978.
1500.	22.743	107.736	91.685	24197.	-98263.	50.892	42548.
2000.	23.762	114.438	96.588	35844.	-84276.	51.612	30945.
2500.	24.380	119.885	100.648	47892.	-74275.	52.859	18978.
3000.	24.769	124.287	104.225	60186.	-62886.	53.986	7838.

TABLE 4.045 THERMODYNAMIC FUNCTIONS FOR ND(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.050)	
O-H-O BOND ANGLE, DEGREES	(150.)	
$11^{\circ}12'13$, $G^{\circ}3 \times CH^{\circ}6$	1.680914-115	
QUANTUM WEIGHT OF GROUND STATE OF $+2H$,	9.	21
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(516.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.263)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.075)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(585.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(91.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(589.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1209.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(230000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR NO IDEAL....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.924	76.184	76.184	8.	-127465.	45.248	68870.
500.	17.619	84.598	77.951	3385.	-122948.	45.876	63220.
1000.	20.926	97.989	84.925	13864.	-118477.	46.248	49700.
1500.	22.679	106.337	90.834	24885.	-96378.	50.210	37400.
2000.	23.724	113.518	95.704	35628.	-80876.	51.770	26300.
2500.	24.296	118.485	99.821	47660.	-64726.	53.040	18400.
3000.	24.752	123.364	103.382	59945.	-48136.	54.100	6170.

TABLE 4.046 THERMODYNAMIC FUNCTIONS FOR PH(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.020)	
O-H-O BOND ANGLE, DEGREES	(108.)	
$11^{\circ}12'13$, $G^{\circ}3 \times CH^{\circ}6$	1.510267-115	
QUANTUM WEIGHT OF GROUND STATE OF $+2H$,	6.	21
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(946.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(2.342)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.085)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(535.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(96.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(539.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1273.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(221000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		60
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		EST

.....FUNCTIONS FOR PH IDEAL....
 . MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.674	74.983	74.983	8.	-141348.	(44.679)	(45796.)
500.	17.341	83.247	76.749	3249.	-134689.	(45.366)	(42196.)
1000.	20.796	96.497	83.592	12985.	-117742.	(47.431)	(32411.)
1500.	22.617	105.303	89.448	23795.	-100697.	(50.826)	(22250.)
2000.	23.681	111.967	94.272	35398.	-83499.	(51.699)	(12436.)
2500.	24.327	117.327	98.365	47406.	-66588.	(53.070)	(1422.)
3000.	24.732	121.681	101.909	59678.	-40426.	(54.220)	(0.)

TABLE 4.847 THERMODYNAMIC FUNCTIONS FOR SM(OH)2 (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					(1.998)		
O-H-O BOND ANGLE, DEGREES					(119.)		
11°12'13, C°°3 ° CM°°6					1.423543-115		
QUANTUM HEIGHT OF GROUND STATE OF +2M,					1.	21	
STRETCH FREQUENCY FROM H-F, WAVE NOS.					(588.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(2.869)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(8.896)		
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(568.)		
O-H-O BENDING FREQUENCY, WAVE NOS.					(162.)		
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					(571.)		
H-O-H BENDING FREQUENCY, WAVE NOS.					(1343.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL					(228288.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						23	
.....FUNCTIONS FOR SM IDEAL.....							
MONATOMIC GAS							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.421	71.836	71.836	6.	-151936.	43.722	41317.
500.	17.847	79.152	72.778	3191.	-146364.	44.545	35862.
1000.	28.638	92.248	79.506	12734.	-138618.	47.439	22941.
1500.	22.524	108.998	85.287	23567.	-112988.	49.676	11351.
2000.	23.632	107.644	98.879	35138.	-93548.	51.379	1248.
2500.	24.295	112.995	94.145	47125.	-65335.	52.728	0.
3000.	24.769	117.464	97.669	59384.	-35988.	53.820	0.

TABLE 4.849 THERMODYNAMIC FUNCTIONS FOR EU(OH)2 (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					(1.968)		
O-H-O BOND ANGLE, DEGREES					(118.)		
11°12'13, C°°3 ° CM°°6					1.348575-115		
QUANTUM HEIGHT OF GROUND STATE OF +2M,					8.	21	
STRETCH FREQUENCY FROM H-F, WAVE NOS.					(817.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(3.254)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(8.188)		
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(594.)		
H-O-H BENDING FREQUENCY, WAVE NOS.					(108.)		
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					(688.)		
H-O-H BENDING FREQUENCY, WAVE NOS.					(1428.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL					(229888.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						23	
.....FUNCTIONS FOR EU IDEAL.....							
MONATOMIC GAS							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.165	74.743	74.743	8.	-158736.	45.897	34212.
500.	18.725	82.788	76.445	3131.	-155786.	45.668	29188.
1000.	28.459	95.617	83.867	12558.	-148889.	47.622	17128.
1500.	22.429	104.321	88.777	23317.	-124339.	49.142	6947.
2000.	23.975	110.945	93.524	36843.	-104776.	50.388	0.
2500.	24.257	116.285	97.568	46815.	-84422.	51.380	0.
3000.	24.682	120.749	101.853	59857.	-52154.	52.138	0.

TABLE 4.049 THERMODYNAMIC FUNCTIONS FOR GO(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (12.100)							
O-H-O BOND ANGLE, DEGREES (120.)							
11*12*13, G**3 * CM**6 2.623546-114							
QUANTUM WEIGHT OF GROUND STATE OF *2H, 5. 21							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (469.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (1.883)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.863)							
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (459.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (82.)							
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (462.)							
M-O-H BENDING FREQUENCY, WAVE NOS. (1115.)							
HEAT OF DISSOCIATION AT 298K TO H2O AND 2(OH) (G), CAL/MOL (236800.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 61							
.....FUNCTIONS FOR GO IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.347	78.709	78.709	0.	-128764.	46.428	81952.
500.	18..50	87.346	80.556	3395.	-116817.	47.168	76794.
1000.	21.137	100.967	87.659	13308.	-103562.	49.690	63899.
1500.	22.782	109.875	93.661	24320.	-90966.	51.578	51806.
2000.	23.785	116.579	98.587	35983.	-78433.	53.810	38189.
2500.	24.195	121.557	102.741	48040.	-65937.	56.198	25214.
3000.	24.780	126.441	106.328	60341.	-53378.	58.228	12314.

TABLE 4.050 THERMODYNAMIC FUNCTIONS FOR TB(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (12.870)							
O-H-O BOND ANGLE, DEGREES (108.)							
11*12*13, G**3 * CM**6 1.664013-115							
QUANTUM WEIGHT OF GROUND STATE OF *2H, 16. 21							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (495.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.188)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.878)							
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (485.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (87.)							
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (487.)							
M-O-H BENDING FREQUENCY, WAVE NOS. (1178.)							
HEAT OF DISSOCIATION AT 298K TO H2O AND 2(OH) (G), CAL/MOL (234800.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 60							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 61							
.....FUNCTIONS FOR TB IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.182	77.920	77.920	0.	-128175.	48.552	79698.
500.	17.881	86.423	79.738	3343.	-114975.	49.212	74481.
1000.	21.022	99.916	86.749	13167.	-101544.	51.587	61186.
1500.	22.723	108.793	92.699	24159.	-87927.	53.321	47972.
2000.	23.750	115.481	97.591	35779.	-74286.	54.767	34758.
2500.	24.373	120.853	101.724	47822.	-59838.	56.984	21143.
3000.	24.764	125.334	105.296	60114.	-45855.	58.984	10241.

TABLE 4.051 THERMODYNAMIC FUNCTIONS FOR OY(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.040)							
O-H-O BOND ANGLE, DEGREES (180.)							
11*12*13, C**3 * CM**6 1.570677-115							
QUANTUM WEIGHT OF GROUND STATE OF +7M, 17. 21							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (523.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.352)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.079)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (512.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (92.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (515.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1230.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 1217000.)							
21(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 60							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR OY IDEAL.....							
. MONATONIC GAS .							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.955	77.656	77.656	0.	-122220.	46.794	61090.
500.	17.535	86.020	79.444	3288.	-117656.	47.357	55500.
1000.	28.893	99.374	86.358	13016.	-105376.	49.324	41650.
1500.	22.657	108.210	92.249	23941.	-93616.	50.874	28280.
2000.	23.711	116.885	97.107	35556.	-78834.	52.119	17530.
2500.	24.347	120.250	101.217	47584.	-63008.	53.167	7890.
3000.	24.746	126.727	104.773	59864.	-45650.	54.076	0.

TABLE 4.052 THERMODYNAMIC FUNCTIONS FOR HO(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.010)							
O-H-O BOND ANGLE, DEGREES (180.)							
11*12*13, C**3 * CM**6 1.441374-115							
QUANTUM WEIGHT OF GROUND STATE OF +7M, 16. 21							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (554.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.645)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.088)							
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (543.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (97.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (546.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1295.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 219000.)							
21(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 23							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR HO IDEAL.....							
. MONATONIC GAS .							
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.603	77.126	77.126	0.	-120559.	46.718	63317.
500.	17.252	85.747	79.893	3232.	-116316.	47.281	57598.
1000.	20.747	98.547	85.694	12854.	-103950.	49.244	43992.
1500.	22.582	107.339	91.522	23726.	-90989.	50.774	31067.
2000.	23.666	113.998	96.342	35311.	-76524.	51.984	19580.
2500.	24.117	119.355	100.426	47321.	-61114.	52.990	9250.
3000.	24.725	123.827	103.964	59589.	-44655.	53.866	0.

TABLE 4.053 THERMODYNAMIC FUNCTIONS FOR ER(OH)₂ (G)

					REFERENCE		
INTERNUCLEAR DISTANCE, ANGSTROMS					(1.990)		
O-H-O BOND ANGLE, DEGREES					(189.)		
I ¹ I ² I ³ , C ⁰⁰³ * CM ⁰⁰⁶					1.395504-115		
QUANTUM WEIGHT OF GROUND STATE OF +2M,					13.	21	
STRETCH FREQUENCY FROM M-F, WAVE NOS.					(599.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(2.990)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(0.180)		
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(577.)		
O-H-O BENDING FREQUENCY, WAVE NOS.					(103.)		
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					(580.)		
H-O-H BENDING FREQUENCY, WAVE NOS.					(1368.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND					(219800.)		
2(OH) (G), CAL/MOL							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						23	
							FUNCTIONS FOR ER IDEAL.....
							MONATOMIC GAS
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TABLE 4.054 THERMODYNAMIC FUNCTIONS FOR TM(OH)₂ (G)

					REFERENCE			
INTERNUCLEAR DISTANCE, ANGSTROMS					(1.958)			
O-H-O BOND ANGLE, DEGREES					(189.)			
I ¹ I ² I ³ , G ⁰⁰³ * CM ⁰⁰⁶					1.324855-115			
QUANTUM WEIGHT OF GROUND STATE OF +2M,					8.	21		
STRETCH FREQUENCY FROM M-F, WAVE NOS.					(627.)			
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM					(3.397)			
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM					(0.113)			
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS					(615.)			
O-H-O BENDING FREQUENCY, WAVE NOS.					(118.)			
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.					(618.)			
H-O-H BENDING FREQUENCY, WAVE NOS.					(1448.)			
HEAT OF DISSOCIATION AT 298K TO H(G) AND					(284888.)			
2(OH) (G), CAL/MOL								
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT						23		
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT						23		
							FUNCTIONS FOR TM IDEAL.....	
							MONATOMIC GAS	
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TABLE 4.054 THERMODYNAMIC FUNCTIONS FOR YB(OH)2 (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.928)		
O-H-O BOND ANGLE, DEGREES	(180.)		
$\angle 1^*12^*13$, $G^*13 = CH^*16$	1.235996-115		
QUANTUM WEIGHT OF GROUND STATE OF $+2H$,	1.	21	
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(670.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.852)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.129)		
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(657.)		
O-H-O BENDING FREQUENCY, WAVE NOS.	(118.)		
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(659.)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(1536.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(286388.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23	

.....FUNCTIONS FOR YB IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.827	70.386	70.386	0.	-143481.	41.352	29285.
500.	16.384	79.549	72.845	3852.	-138263.	41.915	22915.
1000.	20.187	90.798	78.510	12288.	-123835.	43.877	18290.
1500.	22.780	99.419	84.117	22953.	-106913.	45.397	0.
2000.	23.584	106.889	88.798	34422.	-79385.	46.590	0.
2500.	24.197	111.333	92.798	48357.	-52598.	47.540	0.
3000.	24.640	115.787	96.262	58574.	-26868.	48.300	0.

TABLE 4.355 THERMODYNAMIC FUNCTIONS FOR LU(OH)2 (G)

		REFERENCE	
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.986)		
O-H-O BOND ANGLE, DEGREES	(123.)		
$\angle 1^*12^*13$, $G^*13 = CH^*16$	1.582161-114		
QUANTUM WEIGHT OF GROUND STATE OF $+2H$,	2.	21	
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(781.)		
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.257)		
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.142)		
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(638.)		
O-H-O BENDING FREQUENCY, WAVE NOS.	(123.)		
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(693.)		
M-O-H BENDING FREQUENCY, WAVE NOS.	(1681.)		
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(232888.)		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23	

.....FUNCTIONS FOR LU IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.665	74.811	74.811	0.	-185340.	44.152	92671.
500.	16.874	81.668	75.648	3810.	-181281.	44.713	86380.
1000.	20.832	94.175	82.829	12145.	-159341.	46.630	78850.
1500.	22.193	102.747	87.579	22752.	-77617.	48.680	55605.
2000.	23.531	109.317	92.224	36186.	-64658.	50.819	41140.
2500.	24.161	114.631	96.191	46999.	-50883.	51.177	28225.
3000.	24.615	119.79	99.645	58382.	-34389.	52.159	15030.

TABLE 4.057 THERMODYNAMIC FUNCTIONS FOR HF(OH)₂ (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.980)
O-M-O BOND ANGLE, DEGREES	(120.)
I=I ² =I ₃ , G ² =3 CM ⁻¹	1.507819-114
QUANTUM WEIGHT JF GROUND STATE OF +2H,	(5.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(70.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(6.257)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.142)
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(69.)
O-M-O BENDING FREQUENCY, WAVE NOS.	(123.)
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(689.)
M-O-H BENDING FREQUENCY, WAVE NOS.	(1601.)
HEAT OF DISSOCIATION AT 298K TO HIG) AND	(290880.)
2(OH) (G), CAL/POL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	

.....FUNCTIONS FOR HF IDEAL.....

