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The thermochemical properties of the oxides, fluorides, and chlorides to 2500° K

by Alvin Glassner

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The Thermochemical Properties of the Oxides, Fluorides, and Chlorides to 2,500° K

By ALVIN GLASSNER

I. Introduction

In recent years interest in chemical reactions occurring at high temperatures has greatly increased. As the technology for producing and maintaining high temperatures has improved, investigations aimed at utilizing these techniques have demonstrated certain attractive advantages over processes conducted at lower temperatures. As an example, the use of pyrometallurgical methods for the separation of fission products from spent metallic nuclear fuels permits the recovery of unused fissionable material in metallic form, ready for recasting in the desired shape. On the other hand, processing of such materials by more conventional methods, such as by solvent extractions, requires a series of many chemical reactions, the end product of which must again be reduced to the metal.

As the temperature rises, the chemical stabilities of compounds decrease. In general, then, compounds of interest at high temperatures are limited to those consisting of but two elements. Of these, the most stable are the oxides, fluorides, chlorides, borides, carbides, and the like. Thermodynamic data at high temperatures for these substances are, for the most part, lacking. The available experimental values are generally limited to the oxides, chlorides and, to a more limited extent, the fluorides. Observations on borides and carbides are almost completely missing.

In the present effort to provide information on the thermodynamic behavior of important compounds at high temperature, reliable extrapolations could only be made for the oxides, fluorides, and chlorides. Accordingly, this report is limited to a study of these compounds.

II. The Basic Thermodynamic Properties

Thermodynamic calculations over a wide range of temperatures are generally made with the aid of algebraic equations representing the characteristic properties of the substances being considered. The necessary integrations and differentiations, or other mathematical manipulations, are then most easily effected.

The most convenient starting point in making such calculations for a given substance is the heat capacity at constant pressure. From this quantity and a knowledge of the properties of any phase transitions, the other thermodynamic properties may be computed by the well-known equations given in standard texts on thermodynamics.

Empirical heat capacity equations are generally of the form of a power series with the

absolute temperature T as the independent variable:

$$C_p = a' + (b' \times 10^{-3})T + (c' \times 10^{-6})T^2$$

or

$$C_p = a'' + (b'' \times 10^{-3})T + \frac{d \times 10^5}{T^2}.$$

Since both forms are used in the ensuing, let

$$C_p = a + (b \times 10^{-3})T + (c \times 10^{-6})T^2 + \frac{d \times 10^5}{T^2}.$$

The constants a , b , c , and d are to be determined either experimentally or by some theoretical or semi-empirical approach.

The heat content or enthalpy H is determined from the heat capacity by a simple integration over the range of temperatures for which (1) is applicable. Thus, if 298°K is taken as a reference temperature,

$$\begin{aligned} (2) \quad H_T - H_{298} &= \int_{298}^T C_p dT \\ &= a(T - 298) + \frac{1}{2}(b \times 10^{-3})(T^2 - 298^2) + \frac{1}{3}(c \times 10^{-6})(T^3 - 298^3) - (d \times 10^5) \left(\frac{1}{T} - \frac{1}{298} \right) \\ &= aT + \frac{1}{2}(b \times 10^{-3})T^2 + \frac{1}{3}(c \times 10^{-6})T^3 - \frac{d \times 10^5}{T} - A, \end{aligned}$$

where all the constants on the right hand side of the equation have been incorporated in the term $-A$.

In general, the enthalpy is given by a sum of terms such as (2) for each phase of the substance

involved in the temperature range considered plus terms which represent the heats of transitions:

$$H_T - H_{298} = \sum \int_{T_1}^{T_2} C_p dT + \sum \Delta H_{tr}.$$

In a similar manner, the entropy S is obtained from (1) by performing the integration

$$(3) \quad S_T - S_{298} = \int_{298}^T (C_p/T) dt \\ = a \ln(T/298) + (b \times 10^{-3})(T - 298) + \frac{1}{2}(c \times 10^{-6})(T^2 - 298^2) - \frac{1}{2}(d \times 10^5) \left(\frac{1}{T^2} - \frac{1}{298^2} \right) \\ = a \ln T + (b \times 10^{-3})T + \frac{1}{2}(c \times 10^{-6})T^2 - \frac{\frac{1}{2}(d \times 10^5)}{T} - B'$$

or

$$(4) \quad S_T = 2.303 \log T + (b \times 10^{-3})T + \frac{1}{2}(c \times 10^{-6})T^2 \\ - \frac{\frac{1}{2}(d \times 10^5)}{T} - B$$

where

$$(5) \quad B = B' + S_{298}.$$

From the definition of free energy F :

$$F = H - TS$$

the quantity

$$F_T - H_{298} = (H - H_{298}) - TS$$

is obtained from (2) and (4):

$$(6) \quad F_T - H_{298} = 2.303 aT \log T - \frac{1}{2}(b \times 10^3)T^2 \\ - \frac{1}{6}(c \times 10^{-6})T^3 - \frac{\frac{1}{2}(d \times 10^5)}{T} \\ - (B - a)T + A$$

and also the free energy function

$$(7) \quad \frac{F_T - H_{298}}{T} = -2.303 \log T - \frac{1}{2}(b \times 10^3)T \\ - \frac{1}{6}(c \times 10^{-6})T^2 - \frac{\frac{1}{2}(d \times 10^5)}{T^2} \\ - (B - a) + \frac{A}{T}$$

In Table I there has been collected values of the constants for the elements listed in the first

column in alphabetical order by symbol. The second column gives the phase to which they are applicable. The third, fourth, and fifth columns specify the thermodynamic properties for the transition to the succeeding phase. In column 6, the value of the entropy at 298.16° K, the reference temperature, is given. The remaining columns, except for the last, give the values of the constants a , b , c , d , A , and B required in the thermodynamic equations. The last column lists the references for experimental heat capacities. All values throughout the table which represent estimates have been enclosed in parentheses.

Similar sets of data for the oxides, fluorides, and chlorides are given in Tables II, III, and IV, respectively.

The heat capacities at temperatures beyond the range of experimental determination were estimated by extrapolation. Where no experimental values were found, use of analogy with compounds of neighboring elements in the Periodic Table was employed. Approximations were also made by the use of empirical rules given in the literature.¹

¹ For example, see

- a. O. Kubachewski and E. Evans, *Metallurgical Thermochemistry* (Academic Press, New York, N. Y., 1951), Chapter III.
- b. R. R. Wenner, *Thermochemical Calculations* (McGraw-Hill, New York, N. Y., 1941), Chapter VIII.
- c. W. M. Latimer—J. Am. Chem. Soc., 73, 1480 (1951).
- d. E. T. Turkdogan—J. Appl. Chem. 5, 101 (1955).

III. The Free Energies of Formation

With the aid of the material contained in Section II, thermodynamic quantities for the formation of compounds may easily be formulated. Thus, for the reaction

where M indicates an element, X_2 represents the non-metal O_2 , Cl_2 , or F_2 , and n indicates the number of molecules of X_2 reacting per atom of M, the equations of Section II give

$$(8) \quad \Delta C_p = \Delta a + (\Delta b \times 10^{-3})T + (\Delta c \times 10^{-6})T^2 + \frac{\Delta d \times 10^5}{T^2}$$

$$(9) \quad \Delta H - \Delta H_{f, 298} = (\Delta a)T + \frac{1}{2}(\Delta b \times 10^{-3})T^2 + \frac{1}{3}(\Delta c \times 10^{-6})T^3 - \frac{\frac{1}{2}(\Delta d \times 10^5)}{T} + \Delta A$$

$$(10) \quad \Delta S = (2.303\Delta a) \log T + (\Delta b \times 10^{-3})T + \frac{1}{2}(\Delta c \times 10^{-6})T^2 - \frac{\frac{1}{2}(\Delta d \times 10^5)}{T^2} - \Delta B$$

$$(11) \quad \Delta F - \Delta H_{f, 298} = -(2.303\Delta a)T \log T - \frac{1}{2}(\Delta b \times 10^{-3})T^2 - \frac{1}{6}(\Delta c \times 10^{-6})T^3 - \frac{\frac{1}{2}(\Delta d \times 10^5)}{T} - T\Delta(B - a) - \Delta A.$$

In these equations

$$(12) \quad \Delta h = h(MX_{2n}) - h(M) - n h(X_2),$$

where the symbol h indicates any of the quantities a , b , c , d , A , or B , as defined in Section II. Also, $\Delta H_{f, 298}$ is the heat of formation of the substance under consideration from the elements at 298° K.

In Table V have been summarized for the oxides, in alphabetical order in terms of the chemical symbol for the metallic element, the values $\Delta H_{f, 298}$ and of the quantities Δh as determined from the data of Section II. Tables V and VI give similar data for the fluorides and chlorides, respectively.

Values of the free energy of formation in kilocalories per gram atom of nonmetal as a

function of temperature have been plotted in Figure 1 for oxides, in Figure 2 for fluorides, and in Figure 3 for chlorides. A visual comparison makes immediately evident the order of stability of the various compounds at a given temperature. The advantages of this type of plot have been discussed by Kellogg.² In these graphs the symbols for M for melting point, B for boiling point, and S for sublimation point of the compound have been employed. At these and other transformation points, changes in slope occur in the generally linear-appearing curves. Solid lines have been used to represent free energies based on experimental heat capacities, whereas dotted lines represent regions where approximations have been made.

² H. H. Kellogg—J. of Metals 188, 862 (1950).

In general, the agreement with previously published compilations ²⁻⁷ is good. In those cases where divergences do occur, the differences result from alternate choices for the thermal data.

² H. H. Kellogg—J. of Metals 188, 862 (1950).

³ H. H. Kellogg—J. of Metals 191, 137 (1951).

⁴ L. Brewer, et al. Papers 3, 6, and 7 in "The Chemistry and Metallurgy of Miscellaneous Materials: Thermodynamics," L. L. Quill, Ed. (McGraw-Hill, New York, N. Y., 1950).

⁵ M. de Kay Thompson, "The Total and Free Energies of Formation of the Oxides of Thirty-Two Metals," Electrochemical Society, New York, N. Y., 1942.

⁶ F. D. Richardson, J. Iron and Steel Ind., 160, 261 (1948).

⁷ J. P. Coughlin, "Contributions to the Data on Theoretical Metallurgy: XII Heats and Free Energy of Formation of Inorganic Oxides," Bureau of Mines Bulletin 542 (U. S. Government Printing Office, Washington, D. C., 1954).

Table I
THERMODYNAMIC PROPERTIES OF THE ELEMENTS

Element	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/g atom)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/g atom)	B (e.u.)	Reference for Heat Capacity
Ac	solid	(1090)	(2.5)	(2.3)	(13)	(5.4)	(3.0)	-	-	(1.743)	(18.7)	-
	liquid	(2750)	(70)	(25)	-	(8)	-	-	-	(0.295)	(31.3)	-
Ag	solid	1234 (a)	2.855 (b)	2.313	10.20 (a)	5.09	1.02	-	0.36	1.488	19.21	b
	liquid	2485 (c)	60.72 (c)	24.43	-	7.30	-	-	-	0.164	30.12	b (to 1600°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-66.34)	(-12.52)	-
Al	solid	931.7 (d)	2.57 (b)	2.76	6.769 (c)	4.94	2.96	-	-	1.604	22.26	b
	liquid	2600 (c)	67.9 (c)	26	-	7.0	-	-	-	0.33	30.83	b (to 1300°K)
Am	solid	(1200)	(2.4)	(2.0)	(13)	(4.9)	(4.4)	-	-	(1.657)	(16.2)	-
	liquid	2733 (e)	51.7 (e)	18.9	-	(8.5)	-	-	-	(0.409)	(34.5)	-
As	solid	883 (c)	31/4 (d)	35.1/4	8.4 (c)	5.17	2.34	-	-	1.646	21.8	a
1/4As ₄	gas	-	-	-	-	(4.38)	(0.375)	-	-	(-7.565)	(5.6)	-
Au	solid	1336.16 (c)	3.03 (c)	2.27	11.32 (f)	6.14	-0.175	0.92	-	1.831	23.65	a
	liquid	2933 (c)	74.21 (c)	25.30	-	7.00	-	-	-	-0.631	26.99	a (to 1575°K)
B	solid	2313 (c)	(3.8)	(1.6)	1.42 (g)	1.54	4.40	-	-	0.655	8.67	b (to 1200°K)
	liquid	2800 (h)	75 (h)	27	-	(6.0)	-	-	-	(-4.599)	(31.4)	-
Ba	solid,α	648 (c)	0.14 (a)	0.22	16 (c)	5.55	1.50	-	-	1.722	16.1	b
	solid,β	977 (c)	1.83 (a)	1.87	-	5.55	1.50	-	-	1.582	15.9	b
	liquid	1911 (c)	35.665 (h)	18.63	-	(7.4)	-	-	-	(0.843)	(25.3)	-
	gas	-	-	-	-	(4.97)	-	-	-	(-39.65)	(-11.7)	-
Be	solid	1556 (c)	2.335 (i)	1.501	2.28 (c)	5.07	1.21	-	-1.15	1.951	27.62	a
	liquid	-	-	-	-	5.27	-	-	-	-1.611	25.68	i (to 2000°K)
Bi	solid	544.2 (c)	2.63 (c)	4.83	13.6 (c)	5.38	2.60	-	-	1.720	17.8	a
	liquid	1900 (h)	41.1 (a)	21.6	-	7.60	-	-	-	-0.087	25.6	a (to 1000°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-46.19)	(-15.9)	-
C	solid	-	-	-	1.3609 (c)	4.10	1.02	-	-2.10	1.972	23.484	b (to 2300°K)
Ca	solid,α	723 (c)	0.24 (c)	0.33	9.95 (c)	5.24	3.50	-	-	1.718	20.95	b
	solid,β	1123 (c)	2.2 (c)	1.96	-	6.29	1.40	-	-	1.689	26.01	b (to 1000°K)
	liquid	1755 (h)	38.6 (a)	22.0	-	7.4	-	-	-	-0.147	30.28	a (to 1223°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-43.015)	(-9.88)	-
Cd	solid	594.1 (c)	1.46 (c)	2.46	12.3 (c)	5.31	2.94	-	-	1.714	18.8	b
	liquid	1040 (c)	23.86 (c)	22.94	-	7.10	-	-	-	0.798	26.1	b
	gas	-	-	-	-	(4.97)	-	-	-	(-25.28)	(-11.7)	-
Ce	solid	1048 (c)	2.1 (c)	2.0	13.8 (c)	4.40	6.0	-	-	1.579	13.1	b (to 800°K)
	liquid	2800 (h)	73 (h)	26	-	(7.9)	-	-	-	(-0.148)	(29.1)	-
Cl ₂	gas	-	-	-	53.286 (c)	8.76	0.27	-	-0.65	2.845	-2.929	a (to 2000°K)
Co	solid,α	723 (c)	0.005 (c)	0.007	6.8 (c)	4.72	4.30	-	-	1.598	21.4	b
	solid,β	1398 (c)	0.095 (a)	0.068	-	3.30	5.86	-	-	0.974	13.1	b
	solid,γ	1766 (c)	3.7 (c)	2.1	-	9.60	-	-	-	3.961	50.5	b
	liquid	3370 (h)	93 (h)	28	-	8.30	-	-	-	-2.034	38.7	b (to 1900°K)
Cr	solid	2173 (c)	3.5 (c)	1.6	5.68 (c)	5.35	2.36	-	-0.44	1.848	25.75	a (to 2133°K)
	liquid	2495 (h)	72.97 (h)	29.25	-	9.40	-	-	-	1.556	50.13	b (1823-1900°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-82.47)	(-13.8)	-
Cs	solid	301.9 (c)	0.50 (c)	1.7	19.8 (c)	7.42	-	-	-	2.212	22.5	b
	liquid	963 (c)	16.32 (c)	17.0	-	8.00	-	-	-	1.887	24.1	b (to 500°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-17.35)	(-13.6)	-
Cu	solid	1356.2 (c)	3.11 (c)	2.29	7.97 (a)	5.41	1.50	-	-	1.680	23.30	b
	liquid	2868 (h)	72.8 (c)	25.4	-	7.50	-	-	-	0.024	34.05	b (to 1600°K)
F ₂	gas	-	-	-	48.58 (h)	8.29	0.44	-	-0.80	2.760	-0.76	b (to 2000°K)
Fe	solid,α	1033 (c)	0.410 (b)	0.397	6.491 (c)	3.37	7.10	-	0.43	1.176	14.59	b
	solid,β	1180 (c)	0.217	0.184	-	10.40	-	-	-	4.281	55.66	b
	solid,γ	1673 (c)	0.15	0.084	-	4.85	3.00	-	-	0.396	19.76	b
	solid,δ	1808 (c)	3.86	2.14	-	10.30	-	-	-	4.382	55.11	b
	liquid	3008 (h)	84.62 (h)	28.1	-	10.00	-	-	-	-0.021	50.73	b (to 1900°K)
Ga	solid	302.94 (j)	1.335 (j)	4.407	9.82 (j)	5.237	3.33	-	-	1.710	21.01	j
	liquid	2700 (h)	-	-	-	(6.645) (k)	-	-	-	(0.648)	(23.64)	-
Ge	solid	1232 (h)	8.3 (h)	6.7	10.1 (h)	5.90	1.13	-	-	1.764	23.8	b
	liquid	2980 (h)	68 (h)	23	-	(7.3)	-	-	-	(-5.668)	(25.7)	-
H ₂	gas	-	-	-	31.211 (c)	6.62	0.81	-	-	2.010	6.75	l
Hf	solid	(2600) (h)	(6.0) (h)	(2.3)	13.1 (c)	(6.00)	(0.52)	-	-	(1.812)	(21.2)	estd. in b
Hg	liquid	629.73 (c)	13.985 (b)	22.208	18.46 (a)	6.61	-	-	-	1.971	19.20	b
	gas	-	-	-	-	4.969	-	-	-	-13.048	-13.54	b
In	solid	430 (c)	0.775 (b)	1.80	13.88 (a)	5.81	2.50	-	-	1.844	19.97	b
	liquid	2440 (h)	53.8 (h)	22.0	-	7.50	-	-	-	1.564	27.34	b (to 500°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-58.42)	(-14.46)	-
Ir	solid	2727 (h)	6.6 (h)	2.4	8.7 (c)	5.56	1.42	-	-	1.721	23.4	b (to 1800°K)
K	solid	336.4 (m)	0.5575 (m)	1.657	15.2 (c)	1.3264	19.405	-	-	1.258	-1.86	m
	liquid	1052 (h)	18.88 (h)	17.95	-	8.8825	-4.565	2.9369	-	1.923	32.55	m
	gas	-	-	-	-	(4.97)	-	-	-	(-19.689)	(-9.46)	-
La	solid	1153 (c)	(2.3) (h)	(2.0)	13.7 (c)	6.17	1.60	-	-	1.911	21.9	b (to 800°K)
	liquid	3000 (h)	80 (h)	27	-	(7.3)	-	-	-	(-0.15)	(26.0)	-
Li	solid	459 (a)	0.69 (a)	1.5	6.70 (c)	3.05	8.60	-	-	1.292	12.92	a
	liquid	1640 (h)	32.48 (h)	19.81	-	7.0	-	-	-	1.509	32.00	a (to 550°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-34.30)	(-2.84)	-
Mg	solid	923 (c)	2.2 (c)	2.4	7.77 (c)	5.33	2.45	-	-0.103	1.733	23.39	b
	liquid	1393 (c)	31.5 (c)	22.6	-	(8.0)	-	-	-	0.942	36.97	-
	gas	-	-	-	-	(4.97)	-	-	-	(-34.78)	(-7.60)	-
Mn	solid,α	1000 (c)	0.535 (b)	0.535	7.59 (c)	5.70	3.38	-	-0.37	1.974	26.11	b
	solid,β	1374 (c)	0.545 (b)	0.397	-	8.33	0.66	-	-	2.672	41.02	b
	solid,γ	1410 (c)	0.430 (b)	0.305	-	10.70	-	-	-	4.760	56.84	b
	solid,δ	1517 (c)	3.5 (c)	2.31	-	11.30	-	-	-	5.176	60.88	b
	liquid	2368 (b)	53.7 (c)	22.7	-	11.00	-	-	-	1.221	56.38	b
	gas	-	-	-	-	6.26	-	-	-	-63.704	-3.13	b

Table I (Cont'd.)

Element	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/g atom)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/g atom)	B (e.u.)	Reference for Heat Capacity
Mo	solid	2883 (c)	(5.8)	(2.0)	6.83 (c)	5.48	1.30	-	-	1.692	24.78	b (to 1800°K)
N ₂	gas	-	-	-	45.767 (c)	6.76	0.606	0.13	-	2.044	-7.064	l
Na	solid	371 (c)	0.63 (c)	1.7	12.31 (a)	5.657	3.252	0.5785	-	1.836	20.92	m
	liquid	1187 (h)	23.4 (a)	20.1	-	8.954	-4.577	2.540	-	1.924	36.0	m
	gas	-	-	-	-	(4.97)	-	-	-	(-24.40)	(-8.7)	-
Nb	solid	2760 (c)	(5.8)	(2.1)	8.3 (c)	5.66	0.96	-	-	1.730	24.24	b (to 1900°K)
Nd	solid	1297 (n)	(2.55) (d)	(1.97)	13.9 (o)	5.61	5.34	-	-	1.910	19.7	b (to 900°K)
	liquid	(2750)	(61)	(22)	-	(9.1)	-	-	-	-0.606	35.8	-
Ni	solid, α	626 (c)	0.092 (c)	0.15	7.137 (p)	4.06	7.04	-	-	1.523	18.095	b
	solid, β	1728 (c)	4.21 (b)	2.44	-	6.00	1.80	-	-	1.619	27.16	b
	liquid	3110 (h)	90.48 (h)	29.0	-	9.20	-	-	-	0.251	45.47	b (to 1900°K)
Np	solid	913 (q)	(2.3)	(2.5)	(14)	(5.3)	(3.4)	-	-	(1.731)	(17.9)	-
	liquid	(2525)	(55)	(22)	-	(9.0)	-	-	-	(1.392)	(37.5)	-
O ₂	gas	-	-	-	49.003 (c)	8.27	0.258	-	-1.877	3.007	-0.750	l
Os	solid	2970 (h)	(6.4) (h)	(2.2)	7.8 (c)	5.69	0.88	-	-	1.736	24.9	b (to 1900°K)
P ₄	solid, white	317.4 (c)	0.601 (b)	1.89	42.4 (c)	13.62	28.72	-	-	5.338	43.8	a
	liquid	553 (c)	11.9 (c)	21.5	-	19.23	0.51	-	-2.98	6.035	66.7	a
	gas	-	-	-	-	(19.5)	(-0.4)	(1.3)	-	(-6.32)	(46.1)	-
Pa	solid	(1825)	(4.0)	(2.2)	(13.5)	(5.2)	(4.0)	-	-	(1.728)	(17.3)	-
	liquid	(4500)	(115)	(26)	-	(8.0)	-	-	-	(-3.823)	(28.8)	-
Pb	solid	600.6 (c)	1.141 (r)	1.900	15.49 (r)	5.64	2.30	-	-	1.784	17.33	r
	liquid	2023 (c)	42.5 (a)	21.0	-	7.75	-0.73	-	-	1.362	27.11	r (to 1900°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-45.25)	(-13.6)	-
Pd	solid	1828 (h)	4.12 (h)	2.25	8.9 (c)	5.80	1.38	-	-	1.791	24.6	b
	liquid	3440 (h)	89 (h)	26	-	(9.0)	-	-	-	(1.215)	(43.8)	-
Po	solid	525 (h)	(2.4)	(4.6)	13 (h)	(5.2)	(3.2)	-	-	(1.693)	(17.6)	-
	liquid	(1235) (s)	(24.6) (s)	(19.9)	-	(9.0)	-	-	-	(0.847)	(35.2)	-
	gas	-	-	-	-	(4.97)	-	-	-	(-28.73)	(-13.5)	-
Pr	solid	1205 (h)	(2.5)	(2.1)	(13.5)	(5.0)	(4.6)	-	-	(1.705)	(16.4)	-
	liquid	3563 (t)	-	-	-	(8.0)	-	-	-	(-0.519)	(30.0)	-
Pt	solid	2042.5 (c)	5.2 (c)	2.5	10.0 (c)	5.74	1.34	-	0.10	1.737	23.0	b (to 1900°K)
	liquid	4100 (h)	122 (h)	29.8	-	(9.0)	-	-	-	(0.406)	(42.6)	-
Pu	solid	913 (u)	(2.26) (v)	(2.48)	(13.0)	(5.2)	(3.6)	-	-	(1.710)	(17.7)	-
	liquid	-	-	-	-	(8.0)	-	-	-	(0.506)	(31.0)	-
Ra	solid	1233 (h)	(2.3)	(1.9)	(17) (h)	(5.8)	(1.2)	-	-	(1.783)	(16.4)	-
	liquid	(1700)	(35)	(21)	-	(8.0)	-	-	-	(1.284)	(28.6)	-
	gas	-	-	-	-	(4.97)	-	-	-	(-38.87)	(-14.5)	-
Rb	solid	312.0 (c)	0.525 (b)	1.68	16.6 (c)	3.27	13.1	-	-	1.557	5.9	a
	liquid	952 (c)	18.11 (c)	19.0	-	7.85	-	-	-	1.814	26.5	a (to 373°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-19.04)	(-12.3)	-
Re	solid	3440 (h)	(7.9) (h)	(2.3)	(8.89) (w)	(5.85)	(0.8)	-	-	(1.780)	(24.7)	-
Rh	solid	2240 (h)	(5.2) (h)	(2.3)	7.6 (c)	5.40	2.19	-	-	1.707	23.8	a
	liquid	4150 (h)	127 (h)	30.7	-	(9.0)	-	-	-	(-0.923)	(44.4)	-
Ru	solid, α	1308 (c)	0.034 (c)	0.026	6.9 (c)	5.25	1.50	-	-	1.632	23.5	b
	solid, β	1473 (c)	0 (b)	0	-	7.20	-	-	-	2.867	35.5	b
	solid, γ	1773 (c)	0.23 (c)	0.13	-	7.20	-	-	-	2.867	35.5	b
	solid, δ	2700 (h)	(6.1) (h)	(2.3)	-	7.50	-	-	-	3.169	37.6	b (to 1900°K)
S	solid, α	368.6 (c)	0.088 (a)	0.24	7.62 (c)	3.58	6.24	-	-	1.345	14.64	a
	solid, β	392 (c)	0.293 (c)	0.747	-	3.56	6.95	-	-	1.298	14.54	a
	liquid	717.76 (c)	2.5 (c)	3.5	-	5.4	5.0	-	-	1.576	24.02	a
1/2S ₂	gas	-	-	-	-	(4.25)	(0.15)	-	(-1.0)	(-2.859)	(9.57)	-
Sb	solid, (α, β, γ)	903.7 (c)	4.8 (c)	5.3	10.5 (c)	5.51	1.74	-	-	1.720	21.4	b
	liquid	1713 (c)	46.665 (d)	27.3	-	7.50	-	-	-	-1.992	28.1	b (to 1300°K)
1/2Sb ₂	gas	-	-	-	-	4.47	-	-	-0.11	-53.876	-21.7	b (to 2000°K)
Sc	solid	1670 (h)	(4.0) (h)	(2.4)	(9.0) (h)	(5.13)	(3.0)	-	-	1.663	21.1	-
	liquid	3000 (h)	80 (h)	27	-	(7.50)	-	-	-	(-2.563)	31.3	-
Se	solid	490.6 (c)	1.25 (c)	2.55	10.144 (x)	3.30	8.80	-	-	1.375	11.28	b
	liquid	1000 (h)	14.27	14.27	-	7.0	-	-	-	0.881	27.34	a (to 790°K)
1/2Se ₂	gas	-	-	-	-	4.465	-	-	-0.215	-15.895	-4.42	b (to 2000°K)
Si	solid	1683 (c)	11.1 (h)	6.60	4.50 (a)	5.70	1.02	-	-1.06	2.100	28.88	a
	liquid	2750 (h)	71 (h)	26	-	7.4	-	-	-	-7.646	33.17	a
Sm	solid	1623 (d)	3.7 (d)	2.3	(15)	(6.7)	(3.4)	-	-	(2.149)	(24.2)	-
	liquid	(2800)	(70)	(25)	-	(9.0)	-	-	-	(-2.296)	(33.4)	-
Sn	solid, (α, β)	505.1 (c)	1.69 (c)	3.35	12.3 (c)	4.42	6.30	-	-	1.598	14.8	b
	liquid	2473 (a)	(55)	(22)	-	7.30	-	-	-	0.559	26.2	b (to 1300°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-60.21)	(-14.3)	-
Sr	solid	1043 (c)	2.2 (c)	2.1	13.0 (c)	(5.60)	(1.37)	-	-	(1.731)	(19.3)	b
	liquid	1657 (c)	33.61 (h)	20.28	-	(7.7)	-	-	-	(0.976)	(30.4)	-
	gas	-	-	-	-	(4.97)	-	-	-	(-37.16)	(-10.2)	-
Ta	solid	3250 (c)	7.5 (h)	2.3	9.9 (c)	5.82	0.78	-	-	1.770	23.4	b (to 1900°K)
Tc	solid	(2400) (h)	(5.5) (h)	(2.3)	(8.0) (h)	(5.6)	(2.0)	-	-	(1.759)	(24.5)	-
	liquid	(3800)	(120) (h)	(32)	-	(11)	-	-	-	(3.459)	(59.4)	-
Te	solid, α	621 (c)	0.13 (c)	0.21	11.88 (c)	4.58	5.25	-	-	1.599	15.78	a
	solid, β	723 (c)	4.28 (c)	5.92	-	4.58	5.25	-	-	1.469	15.57	a
	liquid	1360 (c)	11.9 (c)	8.75	-	9.0	-	-	-	-0.988	34.96	a (to 873°K)
1/2Te ₂	gas	-	-	-	-	4.47	-	-	-0.10	-19.048	-6.47	b (to 2000°K)
Th	solid	2173 (c)	(4.6)	(2.1)	12.76 (y)	8.2	-0.77	2.04	-	2.591	33.64	a (to 1500°K)
	liquid	4500 (h)	(130)	(29)	-	(8.0)	-	-	-	(-7.602)	(26.84)	-
Ti	solid, α	1155 (c)	0.950 (b)	0.822	7.334 (z)	5.25	2.52	-	-	1.677	23.33	b
	solid, β	2000 (h)	(4.6) (h)	(2.3)	-	7.50	-	-	-	1.645	35.46	b (to 1500°K)
	liquid	3550 (h)	(101) (h)	(28)	-	(7.8)	-	-	-	(-2.355)	(35.45)	-

Table 1 (Cont'd.)

Element	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/g atom)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/g atom)	B (e.u.)	Reference for Heat Capacity
Ti	solid, α	508.3 (c)	0.082 (c)	0.16	15.4 (c)	5.26	3.46	-	-	1.722	15.6	b
	solid, β	576.8 (c)	1.03 (c)	1.79	-	7.30	-	-	-	2.230	26.4	b
	liquid	1730 (c)	38.81 (h)	22.4	-	7.50	-	-	-	1.315	25.9	b (to 800°K)
	gas	-	-	-	-	(4.97)	-	-	-	(-41.88)	(-15.4)	-
U	solid, α	938 (c)	0.665 (c)	0.709	12.03 (c)	3.25	8.15	-	0.80	1.063	8.47	b
	solid, β	1049 (c)	1.165 (c)	1.111	-	10.28	-	-	-	3.493	48.27	b
	solid, γ	1405 (c)	(3.0) (h)	(2.1)	-	9.12	-	-	-	1.110	39.09	b
	liquid	3800 (h)	-	-	-	(8.99)	-	-	-	(-2.073)	36.01	aa
V	solid	2003 (c)	(4.0)	(2.0)	7.05 (c)	5.57	0.97	-	-	1.704	24.97	a
	liquid	3800 (h)	-	-	-	(8.6)	-	-	-	1.827	44.06	-
W	solid	3650 (h)	8.42 (h)	2.3	8.0 (c)	5.74	0.76	-	-	1.745	24.9	b (to 2000°K)
Y	solid	1750 (h)	(4.0) (h)	(2.3)	(11) (h)	(5.6)	(2.2)	-	-	(1.767)	(21.6)	-
	liquid	3500 (h)	(90) (h)	(26)	-	(7.5)	-	-	-	(-2.277)	(29.6)	-
Zn	solid	692.7 (c)	1.595 (c)	2.303	9.95 (c)	5.35	2.40	-	-	1.702	21.25	b
	liquid	1180 (c)	27.43 (c)	23.24	-	7.50	-	-	-	1.020	31.35	b
Zr	gas	-	-	-	-	(4.97)	-	-	-	(-29.407)	(-9.81)	-
	solid, α	1135 (c)	0.920 (bb)	0.811	9.29 (cc)	6.83	1.12	-	-0.87	2.378	30.45	a
	solid, β	2125 (c)	(4.9)	(2.3)	-	7.27	-	-	-	1.159	31.43	a (to 1400°K)
	liquid	(3900)	(100)	(26)	-	(8.0)	-	-	-	(-2.190)	(34.7)	-

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Table II

THERMODYNAMIC PROPERTIES OF THE OXIDES

Oxide	Phase	Temperature of Transition (°K)	Heat of Transition kcal/mole	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
Ac ₂ O ₃	solid	(2250)	(20)	(8.9)	(36.5)	(20.0)	(20.4)	-	-	(6.870)	(80.9)	-
	liquid	-	-	-	-	(40)	-	-	-	(-19.767)	(180.5)	-
Ag ₂ O	solid	dec. 460 (a)	-	-	29.09 (b)	13.26	7.04	-	-	4.266	48.56	c
Ag ₂ O	solid	dec.	-	-	(20.4)	(16.4)	(12.2)	-	-	(5.432)	(76.7)	-
Al ₂ O ₃	solid	2300 (a)	26 (b)	11	12.186 (b)	26.12	4.388	-	-7.269	10.422	142.03	d
	liquid	dec. (a)	-	-	(33)	-	-	-	-	(-11.655)	(174.1)	-
Am ₂ O ₃	solid	(2225)	(17)	(7.6)	(37)	(20.0)	(15.6)	-	-	(6.657)	(81.6)	-
	liquid	(3400)	(85)	(25)	-	(38.5)	-	-	-	(-7.796)	(181.8)	-
AmO ₂	solid	dec. (a)	-	-	(20) (e)	(14.0)	(6.8)	-	-	(4.477)	(61.8)	-
As ₂ O ₃	solid, α	503 (c)	4.1 (c)	8.2	25.6 (b)	8.37	48.6	-	-	4.656	36.6	c
	solid, β	586 (b)	4.4 (b)	7.5	-	8.37	48.6	-	-	0.556	28.4	c
	liquid	730 (c)	7.15 (c)	9.79	-	(39)	-	-	-	(5.760)	(187.6)	-
	gas	-	-	-	-	(21.5)	-	-	-	(-14.164)	(62.5)	-
AsO ₂	solid	(1200)	(9.0)	(7.5)	(13)	(8.5)	(9.4)	-	-	(2.952)	(38.2)	-
	liquid	(dec.)	-	-	-	(21)	-	-	-	(2.184)	(108.0)	-
As ₂ O ₅	solid	dec. >1100 (a)	-	-	25.2 (b)	(31.1)	(16.4)	-	(-5.4)	(11.813)	(159.9)	-
Au ₂ O ₃	solid	dec.	-	-	30 (b)	(23.5)	(4.8)	-	-	(7.220)	(105.3)	-
B ₂ O ₃	solid	723 (b)	5.27 (b)	7.29	12.91 (b)	8.73	25.40	-	-1.31	4.171	45.04	f
	liquid	2520 (a)	(55)	(22)	-	30.50	-	-	-	7.822	161.59	f (to 1800°K)
Ba ₂ O	solid	(880)	(5.2)	(5.9)	(23.5)	(20.0)	(2.2)	-	-	(6.061)	(91.1)	-
	liquid	(1040)	(20)	(19)	-	(22)	-	-	-	(1.769)	(96.8)	-
	gas	-	-	-	-	(15)	-	-	-	(-25.51)	(29.0)	-
BaO	solid	2196 (a)	13.8 (c)	6.28	16.8 (b)	12.74	1.040	-	-1.984	4.510	57.2	g
	liquid	3000 (a)	(62)	(21)	-	(13.9)	-	-	-	(-9.341)	(57.5)	-
BaO ₂	solid	723 (h)	(5.7)	(7.9)	(18.5)	(13.6)	(2.0)	-	-	(4.144)	(59.6)	-
	liquid	dec. 1110 (a)	-	-	-	(21)	-	-	-	(3.241)	(99.0)	-
BeO	solid	dec. (a)	-	-	3.37 (b)	8.69	3.65	-	-3.13	3.803	48.99	c
BiO	solid	(1175)	(3.7)	(3.1)	(15)	(9.7)	(3.0)	-	-	(3.025)	(41.2)	-
	liquid	(1920)	(54)	(28)	-	(14)	-	-	-	(2.306)	(64.9)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-61.49)	(-1.8)	-
Bi ₂ O ₃	solid	1090 (b)	6.8 (b)	6.2	36.2 (b)	23.27	11.05	-	-	7.429	99.7	c
	liquid	(dec.)	-	-	-	(35.7)	-	-	-	(7.614)	(168.3)	-
CO	gas	-	-	-	47.30 (b)	6.60	1.2	-	-	2.021	-9.34	i
CO ₂	gas	-	-	-	51.06 (b)	7.70	5.3	-0.83	-	2.490	-5.64	-
CaO	solid	2860 (a)	(18) (c)	(6.3)	9.5 (b)	10.00	4.84	-	-1.08	3.559	49.5	c (to 1173°K)
CdO	solid	dec. (a)	-	-	13.1 (b)	9.65	2.08	-	-	2.970	42.5	c
Ce ₂ O ₃	solid	1960 (b)	(20)	(10)	(33.5)	(23.0)	(9.0)	-	-	(7.258)	(100.2)	-
	liquid	(3500)	(80)	(23)	-	(37)	-	-	-	(-2.591)	(178.5)	-
CeO ₂	solid	3000 (a)	(19)	(6.3)	17.7 (c)	15.0	2.5	-	-	4.579	68.5	c
CoO	solid	2078 (b)	(12)	(5.8)	10.5 (b)	(9.8)	(2.2)	-	-	(3.020)	(46.0)	-
	liquid	(2900)	(61)	(21)	-	(15.5)	-	-	-	(-1.886)	(79.2)	-
Co ₃ O ₄	solid	dec., 1240 (a)	-	-	(35.5)	(29.5)	(17.0)	-	-	(9.551)	(137.6)	-
Cr ₂ O ₃	solid	2538 (b)	(25)	(10)	19.4 (b)	28.53	2.20	-	-3.736	9.857	145.9	j (to 1800°K)
CrO ₂	solid	dec. 700 (a)	-	-	(11.5)	(16.1)	(3.0)	-	(-3.0)	(5.946)	(82.8)	-
CrO ₃	solid	460 (a)	(6.1)	(13)	(17.5)	(18.1)	(4.0)	-	(-2.0)	(6.245)	(87.9)	-
	liquid	(1000)	(25)	(25)	-	(27)	-	-	-	(3.381)	(127.0)	-
	gas	-	-	-	-	(20)	-	-	-	(-28.62)	(53.6)	-
Cs ₂ O	solid	763 (b)	(4.58) (k)	(6.0)	(23)	(16.5)	(5.4)	-	-	(5.160)	(72.6)	-
	liquid	dec.	-	-	-	(22)	-	-	-	(3.205)	(99.0)	-
Cs ₂ O ₂	solid	867 (c)	(5.5)	(6.3)	(40)	(21.4)	(11.4)	-	-	(6.887)	(85.3)	-
	liquid	dec.	-	-	-	(29.5)	-	-	-	(4.125)	(123.8)	-
Cs ₂ O ₃	solid	775 (c)	(7.75) (k)	(10)	(47)	(24.0)	(22.6)	-	-	(8.160)	(96.5)	-
	liquid	dec.	-	-	-	(35)	-	-	-	(2.148)	(142.2)	-
Cu ₂ O	solid	1503 (a)	13.4 (b)	8.92	22.44 (l)	(13.4)	(8.6)	-	-	(4.378)	(54.9)	-
	liquid	dec.	-	-	-	(21.5)	-	-	-	(3.721)	(96.0)	-
CuO	solid	1609 (a)	(8.9)	(5.5)	10.4 (b)	14.34	6.2	-	-	4.551	61.11	c
	liquid	dec.	-	-	-	(22)	-	-	-	(-4.339)	(98.91)	-
FeO	solid	1641 (b)	7.5 (b)	4.6	12.9 (b)	9.27	4.80	-	-	(2.977)	(43.8)	-
	liquid	(2700)	(55)	(20)	-	(14.5)	-	-	-	(-3.721)	(69.2)	j (to 1250°K)
Fe ₃ O ₄	solid, α	900 (m)	(0)	(0)	35.0 (b)	12.38	1.62	-	-0.38	3.826	58.3	j (to 1200°K)
	solid, β	dec.	-	-	-	(14.5)	-	-	-	(-2.399)	(66.7)	-
Fe ₂ O ₃	solid, α	950 (m)	0.16 (m)	0.17	21.5 (b)	21.88	48.20	-	-	8.666	104.0	m
	solid, β	1050 (m)	0 (m)	0	-	48.00	-	-	-	12.652	238.3	m (to 1800°K)
	solid, γ	dec.	-	-	-	23.49	18.6	-	-3.55	9.021	119.9	m
Ga ₂ O	solid	(925)	(8.5)	(9.2)	(22.5)	36.00	-	-	-	11.979	187.6	m
	liquid	(1000)	(20)	(20)	-	31.71	1.8	-	-	8.467	159.7	m (to 1750°K)
	gas	-	-	-	-	(13.8)	(8.6)	-	-	(4.497)	(58.7)	-
Ga ₂ O ₃	solid	2013 (b)	(22)	(11)	20.23 (n)	(21.5)	-	-	-	(-0.559)	(94.1)	-
	liquid	(2900)	(75)	(26)	-	(14)	-	-	-	(-28.06)	(22.3)	-
GeO	solid	983 (b)	(50)	(51)	(12.5)	11.77	25.2	-	-	(4.630)	(54.35)	j (to 923°K)
	gas	-	-	-	-	(35.5)	-	-	-	(-20.66)	(173.2)	-
GeO ₂	solid (α, β)	1389 (b)	10.5 (c)	7.56	(12.5) (c)	(10.4)	(2.6)	-	(-0.5)	(3.384)	(47.8)	-
	liquid	(2625)	(61)	(23)	-	(8.2)	(0.4)	-	(-0.2)	(-49.67)	(-20.2)	-
H ₂ O	liquid	373.16 (b)	9.770 (j)	26.18	16.716 (b)	11.2	7.17	-	-	(3.658)	(53.5)	j
	gas	-	-	-	-	(21.7)	-	-	-	(1.149)	(111.9)	-
HfO ₂	solid	3063 (a)	(17)	(5.6)	14.18 (o)	18.03	-	-	-	5.376	86.01	j
Hg ₂ O	solid	dec.	-	-	(30)	7.17	2.56	-	-0.08	-8.290	-3.56	j
HgO	solid	dec.	-	-	16.839 (q)	17.39	2.08	-	-3.48	6.445	87.48	p
						(15.6)	(28)	-	-	(4.776)	(59.7)	-
						(8.5)	(7.0)	-	-	(2.846)	(33.7)	-

Table II (Cont'd.)

Oxide	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
In ₂ O	solid	(600)	(4.5)	(7.5)	(28)	(14.7)	(7.8)	-	-	(4.730)	(58.1)	-
	liquid	(800)	(16)	(20)	-	(22)	-	-	-	(3.206)	(92.6)	-
InO	gas	-	-	-	-	(15)	-	-	-	(-18.39)	(25.8)	-
	solid	(1325)	(4.0)	(3.0)	(14.5)	(10.0)	(3.2)	-	-	(3.124)	(43.4)	-
In ₂ O ₃	liquid	(2000)	(60)	(30)	-	(14)	-	-	-	(1.615)	(64.9)	-
	gas	-	-	-	-	(9.0)	-	-	-	(-68.38)	(-3.1)	-
Ir ₂ O ₃	solid	(2000)	(20)	(10)	30.1 (r)	(22.6)	(6.0)	-	-	(7.005)	(100.5)	-
	liquid	(3600)	(85)	(24)	-	(35)	-	-	-	(-0.195)	(172.8)	-
IrO ₂	solid	(1450)	(10)	(6.8)	(26.5)	(21.8)	(14.4)	-	-	(7.140)	(102.0)	-
	liquid	(2250)	(50)	(22)	-	(35)	-	-	-	(0.706)	(170.3)	-
K ₂ O	gas	-	-	-	-	(20)	(10)	-	-	(-57.73)	(54.8)	-
	solid	dec. 1373 (a)	-	-	(15.9) (c)	9.17	15.20	-	-	3.410	40.9	j
K ₂ O ₂	solid	(980)	(6.8)	(6.9)	(23)	(15.9)	(6.4)	-	-	(5.025)	(69.5)	-
	liquid	dec.	-	-	-	(22)	-	-	-	(1.130)	(98.3)	-
K ₂ O ₃	solid	763 (b)	(7.0)	(9.2)	(27)	(20.8)	(5.4)	-	-	(6.442)	(93.1)	-
	liquid	(1800)	(45)	(25)	-	(29)	-	-	-	(4.127)	(134.2)	-
KO ₂	gas	-	-	-	-	(20)	-	-	-	(-57.07)	(41.7)	-
	solid	703 (b)	(6.1)	(8.7)	(33.5)	(19.1)	(23.2)	-	-	(6.750)	(82.2)	-
La ₂ O ₃	liquid	(975)	(25)	(26)	-	(35.5)	-	-	-	(6.447)	(164.7)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-31.29)	(37.3)	-
Li ₂ O	solid	653 (a)	(4.9)	(7.5)	27.9 (s)	(15.0)	(12.0)	-	-	(5.006)	(61.1)	-
	liquid	dec.	-	-	-	(24)	-	-	-	(3.424)	(105.5)	-
Li ₂ O ₂	solid	2590 (a)	(18)	(7)	(36.5)	28.86	3.076	-	-3.275	9.840	(130.7)	d
	liquid	2000 (a)	(14)	(7)	9.06 (t)	(11.4)	(5.4)	-	-	(3.639)	(57.5)	-
MgO	solid	2600 (a)	(56)	(22)	-	(21)	-	-	-	(-1.961)	(112.7)	-
	liquid	dec. 470 (a)	-	-	-	(17.0)	(5.4)	-	-	(5.309)	(82.0)	-
MgO ₂	solid	3075 (a)	18.5 (b)	5.8	6.4 (b)	10.86	1.197	-	-2.087	3.991	57.0	c
	liquid	dec. 361 (a)	-	-	-	(12.1)	(2.4)	-	-	(3.714)	(49.2)	-
MnO	solid	2058 (a)	13.0 (c)	6.32	14.27 (u)	11.11	1.94	-	-0.88	3.689	50.10	j
	liquid	dec.	-	-	-	(13.5)	-	-	-	(-8.543)	(58.02)	-
Mn ₂ O ₃	solid, α	1445 (j)	4.97 (j)	3.44	35.5 (b)	34.64	10.82	-	-2.20	11.312	166.3	j
	solid, β	1863 (a)	(33)	(18)	-	50.20	-	-	-	17.376	260.4	j (to 1800°K)
Mn ₂ O ₄	liquid	(2900)	(75)	(26)	-	(49)	-	-	-	(-17.86)	(233.4)	-
	solid	dec. 1620 (a)	-	-	26.4 (v)	24.73	8.38	-	-3.23	8.829	118.8	w (to 1350°K)
MnO ₂	solid	dec. 1120 (a)	-	-	12.7 (b)	16.60	2.44	-	-3.88	6.359	84.8	-
	liquid	(2200)	(16)	(7.3)	(14.5)	(16.2)	(3.0)	-	(-3.0)	(5.973)	(80.4)	-
MoO ₂	solid	dec. 2250 (a)	-	-	-	(23)	-	-	-	(-2.463)	(118.4)	-
	liquid	1068 (b)	12.54 (x)	11.74	18.68 (b)	13.6	13.5	-	-	4.655	62.83	j
MoO ₃	solid	1530 (a)	33 (b)	22	-	(28.4)	-	-	-	(0.222)	(139.88)	-
	liquid	-	-	-	-	(18.1)	-	-	-	(-48.54)	(42.8)	-
Na ₂ O	gas	-	-	-	52.58 (b)	10.92	2.06	-	-2.04	4.032	11.40	j (to 2000°K)
	solid	1193 (c)	(7.1) (k)	(6.0)	17.4 (b)	15.70	5.40	-	-	4.921	73.7	j (to 1100°K)
Na ₂ O ₂	liquid	dec. (a)	-	-	-	(22)	-	-	-	(1.494)	(105.9)	-
	solid	dec. 919 (a)	-	-	22.6 (s)	(20.2)	(3.8)	-	-	(6.192)	(93.6)	-
NaO ₂	solid	(825)	(6.2)	(7.5)	27.7 (s)	(16.2)	(3.6)	-	-	(4.990)	(65.7)	-
	liquid	(1300)	(28)	(22)	-	(23)	-	-	-	(3.175)	(100.9)	-
NbO	gas	-	-	-	-	(15)	-	-	-	(-35.22)	(22.0)	-
	solid	(2650)	(16)	(6.0)	(12) (c)	(9.6)	(4.4)	-	-	(3.058)	(44.0)	-
NbO ₂	solid	(2275)	(16)	(7.0)	(12.7) (c)	(17.1)	(1.6)	-	(-2.8)	(6.109)	(84.6)	-
	liquid	(3800)	(85)	(22)	-	(24)	-	-	-	(1.033)	(127.2)	-
Nb ₂ O ₅	solid	1733 (b)	(28)	(16)	32.8 (v)	21.88	28.2	-	-	7.776	100.3	j (to 733°K)
	liquid	(3200)	(80)	(25)	-	(44.2)	-	-	-	(-24.09)	(201.6)	-
Nd ₂ O ₃	solid	2545 (y)	(22)	(8.8)	(35.3)	28.99	5.760	-	(-4.159)	10.295	(133.9)	d (to 1100°K)
	liquid	2230 (a)	(12.1) (c)	(5.43)	9.22 (b)	13.69	0.83	-	-2.915	5.097	70.67	c (to 1400°K)
NiO	solid	dec. (a)	-	-	-	(14.3)	-	-	-	(-7.861)	(67.91)	-
	liquid	(2600)	(15)	(5.7)	19.19	(17.7)	(3.2)	-	(-2.6)	(6.292)	(84.08)	-
NpO ₂	solid	dec. 800-900°K (a)	-	-	(43)	(32.4)	(12.6)	-	-	(10.22)	(145.4)	-
	liquid	dec. 923 (a)	-	-	(14.5)	(11.5)	(6.0)	-	-	(3.696)	(52.8)	-
OsO ₄	solid	313.3 (b)	3.41 (b)	10.9	34.7 (b)	(16.4)	(23.1)	-	(-2.4)	(6.726)	(67.0)	-
	liquid	403 (b)	9.45 (c)	23.4	-	(33)	-	-	-	(6.612)	(143.0)	-
P ₂ O ₃	gas	-	-	-	-	16.46	8.60	-	-4.6	(-7.644)	(25.3)	j (to 1000°K)
	liquid	448.5 (b)	4.5 (b)	10	(34)	(34.5)	-	-	-	(10.287)	(162.6)	-
PO ₂	solid	(350)	(2.7)	(7.7)	(11.5)	(11.3)	(5.0)	-	-	(-1.953)	(38.0)	-
	liquid	(dec)	-	-	-	(20)	-	-	-	(3.591)	(54.4)	-
P ₂ O ₅	solid	631 (a)	8.8 (b)	13.9	33.5 (c)	8.375	5.40	-	-	(3.640)	(95.9)	-
	gas	-	-	-	-	36.80	-	-	-	4.897	30.3	j
PaO ₂	solid	(2560)	(20)	(7.8)	(17.8) (aa)	(14.4)	(2.6)	-	-	3.284	165.6	j (to 1400°K)
	liquid	(2050)	(26)	(13)	(37.5)	(28.4)	(11.4)	-	-	(4.409)	(65.0)	-
Pa ₂ O ₅	solid	(3350)	(95)	(28)	-	(48)	-	-	-	(8.975)	(127.7)	-
	liquid	762 (b)	(0.4) (c)	(0.5)	16.2 (b)	10.60	4.00	-	-	(-0.800)	(241.1)	-
PbO	solid, red	1159 (b)	2.8 (b)	2.4	-	9.05	6.40	-	-	3.338	45.4	j
	solid, yellow	1745 (b)	51 (b)	29	-	(14.6)	-	-	-	2.454	36.4	j (to 1000°K)
Pb ₂ O ₃	liquid	-	-	-	-	(8.1)	(0.4)	-	-	1.788	65.7	-
	gas	-	-	-	-	(31.1)	(17.6)	-	-	(-59.94)	(-11.0)	-
Pb ₃ O ₄	solid	dec. (a)	-	-	50.5 (b)	(12.7)	7.80	-	-	(10.055)	(132.0)	-
	liquid	dec. (a)	-	-	18.3 (b)	12.7	-	-	-	4.133	56.4	j (to 1000°K)
PdO	solid	dec. 1150 (a)	-	-	(9.1) (c)	3.30	14.2	-	-	1.615	(13.9)	c (to 823°K)
	liquid	(825)	(5.5)	(6.7)	(17)	(14.3)	(5.6)	-	-	(4.513)	(66.1)	-
PoO ₂	solid	(dec.)	-	-	-	(22)	-	-	-	(3.460)	(106.5)	-
	liquid	-	-	-	-	-	-	-	-	-	-	-

Table II (Cont'd.)

Oxide	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
Pr ₂ O ₃	solid	(2200)	(22)	(10)	(35.5)	(29.0)	(4.0)	-	(-4.0)	(10.166)	(133.2)	-
	liquid	(4000)	(90)	(23)	-	(36)	-	-	-	(-6.298)	(168.3)	-
PrO ₂	solid	dec. 700 (a)	-	-	(17)	(17.6)	(3.4)	-	(-2.8)	(6.338)	(85.9)	-
PtO	solid	dec. 780 (a)	-	-	(13.5)	(9.0)	(6.4)	-	-	(2.968)	(39.7)	-
Pt ₂ O ₄	solid	(dec.)	-	-	(41)	(30.8)	(17.4)	-	-	(9.957)	(139.7)	-
PtO ₂	solid	723 (h)	(4.6)	(6.4)	(16.5)	(11.1)	(9.6)	-	-	(3.736)	(49.6)	-
	liquid	dec. 750 (a)	-	-	-	(21)	-	-	-	(3.785)	(101.5)	-
PuO	solid	(1290)	(7.2)	(5.6)	(20)	(12.0)	(2.4)	-	-	(3.685)	(49.1)	-
	liquid	(2325)	(47)	(20)	-	(14.5)	-	-	-	(-2.287)	(58.3)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-62.307)	(-5.3)	-
Pu ₂ O ₃	solid	(1880)	(16)	(8.5)	(38)	(21.2)	(18.2)	-	-	(7.130)	(88.2)	-
	liquid	(3250)	(75)	(23)	-	(40)	-	-	-	(-5.691)	(187.2)	-
PuO ₂	solid	(2400)	(15)	(6.2)	(19.7) (aa)	(17.1)	(3.4)	-	(-2.6)	(6.122)	(80.2)	-
	liquid	(3500)	(90)	(26)	-	(20.5)	-	-	-	(-10.62)	(92.2)	-
RaO	solid	(>2500)	-	-	(17)	(10.5)	(2.0)	-	-	(3.220)	(43.4)	-
Rb ₂ O	solid	(910)	(5.7)	(6.3)	(27)	(15.4)	(5.8)	-	-	(4.850)	(62.5)	-
	liquid	dec. (a)	-	-	-	(22)	-	-	-	(2.754)	(95.9)	-
Rb ₂ O ₂	solid	843 (c)	(7.3)	(8.7)	(27.5)	(20.9)	(8.0)	-	-	(6.587)	(94.0)	-
	liquid	(dec.)	-	-	-	(29)	-	-	-	(3.273)	(133.2)	-
Rb ₂ O ₃	solid	762 (a)	(7.6) (k)	(10)	(32.5)	(20.5)	(13.0)	-	-	(6.690)	(88.2)	-
	liquid	dec. (a)	-	-	-	(34)	-	-	-	(5.603)	(157.8)	-
RbO ₂	solid	685 (a)	(4.1) (k)	(6.0)	(21.5)	(13.8)	(6.4)	-	-	(4.399)	(59.0)	-
	liquid	dec. (a)	-	-	-	(21)	-	-	-	(3.720)	(95.7)	-
ReO ₂	solid	(1475)	(12)	(8.1)	(15)	(10.8)	(9.8)	-	-	(3.656)	(49.5)	-
	liquid	(3250)	(80)	(25)	-	(24.5)	-	-	-	(1.204)	(127.0)	-
ReO ₃	solid	433 (k)	5.2 (k)	12	19.8 (bb)	(18.0)	(5.8)	-	-	(5.625)	(84.5)	-
	liquid	dec. (a)	-	-	-	29	-	-	-	(4.644)	(136.8)	-
Re ₂ O ₇	solid	569 (b)	15.8 (cc)	27.8	44 (bb)	(41.8)	(14.8)	-	(-3.0)	(14.127)	(200.3)	-
	liquid	635.5 (b)	17.7 (cc)	27.9	-	(65.7)	-	-	-	(9.203)	(314.7)	-
	gas	-	-	-	-	(38.2)	-	-	-	(-25.97)	(109.3)	-
ReO ₄	solid	420 (k)	(4.2)	(10)	(34.5)	(21.4)	(10.8)	-	(-2.0)	(7.531)	(91.8)	-
	liquid	(460)	(9.3)	(20)	-	(33)	-	-	-	(6.775)	(146.7)	-
	gas	-	-	-	-	(16.5)	(8.6)	-	(-5.0)	(-8.118)	(30.6)	-
Rh ₂ O	solid	dec. 1400 (a)	-	-	(25.5)	15.59	6.47	-	-	4.936	(65.3)	j (to 1273°K)
RhO	solid	dec. 1394 (a)	-	-	(12)	(9.84)	(5.53)	-	-	(3.179)	(45.7)	j (to 1273°K)
Rh ₂ O ₃	solid	dec. 1388 (a)	-	-	(23)	20.73	13.80	-	-	6.794	(99.2)	j (to 1273°K)
RuO ₂	solid	dec. 1400 (a)	-	-	(12.5)	(11.4)	(6.0)	-	-	3.666	(54.2)	-
RuO ₄	solid	300 (a)	(3.2)	(11)	(32.5)	(20)	-	-	-	(5.963)	(81.5)	-
	liquid	dec.	-	-	-	(33)	-	-	-	(6.663)	(144.9)	-
SO ₂	gas	-	-	-	59.40 (b)	11.4	1.414	-	-2.045	4.148	7.12	i
Sb ₂ O ₃	solid	928 (b)	14.74 (b)	15.88	29.4 (c)	19.10	17.1	-	-	6.455	84.5	c
	liquid	1698 (a)	8.92 (b)	5.25	-	(36)	-	-	-	(0.035)	(168.2)	-
	gas	-	-	-	-	(20.8)	-	-	-	(-34.70)	(49.9)	-
SbO ₂	solid	dec. (a)	-	-	15.2 (c)	11.30	8.1	-	-	3.725	51.6	c (to 1198°K)
Sb ₂ O ₅	solid	dec. (a)	-	-	29.9 (b)	(22.4)	(23.6)	-	-	(7.728)	(104.8)	-
Sc ₂ O ₃	solid	(2500)	(23)	(9.3)	24.8 (c)	23.17	5.64	-	-	7.159	108.9	c
SeO	solid	(1375)	(7.6)	(5.5)	(11)	(9.1)	(3.8)	-	-	(2.882)	(42.0)	-
	liquid	(2075)	(45)	(22)	-	(15.5)	-	-	-	(0.490)	(77.5)	-
	gas	-	-	-	-	8.20	0.50	-	-0.80	(-58.54)	(0.7)	j
SeO ₂	solid	603 (c)	(24.5) (c)	(40.6)	(15)	(12.8)	(6.1)	-	(-0.2)	(4.150)	(59.9)	-
	gas	-	-	-	-	(14.5)	-	-	-	(-20.45)	(26.4)	-
SiO	solid	(2550)	(12)	(4.7)	(6.5)	(7.3)	(2.4)	-	-	(2.283)	(35.8)	-
SiO ₂	solid,β	856 (b)	0.15 (b)	0.18	10.06 (c)	11.22	8.20	-	-2.70	4.615	57.83	j
	solid,α	1883 (b)	2.04 (b)	1.08	-	14.41	1.94	-	-	4.602	73.67	j
	liquid	dec. 2250 (a)	-	-	-	(20)	-	-	-	(9.649)	(111.08)	-
Sm ₂ O ₃	solid	(2150)	(20)	(9.3)	(36.5)	(25.9)	(7.0)	-	-	(8.033)	(113.2)	-
	liquid	(3800)	(80)	(21)	-	(36)	-	-	-	(-6.431)	(166.3)	-
SnO	solid	(1315)	(6.4)	(4.9)	13.5 (b)	9.40	3.62	-	-	2.964	41.1	c (to 1273°K)
	liquid	(1800) (a)	(60)	(33)	-	(14.5)	-	-	-	(0.141)	(68.1)	-
	gas	-	-	-	-	(9.0)	-	-	-	(-69.76)	(-6.4)	-
SnO ₂	solid	1898 (k)	(11.39) (k)	(5.95)	12.5 (b)	17.66	2.40	-	-5.16	7.103	91.7	j (to 1500°K)
	liquid	(3200)	(75)	(23)	-	(22.5)	-	-	-	(0.304)	(117.7)	-
SrO	solid	2703 (c)	16.7 (c)	6.2	13.0 (b)	12.34	1.120	-	-1.806	4.335	58.7	dd (to 1126.5°K)
SrO ₂	solid	dec. 488 (a)	-	-	(14.8)	(16.8)	(2.2)	-	(-3.0)	(6.113)	(83.3)	-
Ta ₂ O ₅	solid	2150 (a)	(16)	(7.4)	34.2 (b)	29.2	10.0	-	-	9.151	135.2	c
	liquid	-	-	-	-	(46)	-	-	-	(6.158)	(235.1)	-
TcO ₂	solid	(2400)	(18)	(7.5)	(13.5)	(10.4)	(9.2)	-	-	(3.510)	(48.6)	-
	liquid	(4000)	(105)	(26)	-	(25)	-	-	-	(-5.946)	(132.7)	-
TcO ₃	solid	(dec. <1200)	-	-	(19.5)	(19.4)	(5.2)	-	(-2.0)	(6.686)	(93.7)	-
Tc ₂ O ₇	solid	392.7 (ee)	(11)	(28)	(42.5)	(39.1)	(18.6)	-	(-2.4)	(13.29)	(187.2)	-
	liquid	583.8 (ee)	(14)	(24)	-	(64)	-	-	-	(10.02)	(299.8)	-
	gas	-	-	-	-	(25)	(28)	-	-	(-21.98)	(43.8)	-
TeO	solid	(1020)	(7.1)	(7.0)	(13)	(8.6)	(6.2)	-	-	(2.840)	(37.8)	-
	liquid	(1775)	(50)	(28)	-	(15.5)	-	-	-	(-0.448)	(72.3)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-62.16)	(-5.2)	-
TeO ₂	solid	1006 (c)	3.2 (ff)	3.2	16.99 (b)	13.85	6.87	-	-	4.435	63.97	c
	liquid	dec.	-	-	-	(20)	-	-	-	(3.940)	(96.4)	-
ThO	solid	(2150)	(13)	(6.0)	(16)	(11.0)	(2.4)	-	-	(3.386)	(47.4)	-
	liquid	(3250)	(65)	(20)	-	(15)	-	-	-	(-6.561)	(66.9)	-
ThO ₂	solid	3225 (a)	(18)	(5.6)	15.59 (aa)	16.45	2.346	-	-2.124	5.721	80.03	c (to 1970°K)
TiO	solid,α	1264 (b)	0.82 (b)	0.65	8.31 (b)	10.57	3.60	-	-1.86	3.935	54.03	j
	solid,β	dec. 2010 (a)	-	-	-	11.85	3.00	-	-	4.108	61.71	j (to 1800°K)

Table II (Cont'd.)

Oxide	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
Ti ₂ O ₃	solid, α	473 (b)	0.215 (j)	0.455	18.83 (b)	7.31	53.52	-	-	4.559	38.78	j
	solid, β	2400 (a)	(24)	(10)	-	34.68	1.30	-	-10.20	13.605	184.48	j (to 1800°K)
	liquid	3300 (a)	-	-	-	(37.5)	-	-	-	(-7.796)	(193.2)	-
Ti ₃ O ₅	solid, α	450 (b)	2.24 (j)	4.98	30.92 (b)	35.47	29.50	-	-	11.887	179.98	j
	solid, β	(2450)	(50)	(20)	-	41.60	8.00	-	-	10.230	202.80	j
	liquid	(3600)	(85)	(24)	-	(60)	-	-	-	(-18.701)	(306.4)	-
TiO ₂	solid	2128 (a)	(16)	(7.5)	12.01 (b)	17.97	0.28	-	-4.35	6.829	92.92	j (to 1800°K)
	liquid	dec. 3200 (a)	-	-	-	(21.4)	-	-	-	(-2.610)	(111.08)	-
Ti ₂ O	solid	573 (b)	(5.0)	(8.7)	23.8 (b)	(15.8)	(6.0)	-	(-0.3)	(5.078)	(68.2)	-
	liquid	773 (b)	(17)	(22)	-	(22.1)	-	-	-	(2.651)	(96.0)	-
	gas	-	-	-	-	(13.7)	-	-	-	(-20.94)	(18.0)	-
Ti ₂ O ₃	solid	990 (b)	(12.4) (k)	(13)	(33.5)	(23.0)	(5.0)	-	-	(7.080)	(99.0)	-
	liquid	(dec)	-	-	-	(35.5)	-	-	-	(4.604)	(167.8)	-
UO	solid	(2750)	(14)	(5.1)	(16)	(10.6)	(2.0)	-	-	(3.249)	(45.0)	-
UO ₂	solid	3000 (a)	-	-	18.63 (gg)	19.20	1.62	-	-3.957	7.124	93.37	hh (to 1500°K)
U ₂ O ₅	solid	dec.	-	-	(66) (ii)	(65)	(7.5)	-	(-10.9)	(23.37)	(312.7)	-
UO ₃	solid	dec. 925 (a)	-	-	23.57 (gg)	22.09	2.54	-	-2.973	7.696	104.72	hh (to 900°K)
VO	solid	(2350)	(15)	(6.4)	9.3 (u)	11.32	1.61	-	-1.26	3.869	56.4	w (to 1700°K)
V ₂ O ₅	liquid	(3400)	(70)	(21)	-	(14.5)	-	-	-	(-8.157)	(70.9)	-
	solid	2240 (a)	(24)	(11)	23.58 (b)	29.35	4.76	-	-5.42	10.780	148.12	j (to 1800°K)
V ₂ O ₅	liquid	dec. 3300 (a)	-	-	-	(38)	-	-	-	(-6.028)	(193.4)	-
	solid	(2100)	(42)	(20)	(32)	(36)	(30)	-	-	(12.07)	(182.1)	-
VO ₂	liquid	(dec.)	-	-	-	(55.6)	-	-	-	(-54.72)	(249.1)	-
	solid, α	345 (b)	1.02 (b)	2.96	12.32 (b)	14.96	-	-	-	4.460	72.92	j
V ₂ O ₅	solid, β	1818 (a)	13.60 (b)	7.48	-	17.85	1.70	-	-3.94	5.680	89.09	j
	liquid	dec. 3300 (a)	-	-	-	25.50	-	-	-	2.962	135.87	j (to 1800°K)
	solid	943 (b)	15.56 (b)	16.50	313 (b)	46.54	-3.90	-	-13.22	18.136	240.2	j
WO ₂	liquid	(2325)	(63)	(27)	-	45.60	-	-	-	2.122	220.1	j (to 1500°K)
	gas	-	-	-	-	(40)	-	-	-	(-73.90)	(149.6)	-
WO ₃	solid	(1543) (c)	(11.5) (c)	(7.45)	(15)	(17.6)	(4.2)	-	(-4.0)	(6.772)	(88.8)	-
	liquid	dec. 2125 (a)	-	-	-	(24)	-	-	-	(-0.112)	(121.8)	-
WO ₃	solid	1743 (c)	(17)	(9.8)	19.90 (b)	17.33	7.74	-	-	5.511	81.15	c
	liquid	(2100)	(43)	(20)	-	(30)	-	-	-	(-1.162)	(152.5)	-
	gas	-	-	-	-	(18)	-	-	-	(-69.36)	(40.2)	-
Y ₂ O ₃	solid	(2500)	(25)	(10)	(29.5) (c)	(26.0)	(8.2)	-	(-2.2)	(8.846)	(122.3)	-
ZnO	solid	dec. (a)	-	-	10.4 (c)	11.71	1.22	-	-2.18	4.277	57.88	j (to 1600°K)
ZrO ₂	solid, α	1478 (jj)	1.420 (jj)	0.961	12.03 (b)	16.64	1.80	-	-3.36	6.168	85.21	jj
	solid, β	2950 (b)	20.8 (b)	7.0	-	17.80	-	-	-	4.270	89.96	jj

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Table III
THERMODYNAMIC PROPERTIES OF THE FLUORIDES

Fluoride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
AcF ₃	solid	(1600) (a)	(8.0) (a)	(5.0)	(26) (a)	(21.4)	(6.2)	-	-	(6.656)	(97.8)	-
	liquid	(2550) (a)	-	(24)	-	(31.5)	-	-	-	(6.877)	(157.4)	-
AgF	solid	708 (b)	(3.5)	(4.9)	20 (b)	(11.2)	(3.6)	-	-	(3.499)	(44.9)	-
	liquid	1420 (a)	-	(34)	-	(15.5)	-	-	-	(2.141)	(65.6)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-41.23)	(-6.3)	-
AgF ₂	solid	(970)	(4.4)	(4.5)	(22.5)	(15.4)	(5.4)	-	-	(4.832)	(66.9)	-
	liquid	(1500)	(36)	(24)	-	(21.5)	-	-	-	(3.808)	(100.1)	-
	gas	-	-	-	-	(15)	-	-	-	(-41.94)	(28.6)	-
AlF	solid	(1100) (a)	(5.2)	(4.7)	(15)	(10.5)	(3.2)	-	-	(3.273)	(45.8)	-
	liquid	(1675)	(37)	(22)	-	(15.5)	-	-	-	(1.637)	(72.6)	-
	gas	-	-	-	-	8.9	-	-	-1.45	(-46.33)	(1.5)	c (to 2000° K)
AlF ₃	solid	1545 (a)	76 (a)	49	23.8 (a)	18.58	5.60	-	-1.79	6.389	84.7	c
	gas	-	-	-	-	(17.5)	(3.0)	-	-	(-74.50)	(23.6)	-
AmF ₃	solid	(1700) (d)	(13) (d)	(7.6)	(29)	(21.7)	(6.2)	-	-	(6.746)	(96.5)	-
	liquid	(2340)	(66)	(28)	-	(32.5)	-	-	-	(3.147)	(158.6)	-
	gas	-	-	-	-	(20)	-	-	-	(-92.10)	(33.5)	-
AsF ₃	liquid	336 (c)	8.6 (c)	26	50.1 (c)	30.2	-	-	-	9.004	122.0	c
	gas	-	-	-	-	18.18	1.66	-	-2.66	-2.748	28.2	e
AsF ₅	gas	-	-	-	(74)	(19.5)	(11.0)	-	-	(6.303)	(40.4)	-
AuF	solid	(850)	(2.9)	(3.5)	(21.5)	(11.0)	(3.4)	-	-	(3.431)	(42.2)	-
	liquid	(1475)	(34)	(23)	-	(15.5)	-	-	-	(3.128)	(66.2)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-40.61)	(-5.0)	-
AuF ₂	solid	(940)	(3.5)	(3.7)	(25)	(16.2)	(4.6)	-	-	(5.035)	(68.7)	-
	liquid	(1525)	(38)	(25)	-	(21.5)	-	-	-	(4.485)	(96.9)	-
	gas	-	-	-	-	(15)	-	-	-	(-43.43)	(24.3)	-
AuF ₃	solid	(1000) (a)	(8.4)	(8.4)	(30.5)	(22.2)	(6.6)	-	-	(6.912)	(98.0)	-
	liquid	(1470)	(33)	(22)	-	(30.5)	-	-	-	(3.512)	(140.3)	-
	gas	-	-	-	-	(20)	-	-	-	(-44.92)	(41.3)	-
BF ₃	gas	-	-	-	60.70 (b)	14.07	4.35	-	-2.95	5.378	22.44	c (to 1000° K)
BaF ₂	solid	1593 (b)	3.0 (b)	1.9	23.0 (b)	13.98	10.20	-	-	4.622	59.7	e (to 1300° K)
	liquid	(2473) (c)	(66)	(27)	-	(24)	-	-	-	(4.642)	(115.4)	-
	gas	-	-	-	-	(14.8)	-	-	-	(-84.11)	(16.9)	-
BeF ₂	solid	1070 (a)	(7.0)	(6.5)	(9.0)	(10.3)	(4.2)	-	-	(3.258)	(50.9)	-
	liquid	(1600) (a)	(40) (a)	(25)	-	(19)	-	-	-	(3.262)	(100.5)	-
	gas	-	-	-	-	(15)	-	-	-	(-43.14)	(46.1)	-
BiF	solid	(650)	(2.6)	(4.0)	(21)	(10.4)	(3.6)	-	-	(3.261)	(39.3)	-
	liquid	(1075)	(23)	(21)	-	(15.5)	-	-	-	(3.216)	(66.0)	-
	gas	-	-	-	-	(9)	-	-	-	(-26.77)	(-0.8)	-
BiF ₂	solid	(1075)	(2.1)	(2.0)	(25)	(15.9)	(6.2)	-	-	(5.016)	(67.4)	-
	liquid	(1650)	(42)	(25.5)	-	(21)	-	-	-	(4.816)	(94.4)	-
	gas	-	-	-	-	(15)	-	-	-	(-47.08)	(24.5)	-
BiF ₃	solid	1000 (b)	(6.2)	(6.2)	(32.5)	(21.6)	(13.6)	-	-	(7.045)	(94.6)	-
	liquid	(1300)	(28)	(21.5)	-	(31)	-	-	-	(3.445)	(139.8)	-
	gas	-	-	-	-	(20)	-	-	-	(-38.85)	(39.3)	-
BiF ₄	solid	(560)	(6.9)	(12)	(44) (a)	(25.2)	(10.4)	-	-	(7.976)	(102.7)	-
	liquid	(750)	(16)	(21)	-	(36.5)	-	-	-	(5.773)	(156.1)	-
	gas	-	-	-	-	(20)	-	-	-	(-21.20)	(29.2)	-
CF ₄	gas	-	-	-	62.7 (b)	16.64	7.84	-	-4.00	6.651	36.7	e (to 1200° K)
CaF ₂	solid, α	1424 (b)	1.14 (b)	0.801	16.46 (b)	14.30	7.28	-	0.47	4.430	66.92	e
	solid, β	1691 (b)	7.1 (b)	4.2	-	25.81	2.50	-	-	14.867	142.89	e
	liquid	2780 (a)	74 (a)	26.6	-	23.90	-	-	-	0.962	120.27	e (to 1800° K)
CdF ₂	solid	1383 (b)	5.4 (b)	3.9	22 (a)	(14.5)	(7.2)	-	-	(4.643)	(62.8)	-
	liquid	2020 (b)	53.8 (c)	26.6	-	(23)	-	-	-	(4.113)	(110.4)	-
	gas	-	-	-	-	(14.8)	-	-	-	(-66.25)	(21.4)	-
CeF ₃	solid	1733 (a)	(9.0) (a)	(5.2)	(27.5)	(20.3)	(7.8)	-	-	(6.399)	(90.5)	-
	liquid	(2600) (a)	(62) (a)	(24)	-	(32)	-	-	-	(5.962)	(159.0)	-
CeF ₄	solid	(1250) (a)	(11)	(8.8)	(37) (a)	(25.0)	(9.0)	-	-	(7.854)	(108.1)	-
	liquid	(2000)	(48)	(24)	-	(38)	-	-	-	(6.073)	(180.8)	-
	gas	-	-	-	-	(20)	-	-	-	(-67.93)	(29.9)	-
CoF ₂	solid	1475 (a)	(7.2)	(4.9)	19.59 (f)	(13.4)	(10.2)	-	-	(4.449)	(59.8)	-
	liquid	(2050)	(48) (a)	(23)	-	(24)	-	-	-	(1.788)	(117.2)	-
	gas	-	-	-	-	(15)	-	-	-	(-64.66)	(25.1)	-
CoF ₃	solid	(1230)	(12)	(9.8)	27 (a)	(17.2)	(13.0)	-	-	(5.706)	(74.9)	-
	liquid	(1600) (a)	(40) (a)	(25)	-	(30.5)	-	-	-	(0.231)	(143.8)	-
	gas	-	-	-	-	(20)	-	-	-	(-56.57)	(41.4)	-
CrF ₂	solid	1375 (a)	(6.4)	(4.7)	(20) (a)	(12.8)	(9.8)	-	-	(4.252)	(55.9)	-
	liquid	(2400) (a)	(60) (a)	(25)	-	(24)	-	-	-	(3.989)	(118.7)	-
	gas	-	-	-	-	(15)	-	-	-	(-77.61)	(23.6)	-
CrF ₃	solid	1373 (a)	(10)	(7.3)	25 (a)	(18.0)	(10.0)	-	-	(5.811)	(80.5)	-
	liquid	(1700) (a)	(48) (a)	(28)	-	(34)	-	-	-	(8.353)	(174.7)	-
	gas	-	-	-	-	(20)	-	-	-	(-63.45)	(42.4)	-
CrF ₄	solid	(640)	(22)	(34)	(34.5)	(24.0)	(4.8)	-	-	(7.369)	(103.6)	-
	gas	-	-	-	-	(20)	-	-	-	(-17.15)	(43.8)	-
CrF ₅	solid	(375) (a)	(4.6)	(12)	(50) (a)	(27.0)	(17.8)	-	-	(8.841)	(109.1)	-
	liquid	(390) (a)	(8.5) (a)	(22)	-	(43)	-	-	-	(8.989)	(185.3)	-
	gas	-	-	-	-	(20)	-	-	-	(-7.721)	(30.2)	-
CsF	solid	955 (b)	2.45 (b)	2.57	19.8 (c)	(11.3)	(2.71)	-	-	(3.490)	(45.4)	e
	liquid	1524 (a)	34.332 (a)	22.5	-	(16.5)	-	-	-	(4.765)	(75.9)	e
	gas	-	-	-	-	(8.9)	-	-	-	(-41.15)	(-2.3)	-
CuF	solid	(1020)	(4.5)	(4.4)	(17.5)	(9.5)	(4.8)	-	-	(3.046)	(38.1)	-
	liquid	(1660)	(36)	(22)	-	(15.5)	-	-	-	(2.169)	(70.4)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-44.79)	(-0.2)	-

Table III (Con'd.)

Fluoride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
CuF ₂	solid	(1200) (a)	(6.0) (a)	(5.0)	(22) (a)	(14.2	(7.4)	-	-	(4.563)	(61.1)	-
	liquid	(2000)	(50)	(25)	-	(23.5)	-	-	-	(4.395)	(113.2)	-
	gas	-	-	-	-	(15)	-	-	-	(-62.605)	(23.6)	-
FeF ₂	solid	1375 (a)	(8.0) (a)	(5.8)	20.79 (f)	(14.2)	(7.0)	-	-	(4.545)	(62.2)	-
	liquid	(2100) (a)	(50) (a)	(24)	-	(25.5)	-	-	-	(5.465)	(128.4)	-
	gas	-	-	-	-	(15)	-	-	-	(-66.585)	(24.3)	-
FeF ₃	solid	1300 (a)	(12) (a)	(9.2)	(25) (a)	(18.0)	(11.0)	-	-	(5.856)	(80.8)	-
	liquid	(1600) (a)	(40) (a)	(25)	-	(31)	-	-	-	(1.561)	(150.5)	-
	gas	-	-	-	-	(20)	-	-	-	(-56.04)	(44.4)	-
GaF	solid	(660)	(3.4)	(5.2)	(17) (a)	(11.0)	(4.2)	-	-	(3.466)	(46.9)	-
	liquid	(1100)	(25)	(23)	-	(15.5)	-	-	-	(2.121)	(68.2)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-30.14)	(-0.8)	-
GaF ₂	solid	(1080)	(2.9)	(2.7)	(20)	(14.0)	(7.2)	-	-	(4.494)	(61.9)	-
	liquid	(1450)	(37)	(25.5)	-	(20)	-	-	-	(3.875)	(93.3)	-
	gas	-	-	-	-	(15)	-	-	-	(-40.375)	(31.4)	-
GaF ₃	solid	1225 (a)	(45)	(37)	(28)	(18.8)	(10.4)	-	-	(6.068)	(82.2)	-
	liquid	-	-	-	-	(20)	-	-	-	(-45.27)	(41.2)	-
	gas	-	-	-	-	(15.0)	(5.4)	-	-	(4.712)	(66.1)	-
GeF ₂	solid	(1150)	(5.2)	(4.5)	(21)	(15.0)	(5.4)	-	-	(3.991)	(104.6)	-
	liquid	(1825)	(43)	(24)	-	(22)	-	-	-	(-52.68)	(28.5)	-
	gas	-	-	-	-	(15)	-	-	-	(7.364)	(54.9)	-
GeF ₄	gas	-	-	-	72.51 (g)	(22)	(3.0)	-	(-2.0)	-	-	-
HF	gas	-	-	-	41.526 (h)	6.43	0.82	-	0.26	1.866	-4.89	e (to 2000°K)
HfF ₂	solid	(1650)	(5.0)	(3.0)	(22.5)	(15.1)	(7.2)	-	-	(4.822)	(65.7)	-
	liquid	(2300)	(55)	(24)	-	(23.5)	-	-	-	(3.881)	(113.0)	-
	gas	-	-	-	-	(15)	-	-	-	(-70.67)	(23.3)	-
HfF ₃	solid	(1600)	(13)	(8.1)	(28.5)	(19.5)	(12.0)	-	-	(6.347)	(86.2)	-
	liquid	(2400)	(58)	(24)	-	(33)	-	-	-	(-0.413)	(158.5)	-
	gas	-	-	-	-	(20)	-	-	-	(-89.61)	(33.1)	-
HfF ₄	solid	(1200) (a)	(45) (a)	(38)	(36)	(24.7)	(9.4)	-	-	(7.783)	(107.5)	-
	liquid	-	-	-	-	(25)	-	-	-	(-43.625)	(60.8)	-
	gas	-	-	-	-	(11.0)	(3.4)	-	-	(3.431)	(41.7)	-
HgF	solid	843 (a)	(3.1)	(3.7)	(22) (a)	(11.0)	(3.4)	-	-	(1.652)	(55.4)	-
	liquid	dec. (a)	-	-	-	14	-	-	-	(5.055)	(66.6)	-
	gas	-	-	-	-	(23)	-	-	-	(3.284)	(102.5)	-
HgF ₂	solid	918 (a)	(5.5) (a)	(6.0)	(26.5)	(16.0)	(6.4)	-	-	(-26.17)	(23.3)	-
	liquid	920 (a)	(22) (a)	(24)	-	(14.9)	-	-	-	(3.568)	(45.1)	-
	gas	-	-	-	-	(11.4)	(3.8)	-	-	(2.341)	(64.9)	-
InF	solid	(725)	(3.2)	(4.4)	(21) (a)	(15.5)	-	-	-	(-31.41)	(-3.9)	-
	liquid	(1175)	(26)	(22)	-	(8.9)	-	-	-	(5.064)	(71.1)	-
	gas	-	-	-	-	(22.5)	-	-	-	(3.565)	(104.7)	-
InF ₂	solid	(990)	(4.7)	(4.7)	(22)	(16.0)	(6.6)	-	-	(-48.06)	(23.8)	-
	liquid	(1550)	(40)	(26)	-	(15)	-	-	-	(6.554)	(87.0)	-
	gas	-	-	-	-	(31)	-	-	-	(1.463)	(141.9)	-
InF ₃	solid	1443 (b)	(11)	(7.6)	(33.5)	(20.7)	(8.6)	-	-	(-55.69)	(36.8)	-
	liquid	(1650)	(39)	(24)	-	(20)	-	-	-	(4.882)	(65.8)	-
	gas	-	-	-	-	(15)	-	-	-	(3.592)	(95.4)	-
IrF ₂	solid	(1380)	(2.3)	(1.7)	(23.5)	(15.3)	(7.2)	-	-	(-52.41)	(27.8)	-
	liquid	(2000)	(44)	(22)	-	(21)	-	-	-	(6.533)	(90.9)	-
	gas	-	-	-	-	(31)	-	-	-	(3.437)	(147.1)	-
IrF ₃	solid	(1225)	(8.1)	(6.6)	(28) (a)	(20.3)	(10.8)	-	-	(-54.99)	(41.6)	-
	liquid	(1675)	(40)	(24)	-	(20)	-	-	-	(7.684)	(104.8)	-
	gas	-	-	-	-	(36.5)	-	-	-	(7.071)	(168.5)	-
IrF ₄	solid	(750)	(7.1)	(9.5)	(37) (a)	(24.4)	(9.2)	-	-	(-31.27)	(35.9)	-
	liquid	(1030) (a)	(24)	(23)	-	(20)	-	-	-	(9.875)	(122.0)	-
	gas	-	-	-	-	(41)	-	-	-	(8.526)	(164.0)	-
IrF ₅	solid	(370)	(4.0)	(11)	(60) (a)	(31.3)	(12.2)	-	-	(-11.72)	(16.5)	-
	liquid	(500) (a)	(11)	(22)	-	(20)	-	-	-	(10.786)	(129.6)	-
	gas	-	-	-	-	(42)	-	-	-	(10.588)	(164.7)	-
KF	solid	1130 (a)	6.5 (a)	5.8	15.91 (b)	11.02	3.12	-	-	(-0.923)	(49.7)	-
	liquid	1775 (a)	41.275 (a)	23.26	-	16.0	-	-	-	3.424	47.81	e
	gas	-	-	-	-	8.9	-	-	-	0.559	73.5	e (to 1200°K)
LaF ₃	solid	(1800)	(10)	(5.6)	(27)	(20.2)	(9.0)	-	-	(-53.32)	(-2.8)	-
	liquid	(2600) (a)	(56)	(22)	-	(31.5)	-	-	-	(6.423)	(90.8)	-
	gas	-	-	-	-	(14.5)	-	-	-	(1.183)	(153.7)	-
LiF	solid	1120 (a)	2.36 (a)	2.11	8.57 (b)	8.20	5.20	-	-	2.676	39.70	c
	liquid	1954 (a)	50.97 (a)	26.08	-	(8.9)	-	-	-	(4.111)	(76.01)	-
	gas	-	-	-	-	(20)	-	-	-	(-57.80)	(7.49)	-
MgF ₂	solid	1536 (b)	13.9 (b)	9.05	13.68 (b)	16.88	2.70	-	-2.66	6.045	84.80	c
	liquid	2500 (b)	65 (b)	26	-	22.57	-	-	-	-2.474	113.30	c (to 1800°K)
	gas	-	-	-	-	(14.0)	(8.0)	-	-	(4.530)	(59.9)	-
MnF ₂	solid	1129 (c)	5.5 (c)	4.9	22.25 (c)	(23)	-	-	-	(4.093)	(109.3)	-
	liquid	(2300) (c)	(50)	(22)	-	(15)	-	-	-	(-64.31)	(25.6)	-
	gas	-	-	-	-	(19.0)	(10.0)	-	-	(6.110)	(83.2)	-
MnF ₃	solid	(1350) (a)	(11) (a)	(8.1)	(28) (a)	(22.0)	(9.8)	-	-	(0.849)	(140.8)	-
	liquid	(1600) (a)	(42) (a)	(26)	-	(20)	-	-	-	(-57.15)	(40.8)	-
	gas	-	-	-	-	(37)	-	-	-	(6.995)	(90.3)	-
MnF ₄	solid	(660)	(5.7)	(8.6)	(38) (a)	(22.0)	(9.8)	-	-	(9.061)	(172.6)	-
	liquid	(685)	(16)	(23)	-	(25)	-	-	-	(-15.16)	(70.9)	-
	gas	-	-	-	-	(25.0)	(7.2)	-	-	(7.774)	(109.6)	-
MoF ₄	solid	(830)	(7.5)	(9.0)	(35)	(36)	-	-	-	(6.924)	(168.5)	-
	liquid	(890)	(20)	(22.5)	-	(20)	-	-	-	(-25.34)	(41.8)	-
	gas	-	-	-	-	(31.4)	(12.8)	-	-	(9.931)	(124.7)	-
MoF ₅	solid	(350) (a)	(4.2) (a)	(12)	(58) (a)	(43)	-	-	-	(9.007)	(176.2)	-
	liquid	(500) (a)	(11) (a)	(22)	-	(20)	-	-	-	(-12.24)	(16.3)	-
	gas	-	-	-	-	-	-	-	-	-	-	-

Table III (Cont'd.)

Fluoride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
MoF ₆	liquid	309 (c)	6.0(c)	19	(78)	(45.5)	-	-	-	(13.566)	(181.2)	-
	gas	-	-	-	-	(25)	(5.0)	-	-	(1.471)	(45.8)	-
NaF	solid	1268 (c)	7.8 (c)	6.2	13.1 (a)	9.66	4.50	-	-	3.080	43.3	e
	liquid	1977 (a)	53.261 (a)	27.08	-	16.0	-	-	-	-0.300	76.7	e (to 1300°K)
	gas	-	-	-	-	8.9	-	-	-	(-67.53)	(-4.2)	-
NbF ₅	solid	349 (a)	(4.2) (a)	(12)	(55)	(27.8)	(12.8)	-	-	(8.858)	(107.2)	-
	liquid	498 (b)	11.1 (b)	22.3	-	(43.5)	-	-	-	(9.358)	(182.6)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-12.205)	(19.4)	-
NdF ₃	solid	1683 (a)	(8.0) (a)	(4.8)	(27)	(20.6)	(8.4)	-	-	(6.515)	(92.9)	-
	liquid	(2600) (a)	(62) (a)	(24)	-	(31)	-	-	-	(4.122)	(151.3)	-
NiF ₂	solid	(1430)	(8.9)	(6.2)	17.59 (i)	(13.0)	(7.6)	-	-	(4.214)	(58.7)	-
	liquid	(2150)	(55)	(26)	-	(24)	-	-	-	(2.492)	(121.6)	-
	gas	-	-	-	-	(15)	-	-	-	(-71.86)	(27.0)	-
NpF ₃	solid	(1650)	(10)	(6.1)	(27.5)	(21.0)	(7.2)	-	-	(6.581)	(94.3)	-
	liquid	(2500) (j)	(61)	(24)	-	(31.5)	-	-	-	(4.105)	(154.2)	-
NpF ₄	solid	(1100)	(12)	(11)	(36.5)	(25.1)	(10.2)	-	-	(7.837)	(109.6)	-
	liquid	(1750)	(46)	(26)	-	(39)	-	-	-	(4.871)	(184.8)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-66.72)	(25.4)	-
NpF ₅	solid	(680)	(7.5)	(11)	(41)	(28.6)	(11.4)	-	-	(9.034)	(125.4)	-
	liquid	(1000) (j)	(23)	(23)	-	(45)	-	-	-	(10.05)	(213.6)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-32.95)	(27.9)	-
NpF ₆	solid	(310)	(3.5)	(11)	(61)	(31.0)	(30.0)	-	-	(10.576)	(124.6)	-
	liquid	(365)	(7.9)	(22)	-	(44)	-	-	-	(9.665)	(178.6)	-
	gas	-	-	-	-	(30)	(5.0)	-	-	(-3.012)	(75.8)	-
OsF ₂	solid	(1350)	(3.8)	(2.8)	(25.5)	(15.6)	(6.8)	-	-	(4.953)	(65.4)	-
	liquid	(1900)	(51)	(27)	-	(21)	-	-	-	(2.247)	(92.3)	-
	gas	-	-	-	-	(15)	-	-	-	(-60.15)	(20.2)	-
OsF ₃	solid	(1250)	(9.5)	(7.6)	(28) (a)	(20.4)	(10.2)	-	-	(6.536)	(91.3)	-
	liquid	(1475)	(38)	(26)	-	(31)	-	-	-	(2.317)	(146.5)	-
	gas	-	-	-	-	(20)	-	-	-	(-51.91)	(40.5)	-
OsF ₄	solid	(820)	(7.0)	(8.5)	(37.5)	(25.1)	(10.4)	-	-	(7.946)	(108.6)	-
	liquid	(1050) (a)	(23)	(22)	-	(36.5)	-	-	-	(6.798)	(168.0)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-30.80)	(36.6)	-
OsF ₆	solid	(340)	(2.4)	(7.1)	(68) (a)	(34.8)	(16.2)	-	-	(11.096)	(135.1)	-
	liquid	477 (a)	(8.7)	(18)	-	(42)	-	-	-	(10.21)	(164.5)	-
	gas	-	-	-	-	(30)	(5.0)	-	-	(-3.647)	(74.6)	-
OsF ₈	solid	307.6 (b)	(3.0)	(9.8)	(90)	(45.2)	(21.0)	-	-	(14.41)	(172.8)	-
	liquid	320 (a)	6.84 (a)	21.4	-	(58)	-	-	-	(14.35)	(229.9)	-
	gas	dec. >700 (a)	-	-	-	(30)	(20)	-	-	(-0.422)	(53.4)	-
PF ₃	gas	-	-	-	64.12 (b)	17.18	1.92	-3.88	-	6.509	36.52	e (to 2000°K)
PaF ₃	solid	(1550) (a)	(8.8)	(5.7)	(27)	(21.2)	(7.8)	-	-	(6.668)	(96.1)	-
	liquid	(2550) (a)	(60) (a)	(24)	-	(31)	-	-	-	(3.688)	(150.3)	-
PaF ₄	solid	(1300) (a)	(13) (a)	(10)	(36) (a)	(25.3)	(7.4)	-	-	(7.872)	(110.4)	-
	liquid	(1900) (a)	(47) (a)	(25)	-	(38)	-	-	-	(5.128)	(181.9)	-
	gas	-	-	-	-	(28)	-	-	-	(-60.87)	(81.6)	-
PaF ₅	solid	(570)	(6.8)	(12)	(55) (a)	(31.1)	(9.6)	-	-	(9.700)	(125.1)	-
	liquid	(860)	(20)	(23)	-	(44)	-	-	-	(8.702)	(189.6)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-28.24)	(12.7)	-
PbF ₂	solid	1097 (a)	1.86 (a)	1.70	(24)	16.5	4.12	-	-	5.103	71.2	e
	liquid	1566 (a)	38.34 (a)	24.48	-	(24)	-	-	-	(8.989)	(117.5)	-
	gas	-	-	-	-	(15)	-	-	-	(-43.445)	(26.8)	-
PbF ₄	solid	773 (a)	(23)	(30)	(45) (a)	(26.1)	(7.2)	-	-	(8.102)	(105.9)	-
	gas	-	-	-	-	(26)	-	-	(-2.0)	(-16.87)	(70.1)	-
PdF ₂	solid	(1225)	(6.6)	(5.4)	(19.5)	(14.4)	(7.4)	-	-	(4.622)	(64.8)	-
	liquid	(2000)	(43)	(21.5)	-	(23.5)	-	-	-	(3.618)	(115.0)	-
	gas	-	-	-	-	(15)	-	-	-	(-56.31)	(28.9)	-
PdF ₃	solid	dec. 500 (a)	-	-	(26) (a)	(18.4)	(10.0)	-	-	(5.931)	(81.8)	-
PoF ₄	liquid	(320)	(6.0)	(19)	(84)	(44)	-	-	-	(13.119)	(169.7)	-
	gas	-	-	-	-	(30)	(5.0)	-	-	(2.897)	(71.8)	-
PrF ₃	solid	1643 (a)	(8.0) (a)	(4.9)	(27)	(19.8)	(9.6)	-	-	(6.330)	(88.7)	-
	liquid	(2600) (a)	(62) (a)	(24)	-	(31.5)	-	-	-	(4.596)	(154.7)	-
PtF ₂	solid	(1250)	(2.5)	(2.0)	(24)	(15.4)	(7.0)	-	-	(4.903)	(64.8)	-
	liquid	(2025)	(40)	(20)	-	(21)	-	-	-	(3.934)	(94.0)	-
	gas	-	-	-	-	(15)	-	-	-	(-48.22)	(28.5)	-
PtF ₃	solid	(1125)	(8.9)	(7.9)	(30)	(19.8)	(9.6)	-	-	(6.330)	(85.7)	-
	liquid	(1475)	(38)	(26)	-	(31)	-	-	-	(3.955)	(145.7)	-
	gas	-	-	-	-	(20)	-	-	-	(-50.27)	(39.7)	-
PtF ₄	solid	(875)	(7.0)	(8.0)	(38)	(25.0)	(10.8)	-	-	(7.934)	(108.7)	-
	liquid	(1000) (a)	(22)	(22)	-	(37.5)	-	-	-	(7.737)	(175.9)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-29.26)	(38.0)	-
PuF ₃	solid	1680 (k)	13 (k)	7.7	(27.5)	(20.7)	(8.2)	-	-	(6.536)	(92.9)	-
	liquid	(2550) (d)	(62) (d)	(24)	-	(32.5)	-	-	-	(1.788)	(159.0)	-
PuF ₄	solid	(1310) (e)	(14)	(11)	(37.5)	(25.0)	(8.6)	-	-	(7.836)	(107.5)	-
	liquid	(1700)	(47)	(28)	-	(40)	-	-	-	(6.107)	(193.2)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-67.67)	(25.3)	-
PuF ₆	solid	323.91 (t)	4.7 (t)	15	(63)	(37)	-	-	-	(11.03)	(147.8)	-
	liquid	(335) (t)	(7.4) (t)	(22)	-	(51)	-	-	-	(10.87)	(214.2)	-
	gas	-	-	-	-	(30)	(5.0)	-	-	(-3.287)	(70.7)	-
RaF ₂	solid	(1600) (a)	(3.0) (a)	(1.9)	(24)	(16.0)	(7.2)	-	-	(5.091)	(69.3)	-
	liquid	(2200) (a)	(55) (a)	(25)	-	(23.5)	-	-	-	(4.875)	(111.3)	-
	gas	-	-	-	-	(15)	-	-	-	(-68.825)	(20.8)	-
RbF	solid	1048 (b)	4.13 (b)	3.94	18 (c)	11.3	2.56	-	-	3.483	49.1	c
	liquid	1681 (a)	39.513 (a)	23.51	-	(16)	-	-	-	(2.873)	(75.2)	-
	gas	-	-	-	-	(9.0)	-	-	-	(-48.41)	(-0.3)	-

Table III (Cont'd.)

Fluoride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
ReF ₃	solid	(1380)	(11)	(8.0)	(26) (a)	(20.4)	(10.8)	-	-	(6.562)	(93.4)	-
	liquid	(1530)	(37)	(24)	-	(31)	-	-	-	(-0.094)	(146.9)	-
	gas	-	-	-	-	(20)	-	-	-	(-53.92)	(42.0)	-
ReF ₄	solid	(700)	(7.2)	(10)	(37)	(24.4)	(10.0)	-	-	(7.720)	(105.0)	-
	liquid	(960)	(22)	(23)	-	(37)	-	-	-	(6.890)	(170.3)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-29.13)	(35.4)	-
ReF ₅	solid	398 (a)	(4.5) (a)	(11)	(59) (a)	(32.6)	(12.8)	-	-	(10.289)	(130.6)	-
	liquid	(660)	(15)	(23)	-	(42)	-	-	-	(8.516)	(169.4)	-
	gas	-	-	-	-	(20)	(15)	-	-	(-17.74)	(13.8)	-
ReF ₆	liquid	321 (a)	6.9 (a)	21	(86)	(46)	-	-	-	(13.715)	(176.1)	-
	gas	-	-	-	-	(35)	(2.0)	-	(-5.0)	(4.945)	(94.2)	-
	solid	(1210)	(4.7)	(3.9)	(22)	(14.8)	(9.2)	-	-	(4.822)	(65.1)	-
RhF ₂	liquid	(2000)	(45)	(22.5)	-	(23)	-	-	-	(3.310)	(108.3)	-
	gas	-	-	-	-	(15)	-	-	-	(-57.69)	(25.0)	-
	solid	(1460)	(11)	(7.5)	(26) (a)	(18.0)	(10.8)	-	-	(5.845)	(79.9)	-
RhF ₃	liquid	(1700)	(40)	(24)	-	(31.5)	-	-	-	(3.046)	(154.6)	-
	gas	-	-	-	-	(20)	-	-	-	(-56.50)	(45.5)	-
	solid	(780)	(6.8)	(8.7)	(37) (a)	(21.4)	(13.0)	-	-	(6.958)	(-88.2)	-
RhF ₄	liquid	(1025) (a)	(25)	(24)	-	(36.5)	-	-	-	(7.981)	(170.6)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-31.30)	(36.9)	-
	solid	(1300)	(12)	(9.2)	(26) (a)	(19.4)	(11.4)	-	-	(6.291)	(87.9)	-
RuF ₃	liquid	(1675)	(43)	(26)	-	(32)	-	-	-	(1.039)	(154.3)	-
	gas	-	-	-	-	(20)	-	-	-	(-62.06)	(39.5)	-
	solid	(825)	(7.1)	(8.6)	(37) (a)	(24.2)	(12.0)	-	-	(7.749)	(104.5)	-
RuF ₄	liquid	(1050) (a)	(26)	(25)	-	(36.5)	-	-	-	(6.712)	(168.6)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-33.86)	(34.3)	-
	solid	374 (a)	(4.5) (a)	(12)	(58) (a)	(28.0)	(13.4)	-	-	(8.944)	(105.5)	-
RuF ₅	liquid	545 (a)	(12) (a)	(22)	-	(43)	-	-	-	(9.142)	(177.4)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-13.91)	(15.9)	-
	solid	565 (a)	(3.9)	(6.9)	(27.5)	(20.4)	(10.6)	-	-	(6.554)	(91.9)	-
SbF ₃	liquid	649 (a)	(14) (a)	(22)	-	(30)	-	-	-	(6.386)	(139.8)	-
	gas	-	-	-	-	(20)	-	-	-	(-14.10)	(53.5)	-
	liquid	423 (a)	(7.8)	(18)	(70) (a)	(45)	-	-	-	(13.417)	(186.4)	-
SbF ₅	gas	-	-	-	-	(25)	(10)	-	-	(-1.948)	(51.2)	-
	solid	(1500) (a)	(12) (a)	(8.0)	(25)	(17.3)	(10.6)	-	-	(5.629)	(76.7)	-
	liquid	(1800) (a)	(55) (a)	(31)	-	(31.5)	-	-	-	(3.004)	(156.7)	-
SeF ₆	gas	-	-	-	-	(20)	-	-	-	(-72.70)	(39.9)	-
	solid	-	-	-	75.10 (b)	34.86	1.96	-	-8.13	13.208	128.7	e (to 2000° K)
	liquid	-	-	-	68.0 (b)	21.95	2.66	-	-4.72	8.246	60.0	e (to 2000° K)
SiF ₄	gas	-	-	-	-	(15.7)	(7.6)	-	-	(5.019)	(67.7)	-
	solid	(1650) (a)	(4.0)	(2.4)	(24)	(23.5)	-	-	-	(3.544)	(110.5)	-
	liquid	(2700) (a)	(65)	(24)	-	(20.2)	(9.4)	-	-	(6.441)	(89.4)	-
SmF ₃	solid	(1670) (a)	(8.0) (a)	(4.8)	(28.5)	(31)	-	-	-	(3.269)	(149.6)	-
	liquid	(2600) (a)	(62) (a)	(24)	-	(15.2)	(7.0)	-	-	(4.843)	(65.7)	-
	gas	(1140)	(3.3)	(2.9)	(23)	(22)	-	-	-	(4.747)	(102.7)	-
SnF ₂	liquid	(1700)	(41)	(24)	-	(15)	-	-	-	(-48.15)	(26.5)	-
	solid	(720)	(6.6)	(9.2)	(36) (a)	(24.4)	(7.4)	-	-	(7.604)	(105.2)	-
	liquid	978 (a)	(22)	(22)	-	(36)	-	-	-	(7.438)	(167.0)	-
SnF ₄	gas	-	-	-	-	(20)	(5.0)	-	-	(-27.82)	(39.2)	-
	solid	1673 (a)	4.26 (a)	2.5	(20.5)	(15.7)	(7.0)	-	-	(4.992)	(71.2)	-
	liquid	2750 (a)	71 (a)	(26)	-	(24)	-	-	-	(4.822)	(118.3)	-
TaF ₂	solid	(1510)	(4.6)	(3.0)	(24)	(15.2)	(6.8)	-	-	(4.834)	(61.6)	-
	liquid	(2250)	(58)	(26)	-	(22.5)	-	-	-	(3.505)	(101.8)	-
	gas	-	-	-	-	(15)	-	-	-	(-71.35)	(18.1)	-
TaF ₃	solid	(1750)	(13)	(7.4)	(26) (a)	(20.2)	(11.0)	-	-	(6.512)	(92.4)	-
	liquid	(2350)	(57)	(24)	-	(32)	-	-	-	(-2.682)	(153.8)	-
	gas	-	-	-	-	(20)	-	-	-	(-87.88)	(36.5)	-
TaF ₅	solid	370 (a)	(4.5) (a)	(12)	(60) (a)	(31.8)	(15.2)	-	-	(10.157)	(125.7)	-
	liquid	502 (a)	(11) (a)	(22)	-	(43.5)	-	-	-	(8.970)	(177.1)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-12.57)	(14.1)	-
TcF ₃	solid	(1540)	(10)	(6.5)	(28.5)	(19.4)	(12.4)	-	-	(6.335)	(85.7)	-
	liquid	(1800)	(45)	(25)	-	(33)	-	-	-	(2.575)	(159.9)	-
	gas	-	-	-	-	(20)	-	-	-	(-65.82)	(37.4)	-
TcF ₄	solid	(830)	(8.0)	(9.6)	(34) (a)	(23.5)	(14.0)	-	-	(7.629)	(104.1)	-
	liquid	(1000)	(24)	(24)	-	(38)	-	-	-	(6.842)	(180.3)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-32.65)	(37.0)	-
TcF ₅	solid	(322)	(3.6)	(11)	(58) (a)	(30.6)	(15.6)	-	-	(9.817)	(120.0)	-
	liquid	(480)	(11)	(23)	-	(44)	-	-	-	(9.723)	(181.2)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-11.645)	(14.9)	-
TcF ₆	solid	(309)	(2.3)	(7.4)	(68) (a)	(40)	-	-	-	(11.926)	(159.9)	-
	liquid	(330)	(6.6)	(20)	-	(46)	-	-	-	(11.48)	(186.9)	-
	gas	-	-	-	-	(30)	(5.0)	-	(-8.0)	(2.296)	(79.4)	-
TeF ₄	solid	402.8 (I)	6.351 (I)	15.77	(42)	(25.6)	(9.2)	-	-	(8.042)	(106.6)	-
	liquid	647.5 (I)	8.174 (I)	12.63	-	(36)	-	-	-	(5.134)	(149.5)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-12.995)	(36.5)	-
TeF ₆	gas	-	-	-	80.67 (b)	35.33	1.62	-	-7.00	(12.954)	(125.05)	e (to 2000° K)
	solid	(1500) (a)	(8.0) (a)	(5.3)	(27)	(20.8)	(7.2)	-	-	(6.522)	(93.7)	-
	liquid	(2550) (a)	(60) (a)	(24)	-	(31.5)	-	-	-	(6.472)	(155.8)	-
ThF ₄	solid	(1330)	(17) (a)	(13)	33.95 (m)	24.6	(8.4)	-	-	(7.708)	(108.7)	-
	liquid	(2000) (a)	(50) (a)	(25)	-	(39)	-	-	-	(2.430)	(188.3)	-
	gas	-	-	-	-	(29)	-	-	-	(-69.57)	(79.7)	-
TiF ₂	solid	(1550)	(8.0)	(5.2)	(18) (a)	(13.7)	(7.0)	-	-	(4.396)	(62.1)	-
	liquid	(2425)	(60)	(25)	-	(24)	-	-	-	(3.952)	(121.8)	-
	gas	-	-	-	-	(15)	-	-	-	(-77.87)	(26.9)	-

Table III (Cont'd.)