• MONATOMIC GAS

T	K	CF, GIBBS/MOL	S GIBBS/MOL	-1G-H2981/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-1G-H2981/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.	167	75.994	75.894	8.	-118633.	44.642	137794.
500.	16.	76	53.553	77.532	3810.	-115319.	45.288	138976.
1000.	20.	833	96.360	83.914	12146.	-105696.	47.265	144415.
1500.	22.	193	104.632	89.464	22753.	-95255.	49.889	148611.
2000.	23.	421	111.203	94.109	34187.	-84746.	50.472	152318.
2500.	24.	162	116.517	98.076	46181.	-72739.	51.719	154927.
3000.	24.	515	120.965	101.931	58303.	-59742.	52.799	157813.

TABLE 4.053 THERMODYNAMIC FUNCTIONS FOR TA(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.658)
O-H-O BOND ANGLE, DEGREES	(128.7)
I=I ² /3, G ⁰³ * CM ²	1.296275-114
QUANTUM WEIGHT OF GROUND STATE OF +2M,	(4)
STRETCH FREQUENCY FROM N-F, WAVE NOS.	(791.)
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(59.434)
O-H O BENDING FORCE CONSTANT, DYNE/ANGSTROM	(8.161)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(776.)
O-H O BENDING FREQUENCY, WAVE NOS.	(139.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(778.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1797.)
HEAT OF DISSOCIATION AT 298K TO (G) AND	(280000.)
21(04) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	

.....FUNCTIONS FOR TA IDEM.....

MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H2981)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H2981)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.724	74.672	74.672	0.	-69915.	44.241	170667.
500.	15.476	82.061	76.254	2904.	-64613.	44.812	169167.
1000.	19.581	94.174	82.414	11760.	-55902.	46.930	159062.
1500.	21.932	102.603	87.007	22143.	-45339.	48.775	136343.
2000.	23.269	109.113	92.351	33524.	-33949.	50.326	112920.
2500.	24.053	114.197	96.244	45371.	-22655.	51.696	102622.
3000.	24.337	118.028	99.653	57520.	-12130.	52.676	85602.

TABLE 4.059 THERMODYNAMIC FUNCTIONS FOR N(HO)2 (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	1.838
O-H-O BOND ANGLE, DEGREES	(128.)
$11^{\circ}12'13$, 0.003° CM ⁻¹	1.221200-114
QUANTUM WEIGHT OF GROUND STATE OF ^{12}H	(1.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	762.
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(5.850)
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.168)
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(748.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(134.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(1758.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1714.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(258888.)
2(OH) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7

.....FUNCTIONS FOR H IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.368	72.101	72.101	0.	-24473.	41.951	191745.
500.	15.683	79.579	73.781	2939.	-28914.	42.157	164971.
1000.	19.752	91.835	79.938	11897.	-18716.	44.782	167952.
1500.	22.033	100.319	85.347	22390.	164.	47.250	158284.
2000.	23.332	106.853	89.969	33769.	11294.	49.269	132809.
2500.	24.055	112.149	93.092	45642.	22575.	50.873	113609.
3000.	24.568	116.587	97.315	57816.	34080.	52.190	95734.

TABLE 4.060 THERMODYNAMIC FUNCTIONS FOR RE(OH)2 (G)

	REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(1.558)
O-H-O BOND ANGLE, DEGREES	(109.)
$11^{\circ}12'13$, 0.003° CM ⁻¹	1.867461-115
QUANTUM WEIGHT OF GROUND STATE OF ^{12}H	(6.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(798.)
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(5.434)
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.181)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(775.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(139.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(777.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1797.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(228888.)
2(OH) (G), CAL/MOL	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR RE IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	11.228	73.881	73.881	0.	-18152.	45.138	175298.
500.	15.478	80.472	74.643	2984.	-6558.	45.788	168845.
1000.	19.522	92.586	80.825	11761.	3963.	47.670	159510.
1500.	21.932	101.815	86.214	22195.	15863.	49.160	133405.
2000.	23.269	107.526	89.762	33926.	26727.	50.360	110920.
2500.	24.053	112.110	94.669	45373.	38646.	51.340	100720.
3000.	24.537	117.241	98.685	57538.	50696.	52.178	84448.

TABLE 4.061 THERMODYNAMIC FUNCTIONS FOR OS(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.070)
O-H...O BOND ANGLE, DEGREES	(100.)
$11^{\circ}12'13$, $C^{\circ}S^{\circ} = CM^{\circ}46$	1.113429-115
QUANTUM WEIGHT OF GROUND STATE OF $+2M$	(9.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(751.)
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(4.917)
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.164)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(737.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(132.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(738.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1708.)
HEAT OF DISSOCIATION AT 298K TO HIG AND 2(OH) (G), CAL/MOL	(200000.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	25
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	25

.....FUNCTIONS FOR OS IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	17.414	74.261	74.261	0.	10475.	46.002	176010.
500.	19.725	81.761	75.066	2940.	17995.	46.905	160330.
1000.	19.775	94.840	82.110	11922.	22694.	44.994	109750.
1500.	22.045	102.531	87.977	22431.	32400.	50.173	131424.
2000.	23.340	109.060	92.164	33007.	42533.	51.919	133212.
2500.	24.100	114.365	96.092	45602.	52750.	52.677	99000.
3000.	24.971	118.004	99.517	57059.	63137.	53.097	76990.

TABLE 4.062 THERMODYNAMIC FUNCTIONS FOR IR(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.090)
O-H...O BOND ANGLE, DEGREES	(100.)
$11^{\circ}12'13$, $C^{\circ}S^{\circ} = CM^{\circ}46$	1.101671-115
QUANTUM WEIGHT OF GROUND STATE OF $+2M$	(10.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(715.)
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(4.463)
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.149)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(702.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(126.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(703.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1636.)
HEAT OF DISSOCIATION AT 298K TO HIG AND 2(OH) (G), CAL/MOL	(179000.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	25
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	25

.....FUNCTIONS FOR IR IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
290.	13.590	74.011	74.011	0.	8117.	46.256	140740.
500.	19.964	82.420	76.439	2991.	11297.	46.619	141100.
1000.	19.992	94.895	82.779	12070.	20306.	48.617	122440.
1500.	22.147	103.402	88.301	22652.	30250.	50.452	104060.
2000.	23.403	109.962	92.928	34060.	40477.	51.005	67110.
2500.	24.143	115.270	96.002	45970.	50950.	52.999	69590.
3000.	24.691	119.716	100.320	58104.	62352.	53.969	52000.

TABLE 4.063 THERMODYNAMIC FUNCTIONS FOR PT(OH)₂ (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.910)
O-H-O BOND ANGLE, DEGREES	(103.)
11°12'13, C°03 ° CM°06	1.211052-115
QUANTUM WEIGHT OF GROUND STATE OF *2H,	(9.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(692.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(4.064)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(3.135)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(669.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(120.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(670.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1561.)
HEAT OF DISSOCIATION AT 298K TO HIG AND 2(OH) (G), CAL/MOL	(15000.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR PT IDEAL.....
 : MONATOMIC GAS :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.765	74.955	74.955	0.	8477.	45.963	126230.
500.	16.199	82.672	76.605	3835.	11884.	46.682	116960.
1000.	20.116	95.295	83.032	12222.	21658.	47.152	99020.
1500.	22.239	103.052	88.612	22068.	32157.	50.906	81630.
2000.	23.459	110.435	93.277	34112.	42906.	52.350	64220.
2500.	24.180	115.752	97.257	48237.	55121.	53.441	48430.
3000.	24.620	120.203	100.721	58446.	67558.	54.393	33020.

TABLE 4.064 THERMODYNAMIC FUNCTIONS FOR AU(OH)₂ (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(1.920)
O-H-O BOND ANGLE, DEGREES	(103.)
11°12'13, L°03 ° CM°06	1.236332-115
QUANTUM WEIGHT OF GROUND STATE OF *2H,	(6.)
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(666.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(3.092)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(0.129)
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(654.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(117.)
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(655.)
H-O-H BENDING FREQUENCY, WAVE NOS.	(1536.)
HEAT OF DISSOCIATION AT 298K TO HIG AND 2(OH) (G), CAL/MOL	(12500.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23

.....FUNCTIONS FOR AU IDEAL.....
 : MONATOMIC GAS :
 : :
 : :

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.453	74.332	74.332	0.	-13595.	43.120	77820.
500.	16.316	82.182	75.994	3854.	-9180.	43.603	71660.
1000.	20.191	94.756	82.463	12294.	849.	45.654	56150.
1500.	22.282	103.377	88.071	22968.	12647.	47.105	41890.
2000.	23.405	109.968	92.754	34429.	25107.	48.456	28290.
2500.	24.190	115.292	96.746	48364.	37132.	49.340	15120.
3000.	24.640	119.746	100.210	58502.	50656.	50.107	2110.

TABLE 4.065 THERMODYNAMIC FUNCTIONS FOR HClO_2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	2.000	18
O-H-O BOND ANGLE, DEGREES	100.	63
$11^\circ 12' 13$, $6^\circ 03' \pm 0.006$	1.452966-115	
QUANTUM WEIGHT OF GROUND STATE OF $+2h$,	1.	28
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(561.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	3.970	66
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	0.139	66
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	589.	66
O-H-O BENDING FREQUENCY, WAVE NOS.	171.	66
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	641.	66
H-O-H BENDING FREQUENCY, WAVE NOS.	(1563.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(110000.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR HCl IDEAL.....
 : MONATOMIC GAS :
 :

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.487	69.656	69.656	0.	-87988.	41.794	7889.
500.	16.318	77.438	77.438	3899.	-61661.	42.397	2934.
1000.	20.159	93.074	77.790	12204.	-34963.	44.319	0.
1500.	22.761	94.685	83.393	22939.	-9164.	45.848	0.
2000.	23.472	105.271	84.072	34398.	10913.	47.022	0.
2500.	24.189	110.592	92.061	46328.	44033.	47.983	0.
3000.	24.624	115.645	95.931	58942.	73418.	48.790	0.

TABLE 4.065 THERMODYNAMIC FUNCTIONS FOR TiO_2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.044)	
O-H-O BOND ANGLE, DEGREES	(120.)	
$11^\circ 12' 13$, $6^\circ 03' \pm 0.006$	2.634609-114	
QUANTUM WEIGHT OF GROUND STATE OF $+2h$,	2.	28
STRETCH FREQUENCY FROM H-F, WAVE NOS.	475.	94
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.979)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.866)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(466.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(93.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(467.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1139.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(145890.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR Ti IDEAL.....
 : MONATOMIC GAS :
 :

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.261	77.583	77.583	0.	-77007.	43.238	35248.
500.	17.991	86.499	79.339	3375.	-73194.	43.798	29490.
1000.	21.090	99.699	76.407	13252.	-61724.	45.760	17410.
1500.	22.758	105.553	92.308	24248.	-49656.	47.270	9899.
2000.	23.771	115.251	97.300	39902.	-32024.	48.400	0.
2500.	24.386	121.627	101.446	47993.	-8730.	49.460	0.
3000.	24.773	125.110	105.027	61250.	14919.	50.320	0.

TABLE 4.067 THERMODYNAMIC FUNCTIONS FOR $\text{Pb}(\text{OH})_2$ (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	2.855	13
O-H-O BOND ANGLE, DEGREES	98.	63
$\angle \text{H}_2\text{O}$, $G^\circ \text{ cm}^{-1}$	3.219337-114	
QUANTUM WEIGHT OF GROUND STATE OF ^{208}Pb	1.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	574.	10
STRETCHING FORCE CONSTANT, $\text{MDYN}/\text{ANGSTROM}$	(2.493)	
O-H-O BENDING FORCE CONSTANT, $\text{MDYN}/\text{ANGSTROM}$	(8.396)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	546.	63
O-H-O BENDING FREQUENCY, WAVE NOS.	167.	63
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	523.	63
H-O-H BENDING FREQUENCY, WAVE NOS.	(1376.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(150880.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	7	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	7	

.....FUNCTIONS FOR Pb IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.485	73.252	73.252	8.	-77585.	61.898	38874.
500.	16.987	81.358	74.983	3183.	-72746.	62.453	33632.
1000.	20.587	94.393	81.698	12695.	-50753.	64.416	22021.
1500.	22.456	103.124	87.444	23581.	-43978.	65.940	11142.
2000.	23.614	109.775	92.243	35060.	-29844.	67.145	544.
2500.	24.283	115.123	96.383	47040.	-6219.	68.165	0.
3000.	24.781	119.598	99.822	59782.	21484.	69.077	0.

TABLE 4.363 THERMODYNAMIC FUNCTIONS FOR $\text{Bi}(\text{OH})_3$ (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.115)	
O-H-O BOND ANGLE, DEGREES	(120.)	
$\angle \text{H}_2\text{O}$, $G^\circ \text{ cm}^{-1}$	2.463477-114	
QUANTUM WEIGHT OF GROUND STATE OF ^{209}Bi	2.	20
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(455.)	
STRETCHING FORCE CONSTANT, $\text{MDYN}/\text{ANGSTROM}$	(1.417)	
O-H-O BENDING FORCE CONSTANT, $\text{MDYN}/\text{ANGSTROM}$	(0.861)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	(447.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(59.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(447.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1896.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(243889.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	24	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	23	

.....FUNCTIONS FOR Bi IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.454	77.957	77.957	8.	-56343.	64.678	46198.
500.	18.142	86.668	79.815	3416.	-63423.	65.238	33993.
1000.	21.177	100.314	86.494	13388.	-51812.	67.280	21434.
1500.	22.911	109.233	92.476	24386.	-39430.	68.720	9780.
2000.	23.746	115.961	97.913	36896.	-25414.	69.980	0.
2500.	24.442	121.322	102.075	49110.	-1785.	70.874	0.
3000.	24.795	125.887	105.667	60422.	21679.	71.680	0.

TABLE 4.067 THERMODYNAMIC FUNCTIONS FOR PO(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.068)
O-H-O BOND ANGLE, DEGREES	(120.)
$I_1^*I_2^*I_3$, CM ³ ° CM ⁻³	2.476493-114
QUANTUM WEIGHT OF GROUND STATE OF ν_{2H}	(1.)
STRETCH FREQUENCY FROM R-F, WAVE NOS.	(498.)
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(2.193)
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.973)
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	(489.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(87.)
O-H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(489.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(1159.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(110888.)

REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24

.....FUNCTIONS FOR PO IDEAL.....
 MONATOMIC GAS
 :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.447	75.881	75.881	0.	10786.	45.138	25467.
500.	17.728	84.269	77.611	3329.	16591.	45.788	19478.
1000.	20.985	97.722	84.596	13126.	12361.	47.458	7377.
1500.	22.704	106.585	90.529	24094.	4573.	49.370	0.
2000.	23.729	113.271	95.413	35717.	986.	50.560	0.
2500.	24.365	118.642	99.539	47733.	36203.	51.530	0.
3000.	24.759	123.121	103.187	60844.	61365.	52.350	0.

TABLE 4.072 THERMODYNAMIC FUNCTIONS FOR RA(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.308)
O-H-O BOND ANGLE, DEGREES	(108.)
$I_1^*I_2^*I_3$, CM ³ ° CM ⁻³	2.527758-114
QUANTUM WEIGHT OF GROUND STATE OF ν_{2H}	(1.)
STRETCH FREQUENCY FROM R-F, WAVE NOS.	(359.)
STRETCHING FORCE CONSTANT, DYNE/ANGSTROM	(1.116)
O-H-O BENDING FORCE CONSTANT, DYNE/ANGSTROM	(0.937)
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS.	(349.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(62.)
O-H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(349.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(899.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(248888.)

REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 24
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 24

.....FUNCTIONS FOR RA IDEAL.....
 MONATOMIC GAS
 :
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.565	76.329	76.329	0.	-176890.	42.158	31281.
500.	15.105	85.582	74.315	3634.	-171682.	42.710	26233.
1000.	21.560	99.710	85.016	12094.	-159571.	44.600	19857.
1500.	22.794	108.746	92.674	25090.	-145371.	46.280	9521.
2000.	23.780	115.495	97.694	36882.	-128796.	47.390	0.
2500.	24.475	120.896	101.332	48889.	-106179.	48.370	0.
3000.	24.876	125.393	104.970	61243.	-83665.	49.219	0.

TABLE 4.671 THERMODYNAMIC FUNCTIONS FOR AC(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.289)							
O-H-O BOND ANGLE, DEGREES (120.1)							
11*12*13, G**3 * CM**6 3.673610-116							
QUANTUM WEIGHT OF GROUND STATE OF +2H, 20							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (416.)							
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM (1.531)							
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM (9.851)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (489.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (73.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (489.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1827.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (202086.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 62							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 75							
.....FUNCTIONS FOR AC IDEAL.....							
MONATOMIC GAS							
T K							
CP,	S	-(G-H2981)/T,	H-H298,	FREE ENERGY OF	-(G-H2981)/T,	FREE ENERGY OF	
GIBBS/MOL	GIBBS/MOL	GIBBS/MOL	CAL/MOL	FORMATION,	GIBBS/MOL	FORMATION,	
				CAL/MOL		CAL/MOL	
298.	15.927	79.103	79.103	0.	-139531.	39.949	91259.
500.	16.482	87.986	81.885	3491.	-136143.	42.424	85203.
1000.	21.321	101.819	88.270	13549.	-127034.	46.870	70650.
1500.	22.873	110.782	94.364	24627.	-117138.	48.288	56010.
2000.	23.930	117.586	99.343	36325.	-106923.	49.536	43100.
2500.	24.630	122.894	103.933	48483.	-96494.	51.234	30025.
3000.	24.884	127.384	107.144	60719.	-86476.	52.322	16750.

TABLE 4.672 THERMODYNAMIC FUNCTIONS FOR TH(OH)2 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.288)							
O-H-O BOND ANGLE, DEGREES (100.)							
11*12*13, G**3 * CM**6 2.119556-115							
QUANTUM WEIGHT OF GROUND STATE OF +2H, 5.							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (416.)							
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM (1.531)							
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM (9.851)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (489.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (73.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (489.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1827.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (237888.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 23							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR TH IDEAL.....							
MONATOMIC GAS							
T K							
CP,	S	-(G-H2981)/T,	H-H298,	FREE ENERGY OF	-(G-H2981)/T,	FREE ENERGY OF	
GIBBS/MOL	GIBBS/MOL	GIBBS/MOL	CAL/MOL	FORMATION,	GIBBS/MOL	FORMATION,	
				CAL/MOL		CAL/MOL	
298.	15.829	79.155	78.155	0.	-76106.	45.424	127761.
500.	16.483	87.939	81.887	3491.	-72981.	45.988	121267.
1000.	21.322	100.873	87.323	13550.	-64214.	48.821	105580.
1500.	22.923	109.435	93.417	24627.	-54745.	49.789	91831.
2000.	23.926	116.559	98.396	36325.	-43759.	51.338	76746.
2500.	24.630	121.947	102.946	48484.	-31766.	52.782	63716.
3000.	24.884	126.437	106.197	60719.	-19281.	53.915	51956.

TABLE 4.073 THERMODYNAMIC FUNCTIONS FOR PA(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.150)	
O-H-O BOND ANGLE, DEGREES	(120.)	
$11^{\circ}12'13$, $G^{\circ}13 + CM^{\circ}16$	3.222531-114	
QUANTUM WEIGHT OF GROUND STATE OF $+2M$,	12.	21
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(453.)	
STRETCHING FORCE CONSTANT, MOYNE/ANGSTROM	(1.517)	
O-H-O BENDING FORCE CONSTANT, MOYNE/ANGSTROM	(0.061)	
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(445.)	
C-H-O BENDING FREQUENCY, WAVE NOS.	(53.)	
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(445.)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1197.)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND 21(OH) (G), CAL/MOL	(231838.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		68
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		EST

.....FUNCTIONS FOR PA IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.437	81.937	81.937	0.	-83173.	(47.419)	(115227.)
500.	18. 11	93. 14	87.794	3410.	-79632.	(48.861)	(109347.)
1000.	21.161	104.263	98.921	13342.	-69598.	(50.298)	(95533.)
1500.	22.793	113.178	94.926	24363.	-61363.	(51.992)	(79487.)
2000.	23.751	119.834	101.959	36838.	-51394.	(53.314)	(66185.)
2500.	24.299	125.264	106.024	48848.	-40351.	(54.331)	(53515.)
3000.	24.783	129.749	109.618	60392.	-30511.	(55.298)	(39818.)

TABLE 4.07. THERMODYNAMIC FUNCTIONS FOR U(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.180)	
O-H-O BOND ANGLE, DEGREES	(120.)	
$11^{\circ}12'13$, $G^{\circ}13 + CM^{\circ}16$	2.823634-114	
QUANTUM WEIGHT OF GROUND STATE OF $+2M$,	9.	21
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(496.)	
STRETCHING FORCE CONSTANT, MOYNE/ANGSTROM	(2.180)	
O-H-O BENDING FORCE CONSTANT, MOYNE/ANGSTROM	(0.073)	
M-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(487.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(87.)	
M-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(487.)	
M-O-H BENDING FREQUENCY, WAVE NOS.	(1199.)	
HEAT OF DISSOCIATION AT 298K TO M(G) AND 21(OH) (G), CAL/MOL	(226848.)	
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT		23
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT		23

.....FUNCTIONS FOR U IDEAL.....
 MONATOMIC GAS

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.836	88.669	88.669	0.	-78576.	47.724	114355.
500.	17.697	89.125	82.477	3324.	-75952.	48.378	107215.
1000.	20.967	102.561	89.452	13189.	-67982.	50.686	90358.
1500.	22.695	111.410	95.378	24868.	-57396.	52.366	75459.
2000.	23.723	118.192	100.258	35639.	-46423.	53.825	61830.
2500.	24.361	123.472	104.331	47726.	-34381.	55.188	48659.
3000.	24.756	127.951	107.947	60812.	-21700.	56.263	35711.

TABLE 4.075 THERMODYNAMIC FUNCTIONS FOR NP10H12 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.050)							
O-H-O BOND ANGLE, DEGREES (129.)							
I ¹ I ² I ³ , G ⁰ *3 * CM ⁰ *6 2.669464-114							
QUANTUM WEIGHT OF GROUND STATE OF *2M, 6. 21							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (515.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.352)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.078)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (506.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (90.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (506.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1240.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (211000.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 60							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 67							
.....FUNCTIONS FOR NP IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.872	79.532	79.532	0.	-90437.	47.229	87303.
500.	17.518	87.495	81.320	3288.	-85232.	47.796	82643.
1000.	20.978	101.236	88.229	13006.	-71975.	49.872	78974.
1500.	22.649	110.066	94.216	23926.	-58201.	51.660	59385.
2000.	23.706	116.748	98.972	35537.	-44295.	53.288	47636.
2500.	24.344	122.104	103.879	47563.	-30217.	54.515	35967.
3000.	24.743	126.581	106.634	59842.	-16015.	55.644	24299.

TABLE 4.075 THERMODYNAMIC FUNCTIONS FOR PU10H12 (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.000)							
O-H-O BOND ANGLE, DEGREES (130.)							
I ¹ I ² I ³ , G ⁰ *3 * CM ⁰ *6 1.697460-115							
QUANTUM WEIGHT OF GROUND STATE OF *2M, 1. 21							
STRETCH FREQUENCY FROM M-F, WAVE NOS. (515.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.152)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.078)							
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (506.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (90.)							
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (505.)							
H-O-H BENDING FREQUENCY, WAVE NOS. (1240.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL (202800.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 23							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR PU IDEAL.....							
MONATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.173	73.259	73.259	0.	-43184.	42.117	75150.
500.	17.419	81.622	75.847	3288.	-86712.	47.889	69480.
1000.	20.874	94.963	81.456	13007.	-75100.	45.098	57250.
1500.	22.649	103.794	87.843	23926.	-59371.	47.157	45992.
2000.	23.786	110.468	92.439	35538.	-43998.	49.033	36730.
2500.	24.744	115.932	96.907	47563.	-27642.	50.731	23320.
3000.	24.743	120.238	100.341	59842.	-10921.	52.254	11760.

TABLE 4.077 THERMODYNAMIC FUNCTIONS FOR ANIONIZ (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.089)							
O-H-O BOND ANGLE, DEGREES (190.)							
11°12'13, 0.003 * CM ⁻¹ 1.697539-115							
QUANTUM WEIGHT OF GROUND STATE OF +2H, 8. 21							
STRETCH FREQUENCY FROM 4-F, WAVE NOS. (515.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (2.352)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (9.079)							
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS (596.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (99.)							
O-H SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (515.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (1240.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 210M (G), CAL/MOL (207000.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 60							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT 23							
.....FUNCTIONS FOR AN IDEAL.....							
POMATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.974	77.441	77.441	8.	-114342.	46.472	55000.
500.	17.519	85.085	79.229	3280.	-112745.	47.035	50465.
1000.	20.878	99.146	86.139	13007.	-98404.	46.997	39230.
1500.	22.649	107.977	92.026	23926.	-63596.	50.910	20500.
2000.	23.706	114.651	96.002	35539.	-60351.	51.701	10400.
2500.	24.344	120.215	100.990	47563.	-53792.	52.662	0300.
3000.	24.743	124.492	104.944	59843.	-36567.	53.475	0.

TABLE 4.079 THERMODYNAMIC FUNCTIONS FOR CH(ONIZ (G)

REFERENCE							
INTERNUCLEAR DISTANCE, ANGSTROMS (2.200)							
O-H-O BOND ANGLE, DEGREES (120.)							
11°12'13, 0.003 * CM ⁻¹ 3.720234-114							
QUANTUM WEIGHT OF GROUND STATE OF +2H, 5. 21							
STRETCH FREQUENCY FROM H-F, WAVE NOS. (419.)							
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM (1.531)							
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM (0.051)							
O-H ANTISYMMETRIC STRETCH FREQ., WAVE NOS (400.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (73.)							
O-H SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (407.)							
O-H-O BENDING FREQUENCY, WAVE NOS. (1027.)							
HEAT OF DISSOCIATION AT 298K TO H(G) AND 210M (G), CAL/MOL (226000.)							
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT 60							
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT EST							
.....FUNCTIONS FOR CH IDEAL.....							
POMATOMIC GAS							
T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.033	81.191	81.191	8.	-117140.	47.064	(76143.)
500.	18.404	90.076	83.094	3491.	-111969.	47.783	(71797.)
1000.	21.322	103.911	90.360	13551.	-98621.	50.279	(60950.)
1500.	22.973	112.073	96.454	24629.	-85147.	52.174	(50107.)
2000.	23.838	119.597	101.434	36326.	-71746.	53.024	(39262.)
2500.	24.420	124.905	105.623	48405.	-58449.	54.786	(20417.)
3000.	24.904	129.475	109.235	60720.	-45246.	55.749	(17572.)

TABLE 4.87) THERMODYNAMIC FUNCTIONS FOR BK(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.280)	
O-H-O BOND ANGLE, DEGREES	(126.)	
$11^{\circ}12'13$, $G^{\circ}3 \cdot CH^{\circ}6$	3.720316-114	
QUANTUM WEIGHT OF GROUND STATE OF ν_{2M}	16.	21
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(415.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.531)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.851)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(488.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(73.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(497.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1227.)	
HEAT OF DISSOCIATION AT 298K TO HIG AND	(221638.)	
210M) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR BK IDEAL.....
 . NOMATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.833	83.583	83.583	0.	-188529.	(48.552)	(88888.)
500.	16.474	92.389	85.486	3461.	-185219.	(49.212)	(74888.)
1000.	21.722	106.228	92.672	13551.	-94697.	(51.587)	(61888.)
1500.	22.473	115.185	98.766	24629.	-84082.	(53.321)	(48888.)
2000.	23.838	121.989	103.744	36326.	-73948.	(54.767)	(39888.)
2500.	24.438	127.298	107.935	48485.	-61782.	(55.964)	(28888.)
3000.	24.984	131.787	111.947	60720.	-51098.	(56.964)	(18888.)

TABLE 4.88) THERMODYNAMIC FUNCTIONS FOR CF(OH)2 (G)

		REFERENCE
INTERNUCLEAR DISTANCE, ANGSTROMS	(2.280)	
O-H-O BOND ANGLE, DEGREES	(126.)	
$11^{\circ}12'13$, $G^{\circ}3 \cdot CH^{\circ}6$	2.119816-115	
QUANTUM WEIGHT OF GROUND STATE OF ν_{2M}	17.	21
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(419.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(1.531)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(0.851)	
H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(498.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(73.)	
H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(497.)	
H-O-H BENDING FREQUENCY, WAVE NOS.	(1827.)	
HEAT OF DISSOCIATION AT 298K TO HIG AND	(208888.)	
210-1) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR CF IDEAL.....
 . NOMATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.833	88.881	88.881	0.	-186248.	(46.794)	(61888.)
500.	18.485	99.687	89.784	3492.	-182786.	(47.357)	(55888.)
1000.	21.322	103.521	96.478	13551.	-92138.	(49.324)	(42888.)
1500.	22.873	112.444	96.854	24629.	-82629.	(50.874)	(28888.)
2000.	23.838	119.288	101.844	36326.	-69379.	(52.119)	(18888.)
2500.	24.438	124.596	105.274	48485.	-55948.	(53.167)	(88888.)
3000.	24.984	129.36	108.945	60721.	-42668.	(54.876)	(-28888.)