Fluoride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
TiF ₃	solid	(1500) (a)	(12) (a)	(8.0)	(24.5)	(17.2)	(11.2)	-	-	(5.626)	(76.8)	-
	liquid	(2000)	(52)	(26)	-	(30)	-	-	-	(0.226)	(145.6)	-
	gas	-	-	-	-	(20)	-	-	-	(-71.77)	(43.6)	-
TiF ₄	solid	557 (a)	(22) (a)	(40)	(38) (a)	(23.1)	(9.6)	-	-	(7.314)	(96.5)	-
	gas	-	-	-	-	(25)	-	-	(-2.0)	(-14.76)	(63.9)	-
TlF	solid	600 (b)	(2.7)	(4.5)	(22)	(11.2)	(3.6)	-	-	(3.499)	(42.9)	-
	liquid	928 (a)	(20.4) (a)	(22)	-	(15)	-	-	-	(2.431)	(60.5)	-
TlF ₃	solid	-	-	-	-	(8.9)	-	-	-	(-23.63)	(-3.1)	-
	liquid	823 (b)	(8.5)	(10)	(34)	(21.4)	(8.8)	-	-	(6.772)	(90.6)	-
	gas	(1200)	(33)	(27.5)	-	(31)	-	-	-	(3.193)	(137.5)	-
UF ₃	solid	-	-	-	-	(20)	-	-	-	(-43.01)	(32.0)	-
	liquid	(1700) (n)	(85) (n)	(5.0)	(26) (n)	(25.3)	(8.0)	-	-	(7.899)	(109.6)	-
	gas	(2550) (n)	(61) (n)	(24)	-	(41)	-	-	-	(7.596)	(200.5)	-
UF ₄	solid	1309 (n)	(14)	(11)	(36.9) (o)	(28)	-	-	-	(-71.87)	(69.9)	-
	liquid	1690 (n)	57.5 (n)	(34)	-	(32.0)	(9.0)	-	-	(9.941)	(137.0)	-
	gas	-	-	-	-	(44)	-	-	-	(8.250)	(195.4)	-
UF ₅	solid	(560)	(7)	(12.5)	(48)	(20)	(10)	-	-	(-25.75)	(21.5)	-
	liquid	(800)	(18)	(22.5)	-	12.34	92.23	-	-	(7.779)	(43.8)	p
	gas	-	-	-	-	(33)	(4.0)	-	-	(-2.099)	(98.4)	-
UF ₆	solid	329 (n)	11.9 (n)	36.2	(54)	(13.7)	(7.8)	-	-	(4.432)	(61.9)	-
	liquid	-	-	-	-	(22.5)	-	-	-	(2.028)	(110.3)	-
	gas	-	-	-	-	(17.2)	(11.0)	-	-	(5.617)	(77.3)	-
VF ₂	solid	(1600)	(6.5)	(4.1)	(18.5)	(30)	-	-	-	(-0.243)	(145.3)	-
	liquid	(2500) (a)	(65) (a)	(26)	-	(20)	-	-	-	(-74.24)	(40.9)	-
VF ₃	solid	(1400) (a)	(13)	(9.3)	(24)	(22.4)	(14.4)	-	-	(7.319)	(93.9)	-
	liquid	(1900)	(55)	(29)	-	(20)	(5.0)	-	-	(-15.81)	(39.5)	-
	gas	-	-	-	-	(26.6)	(10.2)	-	-	(8.384)	(104.6)	-
VF ₄	solid	(600) (a)	(20)	(33)	(38) (a)	(44.5)	-	-	-	(7.979)	(189.8)	-
	liquid	-	-	-	-	(25)	(10)	-	-	(-7.272)	(54.5)	-
	gas	(375) (a)	(6.4)	(17)	(50) (a)	(25.2)	(8.0)	-	-	(7.869)	(109.5)	-
WF ₄	solid	384 (a)	(8.5) (a)	(22)	-	(37)	-	-	-	(7.749)	(173.2)	-
	liquid	(800)	(7.0)	(8.8)	(36.5)	(20)	(5.0)	-	-	(-26.46)	(38.7)	-
	gas	(895)	(21)	(23.5)	-	(42)	(14.0)	-	-	(10.104)	(126.4)	-
WF ₅	solid	-	-	-	-	(8.469)	-	-	-	(8.469)	(169.8)	-
	liquid	(380) (a)	(4.5) (a)	(12)	(59) (a)	(20)	(10)	-	-	(-12.95)	(15.2)	-
	gas	(520) (a)	(11.5) (a)	(22.5)	-	(34)	(2.0)	-	(-8.0)	(12.909)	(109.8)	-
WF ₆	solid	-	-	-	-	(19.4)	(11.2)	-	-	(6.282)	(85.9)	-
	liquid	-	-	-	-	(32)	-	-	-	(-1.234)	(152.9)	-
	gas	-	-	-	-	(89) (c)	-	-	-	(-83.83)	(36.1)	-
YF ₃	solid	(1660) (a)	(13) (a)	(7.8)	(28)	(20)	-	-	-	(4.333)	(61.0)	-
	liquid	(2300)	(55)	(24)	-	(13.4)	(7.6)	-	-	(4.743)	(115.0)	-
	gas	-	-	-	-	(15)	-	-	-	(-53.46)	(30.4)	-
ZnF ₂	solid	1145 (b)	(5.6)	(4.9)	17.61 (q)	(15.4)	(7.4)	-	-	(4.921)	(69.0)	-
	liquid	1775 (a)	(44) (a)	(25)	-	(24)	-	-	-	(-0.055)	(115.1)	-
	gas	-	-	-	-	(19.4)	(11.2)	-	-	(6.282)	(86.9)	-
ZrF ₂	solid	(1675)	(9.0)	(5.4)	(21) (a)	(32)	-	-	-	(-0.894)	(153.8)	-
	liquid	(2550)	(56)	(22)	-	(20)	-	-	-	(-87.69)	(36.2)	-
	gas	(1600) (a)	(13)	(8.1)	(27)	(22.4)	(9.4)	-	-	(7.097)	(95.4)	-
ZrF ₃	solid	(2400) (a)	(58) (a)	(24)	-	(20)	(5.0)	-	-	(-55.40)	(25.1)	-
	liquid	-	-	-	-	-	-	-	-	-	-	-
	gas	-	-	-	-	-	-	-	-	-	-	-
ZrF ₄	solid	(1176) (r)	(56.63) (r)	(48.15)	(35)	-	-	-	-	-	-	-
	gas	-	-	-	-	-	-	-	-	-	-	-

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Table IV
THERMODYNAMIC PROPERTIES OF CHLORIDES

Chloride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
AcCl ₃	solid	(1075)	(8.6)	(8.0)	(37) (a)	(23.0)	(6.8)	-	-	(7.160)	(96.1)	-
	liquid	(2030) (a)	(45) (a)	(22)	-	(32)	-	-	-	(4.306)	(143.6)	-
	gas	-	-	-	-	(20)	-	-	-	(-65.05)	(30.0)	-
AgCl	solid	728 (b)	3.155 (a)	4.33	2297 (b)	14.88	1.00	-	-2.70	5.387	63.63	c
	liquid	1837 (a)	42.523 (a)	23.15	-	16.0	-	-	-	2.411	65.70	c (to 900°K)
	gas	-	-	-	-	8.9	-	-	-	(-53.10)	(-10.54)	-
AlCl ₃	solid	-	-	-	54.2 (d)	9.0	-	-	-0.68	2.911	-2.5	d (to 2000°K)
	liquid	453.3 (b)	13.4 (b)	29.6	40 (b)	13.25	28.00	-	-	5.195	43.8	d
	gas	-	-	-	-	19.8	-	-	-2.69	-7.519	42.3	d (to 1800°K)
AmCl ₃	solid	(1120)	(14)	(12)	(38)	(22.9)	(7.2)	-	-	(7.148)	(94.6)	-
	liquid	(2025)	(50)	(25)	-	(32.5)	-	-	-	(-0.616)	(141.4)	-
	gas	-	-	-	-	(20)	-	-	-	(-75.93)	(21.6)	-
AsCl ₃	solid	-	-	-	55.8 (b)	31.9	-	-	-	9.511	126.0	d (to 371°K)
	liquid	395 (a)	7.5 (b)	19	-	19.62	0.24	-	-1.42	-2.462	34.0	c (to 1000°K)
	gas	-	-	-	-	(11.1)	(5.0)	-	-	(3.532)	(40.7)	-
AuCl ₃	solid	dec. 560 (a)	-	-	(24) (a)	(16.5)	(6.6)	-	-	(5.213)	(66.0)	-
	liquid	dec. (a)	-	-	(30)	(22.6)	(9.4)	-	-	(7.156)	(91.1)	-
	gas	561 (a)	(3.1)	(5.5)	(40.5)	(34.5)	-	-	-	(9.252)	(155.6)	-
BaCl ₂	solid	-	-	-	69.29 (b)	17.59	1.80	-	-2.82	6.271	33.04	d (to 1000°K)
	liquid	1198 (b)	(0)	(0)	30 (b)	17.0	3.34	-	-	5.217	67.9	d
	gas	1235 (b)	5.4 (b)	4.3	-	(21.0)	-	-	-	(7.612)	(92.3)	-
BeCl ₂	solid	2100 (a)	(50) (a)	(24)	-	(27.0)	-	-	-	(9.622)	(130.7)	-
	liquid	-	-	-	-	(14)	-	-	-	(-67.68)	(7.4)	-
	gas	678 (a)	3.0 (d)	4.4	(18.5)	(14.3)	(2.0)	-	-	(4.353)	(63.6)	-
BiCl ₃	solid	820 (b)	25 (b)	30	-	(19)	-	-	-	(4.079)	(88.4)	-
	liquid	-	-	-	-	(15)	-	-	-	(-24.20)	(31.1)	-
	gas	593 (e)	(4.0)	(6.7)	(23)	(11.4)	(2.8)	-	-	(3.524)	(42.8)	-
BiCl ₂	solid	(1050)	(27)	(26)	-	(15)	-	-	-	(1.167)	(57.4)	-
	liquid	-	-	-	-	(9.0)	-	-	-	(-32.13)	(-10.1)	-
	gas	436 (e)	(3.5)	(8.0)	(35) (a)	(16.8)	(6.2)	-	-	(5.285)	(62.6)	-
BiCl ₃	solid	(850)	(20)	(23)	-	(26)	-	-	-	(5.207)	(107.8)	-
	liquid	-	-	-	-	(15)	-	-	-	(-24.14)	(10.2)	-
	gas	505 (b)	2.6 (b)	5.1	45.8 (a)	(20.9)	(21.4)	-	-	(7.183)	(79.7)	-
BiCl ₄	solid	714 (b)	17.354 (a)	24.3	-	(32.5)	-	-	-	(7.711)	(135.9)	-
	liquid	-	-	-	-	(20)	-	-	-	(-18.57)	(29.5)	-
	gas	449 (a)	(4.1)	(9.1)	(53) (a)	(28.7)	(10.6)	-	-	(9.028)	(113.7)	-
CaCl ₂	solid	(645)	(15)	(23)	-	(35)	-	-	-	(6.689)	(138.3)	-
	liquid	-	-	-	-	(23)	-	-	-	(-16.05)	(37.4)	-
	gas	1055 (b)	6.78 (b)	6.43	27.2 (b)	17.18	3.04	-	-0.6	5.459	71.9	c
CdCl ₂	solid	(1900) (d)	(43)	(23)	-	29.08	-3.48	-	-	7.547	141.4	c (to 1700°K)
	liquid	-	-	-	-	(15)	-	-	-	(-55.92)	(19.1)	-
	gas	841 (b)	5.3 (b)	6.3	29.0 (d)	14.64	9.60	-	-	4.792	57.3	c (to 800°K)
CeCl ₃	solid	1248 (d)	29.86 (a)	23.93	-	(25)	-	-	-	(4.809)	(112.7)	-
	liquid	-	-	-	-	(14)	-	-	-	(-38.78)	(10.3)	-
	gas	(1085)	(8.7)	(8.0)	34.5 (f)	(22.0)	(8.8)	-	-	(6.951)	(93.5)	-
CoCl ₂	solid	(2000) (a)	(46) (a)	(23)	-	(32)	-	-	-	(3.931)	(145.8)	-
	liquid	-	-	-	-	(20)	-	-	-	(-66.07)	(31.6)	-
	gas	1000 (a)	7.39 (a)	7.39	25.4 (b)	14.41	14.60	-	-	4.945	61.1	c
CrCl ₂	solid	1323 (b)	27.17 (a)	20.54	-	(23.8)	-	-	-	(-0.354)	(103.9)	-
	liquid	-	-	-	-	(14)	-	-	-	(-40.49)	(13.0)	-
	gas	1088 (b)	7.72 (a)	7.10	27.7 (a)	1523	5.30	-	-	4.777	60.7	d
CrCl ₃	solid	1575 (a)	47.5 (d)	30.2	-	(24.0)	-	-	-	(3.462)	(109.1)	d
	liquid	-	-	-	-	(14)	-	-	-	(-59.79)	(5.3)	-
	gas	1220 (a)	56.8 (a)	46.6	30.0 (b)	19.44	7.03	-	-	6.109	82.9	c
CrCl ₄	solid	-	-	-	-	(22)	-	-	-	(-52.81)	(46.0)	-
	liquid	(435) (a)	(9.0) (a)	(21)	61 (a)	(36.5)	-	-	-	(10.883)	(147.0)	-
	gas	-	-	-	-	(22.5)	(1.5)	-	-	(-3.998)	(41.8)	-
CsCl	solid	918 (b)	3.60 (b)	3.92	23.9 (d)	11.9	2.28	-	-	3.650	44.6	c
	liquid	1573 (b)	35.69 (b)	22.69	-	(16)	-	-	-	(2.853)	(66.5)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-43.94)	(-8.1)	-
CuCl	solid	703 (b)	2.445 (a)	3.48	20.8 (a)	9.1	7.7	-	-	3.051	33.3	d
	liquid	(1763) (d)	(36) (d)	(20)	-	15.8	-	-	-	3.439	68.4	c
	gas	-	-	-	-	8.92	-	-	-0.47	(-44.66)	(-3.5)	c (to 2000°K)
CuCl ₂	solid	dec. 810 (a)	-	-	(26.5)	16.77	5.54	-	-	5.246	(70.7)	d
	liquid	950 (b)	10.28 (b)	10.82	28.7 (a)	18.94	2.08	-	-1.17	6.132	80.5	c
	gas	1299 (b)	30.21 (b)	23.26	-	24.40	-	-	-	-0.023	105.1	c (to 1110°K)
FeCl ₃	solid	-	-	-	-	(14)	-	-	-	(-43.74)	7.3	-
	liquid	577 (a)	10.25 (a)	17.8	39 (a)	(21.7)	(3.0)	-	-	(6.603)	(85.5)	-
	gas	592 (a)	6.02 (a)	10.2	-	(31.5)	-	-	-	(1.509)	(128.3)	-
GaCl	solid	-	-	-	-	(15)	(6.0)	-	-	(-13.23)	(16.5)	-
	liquid	(725)	(4.1)	(5.7)	(21)	(11.3)	(4.0)	-	-	(3.547)	(44.6)	-
	gas	(1125)	(2.6)	(23)	-	(15)	-	-	-	(1.078)	(60.4)	-
GaCl ₂	solid	-	-	-	-	(8.9)	-	-	-	(-31.785)	(-5.6)	-
	liquid	443.7 (b)	(4.0)	(9.0)	(29)	(16.6)	(5.6)	-	-	(5.198)	(67.3)	-
	gas	(870) (a)	(19) (a)	(22)	-	(23)	-	-	-	(3.480)	(94.8)	-
GaCl ₃	solid	-	-	-	-	(15)	-	-	-	(-22.48)	(18.9)	-
	liquid	350.7 (b)	5.2 (a)	15	(40.5) (d)	(20.9)	(7.8)	-	-	(6.578)	(80.9)	-
	gas	575 (a)	15 (a)	26	-	(30)	-	-	-	(4.090)	(116.7)	-
						(19.8)	-	-	-	(-16.775)	(25.8)	-

Table IV (Cont'd.)

Chloride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
GeCl ₂	solid	(700)	(6.5)	(9.3)	(29.5)	(15.8)	(7.2)	-	-	(5.031)	(62.7)	-
	liquid	(975) (a)	(23)	(24)	-	(24)	-	-	-	(2.507)	(102.1)	-
	gas	-	-	-	-	(15)	-	-	-	(-29.27)	(16.5)	-
GeCl ₄	liquid	357 (a)	7.034 (a)	19.7	59.5 (d)	(37.5)	-	-	-	(11.181)	(154.2)	-
	gas	-	-	-	-	(24.5)	(2.0)	-	(-2.0)	(0.193)	(59.5)	-
HCl	gas	-	-	-	44.617 (b)	6.70	0.84	-	-	2.035	(-6.193)	g
HfCl ₂	solid	(1000)	(5.9)	(5.9)	(30.5)	(16.4)	(6.0)	-	-	(5.156)	(64.7)	-
	liquid	(1750)	(35)	(20)	-	(25)	-	-	-	(4.856)	(112.2)	-
	gas	-	-	-	-	(15)	-	-	-	(-47.64)	(17.5)	-
HfCl ₃	solid	(900)	(10)	(11)	(37)	(22.6)	(7.0)	-	-	(7.050)	(93.9)	-
	liquid	(1500)	(45)	(30)	-	(32)	-	-	-	(2.675)	(140.5)	-
	gas	-	-	-	-	(20)	-	-	-	(-60.325)	(22.7)	-
HfCl ₄	solid	590 (a)	24.0 (a)	40.7	48 (a)	31.47	-	-	-2.38	10.181	132.6	h (to 485°K)
	gas	-	-	-	-	(25.5)	-	-	-	(-17.74)	(53.5)	-
HgCl	solid	575 (d)	(3.1)	(5.4)	23.5 (a)	11.05	3.70	-	-	3.459	40.6	d
	liquid	dec. (a)	-	-	-	(15.5)	-	-	-	(2.306)	(61.3)	-
HgCl ₂	solid	550 (b)	4.15 (b)	7.55	31.4 (d)	15.3	10.3	-	-	5.020	58.8	d
	liquid	577 (b)	14.08 (b)	24.4	-	(24.4)	-	-	-	(4.317)	(103.1)	-
	gas	-	-	-	-	14.66	0.26	-	-0.75	(-15.21)	(17.0)	c (to 1000°K)
InCl	solid	498 (b)	(3.0)	(6.0)	(24) (a)	(12.2)	(2.0)	-	-	(3.726)	(46.1)	-
	liquid	881 (a)	21.2 (a)	24.1	-	(14.5)	-	-	-	(1.624)	(53.4)	-
	gas	-	-	-	-	(9.0)	-	-	-	(-24.42)	(-8.0)	-
InCl ₂	solid	508 (b)	(3.5)	(6.9)	(32)	(16.6)	(7.2)	-	-	(5.269)	(64.7)	-
	liquid	758 (b)	(22)	(29)	-	(23)	-	-	-	(4.092)	(94.0)	-
	gas	-	-	-	-	(15)	-	-	-	(-23.97)	(11.9)	-
InCl ₃	solid	771 (a)	37.8 (a)	49.0	(46)	(19.3)	(17.6)	-	-	(6.537)	(69.2)	-
	gas	-	-	-	-	(19.8)	-	-	-	(-36.11)	(15.9)	-
IrCl	solid	dec. 1072 (a)	-	-	(22) (a)	(11.4)	(2.8)	-	-	(3.524)	(43.8)	-
IrCl ₂	solid	(1000)	(6.7)	(6.7)	(31) (a)	(16.8)	(6.2)	-	-	(5.285)	(66.6)	-
	liquid	dec. 1044 (a)	-	-	-	(24.5)	-	-	-	(3.185)	(106.9)	-
IrCl ₃	solid	(715)	(6.7)	(9.4)	(41.5)	(21.2)	(10.2)	-	-	(6.774)	(82.3)	-
	liquid	(960)	(24)	(25)	-	(31.5)	-	-	-	(4.760)	(132.7)	-
	gas	dec. 1038 (a)	-	-	-	(20)	-	-	-	(-30.18)	(29.3)	-
IrCl ₄	solid	(375)	(3.4)	(9.1)	(49.5)	(24.8)	(11.4)	-	-	(7.901)	(95.2)	-
	liquid	(670)	(14)	(21)	-	(35)	-	-	-	(7.524)	(142.3)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-15.40)	(27.2)	-
KCl	solid	1043 (a)	6.41 (a)	6.15	19.76 (b)	9.89	5.20	-	0.77	2.922	37.71	c
	liquid	1680 (b)	38.84 (a)	23.2	-	16.0	-	-	-	0.130	68.64	c (to 2000°K)
	gas	-	-	-	-	8.94	-	-	-0.24	-50.557	-6.9	-
LaCl ₃	solid	1125 (a)	(9.0) (a)	(8.0)	37 (a)	(22.4)	(9.4)	-	-	(7.097)	(93.4)	-
	liquid	(2020) (a)	(44) (a)	(22)	-	(32)	-	-	-	(2.949)	(142.2)	-
	gas	-	-	-	-	(20)	-	-	-	(-65.29)	(29.1)	-
LiCl	solid	887 (a)	3.2 (a)	3.6	13.9 (i)	(11.0)	(3.40)	-	-	(3.431)	(49.8)	c
	liquid	1655 (b)	35.96 (a)	21.73	-	(14.5)	-	-	-	(1.999)	(66.9)	-
	gas	-	-	-	-	(8.9)	-	-	-	(-43.23)	(3.7)	-
MgCl ₂	solid	987 (b)	10.3 (b)	10.4	21.4 (b)	18.90	1.42	-	-2.06	6.389	87.9	c
	liquid	1691 (a)	32.69 (a)	19.33	-	22.10	-	-	-	-1.652	98.0	c (to 1500°K)
	gas	-	-	-	-	(13)	-	-	-	(-49.73)	(11.0)	-
MnCl ₂	solid	923 (b)	9.0 (b)	9.8	28.0 (b)	18.04	3.16	-	-1.37	5.979	76.5	c
	liquid	1463 (a)	29.6 (a)	20.2	-	22.60	-	-	-	-0.307	94.9	c (to 1200°K)
	gas	-	-	-	-	(14)	-	-	-	(-42.49)	(12.0)	-
MnCl ₃	solid	(860)	(10)	(12)	(33.5)	(23.0)	(5.6)	-	-	(7.107)	(99.2)	-
	liquid	(900) (a)	(21) (a)	(23)	-	(31)	-	-	-	(1.916)	(136.8)	-
	gas	-	-	-	-	(20)	-	-	-	(-28.98)	(38.7)	-
MnCl ₄	liquid	(384)	(7.8)	(20)	(62) (a)	(37.5)	-	-	-	(11.181)	(151.7)	-
	gas	-	-	-	-	(25)	-	-	-	(-1.419)	(57.0)	-
MoCl ₂	solid	dec. (a)	-	-	(29) (a)	(16.2)	(6.8)	-	-	(5.123)	(65.3)	-
MoCl ₃	solid	dec. (a)	-	-	(37)	(20.2)	(10.6)	-	-	(6.494)	(81.2)	-
MoCl ₄	solid	dec. 400°K (a)	-	-	(48)	(25.8)	(9.6)	-	-	(8.119)	(101.9)	-
MoCl ₅	solid	467 (a)	(8.0) (a)	(17)	(61.5)	(32.9)	(14.2)	-	-	(10.441)	(130.2)	-
	liquid	541 (a)	(12) (a)	(22)	-	(43)	-	-	-	(5.609)	(168.5)	-
	gas	dec. (a)	-	-	-	(20)	(10)	-	-	(-17.37)	(7.2)	-
MoCl ₆	solid	(580)	(9.5)	(16)	(73) (a)	(38.3)	(16.8)	-	-	(12.166)	(150.2)	-
	liquid	(630) (a)	(16)	(26)	-	(50)	-	-	-	(7.026)	(198.5)	-
	gas	-	-	-	-	(30)	(5.0)	-	-	(-20.58)	(46.6)	-
NaCl	solid	1073 (a)	7.22 (a)	6.73	17.30 (b)	10.98	3.90	-	-	3.447	46.42	c
	liquid	1738 (a)	40.808 (a)	23.48	-	16.0	-	-	-	-0.631	70.44	c (to 1300°K)
	gas	-	-	-	-	8.9	-	-	-	(-53.71)	(-5.72)	-
NbCl ₅	solid	483 (b)	8.5 (b)	18	60.0 (d)	(32.9)	(14.2)	-	-	(10.441)	(131.7)	-
	liquid	519 (b)	11.8 (b)	22.7	-	(45)	-	-	-	(6.128)	(182.0)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-17.30)	(8.2)	-
NdCl ₃	solid	1033 (b)	(8.0) (a)	(7.7)	34.6 (f)	(22.8)	(7.4)	-	-	(7.127)	(97.5)	-
	liquid	(1960) (a)	(46) (a)	(23)	-	(31)	-	-	-	(3.650)	(139.0)	-
	gas	-	-	-	-	(20)	-	-	-	(-63.91)	(32.2)	-
NiCl ₂	solid	1260 (a)	48.355 (a)	38.4	23.334 (j)	13.10	13.00	-	-	4.484	55.18	c (to 800°K)
	gas	-	-	-	-	(15)	-	-	-	(-51.80)	(14.0)	-
NpCl ₃	solid	(1073) (k)	(10)	(9.3)	(40)	(22.6)	(6.2)	-	-	(7.014)	(90.6)	-
	liquid	(1800) (k)	(40)	(22)	-	(32)	-	-	-	(3.531)	(140.2)	-
	gas	-	-	-	-	(20)	-	-	-	(-58.07)	(28.1)	-

Table IV (Cont'd.)

Chloride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
NpCl ₄	solid	811 (k)	(11)	(14)	(47)	(26.6)	(7.0)	-	-	(8.242)	(106.6)	-
	liquid	(1120)	(28)	(25)	-	(39)	-	-	-	(4.997)	(170.4)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-40.65)	(18.1)	-
OsCl ₂	solid	(1080)	(8.5)	(7.9)	(31) (a)	(16.4)	(7.4)	-	-	(5.219)	(64.6)	-
	liquid	(dec)	-	-	-	(24)	-	-	-	(0.612)	(101.8)	-
OsCl ₃	solid	dec. 800 (a)	-	-	(40) (a)	(20.8)	(11.6)	-	-	(6.717)	(82.0)	-
OsCl ₄	solid	(370)	(3.3)	(8.9)	(49)	(25.2)	(9.6)	-	-	(7.941)	(97.4)	-
	liquid	(600) (a)	(12)	(20)	-	(35)	-	-	-	(7.610)	(142.9)	-
PCl ₃	gas	-	-	-	-	(20)	(5.0)	-	-	(-12.49)	(29.9)	-
	liquid	348 (a)	7.278 (a)	20.9	52.2 (a)	28.7	-	-	-	8.557	111.4	d
PCl ₅	gas	-	-	-	-	19.15	0.74	-	-1.91	-1.450	35.7	c (to 1000°K)
	solid	432 (b)	16.1 (b)	37.3	40.8 (a)	(33)	-	-	-	(9.839)	(147.2)	-
PaCl ₃	gas	-	-	-	-	23.40	12.00	-	-	(-9.288)	(56.9)	c (to 500°K)
	solid	(1075) (a)	(9.0) (a)	(8.4)	(38) (a)	(23.2)	(5.2)	-	-	(7.148)	(95.7)	-
PaCl ₄	liquid	(1800) (a)	(43) (a)	(24)	-	(32)	-	-	-	(4.603)	(143.2)	-
	gas	-	-	-	-	(20)	-	-	-	(-60.00)	(29.4)	-
PaCl ₄	solid	(950) (a)	(11)	(12)	(47)	(26.3)	(9.0)	-	-	(8.242)	(105.5)	-
	liquid	(1120) (a)	(28) (a)	(25)	-	(39)	-	-	-	(5.235)	(172.4)	-
PaCl ₅	gas	-	-	-	-	(20)	(5.0)	-	-	(-40.91)	(19.6)	-
	solid	574 (a)	(9.4)	(16)	(65) (a)	(34.7)	(13.4)	-	-	(10.942)	(136.7)	-
PbCl ₂	liquid	(650)	(15)	(23)	-	(45)	-	-	-	(5.246)	(178.1)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-23.89)	(-0.4)	-
PbCl ₄	solid	771 (a)	5.65	7.33	32.6 (b)	15.96	8.00	-	-	5.114	60.7	c
	liquid	1227 (a)	29.604 (a)	24.13	-	27.20	-	-	-	5.753	121.9	c (to 900°K)
PbCl ₄	gas	-	-	-	-	(14.5)	-	-	-	(-39.43)	(7.5)	-
	liquid	(400)	(8.2)	(21)	(67)	(40)	-	-	-	(11.926)	(160.9)	-
PdCl ₂	gas	-	-	-	-	(26)	-	-	-	(-1.374)	56.6	-
	solid	951 (b)	9.7 (b)	10	(26)	(16.0)	(8.0)	-	-	(5.126)	(67.5)	-
PdCl ₄	liquid	(1300) (a)	(30)	(23)	-	(26)	-	-	-	(1.319)	(118.3)	-
	gas	-	-	-	-	(15)	-	-	-	(-42.98)	(16.4)	-
PoCl ₂	solid	450 (l)	(3.5)	(7.8)	(31.5)	(16.0)	(7.2)	-	-	(5.124)	(61.8)	-
	liquid	(650)	(16)	(25)	-	(26)	-	-	-	(5.395)	(111.9)	-
PoCl ₄	gas	-	-	-	-	(15)	-	-	-	(-17.755)	(16.0)	-
	solid	567 (l)	(5.2)	(9.2)	(51.5)	(33.8)	(4.0)	-	-	(10.256)	(142.3)	-
PrCl ₃	liquid	(750)	(19)	(25)	-	(45)	-	-	-	(10.76)	(201.8)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-24.175)	(18.5)	-
PrCl ₃	solid	1049 (a)	(8.0) (a)	(7.6)	(34.5)	(21.8)	(8.4)	-	-	(6.873)	(92.2)	-
	liquid	(19.80) (a)	(46) (a)	(23)	-	(32)	-	-	-	(4.951)	(146.7)	-
PtCl ₂	gas	-	-	-	-	(20)	-	-	-	(-64.81)	(32.4)	-
	solid	dec. 856 (a)	-	-	(22) (a)	(11.4)	(2.8)	-	-	(3.524)	(43.8)	-
PtCl ₄	solid	dec. 854 (a)	-	-	(29) (a)	(16.2)	(6.2)	-	-	(5.106)	(65.2)	-
	liquid	dec. 708 (a)	-	-	(42.5)	(22.2)	(7.8)	-	-	(6.966)	(89.8)	-
PtCl ₄	solid	(600) (a)	(18)	(30)	(50) (a)	(26.8)	(7.4)	-	-	(8.320)	(104.9)	-
	gas	dec. 643 (e)	-	-	-	(20)	(5.0)	-	-	(-14.19)	(29.9)	-
PuCl ₃	solid	1033 (m)	15.2 (m)	14.7	(38.8)	(22.7)	(6.2)	-	-	(7.044)	(92.4)	-
	liquid	2040 (m)	46.74 (m)	22.9	-	(32)	-	-	-	(-1.857)	(135.8)	-
PuCl ₄	gas	-	-	-	-	(20)	-	-	-	(-73.08)	(21.5)	-
	solid	(730)	(9.5)	(13)	(48)	(26.9)	(7.0)	-	-	(8.332)	(107.4)	-
RaCl ₂	liquid	(1060)	(30)	(28)	-	(39.5)	-	-	-	(6.165)	(172.4)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-41.70)	(13.5)	-
RbCl	solid	(1300) (a)	(6.0)	(4.6)	(34.5)	(18.4)	(2.6)	-	-	(5.602)	(71.1)	-
	liquid	(1880)	(42)	(22)	-	(24)	-	-	-	(4.685)	(103.3)	-
RbCl	gas	-	-	-	-	(15)	-	-	-	(-54.235)	(13.1)	-
	solid	990 (b)	4.40 (b)	4.44	22.0 (d)	11.5	2.49	-	-	3.539	44.3	d
ReCl ₃	liquid	1654 (a)	36.922 (a)	22.32	-	15.3	-	-	-	1.686	63.6	d
	gas	-	-	-	-	(8.9)	-	-	-	(-45.755)	(-5.9)	-
ReCl ₃	solid	(1000) (a)	(12)	(12)	(38) (a)	(21.8)	(8.6)	-	-	(6.883)	(88.8)	-
	liquid	(1100) (a)	(27) (a)	(25)	-	(32)	-	-	-	(0.783)	(138.6)	-
ReCl ₄	gas	-	-	-	-	(20)	-	-	-	(-39.42)	(30.0)	-
	solid	(450)	(4.0)	(8.9)	(50) (a)	(26.2)	(7.4)	-	-	(8.141)	(101.5)	-
ReCl ₅	liquid	(650)	(14)	(21.5)	-	(36.5)	-	-	-	(8.027)	(152.2)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-15.64)	(27.1)	-
RhCl ₃	solid	(530) (a)	(9.0) (a)	(17)	(66) (a)	(35.8)	(11.0)	-	-	(11.163)	(141.3)	-
	liquid	(600) (a)	(14) (a)	(23)	-	(45)	-	-	-	(5.494)	(176.2)	-
RhCl ₄	gas	-	-	-	-	(20)	(15)	-	-	(-20.81)	(1.9)	-
	solid	(1000)	(4.3)	(4.3)	(20) (a)	(11.7)	(3.0)	-	-	(3.622)	(47.6)	-
RhCl ₄	liquid	dec. 1238 (a)	-	-	-	(15.5)	-	-	-	(1.622)	(66.6)	-
	solid	(1050)	(6.3)	(6.0)	(29) (a)	(17.0)	(6.8)	-	-	(5.371)	(69.9)	-
RhCl ₅	liquid	dec. 1231 (a)	-	-	-	(26)	-	-	-	(4.773)	(119.4)	-
	solid	(990)	(8.9)	(9.0)	(38) (a)	(20.5)	(15.0)	-	-	(6.779)	(83.3)	-
RuCl ₃	liquid	dec. 1221 (a)	-	-	-	(33)	-	-	-	(2.903)	(145.7)	-
	solid	dec. 900°K (a)	-	-	(38) (a)	(20.4)	(13.8)	-	-	(6.696)	(85.3)	-
SbCl ₃	solid	346.4 (b)	3.03 (b)	8.75	44.8 (a)	10.3	51.1	-	-	5.347	29.1	d
	liquid	492 (a)	10.362 (a)	21.1	-	32.0	-	-	-	6.762	129.6	d
SbCl ₅	gas	-	-	-	-	19.83	-	-	-1.19	-9.346	33.3	c (to 1000°K)
	liquid	445 (a)	11.57 (a)	26.0	(75)	(47)	-	-	-	(14.014)	(192.8)	-
ScCl ₃	gas	-	-	-	-	(23.4)	(12)	-	-	(-6.870)	(28.2)	-
	solid	1233 (b)	(16)	(13)	(34)	(18.0)	(13.8)	-	-	(5.980)	(72.7)	-
SeCl ₄	liquid	(1350)	(46) (a)	(34)	-	(32)	-	-	-	(-4.249)	(142.4)	-
	gas	-	-	-	-	(20)	-	-	-	(-66.45)	(21.8)	-
SeCl ₄	solid	403 (a)	(9.1)	(23)	(30) (a)	(15.5)	-	-	-	(4.621)	(58.3)	-
	gas	-	-	-	-	(9.0)	-	-	-	(-6.956)	(-3.3)	-

Table IV (Cont'd.)

Chloride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
SeCl ₄	solid	469 (b)	(21)	(45)	(49)	(29.0)	(1.0)	-	-	(8.691)	(116.5)	-
	gas	dec.	-	-	-	(21)	(5.0)	-	-	(-15.62)	(24.4)	-
SiCl ₄	liquid	330 (a)	6.859 (a)	20.8	57.3 (a)	33.5	-	-	-	9.988	133.6	d
	gas	-	-	-	-	24.25	1.64	-	-2.75	0.999	60.9	c (to 1000°K)
SmCl ₃	solid	1013 (a)	(6)	(5.9)	(31.5)	(16.3)	(8.8)	-	-	(5.251)	(64.0)	-
	liquid	(1700)	(41)	(24)	-	(25)	-	-	-	(3.548)	(109.4)	-
	gas	-	-	-	-	(15)	-	-	-	(-54.45)	(11.0)	-
SmCl ₃	solid	951 (a)	(8.0) (a)	(8.4)	(41)	(22.3)	(10.4)	-	-	(7.111)	(89.2)	-
	liquid	(1830)	(47)	(26)	-	(31.5)	-	-	-	(3.157)	(134.0)	-
	gas	-	-	-	-	(20)	-	-	-	(-64.89)	(21.9)	-
SnCl ₂	solid	520 (d)	3.05 (d)	5.86	(34) (a)	16.2	9.26	-	-	5.242	61.1	d
	liquid	925 (d)	19.8 (d)	21.4	-	(25)	-	-	-	(5.516)	(105.5)	-
	gas	-	-	-	-	(15)	-	-	-	(-23.53)	(16.8)	-
SnCl ₄	liquid	386 (a)	8.325 (a)	21.6	62.0 (d)	38.4	-	-	-	11.449	156.8	d
	gas	-	-	-	-	25.57	0.2	-	-1.87	-1.329	59.5	c (to 1000°K)
SrCl ₂	solid	1145 (a)	4.1 (a)	3.6	(31.7) (d)	(18.2)	(2.45)	-	-	(5.535)	(72.7)	c
	liquid	2300 (a)	(55) (a)	(24)	-	(26.2)	-	-	-	(8.995)	(122.6)	d
	gas	-	-	-	-	(15)	-	-	-	(-71.765)	(12.0)	-
TaCl ₃	solid	(1210)	(6.8)	(5.6)	(31) (a)	(16.4)	(5.6)	-	-	(5.139)	(64.1)	-
	liquid	(1650)	(40)	(24)	-	(25.5)	-	-	-	(5.250)	(116.3)	-
	gas	-	-	-	-	(15)	-	-	-	(-52.075)	(14.2)	-
TaCl ₃	solid	(1300)	(12)	(9.2)	(35.5)	(21.2)	(11.2)	-	-	(6.819)	(88.6)	-
	liquid	(1620)	(40)	(25)	-	(32)	-	-	-	(-0.605)	(142.3)	-
	gas	-	-	-	-	(20)	-	-	-	(-60.046)	(28.9)	-
TaCl ₄	solid	(570)	(5.2)	(9.1)	(47.0) (a)	(26.5)	(9.2)	-	-	(8.310)	(106.7)	-
	liquid	(1050)	(20)	(19)	-	(36)	-	-	-	(7.030)	(152.6)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-27.01)	(27.5)	-
TaCl ₅	solid	494 (d)	8.2 (d)	17	(63) (d)	(34.8)	(12.6)	-	-	(10.936)	(139.0)	-
	liquid	507 (a)	12.5 (a)	25	-	(46)	-	-	-	(6.732)	(185.6)	-
	gas	-	-	-	-	(21)	(11)	-	-	(-17.03)	(10.8)	-
TcCl ₃	solid	(1220)	(13)	(11)	(36) (a)	(20.2)	(14.2)	-	-	(6.654)	(83.3)	-
	liquid	(1475)	(36)	(24)	-	(32)	-	-	-	(-2.518)	(139.2)	-
	gas	-	-	-	-	(20)	-	-	-	(-56.22)	(27.3)	-
TcCl ₅	solid	(425)	(7.8)	(18)	(63.5)	(33.0)	(15.2)	-	-	(10.515)	(129.1)	-
	liquid	(505)	(12)	(24)	-	(44.5)	-	-	-	(6.230)	(173.9)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-16.87)	(2.7)	-
TeCl ₂	solid	448 (a)	(3.5)	(7.8)	(29)	(15.7)	(6.8)	-	-	(4.883)	(62.5)	-
	liquid	595 (a)	15.3 (a)	25.7	-	(26)	-	-	-	(5.329)	(114.5)	-
	gas	-	-	-	-	(15)	-	-	-	(-16.57)	(18.5)	-
TeCl ₄	solid	497.3 (b)	4.51 (b)	9.07	52.0 (d)	33.2	-	-	-	9.899	137.2	c
	liquid	665 (a)	16.83 (a)	25.3	-	53.2	-	-	-	15.335	252.3	c (to 550°K)
	gas	-	-	-	-	(18.5)	(3.5)	-	-	(-23.77)	(3.8)	-
ThCl ₃	solid	(1100) (a)	(9.0) (a)	(8.2)	(37)	(22.7)	(6.2)	-	-	(7.044)	(94.2)	-
	liquid	(1890) (a)	(46) (a)	(24)	-	(32)	-	-	-	(4.523)	(144.3)	-
	gas	-	-	-	-	(20)	-	-	-	(-64.16)	(29.5)	-
ThCl ₄	solid	1043 (b)	(13)	(12)	(46.5)	(26.0)	(8.0)	-	-	(8.108)	(104.0)	-
	liquid	1195 (a)	36.5 (a)	30.5	-	(40)	-	-	-	(5.359)	(180.5)	-
	gas	-	-	-	-	(20)	(5.0)	-	-	(-51.47)	(14.2)	-
TiCl ₂	solid	(1030)	(7.5)	(7.3)	24.7 (n)	(15.6)	(4.8)	-	-	(4.865)	(65.6)	-
	liquid	(1600) (o)	(35)	(22)	-	(23)	-	-	-	(2.441)	(104.7)	-
	gas	-	-	-	-	(14)	-	-	-	(-46.96)	(16.5)	-
TiCl ₃	solid	(1200) (a)	(12)	(10)	34.4 (n)	(20.7)	(7.4)	-	-	(6.501)	(85.8)	-
	liquid	(1600)	(49)	(31)	-	(31)	-	-	-	(1.533)	(139.9)	-
	gas	-	-	-	-	(20)	-	-	-	(-65.07)	(28.1)	-
TiCl ₄	liquid	409 (a)	8.346 (a)	20.4	60.4 (b)	35.7	-	-	-	-10.644	143.0	d
	gas	-	-	-	-	25.45	0.24	-	-2.36	-1.297	61.8	c (to 2000°K)
TiCl ₄	solid	700 (a)	4.26 (a)	6.08	25.6 (a)	12.00	2.00	-	-	3.667	43.4	c
	liquid	1080 (a)	24.424	22.62	-	14.2	-	-	-	0.457	50.3	c (to 850°K)
	gas	-	-	-	-	8.94	-	-	-0.25	-29.625	-9.0	c (to 2000°K)
TiCl ₃	solid	dec. c. 350 (a)	-	-	45.0 (a)	(22.0)	(12.4)	-	-	(7.111)	(84.0)	-
UCl ₃	solid	1108 (p)	(9.0) (p)	(8.1)	38.01 (q)	20.98	7.44	-	1.16	6.197	83.10	c (to 1000°K)
	liquid	(2000) (p)	(47)	(24)	-	(34)	-	-	-	(7.161)	(158.0)	-
	gas	-	-	-	-	(20)	-	-	-	(-67.84)	(28.1)	-
UCl ₄	solid	863 (p)	(11.5)	(13.3)	47.14 (q)	26.64	9.60	-	-	8.370	107.51	c (to 700°K)
	liquid	1060 (p)	33.0 (p)	31.1	-	(40)	-	-	-	(4.825)	(176.2)	-
	gas	-	-	-	-	(26)	-	-	-	(-43.015)	(47.6)	-
UCl ₅	solid	(560)	(8.6)	(15)	(62) (p)	(34.8)	(11.2)	-	-	(10.874)	(139.6)	-
	liquid	(690)	(16)	(23)	-	(47)	-	-	-	(7.350)	(195.2)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-25.85)	(2.4)	-
UCl ₆	solid	452 (p)	(5.0) (p)	(11)	68.26 (r)	(35.4)	(11.8)	-	-	(11.080)	(137.0)	-
	liquid	(550) (p)	(12)	(22)	-	(54)	-	-	-	(13.27)	(234.3)	-
	gas	-	-	-	-	(30)	(5.0)	-	-	(-11.15)	(63.8)	-
VCl ₂	solid	(1273) (d)	(8.0)	(6.3)	23.2 (b)	17.25	2.72	-	-0.71	5.502	76.3	c
	liquid	(1650) (a)	(35) (a)	(21)	-	(23.5)	-	-	-	(3.199)	(111.2)	-
	gas	-	-	-	-	(15)	-	-	-	(-45.83)	(27.0)	-
VCl ₃	solid	dec. > 500 (a)	-	-	31.3 (b)	22.99	3.92	-	-1.68	7.592	101.8	c
	liquid	437 (d)	8.2 (d)	19	61 (a)	(37)	-	-	-	(11.032)	(149.8)	-
	gas	-	-	-	-	(26)	-	-	-	(-1.975)	(64.2)	-
WCl ₂	solid	dec. (a)	-	-	(31) (a)	(16.0)	(6.8)	-	-	(5.073)	(62.2)	-
WCl ₄	solid	dec. (a)	-	-	(49)	(26.2)	(8.0)	-	-	(8.147)	(102.7)	-

Table IV (Cont'd.)

Chloride	Phase	Temperature of Transition (°K)	Heat of Transition (kcal/mole)	Entropy of Transition (e.u.)	Entropy at 298°K (e.u.)	a	b	c	d	A (kcal/mole)	B (e.u.)	Reference for Heat Capacity
WCl ₅	solid	500 (a)	(8.9)	(18)	(64)	(34.7)	(12.2)	-	-	(10.888)	(137.3)	-
	liquid	549 (b)	(15)	(27)	-	(46)	-	-	-	(6.113)	(183.6)	-
	gas	-	-	-	-	(20)	(10)	-	-	(-21.65)	(-2.2)	-
WCl ₆	solid	548 (a)	(7.8)	(14)	(70.5)	(40.2)	(14.4)	-	-	(12.626)	(162.8)	-
	liquid	dec. 600 (a)	-	-	-	(53)	-	-	-	(9.678)	(221.4)	-
YCl ₃	solid	973 (a)	(9.0) (a)	(9.2)	(38) (a)	(20.2)	(14.2)	-	-	(6.654)	(81.3)	-
	liquid	(1725)	(45) (a)	(26)	-	(33)	-	-	-	(3.385)	(146.3)	-
ZnCl ₂	gas	-	-	-	-	(20)	-	-	-	(-64.04)	(23.3)	-
	solid	556 (a)	5.54 (a)	9.96	25.9 (b)	15.9	8.00	-	-	5.096	67.1	d
	liquid	1005 (a)	28.71 (a)	28.57	-	(24)	-	-	-	(2.824)	(103.9)	-
ZrCl ₂	gas	-	-	-	-	(15)	-	-	-	(-34.93)	(13.1)	-
	solid	(1000) (a)	(6.4)	(6.4)	(27.0) (a)	(17.3)	(4.2)	-	-	(5.345)	(72.8)	-
	liquid	(1660)	(35)	(21)	-	(25)	-	-	-	(4.545)	(115.4)	-
ZrCl ₃	gas	-	-	-	-	(15)	-	-	-	(-47.055)	(20.2)	-
	solid	(900) (a)	(8.9)	(9.9)	(34.5)	(21.4)	(13.0)	-	-	(6.958)	(91.3)	-
	liquid	(1480)	(43)	(29)	-	(31.5)	-	-	-	(1.884)	(138.4)	-
ZrCl ₄	gas	-	-	-	-	(20)	-	-	-	(-58.14)	(25.4)	-
	solid	604 (a)	25.29 (a)	41.9	44.5 (b)	31.92	-	-	-2.91	10.493	139.0	e
	gas	-	-	-	-	(26)	-	-	-	(-18.855)	(58.8)	-

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Table V
THERMOCHEMICAL PROPERTIES OF THE OXIDES

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-A)$
$2Ac(s) + 3/2O_2(g) = Ac_2O_3(s)$	298 - 1090	444 (a)	(426)	(-3.2)	(14.0)	-	(2.8)	(1.126)	(44.6)	(41.4)
$2Ac(l) + 3/2O_2(g) = Ac_2O_3(s)$	1090 - 2250	-	-	(-8.4)	(20.0)	-	(2.8)	(-1.770)	(19.4)	(11.0)
$2Ac(l) + 3/2O_2(g) = Ac_2O_3(l)$	2250 - 2500	-	-	(11.6)	(-0.4)	-	(2.8)	(24.87)	(119.0)	(130.6)
$2Ag(s) + 1/2O_2(g) = Ag_2O(s)$	298 - 500	7.306 (b)	2.65	-1.06	2.83	-	0.218	0.214	10.50	9.44
$2Ag(s) + O_2(g) = Ag_2O_2(s)$	298 - 500	(5.5)	(-9.0)	(-2.0)	(7.8)	-	(1.5)	(0.551)	(39.0)	(37.0)
$2Al(s) + 3/2O_2(g) = Al_2O_3(s)$	298 - 931.7	400.2 (a)	378.0	3.84	-1.92	-	-4.5	-2.704	98.64	102.47
$2Al(l) + 3/2O_2(g) = Al_2O_3(s)$	931.7 - 2300	-	-	-0.3	4.001	-	-4.454	-6.572	81.50	81.21
$2Al(l) + 3/2O_2(g) = Al_2O_3(l)$	2300 - 2500	-	-	(6.6)	(-0.387)	-	(2.816)	(15.506)	(113.6)	(120.2)
$2Am(s) + 3/2O_2(g) = Am_2O_3(s)$	298 - 1200	(420) (a)	(401.5)	(-2.2)	(6.4)	-	(2.8)	(1.167)	(50.3)	(48.1)
$2Am(l) + 3/2O_2(g) = Am_2O_3(s)$	1200 - 2225	-	-	(-9.4)	(15.2)	-	(2.8)	(-1.329)	(13.7)	(4.3)
$2Am(l) + 3/2O_2(g) = Am_2O_3(l)$	2225 - 2500	-	-	(9.1)	(-0.4)	-	(2.8)	(13.124)	(113.9)	(123.0)
$Am(s) + O_2(g) = AmO_2(s)$	298 - 1200	239.9 (c)	(227.5)	(0.8)	(2.1)	-	(1.9)	(0.187)	(46.4)	(47.2)
$Am(l) + O_2(g) = AmO_2(s)$	1200 - 2500	-	-	(-2.8)	(6.5)	-	(1.9)	(-1.061)	(28.0)	(25.3)
$2As(s) + 3/2O_2(g) = As_2O_3(s, \alpha)$	298 - 503	156 (a)	137	-14.4	43.5	-	2.8	3.146	-5.9	-20.2
$2As(s) + 3/2O_2(g) = As_2O_3(s, \beta)$	503 - 586	-	-	-14.4	43.5	-	2.8	7.246	-14.1	-28.4
$2As(s) + 3/2O_2(g) = As_2O_3(l)$	586 - 730	-	-	(16.3)	(-5.1)	-	(2.8)	(2.042)	(145.1)	(161.4)
$2As(s) + 3/2O_2(g) = As_2O_3(g)$	730 - 883	-	-	(-1.2)	(-5.1)	-	(2.8)	(21.966)	(20.0)	(18.8)
$1/2As_4(g) + 3/2O_2(g) = As_2O_3(g)$	883 - 2500	-	-	(0.3)	(-1.1)	-	(2.8)	(-3.544)	(52.4)	(52.8)
$As(s) + O_2(g) = AsO_2(s)$	298 - 883	87.8 (d)	(74.7)	(-4.9)	(6.8)	-	(1.9)	(1.701)	(17.2)	(12.2)
$1/4As_4(g) + O_2(g) = AsO_2(s)$	883 - 1200	-	-	(-4.1)	(8.8)	-	(1.9)	(-7.510)	(33.3)	(29.2)
$1/4As_4(g) + O_2(g) = AsO_2(l)$	1200 - 2000	-	-	(8.4)	(-0.6)	-	(1.9)	(-6.742)	(103.2)	(111.5)
$2As(s) + 5/2O_2(g) = As_2O_5(s)$	298 - 883	21.85 (a)	(184.7)	(0.1)	(11.1)	-	(-0.7)	(-1.003)	(118.2)	(118.3)
$1/2As_4(g) + 5/2O_2(g) = As_2O_5(s)$	883 - 1200	-	-	(1.7)	(15.0)	-	(-0.7)	(-19.425)	(150.6)	(151.2)
$2Au(s) + 3/2O_2(g) = Au_2O_3(s)$	298 - 500	0.8 (d)	(-18.8)	(-1.2)	(4.8)	(-1.8)	(2.8)	(0.952)	(59.1)	(57.9)
$2B(s) + 3/2O_2(g) = B_2O_3(s)$	298 - 723	302.0 (e)	283.3	-6.76	16.2	-	(1.51)	1.649	28.82	22.07
$2B(s) + 3/2O_2(g) = B_2O_3(l)$	723 - 2313	-	-	15.02	-9.2	-	2.8	-2.002	145.38	160.39
$2B(l) + 3/2O_2(g) = B_2O_3(l)$	2313 - 2500	-	-	(6.1)	(-0.4)	-	(2.8)	(-12.51)	(99.9)	(106.0)
$2Ba(s, \alpha) + 1/2O_2(g) = Ba_2O(s)$	298 - 648	147 (b)	(137)	(4.8)	(-0.9)	-	(0.9)	(-1.114)	(58.5)	(63.3)
$2Ba(s, \beta) + 1/2O_2(g) = Ba_2O(s)$	648 - 880	-	-	(4.8)	(-0.9)	-	(0.9)	(-1.394)	(59.7)	(64.4)
$2Ba(s, \beta) + 1/2O_2(g) = Ba_2O(l)$	880 - 977	-	-	(6.8)	(-3.1)	-	(0.9)	(2.898)	(65.4)	(72.1)
$2Ba(l) + 1/2O_2(g) = Ba_2O(l)$	977 - 1040	-	-	(3.1)	(-0.1)	-	(0.9)	(1.421)	(46.6)	(49.6)
$2Ba(l) + 1/2O_2(g) = Ba_2O(g)$	1040 - 1911	-	-	(-3.9)	(-0.1)	-	(0.9)	(28.70)	(-21.2)	(-25.2)
$2Ba(g) + 1/2O_2(g) = Ba_2O(g)$	1911 - 2500	-	-	(0.9)	(-0.1)	-	(0.9)	(-52.28)	(52.8)	(53.7)
$Ba(s, \alpha) + 1/2O_2(g) = BaO(s)$	298 - 648	133.4 (b)	126.4	3.06	-0.59	-	-1.046	-1.285	41.5	44.5
$Ba(s, \beta) + 1/2O_2(g) = BaO(s)$	648 - 977	-	-	3.06	-0.59	-	-1.046	-1.425	41.7	44.7
$Ba(l) + 1/2O_2(g) = BaO(s)$	977 - 1911	-	-	(1.2)	(0.9)	-	(-1.0)	(-2.164)	(32.3)	(33.6)
$Ba(g) + 1/2O_2(g) = BaO(s)$	1911 - 2196	-	-	(3.6)	(0.9)	-	(-1.0)	(-42.66)	(69.3)	(72.9)
$Ba(g) + 1/2O_2(g) = BaO(l)$	2196 - 2500	-	-	(4.8)	(-0.1)	-	(0.9)	(-28.80)	(69.6)	(74.4)
$Ba(s, \alpha) + O_2(g) = BaO_2(s)$	298 - 648	1505 (b)	(136.7)	(-0.2)	(0.2)	-	(1.9)	(0.585)	(44.2)	(44.0)
$Ba(s, \beta) + O_2(g) = BaO_2(s)$	648 - 723	-	-	(-0.2)	(0.2)	-	(1.9)	(0.445)	(44.4)	(44.2)
$Ba(s, \beta) + O_2(g) = BaO_2(l)$	723 - 977	-	-	(7.2)	(-1.8)	-	(1.9)	(1.348)	(83.8)	(91.0)
$Ba(l) + O_2(g) = BaO_2(l)$	977 - 1911	-	-	(5.3)	(-0.3)	-	(1.9)	(0.609)	(74.4)	(79.8)
$Be(s) + 1/2O_2(g) = BeO(s)$	278 - 1556	143.1 (f)	136.0	-0.52	2.31	-	-1.04	-0.348	22.12	21.60
$Be(l) + 1/2O_2(g) = BeO(s)$	1556 - 2500	-	-	(-0.7)	(3.5)	-	(-2.2)	(-3.911)	(24.06)	(23.34)
$Bi(s) + 1/2O_2(g) = BiO(s)$	298 - 544.2	50 (a)	(43)	(0.2)	(0.3)	-	(0.9)	(0.199)	(23.8)	(24.0)
$Bi(l) + 1/2O_2(g) = BiO(s)$	544.2 - 1175	-	-	(-2.0)	(2.9)	-	(0.9)	(-1.608)	(16.0)	(13.9)
$Bi(l) + 1/2O_2(g) = BiO(l)$	1175 - 1900	-	-	(2.3)	(-0.1)	-	(0.9)	(-0.889)	(39.7)	(41.9)
$Bi(g) + 1/2O_2(g) = BiO(l)$	1900 - 1920	-	-	(4.9)	(-0.1)	-	(0.9)	(-46.99)	(81.2)	(86.1)
$Bi(g) + 1/2O_2(g) = BiO(g)$	1920 - 2500	-	-	(-0.2)	(-0.1)	-	(0.9)	(16.80)	(14.5)	(14.3)
$2Bi(s) + 3/2O_2(g) = Bi_2O_3(s)$	298 - 544.2	138 (a)	119	0.10	5.46	-	2.82	0.521	65.2	65.3
$2Bi(l) + 3/2O_2(g) = Bi_2O_3(s)$	544.2 - 1090	-	-	-4.34	10.7	-	2.82	-3.093	49.6	45.2
$2Bi(l) + 3/2O_2(g) = Bi_2O_3(l)$	1090 - 1833	-	-	(8.1)	(-0.39)	-	(2.82)	(-3.278)	(118.2)	(126.3)
$2Bi(g) + 3/2O_2(g) = Bi_2O_3(l)$	1833 - 2163	-	-	(13.4)	(-0.39)	-	(2.82)	(-95.13)	(202.8)	(216.1)
$C(s) + 1/2O_2(g) = CO(g)$	298 - 2500	26.416 (b)	32.9	-1.64	0.1	-	3.0	1.454	-32.45	-34.08
$C(s) + 1/2O_2(g) = CO_2(g)$	298 - 2500	94.052 (b)	94.3	-4.67	4.0	-0.83	4.0	2.489	-28.37	-33.04
$Ca(s, \alpha) + 1/2O_2(g) = CaO(s)$	298 - 723	151.7 (a)	144.3	0.62	1.21	-	-0.1	-0.338	28.9	29.6
$Ca(s, \beta) + 1/2O_2(g) = CaO(s)$	723 - 1123	-	-	-0.42	3.31	-	-0.1	-0.366	23.9	23.4
$Ca(l) + 1/2O_2(g) = CaO(s)$	1123 - 1755	-	-	-1.5	4.7	-	-0.1	-2.202	19.6	18.1
$Ca(g) + 1/2O_2(g) = CaO(s)$	1755 - 2500	-	-	(0.9)	(4.7)	-	(-0.1)	(-45.07)	(59.8)	(60.7)

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Ca(s, } \alpha) + \text{O}_2(\text{g}) = \text{CaO}_2(\text{s})$	298 - 723	156.4 (a)	(144.2)	(-0.9)	(1.4)	-	(1.9)	(0.737)	(35.6)	(34.7)
$\text{Cd(s)} + 1/2\text{O}_2(\text{g}) = \text{CdO(s)}$	298 - 594.1	62.2 (a)	55.2	0.20	-0.99	-	0.9	0.247	24.1	24.3
$\text{Cd(l)} + 1/2\text{O}_2(\text{g}) = \text{CdO(s)}$	594.1 - 1040	-	-	-1.58	2.0	-	0.9	-0.668	16.8	15.2
$\text{Cd(g)} + 1/2\text{O}_2(\text{g}) = \text{CdO(s)}$	1040 - 1832	-	-	(0.55)	(2.0)	-	(0.9)	(-26.72)	(54.8)	(55.1)
$2\text{Ce(s)} + 3/2\text{O}_2(\text{g}) = \text{Ce}_2\text{O}_3(\text{s})$	298 - 1048	435 (a)	415	(1.8)	(-3.4)	-	(2.8)	(0.410)	(75.1)	(76.9)
$2\text{Ce(l)} + 3/2\text{O}_2(\text{g}) = \text{Ce}_2\text{O}_3(\text{s})$	1048 - 1960	-	-	(-5.2)	(8.6)	-	(2.8)	(-3.044)	(43.1)	(37.9)
$2\text{Ce(l)} + 3/2\text{O}_2(\text{g}) = \text{Ce}_2\text{O}_3(\text{l})$	1960 - 2500	-	-	(8.8)	(-0.4)	-	(2.8)	(6.805)	(121.4)	(130.2)
$\text{Ce(s)} + \text{O}_2(\text{g}) = \text{CeO}_2(\text{s})$	298 - 1048	260.18 (g)	246.9	2.3	-3.8	-	1.9	0.007	56.2	58.5
$\text{Ce(l)} + \text{O}_2(\text{g}) = \text{CeO}_2(\text{s})$	1048 - 2500	-	-	(-1.2)	(2.2)	-	(1.9)	(-1.720)	(40.2)	(39.0)
$\text{Co(s, } \alpha) + 1/2\text{O}_2(\text{g}) = \text{CoO(s)}$	298 - 723	57.2 (b)	(51.1)	(0.9)	(-2.2)	-	(0.9)	(0.082)	(25.0)	(25.9)
$\text{Co(s, } \beta) + 1/2\text{O}_2(\text{g}) = \text{CoO(s)}$	723 - 1398	-	-	(2.4)	(-3.8)	-	(0.9)	(-0.542)	(33.3)	(35.6)
$\text{Co(s, } \gamma) + 1/2\text{O}_2(\text{g}) = \text{CoO(s)}$	1398 - 1766	-	-	(-3.9)	(2.1)	-	(0.9)	(2.445)	(-4.1)	(-8.1)
$\text{Co(l)} + 1/2\text{O}_2(\text{g}) = \text{CoO(s)}$	1766 - 2078	-	-	(-2.6)	(2.1)	-	(0.9)	(-3.550)	(7.7)	(5.0)
$\text{Co(l)} + 1/2\text{O}_2(\text{g}) = \text{CoO(l)}$	2078 - 2500	-	-	(3.1)	(-0.1)	-	(0.9)	(1.356)	(40.9)	(43.9)
$3\text{Co(s, } \alpha) + 2\text{O}_2(\text{g}) = \text{Co}_3\text{O}_4(\text{s})$	298 - 723	204 (a)	(180)	(-1.2)	(3.6)	-	(3.8)	(1.257)	(74.9)	(73.7)
$3\text{Co(s, } \beta) + 2\text{O}_2(\text{g}) = \text{Co}_3\text{O}_4(\text{s})$	723 - 1398	-	-	(3.1)	(-1.1)	-	(3.8)	(-0.615)	(99.8)	(102.9)
$2\text{Cr(s)} + 3/2\text{O}_2(\text{g}) = \text{Cr}_2\text{O}_3(\text{s})$	298 - 2173	270.0 (a)	250.6	0.42	-2.91	-	-0.04	1.650	95.5	101.0
$2\text{Cr(l)} + 3/2\text{O}_2(\text{g}) = \text{Cr}_2\text{O}_3(\text{s})$	2173 - 2495	-	-	(-2.68)	(1.8)	-	(-0.9)	(-2.234)	(46.8)	(44.1)
$2\text{Cr(g)} + 3/2\text{O}_2(\text{g}) = \text{Cr}_2\text{O}_3(\text{s})$	2495 - 2500	-	-	(6.19)	(1.8)	-	(-0.9)	(-170.29)	(174.6)	(180.8)
$\text{Cr(s)} + \text{O}_2(\text{g}) = \text{CrO}_2(\text{s})$	298 - 1660	141 (a)	(128)	(2.5)	(0.4)	-	(-0.7)	(-1.091)	(57.8)	(60.3)
$\text{Cr(s)} + 3/2\text{O}_2(\text{g}) = \text{CrO}_3(\text{s})$	298 - 460	138.4 (b)	(120.2)	(0.3)	(1.3)	-	(1.3)	(0.113)	(63.3)	(63.6)
$\text{Cr(s)} + 3/2\text{O}_2(\text{g}) = \text{CrO}_3(\text{l})$	460 - 1000	-	-	(9.2)	(-2.7)	-	(3.3)	(2.977)	(102.4)	(111.6)
$2\text{Cs(s)} + 1/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O(s)}$	298 - 301.9	75.9 (b)	(63.7)	(-2.5)	(5.3)	-	(0.9)	(0.768)	(28.0)	(25.5)
$2\text{Cs(l)} + 1/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O(s)}$	301.9 - 763	-	-	(-3.6)	(5.3)	-	(0.9)	(0.118)	(24.8)	(21.1)
$2\text{Cs(l)} + 1/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O(l)}$	763 - 915	-	-	(1.9)	(-0.1)	-	(0.9)	(2.073)	(51.2)	(53.0)
$2\text{Cs(l)} + 1/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O(g)}$	915 - 963	-	-	(-5.1)	(-0.1)	-	(0.9)	(25.49)	(-15.1)	(-20.3)
$2\text{Cs(s)} + \text{O}_2(\text{g}) = \text{Cs}_2\text{O}_2(\text{s})$	298 - 301.9	96.2 (b)	(81.9)	(-1.7)	(11.1)	-	(1.9)	(0.544)	(41.0)	(39.3)
$2\text{Cs(l)} + \text{O}_2(\text{g}) = \text{Cs}_2\text{O}_2(\text{s})$	301.9 - 867	-	-	(-2.9)	(11.1)	-	(1.9)	(-0.106)	(37.8)	(35.0)
$2\text{Cs(l)} + \text{O}_2(\text{g}) = \text{Cs}_2\text{O}_2(\text{l})$	867 - 963	-	-	(5.2)	(-0.3)	-	(1.9)	(2.656)	(76.4)	(81.6)
$2\text{Cs(g)} + \text{O}_2(\text{g}) = \text{Cs}_2\text{O}_2(\text{l})$	963 - 2500	-	-	(11.3)	(-0.3)	-	(1.9)	(-35.82)	(151.8)	(163.0)
$2\text{Cs(s)} + 3/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O}_3(\text{s})$	298 - 301.9	111.2 (b)	(91.6)	(-3.2)	(22.2)	-	(2.8)	(0.774)	(52.6)	(49.4)
$2\text{Cs(l)} + 3/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O}_3(\text{s})$	301.9 - 775	-	-	(-4.4)	(22.2)	-	(2.8)	(0.124)	(49.4)	(45.0)
$2\text{Cs(l)} + 3/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O}_3(\text{l})$	775 - 963	-	-	(6.6)	(-0.4)	-	(2.8)	(6.136)	(95.1)	(101.7)
$2\text{Cs(g)} + 3/2\text{O}_2(\text{g}) = \text{Cs}_2\text{O}_3(\text{l})$	963 - 2075	-	-	(12.7)	(-0.4)	-	(2.8)	(-32.34)	(170.5)	(183.2)
$\text{Cs(s)} + \text{O}_2(\text{g}) = \text{CsO}_2(\text{s})$	298 - 301.9	65.0 (f)	(51.8)	(-2.3)	(8.3)	-	(1.9)	(0.841)	(33.2)	(30.9)
$\text{Cs(l)} + \text{O}_2(\text{g}) = \text{CsO}_2(\text{s})$	301.9 - 705	-	-	(-2.9)	(8.3)	-	(1.9)	(0.516)	(31.6)	(28.7)
$\text{Cs(l)} + \text{O}_2(\text{g}) = \text{CsO}_2(\text{l})$	705 - 963	-	-	(5.2)	(-0.3)	-	(1.9)	(1.173)	(72.6)	(77.9)
$\text{Cs(g)} + \text{O}_2(\text{g}) = \text{CsO}_2(\text{l})$	963 - 2500	-	-	(8.3)	(-0.3)	-	(1.9)	(-18.07)	(110.4)	(118.6)
$2\text{Cu(s)} + 1/2\text{O}_2(\text{g}) = \text{Cu}_2\text{O(s)}$	298 - 1356.2	39.84 (b)	34.5	-0.62	3.1	-	0.9	0.313	14.9	14.3
$2\text{Cu(l)} + 1/2\text{O}_2(\text{g}) = \text{Cu}_2\text{O(s)}$	1356.2 - 1503	-	-	-4.8	6.1	-	0.9	-2.999	-6.6	-11.4
$2\text{Cu(l)} + 1/2\text{O}_2(\text{g}) = \text{Cu}_2\text{O(l)}$	1503 - 2500	-	-	(2.9)	(-0.1)	-	(0.9)	(5.891)	(31.2)	(34.0)
$\text{Cu(s)} + 1/2\text{O}_2(\text{g}) = \text{CuO(s)}$	298 - 1356.2	37.1 (b)	30.6	-0.28	2.17	-	0.9	0.207	20.9	20.6
$\text{Cu(l)} + 1/2\text{O}_2(\text{g}) = \text{CuO(s)}$	1356.2 - 1609	-	-	-2.4	4.7	-	0.9	-1.449	10.1	7.8
$\text{Cu(l)} + 1/2\text{O}_2(\text{g}) = \text{CuO(l)}$	1609 - 2200	-	-	(2.9)	(-0.1)	-	(0.9)	(5.249)	(35.5)	(38.4)
$\text{Fe(s, } \alpha) + 1/2\text{O}_2(\text{g}) = \text{FeO(s)}$	298 - 1033	63.7 (b)	58.3	4.88	-5.61	-	0.13	-1.146	44.1	49.0
$\text{Fe(s, } \beta) + 1/2\text{O}_2(\text{g}) = \text{FeO(s)}$	1033 - 1180	-	-	-2.2	1.5	-	0.6	1.958	3.0	0.9
$\text{Fe(s, } \gamma) + 1/2\text{O}_2(\text{g}) = \text{FeO(s)}$	1180 - 1641	-	-	3.40	-1.51	-	0.6	-2.718	38.9	42.3
$\text{Fe(s, } \gamma) + 1/2\text{O}_2(\text{g}) = \text{FeO(l)}$	1641 - 1673	-	-	(5.5)	(-3.1)	-	(0.9)	(3.507)	(47.3)	(52.8)
$\text{Fe(s, } \delta) + 1/2\text{O}_2(\text{g}) = \text{FeO(l)}$	1673 - 1808	-	-	(0.1)	(-0.1)	-	(0.9)	(8.285)	(12.0)	(12.0)
$\text{Fe(l)} + 1/2\text{O}_2(\text{g}) = \text{FeO(l)}$	1808 - 2500	-	-	(0.4)	(-0.1)	-	(0.9)	(3.882)	(16.3)	(16.7)
$3\text{Fe(s, } \alpha) + 2\text{O}_2(\text{g}) = \text{Fe}_3\text{O}_4(\text{s, } \alpha)$	298 - 900	268 (a)	244	-4.77	26.38	-	2.5	0.876	61.7	57.0
$3\text{Fe(s, } \alpha) + 2\text{O}_2(\text{g}) = \text{Fe}_3\text{O}_4(\text{s, } \beta)$	900 - 1033	-	-	21.35	-21.8	-	2.5	-3.110	196.0	217.4
$3\text{Fe(s, } \beta) + 2\text{O}_2(\text{g}) = \text{Fe}_3\text{O}_4(\text{s, } \beta)$	1033 - 1180	-	-	0.26	-0.5	-	3.8	6.205	72.8	73.1
$3\text{Fe(s, } \gamma) + 2\text{O}_2(\text{g}) = \text{Fe}_3\text{O}_4(\text{s, } \beta)$	1180 - 1673	-	-	16.91	-9.5	-	3.8	-7.826	180.5	197.4
$3\text{Fe(s, } \delta) + 2\text{O}_2(\text{g}) = \text{Fe}_3\text{O}_4(\text{s, } \beta)$	1673 - 1808	-	-	0.56	-0.5	-	3.8	6.508	74.5	75.0
$3\text{Fe(l)} + 2\text{O}_2(\text{g}) = \text{Fe}_3\text{O}_4(\text{s, } \beta)$	1808 - 1870	-	-	(1.46)	(-0.5)	-	(3.8)	(-6.701)	(87.6)	(89.1)
$2\text{Fe(s, } \alpha) + 3/2\text{O}_2(\text{g}) = \text{Fe}_2\text{O}_3(\text{s, } \alpha)$	298 - 950	196.5 (b)	177.3	4.34	4.0	-	-1.59	-2.158	91.8	96.2
$2\text{Fe(s, } \alpha) + 3/2\text{O}_2(\text{g}) = \text{Fe}_2\text{O}_3(\text{s, } \beta)$	950 - 1033	-	-	16.86	-14.6	-	2.0	-5.116	159.6	176.5
$2\text{Fe(s, } \beta) + 3/2\text{O}_2(\text{g}) = \text{Fe}_2\text{O}_3(\text{s, } \beta)$	1033 - 1050	-	-	2.80	-0.4	-	2.8	1.094	77.4	80.2
$2\text{Fe(s, } \beta) + 3/2\text{O}_2(\text{g}) = \text{Fe}_2\text{O}_3(\text{s, } \gamma)$	1050 - 1180	-	-	-1.50	1.4	-	2.8	4.606	49.5	48.0
$2\text{Fe(s, } \gamma) + 3/2\text{O}_2(\text{g}) = \text{Fe}_2\text{O}_3(\text{s, } \gamma)$	1180 - 1673	-	-	9.60	-4.6	-	2.8	-4.748	121.3	130.9
$2\text{Fe(s, } \delta) + 3/2\text{O}_2(\text{g}) = \text{Fe}_2\text{O}_3(\text{s, } \gamma)$	1673 - 1808	-	-	-1.30	-1.4	-	2.8	4.808	50.6	49.3

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$2Ga(s) + 1/2O_2(g) = Ga_2O(s)$	298 - 302.94	82.0 (a)	(75.6)	(-0.8)	(1.8)	-	(0.9)	(0.427)	(17.1)	(16.2)
$2Ga(l) + 1/2O_2(g) = Ga_2O(s)$	302.94 - 925	-	-	(-3.6)	(8.5)	-	(0.9)	(-1.697)	(11.8)	(8.2)
$2Ga(l) + 1/2O_2(g) = Ga_2O(l)$	925 - 1000	-	-	(4.1)	(-0.1)	-	(0.9)	(3.359)	(47.2)	(51.3)
$2Ga(l) + 1/2O_2(g) = Ga_2O(g)$	1000 - 2500	-	-	(-3.4)	(-0.1)	-	(0.9)	(30.86)	(-24.6)	(-28.0)
$2Ga(s) + 3/2O_2(g) = Ga_2O_3(s)$	298 - 302.94	258 (b)	236	-11.11	18.2	-	2.8	3.300	13.46	2.35
$2Ga(l) + 3/2O_2(g) = Ga_2O_3(s)$	302.94 - 2013	-	-	(-13.92)	(24.8)	-	(2.8)	(1.176)	(8.20)	(-5.73)
$2Ga(l) + 3/2O_2(g) = Ga_2O_3(l)$	2013 - 2500	-	-	(9.8)	(-0.4)	-	(2.8)	(26.56)	(127.0)	(136.8)
$Ge(s) + 1/2O_2(g) = GeO(s)$	298 - 983	61 (a)	(54.5)	(0.4)	(1.3)	-	(0.4)	(-0.116)	(24.4)	(24.8)
$Ge(s) + 1/2O_2(g) = GeO(g)$	983 - 1232	-	-	(-1.8)	(-0.9)	-	(0.7)	(52.94)	(-43.6)	(-45.4)
$Ge(l) + 1/2O_2(g) = GeO(g)$	1232 - 2500	-	-	(-3.2)	(0.3)	-	(0.7)	(45.51)	(-45.5)	(-48.7)
$Ge(s) + O_2(g) = GeO_2(s, \alpha \text{ and } \beta)$	298 - 1232	128.6 (a)	114.8	-3.0	5.78	-	1.9	1.113	30.5	27.5
$Ge(l) + O_2(g) = GeO_2(s, \alpha \text{ and } \beta)$	1232 - 1389	-	-	(-4.4)	(6.9)	-	(1.9)	(-6.319)	(28.5)	(24.2)
$Ge(l) + O_2(g) = GeO_2(l)$	1389 - 2500	-	-	(6.1)	(-0.3)	-	(1.9)	(-3.810)	(86.9)	(93.1)
$H_2(g) + 1/2O_2(g) = H_2O(l)$	298 - 373.16	68.318 (b)	56.78	7.28	-0.94	-	0.94	-1.862	79.64	86.91
$H_2(g) + 1/2O_2(g) = H_2O(g)$	373.16 - 2500	-	-	-3.58	1.62	-	1.02	-4.776	-9.94	-13.52
$Hf(s) + O_2(g) = HfO_2(s)$	298 - 2500	266.0 (b)	(251.8)	(3.12)	(1.30)	-	(-1.6)	(-1.626)	(67.0)	(70.1)
$2Hg(l) + 1/2O_2(g) = Hg_2O(s)$	298 - 600	22 (d)	(13)	(-1.8)	(2.7)	-	(0.9)	(0.669)	(21.7)	(19.9)
$Hg(l) + 1/2O_2(g) = HgO(s)$	298 - 629.73	21.708 (h)	(14)	(-2.2)	(6.9)	-	(0.9)	(0.629)	(14.9)	(12.6)
$Hg(g) + 1/2O_2(g) = HgO(s)$	629.73 - 1015	-	-	(-0.6)	(6.9)	-	(0.9)	(-14.39)	(47.6)	(47.0)
$2In(s) + 1/2O_2(g) = In_2O(s)$	298 - 430	(40)	(33)	(-1.1)	(1.7)	-	(0.9)	(0.462)	(18.5)	(17.5)
$2In(l) + 1/2O_2(g) = In_2O(s)$	430 - 600	-	-	(-4.4)	(7.7)	-	(0.9)	(-0.098)	(3.8)	(-0.6)
$2In(l) + 1/2O_2(g) = In_2O(l)$	600 - 800	-	-	(2.9)	(-0.1)	-	(0.9)	(1.426)	(38.3)	(41.2)
$2In(l) + 1/2O_2(g) = In_2O(g)$	800 - 2440	-	-	(-4.1)	(-0.1)	-	(0.9)	(23.03)	(-28.5)	(-32.6)
$2In(g) + 1/2O_2(g) = In_2O(g)$	2440 - 2500	-	-	(0.9)	(-0.1)	-	(0.9)	(-96.93)	(55.1)	(56.0)
$In(s) + 1/2O_2(g) = InO(s)$	298 - 430	(65)	(58)	(0.1)	(0.6)	-	(0.9)	(0.224)	(23.8)	(23.9)
$In(l) + 1/2O_2(g) = InO(s)$	430 - 1325	-	-	(-1.6)	(3.1)	-	(0.9)	(-0.056)	(16.4)	(14.8)
$In(l) + 1/2O_2(g) = InO(l)$	1325 - 2000	-	-	(2.4)	(-0.1)	-	(0.9)	(1.453)	(37.9)	(40.3)
$In(l) + 1/2O_2(g) = InO(g)$	2000 - 2440	-	-	(-2.6)	(-0.1)	-	(0.9)	(71.45)	(-30.1)	(-32.7)
$In(g) + 1/2O_2(g) = InO(g)$	2440 - 2500	-	-	(-0.1)	(-0.1)	-	(0.9)	(11.47)	(11.7)	(11.6)
$2In(s) + 3/2O_2(g) = In_2O_3(s)$	298 - 430	221.27 (i)	(200.2)	(-1.4)	(0.6)	-	(2.8)	(1.173)	(61.7)	60.3
$2In(l) + 3/2O_2(g) = In_2O_3(s)$	430 - 2000	-	-	(-4.8)	(5.6)	-	(2.8)	(0.633)	(46.9)	(42.1)
$2In(l) + 3/2O_2(g) = In_2O_3(l)$	2000 - 2440	-	-	(7.6)	(-0.4)	-	(2.8)	(7.833)	(119.2)	(126.8)
$2In(g) + 3/2O_2(g) = In_2O_3(l)$	2440 - 2500	-	-	(12.7)	(-0.4)	-	(2.8)	(-112.12)	(202.8)	(215.5)
$2Ir(s) + 3/2O_2(g) = Ir_2O_3(s)$	298 - 1450	(68)	(49)	(-1.7)	(11.2)	-	(2.8)	(0.812)	(56.3)	(54.6)
$2Ir(s) + 3/2O_2(g) = Ir_2O_3(l)$	1450 - 2250	-	-	(11.5)	(-3.2)	-	(2.8)	(7.246)	(124.6)	(136.1)
$2Ir(s) + 3/2O_2(g) = Ir_2O_3(g)$	2250 - 2500	-	-	(-3.5)	(6.8)	-	(2.8)	(65.68)	(9.1)	(5.6)
$Ir(s) + O_2(g) = IrO_2(s)$	298 - 2250	44 (a)	32	-4.66	13.52	-	1.9	1.318	18.2	13.6
$2K(s) + 1/2O_2(g) = K_2O(s)$	298 - 336.4	86.4 (a)	(77.0)	(9.1)	(-32.5)	-	(0.9)	(-1.005)	(73.6)	(82.7)
$2K(l) + 1/2O_2(g) = K_2O(s)$	336.4 - 980	-	-	(-6.0)	(15.4)	(-5.9)	(0.9)	(0.326)	(4.8)	(1.2)
$2K(l) + 1/2O_2(g) = K_2O(l)$	980 - 1052	-	-	(0.1)	(9.0)	(-5.9)	(0.9)	(4.221)	(33.6)	(33.7)
$2K(g) + 1/2O_2(g) = K_2O(l)$	1052 - 1325	-	-	(7.9)	(-0.1)	-	(0.9)	(-39.00)	(117.6)	(125.5)
$2K(g) + 1/2O_2(g) = K_2O(g)$	1325 - 2500	-	-	(0.9)	(-0.1)	-	(0.9)	(-2.729)	(46.9)	(47.8)
$2K(s) + O_2(g) = K_2O_2(s)$	298 - 336.4	118 (b)	(102.5)	(9.9)	(-33.7)	-	(1.9)	(-0.919)	(97.6)	(107.4)
$2K(l) + O_2(g) = K_2O_2(s)$	336.4 - 763	-	-	(-5.2)	(14.3)	(-5.9)	(1.9)	(0.412)	(28.8)	(23.5)
$2K(l) + O_2(g) = K_2O_2(l)$	763 - 1052	-	-	(3.0)	(8.9)	(-5.9)	(1.9)	(2.727)	(69.8)	(72.8)
$2K(g) + O_2(g) = K_2O_2(l)$	1052 - 1800	-	-	(10.8)	(-0.3)	-	(1.9)	(-40.50)	(153.9)	(164.7)
$2K(g) + O_2(g) = K_2O_2(g)$	1800 - 2500	-	-	(1.8)	(-0.3)	-	(1.9)	(20.70)	(61.4)	(63.2)
$2K(s) + 3/2O_2(g) = K_2O_3(s)$	298 - 336.4	134 (b)	(113)	(4.0)	(-16.0)	-	(2.8)	(0.276)	(87.0)	(91.1)
$2K(l) + 3/2O_2(g) = K_2O_3(s)$	336.4 - 703	-	-	(-11.1)	(31.9)	(-5.9)	(2.8)	(1.607)	(18.2)	(7.2)
$2K(l) + 3/2O_2(g) = K_2O_3(l)$	703 - 975	-	-	(5.3)	(8.7)	(-5.9)	(2.8)	(1.910)	(100.7)	(106.1)
$2K(l) + 3/2O_2(g) = K_2O_3(g)$	975 - 1052	-	-	(-10.2)	(13.7)	(-5.9)	(2.8)	(39.65)	(-26.7)	(-36.8)
$2K(g) + 3/2O_2(g) = K_2O_3(g)$	1052 - 2500	-	-	(-2.3)	(4.6)	-	(2.8)	(-3.579)	(57.3)	(55.0)
$K(s) + O_2(g) = KO_2(s)$	298 - 336.4	67.6 (a)	(56.9)	(5.4)	(-7.7)	-	(1.9)	(-0.741)	(63.7)	(69.1)
$K(l) + O_2(g) = KO_2(s)$	336.4 - 653	-	-	(-2.2)	(16.3)	(-2.9)	(1.9)	(-0.076)	(29.3)	(27.1)
$K(l) + O_2(g) = KO_2(l)$	653 - 925	-	-	(6.8)	(4.3)	(-2.9)	(1.9)	(1.506)	(73.7)	(80.5)
$K(s) + 3/2O_2(g) = KO_3(s)$	298 - 336.4	62 (d)	(44)	(6.1)	(-7.4)	-	(2.8)	(-0.687)	(92.0)	(98.1)
$K(l) + 3/2O_2(g) = KO_3(s)$	336.4 - 350	-	-	(-1.5)	(16.6)	(-2.9)	(2.8)	(-0.022)	(57.6)	(56.1)
$K(l) + 3/2O_2(g) = KO_3(l)$	350 - 715	-	-	(6.2)	(4.2)	(-2.9)	(2.8)	(3.043)	(84.1)	(90.3)
$K(l) + 3/2O_2(g) = KO_3(g)$	715 - 1052	-	-	(-1.3)	(4.2)	(-2.9)	(2.8)	(27.41)	(8.2)	(6.9)
$K(g) + 3/2O_2(g) = KO_3(g)$	1052 - 2500	-	-	(2.6)	(-0.4)	-	(2.8)	(4.794)	(50.2)	(52.8)
$2La(s) + 3/2O_2(g) = La_2O_3(s)$	298 - 1153	428.6 (j)	409.5	4.12	-0.51	-	-0.5	-1.508	88.0	92.1
$2La(l) + 3/2O_2(g) = La_2O_3(s)$	1153 - 2500	-	-	(1.9)	(2.7)	-	(-0.5)	(-5.630)	(79.8)	(81.7)

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{298}$ (kcal/mole)	$-\Delta F_f^{298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$2\text{Li(s)} + 1/2\text{O}_2(\text{g}) = \text{Li}_2\text{O(s)}$	298 - 459	142.57 (k)	(133.8)	(1.2)	(-11.9)	-	(0.9)	(0.449)	(32.0)	(33.2)
$2\text{Li(l)} + 1/2\text{O}_2(\text{g}) = \text{Li}_2\text{O(s)}$	459 - 1640	-	-	(-6.7)	(5.3)	-	(0.9)	(0.883)	(6.1)	(12.9)
$2\text{Li(g)} + 1/2\text{O}_2(\text{g}) = \text{Li}_2\text{O(s)}$	1640 - 2000	-	-	(-2.7)	(5.3)	-	(0.9)	(-70.74)	(63.6)	(60.9)
$2\text{Li(g)} + 1/2\text{O}_2(\text{g}) = \text{Li}_2\text{O(l)}$	2000 - 2500	-	-	(6.9)	(-0.1)	-	(0.9)	(-65.14)	(118.8)	(125.7)
$2\text{Li(s)} + \text{O}_2(\text{g}) = \text{Li}_2\text{O}_2(\text{s})$	298 - 459	151.9 (f)	(138.1)	(2.6)	(-12.1)	-	(1.9)	(0.282)	(56.9)	(59.5)
$2\text{Li(l)} + \text{O}_2(\text{g}) = \text{Li}_2\text{O}_2(\text{s})$	459 - 500	-	-	(-5.3)	(5.1)	-	(1.9)	(0.716)	(18.8)	(13.5)
$\text{Mg(s)} + 1/2\text{O}_2(\text{g}) = \text{MgO(s)}$	298 - 923	143.84 (b)	136.2	1.40	-1.38	-	-1.046	-0.754	34.0	35.4
$\text{Mg(l)} + 1/2\text{O}_2(\text{g}) = \text{MgO(s)}$	923 - 1393	-	-	(-1.3)	(1.1)	-	(-1.1)	(-1.546)	(20.4)	(19.1)
$\text{Mg(g)} + 1/2\text{O}_2(\text{g}) = \text{MgO(s)}$	1393 - 2500	-	-	(1.76)	(1.1)	-	(-1.1)	(-37.27)	(65.0)	(66.7)
$\text{Mg(s)} + \text{O}_2(\text{g}) = \text{MgO}_2(\text{s})$	298 - 500	148.8 (a)	(138.1)	(-1.5)	(-0.3)	-	(2.0)	(1.026)	(26.6)	(25.1)
$\text{Mn(s, } \alpha) + 1/2\text{O}_2(\text{g}) = \text{MnO(s)}$	298 - 1000	92.0 (a)	86.7	1.28	-1.57	-	0.43	-0.212	24.36	25.64
$\text{Mn(s, } \beta) + 1/2\text{O}_2(\text{g}) = \text{MnO(s)}$	1000 - 1374	-	-	-1.36	1.15	-	0.1	0.486	9.46	8.10
$\text{Mn(s, } \gamma) + 1/2\text{O}_2(\text{g}) = \text{MnO(s)}$	1374 - 1410	-	-	-3.62	1.8	-	0.1	2.574	-6.36	-9.99
$\text{Mn(s, } \delta) + 1/2\text{O}_2(\text{g}) = \text{MnO(s)}$	1410 - 1517	-	-	-4.32	1.8	-	0.1	2.990	-10.40	-14.73
$\text{Mn(l)} + 1/2\text{O}_2(\text{g}) = \text{MnO(s)}$	1517 - 2058	-	-	-4.02	1.8	-	0.1	-0.964	-5.90	-9.93
$\text{Mn(l)} + 1/2\text{O}_2(\text{g}) = \text{MnO(l)}$	2058 - 2368	-	-	(-1.64)	(-0.1)	-	(0.9)	(11.27)	(2.02)	(0.38)
$\text{Mn(g)} + 1/2\text{O}_2(\text{g}) = \text{MnO(l)}$	2368 - 2500	-	-	(3.1)	(-0.1)	-	(0.9)	(-53.66)	(61.52)	(64.63)
$3\text{Mn(s, } \alpha) + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{s, } \alpha)$	298 - 1000	331.4 (b)	306.0	1.00	0.16	-	2.66	0.624	89.5	90.5
$3\text{Mn(s, } \beta) + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{s, } \alpha)$	1000 - 1374	-	-	-6.89	8.32	-	1.6	2.718	44.7	37.8
$3\text{Mn(s, } \gamma) + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{s, } \alpha)$	1374 - 1410	-	-	-14.00	10.3	-	1.6	8.982	-2.7	-16.7
$3\text{Mn(s, } \delta) + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{s, } \alpha)$	1410 - 1445	-	-	-15.80	10.3	-	1.6	10.230	-14.8	-30.6
$3\text{Mn(s, } \delta) + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{s, } \beta)$	1445 - 1517	-	-	-0.24	-0.5	-	3.8	4.166	79.3	79.0
$3\text{Mn(l)} + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{s, } \beta)$	1517 - 1863	-	-	0.66	-0.5	-	3.8	-7.699	92.8	93.4
$3\text{Mn(l)} + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{l})$	1863 - 2368	-	-	(-0.5)	(-0.5)	-	(3.8)	(27.54)	(65.8)	(65.3)
$3\text{Mn(g)} + 2\text{O}_2(\text{g}) = \text{Mn}_3\text{O}_4(\text{l})$	2368 - 2500	-	-	(13.7)	(-0.5)	-	(3.8)	(-167.24)	(244.3)	(258.0)
$2\text{Mn(s, } \alpha) + 3/2\text{O}_2(\text{g}) = \text{Mn}_2\text{O}_3(\text{s})$	298 - 1000	232.1 (b)	213.7	0.9	1.2	-	0.3	-0.371	67.7	68.6
$2\text{Mn(s, } \beta) + 3/2\text{O}_2(\text{g}) = \text{Mn}_2\text{O}_3(\text{s})$	1000 - 1374	-	-	-4.3	6.7	-	-0.4	1.025	37.9	33.5
$2\text{Mn(s, } \gamma) + 3/2\text{O}_2(\text{g}) = \text{Mn}_2\text{O}_3(\text{s})$	1374 - 1410	-	-	(-9.1)	(8.0)	-	(-0.4)	(5.201)	(6.2)	(2.8)
$2\text{Mn(s, } \delta) + 3/2\text{O}_2(\text{g}) = \text{Mn}_2\text{O}_3(\text{s})$	1410 - 1517	-	-	(-10.3)	(8.0)	-	(-0.4)	(6.033)	(-1.8)	(-12.1)
$2\text{Mn(l)} + 3/2\text{O}_2(\text{g}) = \text{Mn}_2\text{O}_3(\text{s})$	1517 - 1700	-	-	(-9.7)	(8.0)	-	(-0.4)	(-1.877)	(7.2)	(2.5)
$\text{Mn(s, } \alpha) + \text{O}_2(\text{g}) = \text{MnO}_2(\text{s})$	298 - 1000	124.5 (b)	111.5	2.6	-1.2	-	-1.6	-1.378	59.4	62.1
$\text{Mn(s, } \beta) + \text{O}_2(\text{g}) = \text{MnO}_2(\text{s})$	1000 - 1120	-	-	(0)	(-1.5)	-	(-2.0)	(-0.680)	(44.5)	(44.5)
$\text{Mo(s)} + \text{O}_2(\text{g}) = \text{MoO}_2(\text{s})$	298 - 2200	131 (a)	(119)	(2.4)	(1.4)	-	(-1.1)	(-1.274)	(56.4)	(58.8)
$\text{Mo(s)} + \text{O}_2(\text{g}) = \text{MoO}_2(\text{l})$	2200 - 2500	-	-	(9.2)	(-1.6)	-	(1.9)	(7.162)	(94.4)	(103.6)
$\text{Mo(s)} + 3/2\text{O}_2(\text{g}) = \text{MoO}_3(\text{s})$	298 - 1068	180.3 (a)	162.1	-4.3	11.8	-	2.8	1.548	-39.18	178.8
$\text{Mo(s)} + 3/2\text{O}_2(\text{g}) = \text{MoO}_3(\text{l})$	1068 - 1530	-	-	(10.5)	(-1.7)	-	(2.8)	(5.980)	(116.22)	(126.74)
$\text{Mo(s)} + 3/2\text{O}_2(\text{g}) = \text{MoO}_3(\text{g})$	1530 - 2500	-	-	(0.2)	(-1.7)	-	(2.8)	(54.74)	(19.17)	(19.4)
$\text{N}_2(\text{g}) + 1/2\text{O}_2(\text{g}) = \text{N}_2\text{O(g)}$	298 - 2500	-19.49 (b)	-24.7	0.02	1.32	-	-1.23	-0.484	18.84	18.86
$2\text{Na(s)} + 1/2\text{O}_2(\text{g}) = \text{Na}_2\text{O(s)}$	298 - 371	99.4 (b)	89.9	0.25	-1.23	-1.2	0.9	0.255	32.2	32.5
$2\text{Na(l)} + 1/2\text{O}_2(\text{g}) = \text{Na}_2\text{O(s)}$	371 - 1187	-	-	-6.34	14.42	-5.1	0.9	0.431	2.1	-4.3
$2\text{Na(g)} + 1/2\text{O}_2(\text{g}) = \text{Na}_2\text{O(s)}$	1187 - 1193	-	-	(1.6)	(5.3)	-	(0.9)	(-52.22)	(91.5)	(93.1)
$2\text{Na(g)} + 1/2\text{O}_2(\text{g}) = \text{Na}_2\text{O(l)}$	1193 - 1600	-	-	(7.9)	(-0.1)	-	(0.9)	(-48.79)	(123.7)	(131.6)
$2\text{Na(g)} + 1/2\text{O}_2(\text{g}) = \text{Na}_2\text{O(g)}$	1600 - 2500	-	-	(0.9)	(-0.1)	-	(0.9)	(-8.588)	(53.9)	(54.8)
$2\text{Na(s)} + \text{O}_2(\text{g}) = \text{Na}_2\text{O}_2(\text{s})$	298 - 371	122.2 (a)	(107.1)	(0.6)	(-3.0)	(-1.2)	(1.9)	(0.487)	(52.5)	(53.1)
$2\text{Na(l)} + \text{O}_2(\text{g}) = \text{Na}_2\text{O}_2(\text{s})$	371 - 919	-	-	(-6.0)	(12.7)	(-5.2)	(1.9)	(0.663)	(22.4)	(16.4)
$\text{Na(s)} + \text{O}_2(\text{g}) = \text{NaO}_2(\text{s})$	298 - 371	62.0 (a)	(52.0)	(2.3)	(0.1)	(-0.6)	(1.9)	(-0.147)	(45.5)	(47.8)
$\text{Na(l)} + \text{O}_2(\text{g}) = \text{NaO}_2(\text{s})$	371 - 825	-	-	(-1.0)	(7.9)	(-2.5)	(1.9)	(-0.059)	(30.4)	(29.4)
$\text{Na(l)} + \text{O}_2(\text{g}) = \text{NaO}_2(\text{l})$	825 - 1187	-	-	(5.8)	(4.3)	(-2.5)	(1.9)	(1.756)	(65.6)	(71.4)
$\text{Na(g)} + \text{O}_2(\text{g}) = \text{NaO}_2(\text{l})$	1187 - 1300	-	-	(9.8)	(-0.3)	-	(1.9)	(-24.57)	(110.4)	(120.1)
$\text{Na(g)} + \text{O}_2(\text{g}) = \text{NaO}_2(\text{g})$	1300 - 2500	-	-	(1.8)	(-0.3)	-	(1.9)	(13.83)	(31.4)	(33.2)
$\text{Nb(s)} + 1/2\text{O}_2(\text{g}) = \text{NbO(s)}$	298 - 2500	97 (a)	(91)	(-0.2)	(3.3)	-	(0.9)	(0.176)	(20.1)	(19.9)
$\text{Nb(s)} + \text{O}_2(\text{g}) = \text{NbO}_2(\text{s})$	298 - 2275	189 (a)	(176.5)	(3.2)	(0.4)	-	(0.9)	(-1.372)	(61.1)	(64.3)
$\text{Nb(s)} + \text{O}_2(\text{g}) = \text{NbO}_2(\text{l})$	2275 - 2500	-	-	(10.1)	(-1.2)	-	(1.9)	(3.704)	(103.7)	(113.8)
$2\text{Nb(s)} + 5/2\text{O}_2(\text{g}) = \text{Nb}_2\text{O}_5(\text{s})$	298 - 1733	455.2 (a)	423.7	-10.12	25.6	-	4.7	3.202	53.7	43.6
$2\text{Nb(s)} + 5/2\text{O}_2(\text{g}) = \text{Nb}_2\text{O}_5(\text{l})$	1733 - 2500	-	-	(12.2)	(-2.6)	-	(4.7)	(35.07)	(155.0)	(167.2)
$2\text{Nd(s)} + 3/2\text{O}_2(\text{g}) = \text{Nd}_2\text{O}_3(\text{s})$	298 - 1297	432.15 (l)	412.7	5.36	-5.31	-	-1.3	-1.964	95.6	101.0
$2\text{Nd(l)} + 3/2\text{O}_2(\text{g}) = \text{Nd}_2\text{O}_3(\text{s})$	1297 - 2500	-	-	(-1.6)	(5.4)	-	(-1.3)	(-6.997)	(63.4)	(61.8)
$\text{Ni(s, } \alpha) + 1/2\text{O}_2(\text{g}) = \text{NiO(s)}$	298 - 626	58.0 (a)	51.4	5.50	-6.34	-	-2.0	-2.070	52.95	58.44
$\text{Ni(s, } \beta) + 1/2\text{O}_2(\text{g}) = \text{NiO(s)}$	626 - 1728	-	-	3.56	-1.10	-	-2.0	-1.974	43.88	47.44
$\text{Ni(l)} + 1/2\text{O}_2(\text{g}) = \text{NiO(s)}$	1728 - 2230	-	-	(0.36)	(0.7)	-	(-2.0)	(-3.342)	(25.58)	(25.93)
$\text{Ni(l)} + 1/2\text{O}_2(\text{g}) = \text{NiO(l)}$	2230 - 2500	-	-	(1.0)	(-0.1)	-	(0.9)	(9.616)	(22.8)	(23.8)

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e. u.)	$-\Delta(B-a)$
$\text{Np(s)} + \text{O}_2(\text{g}) = \text{NpO}_2(\text{s})$	298 - 913	(246) (a)	(233)	(4.1)	(-0.5)	-	(-0.7)	(-1.554)	(66.8)	(70.9)
$\text{Np(l)} + \text{O}_2(\text{g}) = \text{NpO}_2(\text{s})$	913 - 2500	-	-	(0.4)	(2.9)	-	(-0.7)	(-2.893)	(47.3)	(48.9)
$2\text{Np(s)} + 5/2\text{O}_2(\text{g}) = \text{Np}_2\text{O}_5(\text{s})$	298 - 900	(510) (a)	(479)	(1.1)	(5.2)	-	(4.7)	(0.659)	(111.5)	(112.6)
$\text{Os(s)} + \text{O}_2(\text{g}) = \text{OsO}_2(\text{s})$	298 - 923	(62) (a)	(49.5)	(-2.5)	(4.9)	-	(1.9)	(1.047)	(28.6)	(26.2)
$\text{Os(s)} + 2\text{O}_2(\text{g}) = \text{OsO}_4(\text{s})$	298 - 313.3	93.6 (a)	(72.6)	(-5.8)	(21.7)	-	(1.4)	(1.024)	(43.6)	(37.8)
$\text{Os(s)} + 2\text{O}_2(\text{g}) = \text{OsO}_4(\text{l})$	313.3 - 403	-	-	(10.8)	(-1.4)	-	(3.8)	(1.138)	(119.6)	(130.4)
$\text{Os(s)} + 2\text{O}_2(\text{g}) = \text{OsO}_4(\text{g})$	403 - 2500	-	-	(-5.8)	(7.2)	-	(-0.9)	(15.39)	(1.9)	(3.9)
$1/2\text{P}_4(\text{s, white}) + 3/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_3(\text{l})$	298 - 317.4	262 (m)	(244)	(15.3)	(-14.7)	-	(2.8)	(-3.108)	(141.8)	(157.1)
$1/2\text{P}_4(\text{l}) + 3/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_3(\text{l})$	317.4 - 448.5	-	-	(12.5)	(-0.6)	-	(4.3)	(-2.759)	(130.4)	(142.9)
$1/2\text{P}_4(\text{l}) + 3/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_3(\text{g})$	448.5 - 553	-	-	(-7.0)	(9.4)	-	(4.3)	(9.481)	(5.8)	(1.2)
$1/2\text{P}_4(\text{g}) + 3/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_3(\text{g})$	553 - 2500	-	-	(-7.2)	(9.8)	(-0.6)	(2.8)	(3.303)	(16.1)	(8.9)
$1/4\text{P}_4(\text{s, white}) + \text{O}_2(\text{g}) = \text{PO}_2(\text{s})$	298 - 317.4	(65)	(51)	(-0.4)	(-2.4)	-	(1.9)	(0.750)	(44.2)	(43.8)
$1/4\text{P}_4(\text{l}) + \text{O}_2(\text{g}) = \text{PO}_2(\text{s})$	317.4 - 350	-	-	(-1.8)	(4.6)	-	(2.6)	(0.925)	(38.5)	(36.7)
$1/4\text{P}_4(\text{l}) + \text{O}_2(\text{g}) = \text{PO}_2(\text{l})$	350 - 553	-	-	(6.9)	(-0.4)	-	(2.6)	(0.876)	(80.0)	(86.9)
$1/4\text{P}_4(\text{g}) + \text{O}_2(\text{g}) = \text{PO}_2(\text{l})$	553 - 1700	-	-	(6.9)	(-0.2)	(-0.3)	(1.9)	(-2.213)	(85.1)	(92.0)
$1/2\text{P}_4(\text{s, white}) + 5/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_5(\text{s})$	298 - 317.4	360.0 (b)	327.4	-19.11	3.90	-	4.7	5.290	10.3	-8.8
$1/2\text{P}_4(\text{l}) + 5/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_5(\text{s})$	317.4 - 553	-	-	-21.92	53.1	-	6.2	5.638	-1.2	-23.1
$1/2\text{P}_4(\text{g}) + 5/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_5(\text{s})$	553 - 631	-	-	(-50.8)	(53.6)	(-0.6)	(4.7)	(-0.540)	(9.1)	(-12.9)
$1/2\text{P}_4(\text{g}) + 5/2\text{O}_2(\text{g}) = \text{P}_2\text{O}_5(\text{g})$	631 - 2500	-	-	(6.4)	(-0.4)	(-0.6)	(4.7)	(1.074)	(144.4)	(150.8)
$\text{Pa(s)} + \text{O}_2(\text{g}) = \text{PaO}_2(\text{s})$	298 - 1825	(246)	(233)	(0.9)	(-1.7)	-	(1.9)	(0.326)	(48.4)	(49.4)
$\text{Pa(l)} + \text{O}_2(\text{g}) = \text{PaO}_2(\text{s})$	1825 - 2500	-	-	(-1.9)	(2.3)	-	(1.9)	(-5.225)	(37.0)	(35.1)
$2\text{Pa(s)} + 5/2\text{O}_2(\text{g}) = \text{Pa}_2\text{O}_5(\text{s})$	298 - 1825	(500)	(467)	(-2.7)	(2.8)	-	(4.7)	(1.999)	(95.0)	(92.3)
$2\text{Pa(l)} + 5/2\text{O}_2(\text{g}) = \text{Pa}_2\text{O}_5(\text{s})$	1825 - 2050	-	-	(-8.3)	(10.8)	-	(4.7)	(-9.103)	(72.0)	(63.7)
$2\text{Pa(l)} + 5/2\text{O}_2(\text{g}) = \text{Pa}_2\text{O}_5(\text{l})$	2050 - 2500	-	-	(11.3)	(-0.6)	-	(4.7)	(0.672)	(185.4)	(196.7)
$\text{Pb(s)} + 1/2\text{O}_2(\text{g}) = \text{PbO(s, red)}$	298 - 600.6	52.4 (b)	45.3	0.82	1.57	-	0.9	-0.050	28.4	29.3
$\text{Pb(l)} + 1/2\text{O}_2(\text{g}) = \text{PbO(s, red)}$	600.6 - 762	-	-	-1.28	4.60	-	0.9	-0.572	18.7	17.4
$\text{Pb(l)} + 1/2\text{O}_2(\text{g}) = \text{PbO(s, yellow)}$	762 - 1159	-	-	-2.84	7.00	-	0.9	0.412	9.7	6.8
$\text{Pb(l)} + 1/2\text{O}_2(\text{g}) = \text{PbO(l)}$	1159 - 1745	-	-	(2.7)	(0.6)	-	(0.9)	(1.078)	(39.0)	(41.7)
$\text{Pb(l)} + 1/2\text{O}_2(\text{g}) = \text{PbO(g)}$	1745 - 2023	-	-	(-3.8)	(1.0)	-	(0.9)	(62.81)	(37.7)	(41.5)
$\text{Pb(g)} + 1/2\text{O}_2(\text{g}) = \text{PbO(g)}$	2023 - 2500	-	-	(-1.0)	(0.3)	-	(0.9)	(16.19)	(3.0)	(2.0)
$3\text{Pb(s)} + 2\text{O}_2(\text{g}) = \text{Pb}_3\text{O}_4(\text{s})$	298 - 600.6	175.6 (b)	(147.8)	(-2.4)	(10.2)	-	(3.8)	(1.311)	(81.5)	(79.2)
$3\text{Pb(l)} + 2\text{O}_2(\text{g}) = \text{Pb}_3\text{O}_4(\text{s})$	600.6 - 1200	-	-	(-8.9)	(19.3)	-	(3.8)	(0.045)	(52.2)	(43.3)
$\text{Pb(s)} + \text{O}_2(\text{g}) = \text{PbO}_2(\text{s})$	298 - 600.6	66.2 (a)	52.5	-1.2	5.2	-	1.9	0.658	39.8	38.6
$\text{Pb(l)} + \text{O}_2(\text{g}) = \text{PbO}_2(\text{s})$	600.6 - 1300	-	-	-3.3	8.27	-	1.9	0.236	30.0	26.6
$\text{Pd(s)} + 1/2\text{O}_2(\text{g}) = \text{PdO(s)}$	298 - 1150	21 (a)	14	-6.6	12.7	-	0.9	1.680	-10.3	-17.0
$\text{Po(s)} + \text{O}_2(\text{g}) = \text{PoO}_2(\text{s})$	298 - 525	60.4 (a)	(47.1)	(0.8)	(2.1)	-	(1.9)	(0.187)	(49.2)	(50.1)
$\text{Po(l)} + \text{O}_2(\text{g}) = \text{PoO}_2(\text{s})$	525 - 825	-	-	(-3.0)	(5.3)	-	(1.9)	(-0.659)	(31.6)	(28.7)
$\text{Po(l)} + \text{O}_2(\text{g}) = \text{PoO}_2(\text{l})$	825 - 1235	-	-	(4.7)	(-0.3)	-	(1.9)	(0.394)	(72.0)	(76.8)
$\text{Po(g)} + \text{O}_2(\text{g}) = \text{PoO}_2(\text{l})$	1235 - 2400	-	-	(8.8)	(-0.3)	-	(1.9)	(-29.19)	(120.8)	(129.5)
$2\text{Pr(s)} + 3/2\text{O}_2(\text{g}) = \text{Pr}_2\text{O}_3(\text{s})$	298 - 1205	433.8 (a)	(414.5)	(6.6)	(-5.6)	-	(-1.2)	(-2.246)	(101.5)	(108.1)
$2\text{Pr(l)} + 3/2\text{O}_2(\text{g}) = \text{Pr}_2\text{O}_3(\text{s})$	1205 - 2200	-	-	(0.6)	(3.6)	-	(-1.2)	(-6.694)	(74.3)	(74.9)
$2\text{Pr(l)} + 3/2\text{O}_2(\text{g}) = \text{Pr}_2\text{O}_3(\text{l})$	2200 - 2500	-	-	(7.6)	(-0.4)	-	(2.8)	(9.770)	(109.4)	(117.0)
$\text{Pr(s)} + \text{O}_2(\text{g}) = \text{PrO}_2(\text{s})$	298 - 700	230 (a)	(216.5)	(4.3)	(-1.5)	-	(-0.9)	(-1.626)	(70.2)	(74.6)
$\text{Pt(s)} + 1/2\text{O}_2(\text{g}) = \text{PtO(s)}$	298 - 780	(17) (a)	(11)	(-0.9)	(4.9)	-	(0.8)	(0.273)	(17.1)	(16.2)
$3\text{Pt(s)} + 2\text{O}_2(\text{g}) = \text{Pt}_3\text{O}_4(\text{s})$	298 - 2000	(64) (a)	(38)	(-3.0)	(12.9)	-	(3.5)	(1.268)	(72.2)	(69.2)
$\text{Pt(s)} + \text{O}_2(\text{g}) = \text{PtO}_2(\text{s})$	298 - 723	(32) (a)	(19)	(-2.9)	(8.0)	-	(1.8)	(1.008)	(27.4)	(24.4)
$\text{Pt(s)} + \text{O}_2(\text{g}) = \text{PtO}_2(\text{l})$	723 - 750	-	-	(7.0)	(-1.6)	-	(1.8)	(0.959)	(79.2)	(86.2)
$\text{Pu(s)} + 1/2\text{O}_2(\text{g}) = \text{PuO(s)}$	298 - 913	(115)	(110)	(2.7)	(-1.3)	-	(0.9)	(-0.472)	(31.8)	(34.5)
$\text{Pu(l)} + 1/2\text{O}_2(\text{g}) = \text{PuO(s)}$	913 - 1290	-	-	(-0.1)	(2.3)	-	(0.9)	(-1.675)	(18.5)	(18.4)
$\text{Pu(l)} + 1/2\text{O}_2(\text{g}) = \text{PuO(l)}$	1290 - 2325	-	-	(2.4)	(-0.1)	-	(0.9)	(4.296)	(27.7)	(30.1)
$\text{Pu(l)} + 1/2\text{O}_2(\text{g}) = \text{PuO(g)}$	2325 - 2500	-	-	(-3.2)	(-0.1)	-	(0.9)	(64.32)	(-35.9)	(-39.1)
$2\text{Pu(s)} + 3/2\text{O}_2(\text{g}) = \text{Pu}_2\text{O}_3(\text{s})$	298 - 913	(387) (a)	(368.9)	(-1.6)	(11.6)	-	(2.8)	(0.800)	(53.9)	(52.3)
$2\text{Pu(l)} + 3/2\text{O}_2(\text{g}) = \text{Pu}_2\text{O}_3(\text{s})$	913 - 1880	-	-	(-7.2)	(17.8)	-	(2.8)	(-1.608)	(27.3)	(20.1)
$2\text{Pu(l)} + 3/2\text{O}_2(\text{g}) = \text{Pu}_2\text{O}_3(\text{l})$	1880 - 2500	-	-	(11.6)	(-0.4)	-	(2.8)	(11.21)	(126.3)	(137.9)
$\text{Pu(s)} + \text{O}_2(\text{g}) = \text{PuO}_2(\text{s})$	298 - 913	(246) (a)	(234)	(3.6)	(-0.5)	-	(-0.7)	(-1.405)	(62.2)	(65.9)
$\text{Pu(l)} + \text{O}_2(\text{g}) = \text{PuO}_2(\text{s})$	913 - 2400	-	-	(0.8)	(3.1)	-	(-0.7)	(-2.609)	(49.0)	(49.8)
$\text{Pu(l)} + \text{O}_2(\text{g}) = \text{PuO}_2(\text{l})$	2400 - 2500	-	-	(4.2)	(-0.3)	-	(1.9)	(14.13)	(61.0)	(65.2)