TABLE 4.881 THERMODYNAMIC FUNCTIONS FOR ES(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.169)
O-H-O BOND ANGLE, DEGREES	(188.)
12 ¹² 13, C ¹³ + CH ¹³ 6	1.973263-115
QUANTUM WEIGHT OF GROUND STATE OF +2P,	16.
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(446.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(1.759)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(8.853)
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(437.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(78.)
O-H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(436.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(1898.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(289388.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST

.....FUNCTIONS FOR ES IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.523	86.156	89.198	8.	-113376.	(46.710)	(63000.)
500.	16.152	89.872	82.816	3626.	-138481.	(47.281)	(50000.)
1000.	21.496	102.561	44.176	13288.	-98422.	(49.294)	(44000.)
1500.	22.911	111.497	25.276	24421.	-87482.	(50.776)	(31000.)
2000.	23.882	119.197	18.149	36895.	-74719.	(51.994)	(20000.)
2500.	24.466	123.578	10.319	48159.	-62969.	(52.999)	(9000.)
3000.	24.787	126.354	187.919	68464.	-47491.	(53.866)	(0.)

TABLE 4.882 THERMODYNAMIC FUNCTIONS FOR FH(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(2.120)
O-H-O BOND ANGLE, DEGREES	(180.)
12 ¹² 13, C ¹³ + CH ¹³ 6	1.838597-115
QUANTUM WEIGHT OF GROUND STATE OF +2P,	12.
STRETCH FREQUENCY FROM H-F, WAVE NOS.	(477.)
STRETCHING FORCE CONSTANT, MDYN/ANGSTROM	(2.926)
O-H-O BENDING FORCE CONSTANT, MDYN/ANGSTROM	(6.867)
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(469.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(84.)
O-H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(468.)
O-H-O BENDING FREQUENCY, WAVE NOS.	(1161.)
HEAT OF DISSOCIATION AT 298K TO H(G) AND 2(OH) (G), CAL/MOL	(219086.)
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST

.....FUNCTIONS FOR FH IDEAL.....
 . MONATOMIC GAS .
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	15.263	79.128	79.128	8.	-118382.	(46.347)	(37000.)
500.	17.171	87.676	89.956	3368.	-115136.	(46.918)	(61000.)
1000.	25.940	101.282	67.999	13287.	-102613.	(48.674)	(48000.)
1500.	28.737	113.884	47.999	24188.	-92163.	(50.486)	(35000.)
2000.	31.758	126.777	36.861	35834.	-79961.	(51.624)	(23000.)
2500.	34.378	138.151	187.999	47888.	-65668.	(52.641)	(13000.)
3000.	36.767	146.633	196.975	61173.	-51498.	(53.529)	(3000.)

TABLE 4.363 THERMODYNAMIC FUNCTIONS FOR MO(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS (2.988)
 O-H-O BOND ANGLE, DEGREES (199.)
 $11^{\circ}12'13$, $6^{\circ}03'0$ CM⁻¹ (1697657-115)
 QUANTUM WEIGHT OF GROUND STATE OF ν_{2H} 0.
 STRETCH FREQUENCY FROM H-F, WAVE NOS. (514.)
 STRETCHING FORCE CONSTANT, MOYNE/ANGSTROM (2.352)
 O-H-O BENDING FORCE CONSTANT, MOYNE/ANGSTROM (8.874)
 H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (505.)
 O-H-O BENDING FREQUENCY, WAVE NOS. (93.)
 H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (594.)
 H-O-H BENDING FREQUENCY, WAVE NOS. (1248.)
 HEAT OF DISSOCIATION AT 298K TO HIG AND (287889.)
 2(OH) (G), CAL/MOL

REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT

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.....FUNCTIONS FOR NO IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.674	77.597	77.597	0.	-126785.	(45.412)	(47888.)
500.	17.521	85.963	79.346	3288.	-121818.	(45.975)	(42888.)
1000.	22.879	99.384	76.296	13888.	-109551.	(47.937)	(29888.)
1500.	26.658	109.136	92.184	23920.	-97922.	(49.458)	(16888.)
2000.	28.786	114.989	97.849	25340.	-84181.	(50.643)	(5888.)
2500.	24.344	128.174	101.149	47545.	-64573.	(51.627)	(0.)
3000.	24.744	124.656	104.787	59044.	-48820.	(52.442)	(-8888.)

TABLE 4.364 THERMODYNAMIC FUNCTIONS FOR MO(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS (2.948)
 O-H-O BOND ANGLE, DEGREES (188.)
 $11^{\circ}12'13$, $6^{\circ}03'0$ CM⁻¹ (1572866-115)
 QUANTUM WEIGHT OF GROUND STATE OF ν_{2H} 1.
 STRETCH FREQUENCY FROM H-F, WAVE NOS. (556.)
 STRETCHING FORCE CONSTANT, MOYNE/ANGSTROM (2.754)
 O-H-O BENDING FORCE CONSTANT, MOYNE/ANGSTROM (8.892)
 H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS (547.)
 O-H-O BENDING FREQUENCY, WAVE NOS. (93.)
 H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS. (546.)
 H-O-H BENDING FREQUENCY, WAVE NOS. (1338.)
 HEAT OF DISSOCIATION AT 298K TO HIG AND (195888.)
 2(OH) (G), CAL/MOL

REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT
 REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT

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.....FUNCTIONS FOR NO IDEAL.....
 MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.546	72.847	72.847	0.	-133499.	(41.352)	(28888.)
500.	17.142	81.821	74.594	3213.	-128453.	(41.915)	(23888.)
1000.	22.679	94.155	81.767	12788.	-115982.	(43.677)	(10888.)
1500.	22.445	102.926	87.169	23635.	-108492.	(45.397)	(0.)
2000.	23.444	109.576	91.973	35287.	-75153.	(46.598)	(0.)
2500.	24.763	114.925	96.846	47287.	-50335.	(47.548)	(0.)
3000.	24.715	119.399	99.576	59465.	-25889.	(48.368)	(0.)

TABLE 4.885 THERMODYNAMIC FUNCTIONS FOR LW(OH)? (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(12.888)	
O-H-O BOND ANGLE, DEGREES	(128.)	
$I_1^*I_2^*I_3$, CM ³ * CM ³ /G	2-191562-114	21
QUANTUM WEIGHT OF GROUND STATE OF $\pm 2M$	2.	
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(884.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(3.254)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.188)	
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(594.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(196.)	
O-H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(593.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(1433.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(223888.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR LW IDEAL.....
 : MONATOMIC GAS
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T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	14.218	76.315	76.315	0.	-92699.	(44.192)	(93800.)
500.	16.733	84.298	78.829	3135.	-90766.	(44.713)	(86890.)
1000.	28.444	97.198	84.643	12947.	-88315.	(46.888)	(71800.)
1500.	22.420	105.889	90.351	23307.	-89458.	(48.688)	(56800.)
2000.	23.569	112.511	95.896	34838.	-88542.	(50.819)	(41800.)
2500.	24.253	117.650	99.178	46799.	-88457.	(51.177)	(28800.)
3000.	24.008	122.313	102.633	59646.	-81781.	(52.159)	(16800.)

TABLE 4.885 THERMODYNAMIC FUNCTIONS FOR H(OH)2 (G)

REFERENCE

INTERNUCLEAR DISTANCE, ANGSTROMS	(11.958)	
O-H-O BOND ANGLE, DEGREES	(128.)	
$I_1^*I_2^*I_3$, CM ³ * CM ³ /G	1.461291-114	
QUANTUM WEIGHT OF GROUND STATE OF $\pm 2M$	(5.)	
STRETCH FREQUENCY FROM M-F, WAVE NOS.	(675.)	
STRETCHING FORCE CONSTANT, MDYNE/ANGSTROM	(4.864)	
O-H-O BENDING FORCE CONSTANT, MDYNE/ANGSTROM	(8.135)	
O-H-O ANTISYMMETRIC STRETCH FREQ., WAVE NOS	(564.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(119.)	
O-H-O SYMMETRIC STRETCH FREQUENCY, WAVE NOS.	(662.)	
O-H-O BENDING FREQUENCY, WAVE NOS.	(1583.)	
HEAT OF DISSOCIATION AT 298K TO H(G) AND	(298888.)	
2(OH) (G), CAL/MOL		
REFERENCE FOR FREE ENERGY FUNCTIONS FOR GASEOUS ELEMENT	EST	
REFERENCE FOR FREE ENERGY OF FORMATION OF GASEOUS ELEMENT	EST	

.....FUNCTIONS FOR H4 IDEAL.....
 : MONATOMIC GAS
 :
 :

T K	CP, GIBBS/MOL	S GIBBS/MOL	-(G-H298)/T, GIBBS/MOL	H-H298, CAL/MOL	FREE ENERGY OF FORMATION, CAL/MOL	-(G-H298)/T, GIBBS/MOL	FREE ENERGY OF FORMATION, CAL/MOL
298.	13.785	77.356	77.356	0.	-93962.	(44.642)	(158800.)
500.	16.184	85.075	79.088	3834.	-96813.	(45.285)	(151800.)
1000.	28.491	97.641	85.431	12211.	-86658.	(47.265)	(135800.)
1500.	22.225	106.231	91.005	22839.	-76920.	(49.889)	(119800.)
2000.	23.450	112.889	95.666	34286.	-86776.	(50.472)	(103800.)
2500.	24.174	119.126	99.643	46287.	-86584.	(51.719)	(87800.)
3000.	24.624	122.376	103.195	58415.	-84278.	(52.799)	(73800.)

Table 5. Constants used in applying Badger's rule.^a

Element	C_{ij}	d_{ij}
Hydrogen to fluorine	0.18817	0.68
Sodium to chlorine	0.15659	0.94
Potassium to bromine	0.12500	1.06
Rubidium to iodine	0.11765	1.18
Cesium to astatine	0.11765	1.26
Francium to 104	0.11765	1.30

^aThe rule has the form

$$\omega = \frac{1}{2\pi c} \sqrt{\frac{C_{ij}}{\mu(X - d_{ij})^3}}$$

where ω is the vibrational frequency, c is the velocity of light, μ is the reduced mass, X is the internuclear distance, and C_{ij} and d_{ij} are the constants.

Table 6. Free energies of formation (in cal/g-atom of M) of various gaseous hydroxides other than the gaseous mono- and dihydroxides covered elsewhere in this report. The known values are taken from the indicated references, and the estimated values are enclosed in parentheses.

Hydroxide	Free energy of formation at a temperature of:					Reference
	500°K	1000°K	1500°K	2000°K	2500°K	
$\text{Li}_2(\text{OH})_2$	-83020	-73242	-62991	-44871	-23921	7
BOOH	-129459	-123795	-117575	-111051	-104176	7
$\text{B}(\text{OH})_3$	-211166	-183011	-154212	-125217	-95982	7
$\text{B}_2(\text{OH})_4$	-133339	-112362	-91436	-70682	-49945	7
$\text{B}_3(\text{OH})_3$	-161756	-142404	-123315	-104512	-85697	7
NOOH	-4252	10296	24708	35932	53005	7
NO_2OH	-7737	17198	41791	66006	89923	7
$\text{Na}_2(\text{OH})_2$	-64303	-54068	-37078	-16721	-3487	7
$\text{NaK}(\text{OH})_2$	-68429	(-59009)	(-40826)	(-20452)	(-90)	76
AlOOH	-104485	-97595	-88866	-79840	-70555	7
$\text{SO}_2(\text{OH})_2$	-142636	-104315	-60859	-18137	24004	7
$\text{K}_2(\text{OH})_2$	-69544	-58951	-39735	-19884	-177	7
$\text{VO}(\text{OH})_3$	(-221565)	-183424	(-147816)	(-122260)	(-86288)	77
$\text{CrO}_2(\text{OH})_2$	-155000	(-127900)	(-104100)	(-79500)	(-54700)	78
$\text{Rb}_2(\text{OH})_2$	(-65881)	(-54280)	(-43042)	(-31623)	(-20204)	4
$\text{MoO}_2(\text{OH})_2$	-177825	-152675	-128292	-104378	-80640	7
$\text{TeO}(\text{OH})_2$	(-84125)	-63750	(-52715)	(-30560)	(-8408)	79
$\text{Cs}_2(\text{OH})_2$	-72948	-61020	-41180	-21503	-1957	7
$\text{WO}_2(\text{OH})_2$	-189897	-163952	-138783	-114200	-89951	7
ReO_3OH	-136292	(-114062)	(-91832)	(-69602)	(-47372)	80

Table 7. Equilibrium constants for the reactions between the gaseous hydroxides, the corresponding condensed oxides, and 1 atm each of water vapor and oxygen at 500°K.