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{298}$ (kcal/mole)	$-\Delta F_f^{298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-A)$
$Ra(s) + 1/2O_2(g) = RaO(s)$	298 - 1233	(130) (a)	(123)	(0.6)	(0.7)	-	(0.9)	(0.067)	(27.4)	(27.9)
$Ra(l) + 1/2O_2(g) = RaO(s)$	1233 - 1700	-	-	(-1.6)	(1.9)	-	(0.9)	(-0.432)	(15.2)	(13.5)
$Ra(g) + 1/2O_2(g) = RaO(s)$	1700 - 2500	-	-	(1.4)	(1.9)	-	(0.9)	(-40.59)	(58.3)	(59.7)
$2Rb(s) + 1/2O_2(g) = Rb_2O(s)$	298 - 312	78.9 (a)	(69.8)	(4.7)	(-20.4)	-	(0.9)	(-0.232)	(51.1)	(55.8)
$2Rb(l) + 1/2O_2(g) = Rb_2O(s)$	312 - 910	-	-	(-4.4)	(5.7)	-	(0.9)	(0.282)	(9.9)	(5.4)
$2Rb(l) + 1/2O_2(g) = Rb_2O(l)$	910 - 952	-	-	(2.2)	(-0.1)	-	(0.9)	(2.378)	(43.3)	(45.4)
$2Rb(g) + 1/2O_2(g) = Rb_2O(l)$	952 - 1600	-	-	(7.9)	(-0.1)	-	(0.9)	(-39.33)	(120.9)	(128.8)
$2Rb(s) + O_2(g) = Rb_2O_2(s)$	298 - 312	101.7 (b)	(85.5)	(6.1)	(-18.5)	-	(1.9)	(-0.466)	(83.0)	(89.0)
$2Rb(l) + O_2(g) = Rb_2O_2(s)$	312 - 843	-	-	(-3.1)	(7.7)	-	(1.9)	(0.048)	(41.8)	(38.7)
$2Rb(l) + O_2(g) = Rb_2O_2(l)$	843 - 952	-	-	(5.0)	(-0.3)	-	(1.9)	(3.362)	(81.0)	(86.0)
$2Rb(g) + O_2(g) = Rb_2O_2(l)$	952 - 2250	-	-	(10.8)	(-0.3)	-	(1.9)	(-38.35)	(158.6)	(169.3)
$2Rb(s) + 3/2O_2(g) = Rb_2O_3(s)$	298 - 312	121.5 (f)	(99.5)	(1.6)	(-13.6)	-	(2.8)	(0.934)	(77.5)	(79.1)
$2Rb(l) + 3/2O_2(g) = Rb_2O_3(s)$	312 - 762	-	-	(-7.6)	(12.6)	-	(2.8)	(1.448)	(36.3)	(28.7)
$2Rb(l) + 3/2O_2(g) = Rb_2O_3(l)$	762 - 952	-	-	(5.9)	(-0.4)	-	(2.8)	(2.535)	(105.9)	(111.8)
$2Rb(g) + 3/2O_2(g) = Rb_2O_3(l)$	952 - 1370	-	-	(11.7)	(-0.4)	-	(2.8)	(-39.17)	(183.5)	(195.2)
$Rb(s) + O_2(g) = RbO_2(s)$	298 - 312	65.8 (f)	(52.7)	(2.3)	(-7.0)	-	(1.9)	(0.165)	(53.8)	(56.1)
$Rb(l) + O_2(g) = RbO_2(s)$	312 - 685	-	-	(-2.3)	(6.1)	-	(1.9)	(0.422)	(33.2)	(30.9)
$Rb(l) + O_2(g) = RbO_2(l)$	685 - 952	-	-	(4.9)	(-0.3)	-	(1.9)	(1.101)	(70.0)	(74.8)
$Rb(g) + O_2(g) = RbO_2(l)$	952 - 1100	-	-	(7.8)	(-0.3)	-	(1.9)	(-19.75)	(108.8)	(116.5)
$Re(s) + O_2(g) = ReO_2(s)$	298 - 1475	103.4 (a)	(90.8)	(-3.3)	(8.7)	-	(1.9)	(1.131)	(25.6)	(22.2)
$Re(s) + O_2(g) = ReO_2(l)$	1475 - 2500	-	-	(10.4)	(-1.1)	-	(1.9)	(3.583)	(103.0)	(113.4)
$Re(s) + 3/2O_2(g) = ReO_3(s)$	298 - 433	(146) (n)	(127)	(-0.3)	(4.6)	-	(2.8)	(0.667)	(60.9)	(60.7)
$Re(s) + 3/2O_2(g) = ReO_3(l)$	433 - 600	-	-	(10.7)	(-1.2)	-	(2.8)	(1.646)	(113.2)	(124.0)
$2Re(s) + 7/2O_2(g) = Re_2O_7(s)$	298 - 569	296.7 (n)	(254.3)	(1.6)	(12.3)	-	(3.6)	(-0.043)	(153.5)	(155.1)
$2Re(s) + 7/2O_2(g) = Re_2O_7(l)$	569 - 635.5	-	-	(25.5)	(-2.5)	-	(6.6)	(4.881)	(267.9)	(293.4)
$2Re(s) + 7/2O_2(g) = Re_2O_7(g)$	635.5 - 2500	-	-	(-2.0)	(-2.5)	-	(6.6)	(40.05)	(62.5)	(60.5)
$Re(s) + 2O_2(g) = ReO_4(s)$	298 - 420	154.2 (d)	(132.9)	(-1.0)	(9.5)	-	(1.8)	(0.263)	(68.6)	(67.6)
$Re(s) + 2O_2(g) = ReO_4(l)$	420 - 460	-	-	(10.6)	(-1.3)	-	(1.8)	(1.019)	(123.5)	(134.1)
$Re(s) + 2O_2(g) = ReO_4(g)$	460 - 2500	-	-	(-5.9)	(7.3)	-	(1.8)	(15.91)	(7.4)	(1.5)
$2Rh(s) + 1/2O_2(g) = Rh_2O(s)$	298 - 1400	22.7 (b)	(18.5)	(0.7)	(2.0)	-	(0.9)	(-0.018)	(18.1)	(18.7)
$Rh(s) + 1/2O_2(g) = RhO(s)$	298 - 1400	22.5 (f)	(16.6)	(0.3)	(3.2)	-	(0.9)	(0.032)	(22.3)	(22.6)
$2Rh(s) + 3/2O_2(g) = Rh_2O_3(s)$	298 - 1400	68.3 (b)	(48.9)	(-2.5)	(9.0)	-	(2.8)	(1.130)	(52.7)	(50.2)
$Ru(s, \alpha) + O_2(g) = RuO_2(s)$	298 - 1308	52.5 (b)	(39.7)	(-2.1)	(4.2)	-	(1.9)	(0.973)	(31.4)	(29.3)
$Ru(s, \alpha) + 2O_2(g) = RuO_4(s)$	298 - 300	(74)	(53)	(-1.8)	(-2.0)	-	(3.8)	(1.683)	(59.5)	(57.7)
$Ru(s, \alpha) + 2O_2(g) = RuO_4(l)$	300 - 385	-	-	(11.2)	(-2.0)	-	(3.8)	(0.983)	(122.9)	(134.1)
$Ru(s, \alpha) + 2O_2(g) = RuO_4(g)$	385 - 1308	-	-	(-5.3)	(6.6)	-	(-0.9)	(14.60)	(5.7)	(0.4)
$Ru(s, \beta \text{ and } \gamma) + 2O_2(g) = RuO_4(g)$	1308 - 1773	-	-	(-7.3)	(8.1)	-	(-0.9)	(15.83)	(-6.3)	(-13.6)
$S(s, \alpha) + O_2(g) = SO_2(g)$	298 - 368.6	70.96 (b)	-	-0.4	-5.08	-	-0.2	0.204	-6.77	-7.22
$S(s, \beta) + O_2(g) = SO_2(g)$	368.6 - 392	-	-	-0.4	-5.79	-	-0.2	0.157	-6.67	-7.10
$S(l) + O_2(g) = SO_2(g)$	392 - 717.76	-	-	-2.3	-3.8	-	-0.2	0.435	-16.15	-18.42
$1/2S_2(g) + O_2(g) = SO_2(g)$	717.76 - 2500	-	-	(-1.1)	(1.0)	-	(0.8)	(-2.570)	(3.08)	(1.96)
$2Sb(s) + 3/2O_2(g) = Sb_2O_3(s)$	298 - 903.7	167.1 (a)	147.8	-4.32	13.2	-	2.8	1.496	42.8	38.5
$2Sb(l) + 3/2O_2(g) = Sb_2O_3(s)$	903.7 - 928	-	-	-8.30	16.7	-	2.8	-5.929	29.4	21.1
$2Sb(l) + 3/2O_2(g) = Sb_2O_3(l)$	928 - 1698	-	-	(8.6)	(-0.4)	-	(2.8)	(0.491)	(113.1)	(121.7)
$2Sb(l) + 3/2O_2(g) = Sb_2O_3(g)$	1698 - 1713	-	-	(-6.6)	(-0.4)	-	(2.8)	(35.22)	(-5.2)	(-11.8)
$Sb_2(g) + 3/2O_2(g) = Sb_2O_3(g)$	1713 - 2500	-	-	(-0.5)	(-0.4)	-	(3.0)	(-68.55)	(94.4)	(93.9)
$Sb(s; \alpha, \beta, \text{ and } \gamma) + O_2(g) = SbO_2(s)$	298 - 903.7	107 (b)	94	-2.48	6.1	-	1.9	1.002	-31.0	28.5
$Sb(l) + O_2(g) = SbO_2(s)$	903.7 - 1275	-	-	-4.5	7.8	-	1.9	-2.710	24.2	19.8
$2Sb(s; \alpha, \beta \text{ and } \gamma) + 5/2O_2(g) = Sb_2O_5(s)$	298 - 903.7	230 (a)	(196)	(-9.3)	(19.5)	-	(4.7)	(3.230)	(63.9)	(54.6)
$2Sb(l) + 5/2O_2(g) = Sb_2O_5(s)$	903.7 - 1200	-	-	(-13.3)	(23.0)	-	(4.7)	(-4.194)	(50.5)	(37.2)
$2Sc(s) + 3/2O_2(g) = Sc_2O_3(s)$	298 - 1670	411 (a)	(391)	(0.50)	(-0.7)	-	(2.8)	(0.678)	(67.8)	(68.3)
$2Sc(l) + 3/2O_2(g) = Sc_2O_3(s)$	1670 - 2500	-	-	(-4.24)	(5.3)	-	(2.8)	(-7.774)	(47.4)	(43.2)
$Se(s) + O_2(g) = SeO_2(s)$	298 - 490.6	55.0 (b)	(41.6)	(1.2)	(-3.0)	-	(1.7)	(0.232)	(49.4)	(50.6)
$Se(l) + O_2(g) = SeO_2(s)$	490.6 - 603	-	-	(-2.5)	(5.8)	-	(1.7)	(-0.262)	(33.3)	(30.8)
$Se(l) + O_2(g) = SeO_2(g)$	603 - 1000	-	-	(-0.8)	(-0.3)	-	(1.9)	(24.34)	(-0.2)	(-1.0)
$1/2Se_2(g) + O_2(g) = SeO_2(g)$	1000 - 2500	-	-	(1.8)	(-0.3)	-	(2.1)	(7.560)	(31.6)	(33.3)
$Si(s) + 1/2O_2(g) = SiO(s)$	298 - 1683	104.6 (a)	(98.0)	(-2.5)	(1.3)	-	(2.0)	(1.321)	(7.3)	(4.8)
$Si(l) + 1/2O_2(g) = SiO(s)$	1683 - 2250	-	-	(-4.2)	(2.3)	-	(0.9)	(-8.425)	(3.0)	(-1.2)

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f, 298$ (kcal/mole)	$-\Delta F_f, 298$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e. u.)	$-\Delta(B-a)$
$\text{Si}(s) + \text{O}_2(g) = \text{SiO}_2(s; \beta\text{-quartz})$	298 - 848	210.2 (a)	197.3	-2.75	6.92	-	0.24	0.492	29.70	26.95
$\text{Si}(s) + \text{O}_2(g) = \text{SiO}_2(s; \beta\text{-quartz})$	848 - 1683	-	-	0.44	0.66	-	2.9	0.505	45.54	45.58
$\text{Si}(l) + \text{O}_2(g) = \text{SiO}_2(s; \beta\text{-quartz})$	1683 - 1883	-	-	-1.3	1.7	-	1.9	-9.241	41.2	40.0
$\text{Si}(l) + \text{O}_2(g) = \text{SiO}_2(l)$	1883 - 2500	-	-	(4.3)	(-0.3)	-	(1.9)	(-14.29)	(78.7)	(83.0)
$2\text{Sm}(s) + 3/2\text{O}_2(g) = \text{Sm}_2\text{O}_3(s)$	298 - 1623	430 (d)	(410)	(0.1)	(-0.2)	-	(2.8)	(0.775)	(65.9)	(66.0)
$2\text{Sm}(l) + 3/2\text{O}_2(g) = \text{Sm}_2\text{O}_3(s)$	1623 - 2150	-	-	(-4.5)	(6.6)	-	(2.8)	(-8.115)	(47.5)	(43.0)
$2\text{Sm}(l) + 3/2\text{O}_2(g) = \text{Sm}_2\text{O}_3(l)$	2150 - 2500	-	-	(5.6)	(-0.4)	-	(2.8)	(6.349)	(100.6)	(106.2)
$\text{Sn}(s; \alpha \text{ and } \beta) + 1/2\text{O}_2(g) = \text{SnO}(s)$	298 - 505.1	68.4 (b)	61.6	0.84	-2.81	-	0.9	0.138	26.7	27.5
$\text{Sn}(l) + 1/2\text{O}_2(g) = \text{SnO}(s)$	505.1 - 660	-	-	-2.0	3.5	-	0.9	-0.901	15.3	13.2
$\text{Sn}(s; \alpha \text{ and } \beta) + \text{O}_2(g) = \text{SnO}_2(s)$	298 - 505.1	138.8 (b)	124.4	4.97	-4.16	-	-3.3	-2.498	77.6	82.6
$\text{Sn}(l) + \text{O}_2(g) = \text{SnO}_2(s)$	505.1 - 1898	-	-	2.1	2.1	-	-3.3	-3.537	66.2	68.3
$\text{Sn}(l) + \text{O}_2(g) = \text{SnO}_2(l)$	1898 - 2473	-	-	(6.9)	(-0.3)	-	(1.9)	(3.262)	(92.2)	(9.92)
$\text{Sn}(g) + \text{O}_2(g) = \text{SnO}_2(l)$	2473 - 2500	-	-	(9.3)	(-0.3)	-	(1.9)	(-57.51)	(132.8)	(142.0)
$\text{Sr}(s) + 1/2\text{O}_2(g) = \text{SrO}(s)$	298 - 1043	141.0 (f)	133.7	2.60	-0.38	-	-0.9	-1.100	39.8	42.4
$\text{Sr}(l) + 1/2\text{O}_2(g) = \text{SrO}(s)$	1043 - 1657	-	-	(0.50)	(1.0)	-	(-0.9)	(-1.856)	(28.7)	(29.2)
$\text{Sr}(g) + 1/2\text{O}_2(g) = \text{SrO}(s)$	1657 - 2500	-	-	(3.24)	(1.0)	-	(-0.9)	(-39.99)	(69.3)	(72.5)
$\text{Sr}(s) + \text{O}_2(g) = \text{SrO}_2(s)$	298 - 488	153.6 (b)	(139.6)	(2.9)	(0.6)	-	(-1.1)	(-1.375)	(64.8)	(67.7)
$2\text{Ta}(s) + 5/2\text{O}_2(g) = \text{Ta}_2\text{O}_5(s)$	298 - 2150	488.8 (o)	456.7	-3.1	7.8	-	(4.7)	1.907	90.3	87.2
$2\text{Ta}(s) + 5/2\text{O}_2(g) = \text{Ta}_2\text{O}_5(l)$	2150 - 2500	-	-	(13.7)	(-2.2)	-	(4.7)	(4.900)	(190.2)	(203.9)
$\text{Tc}(s) + \text{O}_2(g) = \text{TcO}_2(s)$	298 - 2400	103.72 (p)	(90.9)	(-3.5)	(6.9)	-	(1.9)	(1.256)	(24.8)	(21.4)
$\text{Tc}(l) + \text{O}_2(g) = \text{TcO}_2(s)$	2400 - 2500	-	-	(5.7)	(-0.3)	-	(1.9)	(12.41)	(74.0)	(79.7)
$\text{Tc}(s) + 3/2\text{O}_2(g) = \text{TcO}_3(s)$	298 - 1100	129 (a)	(111)	(1.4)	(2.8)	-	(0.8)	(-0.417)	(70.3)	(71.7)
$2\text{Tc}(s) + 7/2\text{O}_2(g) = \text{Tc}_2\text{O}_7(s)$	298 - 392.7	266.1 (p)	(223.1)	(-1.0)	(13.7)	-	(4.2)	(0.752)	(140.8)	(139.8)
$2\text{Tc}(s) + 7/2\text{O}_2(g) = \text{Tc}_2\text{O}_7(l)$	392.7 - 583.8	-	-	(23.9)	(-4.9)	-	(6.6)	(4.020)	(253.4)	(277.3)
$2\text{Tc}(s) + 7/2\text{O}_2(g) = \text{Tc}_2\text{O}_7(g)$	583.8 - 2400	-	-	(-15.1)	(23.1)	-	(6.6)	(36.02)	(-3.6)	(-17.7)
$2\text{Tc}(l) + 7/2\text{O}_2(g) = \text{Tc}_2\text{O}_7(g)$	2400 - 2500	-	-	(-25.9)	(27.1)	-	(6.6)	(39.42)	(-72.4)	(-98.3)
$\text{Te}(s, \alpha) + 1/2\text{O}_2(g) = \text{TeO}(s)$	298 - 621	(56)	(49)	(-0.1)	(0.8)	-	(0.9)	(0.263)	(22.4)	(22.3)
$\text{Te}(s, \beta) + 1/2\text{O}_2(g) = \text{TeO}(s)$	621 - 723	-	-	(-0.1)	(0.8)	-	(0.9)	(0.133)	(22.6)	(22.5)
$\text{Te}(l) + 1/2\text{O}_2(g) = \text{TeO}(s)$	723 - 1020	-	-	(-4.5)	(6.1)	-	(0.9)	(-2.324)	(3.2)	(-1.3)
$\text{Te}(l) + 1/2\text{O}_2(g) = \text{TeO}(l)$	1020 - 1360	-	-	(2.4)	(-0.1)	-	(0.9)	(0.964)	(37.7)	(40.1)
$1/2\text{Te}_2(g) + 1/2\text{O}_2(g) = \text{TeO}(l)$	1360 - 1775	-	-	(6.9)	(-0.1)	-	(1.0)	(-17.10)	(79.1)	(86.0)
$1/2\text{Te}_2(g) + 1/2\text{O}_2(g) = \text{TeO}(g)$	1775 - 2500	-	-	(0.3)	(-0.1)	-	(1.0)	(44.62)	(1.6)	(1.9)
$\text{Te}(s, \alpha) + \text{O}_2(g) = \text{TeO}_2(s)$	298 - 621	77.69 (b)	64.7	1.0	1.4	-	1.9	0.171	48.9	49.9
$\text{Te}(s, \beta) + \text{O}_2(g) = \text{TeO}_2(s)$	621 - 723	-	-	1.0	1.4	-	1.9	0.041	49.2	50.2
$\text{Te}(l) + \text{O}_2(g) = \text{TeO}_2(s)$	723 - 1006	-	-	-3.4	6.6	-	1.9	-2.416	29.8	26.3
$\text{Te}(l) + \text{O}_2(g) = \text{TeO}_2(l)$	1006 - 1360	-	-	(2.7)	(-0.3)	-	(1.9)	(-1.921)	(62.2)	(64.9)
$1/2\text{Te}_2(g) + \text{O}_2(g) = \text{TeO}_2(l)$	1360 - 2250	-	-	(7.3)	(-0.3)	-	(2.0)	(-19.98)	(103.62)	(110.9)
$\text{Th}(s) + 1/2\text{O}_2(g) = \text{ThO}(s)$	298 - 2150	(145)	(138.5)	(-1.3)	(3.0)	(-2.0)	(0.9)	(0.709)	(14.1)	(12.8)
$\text{Th}(s) + 1/2\text{O}_2(g) = \text{ThO}(l)$	2150 - 2173	-	-	(2.7)	(0.6)	(-2.0)	(0.9)	(10.66)	(33.6)	(36.3)
$\text{Th}(l) + 1/2\text{O}_2(g) = \text{ThO}(l)$	2173 - 2500	-	-	(2.9)	(-0.1)	-	(0.9)	(0.463)	(40.4)	(43.3)
$\text{Th}(s) + \text{O}_2(g) = \text{ThO}_2(s)$	298 - 2173	293.21 (q)	279.3	0.0	2.86	-2.0	-0.2	-0.123	47.14	47.14
$\text{Th}(l) + \text{O}_2(g) = \text{ThO}_2(s)$	2173 - 2500	-	-	(0.2)	(2.1)	-	(-0.2)	(-10.32)	(53.9)	(54.1)
$\text{Ti}(s, \alpha) + 1/2\text{O}_2(g) = \text{TiO}(s, \alpha)$	298 - 1155	123.9 (r)	117.0	1.18	0.95	-	-0.9	-0.754	31.08	32.26
$\text{Ti}(s, \beta) + 1/2\text{O}_2(g) = \text{TiO}(s, \alpha)$	1155 - 1264	-	-	-1.06	3.5	-	-0.9	-0.786	18.94	17.88
$\text{Ti}(s, \beta) + 1/2\text{O}_2(g) = \text{TiO}(s, \beta)$	1264 - 2000	-	-	0.22	2.9	-	0.9	-0.960	26.62	26.84
$\text{Ti}(l) + 1/2\text{O}_2(g) = \text{TiO}(s, \beta)$	2000 - 2010	-	-	(-0.1)	(2.9)	-	(0.9)	(-4.970)	(26.64)	(26.55)
$2\text{Ti}(s, \alpha) + 3/2\text{O}_2(g) = \text{Ti}_2\text{O}_3(s, \alpha)$	298 - 473	362.9 (r)	342.4	-15.60	48.09	-	2.8	3.306	-6.76	-22.35
$2\text{Ti}(s, \alpha) + 3/2\text{O}_2(g) = \text{Ti}_2\text{O}_3(s, \beta)$	473 - 1155	-	-	11.78	-4.13	-	-7.4	-5.840	138.94	150.72
$2\text{Ti}(s, \beta) + 3/2\text{O}_2(g) = \text{Ti}_2\text{O}_3(s, \beta)$	1155 - 2000	-	-	7.28	0.9	-	-7.4	-5.804	114.68	121.96
$2\text{Ti}(l) + 3/2\text{O}_2(g) = \text{Ti}_2\text{O}_3(s, \beta)$	2000 - 2400	-	-	(6.7)	(0.9)	-	(-7.4)	(-13.80)	(114.70)	(121.28)
$2\text{Ti}(l) + 3/2\text{O}_2(g) = \text{Ti}_2\text{O}_3(l)$	2400 - 2500	-	-	(9.5)	(-0.4)	-	(2.8)	(7.596)	(123.4)	(132.9)
$3\text{Ti}(s, \alpha) + 5/2\text{O}_2(g) = \text{Ti}_3\text{O}_5(s, \alpha)$	298 - 450	586.7 (r)	553.1	-0.96	21.30	-	4.7	0.662	111.86	110.91
$3\text{Ti}(s, \alpha) + 5/2\text{O}_2(g) = \text{Ti}_3\text{O}_5(s, \beta)$	450 - 1155	-	-	5.18	-0.20	-	4.7	2.318	134.68	139.86
$3\text{Ti}(s, \beta) + 5/2\text{O}_2(g) = \text{Ti}_3\text{O}_5(s, \beta)$	1155 - 2000	-	-	-1.58	7.4	-	4.7	2.222	98.30	96.72
$3\text{Ti}(l) + 5/2\text{O}_2(g) = \text{Ti}_3\text{O}_5(s, \beta)$	2000 - 2450	-	-	(-2.5)	(7.4)	-	(4.7)	(-9.778)	(98.32)	(95.85)
$3\text{Ti}(l) + 5/2\text{O}_2(g) = \text{Ti}_3\text{O}_5(l)$	2450 - 2500	-	-	(15.9)	(-0.3)	-	(4.7)	(19.15)	(201.9)	(217.8)
$\text{Ti}(s, \alpha) + \text{O}_2(g) = \text{TiO}_2(s, \text{rutile})$	298 - 1155	225.5 (r)	212.4	4.45	-2.50	-	-2.5	-2.145	70.34	74.29
$\text{Ti}(s, \beta) + \text{O}_2(g) = \text{TiO}_2(s, \text{rutile})$	1155 - 2000	-	-	2.20	-	-	-2.5	-2.177	58.21	60.41
$\text{Ti}(l) + \text{O}_2(g) = \text{TiO}_2(s, \text{rutile})$	2000 - 2128	-	-	(1.9)	-	-	(-2.5)	(-6.177)	(58.22)	(60.12)
$\text{Ti}(l) + \text{O}_2(g) = \text{TiO}_2(l)$	2128 - 2500	-	-	(5.3)	(-0.3)	-	(1.9)	(3.262)	(76.38)	(81.71)

Table V (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f, 298$ (kcal/mole)	$-\Delta F_f, 298$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$2Ti(s, \alpha) + 1/2O_2(g) = Ti_2O(s)$	298 - 508.3	42.5 (a)	(33.1)	(1.1)	(-1.0)	-	(0.6)	(-0.130)	(37.4)	(38.5)
$2Ti(s, \beta) + 1/2O_2(g) = Ti_2O(s)$	508.3 - 573	-	-	(-2.9)	(5.9)	-	(0.6)	(0.886)	(15.8)	(12.8)
$2Ti(s, \beta) + 1/2O_2(g) = Ti_2O(l)$	573 - 576.8	-	-	(3.4)	(-0.1)	-	(0.9)	(3.312)	(43.6)	(46.9)
$2Ti(l) + 1/2O_2(g) = Ti_2O(l)$	576.8 - 773	-	-	(3.0)	(-0.1)	-	(0.9)	(1.482)	(44.6)	(47.5)
$2Ti(l) + 1/2O_2(g) = Ti_2O(g)$	773 - 1730	-	-	(-5.4)	(-0.1)	-	(0.9)	(25.08)	(-33.4)	(-38.9)
$2Ti(g) + 1/2O_2(g) = Ti_2O(g)$	1730 - 2500	-	-	(-0.4)	(-0.1)	-	(0.9)	(-61.31)	(49.2)	(48.8)
$U(s, \alpha) + 1/2O_2(g) = UO(s)$	298 - 938	(129) (a)	(123)	(3.2)	(-6.3)	-	(0.1)	(-0.682)	(36.9)	(40.1)
$U(s, \beta) + 1/2O_2(g) = UO(s)$	938 - 1049	-	-	(-3.8)	(1.9)	-	(0.9)	(1.748)	(-2.9)	(-6.7)
$U(s, \gamma) + 1/2O_2(g) = UO(s)$	1049 - 1405	-	-	(-2.7)	(1.9)	-	(0.9)	(-0.635)	(6.3)	(3.6)
$U(l) + 1/2O_2(g) = UO(s)$	1405 - 2500	-	-	(-2.5)	(1.9)	-	(0.9)	(-3.818)	(9.4)	(6.8)
$U(s, \alpha) + O_2(g) = UO_2(s)$	298 - 938	259.2 (s)	246.7	7.68	-6.79	-	-2.88	-3.054	85.65	93.33
$U(s, \beta) + O_2(g) = UO_2(s)$	938 - 1049	-	-	0.65	1.4	-	-2.1	-0.624	45.85	46.50
$U(s, \gamma) + O_2(g) = UO_2(s)$	1049 - 1405	-	-	1.81	1.4	-	-2.1	-3.007	55.03	56.84
$U(l) + O_2(g) = UO_2(s)$	1405 - 2500	-	-	(1.94)	(1.4)	-	(-2.1)	(-6.190)	(58.11)	(60.05)
$3U(s, \alpha) + 4O_2(g) = U_3O_8(s)$	298 - 938	853.5 (q)	(804.4)	(22.2)	(-18.0)	-	(-5.8)	(-8.157)	(290.3)	(312.5)
$3U(s, \beta) + 4O_2(g) = U_3O_8(s)$	938 - 1049	-	-	(1.1)	(6.5)	-	(-3.4)	(-0.867)	(170.9)	(172.0)
$3U(s, \gamma) + 4O_2(g) = U_3O_8(s)$	1049 - 1405	-	-	(4.6)	(6.5)	-	(-3.4)	(-8.016)	(198.4)	(203.0)
$3U(l) + 4O_2(g) = U_3O_8(s)$	1405 - 1950	-	-	(5.0)	(6.5)	-	(-3.4)	(-17.56)	(207.7)	(212.6)
$U(s, \alpha) + 3/2O_2(g) = UO_3(s)$	298 - 925	291.6 (s)	273.1	6.44	-6.00	-	-1.6	-2.123	97.38	103.81
$V(s) + 1/2O_2(g) = VO(s)$	298 - 2003	100 (b)	93	1.62	0.51	-	-0.3	-0.661	31.8	33.4
$V(l) + 1/2O_2(g) = VO(s)$	2003 - 2350	-	-	(-1.4)	(1.5)	-	(-0.3)	(-0.538)	(12.7)	(11.3)
$V(l) + 1/2O_2(g) = VO(l)$	2350 - 2500	-	-	(1.8)	(-0.1)	-	(0.9)	(11.49)	(27.2)	(29.0)
$2V(s) + 3/2O_2(g) = V_2O_3(s)$	298 - 2003	296.1 (a)	277.2	5.80	2.43	-	-2.6	-2.862	99.30	105.11
$2V(l) + 3/2O_2(g) = V_2O_3(s)$	2003 - 2240	-	-	(-0.3)	(4.4)	-	(-2.6)	(-2.616)	(61.1)	(60.9)
$2V(l) + 3/2O_2(g) = V_2O_3(l)$	2240 - 2350	-	-	(8.4)	(-0.4)	-	(2.8)	(14.19)	(106.4)	(114.8)
$3V(s) + 5/2O_2(g) = V_3O_5(s)$	298 - 2003	(505)	(472)	(-1.4)	(26.4)	-	(4.7)	(0.562)	(109.1)	(107.7)
$3V(l) + 5/2O_2(g) = V_3O_5(s)$	2003 - 2100	-	-	(-10.5)	(29.4)	-	(4.7)	(0.930)	(51.8)	(41.3)
$3V(l) + 5/2O_2(g) = V_3O_5(l)$	2100 - 2500	-	-	(9.1)	(-0.6)	-	(4.7)	(67.72)	(118.8)	(127.9)
$V(s) + O_2(g) = VO_2(s, \alpha)$	298 - 345	171.0 (a)	158.0	1.12	-1.2	-	1.9	0.251	48.70	49.82
$V(s) + O_2(g) = VO_2(s, \beta)$	345 - 1818	-	-	4.01	0.47	-	-2.06	-0.969	64.87	68.88
$V(s) + O_2(g) = VO_2(l)$	1818 - 2003	-	-	11.66	-1.2	-	1.9	1.749	111.65	123.31
$V(l) + O_2(g) = VO_2(l)$	2003 - 2500	-	-	(8.6)	(-0.3)	-	(1.9)	(1.872)	(92.56)	(101.1)
$2V(s) + 5/2O_2(g) = V_2O_5(s)$	298 - 943	372.5 (a)	341.3	14.72	-6.48	-	-8.5	-7.210	192.1	206.9
$2V(l) + 5/2O_2(g) = V_2O_5(s)$	943 - 2003	-	-	13.78	-2.6	-	4.7	8.804	172.0	185.8
$2V(l) + 5/2O_2(g) = V_2O_5(l)$	2003 - 2325	-	-	(7.7)	(-0.6)	-	(4.7)	(9.050)	(133.9)	(141.6)
$2V(l) + 5/2O_2(g) = V_2O_5(g)$	2325 - 2500	-	-	(2.1)	(-0.6)	-	(4.7)	(85.07)	(63.4)	(65.5)
$W(s) + O_2(g) = WO_2(s)$	298 - 1543	136.3 (b)	(123.8)	(3.6)	(3.2)	-	(-2.1)	(-2.020)	(64.6)	(68.2)
$W(s) + O_2(g) = WO_2(l)$	1543 - 2125	-	-	(10.0)	(-1.0)	-	(1.9)	(4.864)	(97.6)	(107.6)
$W(s) + 3/2O_2(g) = WO_3(s)$	298 - 1743	200.84 (b)	182.6	-0.8	6.6	-	2.8	0.744	57.4	56.6
$W(s) + 3/2O_2(g) = WO_3(l)$	1743 - 2100	-	-	(11.9)	(-1.1)	-	(2.8)	(7.417)	(128.7)	(140.6)
$W(s) + 3/2O_2(g) = WO_3(g)$	2100 - 2500	-	-	(-0.1)	(-1.1)	-	(2.8)	(75.62)	(16.4)	(16.3)
$2Y(s) + 3/2O_2(g) = Y_2O_3(s)$	298 - 1750	(420) (a)	(400.5)	(2.4)	(3.4)	-	(0.6)	(-0.802)	(80.2)	(82.6)
$2Y(l) + 3/2O_2(g) = Y_2O_3(s)$	1750 - 2500	-	-	(-1.4)	(7.8)	-	(0.6)	(-8.890)	(64.2)	(62.8)
$Zn(s) + 1/2O_2(g) = ZnO(s)$	298 - 692.7	83.2 (a)	76.1	2.22	-1.31	-	-1.2	-1.072	37.00	39.23
$Zn(l) + 1/2O_2(g) = ZnO(s)$	692.7 - 1180	-	-	0.08	1.1	-	-1.2	-1.754	26.90	26.98
$Zn(g) + 1/2O_2(g) = ZnO(s)$	1180 - 2248	-	-	(2.61)	(1.1)	-	(-1.2)	(-32.18)	(68.06)	(20.67)
$Zn(g) + 1/2O_2(g) = ZnO(l)$	2248 - 2500	-	-	(5.1)	(-0.1)	-	(0.9)	(-23.60)	(79.6)	(84.7)
$Zr(s, \alpha) + O_2(g) = ZrO(s, \alpha)$	298 - 1135	261.5 (o)	247.8	1.54	0.42	-	-0.61	-0.783	55.51	57.05
$Zr(s, \beta) + O_2(g) = ZrO(s, \alpha)$	1135 - 1478	-	-	1.10	1.5	-	-1.5	-2.002	54.53	55.63
$Zr(s, \beta) + O_2(g) = ZrO(s, \beta)$	1478 - 2125	-	-	(2.26)	(-0.3)	-	(1.9)	(-0.104)	(59.28)	(61.54)
$Zr(l) + O_2(g) = ZrO(s, \beta)$	2125 - 2500	-	-	(1.5)	(-0.3)	-	(1.9)	(-3.453)	(56.0)	(57.5)