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
LiO ₂ .500 (S)	-64887.	7	LiOH Li ₂ (OH) ₂	-59191. -77239.	2.6189E-16 7.3934E-46
BeO ₂ .000 (S)	-133615.	7	BeOH Be(OH) ₂	-27772. -143748.	1.9653E-59 3.4971E-19
B ₂ O ₃ .500 (S)	-126143.	7	BOH B(OH) ₂ B(OH) ₃ B ₂ (OH) ₄ B ₃ (OH) ₃	-8685. -194289. -129459. -211166. -133339. -161756.	6.4695E-69 1.5546E-37 4.3171E-15 2.9948E-82 3.1285-187 7.1021-143
NaO ₂ .J00 (S)	-48487.	7	NaOH Na ₂ (OH) ₂	-47945. -64383.	2.2633E-12 8.8079E-38
MgO ₂ .J00 (S)	-130759.	7	MgOH Mg(OH) ₂	-55088. -128332.	2.7732E-45 1.1291E-24
AlO ₂ .500 (A)	-181445.	7	AlOH Al(OH) ₂ AlO(OH)	-45725. -141916. -104484.	1.7166E-71 6.9477E-41 8.2414E-46
SiO ₂ .J60 (Q)	-195898.	7	SiOH Si(OH) ₂	5328. -111788.	4.1425-100 9.6156E-85
PO ₂ .500 (S)	-149165.	7	POH P(OH) ₂	-7517. -11792.	4.4419E-74 4.5485E-53
SO ₂ .J00 (L)	0.		SOH S(OH) ₂ SO ₂ (OH) ₂	251. -62128. -142636.	2.8010E-12 1.7419E-84 2.5749E-29
K ₂ O ₂ .000 (S)	-53418.	7	KOH K ₂ (OH) ₂	-56748. -69544.	2.1061E-29 2.7730E-37
CaO ₂ .000 (S)	-139144.	7	CaOH Ca(OH) ₂	-35211. -131553.	7.1242E-49 5.9977E-27
SCO ₂ .500 (S)	-218225.	29	SCOH SC(OH) ₂	-18479. -131454.	5.5751E-96 6.8607E-59
VO ₂ .000 (R)	-283692.	7	TiOH Ti(OH) ₂	6121. -89394.	7.8647-104 3.3546E-69
VO ₂ .500 (S)	-168880.	27	VOH V(OH) ₂ VO(OH) ₃	22412. -84118. -221565.	6.5951E-97 8.9353E-57 3.7994E-68

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM H	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM H	EQUILIBRIUM CONSTANT, K
CR01.500 (S)	-120150.	22,25	CR(OH) CR(OH) ₂ CR ₂ (OH) ₂	17143. -60710. -155000.	3.9251E-72 1.3570E-49 2.2106E-08
MnO2.000 (S)	-102600.	22	Mn(OH) Mn(OH) ₂	-2972. -94660.	1.0237E-55 4.4308E-27
FE01.500 (S)	-82340.	7	FE(OH) FE(OH) ₂	22502. -69622.	5.3034E-58 3.5061E-29
CO01.333 (S)	-57825.	7	CO(OH) CO(OH) ₂	28796. -53053.	4.9443E-50 2.3776E-25
NI01.000 (S)	-45100.	22	NI(OH) NI(OH) ₂	28953. -52276.	5.6460E-45 6.4902E-21
CU01.000 (S)	-26204.	7	CU(OH) CU(OH) ₂	7731. -35649.	5.2973E-27 1.7377E-19
ZN01.000 (S)	-71300.	22	ZN(OH) ZN(OH) ₂	-27690. -07034.	3.1520E-31 2.1005E-16
GA01.500 (S)	-111079.	26	GA(OH) GA(OH) ₂	-29469. -95940.	7.6509E-48 3.1370E-30
GE02.000 (S)	-107360.	26	GE(OH) GE(OH) ₂	0090. -67341.	1.2327E-62 4.1029E-41
AS02.500 (S)	-80750.	60	AS(OH) AS(OH) ₂	-6110. -72656.	0.6260E-45 3.0706E-27
SE02.000 (S)	-32500.	60	SE(OH) SE(OH) ₂	-11446. -41233.	2.2593E-21 0.5104E-20
RB02.000 (S)	-45000.	60	RB(OH) RB ₂ (OH) ₂	-94027. -65200.	3.1792E-08 2.0512E-34
SR02.000 (S)	-133000.	60	SR(OH) SR(OH) ₂	-57359. -134230.	3.1226E-45 4.4792E-23
Y01.500 (S)	-210055.	29	Y(OH) Y(OH) ₂	-11639. -121406.	6.7749E-99 2.3206E-62
ZR02.000 (S)	-239221.	7	ZR(OH) ZR(OH) ₂	24620. -09999.	1.7030E-127 7.7592E-09
NB02.500 (S)	-200454.	25	NB(OH) NB(OH) ₂	61903. -75400.	7.4030E-127 3.0110E-70
MO03.000 (S)	-147364.	7	MO(OH) MO(OH) ₂ MOO ₂ (OH) ₂	64040. -35199. -177825.	1.4244E-104 1.2216E-72 2.6772E-10
TC03.500 (S)	-97250.	60	TC(OH) TC(OH) ₂	72124. -7507.	3.3490E-06 0.3650E-63

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
RU02.000 (S)	-58688.	69	RUOH RU(OH)2	71144. 5384.	2.2058E-65 4.3981E-48
RHO1.500 (S)	-18758.	68	RHOH RH(OH)2	56117. -5274.	6.8036E-45 1.6723E-29
PDO1.000 (S)	-12788.	68	PDOH PD(OH)2	13481. -8287.	1.2976E-23 1.4112E-25
AGO0.000 (S)	0.		AGOH AG(OH)2	5216. -3498.	1.8932E-14 4.3937E-22
COO1.000 (S)	-58488.	68	COOH CO(OH)2	-11262. -77338.	2.8177E-29 7.7202E-12
INO1.500 (S)	-93315.	26	INOH IN(OH)2	-20578. -93496.	5.8082E-44 1.5577E-23
SNO2.000 (S)	-114500.	68	SNOH SN(OH)2	-2777. -82631.	5.2927E-61 1.5265E-37
SBO2.500 (S)	-86258.	68	SBOH SB(OH)2	-7239. -74428.	1.0513E-46 8.8359E-29
TEO2.000 (S)	-55900.	68	TEOH TE(OH)2 TEO(OH)2	-14586. -64772. -84125.	3.1522E-30 9.8024E-20 2.8207E-11
CSO2.000 (S)	-42156.	26	CSOH CS2(OH)2	-62704. -72948.	3.4515E-03 1.4006E-28
BAO2.000 (S)	-131888.	22	BAOH BA(OH)2	-64902. -142471.	4.6311E-41 1.3403E-18
LAO1.500 (S)	-196935.	29	LAOH LA(OH)2	-19193. -141968.	7.3606E-90 1.2240E-47
CEO2.000 (S)	-234178.	29	CEOH CE(OH)2	-20359. -117511.	1.2636-105 1.7944E-74
PRO2.000 (S)	-208508.	68	PROH PR(OH)2	-30539. -123545.	5.9091E-90 9.5523E-61
NDO1.500 (S)	-198495.	29	NDOH ND(OH)2	-36031. -122948.	3.5084E-83 1.2377E-56
PHO1.500 (S)	-197888.	EST	PHOH PH(OH)2	-58792. -134689.	4.4728E-76 6.9686E-51
SNO1.500 (S)	-199355.	29	SNOH SN(OH)2	-52456. -146364.	2.2394E-76 8.9399E-47
EUO1.500 (S)	-177388.	29	EUOH EU(OH)2	-55831. -155406.	1.2994E-65 3.4962E-33

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
GD01.500 (S)	-199850.	29	GD0H GD(OH)2	-21210. -116017.	2.9819E-98 2.9558E-68
TB01.817 (S)	-208600.	29	TB0H TB(OH)2	-24164. -114975.	8.7386E-93 1.5510E-64
DY01.500 (S)	-205150.	29	DY0H DY(OH)2	-33943. -117656.	5.2894E-87 7.4245E-62
HO01.500 (S)	-206950.	29	HO0H HO(OH)2	-30771. -116316.	3.5515E-89 3.1483E-63
ER01.500 (S)	-208920.	29	ER0H ER(OH)2	-27784. -113195.	2.2321E-91 1.6749E-65
TM01.500 (S)	-207700.	29	TM0H TM(OH)2	-42360. -117783.	1.9405E-84 5.9773E-63
YB01.500 (S)	-199395.	29	YB0H YB(OH)2	-56598. -139263.	1.3845E-74 2.4738E-58
LU01.500 (S)	-206500.	29	LU0H LU(OH)2	-11048. -101281.	1.3375E-97 1.3272E-69
HF02.000 (S)	-243395.	25	HFOH HF(OH)2	10984. -115219.	2.3433E-123 1.3569E-79
TA02.500 (S)	-217434.	25	TA0H TA(OH)2	68811. -66938.	1.9393E-133 8.6274E-98
WO3.000 (S)	-170091.	7	WOH W(OH)2 WO2(OH)2	89211. -20914. -189997.	1.8098E-125 8.8874E-89 7.1371E-15
RE03.000 (L)	-116500.	22	RE0H RE(OH)2 REO3(OH)	87813. -6550. -136292.	1.7922E-181 1.1351E-71 1.6138E-63
OS04.000 (S)	-57700.	70	OS0H OS(OH)2	96126. 13595.	2.0873E-79 8.9351E-55
IR02.000 (S)	-29515.	26	IROH IR(OH)2	81935. 11257.	6.6238E-61 1.9599E-41
PT02.000 (S)	-12975.	26	PT0H PT(OH)2	68613. 11884.	7.8565E-48 1.7645E-34
AU06.000 (S)	0.		AU0H AU(OH)2	28333. -9888.	1.4898E-24 2.5176E-19
HG01.000 (S)	-8815.	7	HG0H HG(OH)2	2783. -61662.	3.8724E-17 1.6295E-68
TL01.500 (S)	-25500.	26	TL0H TL(OH)2	-19285. -73198.	6.3859E-15 9.1558E-83

CONDENSED OXIDE POX	FREE ENERGY OF FORMATION OF OXIDE POX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
P901.333 (S)	-42790.	7	P8OH P8(OH)2	-12534. -72746.	2.1529E-25 1.6139E-10
B101.500 (S)	-52900.	22	B1OH B1(OH)2	-10335. -63413.	8.9527E-31 5.1120E-19
P002.000 (S)	-38475.	26	P0OH P0(OH)2	-20974. -46591.	7.3022E-20 4.5741E-20
A100.000 (S)	0.		A1OH	-26749.	1.7736E+00
F000.500 (S)	-53495.	71	F0OH	-62011.	1.9007E-08
RA01.000 (S)	-118159.	26	RAOH RA(OH)2	-63873. -171602.	6.7414E-36 3.2213E+00
AC01.500 (S)	-208250.	26	ACOH AC(OH)2	-11208. -136143.	2.6996E-98 3.9468E-55
TH02.000 (S)	-270150.	22	THOH TH(OH)2	20541. -72581.	3.1489-139 7.7380-110
PA02.000 (S)	-224401.	26	PAOH PA(OH)2	14026. -79632.	2.1985-116 6.8582E-87
U03.000 (S)	-260000.	68	UOH U(OH)2	14180. -75952.	5.1839-132 4.6495-104
NP02.500 (S)	-226949.	26	NPOH NP(OH)2	-7826. -85232.	6.0235-108 1.4793E-85
PU02.000 (S)	-231475.	29,72	PUOH PU(OH)2	-17605. -88712.	1.1911-105 5.1626E-86
AM02.000 (S)	-219425.	26	AMOH AM(OH)2	-35147. -112745.	1.0239E-92 3.0516E-70
CM01.500 (S)	-204000.	EST	CMOH CM(OH)2	-25017. -111969.	2.1126E-90 7.7148E-64
BK01.500 (S)	-264000.	EST	BKOH BK(OH)2	-20650. -105210.	2.6047E-92 8.5720E-67
CF01.500 (S)	-284000.	EST	CFOH CF(OH)2	-28121. -102786.	4.7999E-89 7.4784E-68
ES01.500 (S)	-244000.	EST	ESOH ES(OH)2	-31741. -108481.	1.8361E-87 2.3050E-65
FM01.500 (S)	-204000.	EST	FMOH FM(OH)2	-31684. -115136.	1.7323E-87 1.8694E-62
MD01.500 (S)	-284000.	EST	MDOH MD(OH)2	-44858. -121818.	9.9285E-82 1.5577E-59

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM N	EQUILIBRIUM CONSTANT, K
N001.500 (S)	-204800.	EST	N0OH N0(OH)2	-61383. -128453.	1.5386E-74 1.2389E-96
LW01.500 (S)	-204000.	EST	LW0H LW(OH)2	-14226. -98766.	4.8575E-95 4.1685E-73
O402.000 (S)	-247500.	EST	O4OH O4(OH)2	38524. -96813.	1.8834-133 7.9367E-90

Table 8. Equilibrium constants for the reactions between the gaseous hydroxides, the corresponding condensed oxides, and 1 atm each of water vapor and oxygen at 1000°K.

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
LiO0.500 (S)	-55748.	7	LiOH Li2(OH)2	-57908. -67497.	2.7731E-05 2.1176E-20
BeO1.000 (S)	-121980.	7	BeOH Be(OH)2	-29967. -129922.	7.5417E-26 4.9135E-09
B2O1.500 (L)	-121742.	7	BOH B(OH)2 B(OH) B(OH)3 B2(OH)4 B3(OH)3	-11056. -92534. -123795. -183311. -112362. -142404.	6.0117E-30 3.5877E-17 2.6167E-05 1.9829E-02 1.6600E-49 1.6232E-64
NaO1.000 (L)	-35641.	7	NaOH Na2(OH)2	-47233. -54069.	3.2453E-03 1.5616E-14
MgO1.000 (S)	-117790.	7	MgOH Mg(OH)2	-57029. -114061.	4.9235E-19 1.3344E-11
AlO1.500 (A)	-162650.	7	AlOH Al(OH)2 AlO(OH)	-47366. -128687. -97595.	5.9453E-31 3.2739E-13 5.6437E-20
SiO2.000 (Q)	-174561.	7	SiOH Si(OH)2	678. -88534.	4.6916E-44 1.3720E-29
KO2.000 (S)	-34616.	7	KOH K2(OH)2	-55456. -58951.	3.3392E-01 4.9122E-13
CaO1.000 (S)	-126957.	7	CaOH Ca(OH)2	-57314. -118771.	5.6077E-21 1.4099E-12
ScO1.500 (S)	-192875.	29	ScOH Sc(OH)2	-20991. -121051.	2.4141E-43 1.7426E-26
TiO2.000 (R)	-182090.	7	TiOH Ti(OH)2	1152. -89156.	9.4044E-46 4.2647E-31
VO2.500 (L)	-135700.	22	VOH V(OH)2 V2(OH)3	18886. -73389. -183424.	1.5310E-39 2.0904E-24 2.1732E-05
CrO1.500 (S)	-104725.	22,25	CrOH Cr(OH)2 CrO2(OH)2	11307. -48579. -127900.	4.0800E-31 4.6512E-23 1.0068E-05
MnO1.333 (S)	-82450.	22	MnOH Mn(OH)2	-7650. -83208.	4.1861E-22 1.2698E-10