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Table VI

THERMOCHEMICAL PROPERTIES OF THE FLUORIDES

Reaction	Temperature Range (°K)	$-\Delta H_f^{298}$ (kcal/mole)	$-\Delta F_f^{298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Ac(s)} + 3/2\text{F}_2(\text{g}) = \text{AcF}_3(\text{s})$	298 - 1090	(395)	(377)	(3.6)	(2.5)	-	(1.2)	(-0.773)	(80.2)	(83.8)
$\text{Ac(l)} + 3/2\text{F}_2(\text{g}) = \text{AcF}_3(\text{s})$	1090 - 1600	-	-	(1.0)	(5.5)	-	(1.2)	(-2.221)	(67.6)	(66.6)
$\text{Ac(l)} + 3/2\text{F}_2(\text{g}) = \text{AcF}_3(\text{l})$	1600 - 2500	-	-	(11.1)	(-0.7)	-	(1.2)	(-2.442)	(127.2)	(138.3)
$\text{Ag(s)} + 1/2\text{F}_2(\text{g}) = \text{AgF(s)}$	298 - 708	48.7 (a)	(44.3)	(2.0)	(1.3)	-	-	(-0.631)	(26.1)	(28.0)
$\text{Ag(s)} + 1/2\text{F}_2(\text{g}) = \text{AgF(l)}$	708 - 1234	-	-	(6.3)	(-2.3)	-	-	(0.727)	(46.8)	(53.0)
$\text{Ag(l)} + 1/2\text{F}_2(\text{g}) = \text{AgF(l)}$	1234 - 1420	-	-	(4.1)	(-0.2)	-	(0.4)	(-0.597)	(35.9)	(39.9)
$\text{Ag(l)} + 1/2\text{F}_2(\text{g}) = \text{AgF(g)}$	1420 - 2485	-	-	(-2.5)	(-0.2)	-	(0.4)	(42.78)	(-36.0)	(-38.6)
$\text{Ag(g)} + 1/2\text{F}_2(\text{g}) = \text{AgF(g)}$	2485 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(-23.73)	(6.6)	(6.4)
$\text{Ag(s)} + \text{F}_2(\text{g}) = \text{AgF}_2(\text{s})$	298 - 970	50.3 (a)	(39.5)	(2.0)	(2.9)	-	(0.4)	(-0.584)	(48.4)	(50.5)
$\text{Ag(s)} + \text{F}_2(\text{g}) = \text{AgF}_2(\text{l})$	970 - 1234	-	-	(8.1)	(-2.5)	-	(0.4)	(0.440)	(81.6)	(89.8)
$\text{Ag(l)} + \text{F}_2(\text{g}) = \text{AgF}_2(\text{l})$	1234 - 1500	-	-	(5.9)	(-0.4)	-	(0.8)	(-0.884)	(70.7)	(76.6)
$\text{Ag(l)} + \text{F}_2(\text{g}) = \text{AgF}_2(\text{g})$	1500 - 2485	-	-	(-0.6)	(-0.4)	-	(0.8)	(44.87)	(-0.8)	(-1.4)
$\text{Al(s)} + 1/2\text{F}_2(\text{g}) = \text{AlF(s)}$	298 - 931.7	102 (a)	(97)	(1.4)	-	-	(0.4)	(-0.289)	(23.9)	(25.3)
$\text{Al(l)} + 1/2\text{F}_2(\text{g}) = \text{AlF(s)}$	931.7 - 1100	-	-	(-0.6)	(3.0)	-	(0.4)	(-2.223)	(15.4)	(14.7)
$\text{Al(l)} + 1/2\text{F}_2(\text{g}) = \text{AlF(l)}$	1100 - 1675	-	-	(4.4)	(-0.2)	-	(0.4)	(-0.587)	(42.2)	(46.5)
$\text{Al(l)} + 1/2\text{F}_2(\text{g}) = \text{AlF(g)}$	1675 - 2500	-	-	(-2.2)	(-0.2)	-	(-1.0)	(47.38)	(-29.0)	(-31.2)
$\text{Al(s)} + 3/2\text{F}_2(\text{g}) = \text{AlF}_3(\text{s})$	298 - 931.7	323 (a)	306	1.20	1.98	-	-0.6	-0.645	63.6	64.8
$\text{Al(l)} + 3/2\text{F}_2(\text{g}) = \text{AlF}_3(\text{s})$	931.7 - 1545	-	-	-0.86	4.9	-	-0.6	-2.579	55.0	54.2
$\text{Al(l)} + 3/2\text{F}_2(\text{g}) = \text{AlF}_3(\text{g})$	1545 - 2500	-	-	(-1.9)	(2.3)	-	(1.2)	(78.31)	(-6.1)	(-8.0)
$\text{Am(s)} + 3/2\text{F}_2(\text{g}) = \text{AmF}_3(\text{s})$	298 - 1200	(382)	(365)	(4.4)	(1.1)	-	(1.2)	(-0.949)	(81.4)	(85.8)
$\text{Am(l)} + 3/2\text{F}_2(\text{g}) = \text{AmF}_3(\text{s})$	1200 - 1700	-	-	(0.8)	(5.5)	-	(1.2)	(-2.197)	(63.1)	(63.9)
$\text{Am(l)} + 3/2\text{F}_2(\text{g}) = \text{AmF}_3(\text{l})$	1700 - 2340	-	-	(11.6)	(-0.7)	-	(1.2)	(1.402)	(125.2)	(136.8)
$\text{Am(l)} + 3/2\text{F}_2(\text{g}) = \text{AmF}_3(\text{g})$	2340 - 2500	-	-	(-0.9)	(-0.7)	-	(1.2)	(96.65)	(-0.1)	(-0.8)
$\text{As(s)} + 3/2\text{F}_2(\text{g}) = \text{AsF}_3(\text{l})$	298 - 336	198.3 (b)	189.0	12.6	-3.0	-	1.2	-3.218	101.3	113.9
$\text{As(s)} + 3/2\text{F}_2(\text{g}) = \text{AsF}_3(\text{g})$	336 - 883	-	-	0.58	-1.34	-	-1.5	8.534	7.5	8.1
$1/4\text{As}_4(\text{g}) + 3/2\text{F}_2(\text{g}) = \text{AsF}_3(\text{g})$	883 - 2500	-	-	(1.37)	(0.62)	-	(-1.5)	(-0.677)	(23.7)	(25.1)
$\text{As(s)} + 5/2\text{F}_2(\text{g}) = \text{AsF}_5(\text{g})$	298 - 883	(265)	(248)	(-6.4)	(7.6)	-	(2.0)	(2.243)	(20.5)	(14.1)
$1/4\text{As}_4(\text{g}) + 5/2\text{F}_2(\text{g}) = \text{AsF}_5(\text{g})$	883 - 2500	-	-	(-5.6)	(9.5)	-	(2.0)	(-6.968)	(36.7)	(31.1)
$\text{Au(s)} + 1/2\text{F}_2(\text{g}) = \text{AuF(s)}$	298 - 850	18 (a)	(14)	(0.7)	(3.4)	(-0.9)	(0.4)	(-0.220)	(18.9)	(19.6)
$\text{Au(s)} + 1/2\text{F}_2(\text{g}) = \text{AuF(l)}$	850 - 1336.16	-	-	(5.2)	-	(-0.9)	(0.4)	(0.083)	(42.9)	(48.1)
$\text{Au(l)} + 1/2\text{F}_2(\text{g}) = \text{AuF(l)}$	1336.16 - 1475	-	-	(4.4)	(0.2)	-	(0.4)	(-2.379)	(39.6)	(43.9)
$\text{Au(l)} + 1/2\text{F}_2(\text{g}) = \text{AuF(g)}$	1475 - 2500	-	-	(-2.2)	(-0.2)	-	(0.4)	(41.36)	(-31.6)	(33.9)
$\text{Au(s)} + \text{F}_2(\text{g}) = \text{AuF}_2(\text{s})$	298 - 940	(57) (a)	(46.5)	(1.8)	(4.3)	(-0.9)	(0.8)	(-0.444)	(45.8)	(47.6)
$\text{Au(s)} + \text{F}_2(\text{g}) = \text{AuF}_2(\text{l})$	940 - 1336.16	-	-	(7.1)	(-0.3)	(-0.9)	(0.8)	(0.106)	(74.0)	(81.1)
$\text{Au(l)} + \text{F}_2(\text{g}) = \text{AuF}_2(\text{l})$	1336.16 - 1525	-	-	(6.2)	(-0.4)	-	(0.8)	(-2.356)	(70.7)	(76.9)
$\text{Au(l)} + \text{F}_2(\text{g}) = \text{AuF}_2(\text{g})$	1525 - 2500	-	-	(-0.3)	(-0.4)	-	(0.8)	(45.56)	(-1.9)	(-2.2)
$\text{Au(s)} + 3/2\text{F}_2(\text{g}) = \text{AuF}_3(\text{s})$	298 - 1000	(100) (a)	(84)	(3.6)	(7.1)	(-0.9)	(1.2)	(-0.941)	(75.5)	(79.1)
$\text{Au(s)} + 3/2\text{F}_2(\text{g}) = \text{AuF}_3(\text{l})$	1000 - 1336.16	-	-	(11.9)	(0.5)	(-0.9)	(1.2)	(2.459)	(117.8)	(129.7)
$\text{Au(l)} + 3/2\text{F}_2(\text{g}) = \text{AuF}_3(\text{l})$	1336.16 - 1470	-	-	(11.1)	(-0.7)	-	(1.2)	(-0.003)	(114.4)	(125.5)
$\text{Au(l)} + 3/2\text{F}_2(\text{g}) = \text{AuF}_3(\text{g})$	1470 - 2500	-	-	(0.6)	(-0.7)	-	(1.2)	(48.43)	(15.4)	(16.0)
$\text{B(s)} + 3/2\text{F}_2(\text{g}) = \text{BF}_3(\text{g})$	298 - 2313	273.5 (a)	269.5	0.10	-0.71	-	-1.8	-0.583	14.91	15.00
$\text{B(l)} + 3/2\text{F}_2(\text{g}) = \text{BF}_3(\text{g})$	2313 - 2500	-	-	(-4.4)	(3.7)	-	(-1.8)	(-5.837)	(-7.8)	(-12.2)
$\text{Ba(s, } \alpha) + \text{F}_2(\text{g}) = \text{BaF}_2(\text{s})$	298 - 648	286 (a)	274	0.14	8.26	-	0.8	-0.140	44.4	44.5
$\text{Ba(s, } \beta) + \text{F}_2(\text{g}) = \text{BaF}_2(\text{s})$	648 - 977	-	-	0.14	8.26	-	0.8	-0.280	44.6	44.7
$\text{Ba(l)} + \text{F}_2(\text{g}) = \text{BaF}_2(\text{s})$	977 - 1593	-	-	(-1.7)	(9.8)	-	(0.8)	(-1.019) ^m	(35.2)	(33.4)
$\text{Ba(l)} + \text{F}_2(\text{g}) = \text{BaF}_2(\text{l})$	1593 - 1911	-	-	(8.3)	(-0.4)	-	(0.8)	(-1.039)	(90.9)	(99.2)
$\text{Ba(g)} + \text{F}_2(\text{g}) = \text{BaF}_2(\text{l})$	1911 - 2473	-	-	(10.7)	(-0.4)	-	(0.8)	(-41.53)	(127.9)	(138.6)
$\text{Ba(g)} + \text{F}_2(\text{g}) = \text{BaF}_2(\text{g})$	2473 - 2500	-	-	(1.5)	(-0.4)	-	(0.8)	(47.22)	(29.4)	(30.9)
$\text{Be(s)} + \text{F}_2(\text{g}) = \text{BeF}_2(\text{s})$	298 - 1070	(220)	(207.5)	(-3.1)	(2.6)	-	(2.0)	(1.453)	(24.0)	(21.0)
$\text{Be(s)} + \text{F}_2(\text{g}) = \text{BeF}_2(\text{l})$	1070 - 1556	-	-	(5.6)	(-1.6)	-	(2.0)	(1.449)	(73.6)	(79.3)
$\text{Be(l)} + \text{F}_2(\text{g}) = \text{BeF}_2(\text{l})$	1556 - 1600	-	-	(5.4)	(-0.4)	-	(0.8)	(-2.113)	(75.6)	(81.0)
$\text{Be(l)} + \text{F}_2(\text{g}) = \text{BeF}_2(\text{g})$	1600 - 2500	-	-	(1.4)	(-0.4)	-	(0.8)	(44.29)	(21.2)	(22.6)
$\text{Bi(s)} + 1/2\text{F}_2(\text{g}) = \text{BiF(s)}$	298 - 544.2	(65)	(60)	(0.9)	(0.8)	-	(0.4)	(-0.161)	(21.9)	(22.8)
$\text{Bi(l)} + 1/2\text{F}_2(\text{g}) = \text{BiF(s)}$	544.2 - 650	-	-	(-1.3)	(3.4)	-	(0.4)	(-1.968)	(14.1)	(12.7)
$\text{Bi(l)} + 1/2\text{F}_2(\text{g}) = \text{BiF(l)}$	650 - 1075	-	-	(3.8)	(-0.2)	-	(0.4)	(-1.923)	(40.8)	(44.5)
$\text{Bi(l)} + 1/2\text{F}_2(\text{g}) = \text{BiF(g)}$	1075 - 1900	-	-	(-2.7)	(-0.2)	-	(0.4)	(28.06)	(-26.0)	(-28.8)
$\text{Bi(g)} + 1/2\text{F}_2(\text{g}) = \text{BiF(g)}$	1900 - 2500	-	-	(-0.1)	(-0.2)	-	(0.4)	(-18.04)	(15.5)	(15.4)
$\text{Bi(s)} + \text{F}_2(\text{g}) = \text{BiF}_3(\text{s})$	298 - 544.2	(140)	(129)	(2.2)	(3.2)	-	(0.8)	(-0.536)	(50.4)	(52.6)
$\text{Bi(l)} + \text{F}_2(\text{g}) = \text{BiF}_3(\text{s})$	544.2 - 1075	-	-	-	(5.8)	-	(0.8)	(-2.343)	(42.6)	(42.6)
$\text{Bi(l)} + \text{F}_2(\text{g}) = \text{BiF}_3(\text{l})$	1075 - 1650	-	-	(5.1)	(-0.4)	-	(0.8)	(-2.143)	(69.6)	(74.7)
$\text{Bi(l)} + \text{F}_2(\text{g}) = \text{BiF}_3(\text{g})$	1650 - 1900	-	-	(-0.9)	(-0.4)	-	(0.8)	(49.76)	(-0.3)	(-1.2)
$\text{Bi(g)} + \text{F}_2(\text{g}) = \text{BiF}_3(\text{g})$	1900 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(3.655)	(41.2)	(42.9)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Bi(s)} + 3/2\text{F}_2(\text{g}) = \text{BiF}_3(\text{s})$	298 - 544.2	(216) (a)	(200)	(3.8)	(10.3)	-	(1.2)	(-1.185)	(77.9)	(81.7)
$\text{Bi(l)} + 3/2\text{F}_2(\text{g}) = \text{BiF}_3(\text{s})$	544.2 - 1000	-	-	(1.6)	(12.9)	-	(1.2)	(-2.992)	(70.1)	(71.7)
$\text{Bi(l)} + 3/2\text{F}_2(\text{g}) = \text{BiF}_3(\text{l})$	1000 - 1300	-	-	(11.0)	(-0.7)	-	(1.2)	(0.608)	(115.3)	(126.3)
$\text{Bi(l)} + 3/2\text{F}_2(\text{g}) = \text{BiF}_3(\text{g})$	1300 - 1900	-	-	-	(-0.7)	-	(1.2)	(42.91)	(14.8)	(14.8)
$\text{Bi(g)} + 3/2\text{F}_2(\text{g}) = \text{BiF}_3(\text{g})$	1900 - 2500	-	-	(2.6)	(-0.7)	-	(1.2)	(-3.195)	(56.3)	(58.9)
$\text{Bi(s)} + 2\text{F}_2(\text{g}) = \text{BiF}_4(\text{s})$	298 - 544.2	(285)	(265)	(3.2)	(6.9)	-	(1.6)	(-0.736)	(86.4)	(89.7)
$\text{Bi(l)} + 2\text{F}_2(\text{g}) = \text{BiF}_4(\text{s})$	544.2 - 560	-	-	(1.0)	(9.5)	-	(1.6)	(-2.543)	(78.6)	(79.6)
$\text{Bi(l)} + 2\text{F}_2(\text{g}) = \text{BiF}_4(\text{l})$	560 - 750	-	-	(12.3)	(-0.9)	-	(1.6)	(-0.340)	(132.0)	(144.3)
$\text{Bi(l)} + 2\text{F}_2(\text{g}) = \text{BiF}_4(\text{g})$	750 - 1900	-	-	(-4.2)	(4.1)	-	(1.6)	(26.63)	(5.1)	(0.9)
$\text{Bi(g)} + 2\text{F}_2(\text{g}) = \text{BiF}_4(\text{g})$	1900 - 2500	-	-	(-1.5)	(4.1)	-	(1.6)	(-19.47)	(46.6)	(45.1)
$\text{C(s)} + 2\text{F}_2(\text{g}) = \text{CF}_4(\text{g})$	298 - 2500	162.5 (c)	151.9	-4.04	5.94	-	-0.30	0.841	14.7	10.7
$\text{Ca(s}, \alpha) + \text{F}_2(\text{g}) = \text{CaF}_2(\text{s}, \alpha)$	298 - 723	290.3 (c)	277.8	0.77	3.3	-	1.3	0.048	46.73	47.50
$\text{Ca(s}, \beta) + \text{F}_2(\text{g}) = \text{CaF}_2(\text{s}, \alpha)$	723 - 1123	-	-	-0.28	5.44	-	1.3	0.019	41.67	41.39
$\text{Ca(l)} + \text{F}_2(\text{g}) = \text{CaF}_2(\text{s}, \alpha)$	1123 - 1424	-	-	(-1.4)	(6.8)	-	1.3	(-1.817)	(37.40)	(36.01)
$\text{Ca(l)} + \text{F}_2(\text{g}) = \text{CaF}_2(\text{s}, \beta)$	1424 - 1691	-	-	(10.1)	(2.1)	-	(0.8)	(-12.25)	(113.4)	(123.5)
$\text{Ca(l)} + \text{F}_2(\text{g}) = \text{CaF}_2(\text{l})$	1691 - 1755	-	-	(8.2)	(-0.4)	-	(0.8)	(1.651)	(90.8)	(99.0)
$\text{Ca(g)} + \text{F}_2(\text{g}) = \text{CaF}_2(\text{l})$	1755 - 2500	-	-	(10.64)	(-0.4)	-	(0.8)	(-41.22)	(130.9)	(141.6)
$\text{Cd(s)} + \text{F}_2(\text{g}) = \text{CdF}_2(\text{s})$	298 - 594.1	164.9 (c)	(153.3)	(0.9)	(3.8)	-	(0.8)	(-0.169)	(44.8)	(45.7)
$\text{Cd(l)} + \text{F}_2(\text{g}) = \text{CdF}_2(\text{s})$	594.1 - 1040	-	-	(-0.8)	(6.8)	-	(0.8)	(-1.085)	(37.5)	(36.6)
$\text{Cd(g)} + \text{F}_2(\text{g}) = \text{CdF}_2(\text{s})$	1040 - 1383	-	-	(1.2)	(6.8)	-	(0.8)	(-27.16)	(75.3)	(76.5)
$\text{Cd(g)} + \text{F}_2(\text{g}) = \text{CdF}_2(\text{l})$	1383 - 2020	-	-	(9.7)	(-0.4)	-	(0.8)	(-26.63)	(122.9)	(132.6)
$\text{Cd(g)} + \text{F}_2(\text{g}) = \text{CdF}_2(\text{g})$	2020 - 2500	-	-	1.5	(-0.4)	-	(0.8)	(43.73)	(33.9)	(35.4)
$\text{Ce(s)} + 3/2\text{F}_2(\text{g}) = \text{CeF}_3(\text{s})$	298 - 1048	416 (a)	(398)	(3.5)	(1.1)	-	(1.2)	(-0.680)	(78.5)	(82.0)
$\text{Ce(l)} + 3/2\text{F}_2(\text{g}) = \text{CeF}_3(\text{s})$	1048 - 1733	-	-	-	(7.1)	-	(1.2)	(-2.407)	(62.5)	(62.5)
$\text{Ce(l)} + 3/2\text{F}_2(\text{g}) = \text{CeF}_3(\text{l})$	1733 - 2500	-	-	(11.7)	(-0.7)	-	(1.2)	(-1.970)	(131.0)	(142.7)
$\text{Ce(s)} + 2\text{F}_2(\text{g}) = \text{CeF}_4(\text{s})$	298 - 1048	442 (a)	(420)	(4.0)	(2.1)	-	(1.6)	(-0.755)	(96.5)	(100.5)
$\text{Ce(l)} + 2\text{F}_2(\text{g}) = \text{CeF}_4(\text{s})$	1048 - 1250	-	-	(0.5)	(8.1)	-	(1.6)	(-2.482)	(80.5)	(81.0)
$\text{Ce(l)} + 2\text{F}_2(\text{g}) = \text{CeF}_4(\text{l})$	1250 - 2000	-	-	(13.5)	(-0.9)	-	(1.6)	(-0.701)	(153.2)	(166.7)
$\text{Ce(l)} + 2\text{F}_2(\text{g}) = \text{CeF}_4(\text{g})$	2000 - 2500	-	-	(-4.5)	(4.1)	-	(1.6)	(73.30)	(2.3)	(-2.2)
$\text{Co(s}, \alpha) + \text{F}_2(\text{g}) = \text{CoF}_2(\text{s})$	298 - 723	158 (a)	(147)	(0.4)	(5.5)	-	(0.8)	(-0.091)	(39.2)	(39.6)
$\text{Co(s}, \beta) + \text{F}_2(\text{g}) = \text{CoF}_2(\text{s})$	723 - 1398	-	-	(1.8)	(3.9)	-	(0.8)	(-0.715)	(47.5)	(49.3)
$\text{Co(s}, \gamma) + \text{F}_2(\text{g}) = \text{CoF}_2(\text{s})$	1398 - 1475	-	-	(-4.5)	(9.8)	-	(0.8)	(2.272)	(10.1)	(5.6)
$\text{Co(s}, \gamma) + \text{F}_2(\text{g}) = \text{CoF}_2(\text{l})$	1475 - 1766	-	-	(6.1)	(-0.4)	-	(0.8)	(4.933)	(67.5)	(153.1)
$\text{Co(l)} + \text{F}_2(\text{g}) = \text{CoF}_2(\text{l})$	1766 - 2050	-	-	(7.4)	(-0.4)	-	(0.8)	(-1.062)	(79.3)	(86.7)
$\text{Co(l)} + \text{F}_2(\text{g}) = \text{CoF}_2(\text{g})$	2050 - 2500	-	-	(-1.6)	(-0.4)	-	(0.8)	(65.39)	(-12.8)	(-14.4)
$\text{Co(s}, \alpha) + 3/2\text{F}_2(\text{g}) = \text{CoF}_3(\text{s})$	298 - 723	(190) (a)	(174)	-	(8.0)	-	(1.2)	(0.032)	(54.6)	(54.6)
$\text{Co(s}, \beta) + 3/2\text{F}_2(\text{g}) = \text{CoF}_3(\text{s})$	723 - 1230	-	-	(1.5)	(6.5)	-	(1.2)	(-0.592)	(62.9)	(64.4)
$\text{Co(s}, \beta) + 3/2\text{F}_2(\text{g}) = \text{CoF}_3(\text{l})$	1230 - 1398	-	-	(14.8)	(-6.5)	-	(1.2)	(4.883)	(131.8)	(146.6)
$\text{Co(s}, \gamma) + 3/2\text{F}_2(\text{g}) = \text{CoF}_3(\text{l})$	1398 - 1600	-	-	(8.5)	(-0.7)	-	(1.2)	(7.870)	(94.4)	(102.9)
$\text{Co(s}, \gamma) + 3/2\text{F}_2(\text{g}) = \text{CoF}_3(\text{g})$	1600 - 1766	-	-	(-2.0)	(-0.7)	-	(1.2)	(64.67)	(-8.0)	(-10.0)
$\text{Co(l)} + 3/2\text{F}_2(\text{g}) = \text{CoF}_3(\text{g})$	1766 - 2500	-	-	(-0.7)	(-0.7)	-	(1.2)	(58.68)	(-3.8)	(-3.1)
$\text{Cr(s)} + \text{F}_2(\text{g}) = \text{CrF}_2(\text{s})$	298 - 1375	182 (a)	(172)	(-0.8)	(7.0)	-	(1.2)	(0.356)	(30.9)	(30.1)
$\text{Cr(s)} + \text{F}_2(\text{g}) = \text{CrF}_2(\text{l})$	1375 - 2173	-	-	(10.4)	(-2.8)	-	(1.2)	(0.619)	(93.7)	(104.1)
$\text{Cr(l)} + \text{F}_2(\text{g}) = \text{CrF}_2(\text{l})$	2173 - 2400	-	-	(6.3)	(-0.4)	-	(1.2)	(0.327)	(69.3)	(75.6)
$\text{Cr(l)} + \text{F}_2(\text{g}) = \text{CrF}_2(\text{g})$	2400 - 2495	-	-	(-2.7)	(-0.4)	-	(1.2)	(81.93)	(-25.8)	(-28.5)
$\text{Cr(g)} + \text{F}_2(\text{g}) = \text{CrF}_2(\text{g})$	2495 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(-2.102)	(38.2)	(39.9)
$\text{Cr(s)} + 3/2\text{F}_2(\text{g}) = \text{CrF}_3(\text{s})$	298 - 1373	266 (a)	(250)	(0.2)	(7.0)	-	(1.6)	(0.177)	(55.9)	(56.1)
$\text{Cr(s)} + 3/2\text{F}_2(\text{g}) = \text{CrF}_3(\text{l})$	1373 - 1700	-	-	(16.2)	(-3.0)	-	(1.6)	(-2.365)	(150.1)	(166.3)
$\text{Cr(s)} + 3/2\text{F}_2(\text{g}) = \text{CrF}_3(\text{g})$	1700 - 2173	-	-	(2.2)	(-3.0)	-	(1.6)	(69.44)	(17.8)	(20.0)
$\text{Cr(l)} + 3/2\text{F}_2(\text{g}) = \text{CrF}_3(\text{l})$	2173 - 2495	-	-	(-1.8)	(-0.7)	-	(1.2)	(69.14)	(-6.6)	(-8.4)
$\text{Cr(g)} + 3/2\text{F}_2(\text{g}) = \text{CrF}_3(\text{g})$	2495 - 2500	-	-	(2.6)	(-0.7)	-	(1.2)	(-14.89)	(57.3)	(59.9)
$\text{Cr(s)} + 2\text{F}_2(\text{g}) = \text{CrF}_4(\text{s})$	298 - 640	286.5 (b)	(266.2)	(2.1)	(1.6)	-	(2.0)	(0)	(79.4)	(81.4)
$\text{Cr(s)} + 2\text{F}_2(\text{g}) = \text{CrF}_4(\text{g})$	640 - 2173	-	-	(-1.9)	(1.8)	-	(2.0)	(24.52)	(19.6)	(17.6)
$\text{Cr(l)} + 2\text{F}_2(\text{g}) = \text{CrF}_4(\text{g})$	2173 - 2495	-	-	(-6.0)	(4.1)	-	(1.6)	(24.23)	(-4.8)	(-10.8)
$\text{Cr(g)} + 2\text{F}_2(\text{g}) = \text{CrF}_4(\text{g})$	2495 - 2500	-	-	(-1.5)	(4.1)	-	(1.6)	(-59.80)	(59.1)	(57.6)
$\text{Cr(s)} + 5/2\text{F}_2(\text{g}) = \text{CrF}_5(\text{s})$	298 - 375	(350)	(327)	(0.9)	(14.3)	-	(2.4)	(-0.093)	(85.2)	(86.2)
$\text{Cr(s)} + 5/2\text{F}_2(\text{g}) = \text{CrF}_5(\text{l})$	375 - 390	-	-	(16.9)	(-3.5)	-	(2.4)	(-0.241)	(161.4)	(178.4)
$\text{Cr(s)} + 5/2\text{F}_2(\text{g}) = \text{CrF}_5(\text{g})$	390 - 2173	-	-	(-6.1)	(6.5)	-	(2.4)	(16.47)	(6.4)	(0.3)
$\text{Cr(l)} + 5/2\text{F}_2(\text{g}) = \text{CrF}_5(\text{g})$	2173 - 2495	-	-	(-10.1)	(8.9)	-	(2.0)	(16.18)	(-18.0)	(-28.2)
$\text{Cr(g)} + 5/2\text{F}_2(\text{g}) = \text{CrF}_5(\text{g})$	2495 - 2500	-	-	(-5.7)	(8.9)	-	(2.0)	(-67.85)	(45.9)	(40.2)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Cs(s)} + 1/2\text{F}_2(\text{g}) = \text{CsF(s)}$	298 - 301.9	131.7 (a)	(124.5)	(-0.3)	(2.5)	-	(0.4)	(0.102)	(23.3)	(23.0)
$\text{Cs(l)} + 1/2\text{F}_2(\text{g}) = \text{CsF(s)}$	301.9 - 955	-	-	(-0.8)	(2.5)	-	(0.4)	(-0.223)	(21.7)	(20.8)
$\text{Cs(l)} + 1/2\text{F}_2(\text{g}) = \text{CsF(l)}$	955 - 963	-	-	(4.4)	(-0.2)	-	(0.4)	(-1.498)	(52.2)	(56.5)
$\text{Cs(g)} + 1/2\text{F}_2(\text{g}) = \text{CsF(l)}$	963 - 1524	-	-	(7.4)	(-0.2)	-	(0.4)	(-20.74)	(89.9)	(97.3)
$\text{Cs(g)} + 1/2\text{F}_2(\text{g}) = \text{CsF(g)}$	1524 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(25.18)	(11.7)	(11.5)
$\text{Cu(s)} + 1/2\text{F}_2(\text{g}) = \text{CuF(s)}$	298 - 1020	60 (a)	(56)	(-0.1)	(3.1)	-	(0.4)	(0.016)	(15.2)	(15.1)
$\text{Cu(s)} + 1/2\text{F}_2(\text{g}) = \text{CuF(l)}$	1020 - 1356.2	-	-	(5.9)	(-1.7)	-	(0.4)	(0.891)	(47.5)	(53.4)
$\text{Cu(l)} + 1/2\text{F}_2(\text{g}) = \text{CuF(l)}$	1356.2 - 1660	-	-	(3.9)	(-0.2)	-	(0.4)	(-0.765)	(36.7)	(40.6)
$\text{Cu(l)} + 1/2\text{F}_2(\text{g}) = \text{CuF}_2(\text{g})$	1660 - 2500	-	-	(-2.7)	(-0.2)	-	(0.4)	(46.19)	(-33.9)	(-36.6)
$\text{Cu(s)} + \text{F}_2(\text{g}) = \text{CuF}_2(\text{s})$	298 - 1200	128 (a)	(118)	(0.5)	(5.5)	-	(0.8)	(-0.123)	(38.6)	(39.1)
$\text{Cu(s)} + \text{F}_2(\text{g}) = \text{CuF}_2(\text{l})$	1200 - 1356.2	-	-	(9.8)	(-1.9)	-	(0.8)	(0.045)	(90.7)	(100.5)
$\text{Cu(l)} + \text{F}_2(\text{g}) = \text{CuF}_2(\text{l})$	1356.2 - 2000	-	-	(7.7)	(-0.4)	-	(0.8)	(-1.611)	(79.9)	(87.6)
$\text{Cu(l)} + \text{F}_2(\text{g}) = \text{CuF}_2(\text{g})$	2000 - 2500	-	-	(-0.8)	(-0.4)	-	(0.8)	(65.39)	(-9.7)	(-10.5)
$\text{Fe(s,}\alpha) + \text{F}_2(\text{g}) = \text{FeF}_2(\text{s})$	298 - 1033	128 (a)	(158)	(2.5)	(-0.5)	-	(0.4)	(-0.609)	(48.4)	(50.9)
$\text{Fe(s,}\beta) + \text{F}_2(\text{g}) = \text{FeF}_2(\text{s})$	1033 - 1180	-	-	(-4.5)	(6.6)	-	(0.8)	(2.496)	(7.3)	(2.8)
$\text{Fe(s,}\gamma) + \text{F}_2(\text{g}) = \text{FeF}_2(\text{s})$	1180 - 1375	-	-	(1.1)	(3.6)	-	(0.8)	(-2.181)	(43.2)	(44.3)
$\text{Fe(s,}\gamma) + \text{F}_2(\text{g}) = \text{FeF}_2(\text{l})$	1375 - 1673	-	-	(12.4)	(-3.4)	-	(0.8)	(-3.101)	(109.4)	(121.8)
$\text{Fe(s,}\delta) + \text{F}_2(\text{g}) = \text{FeF}_2(\text{l})$	1673 - 1808	-	-	(6.9)	(-0.4)	-	(0.8)	(1.677)	(74.0)	(81.0)
$\text{Fe(l)} + \text{F}_2(\text{g}) = \text{FeF}_2(\text{l})$	1808 - 2100	-	-	(7.2)	(-0.4)	-	(0.8)	(-2.726)	(78.4)	(85.6)
$\text{Fe(l)} + \text{F}_2(\text{g}) = \text{FeF}_2(\text{g})$	2100 - 2500	-	-	(-3.3)	(-0.4)	-	(0.8)	(69.32)	(-25.7)	(-29.0)
$\text{Fe(s,}\alpha) + \text{F}_2(\text{g}) = \text{FeF}_3(\text{s})$	298 - 1033	235 (a)	(219)	(2.2)	(3.2)	-	(0.8)	(-0.540)	(67.4)	(69.5)
$\text{Fe(s,}\beta) + \text{F}_2(\text{g}) = \text{FeF}_3(\text{s})$	1033 - 1180	-	-	(-4.8)	(10.3)	-	(1.2)	(2.565)	(26.3)	(21.4)
$\text{Fe(s,}\gamma) + \text{F}_2(\text{g}) = \text{FeF}_3(\text{s})$	1180 - 1300	-	-	(0.7)	(7.3)	-	(1.2)	(-2.112)	(62.2)	(62.9)
$\text{Fe(s,}\gamma) + \text{F}_2(\text{g}) = \text{FeF}_3(\text{l})$	1300 - 1600	-	-	(13.7)	(-3.7)	-	(1.2)	(2.183)	(131.9)	(145.6)
$\text{Fe(s,}\gamma) + \text{F}_2(\text{g}) = \text{FeF}_3(\text{g})$	1600 - 1673	-	-	(2.7)	(-3.7)	-	(1.2)	(59.78)	(25.8)	(28.5)
$\text{Fe(s,}\delta) + \text{F}_2(\text{g}) = \text{FeF}_3(\text{g})$	1673 - 1808	-	-	(-2.7)	(-0.7)	-	(1.2)	(64.56)	(-9.6)	(-12.3)
$\text{Fe(l)} + \text{F}_2(\text{g}) = \text{FeF}_3(\text{g})$	1808 - 2500	-	-	(2.4)	(-0.7)	-	(1.2)	(60.16)	(5.2)	(-7.6)
$\text{Ga(s)} + 1/2\text{F}_2(\text{g}) = \text{GaF(s)}$	298 - 302.94	(56) (a)	(51)	(1.6)	(1.6)	-	(0.4)	(-0.376)	(26.3)	(27.9)
$\text{Ga(l)} + 1/2\text{F}_2(\text{g}) = \text{GaF(s)}$	302.94 - 660	-	-	(0.2)	(4.0)	-	(0.4)	(-1.438)	(23.6)	(23.8)
$\text{Ga(l)} + 1/2\text{F}_2(\text{g}) = \text{GaF(l)}$	660 - 1100	-	-	(4.7)	(-0.2)	-	(0.4)	(-0.093)	(44.9)	(49.6)
$\text{Ga(l)} + 1/2\text{F}_2(\text{g}) = \text{GaF(g)}$	1100 - 2500	-	-	(-1.9)	(-0.2)	-	(0.4)	(32.17)	(-24.1)	(-26.0)
$\text{Ga(s)} + \text{F}_2(\text{g}) = \text{GaF}_2(\text{s})$	298 - 302.94	(160)	(148.5)	(0.5)	(3.4)	-	(0.8)	(-0.024)	(41.6)	(42.1)
$\text{Ga(l)} + \text{F}_2(\text{g}) = \text{GaF}_2(\text{s})$	302.94 - 1080	-	-	(-0.9)	(6.8)	-	(0.8)	(-1.086)	(39.0)	(38.1)
$\text{Ga(l)} + \text{F}_2(\text{g}) = \text{GaF}_2(\text{l})$	1080 - 1450	-	-	(5.1)	(-0.4)	-	(0.8)	(-0.467)	(70.4)	(75.5)
$\text{Ga(l)} + \text{F}_2(\text{g}) = \text{GaF}_2(\text{g})$	1450 - 2500	-	-	(0.1)	(-0.4)	-	(0.8)	(43.78)	(8.5)	(8.6)
$\text{Ga(s)} + 3/2\text{F}_2(\text{g}) = \text{GaF}_3(\text{s})$	298 - 302.94	(255) (a)	(239)	(1.1)	(6.4)	-	(1.2)	(-0.218)	(62.3)	(63.5)
$\text{Ga(l)} + 3/2\text{F}_2(\text{g}) = \text{GaF}_3(\text{s})$	302.94 - 1225	-	-	(-0.3)	(9.7)	-	(1.2)	(-1.280)	(59.7)	(59.4)
$\text{Ga(l)} + 3/2\text{F}_2(\text{g}) = \text{GaF}_3(\text{g})$	1225 - 2500	-	-	(0.9)	(-0.7)	-	(1.2)	(50.06)	(18.7)	(19.6)
$\text{Ge(s)} + \text{F}_2(\text{g}) = \text{GeF}_2(\text{s})$	298 - 1150	(170) (a)	(159)	(0.8)	(3.8)	-	(0.8)	(-0.188)	(43.1)	(43.9)
$\text{Ge(s)} + \text{F}_2(\text{g}) = \text{GeF}_2(\text{l})$	1150 - 1232	-	-	(7.8)	(-1.6)	-	(0.8)	(0.533)	(81.6)	(89.4)
$\text{Ge(l)} + \text{F}_2(\text{g}) = \text{GeF}_2(\text{l})$	1232 - 1825	-	-	(6.4)	(-0.4)	-	(0.8)	(-6.899)	(79.7)	(86.1)
$\text{Ge(l)} + \text{F}_2(\text{g}) = \text{GeF}_2(\text{g})$	1825 - 2500	-	-	(-0.6)	(-0.4)	-	(0.8)	(49.78)	(3.6)	(3.0)
$\text{Ge(s)} + 2\text{F}_2(\text{g}) = \text{GeF}_4(\text{g})$	298 - 1232	(281)	(271)	(-0.5)	(1.0)	-	(-0.4)	(-0.080)	(32.6)	(32.1)
$\text{Ge(l)} + 2\text{F}_2(\text{g}) = \text{GeF}_4(\text{g})$	1232 - 2500	-	-	(-1.9)	(2.6)	-	(-0.4)	(-7.512)	(30.7)	(28.8)
$1/2\text{H}_2(\text{g}) + 1/2\text{F}_2(\text{g}) = \text{HF(g)}$	298 - 2500	64.2 (c)	64.7	-1.02	0.20	-	0.7	0.519	-7.88	-8.9
$\text{Hf(s)} + \text{F}_2(\text{g}) = \text{HfF}_2(\text{s})$	298 - 1650	(230)	(218)	(0.8)	(6.2)	-	(0.8)	(-0.250)	(45.3)	(46.1)
$\text{Hf(s)} + \text{F}_2(\text{g}) = \text{HfF}_2(\text{l})$	1650 - 2300	-	-	(9.2)	(-1.0)	-	(0.8)	(0.691)	(92.6)	(101.8)
$\text{Hf(s)} + \text{F}_2(\text{g}) = \text{HfF}_2(\text{g})$	2300 - 2500	-	-	(0.7)	(-1.0)	-	(0.8)	(75.24)	(2.9)	(3.6)
$\text{Hf(s)} + 3/2\text{F}_2(\text{g}) = \text{HfF}_3(\text{s})$	298 - 1600	(350)	(333)	(1.1)	(10.8)	-	(1.2)	(-0.395)	(66.1)	(67.2)
$\text{Hf(s)} + 3/2\text{F}_2(\text{g}) = \text{HfF}_3(\text{l})$	1600 - 2400	-	-	(14.6)	(-1.2)	-	(1.2)	(6.365)	(138.4)	(153.0)
$\text{Hf(s)} + 3/2\text{F}_2(\text{g}) = \text{HfF}_3(\text{g})$	2400 - 2500	-	-	(1.6)	(-1.2)	-	(1.2)	(95.56)	(13.0)	(14.6)
$\text{Hf(s)} + 2\text{F}_2(\text{g}) = \text{HfF}_4(\text{s})$	298 - 1200	(435) (a)	(413)	(2.1)	(8.0)	-	(1.6)	(-0.451)	(87.8)	(89.9)
$\text{Hf(s)} + 2\text{F}_2(\text{g}) = \text{HfF}_4(\text{g})$	1200 - 2500	-	-	(2.4)	(-1.4)	-	(1.6)	(50.96)	(41.1)	(43.5)
$\text{Hg(l)} + 1/2\text{F}_2(\text{g}) = \text{HgF(s)}$	298 - 629.73	46 (a)	(40)	(0.2)	(3.2)	-	(0.4)	(-0.080)	(22.9)	(23.1)
$\text{Hg(g)} + 1/2\text{F}_2(\text{g}) = \text{HgF(s)}$	629.73 - 843	-	-	(1.9)	(3.2)	-	(0.4)	(-15.10)	(55.6)	(57.5)
$\text{Hg(g)} + 1/2\text{F}_2(\text{g}) = \text{HgF(l)}$	843 - 1115	-	-	(4.9)	(-0.2)	-	(0.4)	(-13.32)	(69.3)	(74.2)
$\text{Hg(g)} + 1/2\text{F}_2(\text{g}) = \text{HgF(g)}$	1115 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(17.37)	(11.1)	(10.9)
$\text{Hg(l)} + \text{F}_2(\text{g}) = \text{HgF}_2(\text{s})$	298 - 629.73	95 (a)	(83)	(1.1)	(6.0)	-	(0.8)	(-0.324)	(48.2)	(49.3)
$\text{Hg(g)} + \text{F}_2(\text{g}) = \text{HgF}_2(\text{s})$	629.73 - 918	-	-	(2.7)	(6.0)	-	(0.8)	(-15.34)	(80.9)	(83.6)
$\text{Hg(g)} + \text{F}_2(\text{g}) = \text{HgF}_2(\text{l})$	918 - 920	-	-	(9.7)	(-0.4)	-	(0.8)	(-13.57)	(116.8)	(126.5)
$\text{Hg(g)} + \text{F}_2(\text{g}) = \text{HgF}_2(\text{g})$	920 - 2500	-	-	(1.6)	(-0.4)	-	(0.8)	(15.88)	(37.6)	(39.2)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{In}(s) + 1/2\text{F}_2(g) = \text{InF}(s)$	298 - 430	(70) (a)	(65)	(1.4)	(1.1)	-	(0.4)	(-0.344)	(25.5)	(27.0)
$\text{In}(l) + 1/2\text{F}_2(g) = \text{InF}(s)$	430 - 725	-	-	(-0.2)	(3.6)	-	(0.4)	(-0.624)	(18.1)	(17.9)
$\text{In}(l) + 1/2\text{F}_2(g) = \text{InF}(l)$	725 - 1175	-	-	(3.9)	(-0.2)	-	(0.4)	(0.603)	(37.9)	(41.8)
$\text{In}(l) + 1/2\text{F}_2(g) = \text{InF}(g)$	1175 - 2440	-	-	(-2.7)	(-0.2)	-	(0.4)	(34.36)	(-30.9)	(-33.6)
$\text{In}(g) + 1/2\text{F}_2(g) = \text{InF}(g)$	2440 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(-25.62)	(10.9)	(10.7)
$\text{In}(s) + \text{F}_2(g) = \text{InF}_2(s)$	298 - 430	(160)	(148)	(1.9)	(3.7)	-	(0.8)	(-0.460)	(51.9)	(53.8)
$\text{In}(l) + \text{F}_2(g) = \text{InF}_2(s)$	430 - 990	-	-	(0.2)	(6.2)	-	(0.8)	(-0.740)	(44.5)	(44.7)
$\text{In}(l) + \text{F}_2(g) = \text{InF}_2(l)$	990 - 1550	-	-	(6.7)	(-0.4)	-	(0.8)	(0.759)	(78.1)	(84.8)
$\text{In}(l) + \text{F}_2(g) = \text{InF}_2(g)$	1550 - 2440	-	-	(-0.8)	(-0.4)	-	(0.8)	(52.38)	(-2.8)	(-3.6)
$\text{In}(g) + \text{F}_2(g) = \text{InF}_2(g)$	2440 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(-7.595)	(39.0)	(40.8)
$\text{In}(s) + 3/2\text{F}_2(g) = \text{InF}_3(s)$	298 - 430	250 (a)	(234)	(2.5)	(5.4)	-	(1.2)	(-0.570)	(68.2)	(70.6)
$\text{In}(l) + 3/2\text{F}_2(g) = \text{InF}_3(s)$	430 - 1443	-	-	(0.8)	(7.9)	-	(1.2)	(-0.850)	(60.8)	(61.6)
$\text{In}(l) + 3/2\text{F}_2(g) = \text{InF}_3(l)$	1443 - 1650	-	-	(11.1)	(-0.7)	-	(1.2)	(4.241)	(115.7)	(126.8)
$\text{In}(l) + 3/2\text{F}_2(g) = \text{InF}_3(g)$	1650 - 2440	-	-	(0.1)	(-0.7)	-	(1.2)	(61.39)	(10.6)	(10.7)
$\text{In}(g) + 3/2\text{F}_2(g) = \text{InF}_3(g)$	2440 - 2500	-	-	(2.6)	(-0.7)	-	(1.2)	(1.411)	(52.4)	(55.0)
$\text{Ir}(s) + \text{F}_2(g) = \text{IrF}_2(s)$	298 - 1380	(88)	(78)	(1.4)	(5.3)	-	(0.8)	(-0.401)	(43.2)	(44.6)
$\text{Ir}(s) + \text{F}_2(g) = \text{IrF}_2(l)$	1380 - 2000	-	-	(7.2)	(-1.9)	-	(0.8)	(2.189)	(71.9)	(79.0)
$\text{Ir}(s) + \text{F}_2(g) = \text{IrF}_2(g)$	2000 - 2500	-	-	(1.2)	(-1.9)	-	(0.8)	(58.19)	(4.2)	(5.3)
$\text{Ir}(s) + 3/2\text{F}_2(g) = \text{IrF}_3(s)$	298 - 1225	(140)	(124)	(3.3)	(8.7)	-	(1.2)	(-0.672)	(68.6)	(70.9)
$\text{Ir}(s) + 3/2\text{F}_2(g) = \text{IrF}_3(l)$	1225 - 1675	-	-	(13.0)	(-2.1)	-	(1.2)	(2.424)	(124.8)	(137.8)
$\text{Ir}(s) + 3/2\text{F}_2(g) = \text{IrF}_3(g)$	1675 - 2500	-	-	(2.0)	(-2.1)	-	(1.2)	(60.85)	(19.3)	(21.3)
$\text{Ir}(s) + 2\text{F}_2(g) = \text{IrF}_4(s)$	298 - 750	(210)	(189)	(2.3)	(6.9)	-	(1.6)	(-0.443)	(82.9)	(85.2)
$\text{Ir}(s) + 2\text{F}_2(g) = \text{IrF}_4(l)$	750 - 1030	-	-	(14.4)	(-2.3)	-	(1.6)	(0.170)	(146.6)	(161.0)
$\text{Ir}(s) + 2\text{F}_2(g) = \text{IrF}_4(g)$	1030 - 2500	-	-	(-2.1)	(2.7)	-	(1.6)	(38.51)	(14.0)	(11.9)
$\text{Ir}(s) + 5/2\text{F}_2(g) = \text{IrF}_5(s)$	298 - 370	(200)	(179)	(5.0)	(9.7)	-	(2.0)	(-1.254)	(100.5)	(105.5)
$\text{Ir}(s) + 5/2\text{F}_2(g) = \text{IrF}_5(l)$	370 - 500	-	-	(14.7)	(-2.5)	-	(2.0)	(0.095)	(142.5)	(157.2)
$\text{Ir}(s) + 5/2\text{F}_2(g) = \text{IrF}_5(g)$	500 - 2500	-	-	(-6.3)	(7.5)	-	(2.0)	(20.34)	(-5.0)	(-11.3)
$\text{Ir}(s) + 3\text{F}_2(g) = \text{IrF}_6(s)$	298 - 317	(130) (b)	(104)	(3.6)	(11.9)	-	(2.4)	(-0.785)	(108.5)	(112.0)
$\text{Ir}(s) + 3\text{F}_2(g) = \text{IrF}_6(l)$	317 - 326	-	-	(11.6)	(-2.7)	-	(2.4)	(-0.587)	(143.6)	(155.2)
$\text{Ir}(s) + 3\text{F}_2(g) = \text{IrF}_6(g)$	326 - 2500	-	-	(-5.4)	(7.3)	-	(2.4)	(10.92)	(28.6)	(23.2)
$\text{K}(s) + 1/2\text{F}_2(g) = \text{KF}(s)$	298 - 336.4	134.46 (c)	127.4	5.55	-16.50	-	0.4	-0.786	50.05	55.60
$\text{K}(l) + 1/2\text{F}_2(g) = \text{KF}(s)$	336.4 - 1052	-	-	-2.01	7.46	-2.9	0.4	-0.121	15.64	13.63
$\text{K}(g) + 1/2\text{F}_2(g) = \text{KF}(s)$	1052 - 1130	-	-	(1.91)	(2.9)	-	(0.4)	(-21.73)	(58.65)	(60.56)
$\text{K}(g) + 1/2\text{F}_2(g) = \text{KF}(l)$	1130 - 1775	-	-	(6.9)	(-0.2)	-	(0.4)	(-18.87)	(84.3)	(91.2)
$\text{K}(g) + 1/2\text{F}_2(g) = \text{KF}(g)$	1775 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(35.01)	(8.0)	(7.8)
$\text{La}(s) + 3/2\text{F}_2(g) = \text{LaF}_3(s)$	298 - 1153	(421) (a)	(403)	(1.6)	(6.7)	-	(1.2)	(-0.372)	(70.0)	(71.6)
$\text{La}(l) + 3/2\text{F}_2(g) = \text{LaF}_3(s)$	1153 - 1800	-	-	(0.5)	(8.3)	-	(1.2)	(-2.433)	(65.9)	(66.4)
$\text{La}(l) + 3/2\text{F}_2(g) = \text{LaF}_3(l)$	1800 - 2500	-	-	(11.8)	(-0.7)	-	(1.2)	(2.807)	(128.8)	(140.6)
$\text{Li}(s) + 3/2\text{F}_2(g) = \text{LiF}(s)$	298 - 459	145.6 (a)	138.8	1.00	-3.62	-	0.4	-0.004	27.16	28.17
$\text{Li}(l) + 3/2\text{F}_2(g) = \text{LiF}(s)$	459 - 1120	-	-	-2.9	5.0	-	0.4	0.213	8.1	5.0
$\text{Li}(l) + 3/2\text{F}_2(g) = \text{LiF}(l)$	1120 - 1640	-	-	(3.4)	(-0.2)	-	(0.4)	(-1.222)	(44.4)	(47.7)
$\text{Li}(g) + 3/2\text{F}_2(g) = \text{LiF}(l)$	1640 - 1954	-	-	(5.4)	(-0.2)	-	(0.4)	(-37.03)	(79.2)	(84.6)
$\text{Li}(g) + 3/2\text{F}_2(g) = \text{LiF}(g)$	1954 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(24.88)	(10.7)	(10.5)
$\text{Mg}(s) + \text{F}_2(g) = \text{MgF}_2(s)$	298 - 923	263.51 (c)	250.8	3.26	-0.19	-	-1.76	-1.552	62.17	65.43
$\text{Mg}(l) + \text{F}_2(g) = \text{MgF}_2(s)$	923 - 1393	-	-	(0.6)	(2.3)	-	(-1.9)	(-2.343)	(48.6)	(49.2)
$\text{Mg}(g) + \text{F}_2(g) = \text{MgF}_2(s)$	1393 - 1536	-	-	(3.6)	(2.3)	-	(-1.9)	(-38.07)	(93.2)	(96.8)
$\text{Mg}(g) + \text{F}_2(g) = \text{MgF}_2(l)$	1536 - 2500	-	-	(9.3)	(-0.4)	-	(0.8)	(-29.55)	(121.7)	(131.0)
$\text{Mn}(s, \alpha) + \text{F}_2(g) = \text{MnF}_2(s)$	298 - 1000	190 (a)	(180)	-	(4.2)	-	(1.2)	(0.204)	(34.6)	(34.6)
$\text{Mn}(s, \beta) + \text{F}_2(g) = \text{MnF}_2(s)$	1000 - 1129	-	-	(-2.6)	(6.9)	-	(0.8)	(0.902)	(19.6)	(17.0)
$\text{Mn}(s, \beta) + \text{F}_2(g) = \text{MnF}_2(l)$	1129 - 1374	-	-	(6.4)	(-1.1)	-	(0.8)	(1.339)	(69.0)	(75.4)
$\text{Mn}(s, \gamma) + \text{F}_2(g) = \text{MnF}_2(l)$	1374 - 1410	-	-	(4.0)	(-0.4)	-	(0.8)	(3.427)	(53.2)	(57.2)
$\text{Mn}(s, \delta) + \text{F}_2(g) = \text{MnF}_2(l)$	1410 - 1517	-	-	(3.4)	(-0.4)	-	(0.8)	(3.843)	(49.2)	(52.6)
$\text{Mn}(l) + \text{F}_2(g) = \text{MnF}_2(l)$	1517 - 2300	-	-	(3.7)	(-0.4)	-	(0.8)	(-0.112)	(53.7)	(57.4)
$\text{Mn}(l) + \text{F}_2(g) = \text{MnF}_2(g)$	2300 - 2368	-	-	(-4.3)	(-0.4)	-	(0.8)	(68.29)	(-30.0)	(-34.3)
$\text{Mn}(g) + \text{F}_2(g) = \text{MnF}_2(g)$	2368 - 2500	-	-	(0.4)	(-0.4)	-	(0.8)	(3.363)	(29.5)	(29.9)
$\text{Mn}(s, \alpha) + 3/2\text{F}_2(g) = \text{MnF}_3(s)$	298 - 1000	238 (a)	(223)	(0.9)	(6.0)	-	(1.6)	(0.004)	(58.2)	(59.1)
$\text{Mn}(s, \beta) + 3/2\text{F}_2(g) = \text{MnF}_3(s)$	1000 - 1350	-	-	(-1.8)	(8.7)	-	(1.2)	(0.702)	(43.3)	(41.6)
$\text{Mn}(s, \beta) + 3/2\text{F}_2(g) = \text{MnF}_3(l)$	1350 - 1374	-	-	(9.2)	(-1.3)	-	(1.2)	(5.963)	(100.9)	(110.2)
$\text{Mn}(s, \gamma) + 3/2\text{F}_2(g) = \text{MnF}_3(l)$	1374 - 1410	-	-	(6.9)	(-0.7)	-	(1.2)	(8.051)	(85.1)	(92.0)
$\text{Mn}(s, \delta) + 3/2\text{F}_2(g) = \text{MnF}_3(l)$	1410 - 1517	-	-	(6.3)	(-0.7)	-	(1.2)	(8.467)	(81.1)	(87.3)
$\text{Mn}(l) + 3/2\text{F}_2(g) = \text{MnF}_3(l)$	1517 - 1600	-	-	(6.6)	(-0.7)	-	(1.2)	(4.512)	(85.6)	(92.1)
$\text{Mn}(l) + 3/2\text{F}_2(g) = \text{MnF}_3(g)$	1600 - 2368	-	-	(-3.4)	(-0.7)	-	(1.2)	(62.51)	(-14.4)	(-17.9)
$\text{Mn}(g) + 3/2\text{F}_2(g) = \text{MnF}_3(g)$	2368 - 2500	-	-	(1.3)	(-0.7)	-	(1.2)	(-2.413)	(45.1)	(46.4)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}^{\circ}$ (kcal/mole)	$-\Delta F_{f,298}^{\circ}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$Mn(s, \alpha) + 2F_2(g) = MnF_4(s)$	298 - 660	(230) (a)	(210)	(-0.3)	(5.5)	-	(2.0)	(0.499)	(65.7)	(65.4)
$Mn(s, \alpha) + 2F_2(g) = MnF_4(l)$	660 - 685	-	-	(14.7)	(-4.3)	-	(2.0)	(-1.567)	(148.0)	(162.7)
$Mn(s, \alpha) + 2F_2(g) = MnF_4(g)$	685 - 1000	-	-	(2.7)	(-4.3)	-	(2.0)	(22.65)	(46.3)	(49.0)
$Mn(s, \beta) + 2F_2(g) = MnF_4(g)$	1000 - 1374	-	-	(0.1)	(-1.5)	-	(1.6)	(23.35)	(31.4)	(31.5)
$Mn(s, \gamma) + 2F_2(g) = MnF_4(g)$	1374 - 1410	-	-	(-2.3)	(-0.9)	-	(1.6)	(25.44)	(15.6)	(13.3)
$Mn(s, \delta) + 2F_2(g) = MnF_4(g)$	1410 - 1517	-	-	(-2.9)	(-0.9)	-	(1.6)	(25.86)	(11.5)	(8.7)
$Mn(l) + 2F_2(g) = MnF_4(g)$	1517 - 2368	-	-	(-2.6)	(-0.9)	-	(1.6)	(21.90)	(16.0)	(13.5)
$Mn(g) + 2F_2(g) = MnF_4(g)$	2368 - 2500	-	-	(2.2)	(-0.9)	-	(1.6)	(-43.02)	(75.6)	(77.7)
$Mo(s) + 2F_2(g) = MoF_4(s)$	298 - 830	(256)	(236)	(2.9)	(5.0)	-	(1.6)	(-0.562)	(86.3)	(89.3)
$Mo(s) + 2F_2(g) = MoF_4(l)$	830 - 890	-	-	(13.9)	(-2.2)	-	(1.6)	(0.288)	(145.2)	(159.2)
$Mo(s) + 2F_2(g) = MoF_4(g)$	890 - 2500	-	-	(-2.1)	(2.8)	-	(1.6)	(32.55)	(18.5)	(16.5)
$Mo(s) + 5/2F_2(g) = MoF_5(s)$	298 - 350	(335)	(314)	(5.2)	(10.4)	-	(2.0)	(-1.339)	(101.8)	(107.0)
$Mo(s) + 5/2F_2(g) = MoF_5(l)$	350 - 500	-	-	(16.8)	(-2.4)	-	(2.0)	(-0.415)	(153.3)	(170.1)
$Mo(s) + 5/2F_2(g) = MoF_5(g)$	500 - 2500	-	-	(-6.2)	(7.6)	-	(2.0)	(20.84)	(-6.6)	(-12.8)
$Mo(s) + 3F_2(g) = MoF_6(l)$	298 - 309	(405) (b)	(383)	(15.2)	(-2.6)	-	(2.4)	(-3.594)	(158.7)	(173.8)
$Mo(s) + 3F_2(g) = MoF_6(g)$	309 - 2500	-	-	(-5.4)	(2.4)	-	(2.4)	(8.501)	(23.3)	(18.0)
$Na(s) + 1/2F_2(g) = NaF(s)$	298 - 371	136.0 (a)	129.0	-0.14	1.03	-0.6	0.4	0.136	22.8	22.6
$Na(l) + 1/2F_2(g) = NaF(s)$	371 - 1187	-	-	-3.44	8.86	-2.5	0.4	0.224	7.7	4.2
$Na(g) + 1/2F_2(g) = NaF(s)$	1187 - 1268	-	-	(0.55)	(4.3)	-	(0.4)	(-26.10)	(52.4)	(52.9)
$Na(g) + 1/2F_2(g) = NaF(l)$	1268 - 1977	-	-	(6.9)	(-0.2)	-	(0.4)	(-22.72)	(85.8)	(92.7)
$Na(g) + 1/2F_2(g) = NaF(g)$	1977 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(44.51)	(4.9)	(4.7)
$Nb(s) + 5/2F_2(g) = NbF_5(s)$	298 - 349	(342)	(320)	(1.4)	(10.7)	-	(2.0)	(-0.228)	(84.9)	(86.3)
$Nb(s) + 5/2F_2(g) = NbF_5(l)$	349 - 498	-	-	(17.1)	(-2.1)	-	(2.0)	(-0.728)	(160.3)	(177.4)
$Nb(s) + 5/2F_2(g) = NbF_5(g)$	498 - 2500	-	-	(-6.4)	(7.9)	-	(2.0)	(20.84)	(-2.9)	(-9.3)
$Nd(s) + 3/2F_2(g) = NdF_3(s)$	298 - 1297	(410) (a)	(392)	(2.6)	(2.4)	-	(1.2)	(-0.465)	(74.3)	(76.9)
$Nd(l) + 3/2F_2(g) = NdF_3(l)$	1297 - 1683	-	-	(-0.9)	(7.7)	-	(1.2)	(-2.981)	(58.2)	(57.3)
$Nd(l) + 3/2F_2(g) = NdF_3(g)$	1683 - 2500	-	-	(9.5)	(-0.7)	-	(1.2)	(-0.588)	(116.6)	(126.1)
$Ni(s, \alpha) + F_2(g) = NiF_2(s)$	298 - 626	158 (a)	(147)	(0.6)	(0.1)	-	(0.8)	(0.069)	(41.4)	(42.0)
$Ni(s, \beta) + F_2(g) = NiF_2(s)$	626 - 1430	-	-	(-1.3)	(5.4)	-	(0.8)	(0.165)	(32.3)	(31.0)
$Ni(s, \beta) + F_2(g) = NiF_2(l)$	1430 - 1728	-	-	(9.7)	(-2.2)	-	(0.8)	(1.887)	(95.2)	(104.9)
$Ni(l) + F_2(g) = NiF_2(l)$	1728 - 2150	-	-	(6.5)	(-0.4)	-	(0.8)	(1.519)	(76.9)	(83.4)
$Ni(l) + F_2(g) = NiF_2(g)$	2150 - 2500	-	-	(-2.5)	(-0.4)	-	(0.8)	(74.87)	(-17.7)	(-20.2)
$Np(s) + 3/2F_2(g) = NpF_3(s)$	298 - 913	(360) (h)	(342.5)	(3.3)	(3.1)	-	(1.2)	(-0.710)	(77.5)	(80.8)
$Np(l) + 3/2F_2(g) = NpF_3(s)$	913 - 1650	-	-	(-0.4)	(6.5)	-	(1.2)	(-1.049)	(57.9)	(57.5)
$Np(l) + 3/2F_2(g) = NpF_3(l)$	1650 - 2500	-	-	(10.1)	(-0.7)	-	(1.2)	(1.427)	(117.8)	(127.9)
$Np(s) + 2F_2(g) = NpF_4(s)$	298 - 913	(428) (h)	(406)	(3.2)	(5.9)	-	(1.6)	(-0.586)	(93.2)	(96.4)
$Np(l) + 2F_2(g) = NpF_4(s)$	913 - 1100	-	-	(-0.5)	(9.3)	-	(1.6)	(-0.925)	(73.6)	(73.1)
$Np(l) + 2F_2(g) = NpF_4(l)$	1100 - 1750	-	-	(13.4)	(-0.9)	-	(1.6)	(2.041)	(148.8)	(162.2)
$Np(l) + 2F_2(g) = NpF_4(g)$	1750 - 2500	-	-	(-5.6)	(4.1)	-	(1.6)	(73.64)	(-10.6)	(-16.2)
$Np(s) + 5/2F_2(g) = NpF_5(s)$	298 - 680	(467) (h)	(439)	(2.6)	(6.9)	-	(2.0)	(-0.403)	(109.4)	(113.0)
$Np(s) + 5/2F_2(g) = NpF_5(l)$	680 - 913	-	-	(19.0)	(-4.5)	-	(2.0)	(-1.419)	(197.6)	(216.6)
$Np(l) + 5/2F_2(g) = NpF_5(l)$	913 - 1000	-	-	(15.3)	(-1.1)	-	(2.0)	(-1.758)	(178.0)	(193.3)
$Np(l) + 5/2F_2(g) = NpF_5(g)$	1000 - 2500	-	-	(-9.7)	(8.9)	-	(2.0)	(41.24)	(-7.7)	(-17.4)
$Np(s) + 3F_2(g) = NpF_6(s)$	298 - 310	(472)	(443)	(0.8)	(25.3)	-	(2.4)	(-0.565)	(109.0)	(109.8)
$Np(s) + 3F_2(g) = NpF_6(l)$	310 - 365	-	-	(13.8)	(-4.7)	-	(2.4)	(0.346)	(163.0)	(176.8)
$Np(s) + 3F_2(g) = NpF_6(g)$	365 - 913	-	-	(-0.2)	(0.3)	-	(2.4)	(13.02)	(60.2)	(60.0)
$Np(l) + 3F_2(g) = NpF_6(g)$	913 - 2500	-	-	(-3.9)	(3.7)	-	(2.4)	(12.68)	(40.6)	(36.7)
$Os(s) + F_2(g) = OsF_2(s)$	298 - 1350	(100)	(91)	(1.6)	(5.5)	-	(0.8)	(-0.457)	(41.3)	(42.9)
$Os(s) + F_2(g) = OsF_2(l)$	1350 - 1900	-	-	(7.0)	(-1.3)	-	(0.8)	(2.249)	(68.2)	(75.2)
$Os(s) + F_2(g) = OsF_2(g)$	1900 - 2500	-	-	(1.0)	(-1.3)	-	(0.8)	(64.65)	(-3.9)	(-2.9)
$Os(s) + 3/2F_2(g) = OsF_3(s)$	298 - 1250	(150)	(134)	(2.3)	(8.7)	-	(1.2)	(-0.660)	(67.5)	(69.8)
$Os(s) + 3/2F_2(g) = OsF_3(l)$	1250 - 1475	-	-	(12.9)	(-1.5)	-	(1.2)	(3.559)	(122.7)	(135.6)
$Os(s) + 3/2F_2(g) = OsF_3(g)$	1475 - 2500	-	-	(1.9)	(-1.5)	-	(1.2)	(57.78)	(16.7)	(18.6)
$Os(s) + 2F_2(g) = OsF_4(s)$	298 - 820	(200)	(180)	(2.8)	(8.6)	-	(1.6)	(-0.690)	(85.2)	(88.0)
$Os(s) + 2F_2(g) = OsF_4(l)$	820 - 1050	-	-	(14.2)	(-1.8)	-	(1.6)	(0.458)	(144.6)	(158.8)
$Os(s) + 2F_2(g) = OsF_4(g)$	1050 - 2500	-	-	(-2.3)	(3.2)	-	(1.6)	(38.05)	(13.2)	(11.0)
$Os(s) + 3F_2(g) = OsF_6(s)$	298 - 340	(225) (a)	(199)	(4.2)	(14.0)	-	(2.4)	(-1.080)	(112.5)	(116.7)
$Os(s) + 3F_2(g) = OsF_6(l)$	340 - 477	-	-	(11.4)	(-2.2)	-	(2.4)	(-0.192)	(141.9)	(153.3)
$Os(s) + 3F_2(g) = OsF_6(g)$	477 - 2500	-	-	(-0.6)	(2.8)	-	(2.4)	(13.66)	(52.0)	(51.4)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{298}$ (kcal/mole)	$-\Delta F_f^{298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$Os(s) + 4F_2(g) = OsF_8(s)$	298 - 307.6	(300)	(267)	(6.4)	(18.4)	-	(3.2)	(-1.634)	(150.9)	(157.3)
$Os(s) + 4F_2(g) = OsF_8(l)$	307.6 - 320	-	-	(19.2)	(-2.6)	-	(3.2)	(-1.578)	(208.0)	(227.2)
$Os(s) + 4F_2(g) = OsF_8(g)$	320 - 2500	-	-	(-8.8)	(17.4)	-	(3.2)	(13.20)	(32.5)	(23.7)
$1/4 P_4(s, white) + 3/2 F_2(g) = PF_3(g)$	298 - 317.4	(170)	(164)	1.34	-5.92	-	-2.7	-1.035	26.71	28.05
$1/4 P_4(l) + 3/2 F_2(g) = PF_3(g)$	317.4 - 553	-	-	-0.06	1.13	-	-1.9	-0.860	20.98	20.91
$1/4 P_4(g) + 3/2 F_2(g) = PF_3(g)$	553 - 2500	-	-	(-0.1)	(1.4)	(-0.3)	(-2.7)	(-3.949)	(26.1)	(26.0)
$Pa(s) + 3/2 F_2(g) = PaF_3(s)$	298 - 1550	(390)	(372)	(3.6)	(3.1)	-	(1.2)	(-0.800)	(79.9)	(83.5)
$Pa(s) + 3/2 F_2(g) = PaF_3(l)$	1550 - 1825	-	-	(13.4)	(-4.7)	-	(1.2)	(2.180)	(134.1)	(147.5)
$Pa(l) + 3/2 F_2(g) = PaF_3(l)$	1825 - 2500	-	-	(10.6)	(-0.7)	-	(1.2)	(-3.371)	(122.6)	(133.2)
$Pa(s) + 2F_2(g) = PaF_4(s)$	298 - 1300	(470)	(448)	(3.5)	(2.5)	-	(1.6)	(-0.624)	(94.6)	(98.1)
$Pa(s) + 2F_2(g) = PaF_4(l)$	1300 - 1825	-	-	(16.2)	(-4.9)	-	(1.6)	(2.120)	(166.1)	(182.3)
$Pa(l) + 2F_2(g) = PaF_4(l)$	1825 - 1900	-	-	(13.4)	(-0.9)	-	(1.6)	(-3.431)	(154.6)	(168.0)
$Pa(l) + 2F_2(g) = PaF_4(g)$	1900 - 2500	-	-	(3.4)	(-0.9)	-	(1.6)	(62.57)	(54.3)	(57.7)
$Pa(s) + 5/2 F_2(g) = PaF_5(s)$	298 - 570	(525)	(501)	(5.2)	(4.5)	-	(2.0)	(-1.072)	(109.7)	(114.9)
$Pa(s) + 5/2 F_2(g) = PaF_5(l)$	570 - 860	-	-	(18.1)	(-5.1)	-	(2.0)	(-0.074)	(174.2)	(192.3)
$Pa(s) + 5/2 F_2(g) = PaF_5(g)$	860 - 1825	-	-	(-5.9)	(4.9)	-	(2.0)	(36.87)	(-2.7)	(-8.6)
$Pa(l) + 5/2 F_2(g) = PaF_5(g)$	1825 - 2500	-	-	(-8.7)	(8.9)	-	(2.0)	(31.32)	(-14.2)	(-22.9)
$Pb(s) + F_2(g) = PbF_2(s)$	298 - 600.1	158.5 (c)	(146.6)	2.6	1.38	-	0.8	-0.559	(54.6)	(57.2)
$Pb(l) + F_2(g) = PbF_2(s)$	600.1 - 1097	-	-	0.5	4.4	-	0.8	-0.981	(44.8)	(45.3)
$Pb(l) + F_2(g) = PbF_2(l)$	1097 - 1566	-	-	(8.0)	(0.3)	-	(0.8)	(-4.867)	(91.2)	(99.1)
$Pb(l) + F_2(g) = PbF_2(g)$	1566 - 2023	-	-	(-1.0)	(0.3)	-	(0.8)	(47.57)	(0.4)	(-0.6)
$Pb(g) + F_2(g) = PbF_2(g)$	2023 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(0.952)	(41.2)	(4.29)
$Pb(s) + 2F_2(g) = PbF_4(s)$	298 - 600.1	222 (a)	(202)	(3.9)	(4.0)	-	(1.6)	(-0.798)	(90.1)	(94.0)
$Pb(l) + 2F_2(g) = PbF_4(s)$	600.1 - 773	-	-	(1.8)	(7.0)	-	(1.6)	(-1.220)	(80.3)	(82.1)
$Pb(l) + 2F_2(g) = PbF_4(l)$	773 - 2023	-	-	(1.7)	(-0.2)	-	(-0.4)	(23.75)	(44.5)	(46.2)
$Pb(g) + 2F_2(g) = PbF_4(g)$	2023 - 2500	-	-	(4.5)	(-0.9)	-	(-0.4)	(-22.87)	(85.2)	(89.7)
$Pd(s) + F_2(g) = PdF_2(s)$	298 - 1225	(112) (a)	(101)	(0.3)	(5.6)	-	(0.8)	(-0.071)	(41.0)	(41.3)
$Pd(s) + F_2(g) = PdF_2(l)$	1225 - 1828	-	-	(9.4)	(-1.8)	-	(0.8)	(0.933)	(91.2)	(100.6)
$Pd(l) + F_2(g) = PdF_2(l)$	1828 - 2000	-	-	(6.2)	(-0.4)	-	(0.8)	(0.357)	(72.0)	(78.2)
$Pd(l) + F_2(g) = PdF_2(g)$	2000 - 2500	-	-	(-2.3)	(-0.4)	-	(0.8)	(60.29)	(-14.1)	(-16.4)
$Pd(s) + 3/2 F_2(g) = PdF_3(s)$	298 - 1110	(122) (a)	(105)	(0.2)	(8.0)	-	(1.2)	-	(58.3)	(58.5)
$Pd(s) + 3/2 F_2(g) = PdF_3(l)$	1110 - 1530	-	-	(12.8)	(-2.0)	-	(1.2)	(0.375)	(128.2)	(141.0)
$Pd(s) + 3/2 F_2(g) = PdF_3(g)$	1530 - 1828	-	-	(1.8)	(-2.0)	-	(1.2)	(56.20)	(22.0)	(23.8)
$Pd(l) + 3/2 F_2(g) = PdF_3(g)$	1828 - 2500	-	-	(-1.4)	(-0.7)	-	(1.2)	(55.63)	(2.8)	(1.4)
$Po(s) + 3F_2(g) = PoF_6(l)$	298 - 320	(300) (d)	(277)	(13.9)	(-4.5)	-	(2.4)	(-3.146)	(154.4)	(168.3)
$Po(s) + 3F_2(g) = PoF_6(g)$	320 - 525	-	-	(-0.1)	(0.5)	-	(2.4)	(7.076)	(56.5)	(56.4)
$Po(l) + 3F_2(g) = PoF_6(g)$	525 - 1235	-	-	(-3.9)	(3.7)	-	(2.4)	(6.230)	(38.9)	(35.0)
$Po(g) + 3F_2(g) = PoF_6(g)$	1235 - 2500	-	-	(0.2)	(3.7)	-	(2.4)	(-23.36)	(87.6)	(87.7)
$Pr(s) + 3/2 F_2(g) = PrF_3(s)$	298 - 1205	(413) (a)	(395)	(2.4)	(4.3)	-	(1.2)	(-0.485)	(73.4)	(75.8)
$Pr(l) + 3/2 F_2(g) = PrF_3(s)$	1205 - 1643	-	-	(-0.6)	(8.9)	-	(1.2)	(-2.709)	(59.8)	(59.2)
$Pr(l) + 3/2 F_2(g) = PrF_3(l)$	1643 - 2500	-	-	(11.1)	(-0.7)	-	(1.2)	(-0.975)	(125.8)	(176.9)
$Pt(s) + F_2(g) = PtF_2(s)$	298 - 1250	(82)	(72)	(1.4)	(5.2)	-	(0.7)	(-0.406)	(42.6)	(43.9)
$Pt(s) + F_2(g) = PtF_2(l)$	1250 - 2025	-	-	(7.0)	(-1.8)	-	(0.7)	(0.563)	(71.8)	(78.7)
$Pt(s) + F_2(g) = PtF_2(g)$	2025 - 2042.5	-	-	(1.0)	(-1.8)	-	(0.7)	(52.71)	(6.3)	(7.2)
$Pt(l) + F_2(g) = PtF_2(g)$	2042.5 - 2500	-	-	(-2.3)	(-0.4)	-	(0.8)	(51.38)	(-13.3)	(-15.6)
$Pt(s) + 3/2 F_2(g) = PtF_3(s)$	298 - 1125	(135)	(119)	(1.6)	(7.6)	-	(1.1)	(-0.453)	(63.8)	(65.5)
$Pt(s) + 3/2 F_2(g) = PtF_3(l)$	1125 - 1475	-	-	(12.8)	(-2.0)	-	(1.1)	(1.922)	(123.8)	(136.7)
$Pt(s) + 3/2 F_2(g) = PtF_3(g)$	1475 - 2042.5	-	-	(1.8)	(-2.0)	-	(1.1)	(56.15)	(17.8)	(19.7)
$Pt(l) + 3/2 F_2(g) = PtF_3(g)$	2042.5 - 2500	-	-	(-1.4)	(-0.7)	-	(1.2)	(54.82)	(-1.8)	(-3.2)
$Pt(s) + 2F_2(g) = PtF_4(s)$	298 - 875	(190)	(169)	(2.7)	(8.6)	-	(1.5)	(-0.677)	(87.2)	(89.9)
$Pt(s) + 2F_2(g) = PtF_4(l)$	875 - 1000	-	-	(15.2)	(-2.2)	-	(1.5)	(-0.480)	(154.4)	(169.6)
$Pt(s) + 2F_2(g) = PtF_4(g)$	1000 - 2042.5	-	-	(-2.3)	(2.8)	-	(1.5)	(36.52)	(16.5)	(14.2)
$Pt(l) + 2F_2(g) = PtF_4(g)$	2042.5 - 2500	-	-	(-5.6)	(4.1)	-	(1.6)	(35.19)	(-3.1)	(-8.7)
$Pu(s) + 3/2 F_2(g) = PuF_3(s)$	298 - 913	374.6 (e)	(357.2)	(3.1)	(3.9)	-	(1.2)	(-0.686)	(76.3)	(79.4)
$Pu(l) + 3/2 F_2(g) = PuF_3(s)$	913 - 1680	-	-	(0.3)	(7.5)	-	(1.2)	(-1.890)	(63.0)	(63.3)
$Pu(l) + 3/2 F_2(g) = PuF_3(l)$	1680 - 2500	-	-	(12.1)	(-0.7)	-	(1.2)	(2.858)	(129.1)	(141.2)
$Pu(s) + 2F_2(g) = PuF_4(s)$	298 - 913	(424) (i)	(402.5)	(3.2)	(4.1)	-	(1.6)	(-0.606)	(91.3)	(94.5)
$Pu(l) + 2F_2(g) = PuF_4(s)$	913 - 1310	-	-	(0.4)	(7.7)	-	(1.6)	(-1.810)	(78.0)	(78.4)
$Pu(l) + 2F_2(g) = PuF_4(l)$	1310 - 1700	-	-	(15.4)	(-0.9)	-	(1.6)	(-0.081)	(163.7)	(179.1)
$Pu(l) + 2F_2(g) = PuF_4(g)$	1700 - 2500	-	-	(-4.6)	(4.1)	-	(1.6)	(73.69)	(-4.2)	(-8.8)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-A)$
$\text{Pu(s)} + 3\text{F}_2(\text{g}) = \text{PuF}_6(\text{s})$	298 - 323.91	(460)	(431)	(6.9)	(-4.9)	-	(2.4)	(-1.042)	(132.4)	(139.3)
$\text{Pu(s)} + 3\text{F}_2(\text{g}) = \text{PuF}_6(\text{l})$	323.91 - 335	-	-	(20.9)	(-4.9)	-	(2.4)	(-0.877)	(198.8)	(219.7)
$\text{Pu(s)} + 3\text{F}_2(\text{g}) = \text{PuF}_6(\text{g})$	335 - 913	-	-	(-0.1)	(0.1)	-	(2.4)	(13.28)	(55.3)	(55.2)
$\text{Pu(l)} + 3\text{F}_2(\text{g}) = \text{PuF}_6(\text{g})$	913 - 2500	-	-	(-2.9)	(3.7)	-	(2.4)	(12.07)	(42.0)	(39.1)
$\text{Ra(s)} + \text{F}_2(\text{g}) = \text{RaF}_2(\text{s})$	298 - 1233	(287) (a)	(274.5)	(1.9)	(5.6)	-	(0.8)	(-0.548)	(53.7)	(55.6)
$\text{Ra(l)} + \text{F}_2(\text{g}) = \text{RaF}_2(\text{s})$	1233 - 1600	-	-	(-0.3)	(6.8)	-	(0.8)	(-1.047)	(41.5)	(41.2)
$\text{Ra(l)} + \text{F}_2(\text{g}) = \text{RaF}_2(\text{l})$	1600 - 1700	-	-	(7.2)	(-0.4)	-	(0.8)	(-0.831)	(83.5)	(90.7)
$\text{Ra(g)} + \text{F}_2(\text{g}) = \text{RaF}_2(\text{l})$	1700 - 2200	-	-	(10.2)	(-0.4)	-	(0.8)	(-40.99)	(126.6)	(136.8)
$\text{Ra(g)} + \text{F}_2(\text{g}) = \text{RaF}_2(\text{g})$	2200 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(32.71)	(36.1)	(37.8)
$\text{Rb(s)} + 1/2\text{F}_2(\text{g}) = \text{RbF(s)}$	298 - 312	133.2 (a)	125.7	3.9	-10.8	-	0.4	-0.546	43.6	47.5
$\text{Rb(l)} + 1/2\text{F}_2(\text{g}) = \text{RbF(s)}$	312 - 952	-	-	-0.7	2.3	-	0.4	-0.289	23.0	22.3
$\text{Rb(g)} + 1/2\text{F}_2(\text{g}) = \text{RbF(s)}$	952 - 1048	-	-	(2.2)	(2.3)	-	(0.4)	(-21.14)	(61.8)	(64.0)
$\text{Rb(g)} + 1/2\text{F}_2(\text{g}) = \text{RbF(l)}$	1048 - 1681	-	-	(6.9)	(-0.2)	-	(0.4)	(-20.53)	(87.9)	(94.8)
$\text{Rb(g)} + 1/2\text{F}_2(\text{g}) = \text{RbF(g)}$	1681 - 2500	-	-	(-0.1)	(-0.2)	-	(0.4)	(30.75)	(12.4)	(12.3)
$\text{Re(s)} + 3/2\text{F}_2(\text{g}) = \text{ReF}_3(\text{s})$	298 - 1380	(170)	(153)	(2.1)	(9.3)	-	(1.2)	(-0.642)	(69.8)	(72.0)
$\text{Re(s)} + 3/2\text{F}_2(\text{g}) = \text{ReF}_3(\text{l})$	1380 - 1530	-	-	(12.7)	(-1.5)	-	(1.2)	(6.014)	(123.3)	(136.1)
$\text{Re(s)} + 3/2\text{F}_2(\text{g}) = \text{ReF}_3(\text{g})$	1530 - 2500	-	-	(1.7)	(-1.5)	-	(1.2)	(59.84)	(18.4)	(20.2)
$\text{Re(s)} + 2\text{F}_2(\text{g}) = \text{ReF}_4(\text{s})$	298 - 700	(220)	(199)	(2.0)	(8.3)	-	(1.6)	(-0.420)	(81.8)	(83.8)
$\text{Re(s)} + 2\text{F}_2(\text{g}) = \text{ReF}_4(\text{l})$	700 - 960	-	-	(14.6)	(-1.7)	-	(1.6)	(0.410)	(147.1)	(161.7)
$\text{Re(s)} + 2\text{F}_2(\text{g}) = \text{ReF}_4(\text{g})$	960 - 2500	-	-	(-2.4)	(3.3)	-	(1.6)	(36.43)	(12.2)	(9.8)
$\text{Re(s)} + 5/2\text{F}_2(\text{g}) = \text{ReF}_5(\text{s})$	298 - 398	(225) (a)	(204)	(6.0)	(10.9)	-	(2.0)	(-1.609)	(106.8)	(112.8)
$\text{Re(s)} + 5/2\text{F}_2(\text{g}) = \text{ReF}_5(\text{l})$	398 - 660	-	-	(15.4)	(-1.9)	-	(2.0)	(0.164)	(146.6)	(162.0)
$\text{Re(s)} + 5/2\text{F}_2(\text{g}) = \text{ReF}_5(\text{g})$	660 - 2500	-	-	(-6.6)	(13.1)	-	(2.0)	(26.42)	(-9.0)	(-15.6)
$\text{Re(s)} + 3\text{F}_2(\text{g}) = \text{ReF}_6(\text{l})$	298 - 321	278 (a)	(258)	(15.3)	(-2.1)	-	(2.4)	(-3.655)	(153.7)	(169.0)
$\text{Re(s)} + 3\text{F}_2(\text{g}) = \text{ReF}_6(\text{g})$	321 - 2500	-	-	(4.3)	(-0.1)	-	(-2.6)	(5.115)	(71.8)	(76.1)
$\text{Rh(s)} + \text{F}_2(\text{g}) = \text{RhF}_2(\text{s})$	298 - 1210	(117)	(107)	(1.1)	(6.6)	-	(0.8)	(-0.355)	(42.1)	(43.2)
$\text{Rh(s)} + \text{F}_2(\text{g}) = \text{RhF}_2(\text{l})$	1210 - 2000	-	-	(9.3)	(-2.6)	-	(0.8)	(1.157)	(85.3)	(94.6)
$\text{Rh(s)} + \text{F}_2(\text{g}) = \text{RhF}_2(\text{g})$	2000 - 2240	-	-	(1.3)	(-2.6)	-	(0.8)	(62.16)	(2.0)	(3.3)
$\text{Rh(l)} + \text{F}_2(\text{g}) = \text{RhF}_2(\text{g})$	2240 - 2500	-	-	(-2.3)	(-0.4)	-	(0.8)	(59.53)	(-18.6)	(-20.9)
$\text{Rh(s)} + 3/2\text{F}_2(\text{g}) = \text{RhF}_3(\text{s})$	298 - 1460	(175)	(159)	(0.2)	(8.0)	-	(1.2)	(0.002)	(57.2)	(57.4)
$\text{Rh(s)} + 3/2\text{F}_2(\text{g}) = \text{RhF}_3(\text{l})$	1460 - 1700	-	-	(13.7)	(-2.8)	-	(1.2)	(2.801)	(131.9)	(145.6)
$\text{Rh(s)} + 3/2\text{F}_2(\text{g}) = \text{RhF}_3(\text{g})$	1700 - 2240	-	-	(2.2)	(-2.8)	-	(1.2)	(62.35)	(22.8)	(25.0)
$\text{Rh(l)} + 3/2\text{F}_2(\text{g}) = \text{RhF}_3(\text{g})$	2240 - 2500	-	-	(-1.4)	(-0.7)	-	(1.2)	(59.72)	(2.2)	(0.8)
$\text{Rh(s)} + 2\text{F}_2(\text{g}) = \text{RhF}_4(\text{s})$	298 - 780	(225)	(205)	(-0.6)	(9.9)	-	(1.6)	(0.269)	(65.9)	(65.3)
$\text{Rh(s)} + 2\text{F}_2(\text{g}) = \text{RhF}_4(\text{l})$	780 - 1025	-	-	(14.5)	(-3.1)	-	(1.6)	(-0.754)	(148.3)	(162.8)
$\text{Rh(s)} + 2\text{F}_2(\text{g}) = \text{RhF}_4(\text{g})$	1025 - 2240	-	-	(-2.0)	(1.9)	-	(1.6)	(38.53)	(14.6)	(12.6)
$\text{Rh(l)} + 2\text{F}_2(\text{g}) = \text{RhF}_4(\text{g})$	2240 - 2500	-	-	(-5.6)	(4.1)	-	(1.6)	(35.99)	(-6.0)	(-11.6)
$\text{Ru(s}, \alpha) + 3/2\text{F}_2(\text{g}) = \text{RuF}_3(\text{s})$	298 - 1300	(180)	(164)	(1.7)	(9.2)	-	(1.2)	(-0.519)	(65.5)	(67.3)
$\text{Ru(s}, \alpha) + 3/2\text{F}_2(\text{g}) = \text{RuF}_3(\text{l})$	1300 - 1308	-	-	(14.3)	(-2.2)	-	(1.2)	(4.733)	(131.9)	(146.3)
$\text{Ru(s}, \beta \text{ and } \gamma) + 3/2\text{F}_2(\text{g}) = \text{RuF}_3(\text{l})$	1308 - 1675	-	-	(12.4)	(-0.7)	-	(1.2)	(5.968)	(119.9)	(132.3)
$\text{Ru(s}, \beta \text{ and } \gamma) + 3/2\text{F}_2(\text{g}) = \text{RuF}_3(\text{g})$	1675 - 1773	-	-	(0.4)	(-0.7)	-	(1.2)	(69.07)	(5.1)	(5.5)
$\text{Ru(s}, \delta) + 3/2\text{F}_2(\text{g}) = \text{RuF}_3(\text{g})$	1773 - 2500	-	-	(0.1)	(-0.7)	-	(1.2)	(69.37)	(3.0)	(3.1)
$\text{Ru(s}, \alpha) + 2\text{F}_2(\text{g}) = \text{RuF}_4(\text{s})$	298 - 825	(230)	(210)	(2.4)	(9.6)	-	(1.6)	(-0.597)	(82.5)	(84.9)
$\text{Ru(s}, \alpha) + 2\text{F}_2(\text{g}) = \text{RuF}_4(\text{l})$	825 - 1050	-	-	(14.7)	(-2.4)	-	(1.6)	(0.440)	(146.6)	(161.3)
$\text{Ru(s}, \alpha) + 2\text{F}_2(\text{g}) = \text{RuF}_4(\text{g})$	1050 - 1308	-	-	(-1.8)	(2.6)	-	(1.6)	(41.01)	(12.3)	(10.5)
$\text{Ru(s}, \beta \text{ and } \gamma) + 2\text{F}_2(\text{g}) = \text{RuF}_4(\text{g})$	1308 - 1773	-	-	(-3.8)	(4.1)	-	(1.6)	(42.24)	(0.3)	(-3.5)
$\text{Ru(s}, \delta) + 2\text{F}_2(\text{g}) = \text{RuF}_4(\text{g})$	1773 - 2500	-	-	(-4.1)	(4.1)	-	(1.6)	(42.55)	(-1.8)	(-5.9)
$\text{Ru(s}, \alpha) + 5/2\text{F}_2(\text{g}) = \text{RuF}_5(\text{s})$	298 - 374	(300)	(279)	(2.0)	(10.8)	-	(2.0)	(-0.412)	(83.9)	(85.9)
$\text{Ru(s}, \alpha) + 5/2\text{F}_2(\text{g}) = \text{RuF}_5(\text{l})$	374 - 545	-	-	(17.0)	(-2.6)	-	(2.0)	(-0.610)	(155.8)	(172.8)
$\text{Ru(s}, \alpha) + 5/2\text{F}_2(\text{g}) = \text{RuF}_5(\text{g})$	545 - 1308	-	-	(-6.0)	(7.4)	-	(2.0)	(22.44)	(-5.7)	(-11.7)
$\text{Ru(s}, \beta \text{ and } \gamma) + 5/2\text{F}_2(\text{g}) = \text{RuF}_5(\text{g})$	1308 - 1773	-	-	(-7.9)	(8.9)	-	(2.0)	(23.68)	(-17.7)	(-25.6)
$\text{Ru(s}, \delta) + 5/2\text{F}_2(\text{g}) = \text{RuF}_5(\text{g})$	1773 - 2500	-	-	(-8.2)	(8.9)	-	(2.0)	(23.98)	(-19.8)	(-28.0)
$\text{Sb(s}, \alpha, \beta, \text{ and } \gamma) + 3/2\text{F}_2(\text{g}) = \text{SbF}_3(\text{s})$	298 - 565	216.6 (a)	(200.0)	(2.5)	(8.2)	-	(1.2)	(-0.694)	(71.6)	(74.1)
$\text{Sb(s}, \alpha, \beta, \text{ and } \gamma) + 3/2\text{F}_2(\text{g}) = \text{SbF}_3(\text{l})$	565 - 649	-	-	(12.1)	(-2.4)	-	(1.2)	(-0.526)	(119.5)	(131.6)
$\text{Sb(s}, \alpha, \beta, \text{ and } \gamma) + 3/2\text{F}_2(\text{g}) = \text{SbF}_3(\text{g})$	649 - 903.7	-	-	(2.1)	(-2.4)	-	(1.2)	(19.96)	(33.2)	(35.3)
$\text{Sb(l)} + 3/2\text{F}_2(\text{g}) = \text{SbF}_3(\text{g})$	903.7 - 1713	-	-	(0.1)	(-0.7)	-	(1.2)	(16.25)	(26.5)	(26.6)
$1/2\text{Sb}_2(\text{g}) + 3/2\text{F}_2(\text{g}) = \text{SbF}_3(\text{g})$	1713 - 2500	-	-	(3.1)	(-0.7)	-	(1.3)	(-35.63)	(76.3)	(79.4)
$\text{Sb(s}, \alpha, \beta, \text{ and } \gamma) + 5/2\text{F}_2(\text{g}) = \text{SbF}_5(\text{l})$	298 - 423	(305)	(286.5)	(18.8)	(-2.8)	-	(2.0)	(-4.797)	(166.9)	(185.7)
$\text{Sb(s}, \alpha, \beta, \text{ and } \gamma) + 5/2\text{F}_2(\text{g}) = \text{SbF}_5(\text{g})$	423 - 903.7	-	-	(-1.2)	(7.2)	-	(2.0)	(10.57)	(31.7)	(30.5)
$\text{Sb(l)} + 5/2\text{F}_2(\text{g}) = \text{SbF}_5(\text{g})$	903.7 - 1713	-	-	(-3.2)	(8.9)	-	(2.0)	(6.856)	(25.0)	(21.8)
$1/2\text{Sb}_2(\text{g}) + 5/2\text{F}_2(\text{g}) = \text{SbF}_5(\text{g})$	1713 - 2500	-	-	(-0.2)	(8.9)	-	(2.1)	(-45.03)	(74.8)	(74.6)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{298}$ (kcal/mole)	$-\Delta F_f^{298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
Sc(s) + 3/2F ₂ (g) = ScF ₃ (s)	298 - 1500	(367) (a)	(350)	(-0.3)	(6.9)	-	(1.2)	(0.174)	(56.7)	(56.5)
Sc(s) + 3/2F ₂ (g) = ScF ₃ (l)	1500 - 1670	-	-	(13.9)	(-3.7)	-	(1.2)	(2.799)	(136.7)	(150.7)
Sc(l) + 3/2F ₂ (g) = ScF ₃ (l)	1670 - 1800	-	-	(11.6)	(-0.7)	-	(1.2)	(-1.427)	(126.5)	(138.1)
Sc(l) + 3/2F ₂ (g) = ScF ₃ (g)	1800 - 2500	-	-	(0.1)	(-0.7)	-	(1.2)	(74.27)	(9.7)	(9.8)
Se(s) + 3F ₂ (g) = SeF ₆ (g)	298 - 490.6	246.0 (b)	221.8	6.69	-8.16	-	-5.7	-3.453	119.7	126.4
Se(l) + 3F ₂ (g) = SeF ₆ (g)	490.6 - 1000	-	-	3.0	0.6	-	-5.7	-3.947	103.6	106.6
1/2Se ₂ (g) + 3F ₂ (g) = SeF ₆ (g)	1000 - 2500	-	-	(5.5)	(0.6)	-	(-5.5)	(-20.82)	(135.4)	(140.9)
Si(s) + 2F ₂ (g) = SiF ₄ (g)	298 - 1683	370.8 (b)	360.9	-0.33	0.76	-	-2.06	-0.626	32.6	32.3
Si(l) + 2F ₂ (g) = SiF ₄ (g)	1683 - 2500	-	-	(-2.0)	(1.8)	-	(-3.1)	(-10.37)	(28.4)	(26.3)
Sm(s) + F ₂ (g) = SmF ₂ (s)	298 - 1623	(237)	(225)	(0.7)	(3.8)	-	(0.8)	(-0.110)	(44.3)	(45.0)
Sm(l) + F ₂ (g) = SmF ₂ (s)	1623 - 1650	-	-	(-1.6)	(7.2)	-	(0.8)	(-4.555)	(35.1)	(33.5)
Sm(l) + F ₂ (g) = SmF ₂ (l)	1650 - 2500	-	-	(6.2)	(-0.4)	-	(0.8)	(-3.080)	(77.9)	(84.1)
Sm(s) + 3/2F ₂ (g) = SmF ₃ (s)	298 - 1623	(405) (a)	(387)	(1.1)	(5.3)	-	(1.2)	(-0.152)	(66.3)	(67.4)
Sm(l) + 3/2F ₂ (g) = SmF ₃ (s)	1623 - 1670	-	-	(-1.2)	(8.7)	-	(1.2)	(-4.597)	(57.1)	(55.9)
Sm(l) + 3/2F ₂ (g) = SmF ₃ (l)	1670 - 2500	-	-	(9.6)	(-0.7)	-	(1.2)	(-1.425)	(117.3)	(126.9)
Sn(s; α and β) + F ₂ (g) = SnF ₂ (s)	298 - 505.1	(158) (a)	(147)	(2.5)	(0.3)	-	(0.8)	(-0.485)	(51.7)	(54.2)
Sn(l) + F ₂ (g) = SnF ₂ (s)	505.1 - 1140	-	-	(-0.4)	(6.6)	-	(0.8)	(-1.524)	(40.3)	(39.9)
Sn(l) + F ₂ (g) = SnF ₂ (l)	1140 - 1700	-	-	(6.4)	(-0.4)	-	(0.8)	(-1.428)	(77.3)	(83.7)
Sn(l) + F ₂ (g) = SnF ₂ (g)	1700 - 2473	-	-	(-0.6)	(-0.4)	-	(0.8)	(51.47)	(1.1)	(0.5)
Sn(g) + F ₂ (g) = SnF ₂ (g)	2473 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(-9.296)	(41.6)	(43.3)
Sn(s; α and β) + 2F ₂ (g) = SnF ₄ (s)	298 - 505.1	(259)	(237)	(3.4)	(0.2)	-	(1.6)	(-0.486)	(91.9)	(95.3)
Sn(l) + 2F ₂ (g) = SnF ₄ (s)	505.1 - 720	-	-	(0.5)	(6.5)	-	(1.6)	(-1.525)	(80.5)	(81.0)
Sn(l) + 2F ₂ (g) = SnF ₄ (l)	720 - 978	-	-	(12.1)	(-0.9)	-	(1.6)	(-1.359)	(142.3)	(154.4)
Sn(l) + 2F ₂ (g) = SnF ₄ (g)	978 - 2473	-	-	(-3.9)	(4.1)	-	(1.6)	(33.90)	(14.5)	(10.6)
Sn(g) + 2F ₂ (g) = SnF ₄ (g)	2473 - 2500	-	-	(-1.5)	(4.1)	-	(1.6)	(-26.87)	(55.0)	(53.5)
Sr(s) + F ₂ (g) = SrF ₂ (s)	298 - 1043	289.0 (a)	(276.7)	(1.8)	(5.2)	-	(0.8)	(-0.501)	(52.7)	(54.5)
Sr(l) + F ₂ (g) = SrF ₂ (s)	1043 - 1657	-	-	(-0.3)	(6.6)	-	(0.8)	(-1.256)	(41.6)	(41.3)
Sr(l) + F ₂ (g) = SrF ₂ (l)	1657 - 1673	-	-	(2.4)	(6.6)	-	(0.8)	(-39.39)	(82.2)	(84.6)
Sr(g) + F ₂ (g) = SrF ₂ (l)	1673 - 2500	-	-	(10.7)	(-0.4)	-	(0.8)	(-39.22)	(129.3)	(140.0)
Ta(s) + F ₂ (g) = TaF ₅ (s)	298 - 1510	(180)	(171)	(1.1)	(5.6)	-	(0.8)	(-0.304)	(39.0)	(40.1)
Ta(s) + F ₂ (g) = TaF ₅ (l)	1510 - 2250	-	-	(8.4)	(-1.2)	-	(0.8)	(1.025)	(79.2)	(87.5)
Ta(s) + F ₂ (g) = TaF ₅ (g)	2250 - 2500	-	-	(0.9)	(-1.2)	-	(0.8)	(75.88)	(-4.5)	(-3.7)
Ta(s) + 3/2F ₂ (g) = TaF ₃ (s)	298 - 1750	(260)	(243)	(1.9)	(9.6)	-	(1.2)	(-0.602)	(70.1)	(72.1)
Ta(s) + 3/2F ₂ (g) = TaF ₃ (l)	1750 - 2350	-	-	(13.7)	(-1.4)	-	(1.2)	(8.592)	(131.5)	(145.3)
Ta(s) + 3/2F ₂ (g) = TaF ₃ (g)	2350 - 2500	-	-	(1.7)	(-1.4)	-	(1.2)	(93.79)	(14.2)	(16.0)
Ta(s) + 5/2F ₂ (g) = TaF ₅ (s)	298 - 370	(360)	(339)	(5.3)	(13.3)	-	(2.0)	(-1.487)	(104.2)	(109.5)
Ta(s) + 5/2F ₂ (g) = TaF ₅ (l)	370 - 502	-	-	(17.0)	(-1.9)	-	(2.0)	(-0.300)	(155.6)	(172.6)
Ta(s) + 5/2F ₂ (g) = TaF ₅ (g)	502 - 2500	-	-	(-6.5)	(8.9)	-	(2.0)	(21.24)	(-7.4)	(-13.9)
Tc(s) + 3/2F ₂ (g) = TcF ₃ (s)	298 - 1540	(190)	(174)	(1.4)	(9.7)	-	(1.2)	(-0.436)	(62.3)	(63.7)
Tc(s) + 3/2F ₂ (g) = TcF ₃ (l)	1540 - 1800	-	-	(15.0)	(-2.7)	-	(1.2)	(3.324)	(136.5)	(151.5)
Tc(s) + 3/2F ₂ (g) = TcF ₃ (g)	1800 - 2400	-	-	(2.0)	(-2.7)	-	(1.2)	(71.72)	(14.0)	(16.0)
Tc(l) + 3/2F ₂ (g) = TcF ₃ (g)	2400 - 2500	-	-	(-3.4)	(-0.7)	-	(1.2)	(73.42)	(-20.9)	(-24.3)
Tc(s) + 2F ₂ (g) = TcF ₄ (s)	298 - 830	(250)	(279)	(1.3)	(11.1)	-	(1.6)	(-0.350)	(81.1)	(82.4)
Tc(s) + 2F ₂ (g) = TcF ₄ (l)	830 - 1000	-	-	(15.8)	(-2.9)	-	(1.6)	(0.437)	(157.3)	(173.1)
Tc(s) + 2F ₂ (g) = TcF ₄ (g)	1000 - 2400	-	-	(-2.2)	(2.1)	-	(1.6)	(39.93)	(14.0)	(11.8)
Tc(l) + 2F ₂ (g) = TcF ₄ (g)	2400 - 2500	-	-	(-7.6)	(4.1)	-	(1.6)	(41.63)	(-20.9)	(-28.5)
Tc(s) + 5/2F ₂ (g) = TcF ₅ (s)	298 - 322	(270)	(249)	(4.3)	(12.5)	-	(2.0)	(-1.158)	(97.4)	(101.7)
Tc(s) + 5/2F ₂ (g) = TcF ₅ (l)	322 - 480	-	-	(17.7)	(-3.1)	-	(2.0)	(-1.064)	(158.6)	(176.3)
Tc(s) + 5/2F ₂ (g) = TcF ₅ (g)	480 - 2400	-	-	(-6.3)	(6.9)	-	(2.0)	(20.30)	(-7.7)	(-14.0)
Tc(l) + 5/2F ₂ (g) = TcF ₅ (g)	2400 - 2500	-	-	(-11.7)	(8.9)	-	(2.0)	(22.00)	(-42.6)	(-54.3)
Tc(s) + 3F ₂ (g) = TcF ₆ (s)	298 - 309	(300)	(274.5)	(9.5)	(-3.3)	-	(2.4)	(-1.887)	(137.7)	(147.2)
Tc(s) + 3F ₂ (g) = TcF ₆ (l)	309 - 330	-	-	(15.5)	(-3.3)	-	(2.4)	(-1.441)	(164.7)	(180.2)
Tc(s) + 3F ₂ (g) = TcF ₆ (g)	330 - 2400	-	-	(-0.5)	(1.7)	-	(-5.6)	(7.743)	(57.2)	(56.7)
Tc(l) + 3F ₂ (g) = TcF ₆ (g)	2400 - 2500	-	-	(-5.9)	(3.7)	-	(-5.6)	(9.443)	(22.3)	(16.4)
Te(s, α) + 2F ₂ (g) = TeF ₄ (s)	298 - 402.8	(205)	(185)	(4.4)	(3.1)	-	(1.6)	(-0.923)	(92.3)	(96.8)
Te(s, α) + 2F ₂ (g) = TeF ₄ (l)	402.8 - 621	-	-	(14.8)	(-6.1)	-	(1.6)	(1.985)	(135.2)	(150.1)
Te(s, β) + 2F ₂ (g) = TeF ₄ (l)	621 - 647.5	-	-	(14.8)	(-6.1)	-	(1.6)	(1.855)	(135.4)	(150.3)
Te(s, β) + 2F ₂ (g) = TeF ₄ (g)	647.5 - 723	-	-	(-1.2)	(-1.1)	-	(1.6)	(19.98)	(22.4)	(21.3)
Te(l) + 2F ₂ (g) = TeF ₄ (g)	723 - 1360	-	-	(-5.6)	(4.1)	-	(1.6)	(17.53)	(3.1)	(-2.5)
1/2Te ₂ (g) + 2F ₂ (g) = TeF ₄ (g)	1360 - 2500	-	-	(-1.0)	(4.1)	-	(1.7)	(-0.533)	(44.5)	(43.4)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e. u.)	$-\Delta(B-a)$
$\text{Te}(s, \alpha) + 3\text{F}_2(g) = \text{TeF}_6(g)$	298 - 621	315 (c)	292	5.88	-4.95	-	-4.6	-3.075	111.55	117.43
$\text{Te}(s, \beta) + 3\text{F}_2(g) = \text{TeF}_6(g)$	621 - 723	-	-	5.88	-4.95	-	-4.6	-3.205	111.76	117.64
$\text{Te}(l) + 3\text{F}_2(g) = \text{TeF}_6(g)$	723 - 1360	-	-	1.5	0.3	-	-4.6	-5.662	92.4	93.8
$1/2\text{Te}_2(g) + 3\text{F}_2(g) = \text{TeF}_6(g)$	1360 - 2500	-	-	(6.0)	(0.3)	-	(-4.5)	(-24.72)	(133.8)	(139.8)
$\text{Th}(s) + 3/2\text{F}_2(g) = \text{ThF}_3(s)$	298 - 1500	(355)	(337)	(0.2)	(7.3)	(-2.0)	(1.2)	(0.209)	(61.2)	(61.4)
$\text{Th}(s) + 3/2\text{F}_2(g) = \text{ThF}_3(l)$	1500 - 2173	-	-	(10.9)	(0.1)	(-2.0)	(1.2)	(0.259)	(123.3)	(134.2)
$\text{Th}(l) + 3/2\text{F}_2(g) = \text{ThF}_3(l)$	2173 - 2500	-	-	(11.7)	(-0.7)	-	(1.2)	(-9.934)	(130.1)	(141.2)
$\text{Th}(s) + 2\text{F}_2(g) = \text{ThF}_4(s)$	298 - 1330	477 (c)	(454)	(-0.2)	(8.3)	(-2.0)	(1.6)	(0.403)	(76.6)	(76.4)
$\text{Th}(s) + 2\text{F}_2(g) = \text{ThF}_4(l)$	1330 - 2000	-	-	(14.2)	(-0.1)	(-2.0)	(1.6)	(5.681)	(156.2)	(170.4)
$\text{Th}(s) + 2\text{F}_2(g) = \text{ThF}_4(g)$	2000 - 2173	-	-	(3.2)	(-0.1)	(-2.0)	(1.6)	(77.68)	(47.6)	(50.8)
$\text{Th}(l) + 2\text{F}_2(g) = \text{ThF}_4(g)$	2173 - 2500	-	-	(3.4)	(-0.9)	-	(1.6)	(67.49)	(54.4)	(57.8)
$\text{Ti}(s, \alpha) + \text{F}_2(g) = \text{TiF}_2(s)$	298 - 1155	198 (c)	(187)	(0.2)	(4.0)	-	(0.8)	(0.041)	(39.5)	(39.7)
$\text{Ti}(s, \beta) + \text{F}_2(g) = \text{TiF}_2(s)$	1155 - 1550	-	-	(-2.1)	(6.6)	-	(0.8)	(0.009)	(27.4)	(25.3)
$\text{Ti}(s, \beta) + \text{F}_2(g) = \text{TiF}_2(l)$	1550 - 2000	-	-	(8.2)	(-0.4)	-	(0.8)	(0.453)	(87.1)	(95.3)
$\text{Ti}(l) + \text{F}_2(g) = \text{TiF}_2(l)$	2000 - 2425	-	-	(7.9)	(-0.4)	-	(0.8)	(-3.547)	(87.1)	(95.0)
$\text{Ti}(l) + \text{F}_2(g) = \text{TiF}_2(g)$	2425 - 2500	-	-	(-1.1)	(-0.4)	-	(0.8)	(78.28)	(-7.8)	(-8.9)
$\text{Ti}(s, \alpha) + 3/2\text{F}_2(g) = \text{TiF}_3(s)$	298 - 1155	315 (c)	(298)	(-0.5)	(8.0)	-	(1.2)	(0.191)	(54.6)	(54.1)
$\text{Ti}(s, \beta) + 3/2\text{F}_2(g) = \text{TiF}_3(s)$	1155 - 1500	-	-	(-2.7)	(10.5)	-	(1.2)	(0.159)	(42.5)	(39.7)
$\text{Ti}(s, \beta) + 3/2\text{F}_2(g) = \text{TiF}_3(l)$	1500 - 2000	-	-	(10.1)	(-0.7)	-	(1.2)	(5.559)	(111.3)	(121.3)
$\text{Ti}(l) + 3/2\text{F}_2(g) = \text{TiF}_3(g)$	2000 - 2500	-	-	(-0.2)	(-0.7)	-	(1.2)	(73.56)	(9.3)	(9.1)
$\text{Ti}(s, \alpha) + 2\text{F}_2(g) = \text{TiF}_4(s)$	298 - 557	370 (c)	(350)	(1.3)	(6.2)	-	(1.6)	(-0.117)	(74.7)	(76.0)
$\text{Ti}(s, \alpha) + 2\text{F}_2(g) = \text{TiF}_4(g)$	557 - 1155	-	-	(3.2)	(-3.4)	-	(1.6)	(21.96)	(42.1)	(45.3)
$\text{Ti}(s, \beta) + 2\text{F}_2(g) = \text{TiF}_4(g)$	1155 - 2000	-	-	(0.9)	(-0.9)	-	(1.6)	(21.92)	(30.0)	(30.9)
$\text{Ti}(l) + 2\text{F}_2(g) = \text{TiF}_4(g)$	2000 - 2500	-	-	(0.6)	(-0.9)	-	(1.6)	(17.92)	(30.0)	(30.6)
$\text{Ti}(s, \alpha) + 1/2\text{F}_2(g) = \text{TiF}(s)$	298 - 508.3	(65) (a)	(60)	(1.8)	(-0.1)	-	(0.4)	(-0.397)	(27.7)	(29.5)
$\text{Ti}(s, \beta) + 1/2\text{F}_2(g) = \text{TiF}(s)$	508.3 - 576.8	-	-	(-0.2)	(3.4)	-	(0.4)	(0.111)	(16.9)	(16.6)
$\text{Ti}(l) + 1/2\text{F}_2(g) = \text{TiF}(s)$	576.8 - 600	-	-	(-0.4)	(3.4)	-	(0.4)	(-0.804)	(17.4)	(16.9)
$\text{Ti}(l) + 1/2\text{F}_2(g) = \text{TiF}(l)$	600 - 928	-	-	(3.4)	(-0.2)	-	(0.4)	(0.264)	(35.0)	(38.3)
$\text{Ti}(l) + 1/2\text{F}_2(g) = \text{TiF}(g)$	928 - 1730	-	-	(-2.7)	(-0.2)	-	(0.4)	(26.32)	(-28.6)	(-31.4)
$\text{Ti}(g) + 1/2\text{F}_2(g) = \text{TiF}(g)$	1730 - 2500	-	-	(-0.2)	(-0.2)	-	(0.4)	(-16.87)	(12.7)	(12.5)
$\text{Ti}(s, \alpha) + 3/2\text{F}_2(g) = \text{TiF}_3(s)$	298 - 508.3	(175) (a)	(159)	(3.7)	(4.7)	-	(1.2)	(-0.910)	(76.1)	(79.8)
$\text{Ti}(s, \beta) + 3/2\text{F}_2(g) = \text{TiF}_3(s)$	508.3 - 576.8	-	-	(1.7)	(8.1)	-	(1.2)	(-0.402)	(65.3)	(67.0)
$\text{Ti}(l) + 3/2\text{F}_2(g) = \text{TiF}_3(s)$	576.8 - 823	-	-	(1.5)	(8.1)	-	(1.2)	(-1.317)	(65.8)	(67.3)
$\text{Ti}(l) + 3/2\text{F}_2(g) = \text{TiF}_3(l)$	823 - 1200	-	-	(11.1)	(-0.7)	-	(1.2)	(2.262)	(112.7)	(123.8)
$\text{Ti}(l) + 3/2\text{F}_2(g) = \text{TiF}_3(g)$	1200 - 1730	-	-	(0.1)	(-0.7)	-	(1.2)	(48.46)	(7.2)	(7.3)
$\text{Ti}(g) + 3/2\text{F}_2(g) = \text{TiF}_3(g)$	1730 - 2500	-	-	(2.6)	(-0.7)	-	(1.2)	(5.271)	(48.5)	(51.1)
$\text{U}(s, \alpha) + 3/2\text{F}_2(g) = \text{UF}_3(s)$	298 - 938	(340)	(322)	(5.1)	(-1.6)	-	(0.4)	(-1.319)	(87.3)	(92.4)
$\text{U}(s, \beta) + 3/2\text{F}_2(g) = \text{UF}_3(s)$	938 - 1049	-	-	(-1.9)	(6.5)	-	(1.2)	(1.111)	(47.5)	(45.6)
$\text{U}(s, \gamma) + 3/2\text{F}_2(g) = \text{UF}_3(s)$	1049 - 1405	-	-	(-0.8)	(6.5)	-	(1.2)	(-1.272)	(56.6)	(55.9)
$\text{U}(l) + 3/2\text{F}_2(g) = \text{UF}_3(s)$	1405 - 1700	-	-	(-0.6)	(6.5)	-	(1.2)	(-4.455)	(59.7)	(59.1)
$\text{U}(l) + 3/2\text{F}_2(g) = \text{UF}_3(l)$	1700 - 2500	-	-	(12.6)	(-0.7)	-	(1.2)	(-7.991)	(140.6)	(153.2)
$\text{U}(s, \alpha) + 2\text{F}_2(g) = \text{UF}_4(s)$	298 - 938	443 (f)	(421.5)	(5.5)	(-1.0)	-	(0.8)	(-1.316)	(102.6)	(108.1)
$\text{U}(s, \beta) + 2\text{F}_2(g) = \text{UF}_4(s)$	938 - 1049	-	-	(-1.6)	(7.1)	-	(1.6)	(1.114)	(62.8)	(61.3)
$\text{U}(s, \gamma) + 2\text{F}_2(g) = \text{UF}_4(s)$	1049 - 1309	-	-	(-0.4)	(7.1)	-	(1.6)	(-1.269)	(72.0)	(71.6)
$\text{U}(s, \gamma) + 2\text{F}_2(g) = \text{UF}_4(l)$	1309 - 1405	-	-	(15.3)	(-0.9)	-	(1.6)	(-0.966)	(162.9)	(178.2)
$\text{U}(l) + 2\text{F}_2(g) = \text{UF}_4(l)$	1405 - 1690	-	-	(15.4)	(-0.9)	-	(1.6)	(-4.149)	(166.0)	(181.4)
$\text{U}(l) + 2\text{F}_2(g) = \text{UF}_4(g)$	1690 - 2500	-	-	(2.4)	(-0.9)	-	(1.6)	(75.32)	(35.4)	(37.8)
$\text{U}(s, \alpha) + 5/2\text{F}_2(g) = \text{UF}_5(s)$	298 - 560	488 (f)	(462.5)	(8.0)	(-0.2)	-	(1.2)	(-1.978)	(130.4)	(138.5)
$\text{U}(s, \alpha) + 5/2\text{F}_2(g) = \text{UF}_5(l)$	560 - 800	-	-	(20.0)	(-9.2)	-	(1.2)	(-0.287)	(188.8)	(208.9)
$\text{U}(s, \alpha) + 5/2\text{F}_2(g) = \text{UF}_5(g)$	800 - 938	-	-	(-4.0)	(0.8)	-	(1.2)	(33.71)	(14.9)	(11.0)
$\text{U}(s, \beta) + 5/2\text{F}_2(g) = \text{UF}_5(g)$	938 - 1049	-	-	(-11.0)	(8.9)	-	(2.0)	(36.14)	(-24.9)	(-35.9)
$\text{U}(s, \gamma) + 5/2\text{F}_2(g) = \text{UF}_5(g)$	1049 - 1405	-	-	(-9.8)	(8.9)	-	(2.0)	(33.76)	(-15.7)	(-25.5)
$\text{U}(l) + 5/2\text{F}_2(g) = \text{UF}_5(g)$	1405 - 2500	-	-	(-9.7)	(8.9)	-	(2.0)	(30.58)	(-12.6)	(-22.3)
$\text{U}(s, \alpha) + 3\text{F}_2(g) = \text{UF}_6(s)$	298 - 329	516 (g)	(485)	-15.78	82.76	-	1.6	1.564	(37.6)	(21.8)
$\text{U}(s, \alpha) + 3\text{F}_2(g) = \text{UF}_6(l)$	329 - 938	-	-	(4.9)	(-5.5)	-	(1.6)	(11.44)	(92.2)	(97.1)
$\text{U}(s, \beta) + 3\text{F}_2(g) = \text{UF}_6(g)$	938 - 1049	-	-	(-2.2)	(2.7)	-	(2.4)	(13.87)	(52.4)	(50.3)
$\text{U}(s, \gamma) + 3\text{F}_2(g) = \text{UF}_6(g)$	1049 - 1405	-	-	(-1.0)	(2.7)	-	(2.4)	(11.49)	(61.6)	(60.6)
$\text{U}(l) + 3\text{F}_2(g) = \text{UF}_6(g)$	1405 - 2500	-	-	(-0.9)	(2.7)	-	(2.4)	(8.306)	(64.7)	(63.8)
$\text{V}(s) + \text{F}_2(g) = \text{VF}_2(s)$	298 - 1600	(200)	(189)	(-0.2)	(6.4)	-	(0.8)	(0.032)	(37.7)	(37.5)
$\text{V}(s) + \text{F}_2(g) = \text{VF}_2(l)$	1600 - 2003	-	-	(8.6)	(-1.4)	-	(0.8)	(2.436)	(86.1)	(94.7)
$\text{V}(l) + \text{F}_2(g) = \text{VF}_2(l)$	2003 - 2500	-	-	(5.6)	(-0.4)	-	(0.8)	(2.559)	(67.0)	(72.6)

Table VI (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}^{\circ}$ (kcal/mole)	$-\Delta F_{f,298}^{\circ}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$V(s) + 3/2F_2(g) = VF_3(s)$	298 - 1400	(271)	(254)	(-0.8)	(9.4)	-	(1.2)	(0.227)	(53.5)	(52.7)
$V(s) + 3/2F_2(g) = VF_3(l)$	1400 - 1900	-	-	(-12.0)	(-1.6)	-	(1.2)	(6.087)	(121.5)	(133.5)
$V(s) + 3/2F_2(g) = VF_3(g)$	1900 - 2003	-	-	(2.0)	(-1.6)	-	(1.2)	(80.09)	(17.1)	(19.1)
$V(l) + 3/2F_2(g) = VF_3(g)$	2003 - 2500	-	-	(-1.0)	(-0.7)	-	(1.2)	(80.21)	(-2.0)	(-3.1)
$V(s) + 2F_2(g) = VF_4(s)$	298 - 600	(325) (a)	(305)	(0.2)	(12.6)	-	(1.6)	(-0.095)	(70.4)	(70.7)
$V(s) + 2F_2(g) = VF_4(l)$	600 - 2003	-	-	(-2.2)	(3.2)	-	(1.6)	(23.04)	(16.0)	(13.8)
$V(l) + 2F_2(g) = VF_4(g)$	2003 - 2500	-	-	(-5.2)	(4.1)	-	(1.6)	(23.16)	(-3.0)	(-8.2)
$V(s) + 5/2F_2(g) = VF_5(s)$	298 - 375	(335) (a)	(312)	(0.5)	(8.1)	-	(2.0)	(0.220)	(81.5)	(82.0)
$V(s) + 5/2F_2(g) = VF_5(l)$	375 - 384	-	-	(18.2)	(-2.1)	-	(2.0)	(0.625)	(166.7)	(184.9)
$V(s) + 5/2F_2(g) = VF_5(g)$	384 - 2003	-	-	(-1.3)	(7.9)	-	(2.0)	(15.88)	(31.4)	(30.1)
$V(l) + 5/2F_2(g) = VF_5(g)$	2003 - 2500	-	-	(-4.3)	(8.9)	-	(2.0)	(16.00)	(12.3)	(8.0)
$W(s) + 2F_2(g) = WF_4(s)$	298 - 800	(250)	(229.5)	(2.9)	(6.4)	-	(1.6)	(-0.604)	(86.1)	(89.0)
$W(s) + 2F_2(g) = WF_4(l)$	800 - 895	-	-	(14.7)	(-1.6)	-	(1.6)	(-0.484)	(149.8)	(164.5)
$W(s) + 2F_2(g) = WF_4(g)$	895 - 2500	-	-	(-2.3)	(3.4)	-	(1.6)	(33.73)	(15.3)	(13.0)
$W(s) + 5/2F_2(g) = WF_5(s)$	298 - 380	(280)	(259)	(5.3)	(12.1)	-	(2.0)	(-1.459)	(103.4)	(108.7)
$W(s) + 5/2F_2(g) = WF_5(l)$	380 - 510	-	-	(15.5)	(-1.9)	-	(2.0)	(0.126)	(146.8)	(162.3)
$W(s) + 5/2F_2(g) = WF_5(g)$	510 - 2500	-	-	(-6.5)	(8.1)	-	(2.0)	(21.60)	(-7.8)	(-14.3)
$W(s) + 3F_2(g) = WF_6(g)$	298 - 2500	300 (b)	(281)	(3.4)	(-0.1)	-	(-5.6)	(-2.884)	(87.2)	(90.6)
$Y(s) + 3/2F_2(g) = YF_3(s)$	298 - 1660	(397) (a)	(380)	(1.4)	(8.3)	-	(1.2)	(-0.375)	(65.4)	(66.8)
$Y(s) + 3/2F_2(g) = YF_3(l)$	1660 - 1750	-	-	(14.0)	(-2.9)	-	(1.2)	(7.141)	(132.4)	(146.4)
$Y(l) + 3/2F_2(g) = YF_3(l)$	1750 - 2300	-	-	(12.1)	(-0.7)	-	(1.2)	(3.097)	(124.4)	(136.5)
$Y(l) + 3/2F_2(g) = YF_3(g)$	2300 - 2500	-	-	(0.1)	(-0.7)	-	(1.2)	(84.90)	(7.6)	(7.7)
$Zn(s) + F_2(g) = ZnF_2(s)$	298 - 692.7	176 (a)	(164)	(-0.2)	(4.8)	-	(0.8)	(0.129)	(40.5)	(40.3)
$Zn(l) + F_2(g) = ZnF_2(s)$	692.7 - 1145	-	-	(-2.4)	(7.2)	-	(0.8)	(-0.553)	(30.4)	(28.0)
$Zn(l) + F_2(g) = ZnF_2(l)$	1145 - 1180	-	-	(7.2)	(-0.4)	-	(0.8)	(-0.963)	84.4	(91.6)
$Zn(g) + F_2(g) = ZnF_2(l)$	1180 - 1775	-	-	(9.7)	(-0.4)	-	(0.8)	(-31.39)	(125.6)	(135.3)
$Zn(g) + F_2(g) = ZnF_2(g)$	1775 - 2500	-	-	(1.7)	(-0.4)	-	(0.8)	(26.81)	(41.0)	(42.7)
$Zr(s, \alpha) + F_2(g) = ZrF_2(s)$	298 - 1135	230 (c)	(219)	(0.3)	(5.8)	-	(1.7)	(0.217)	(39.3)	(39.6)
$Zr(s, \beta) + F_2(g) = ZrF_2(s)$	1135 - 1675	-	-	(-0.2)	(7.0)	-	(0.8)	(-1.002)	(38.3)	(38.2)
$Zr(s, \beta) + F_2(g) = ZrF_2(l)$	1675 - 2125	-	-	(8.4)	(-0.4)	-	(0.8)	(3.974)	(84.4)	(92.9)
$Zr(l) + F_2(g) = ZrF_2(l)$	2125 - 2500	-	-	(7.7)	(-0.4)	-	(0.8)	(0.625)	(81.2)	(88.9)
$Zr(s, \alpha) + 3/2F_2(g) = ZrF_3(s)$	298 - 1135	350 (c)	(334)	(0.1)	(9.4)	-	(2.1)	(0.236)	(57.6)	(57.7)
$Zr(s, \alpha) + 3/2F_2(g) = ZrF_3(l)$	1135 - 1600	-	-	(-0.3)	(10.5)	-	(1.2)	(-0.983)	(56.6)	(56.3)
$Zr(s, \beta) + 3/2F_2(g) = ZrF_3(l)$	1600 - 2125	-	-	(12.3)	(-0.7)	-	(1.2)	(6.193)	(123.5)	(135.8)
$Zr(l) + 3/2F_2(g) = ZrF_3(l)$	2125 - 2400	-	-	(11.6)	(-0.7)	-	(1.2)	(2.844)	(120.2)	(131.8)
$Zr(l) + 3/2F_2(g) = ZrF_3(g)$	2400 - 2500	-	-	(-0.4)	(-0.7)	-	(1.2)	(89.64)	(2.6)	(2.2)
$Zr(s, \alpha) + 2F_2(g) = ZrF_4(s)$	298 - 1135	445 (a)	(424)	(-1.0)	(7.4)	-	(2.5)	(0.801)	(66.5)	(65.5)
$Zr(s, \beta) + 2F_2(g) = ZrF_4(s)$	1135 - 1176	-	-	(-1.4)	(8.5)	-	(1.6)	(-0.418)	(65.5)	(64.0)
$Zr(s, \beta) + 2F_2(g) = ZrF_4(l)$	1176 - 2125	-	-	(-3.8)	(4.1)	-	(1.6)	(62.08)	(-4.8)	(-8.7)
$Zr(l) + 2F_2(g) = ZrF_4(g)$	2125 - 2500	-	-	(-4.6)	(4.1)	-	(1.6)	(58.73)	(-8.1)	(-12.7)

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Table VII
THERMOCHEMICAL PROPERTIES OF THE CHLORIDES