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	RFF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
FE01.500 (S)	-67191.	7	FEOH FE(OH)2	16945. -59488.	4.8324E-24 1.7352E-12
CO01.333 (S)	-42156.	7	COOH CO(OH)2	24756. -43587.	2.2165E-28 1.7119E-18
NI01.000 (S)	-35710.	22	NI OH NI(OH)2	24930. -41978.	5.5008E-19 2.8348E-89
CU01.000 (S)	-15923.	7	CUOH CU(OH)2	5627. -24766.	1.8175E-18 7.4271E-89
ZN01.000 (S)	-59000.	22	ZNOH ZN(OH)2	-29543. -73441.	3.3984E-12 1.2419E-87
GA01.500 (S)	-90636.	26	GAOH GA(OH)2	-29646. -83488.	4.3649E-19 2.3764E-12
GE02.000 (S)	-84370.	26	GE OH GE(OH)2	3483. -56627.	5.8774E-25 7.4991E-17
AS02.500 (S)	-45675.	68	ASOH AS(OH)2	-13983. -65714.	1.2218E-12 2.2979E-06
RB02.000 (L)	-29500.	68	RBOH RB2(OH)2	-52258. -54280.	8.7664E-81 8.0651E-12
SR01.000 (S)	-118100.	68	SROH SR(OH)2	-59389. -123019.	1.3740E-18 1.0306E-89
Y01.500 (S)	-192990.	29	YOH Y(OH)2	-13567. -111698.	5.7130E-45 1.4861E-28
ZR02.000 (S)	-216798.	7	ZROH ZR(OH)2	19981. -80559.	1.6669E-57 1.4574E-40
NB02.500 (S)	-174791.	25	NBOH NB(OH)2	58328. -65610.	1.0517E-56 1.1942E-34
MO03.000 (S)	-118048.	7	MOOH MO(OH)2 MOO2(OH)2	57708. -24926. -152675.	3.6163E-44 3.8620E-31 3.2043E-03
TC13.000 (L)	-64500.	68,73	TCOH TC(OH)2	66183. 2684.	2.5636E-34 1.8748E-25
RU02.000 (S)	-38700.	69	RUOH RU(OH)2	64116. 14438.	1.7682E-26 1.1848E-20
RH00.500 (S)	-6250.	69	RHOH RH(OH)2	50529. 4222.	3.6333E-18 4.4628E-13
PD01.000 (S)	-2930.	68	PDOH PD(OH)2	9024. 2123.	2.3072E-88 6.9234E-12

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MIX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
AG00.000 (S)	0.		AGOH AG(OH)2	3658. 7705.	1.4787E-06 1.7970E-12
CO01.000 (S)	-37700.	68	COOH CO(OH)2	-11946. -62506.	2.1905E-11 2.2879E-05
IN01.500 (S)	-74720.	26	INOH IN(OH)2	-21105. -81942.	1.7951E-17 3.2841E-09
SN02.000 (S)	-89150.	68	SNOH SN(OH)2	-4110. -68368.	2.4209E-24 2.4905E-15
SB02.167 (S)	-60600.	68	SBOH SB(OH)2	-9774. -63488.	7.2647E-17 3.7088E-10
TE02.000 (S)	-33800.	68	TEOH TE(OH)2 TEO(OH)2	-17083. -51642. -63750.	2.0681E-09 6.8761E-07 3.0451E-04
CS00.500 (L)	-18750.	68	CSOH CS2(OH)2	-60479. -61020.	1.2269E+04 1.1977E-05
BA01.000 (S)	-116000.	74	BAOH BA(OH)2	-66591. -132072.	1.4822E-16 2.8218E-07
LA01.500 (S)	-180310.	29	LAOH LA(OH)2	-22111. -131364.	2.4846E-40 1.7426E-21
CE02.000 (S)	-209010.	29	CEOH CE(OH)2	-20990. -105953.	7.5519E-47 2.4749E-33
PR02.000 (S)	-137000.	68	PROH PR(OH)2	-31957. -109964.	7.7338E-40 1.2653E-27
ND01.500 (S)	-181610.	29	NDOH ND(OH)2	-37810. -110477.	3.4850E-37 2.4677E-26
PM01.500 (S)	-180000.	EST	PMOH PM(OH)2	-47343. -117742.	9.4922E-35 2.1472E-24
SM01.500 (S)	-182190.	29	SMOH SM(OH)2	-52103. -130618.	3.4592E-34 4.6475E-22
EU01.500 (S)	-159800.	29	EUOH EU(OH)2	-55427. -140809.	1.4411E-28 6.1343E-15
GD01.500 (S)	-183150.	29	GDOH GD(OH)2	-21009. -103562.	3.4179E-41 3.5038E-28
TB01.500 (S)	-188690.	29	TBOH TB(OH)2	-25049. -101548.	1.6813E-41 8.1893E-30
DY01.500 (S)	-188600.	29	DYOH DY(OH)2	-36636. -105876.	7.7467E-39 9.7769E-29

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
H001.500 (S)	-190000.	29	H0OH H0(OH)2	-32114. -103950.	2.9087E-40 1.3558E-29
ER01.500 (S)	-191755.	29	EROH ER(OH)2	-29766. -100428.	3.6907E-41 9.5285E-31
TM01.500 (S)	-190750.	29	TMOH TM(OH)2	-43552. -104150.	7.3314E-38 1.0282E-29
YB01.500 (S)	-182885.	29	YBOH YB(OH)2	-57960. -123335.	4.6487E-33 1.0792E-23
LU01.500 (S)	-189200.	29	LUOH LU(OH)2	-12876. -39541.	4.4948E-44 2.7688E-32
HF02.000 (S)	-221648.	25	HFOH HF(OH)2	6039. -105696.	1.6183E-55 3.9565E-36
TA02.500 (S)	-191745.	25	TAOH TA(OH)2	55172. -55906.	1.0149E-59 1.7826E-40
W03.000 (S)	-139994.	7	WOH W(OH)2 W02(OH)2	83538. -10716. -163952.	1.3091E-54 4.8412E-39 1.4930E-05
RE02.000 (S)	-63976.	26	REOH RE(OH)2 RE03(OH)	81584. 3863. -114062.	1.4374E-37 1.2946E-25 8.2255E+05
OS00.000 (S)	0.		OSOH OS(OH)2	88817. 22699.	3.6198E-25 9.4979E-16
IR02.000 (S)	-6377.	26	IROH IR(OH)2	75320. 20386.	1.3014E-23 1.2283E-16
PT00.000 (S)	0.		PTOH PT(OH)2	63639. 21658.	1.1513E-19 1.6037E-15
AU00.000 (S)	0.		AUOH AU(OH)2	25679. 849.	2.2763E-11 5.6586E-11
TL01.500 (L)	-6090.	26	TLOH TL(OH)2	-19830. -61729.	9.8067E-03 1.3104E+02
PB01.000 (Y)	-28170.	7	PBOH PB(OH)2	-13997. -58753.	7.4414E-09 4.1880E-04
BI01.500 (S)	-35425.	22	BIOH BI(OH)2	-11062. -51812.	4.4111E-11 3.3074E-07
PO02.000 (L)	-16411.	26	POOH PO(OH)2	-21429. -32361.	1.1634E-04 2.6549E-07
RA01.000 (S)	-165878.	26	RAOH RA(OH)2	-64728. -159571.	9.4603E-15 4.7050E+01

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
ACC1.500 (S)	-194178.	26	ACOH AC(OH)2	-13113. -127034.	2.5003E-45 1.9372E-25
THC2.000 (S)	-244500.	22	THOH TH(OH)2	15680. -64214.	1.2819E-62 3.4466E-50
PAO2.000 (S)	-200989.	26	PAOH PA(OH)2	12581. -69590.	1.8727E-52 1.6651E-39
UO2.667 (S)	-230500.	26,68	UOH U(OH)2	9132. -67982.	3.9664E-58 2.6339E-46
NPO2.000 (S)	-198386.	26	NPOH NP(OH)2	-7256. -71875.	1.5799E-47 1.9487E-38
PUO2.000 (S)	-211350.	29,72	PUOH PU(OH)2	-19079. -75100.	8.8939E-48 1.4500E-40
AMO2.000 (S)	-197459.	26	AMOH AM(OH)2	-34400. -98404.	2.1535E-41 1.9503E-32
CMO1.500 (S)	-187000.	EST	CMOH CM(OH)2	-24701. -98621.	7.1564E-41 4.2002E-30
BKO1.500 (S)	-187000.	EST	BKOH BK(OH)2	-22485. -94657.	1.0353E-41 5.7150E-31
CFO1.500 (S)	-187000.	EST	CFOH CF(OH)2	-30776. -92138.	6.7145E-40 1.6099E-31
ESO1.500 (S)	-187000.	EST	FSOH ES(OH)2	-36315. -98422.	9.3755E-39 3.7995E-30
FHO1.500 (S)	-187000.	EST	FHOH FM(OH)2	-34892. -103613.	5.3265E-39 5.1789E-29
MOO1.500 (S)	-187000.	EST	MOOH MO(OH)2	-47249. -109851.	2.6732E-36 1.1957E-27
NOO1.500 (S)	-187000.	EST	NOOH NO(OH)2	-65139. -115982.	2.1718E-32 2.6143E-26
LWO1.500 (S)	-187600.	EST	LWOH LW(OH)2	-17832. -80305.	9.9542E-43 4.1730E-34
O4O2.000 (S)	-227000.	EST	O4OH O4(OH)2	25654. -86658.	5.6572E-61 1.8487E-41

Table 9. Equilibrium constants for the reactions between the gaseous hydroxides, the corresponding condensed oxides, and 1 atm each of water vapor and oxygen at 1500°K.

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
LiO0.500 (S)	-47691.	7	LiOH Li2(OH)2	-56126. -57245.	2.3243E-02 5.2249E-12
BeO1.000 (S)	-110450.	7	BeOH Be(OH)2	-31691. -115366.	4.5956E-15 9.7914E-06
B01.500 (L)	-109015.	7	B(OH) B(OH)2 BO(OH) B(OH)3 B2(OH)4 B3(OH)3	-13148. -88914. -117575. -154212. -91436. -123315.	1.4762E-17 1.1199E-10 2.4239E-02 9.9204E-03 1.2729E-30 5.3566E-39
NaO0.500 (L)	-20168.	7	NaOH Na2(OH)2	-39772. -37078.	9.8582E-01 6.3074E-07
MgO1.000 (S)	-161203.	7	MgOH Mg(OH)2	-54694. -95358.	2.2962E-10 2.6482E-07
AlO1.500 (A)	-143043.	7	AlOH Al(OH)2 AlO(OH)	-47167. -113463. -88886.	1.4737E-17 9.2226E-11 1.7650E-11
SiO2.100 (Q)	-153831.	7	SiOH Si(OH)2	-3247. -74732.	1.5581E-25 5.5297E-10
KO1.000 (S)	-13502.	7	KOH K2(OH)2	-45550. -39735.	6.4062E+01 1.3471E-04
CaO1.000 (S)	-114070.	7	CaOH Ca(OH)2	-57394. -104441.	8.9653E-12 7.4495E-08
ScO1.500 (S)	-175850.	29	ScOH Sc(OH)2	-22651. -109459.	6.5561E-26 3.9957E-16
TiO2.000 (R)	-160606.	7	TiOH Ti(OH)2	-2571. -77970.	1.2943E-26 1.7163E-10
VO2.500 (L)	-116250.	22	VOH V(OH)2 VO(OH)3	16288. -61982. -147916.	6.7112E-23 2.3322E-14 1.8604E-04
CrO1.500 (S)	-89375.	22,25	CrOH Cr(OH)2 CrO2(OH)2	6556. -35584. -104100.	1.4465E-17 2.7370E-14 2.6298E-04
MnO1.333 (S)	-68433.	22	MnOH Mn(OH)2	-10598. -70233.	5.1383E-12 3.4419E-06

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
FE01.500 (S)	-52436.	7	FEOH FE(OH)2	12998. -47731.	4.0256E-13 3.6623E-07
CO01.383 (S)	-33690.	7	COOH CO(OH)2	21721. -32116.	3.1705E-11 3.6363E-06
NI01.000 (S)	-25550.	22	NI OH NI(OH)2	21475. -38949.	1.9316E-10 1.1131E-05
CU06.500 (S)	-7264.	7	CUOH CU(OH)2	4292. -13857.	2.6422E-05 1.3139E-05
ZN01.000 (S)	-45188.	22	ZNOH ZN(OH)2	-23864. -58596.	6.2775E-07 1.1693E-05
GA01.500 (S)	-71519.	26	GAOH GA(OH)2	-29456. -76697.	1.8203E-09 1.4290E-06
GE02.000 (L)	-59350.	26	GE OH GE(OH)2	1767. -43258.	1.7097E-12 8.5117E-09
AS02.000 (L)	-18818.	68	ASOH AS(OH)2	-7581. -44362.	3.1714E-05 1.1756E-02
RB02.000 (L)	-9808.	68	RBOH RB(OH)2	-41765. -43273.	9.1471E+01 9.0519E-03
SR01.000 (S)	-186660.	68	SROH SR(OH)2	-59597. -110001.	1.9066E-10 5.7714E-06
YO1.500 (S)	-176310.	29	YOH Y(OH)2	-14970. -181231.	4.0539E-27 2.1161E-17
ZR02.000 (S)	-194661.	7	ZROH ZR(OH)2	16656. -70870.	2.2330E-24 1.3241E-24
NB02.500 (S)	-150052.	25	NBOH NB(OH)2	55561. -55130.	1.5134E-33 2.7635E-20
MO03.000 (L)	-95210.	7	MOOH MO(OH)2 MOO2(OH)2	52204. -14833. -128292.	4.5588E-25 2.8103E-18 1.2472E-01
TC02.000 (S)	-40030.	68	TCOH TC(OH)2	61182. 13528.	2.4453E-18 2.9897E-14
RU02.000 (L)	-11780.	69	RUOH RU(OH)2	57988. 24186.	9.9984E-14 1.1428E-11
RH00.500 (L)	-4250.	68	RHOH RH(OH)2	47115. 16870.	4.5032E-11 2.0635E-09
PD00.000 (S)	0.		PDOH PD(OH)2	5131. 13195.	2.4537E-04 2.2584E-08

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
AG00.000 (L)	0.		AGOH AG(OH)2	3241. 20226.	4.6256E-04 2.1272E-09
CO01.000 (S)	-14408.	68	COOH CO(OH)2	-1558. -36483.	1.8418E-05 3.0218E-03
IN01.500 (S)	-66288.	26	INOH IN(OH)2	-21226. -70859.	3.8429E-10 6.4670E-06
SN02.000 (S)	-64858.	68	SNOH SN(OH)2	-4631. -53780.	2.3898E-12 4.4666E-08
SB01.500 (L)	-39598.	68	SEOH SB(OH)2	-9298. -49821.	5.4418E-08 6.8809E-05
TE02.000 (L)	-14588.	68	TEOH TE(OH)2 TEO(OH)2	-14881. -34853. -52715.	1.5590E-03 1.3284E-03 6.9559E-01
CS00.500 (L)	-2588.	68	CSOH CS2(OH)2	-50132. -41188.	1.1944E+04 3.5145E-01
BA01.000 (S)	-104388.	74	BAOH BA(OH)2	-66175. -119770.	3.8248E-09 3.3768E-04
LA01.500 (S)	-163538.	29	LAOH LA(OH)2	-23733. -119392.	5.8785E-24 6.9798E-13
CE02.000 (S)	-183568.	29	CEOH CE(OH)2	-20788. -93118.	2.6346E-27 1.2481E-19
PR01.933 (L)	-167997.	29	PROH PR(OH)2	-33425. -98263.	3.3926E-23 1.3016E-16
ND01.500 (S)	-164588.	29	NDOH ND(OH)2	-37955. -96370.	4.8784E-22 2.1705E-16
PM01.500 (S)	-162888.	FST	PMOH PM(OH)2	-43748. -108697.	8.0973E-21 2.2028E-15
SM01.500 (S)	-164788.	29	SMOH SM(OH)2	-49848. -112908.	2.5328E-20 5.3387E-14
EU01.500 (S)	-142237.	29	EUOH EU(OH)2	-54860. -124339.	1.9585E-16 4.6438E-09
GD01.500 (S)	-166758.	29	GDH GD(OH)2	-20617. -90965.	7.0171E-25 1.7096E-17
TB01.500 (S)	-172558.	29	TBOH TB(OH)2	-25720. -87927.	5.5533E-25 8.8141E-19
OY01.500 (S)	-171458.	29	OYOH OY(OH)2	-38861. -93616.	6.5985E-23 8.5962E-18

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
HO01.500 (S)	-173588.	29	HOOH HO(OH)2	-32907. -97989.	4.3517E-24 1.7318E-19
ER01.500 (S)	-175050.	29	EROH ER(OH)2	-31169. -86918.	1.4934E-24 2.7161E-19
TM01.500 (S)	-174408.	29	TMOH TM(OH)2	-44734. -89362.	1.7593E-22 9.0681E-19
YB01.500 (S)	-166457.	29	YBOH YB(OH)2	-57088. -106913.	1.5477E-19 3.9736E-15
LU01.500 (S)	-172408.	29	LUOH LU(OH)2	-14123. -77617.	1.1935E-26 2.9167E-20
HF02.000 (S)	-208616.	25	HFOH HF(OH)2	2897. -95255.	4.0639E-33 8.3988E-22
TA02.500 (S)	-167185.	25	TAOH TA(OH)2	51182. -45039.	2.0976E-35 3.0874E-24
WO3.000 (S)	-111404.	7	WOH W(OH)2 WO2(OH)2	78665. 164. -138783.	2.7843E-31 1.0457E-22 1.3748E-82
RE02.000 (L)	-49905.	26	REOH RE(OH)2 REO3(OH)	76249. 15963. -91832.	5.7135E-22 6.4389E-16 1.7616E+03
OSO0.000 (S)	0.		OSOH OS(OH)2	52331. 32488.	1.3869E-15 3.4780E-11
IRO0.000 (S)	0.		IROH IR(OH)2	69174. 30253.	1.1456E-13 7.3600E-11
PTO0.000 (S)	0.		PTOH PT(OH)2	59284. 32157.	3.2477E-12 3.8668E-11
AU00.000 (L)	0.		AUOH AU(OH)2	23944. 12497.	4.6065E-07 2.8434E-83
TL00.000 (L)	0.		TLOH TL(OH)2	-19814. -49656.	1.0575E+00 3.2311E+01
PB01.000 (L)	-18353.	7	PBOH PB(OH)2	-14392. -43978.	3.6323E-04 1.9186E-82
BI01.500 (L)	-20000.	22	BIOH BI(OH)2	-10619. -39438.	5.8946E-05 1.2782E-83
PO08.000 (L)	2925.	24	POOH PO(OH)2	-18865. -14573.	1.5684E+08 6.6669E-04
RA01.000 (S)	-93930.	26	RAOH RA(OH)2	-64038. -146071.	6.8544E-88 7.4368E+01

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
AC01.500 (S)	-178888.	26	ACOH AC(OH)2	-14137. -117138.	1.7838E-27 2.4854E-15
TH02.000 (S)	-225088.	22	THOH TH(OH)2	12215. -54245.	3.7643E-38 2.4884E-31
PA02.000 (S)	-180252.	26	PAOH PA(OH)2	9573. -61363.	3.8222E-31 8.9698E-24
UO2.667 (S)	-203788.	26,68	UOH U(OH)2	6287. -57496.	3.5841E-34 1.8749E-27
NP02.000 (S)	-177393.	26	NPOH NP(OH)2	-6383. -58281.	1.6713E-28 8.1287E-24
PU02.000 (S)	-191225.	29,72	PUOH PU(OH)2	-18951. -59871.	1.8899E-28 1.3698E-25
AM02.000 (S)	-177543.	26	AMOH AM(OH)2	-33281. -83396.	1.2793E-24 3.8611E-28
CH01.500 (S)	-171838.	EST	CHOH CH(OH)2	-24171. -85147.	5.5552E-25 5.8341E-19
BK01.500 (S)	-171888.	EST	BKOH BK(OH)2	-24125. -84882.	5.4697E-25 3.9732E-19
CF01.500 (S)	-171838.	EST	CFOH CF(OH)2	-34472. -82628.	1.7681E-23 2.4998E-19
ES01.500 (S)	-171888.	EST	ESOH ES(OH)2	-39356. -87482.	9.8598E-23 1.2778E-18
FM01.500 (S)	-171888.	EST	FMOH FM(OH)2	-38163. -92163.	6.8788E-23 6.1488E-18
MD01.500 (S)	-171888.	EST	MDOH MD(OH)2	-45728. -97922.	2.9315E-21 4.2397E-17
NO01.500 (S)	-171888.	EST	NOOH NO(OH)2	-66857. -188492.	7.8393E-29 1.8838E-16
LM01.500 (S)	-171888.	EST	LMOH LM(OH)2	-21221. -69468.	2.8645E-25 3.8234E-21
0402.000 (S)	-246888.	EST	O4OH O4(OH)2	21498. -76928.	9.8861E-37 2.8679E-25

Table 10. Equilibrium constants for the reactions between the gaseous hydroxides, the corresponding condensed oxides, and 1 atm each of water vapor and oxygen at 2000°K.

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
LiO0.500 (L)	-32885.	7	LiOH Li2(OH)2	-46370. -39127.	5.0502E-01 3.5325E-07
BeO1.000 (S)	-98394.	7	BeOH Be(OH)2	-32253. -99694.	1.0053E-09 3.9947E-04
B01.500 (L)	-96686.	7	B0H B(OH)2 B0(OH) B(OH)3 B2(OH)4 B3(OH)3	-14964. -67208. -111051. -125217. -70682. -104512.	1.9942E-11 1.7311E-07 6.3013E-01 6.4097E-03 3.2523E-21 2.5942E-26
NaO0.500 (L)	-6063.	7	NaOH Na2(OH)2	-28850. -16721.	5.2450E+00 9.1529E-04
MgO1.000 (S)	-76642.	7	MgOH Mg(OH)2	-43856. -68269.	4.4366E-06 3.5038E-05
AlO1.500 (A)	-123809.	7	AlOH Al(OH)2 AlO(OH)	-46569. -97926. -79944.	6.1592E-11 4.2774E-07 2.117E-07
SiO2.000 (L)	-131719.	7	SiOH Si(OH)2	-4474. -58509.	2.1151E-16 2.9409E-12
CaO1.000 (S)	-96446.	7	CaOH Ca(OH)2	-52863. -84628.	2.9331E-07 1.4724E-05
SCO1.500 (S)	-158909.	29	SCOH SC(OH)2	-23192. -96719.	2.5088E-17 4.6106E-11
TiO2.000 (R)	-139287.	7	TiOH Ti(OH)2	-5425. -66234.	4.0014E-17 2.9977E-12
VO2.500 (L)	-101750.	22	VOH V(OH)2 VO(OH)3	14508. -50059. -122260.	3.3562E-15 6.4711E-04 8.5184E-04
CrO1.500 (S)	-73838.	22,25	CrOH Cr(OH)2 CrO2(OH)2	2778. -21906. -79500.	7.2060E-11 6.0903E-10 1.1972E-03
MnO1.000 (S)	-55600.	22	MnOH Mn(OH)2	-11077. -55078.	2.3152E-07 2.5259E-04
FeO1.333 (S)	-38876.	7	FeOH Fe(OH)2	10450. -35073.	6.9140E-08 1.1063E-04

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
COC1.000 (L)	-21872.	7	COOH CO(OH)2	20060. -19474.	4.4436E-07 1.5755E-04
NI00.000 (L)	0.		NIOH NI(OH)2	1936. -18600.	1.2985E-04 3.1047E-02
CU00.500 (L)	-4716.	7	CUOH CU(OH)2	4141. -281.	1.8278E-03 9.4372E-05
ZNO1.000 (S)	-28800.	22	ZNOH ZN(OH)2	-12189. -23591.	2.5978E-04 7.7677E-05
GA01.500 (S)	-54330.	26	GAOH GA(OH)2	-23059. -57848.	2.9397E-05 6.9805E-04
GE02.000 (L)	-38357.	26	GEOH GE(OH)2	1946. -28293.	6.6935E-07 2.2891E-05
AS02.000 (L)	-300.	68	ASOH AS(OH)2	-1091. -24188.	2.0707E-02 1.1744E-01
RB01.000 (L)	15000.	68	RBOH RB(OH)2	-31356. -32265.	1.9734E+03 1.8337E+03
SR01.000 (S)	-88400.	68	SROH SR(OH)2	-52481. -89801.	2.0171E-06 4.0973E-04
YO1.500 (S)	-159440.	29	YOH Y(OH)2	-15740. -90420.	3.3665E-18 8.2689E-12
ZR02.000 (S)	-173149.	7	ZROH ZR(OH)2	-6017. -79236.	9.2614E-21 1.5749E-14
NBC2.500 (L)	-127560.	25	NBOH NB(OH)2	53323. -44405.	2.9111E-22 2.3596E-13
MO03.000 (L)	-74816.	7	MOOH MO(OH)2 MOO2(OH)2	47282. -2842. -104378.	7.7223E-16 3.9320E-12 4.8952E-01
TC02.000 (S)	-20000.	68	TCOH TC(OH)2	56885. 24872.	6.7345E-11 3.5988E-09
RU00.000 (S)	0.		RUOH RU(OH)2	52315. 34104.	3.2600E-08 5.4065E-08
RHOE.500 (L)	-2750.	68	RHOH RH(OH)2	42254. 26397.	2.0511E-07 1.8813E-07
PD00.000 (L)	0.		PDOH PD(OH)2	2076 25030.	1.8078E-02 5.3027E-07
AG00.000 (L)	0.		AGOH AG(OH)2	3748. 33597.	6.6104E-03 6.1419E-08

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM H	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM H	EQUILIBRIUM CONSTANT, K
COO1.000 (L)	9000.	68	COOH CO(OH)2	9710. -9506.	1.4195E-02 3.0316E-02
INO1.500 (S)	-37960.	26	INOH IN(OH)2	-21037. -58027.	2.4013E-04 4.4902E-02
SNO2.000 (L)	-41950.	68	SNOH SN(OH)2	-4680. -38911.	1.4358E-06 1.3410E-04
BA01.000 (S)	-92961.	74	BAOH BA(OH)2	-65076. -106984.	1.5227E-05 9.8131E-03
LA01.500 (S)	-147327.	29	LAOH LA(OH)2	-24567. -106744.	6.5369E-16 1.0588E-08
CE02.000 (S)	-158210.	29	CEOH CE(OH)2	-19908. -79860.	1.3092E-17 7.9045E-13
PRO1.500 (S)	-151791.	29	PROH PR(OH)2	-33361. -84276.	1.9431E-15 1.2074E-11
NO01.500 (S)	-148299.	25	NOOH NO(OH)2	-36574. -80876.	1.0501E-14 1.2357E-11
PM01.500 (S)	-144000.	EST	PMOH PM(OH)2	-39475. -83099.	6.4271E-14 6.3764E-11
SM01.500 (S)	-147821.	29	SMOH SM(OH)2	-45838. -93540.	1.2182E-13 3.3731E-10
EU01.500 (S)	-125346.	29	EUOH EU(OH)2	-49502. -104776.	8.7502E-11 1.6280E-06
GO01.500 (S)	-149750.	29	GOOH GO(OH)2	-20139. -78433.	1.1660E-16 4.6391E-12
TO01.500 (S)	-156382.	29	TOOH TO(OH)2	-26228. -74286.	1.0172E-16 3.0803E-13
OY01.500 (S)	-154250.	29	OYOH OY(OH)2	-38431. -78934.	3.7485E-15 1.6539E-12
HO01.500 (S)	-156875.	29	HOOH HO(OH)2	-32074. -76524.	3.9120E-16 4.7780E-13
ER01.500 (S)	-158167.	29	EROH ER(OH)2	-31391. -72336.	2.3800E-16 1.2036E-13
TM01.500 (S)	-158179.	29	TMOH TM(OH)2	-44682. -74732.	6.7238E-15 2.1927E-13
YB01.500 (S)	-150364.	29	YBOH YB(OH)2	-45777. -79805.	6.3275E-14 5.6132E-12
LU01.500 (S)	-155758.	29	LUOH LU(OH)2	-14574. -64658.	6.3404E-18 3.1964E-14

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
HFO2.000 (S)	-180094.	25	HFOH HF(OH)2	-1101. -84346.	4.6955E-22 9.9517E-15
TAO2.500 (S)	-143532.	25	TAOH TA(OH)2	47781. -33909.	2.1532E-23 3.0246E-16
WO3.000 (L)	-86319.	7	WOH W(OH)2 WO2(OH)2	74292. 11294. -114200.	4.7779E-20 6.2086E-15 3.2069E-01
REO2.000 (L)	-36156.	26	REOH RE(OH)2 REO3(OH)	71624. 26727. -69602.	2.8329E-14 3.8729E-11 7.6642E+01
OSO0.000 (S)	0.		OSOH OS(OH)2	76360. 42533.	7.6860E-11 6.4834E-09
IRO0.000 (S)	0.		IROH IR(OH)2	63438. 40477.	1.9850E-09 1.0878E-08
PTO0.000 (S)	0.		PTOH PT(OH)2	55168. 42986.	1.5903E-08 5.7853E-09
AUO0.300 (L)	0.		AUOH AU(OH)2	23047. 25187.	5.1458E-05 5.2006E-17
POO0.000 (L)	13670.	24	POOH PO(OH)2	-6675. 10906.	2.8372E+08 5.7739E-04
RAO1.000 (S)	-76299.	26	RAOH RA(OH)2	-59387. -128796.	2.4089E-04 1.5706E+02
ACO1.500 (S)	-166291.	26	ACOH AC(OH)2	-14576. -106823.	4.4805E-19 9.1445E-11
THO2.000 (S)	-201750.	22	THOH TH(OH)2	9433. -43759.	1.4227E-25 1.5677E-21
PAO2.000 (S)	-156794.	26	PAOH PA(OH)2	8362. -51394.	1.5266E-20 8.7727E-16
UO2.667 (S)	-178290.	26,68	UOH U(OH)2	4908. -46423.	1.6676E-22 1.1220E-18
NPO2.300 (S)	-158072.	26	NPOH NP(OH)2	-5147. -44295.	3.3050E-19 1.0634E-16
PUO2.400 (S)	-171100.	29,72	PUOH PU(OH)2	-18038. -43090.	3.1928E-19 3.7130E-18
AMO2.000 (S)	-158714.	26	AMOH AM(OH)2	-31433. -68351.	2.0959E-16 3.6482E-14
CMO1.500 (S)	-156030.	EST	CMOH CM(OH)2	-23550. -71746.	5.7079E-17 1.7895E-13

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
BK01.500 (S)	-156000.	EST	BKOH BK(OH)2	-25598. -73346.	9.5557E-17 2.6768E-13
CF01.500 (S)	-156000.	EST	CFOH CF(OH)2	-34140. -69239.	8.1990E-16 9.5232E-14
ES01.500 (S)	-156000.	EST	ESOH ES(OH)2	-40719. -74713.	4.2915E-15 3.7809E-13
FM01.500 (S)	-156000.	EST	FMOH FM(OH)2	-40441. -79861.	4.0021E-15 1.3789E-12
MD01.500 (S)	-156000.	EST	MDOH MD(OH)2	-50254. -84181.	4.7264E-14 4.0888E-12
NO01.500 (S)	-156000.	EST	NOOH NO(OH)2	-57020. -75153.	2.5935E-13 4.2178E-13
LW01.500 (S)	-156000.	EST	LWOH LW(OH)2	-24453. -58542.	7.1653E-17 6.4559E-15
O402.000 (S)	-187000.	EST	O4OH O4(OH)2	17860. -66776.	6.9841E-25 2.0999E-17

Table 11. Equilibrium constants for the reactions between condensed oxides, and 1 atm of

gaseous hydroxides, the water vapor and oxygen

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
LiO0.500 (L)	-17058.	7	LiOH Li2(OH)2	-33689. -18179.	2.1976E+00 2.4153E-04
BeO1.000 (S)	-86557.	7	BeOH Be(OH)2	-32477. -783.	1.4471E-06 3.4170E-03
MgO1.000 (S)	-52540.	7	MgOH Mg(OH)2	-33065. -41359.	1.5332E-03 6.2907E-04
AlO1.500 (L)	-106042.	7	AlOH Al(OH)2 AlO(OH)	-45690. -82226. -70555.	4.0947E-07 4.9450E-05 6.1075E-05
SiO2.000 (L)	-109047.	7	SiOH Si(OH)2	-4088. -40925.	5.1609E-11 6.6223E-09
CaO1.000 (S)	-73739.	7	CaOH Ca(OH)2	-42521. -59637.	1.4422E-04 3.4940E-04
ScO1.500 (S)	-142126.	29	ScOH Sc(OH)2	-22349. -82706.	2.6145E-12 3.8176E-08
TiO2.000 (L)	-120006.	7	TiOH Ti(OH)2	-6776. -53261.	9.7547E-12 8.7385E-09
VO1.000 (L)	-63100.	22	VOH V(OH)2 VO(OH)3	15253. -25874. -86288.	1.0930E-08 2.4894E-05 4.9125E-02
CrO1.500 (S)	-57938.	22,25	CrOH Cr(OH)2 CrO2(OH)2	540. -6944. -54780.	5.9706E-07 2.0613E-07 3.1125E-03
MnO1.000 (L)	-48175.	22	MnOH Mn(OH)2	-6703. -35327.	1.8311E-05 4.4975E-04
FeO1.000 (L)	-29118.	7	FeOH Fe(OH)2	9335. -21264.	3.3616E-05 1.2291E-03
COO0.000 (L)	0.		COOH CO(OH)2	20056. -5307.	1.3642E-03 1.7384E-02
NiO0.000 (L)	0.		NiOH Ni(OH)2	18434. -5310.	1.8911E-03 1.7397E-02
CUO0.500 (L)	-2494.	7	CUOH CU(OH)2	4257. 12630.	1.9856E-02 2.8446E-04

CONDENSED OXIDE FOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
GA01.500 (L)	-39983.	26	GAOH GA(OH)2	-28478. -44959.	7.6270E-03 1.6263E-02
GE02.000 (L)	-18059.	26	GE0H GE(OH)2	2473. -13240.	1.2393E-03 2.2641E-03
AS02.500 (L)	31235.	68	ASOH AS(OH)2	5436. -3726.	1.3912E+01 6.7979E+00
SR01.000 (S)	-70000.	68	SROH SR(OH)2	-42334. -66711.	2.9484E-04 3.0888E-03
YO1.500 (S)	-131256.	29	YOH Y(OH)2	-14966. -78985.	5.2748E-12 1.3428E-07
ZR02.000 (S)	-150847.	7	ZROH ZR(OH)2	12634. -47343.	3.9522E-16 5.3460E-12
NB02.500 (L)	-108163.	25	NBOH NB(OH)2	51531. -33490.	8.4709E-16 1.7716E-09
MO02.000 (S)	-41663.	7	MOOH MO(OH)2 MOO2(OH)2	42917. 8652. -80640.	3.1207E-09 2.3863E-07 1.5257E+01
TC00.000 (L)	0.		TCOH TC(OH)2	53275. 36648.	1.7020E-06 3.7373E-06
RU00.000 (S)	0.		RUOH RU(OH)2	47329. 44454.	5.6326E-06 7.7648E-07
RH00.500 (L)	-1250.	68	RHOH RH(OH)2	37984. 37203.	2.8730E-05 2.5980E-06
PD00.000 (L)	0.		PDOH PD(OH)2	105. 37338.	7.5678E-02 2.9412E-06
IN01.500 (L)	-20922.	26	INOH IN(OH)2	-16953. -42252.	3.4765E-02 4.3729E-01
SN02.000 (L)	-20000.	68	SNOH SN(OH)2	-4346. -24926.	3.3053E-03 1.3430E-02
BA01.000 (L)	-81848.	74	BAOH BA(OH)2	-57546. -87934.	5.8028E-04 2.0332E-02
LA01.500 (S)	-131062.	29	LAOH LA(OH)2	-25034. -93958.	4.1621E-11 3.3405E-06
CE02.000 (S)	-132860.	29	CEOH CE(OH)2	-18542. -66264.	7.8451E-12 9.0034E-09
PR01.500 (S)	-136056.	29	PROH PR(OH)2	-33140. -70275.	7.7957E-11 1.0610E-08

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM H	EQUILIBRIUM CONSTANT, K
ND01.500 (S)	-131948.	29	ND(OH) ND(OH)2	-34399. -64726.	2.2937E-10 7.9379E-09
PM01.500 (L)	-126000.	EST	PM(OH) PM(OH)2	-36156. -66588.	1.0816E-09 3.8238E-08
SM01.500 (S)	-130753.	29	SM(OH) SH(OH)2	-32853. -65335.	2.1373E-10 1.1413E-08
EU01.500 (S)	-108721.	29	EU(OH) EU(OH)2	-38031. -78422.	5.1107E-08 1.3411E-05
GD01.500 (S)	-133336.	29	GD(OH) GD(OH)2	-19549. -65937.	8.7302E-12 7.6598E-09
TB01.500 (S)	-140670.	29	TB(OH) TB(OH)2	-24978. -59030.	5.9496E-12 4.3584E-10
OY01.500 (S)	-138671.	29	OY(OH) OY(OH)2	-36819. -63008.	9.6454E-11 1.4514E-09
HO01.500 (S)	-140616.	29	HO(OH) HO(OH)2	-30164. -61114.	1.7083E-11 6.7024E-10
ER01.500 (S)	-141697.	29	ER(OH) ER(OH)2	-30355. -56622.	1.4541E-11 2.2238E-10
TM01.500 (S)	-142232.	29	TM(OH) TM(OH)2	-37685. -52778.	5.6073E-11 9.0410E-11
YB01.500 (S)	-134442.	29	YB(OH) YB(OH)2	-34645. -52398.	1.4587E-10 4.4436E-10
LU01.500 (S)	-139379.	29	LU(OH) LU(OH)2	-13302. -50983.	7.3564E-13 9.3339E-11
HF02.000 (S)	-160392.	25	HF(OH) HF(OH)2	-3349. -72739.	1.4472E-15 1.3019E-10
TA02.500 (L)	-123667.	25	TA(OH) TA(OH)2	44586. -22652.	1.5125E-16 8.8226E-12
WO3.000 (L)	-64901.	7	WOH W(OH)2 W2(OH)2	70310. 22575. -89951.	1.1699E-13 1.3464E-10 9.2469E-01
RE02.000 (L)	-23542.	26	RE(OH) RE(OH)2 REO3(OH)	67493. 38646. -47372.	8.5112E-10 2.1867E-09 9.3597E+00
OS00.000 (S)	0.		OSOH OS(OH)2	70805. 52750.	4.9949E-08 1.4618E-07
IR00.000 (S)	0.		IROH IR(OH)2	58064. 50958.	6.4907E-07 2.0968E-07

CONDENSED OXIDE MOX	FREE ENERGY OF FORMATION OF OXIDE MOX, CAL/G ATOM M	REF.	HYDROXIDE SPECIES	FREE ENERGY OF FORMATION OF HYDROXIDE, CAL/G ATOM M	EQUILIBRIUM CONSTANT, K
PT00.000 (L)	0.		PTOH FT(OH)2	52547. 55121.	1.9704E-06 9.0705E-08
AU00.000 (L)	0.		AUOH AU(OH)2	22477. 37832.	8.3804E-04 2.9448E-06
RA01.000 (S)	-54684.	26	RAOH RA(OH)2	-49234. -106179.	2.5804E-02 1.8957E+02
AC01.500 (L)	-159185.	26	ACOH AC(OH)2	-14849. -96494.	1.8642E-14 1.9763E-08
TH02.000 (S)	-179650.	22	THOH TH(OH)2	8310. -31766.	2.8636E-16 7.0533E-16
PA02.000 (S)	-133470.	26	PAOH PA(OH)2	8371. -40351.	3.0502E-14 4.3236E-11
U02.000 (S)	-157590.	68,72	UOH U(OH)2	4197. -34301.	5.5575E-16 9.9647E-14
NP02.000 (S)	-137730.	26	NP0H NP(OH)2	-3602. -30217.	1.4548E-13 2.3853E-12
PU02.000 (L)	-150975.	29,72	PUOH PU(OH)2	-16522. -27642.	1.3628E-13 9.8770E-14
AM02.000 (S)	-141162.	26	AMOH AM(OH)2	-29714. -53292.	1.3979E-11 1.2437E-10
CM01.500 (S)	-148000.	EST	CMOH CM(OH)2	-22882. -58449.	8.9213E-13 8.8668E-11
BK01.500 (S)	-148000.	EST	BKOH BK(OH)2	-25929. -61702.	1.6477E-12 1.7065E-10
CF01.500 (S)	-148000.	EST	CFOH CF(OH)2	-33739. -55940.	7.9358E-12 5.3509E-11
ES01.500 (S)	-148000.	EST	ESOH ES(OH)2	-42064. -62085.	4.2401E-11 1.8434E-10
FM01.500 (S)	-148000.	EST	FMOH FM(OH)2	-40687. -65668.	3.2135E-11 3.7921E-10
MD01.500 (S)	-148000.	EST	MDOH MD(OH)2	-44788. -64575.	7.3364E-11 3.0427E-10
NO01.500 (S)	-148000.	EST	NOOH NO(OH)2	-48881. -50038.	1.4234E-10 1.6313E-11
LW01.500 (S)	-148000.	EST	LWOH LW(OH)2	-25603. -45657.	1.5428E-12 6.7527E-12
0402.000 (S)	-169500.	EST	04OH 04(OH)2	14621. -56584.	6.2014E-18 8.0396E-13

Appendix B:

Plots of Bond Energies and Equilibrium Constants

Fig. 1. Estimated M-OH bond energy versus the atomic number of M for MOH(g) at 298°K.

Fig. 2. Sum of the estimated M-OH bond energies versus the atomic number of M for M(OH)₂(g) at 298°K.

Fig. 3. Equilibrium constant (K) versus the atomic number of M for the formation of MOH(g) at 500°K.

Fig. 4. Equilibrium constant (K) versus the atomic number of M for the formation of MOH(g) at 1000°K.

Fig. 5. Equilibrium constant (K) versus the atomic number of M for the formation of MOH(g) at 1500°K.

Fig. 6. Equilibrium constant (K) versus the atomic number of M for the formation of MOH(g) at 2000°K.

Fig. 7. Equilibrium constant (K) versus the atomic number of M for the formation of MOH(g) at 2500°K.

Fig. 8. Equilibrium constant (K) versus the atomic number of M for the formation of M(OH)₂(g) at 500°K.

Fig. 9. Equilibrium constant (K) versus the atomic number of M for the formation of $M(OH)_2(g)$ at $1000^\circ K$.

Fig. 10. Equilibrium constant (K) versus the atomic number of M for the formation of $M(OH)_2(g)$ at $1500^\circ K$.

Fig. 11. Equilibrium constant (K) versus the atomic number of M for the formation of $M(OH)_2(g)$ at 2000°K.

Fig. 12. Equilibrium constant (K) versus the atomic number of M for the formation of $M(OH)_2(g)$ at 2500°K.