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$Ac(s) + 3/2Cl_2(g) = AcCl_3(s)$	298 - 1075	(245)	(228)	(4.5)	(3.4)	-	(1.0)	(-1.149)	(81.8)	(86.3)
$Ac(s) + 3/2Cl_2(g) = AcCl_3(l)$	1075 - 1090	-	-	(13.5)	(-3.4)	-	(1.0)	(1.705)	(129.3)	(142.8)
$Ac(l) + 3/2Cl_2(g) = AcCl_3(l)$	1090 - 2030	-	-	(10.9)	(-0.4)	-	(1.0)	(0.257)	(116.7)	(127.6)
$Ac(l) + 3/2Cl_2(g) = AcCl_3(g)$	2030 - 2500	-	-	(-1.1)	(-0.4)	-	(1.0)	(69.62)	(3.1)	(2.0)
$Ag(s) + 1/2Cl_2(g) = AgCl(s)$	298 - 728	30.362 (a)	26.2	5.41	-1.18	-	-2.74	-2.476	45.88	51.29
$Ag(s) + 1/2Cl_2(g) = AgCl(l)$	728 - 1234	-	-	6.5	-2.2	-	-	0.500	47.95	54.48
$Ag(l) + 1/2Cl_2(g) = AgCl(l)$	1234 - 1837	-	-	(4.3)	(-0.1)	-	(0.3)	(-0.824)	(37.04)	(41.36)
$Ag(l) + 1/2Cl_2(g) = AgCl(g)$	1837 - 2485	-	-	(-2.75)	(-0.1)	-	(0.3)	(54.69)	(38.7)	(-41.44)
$Ag(g) + 1/2Cl_2(g) = AgCl(g)$	2485 - 2500	-	-	(-0.42)	(-0.1)	-	(0.3)	(-11.82)	(3.94)	(3.52)
$Al(s) + 1/2Cl_2(g) = AlCl(g)$	298 - 931.7	11.6 (b)	17.8	-0.32	-3.095	-	0.355	0.116	-23.30	-23.62
$Al(l) + 1/2Cl_2(g) = AlCl(g)$	931.7 - 2500	-	-	-2.38	-0.135	-	-0.355	-1.818	-31.87	-34.25
$Al(s) + 3/2Cl_2(g) = AlCl_3(s)$	298 - 453.3	166.2 (a)	152.3	-4.83	24.64	-	0.975	0.677	25.93	21.10
$Al(s) + 3/2Cl_2(g) = AlCl_3(l)$	453.3 - 931.7	-	-	1.72	-3.36	-	-1.72	13.391	24.4	26.15
$Al(l) + 3/2Cl_2(g) = AlCl_3(g)$	931.7 - 2500	-	-	-0.34	-0.405	-	-1.72	11.457	15.86	15.52
$Am(s) + 3/2Cl_2(g) = AmCl_3(s)$	298 - 1120	(251.3) (c)	(234.9)	(4.9)	(2.4)	-	(1.0)	(-1.223)	(82.8)	(87.7)
$Am(s) + 3/2Cl_2(g) = AmCl_3(l)$	1120 - 1200	-	-	(14.5)	(-4.8)	-	(1.0)	(6.541)	(129.6)	(144.1)
$Am(l) + 3/2Cl_2(g) = AmCl_3(l)$	1200 - 2025	-	-	(10.9)	(-0.4)	-	(1.0)	(5.293)	(111.3)	(122.2)
$Am(l) + 3/2Cl_2(g) = AmCl_3(g)$	2025 - 2500	-	-	(-1.6)	(-0.4)	-	(1.0)	(80.61)	(-8.5)	(-10.1)
$As(s) + 3/2Cl_2(g) = AsCl_3(l)$	298 - 395	71.5 (d)	61.7	13.6	-2.7	-	1.0	-3.597	108.6	122.5
$As(s) + 3/2Cl_2(g) = AsCl_3(g)$	395 - 883	-	-	(1.3)	(-2.5)	-	(-0.4)	(8.376)	(16.6)	(17.9)
$1/4As_4(g) + 3/2Cl_2(g) = AsCl_3(g)$	883 - 2500	-	-	(2.1)	(-0.5)	-	(-0.4)	(-0.835)	(32.8)	(34.9)
$Au(s) + 1/2Cl_2(g) = AuCl(s)$	298 - 850	8.4 (a)	(4.3)	(0.6)	(5.0)	(-0.9)	(0.3)	(-0.275)	(18.5)	(19.1)
$Au(s) + Cl_2(g) = AuCl_2(s)$	298 - 725	18.1 (a)	(7.7)	(1.6)	(6.5)	(-0.9)	(0.6)	(-0.537)	(45.3)	(46.9)
$Au(s) + 3/2Cl_2(g) = AuCl_3(s)$	298 - 561	28.3 (a)	(13.2)	(3.3)	(9.2)	(-0.9)	(1.0)	(-1.057)	(71.8)	(75.2)
$Au(s) + 3/2Cl_2(g) = AuCl_3(l)$	561 - 700	-	-	(15.2)	(-0.2)	(-0.9)	(1.0)	(-3.153)	(136.3)	(151.6)
$B(s) + 3/2Cl_2(g) = BCl_3(g)$	298 - 2313	94.5 (a)	90.9	2.91	-3.00	-	-1.845	-1.348	28.76	31.67
$B(l) + 3/2Cl_2(g) = BCl_3(g)$	2313 - 2500	-	-	(-1.6)	(1.4)	-	(-1.8)	(-6.602)	(6.0)	(4.5)
$Ba(s,\alpha) + Cl_2(g) = BaCl_2(s,\alpha)$	298 - 648	205.56 (a)	193.7	2.7	1.6	-	0.6	-0.650	54.7	57.4
$Ba(s,\beta) + Cl_2(g) = BaCl_2(s,\alpha)$	648 - 977	-	-	2.7	1.6	-	0.6	-0.790	54.9	57.6
$Ba(l) + Cl_2(g) = BaCl_2(s,\alpha)$	977 - 1198	-	-	(0.8)	(3.1)	-	(0.6)	(-1.529)	(45.5)	(46.4)
$Ba(l) + Cl_2(g) = BaCl_2(s,\beta)$	1198 - 1235	-	-	(4.8)	(-0.3)	-	(0.6)	(-3.924)	(69.9)	(74.8)
$Ba(l) + Cl_2(g) = BaCl_2(l)$	1235 - 1911	-	-	(10.8)	(-0.3)	-	(0.6)	(-5.934)	(108.3)	(119.2)
$Ba(g) + Cl_2(g) = BaCl_2(l)$	1911 - 2100	-	-	(13.3)	(-0.3)	-	(0.6)	(-46.43)	(145.3)	(158.6)
$Ba(g) + Cl_2(g) = BaCl_2(g)$	2100 - 2500	-	-	(0.3)	(-0.3)	-	(0.6)	(30.87)	(22.0)	(22.3)
$Be(s) + Cl_2(g) = BeCl_2(s)$	298 - 678	112.6 (b)	(101.6)	(0.5)	(0.5)	-	(1.8)	(0.443)	(38.9)	(39.4)
$Be(s) + Cl_2(g) = BeCl_2(l)$	678 - 820	-	-	(5.2)	(-1.5)	-	(1.8)	(0.717)	(63.7)	(68.9)
$Be(s) + Cl_2(g) = BeCl_2(g)$	820 - 1556	-	-	(1.2)	(-1.5)	-	(1.8)	(29.00)	(6.4)	(7.6)
$Be(l) + Cl_2(g) = BeCl_2(g)$	1556 - 2500	-	-	(1.0)	(-0.3)	-	(0.6)	(25.44)	(8.3)	(9.3)
$Bi(s) + 1/2Cl_2(g) = BiCl(s)$	298 - 544.2	(20)	(15)	(1.6)	(0.1)	-	(0.3)	(-0.381)	(26.5)	(28.1)
$Bi(l) + 1/2Cl_2(g) = BiCl(s)$	544.2 - 593	-	-	(-0.6)	(2.7)	-	(0.3)	(-2.188)	(18.7)	(18.1)
$Bi(l) + 1/2Cl_2(g) = BiCl(l)$	593 - 1050	-	-	(3.0)	(-0.1)	-	(0.3)	(0.169)	(33.3)	(36.3)
$Bi(l) + 1/2Cl_2(g) = BiCl(g)$	1050 - 1900	-	-	(-3.0)	(-0.1)	-	(0.3)	(33.47)	(-34.2)	(-37.2)
$Bi(g) + 1/2Cl_2(g) = BiCl(g)$	1900 - 2500	-	-	(-0.3)	(-0.1)	-	(0.3)	(-12.63)	(7.3)	(6.9)
$Bi(s) + Cl_2(g) = BiCl_2(s)$	298 - 436	(50)	(40)	(2.7)	(3.3)	-	(0.6)	(-0.720)	(47.7)	(50.4)
$Bi(s) + Cl_2(g) = BiCl_2(l)$	436 - 544.2	-	-	(11.9)	(-2.9)	-	(0.6)	(-0.642)	(92.9)	(104.8)
$Bi(l) + Cl_2(g) = BiCl_2(l)$	544.2 - 850	-	-	(9.6)	(-0.3)	-	(0.6)	(-2.449)	(85.1)	(94.8)
$Bi(l) + Cl_2(g) = BiCl_2(g)$	850 - 1900	-	-	(-1.4)	(-0.3)	-	(0.6)	(26.90)	(-12.5)	(-13.8)
$Bi(g) + Cl_2(g) = BiCl_2(g)$	1900 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(-19.20)	(29.0)	(30.3)
$Bi(s) + 3/2Cl_2(g) = BiCl_3(s)$	298 - 505	90.61 (a)	(76.3)	(2.4)	(18.4)	-	(1.0)	(-1.195)	(66.3)	(68.7)
$Bi(s) + 3/2Cl_2(g) = BiCl_3(l)$	505 - 544.2	-	-	(14.0)	(-3.0)	-	(1.0)	(-1.723)	(122.5)	(136.5)
$Bi(l) + 3/2Cl_2(g) = BiCl_3(l)$	544.2 - 714	-	-	(11.8)	(-0.4)	-	(1.0)	(-3.530)	(114.7)	(126.5)
$Bi(l) + 3/2Cl_2(g) = BiCl_3(g)$	714 - 1900	-	-	(-0.7)	(-0.4)	-	(1.0)	(22.75)	(8.3)	(7.6)
$Bi(g) + 3/2Cl_2(g) = BiCl_3(g)$	1900 - 2500	-	-	(1.9)	(-0.4)	-	(1.0)	(-23.35)	(49.8)	(51.7)
$Bi(s) + 2Cl_2(g) = BiCl_4(s)$	298.449	(120)	(100)	(5.8)	(7.5)	-	(1.3)	(-1.618)	(101.8)	(107.6)
$Bi(s) + 2Cl_2(g) = BiCl_4(l)$	449 - 544.2	-	-	(12.1)	(-3.1)	-	(1.3)	(0.721)	(126.4)	(138.5)
$Bi(l) + 2Cl_2(g) = BiCl_4(l)$	544.2 - 645	-	-	(9.9)	(-0.5)	-	(1.3)	(-1.086)	(118.6)	(128.4)
$Bi(l) + 2Cl_2(g) = BiCl_4(g)$	645 - 1900	-	-	(-2.1)	(-0.5)	-	(1.3)	(21.65)	(17.7)	(15.5)
$Bi(g) + 2Cl_2(g) = BiCl_4(g)$	1900 - 2500	-	-	(0.5)	(-0.5)	-	(1.3)	(-24.45)	(59.2)	(59.7)
$Ca(s,\alpha) + Cl_2(g) = CaCl_2(s)$	298 - 723	190.4 (b)	179.6	3.18	-0.73	-	-	-0.896	53.9	57.1
$Ca(s,\beta) + Cl_2(g) = CaCl_2(s)$	723 - 1055	-	-	2.13	1.37	-	-	-0.925	48.8	50.9
$Ca(s,\beta) + Cl_2(g) = CaCl_2(l)$	1055 - 1123	-	-	14.03	-5.15	-	0.6	-3.013	118.3	132.3
$Ca(l) + Cl_2(g) = CaCl_2(l)$	1123 - 1755	-	-	12.9	-3.8	-	0.6	-4.849	114.0	127.0
$Ca(g) + Cl_2(g) = CaCl_2(l)$	1755 - 1900	-	-	(15.35)	(-3.8)	-	(0.6)	(-47.72)	(154.2)	(169.6)
$Ca(g) + Cl_2(g) = CaCl_2(g)$	1900 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(15.75)	(31.9)	(33.27)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Cd(s)} + \text{Cl}_2(\text{g}) = \text{CdCl}_2(\text{s})$	298 - 594.1	93.0 (a)	82.0	0.57	6.39	-	0.6	-0.233	41.4	42.0
$\text{Cd(l)} + \text{Cl}_2(\text{g}) = \text{CdCl}_2(\text{s})$	594.1 - 841	-	-	-1.22	9.3	-	0.6	-1.148	34.1	32.9
$\text{Cd(l)} + \text{Cl}_2(\text{g}) = \text{CdCl}_2(\text{l})$	841 - 1040	-	-	(9.1)	(-0.3)	-	(0.6)	(-1.165)	(89.5)	(98.7)
$\text{Cd(g)} + \text{Cl}_2(\text{g}) = \text{CdCl}_2(\text{l})$	1040 - 1248	-	-	(11.3)	(-0.3)	-	(0.6)	(-27.24)	(127.3)	(138.6)
$\text{Cd(g)} + \text{Cl}_2(\text{g}) = \text{CdCl}_2(\text{g})$	1248 - 2500	-	-	(0.3)	(-0.3)	-	(0.6)	(16.34)	(24.9)	(25.2)
$\text{Ce(s)} + 3/2\text{Cl}_2(\text{g}) = \text{CeCl}_3(\text{s})$	298 - 1048	252.84 (e)	(235.1)	(4.5)	(2.4)	-	(1.0)	(-1.104)	(84.8)	(89.3)
$\text{Ce(l)} + 3/2\text{Cl}_2(\text{g}) = \text{CeCl}_3(\text{s})$	1048 - 1085	-	-	(1.0)	(8.4)	-	(1.0)	(-2.831)	(68.8)	(69.8)
$\text{Ce(l)} + 3/2\text{Cl}_2(\text{g}) = \text{CeCl}_3(\text{l})$	1085 - 2000	-	-	(11.0)	(-0.4)	-	(1.0)	(0.189)	(121.1)	(132.1)
$\text{Ce(l)} + 3/3\text{Cl}_2(\text{g}) = \text{CeCl}_3(\text{g})$	2000 - 2500	-	-	(-1.0)	(-0.4)	-	(1.0)	(70.19)	(6.9)	(5.9)
$\text{Co(s}, \alpha) + \text{Cl}_2(\text{g}) = \text{CoCl}_2(\text{s})$	298 - 723	76.9 (d)	66.5	0.93	10.03	-	0.6	-0.502	42.6	43.6
$\text{Co(s}, \beta) + \text{Cl}_2(\text{g}) = \text{CoCl}_2(\text{s})$	723 - 1000	-	-	2.35	8.47	-	0.6	-1.126	50.9	53.3
$\text{Co(s}, \beta) + \text{Cl}_2(\text{g}) = \text{CoCl}_2(\text{l})$	1000 - 1323	-	-	(11.7)	(-6.1)	-	(0.6)	(4.173)	(93.7)	(105.5)
$\text{Co(s}, \beta) + \text{Cl}_2(\text{g}) = \text{CoCl}_2(\text{g})$	1323 - 1398	-	-	(1.9)	(-6.1)	-	(0.6)	(44.31)	(2.8)	(4.8)
$\text{Co(s}, \gamma) + \text{Cl}_2(\text{g}) = \text{CoCl}_2(\text{g})$	1398 - 1766	-	-	(-4.4)	(-0.3)	-	(0.6)	(47.30)	(-34.6)	(-38.9)
$\text{Co(l)} + \text{Cl}_2(\text{g}) = \text{CoCl}_2(\text{g})$	1766 - 2500	-	-	(-3.1)	(-0.3)	-	(0.6)	(41.30)	(-22.8)	(-25.8)
$\text{Cr(s)} + \text{Cl}_2(\text{g}) = \text{CrCl}_2(\text{s})$	298 - 1088	94.56 (a)	85.2	1.12	2.67	-	1.1	-0.084	37.9	39.0
$\text{Cr(s)} + \text{Cl}_2(\text{g}) = \text{Cl}_2(\text{g})$	1088 - 1575	-	-	(9.9)	(-2.6)	-	(1.1)	(1.231)	(86.3)	(96.2)
$\text{Cr(s)} + \text{Cl}_2(\text{g}) = \text{CrCl}_2(\text{g})$	1575 - 2173	-	-	(-0.1)	(-2.6)	-	(1.1)	(64.48)	(-17.5)	(-17.6)
$\text{Cr(l)} + \text{Cl}_2(\text{g}) = \text{CrCl}_2(\text{g})$	2173 - 2495	-	-	(-4.2)	(-0.3)	-	(0.6)	(64.19)	(-41.9)	(-46.1)
$\text{Cr(g)} + \text{Cl}_2(\text{g}) = \text{CrCl}_2(\text{g})$	2495 - 2500	-	-	(0.3)	(-0.3)	-	(0.6)	(-19.84)	(22.0)	(22.3)
$\text{Cr(s)} + 3/2\text{Cl}_2(\text{g}) = \text{CrCl}_3(\text{s})$	298 - 1220	132.5 (d)	115.9	0.95	4.26	-	1.4	0.007	61.5	62.5
$\text{Cr(s)} + 3/2\text{Cl}_2(\text{g}) = \text{CrCl}_3(\text{g})$	1220 - 2173	-	-	(3.5)	(-2.8)	-	(1.4)	(58.92)	(24.6)	(28.2)
$\text{Cr(l)} + 3/2\text{Cl}_2(\text{g}) = \text{CrCl}_3(\text{g})$	2173 - 2495	-	-	(-0.5)	(-0.4)	-	(1.0)	(58.63)	(0.3)	(-0.3)
$\text{Cr(g)} + 3/2\text{Cl}_2(\text{g}) = \text{CrCl}_3(\text{g})$	2495 - 2500	-	-	(3.9)	(-0.4)	-	(1.0)	(-25.40)	(64.2)	(68.1)
$\text{Cr(s)} + 2\text{Cl}_2(\text{g}) = \text{CrCl}_4(\text{l})$	298 - 430	110 (d)	(95)	(13.6)	(-2.9)	-	(1.7)	(-3.345)	(127.1)	(140.7)
$\text{Cr(s)} + 2\text{Cl}_2(\text{g}) = \text{CrCl}_4(\text{g})$	430 - 2173	-	-	(-0.4)	(-1.4)	-	(1.7)	(11.54)	(21.9)	(21.5)
$\text{Cr(l)} + 2\text{Cl}_2(\text{g}) = \text{CrCl}_4(\text{g})$	2173 - 2495	-	-	(-4.4)	(1.0)	-	(1.3)	(11.24)	(-2.5)	(-6.9)
$\text{Cr(g)} + 2\text{Cl}_2(\text{g}) = \text{CrCl}_4(\text{g})$	2495 - 2500	-	-	-	(1.0)	-	(1.3)	(-72.78)	(61.5)	(61.5)
$\text{Cs(s)} + 1/2\text{Cl}_2(\text{g}) = \text{CsCl(s)}$	298 - 301.9	106.3 (d)	99.6	0.1	2.1	-	0.3	-0.015	23.6	23.7
$\text{Cs(l)} + 1/2\text{Cl}_2(\text{g}) = \text{CsCl(s)}$	301.9 - 918	-	-	-0.5	2.1	-	0.3	-0.340	22.0	21.5
$\text{Cs(l)} + 1/2\text{Cl}_2(\text{g}) = \text{CsCl(l)}$	918 - 963	-	-	(3.6)	(-0.1)	-	(0.3)	(0.457)	(43.9)	(47.5)
$\text{Cs(g)} + 1/2\text{Cl}_2(\text{g}) = \text{CsCl(l)}$	963 - 1573	-	-	(6.7)	(-0.1)	-	(0.3)	(-18.78)	(81.6)	(88.2)
$\text{Cs(g)} + 1/2\text{Cl}_2(\text{g}) = \text{CsCl(g)}$	1573 - 2500	-	-	(-0.41)	(-0.1)	-	(0.3)	(28.01)	(7.0)	(6.6)
$\text{Cu(s)} + 1/2\text{Cl}_2(\text{g}) = \text{CuCl(s)}$	298 - 703	32.6 (d)	28.5	-0.7	6.1	-	0.3	0.052	11.5	10.8
$\text{Cu(s)} + 1/2\text{Cl}_2(\text{g}) = \text{CuCl(l)}$	703 - 1356.2	-	-	6.0	-1.6	-	0.3	-0.336	46.6	52.6
$\text{Cu(l)} + 1/2\text{Cl}_2(\text{g}) = \text{CuCl(l)}$	1356.2 - 1763	-	-	(3.9)	(-0.1)	-	(0.3)	(-1.992)	(35.8)	(39.7)
$\text{Cu(l)} + 1/2\text{Cl}_2(\text{g}) = \text{CuCl(g)}$	1763 - 2500	-	-	(-2.96)	(-0.1)	-	(-0.1)	(46.11)	(-36.1)	(-39.0)
$\text{Cu(s)} + \text{Cl}_2(\text{g}) = \text{CuCl}_2(\text{s})$	298 - 903	53.4 (d)	(43.0)	2.60	3.77	-	0.6	-0.721	(50.3)	(52.9)
$\text{Fe(s}, \alpha) + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{s})$	298 - 950	81.9 (d)	72.6	6.81	-5.29	-	-0.95	-2.111	68.8	75.6
$\text{Fe(s}, \alpha) + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{l})$	950 - 1033	-	-	12.27	-7.4	-	0.2	4.044	93.4	105.7
$\text{Fe(s}, \beta) + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{l})$	1033 - 1180	-	-	5.24	-0.3	-	0.6	7.149	52.4	57.6
$\text{Fe(s}, \gamma) + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{l})$	1180 - 1299	-	-	(10.79)	(-3.3)	-	(0.6)	(2.472)	(88.3)	(99.1)
$\text{Fe(s}, \gamma) + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{g})$	1299 - 1673	-	-	(0.4)	(-3.3)	-	(0.6)	(46.19)	(-9.5)	(-9.1)
$\text{Fe(s}, \delta) + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{g})$	1673 - 1808	-	-	(-5.1)	(-0.3)	-	(0.6)	(50.97)	(-44.9)	(-49.9)
$\text{Fe(l)} + \text{Cl}_2(\text{g}) = \text{FeCl}_2(\text{g})$	1808 - 2500	-	-	(-4.8)	(-0.3)	-	(0.6)	(46.57)	(-40.5)	(-45.3)
$\text{Fe(s}, \alpha) + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{s})$	298 - 577	96(d; $\frac{1}{2}\text{Fe}_2\text{Cl}_6$)	(81.9)	(5.2)	(-4.5)	-	(0.5)	(-1.159)	(75.3)	(80.5)
$\text{Fe(s}, \alpha) + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{l})$	577 - 592	-	-	(15.0)	(-7.5)	-	(0.5)	(3.935)	(118.1)	(133.1)
$\text{Fe(s}, \alpha) + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{g})$	592 - 1033	-	-	(-1.5)	(-1.5)	-	(0.5)	(18.67)	(6.3)	(4.8)
$\text{Fe(s}, \beta) + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{g})$	1033 - 1180	-	-	(-8.5)	(5.6)	-	(1.0)	(21.78)	(-34.8)	(-43.3)
$\text{Fe(s}, \gamma) + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{g})$	1180 - 1673	-	-	(-3.0)	(2.6)	-	(1.0)	(17.10)	(1.1)	(-1.9)
$\text{Fe(s}, \delta) + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{g})$	1673 - 1808	-	-	(-8.4)	(5.6)	-	(1.0)	(21.88)	(-34.2)	(-42.7)
$\text{Fe(l)} + 3/2\text{Cl}_2(\text{g}) = 1/2\text{Fe}_2\text{Cl}_6(\text{g})$	1808 - 2500	-	-	(-8.1)	(5.6)	-	(1.0)	(17.48)	(-29.8)	(-38.0)
$\text{Ga(s)} + 1/2\text{Cl}_2(\text{g}) = \text{GaCl(s)}$	298 - 302.94	(38)	(33)	(1.7)	(0.5)	-	(0.3)	(-0.414)	(25.1)	(26.7)
$\text{Ga(l)} + 1/2\text{Cl}_2(\text{g}) = \text{GaCl(s)}$	302.94 - 725	-	-	(0.3)	(3.9)	-	(0.3)	(-1.426)	(22.4)	(22.7)
$\text{Ga(l)} + 1/2\text{Cl}_2(\text{g}) = \text{GaCl(l)}$	725 - 1125	-	-	(4.0)	(-0.1)	-	(0.3)	(0.993)	(38.2)	(42.2)
$\text{Ga(l)} + 1/2\text{Cl}_2(\text{g}) = \text{GaCl(g)}$	1125 - 2500	-	-	(-2.1)	(-0.1)	-	(0.3)	(33.86)	(-27.8)	(-29.9)
$\text{Ga(s)} + \text{Cl}_2(\text{g}) = \text{GaCl}_2(\text{s})$	298 - 302.94	(80)	(70)	(2.6)	(2.0)	-	(0.6)	(-0.643)	(49.2)	(51.8)
$\text{Ga(l)} + \text{Cl}_2(\text{g}) = \text{GaCl}_2(\text{s})$	302.94 - 443.7	-	-	(1.2)	(5.3)	-	(0.6)	(-1.705)	(46.6)	(47.8)
$\text{Ga(l)} + \text{Cl}_2(\text{g}) = \text{GaCl}_2(\text{l})$	443.7 - 870	-	-	(7.6)	(-0.3)	-	(0.6)	(0.013)	(74.1)	(81.7)
$\text{Ga(l)} + \text{Cl}_2(\text{g}) = \text{GaCl}_2(\text{g})$	870 - 2500	-	-	(-0.4)	(-0.3)	-	(0.6)	(25.97)	(-1.8)	(-2.2)
$\text{Ga(s)} + 3/2\text{Cl}_2(\text{g}) = \text{GaCl}_3(\text{s})$	298 - 302.94	125 (d)	(110)	(2.5)	(4.1)	-	(1.0)	(-0.600)	(64.3)	(66.8)
$\text{Ga(l)} + 3/2\text{Cl}_2(\text{g}) = \text{GaCl}_3(\text{s})$	302.94 - 350.7	-	-	(1.1)	(7.4)	-	(1.0)	(-1.662)	(61.7)	(62.8)
$\text{Ga(l)} + 3/2\text{Cl}_2(\text{g}) = \text{GaCl}_3(\text{l})$	350.7 - 575	-	-	(10.2)	(-0.4)	-	(1.0)	(0.826)	(97.5)	(107.7)
$\text{Ga(l)} + 3/2\text{Cl}_2(\text{g}) = \text{GaCl}_3(\text{g})$	575 - 2500	-	-	-	(-0.4)	-	(1.0)	(21.69)	(6.6)	(6.6)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{\circ}, 298$ (kcal/mole)	$-\Delta F_f^{\circ}, 298$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Ge(s)} + \text{Cl}_2(\text{g}) = \text{GeCl}_2(\text{s})$	298 - 700	(90) (d)	(80)	(1.1)	(5.8)	-	(0.6)	(-0.422)	(41.8)	(43.0)
$\text{Ge(s)} + \text{Cl}_2(\text{g}) = \text{GeCl}_2(\text{l})$	700 - 975	-	-	(9.3)	(-1.4)	-	(0.6)	(2.102)	(81.2)	(90.6)
$\text{Ge(s)} + \text{Cl}_2(\text{g}) = \text{GeCl}_2(\text{g})$	975 - 1232	-	-	(0.3)	(-1.4)	-	(0.6)	(33.88)	(-4.4)	(-4.0)
$\text{Ge(l)} + \text{Cl}_2(\text{g}) = \text{GeCl}_2(\text{g})$	1232 - 2500	-	-	(-1.1)	(-0.3)	-	(0.6)	(26.44)	(-6.3)	(-7.3)
$\text{Ge(s)} + 2\text{Cl}_2(\text{g}) = \text{GeCl}_4(\text{l})$	298 - 357	130 (a)	(113)	(14.1)	(-1.7)	-	(1.3)	(-3.727)	(136.3)	(150.3)
$\text{Ge(s)} + 2\text{Cl}_2(\text{g}) = \text{GeCl}_4(\text{g})$	357 - 1232	-	-	(1.1)	(0.3)	-	(-0.7)	(7.261)	(41.6)	(42.6)
$\text{Ge(l)} + 2\text{Cl}_2(\text{g}) = \text{GeCl}_4(\text{g})$	1232 - 2500	-	-	(-0.3)	(1.5)	-	(-0.7)	(-0.171)	(39.7)	(39.3)
$1/2\text{H}_2(\text{g}) + 1/2\text{Cl}_2(\text{g}) = \text{HCl}(\text{g})$	298 - 2500	22.063 (a)	22.8	-0.99	0.30	-	0.3	0.393	-8.10	-9.09
$\text{Hf(s)} + \text{Cl}_2(\text{g}) = \text{HfCl}_2(\text{s})$	298 - 1000	(145)	(134)	(1.6)	(5.2)	-	(0.6)	(-0.499)	(46.4)	(48.1)
$\text{Hf(s)} + \text{Cl}_2(\text{g}) = \text{HfCl}_2(\text{l})$	1000 - 1750	-	-	(10.2)	(-0.8)	-	(0.6)	(-0.199)	(93.9)	(104.2)
$\text{Hf(s)} + \text{Cl}_2(\text{g}) = \text{HfCl}_2(\text{g})$	1750 - 2500	-	-	(0.2)	(-0.8)	-	(0.6)	(52.30)	(-0.8)	(-0.5)
$\text{Hf(s)} + 3/2\text{Cl}_2(\text{g}) = \text{HfCl}_3(\text{s})$	298 - 900	(210)	(193)	(3.5)	(6.1)	-	(1.0)	(-0.970)	(77.1)	(80.6)
$\text{Hf(s)} + 3/2\text{Cl}_2(\text{g}) = \text{HfCl}_3(\text{l})$	900 - 1500	-	-	(12.9)	(-0.9)	-	(1.0)	(3.405)	(123.7)	(136.6)
$\text{Hf(s)} + 3/2\text{Cl}_2(\text{g}) = \text{HfCl}_3(\text{g})$	1500 - 2500	-	-	(0.9)	(-0.9)	-	(1.0)	(66.40)	(5.9)	(6.8)
$\text{Hf(s)} + 2\text{Cl}_2(\text{g}) = \text{HfCl}_4(\text{s})$	298 - 590	255 (a)	(234)	(7.95)	(-1.1)	-	(-1.1)	(-2.679)	(117.3)	(125.2)
$\text{Hf(s)} + 2\text{Cl}_2(\text{g}) = \text{HfCl}_4(\text{g})$	590 - 2500	-	-	(2.0)	(-1.1)	-	(1.3)	(25.25)	(38.2)	(40.1)
$\text{Hg(l)} + 1/2\text{Cl}_2(\text{g}) = \text{HgCl}(\text{s})$	298 - 575	31.66 (a)	25.2	0.36	3.6	-	0.3	-0.065	22.9	22.9
$\text{Hg(l)} + 1/2\text{Cl}_2(\text{g}) = \text{HgCl}(\text{l})$	575 - 629.73	-	-	(4.5)	(-0.1)	-	(0.3)	(1.088)	(43.6)	(48.1)
$\text{Hg(g)} + 1/2\text{Cl}_2(\text{g}) = \text{HgCl}(\text{l})$	629.73 - 2500	-	-	(6.2)	(-0.1)	-	(0.3)	(-13.93)	(76.3)	(82.5)
$\text{Hg(l)} + \text{Cl}_2(\text{g}) = \text{HgCl}_2(\text{s})$	298 - 550	53.4 (d)	41.4	-0.1	10.0	-	0.6	-0.204	42.5	42.4
$\text{Hg(l)} + \text{Cl}_2(\text{g}) = \text{HgCl}_2(\text{l})$	550 - 577	-	-	(9.0)	(-0.3)	-	(0.6)	(0.499)	(86.8)	(95.9)
$\text{Hg(l)} + \text{Cl}_2(\text{g}) = \text{HgCl}_2(\text{g})$	577 - 629.73	-	-	(-0.7)	-	-	(-0.1)	(20.03)	(0.7)	-
$\text{Hg(g)} + \text{Cl}_2(\text{g}) = \text{HgCl}_2(\text{g})$	629.73 - 2500	-	-	(0.93)	-	-	(-0.1)	(5.007)	(32.5)	(34.4)
$\text{In(s)} + 1/2\text{Cl}_2(\text{g}) = \text{InCl}(\text{s})$	298 - 430	44.6 (a)	(39.7)	(2.0)	(-0.6)	-	(0.3)	(-0.459)	(27.6)	(29.6)
$\text{In(l)} + 1/2\text{Cl}_2(\text{g}) = \text{InCl}(\text{s})$	430 - 498	-	-	(0.3)	(1.9)	-	(0.3)	(-0.739)	(20.2)	(20.5)
$\text{In(l)} + 1/2\text{Cl}_2(\text{g}) = \text{InCl}(\text{l})$	498 - 881	-	-	(2.6)	(-0.1)	-	(0.3)	(1.363)	(27.5)	(30.1)
$\text{In(l)} + 1/2\text{Cl}_2(\text{g}) = \text{InCl}(\text{g})$	881 - 2440	-	-	(-2.9)	(-0.1)	-	(0.3)	(27.41)	(-33.9)	(36.8)
$\text{In(g)} + 1/2\text{Cl}_2(\text{g}) = \text{InCl}(\text{g})$	2440 - 2500	-	-	(-0.3)	(-0.1)	-	(0.3)	(-32.57)	(7.9)	(7.6)
$\text{In(s)} + \text{Cl}_2(\text{g}) = \text{InCl}_2(\text{s})$	298 - 430	86.8 (a)	(76.3)	(2.0)	(4.4)	-	(0.6)	(-0.580)	(47.7)	(49.7)
$\text{In(l)} + \text{Cl}_2(\text{g}) = \text{InCl}_2(\text{s})$	430 - 508	-	-	(0.3)	(6.9)	-	(0.6)	(-0.860)	(40.3)	(40.6)
$\text{In(l)} + \text{Cl}_2(\text{g}) = \text{InCl}_2(\text{l})$	508 - 758	-	-	(6.7)	(-0.3)	-	(0.6)	(0.317)	(69.6)	(76.3)
$\text{In(l)} + \text{Cl}_2(\text{g}) = \text{InCl}_2(\text{g})$	758 - 2440	-	-	(-1.3)	(-0.3)	-	(0.6)	(28.38)	(-12.5)	(-13.8)
$\text{In(g)} + \text{Cl}_2(\text{g}) = \text{InCl}_2(\text{g})$	2440 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(31.60)	(29.3)	(30.6)
$\text{In(s)} + 3/2\text{Cl}_2(\text{g}) = \text{InCl}_3(\text{s})$	298 - 430	128.4 (a)	(112.3)	(0.4)	(14.7)	-	(1.0)	(-0.425)	(59.6)	(60.0)
$\text{In(l)} + 3/2\text{Cl}_2(\text{g}) = \text{InCl}_3(\text{s})$	430 - 771	-	-	(-1.3)	(17.2)	-	(1.0)	(-0.705)	(52.3)	(50.9)
$\text{In(l)} + 3/2\text{Cl}_2(\text{g}) = \text{InCl}_3(\text{l})$	771 - 2440	-	-	(-0.8)	(-0.4)	-	(1.0)	(41.94)	(-7.0)	(-7.9)
$\text{In(l)} + 3/2\text{Cl}_2(\text{g}) = \text{InCl}_3(\text{g})$	2440 - 2500	-	-	(1.7)	(-0.4)	-	(1.0)	(-18.04)	(34.8)	(36.4)
$\text{Ir(s)} + 1/2\text{Cl}_2(\text{g}) = \text{IrCl}(\text{s})$	298 - 1075	(13)	(9)	(1.5)	(1.2)	-	(0.3)	(-0.380)	(21.9)	(23.3)
$\text{Ir(s)} + \text{Cl}_2(\text{g}) = \text{IrCl}_2(\text{s})$	298 - 1000	(29)	(20)	(2.5)	(4.5)	-	(0.6)	(-0.719)	(46.1)	(48.6)
$\text{Ir(s)} + \text{Cl}_2(\text{g}) = \text{IrCl}_2(\text{l})$	1000 - 1375	-	-	(10.2)	(-1.7)	-	(0.6)	(1.381)	(86.4)	(96.6)
$\text{Ir(s)} + 3/2\text{Cl}_2(\text{g}) = \text{IrCl}_3(\text{s})$	298 - 715	(42)	(28)	(2.5)	(8.4)	-	(1.0)	(-0.785)	(63.3)	(65.8)
$\text{Ir(s)} + 3/2\text{Cl}_2(\text{g}) = \text{IrCl}_3(\text{l})$	715 - 960	-	-	(12.8)	(-1.8)	-	(1.0)	(1.229)	(113.7)	(126.5)
$\text{Ir(s)} + 3/2\text{Cl}_2(\text{g}) = \text{IrCl}_3(\text{g})$	960 - 2500	-	-	(1.3)	(-1.8)	-	(1.0)	(36.17)	(10.3)	(11.6)
$\text{Ir(s)} + 2\text{Cl}_2(\text{g}) = \text{IrCl}_4(\text{s})$	298 - 375	(55)	(35)	(1.7)	(9.4)	-	(1.3)	(-0.490)	(77.7)	(79.4)
$\text{Ir(s)} + 2\text{Cl}_2(\text{g}) = \text{IrCl}_4(\text{l})$	375 - 670	-	-	(11.9)	(-2.0)	-	(1.3)	(-0.113)	(124.8)	(136.7)
$\text{Ir(s)} + 2\text{Cl}_2(\text{g}) = \text{IrCl}_4(\text{g})$	670 - 2500	-	-	(-3.1)	(3.0)	-	(1.3)	(22.82)	(9.7)	(6.6)
$\text{K(s)} + 1/2\text{Cl}_2(\text{g}) = \text{KCl}(\text{s})$	298 - 336.4	104.25 (b)	97.7	4.18	-14.3	-	1.1	-0.241	41.03	45.22
$\text{K(l)} + 1/2\text{Cl}_2(\text{g}) = \text{KCl}(\text{s})$	336.4 - 1043	-	-	-3.37	9.63	-2.94	1.1	-0.424	6.62	3.25
$\text{K(l)} + 1/2\text{Cl}_2(\text{g}) = \text{KCl}(\text{l})$	1043 - 1052	-	-	2.74	4.4	-2.9	0.3	3.216	37.55	40.29
$\text{K(g)} + 1/2\text{Cl}_2(\text{g}) = \text{KCl}(\text{l})$	1052 - 1680	-	-	(6.65)	(-0.1)	-	(0.3)	(-18.40)	(79.56)	(86.22)
$\text{K(g)} + 1/2\text{Cl}_2(\text{g}) = \text{KCl}(\text{g})$	1680 - 2500	-	-	(-0.41)	(-0.1)	-	(0.08)	(32.29)	(4.0)	(3.6)
$\text{La(s)} + 3/2\text{Cl}_2(\text{g}) = \text{LaCl}_3(\text{s})$	298 - 1125	255.68 (f)	(238.8)	(3.1)	(7.4)	-	(1.0)	(-0.918)	(75.9)	(79.0)
$\text{La(s)} + 3/2\text{Cl}_2(\text{g}) = \text{LaCl}_3(\text{l})$	1125 - 1153	-	-	(12.7)	(-2.0)	-	(1.0)	(3.230)	(124.7)	(137.4)
$\text{La(l)} + 3/2\text{Cl}_2(\text{g}) = \text{LaCl}_3(\text{l})$	1153 - 2020	-	-	(11.6)	(-0.4)	-	(1.0)	(1.169)	(120.6)	(132.2)
$\text{La(l)} + 3/2\text{Cl}_2(\text{g}) = \text{LaCl}_3(\text{g})$	2020 - 2500	-	-	(-0.4)	(-0.4)	-	(1.0)	(69.41)	(7.5)	(7.1)
$\text{Li(s)} + 1/2\text{Cl}_2(\text{g}) = \text{LiCl}(\text{s})$	298 - 459	97.7 (a)	(91.8)	(3.6)	(-5.34)	-	(0.3)	(-0.716)	(38.3)	(41.9)
$\text{Li(l)} + 1/2\text{Cl}_2(\text{g}) = \text{LiCl}(\text{s})$	459 - 887	-	-	(-0.4)	(3.3)	-	(0.3)	(-0.499)	(19.3)	(18.9)
$\text{Li(l)} + 1/2\text{Cl}_2(\text{g}) = \text{LiCl}(\text{l})$	887 - 1640	-	-	(3.1)	(-0.1)	-	(0.3)	(0.933)	(36.4)	(39.5)
$\text{Li(g)} + 1/2\text{Cl}_2(\text{g}) = \text{LiCl}(\text{l})$	1640 - 1655	-	-	(5.2)	(-0.1)	-	(0.3)	(-34.88)	(71.2)	(76.4)
$\text{Li(g)} + 1/2\text{Cl}_2(\text{g}) = \text{LiCl}(\text{g})$	1655 - 2500	-	-	(-0.4)	(-0.1)	-	(0.3)	(10.35)	(8.0)	(7.6)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-A)$
$Mg(s) + Cl_2(g) = MgCl_2(s)$	298 - 923	153.2 (d)	141.4	4.81	-1.30	-	-1.31	-1.811	67.4	72.2
$Mg(l) + Cl_2(g) = MgCl_2(s)$	923 - 987	-	-	(2.1)	(1.2)	-	(-1.4)	(-2.602)	(53.9)	(56.0)
$Mg(l) + Cl_2(g) = MgCl_2(l)$	987 - 1393	-	-	(5.3)	(-0.3)	-	(0.6)	(5.439)	(64.0)	(69.3)
$Mg(g) + Cl_2(g) = MgCl_2(l)$	1393 - 1691	-	-	(8.4)	(-0.3)	-	(0.6)	(-30.28)	(108.5)	(116.9)
$Mg(g) + Cl_2(g) = MgCl_2(g)$	1691 - 2500	-	-	(-0.7)	(-0.3)	-	(0.6)	(17.79)	(21.5)	(20.8)
$Mn(s, \alpha) + Cl_2(g) = MnCl_2(s)$	298 - 923	111.6 (d)	101.7	3.58	-0.49	-	-0.35	-1.160	53.3	56.9
$Mn(s, \alpha) + Cl_2(g) = MnCl_2(l)$	923 - 1000	-	-	8.14	-3.6	-	1.0	5.126	71.7	80.0
$Mn(s, \beta) + Cl_2(g) = MnCl_2(l)$	1000 - 1374	-	-	5.5	-0.9	-	0.6	5.824	56.8	62.3
$Mn(s, \gamma) + Cl_2(g) = MnCl_2(l)$	1374 - 1410	-	-	(3.14)	(-0.3)	-	(0.6)	(7.912)	(41.0)	(44.1)
$Mn(s, \delta) + Cl_2(g) = MnCl_2(l)$	1410 - 1463	-	-	(2.54)	(-0.3)	-	(0.6)	(8.328)	(36.9)	(39.5)
$Mn(s, \delta) + Cl_2(g) = MnCl_2(g)$	1463 - 1517	-	-	(-6.1)	(-0.3)	-	(0.6)	(50.51)	(-46.0)	(-52.0)
$Mn(l) + Cl_2(g) = MnCl_2(g)$	1517 - 2368	-	-	(-5.8)	(-0.3)	-	(0.6)	(46.56)	(-41.5)	(-47.2)
$Mn(g) + Cl_2(g) = MnCl_2(g)$	2368 - 2500	-	-	(-1.0)	(-0.3)	-	(0.6)	(-18.37)	(18.1)	(17.0)
$Mn(s, \alpha) + 3/2 Cl_2(g) = MnCl_3(s)$	298 - 860	110 (d)	(94)	(4.2)	(1.8)	-	(1.3)	(-0.865)	(77.5)	(81.6)
$Mn(s, \alpha) + 3/2 Cl_2(g) = MnCl_3(l)$	860 - 900	-	-	(12.2)	(-3.8)	-	(1.3)	(4.326)	(115.1)	(127.2)
$Mn(s, \alpha) + 3/2 Cl_2(g) = MnCl_3(g)$	900 - 1000	-	-	(1.2)	(-3.8)	-	(1.3)	(35.23)	(17.0)	(18.1)
$Mn(s, \beta) + 3/2 Cl_2(g) = MnCl_3(g)$	1000 - 1374	-	-	(-1.5)	(-1.1)	-	(1.0)	(35.92)	(2.1)	(0.6)
$Mn(s, \gamma) + 3/2 Cl_2(g) = MnCl_3(g)$	1374 - 1410	-	-	(-3.8)	(-0.4)	-	(1.0)	(38.01)	(-13.7)	(-17.6)
$Mn(s, \delta) + 3/2 Cl_2(g) = MnCl_3(g)$	1410 - 1517	-	-	(-4.4)	(-0.4)	-	(1.0)	(38.43)	(-17.8)	(-22.2)
$Mn(l) + 3/2 Cl_2(g) = MnCl_3(g)$	1517 - 2368	-	-	(-4.1)	(-0.4)	-	(1.0)	(34.47)	(-13.3)	(-17.4)
$Mn(g) + 3/2 Cl_2(g) = MnCl_3(g)$	2368 - 2500	-	-	(0.6)	(-0.4)	-	(1.0)	(-30.45)	(46.2)	(46.8)
$Mn(s, \alpha) + 2 Cl_2(g) = MnCl_4(l)$	298 - 384	(110)	(94)	(14.3)	(-3.9)	-	(1.7)	(-3.517)	(131.4)	(145.7)
$Mn(s, \alpha) + 2 Cl_2(g) = MnCl_4(g)$	384 - 1000	-	-	(1.8)	(-3.9)	-	(1.7)	(9.083)	(36.7)	(38.5)
$Mn(s, \beta) + 2 Cl_2(g) = MnCl_4(g)$	1000 - 1374	-	-	(-0.8)	(-1.2)	-	(1.3)	(9.781)	(21.8)	(21.0)
$Mn(s, \gamma) + 2 Cl_2(g) = MnCl_4(g)$	1374 - 1410	-	-	(-3.2)	(-0.5)	-	(1.3)	(11.87)	(6.0)	(2.8)
$Mn(s, \delta) + 2 Cl_2(g) = MnCl_4(g)$	1410 - 1517	-	-	(-3.8)	(-0.5)	-	(1.3)	(12.28)	(2.0)	(-1.8)
$Mn(l) + 2 Cl_2(g) = MnCl_4(g)$	1517 - 2368	-	-	(-3.5)	(-0.5)	-	(1.3)	(8.330)	(6.5)	(3.0)
$Mn(g) + 2 Cl_2(g) = MnCl_4(g)$	2368 - 2500	-	-	(1.2)	(-0.5)	-	(1.3)	(-56.60)	(66.0)	(67.2)
$Mo(s) + Cl_2(g) = MoCl_2(s)$	298 - 800	44(a)	(35)	(2.0)	(5.2)	-	(0.6)	(-0.586)	(43.4)	(45.4)
$Mo(s) + 3/2 Cl_2(g) = MoCl_3(s)$	298 - 600	(65) (d)	(50)	(1.6)	(8.9)	-	(1.0)	(-0.534)	(60.8)	(62.4)
$Mo(s) + 2 Cl_2(g) = MoCl_4(s)$	298 - 400	79 (a)	(59)	(2.8)	(7.8)	-	(1.3)	(-0.737)	(83.0)	(85.8)
$Mo(s) + 5/2 Cl_2(g) = MoCl_5(s)$	298 - 467	90.8 (a)	(67.3)	(5.5)	(12.2)	-	(1.6)	(-1.636)	(112.7)	(118.2)
$Mo(s) + 5/2 Cl_2(g) = MoCl_5(l)$	467 - 541	-	-	(15.6)	(-2.0)	-	(1.6)	(3.196)	(151.0)	(166.6)
$Mo(s) + 5/2 Cl_2(g) = MoCl_5(g)$	541 - 2500	-	-	(-7.4)	(8.0)	-	(1.6)	(26.18)	(-10.3)	(-17.7)
$Mo(s) + 3 Cl_2(g) = MoCl_6(s)$	298 - 580	90 (a)	(62)	(6.5)	(14.7)	-	(2.0)	(-1.939)	(134.2)	(140.7)
$Mo(s) + 3 Cl_2(g) = MoCl_6(l)$	580 - 630	-	-	(18.2)	(-2.1)	-	(2.0)	(3.201)	(182.5)	(200.7)
$Mo(s) + 3 Cl_2(g) = MoCl_6(g)$	630 - 2500	-	-	(-1.8)	(2.9)	-	(2.0)	(30.81)	(30.6)	(28.8)
$Na(s) + 1/2 Cl_2(g) = NaCl(s)$	298 - 371	98.3 (d)	91.9	0.94	0.51	-0.6	0.3	-0.188	26.96	27.91
$Na(l) + 1/2 Cl_2(g) = NaCl(s)$	371 - 1073	-	-	-2.35	8.34	-2.5	0.3	-0.100	11.9	9.5
$Na(l) + 1/2 Cl_2(g) = NaCl(l)$	1073 - 1187	-	-	2.7	4.4	-2.5	0.3	3.978	35.9	38.6
$Na(g) + 1/2 Cl_2(g) = NaCl(l)$	1187 - 1738	-	-	(6.7)	(-0.1)	-	(0.3)	(-22.34)	(80.6)	(87.3)
$Na(g) + 1/2 Cl_2(g) = NaCl(g)$	1738 - 2500	-	-	(-0.41)	(-0.1)	-	(0.3)	(30.73)	(4.4)	(4.0)
$Nb(s) + 5/2 Cl_2(g) = NbCl_5(s)$	298 - 483	(115)	(91)	(5.3)	(12.6)	-	(1.6)	(-1.598)	(114.8)	(120.1)
$Nb(s) + 5/2 Cl_2(g) = NbCl_5(l)$	483 - 519	-	-	(17.4)	(-1.6)	-	(1.6)	(1.715)	(165.1)	(182.5)
$Nb(s) + 5/2 Cl_2(g) = NbCl_5(g)$	519 - 2500	-	-	(-7.6)	(8.4)	-	(1.6)	(26.14)	(-8.7)	(-16.3)
$Nd(s) + 3/2 Cl_2(g) = NdCl_3(s)$	298 - 1033	245.62 (e)	(227.9)	(4.1)	(1.7)	-	(1.0)	(-0.949)	(82.2)	(86.2)
$Nd(s) + 3/2 Cl_2(g) = NdCl_3(l)$	1033 - 1297	-	-	(12.2)	(-5.7)	-	(1.0)	(2.528)	(123.7)	(135.9)
$Nd(l) + 3/2 Cl_2(g) = NdCl_3(l)$	1297 - 1960	-	-	(8.8)	(-0.4)	-	(1.0)	(0.012)	(107.6)	(116.4)
$Nd(l) + 3/2 Cl_2(g) = NdCl_3(g)$	1960 - 2500	-	-	(-2.2)	(-0.4)	-	(1.0)	(67.57)	(0.8)	(-1.4)
$Ni(s, \alpha) + Cl_2(g) = NiCl_2(s)$	298 - 626	72.974 (g)	61.9	0.28	5.69	-	0.6	-0.116	40.01	40.29
$Ni(s, \beta) + Cl_2(g) = NiCl_2(s)$	626 - 1260	-	-	-1.66	10.93	-	0.6	-0.020	30.95	29.29
$Ni(s, \beta) + Cl_2(g) = NiCl_2(l)$	1260 - 1728	-	-	(0.2)	(-2.1)	-	(0.6)	(56.26)	(-10.2)	(-10.0)
$Ni(l) + Cl_2(g) = NiCl_2(g)$	1728 - 2500	-	-	(-3.0)	(-0.3)	-	(0.6)	(54.89)	(-28.5)	(-31.5)
$Np(s) + 3/2 Cl_2(g) = NpCl_3(s)$	298 - 913	(216) (n)	(200)	(4.2)	(2.4)	-	(1.0)	(-1.015)	(77.0)	(81.2)
$Np(l) + 3/2 Cl_2(g) = NpCl_3(s)$	913 - 1073	-	-	(0.5)	(5.8)	-	(1.0)	(-1.354)	(57.5)	(58.0)
$Np(l) + 3/2 Cl_2(g) = NpCl_3(l)$	1073 - 1800	-	-	(9.9)	(-0.4)	-	(1.0)	(2.129)	(107.1)	(117.0)
$Np(l) + 3/2 Cl_2(g) = NpCl_3(g)$	1800 - 2500	-	-	(2.1)	(-0.4)	-	(1.0)	(63.73)	(-5.0)	(-7.1)
$Np(s) + 2 Cl_2(g) = NpCl_4(s)$	298 - 811	(237) (n)	(215)	(3.8)	(3.1)	-	(1.3)	(-0.821)	(94.6)	(98.4)
$Np(s) + 2 Cl_2(g) = NpCl_4(l)$	811 - 913	-	-	(16.2)	(-3.9)	-	(1.3)	(2.424)	(158.4)	(174.6)
$Np(l) + 2 Cl_2(g) = NpCl_4(l)$	913 - 1120	-	-	12.5	(-0.5)	-	(1.3)	(2.085)	(138.8)	(151.3)
$Np(l) + 2 Cl_2(g) = NpCl_4(g)$	1120 - 2500	-	-	(-6.5)	(4.5)	-	(1.3)	(47.73)	(-13.5)	(20.0)
$Os(s) + Cl_2(g) = OsCl_2(s)$	298 - 1080	(32) (d)	(23) (d)	(2.0)	(6.2)	-	(0.6)	(-0.638)	(42.6)	(44.6)
$Os(s) + Cl_2(g) = OsCl_2(l)$	1080 - 1500	-	-	(9.6)	(-1.2)	-	(0.6)	(3.969)	(79.8)	(89.4)
$Os(s) + 3/2 Cl_2(g) = OsCl_3(s)$	298 - 850	(45) (d)	(31)	(2.0)	(10.3)	-	(1.0)	(-0.713)	(61.5)	(63.5)
$Os(s) + 3/2 Cl_2(g) = OsCl_3(l)$	850 - 1100	-	-	(13.2)	(-1.3)	-	(1.0)	(2.457)	(117.1)	(130.3)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e. u.)	$-\Delta(B-a)$
$\text{Os(s)} + 2\text{Cl}_2(\text{g}) = \text{OsCl}_4(\text{s})$	298 - 370	(64)	(44.5)	(2.0)	(8.2)	-	(1.3)	(-0.515)	(78.4)	(80.3)
$\text{Os(s)} + 2\text{Cl}_2(\text{g}) = \text{OsCl}_4(\text{l})$	370 - 600	-	-	(11.8)	(-1.4)	-	(1.3)	(-0.184)	(123.9)	(135.6)
$\text{Os(s)} + 2\text{Cl}_2(\text{g}) = \text{OsCl}_4(\text{g})$	600 - 2500	-	-	(-3.2)	(3.6)	-	(1.3)	(19.92)	(10.9)	(7.6)
$1/4\text{P}_4(\text{s, white}) + 3/2\text{Cl}_2(\text{g}) = \text{PCl}_3(\text{l})$	298 - 317.4	75.9 (b)	64.5	12.2	-7.6	-	1.0	-2.955	104.8	117.0
$1/4\text{P}_4(\text{l}) + 3/2\text{Cl}_2(\text{g}) = \text{PCl}_3(\text{l})$	317.4 - 348	-	-	10.8	-0.5	-	1.7	-2.780	99.1	109.9
$1/4\text{P}_4(\text{l}) + 3/2\text{Cl}_2(\text{g}) = \text{PCl}_3(\text{g})$	348 - 553	-	-	1.20	0.21	-	-0.19	7.227	23.4	24.6
$1/4\text{P}_4(\text{g}) + 3/2\text{Cl}_2(\text{g}) = \text{PCl}_3(\text{g})$	553 - 2500	-	-	(1.14)	(0.4)	-	(-1.26)	(4.138)	(28.6)	(29.7)
$1/4\text{P}_4(\text{s, white}) + 5/2\text{Cl}_2(\text{g}) = \text{PCl}_5(\text{s})$	298 - 317.4	106.5 (d)	(75.8)	(7.7)	(-7.9)	-	(1.6)	(-1.392)	(143.6)	(151.3)
$1/4\text{P}_4(\text{l}) + 5/2\text{Cl}_2(\text{g}) = \text{PCl}_5(\text{s})$	317.4 - 432	-	-	(6.3)	(-0.8)	-	(2.4)	(-1.217)	(137.8)	(144.1)
$1/4\text{P}_4(\text{l}) + 5/2\text{Cl}_2(\text{g}) = \text{PCl}_5(\text{g})$	432 - 553	-	-	(-3.31)	(11.20)	-	(2.4)	(17.91)	(47.5)	(44.2)
$1/4\text{P}_4(\text{g}) + 5/2\text{Cl}_2(\text{g}) = \text{PCl}_5(\text{g})$	553 - 2500	-	-	(-3.38)	(11.48)	-	(1.3)	(14.82)	(52.7)	(49.3)
$\text{Pa(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PaCl}_3(\text{s})$	298 - 1075	(244)	(227.5)	(4.9)	(0.8)	-	(1.0)	(-1.152)	(82.8)	(87.7)
$\text{Pa(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PaCl}_3(\text{l})$	1075 - 1800	-	-	(13.7)	(-4.4)	-	(1.0)	(1.393)	(130.3)	(144.0)
$\text{Pa(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PaCl}_3(\text{g})$	1800 - 1825	-	-	(1.7)	(-4.4)	-	(1.0)	(65.99)	(16.5)	(18.2)
$\text{Pa(l)} + 3/2\text{Cl}_2(\text{g}) = \text{PaCl}_3(\text{g})$	1825 - 2500	-	-	(-1.1)	(-0.4)	-	(1.0)	(60.44)	(5.0)	(3.9)
$\text{Pa(s)} + 2\text{Cl}_2(\text{g}) = \text{PaCl}_4(\text{s})$	298 - 950	(260)	(238)	(3.6)	(4.5)	-	(1.3)	(-0.824)	(94.1)	(97.6)
$\text{Pa(s)} + 2\text{Cl}_2(\text{g}) = \text{PaCl}_4(\text{l})$	950 - 1120	-	-	(16.3)	(-4.5)	-	(1.3)	(2.183)	(161.0)	(177.2)
$\text{Pa(s)} + 2\text{Cl}_2(\text{g}) = \text{PaCl}_4(\text{g})$	1120 - 1825	-	-	(-2.7)	(0.5)	-	(1.3)	(48.33)	(8.2)	(5.4)
$\text{Pa(l)} + 2\text{Cl}_2(\text{g}) = \text{PaCl}_4(\text{g})$	1825 - 2500	-	-	(-5.5)	(4.5)	-	(1.3)	(42.78)	(-3.3)	(-8.9)
$\text{Pa(s)} + 5/2\text{Cl}_2(\text{g}) = \text{PaCl}_5(\text{s})$	298 - 574	(268)	(244)	(7.6)	(8.7)	-	(1.6)	(-2.101)	(126.7)	(134.3)
$\text{Pa(s)} + 5/2\text{Cl}_2(\text{g}) = \text{PaCl}_5(\text{l})$	574 - 650	-	-	(17.9)	(-4.7)	-	(1.6)	(3.595)	(168.1)	(186.0)
$\text{Pa(s)} + 5/2\text{Cl}_2(\text{g}) = \text{PaCl}_5(\text{g})$	650 - 1825	-	-	(-7.1)	(5.3)	-	(1.6)	(32.73)	(-10.4)	(-17.5)
$\text{Pa(l)} + 5/2\text{Cl}_2(\text{g}) = \text{PaCl}_5(\text{g})$	1825 - 2500	-	-	(-9.9)	(9.3)	-	(1.6)	(27.19)	(-21.9)	(-31.8)
$\text{Pb(s)} + \text{Cl}_2(\text{g}) = \text{PbCl}_2(\text{s})$	298 - 600.6	85.85 (a)	75.05	1.56	5.43	-	0.6	-0.485	46.3	47.9
$\text{Pb(l)} + \text{Cl}_2(\text{g}) = \text{PbCl}_2(\text{s})$	600.6 - 771	-	-	-0.55	8.46	-	0.6	-0.907	36.5	36.0
$\text{Pb(l)} + \text{Cl}_2(\text{g}) = \text{PbCl}_2(\text{l})$	771 - 1227	-	-	10.69	0.5	-	0.6	-1.546	97.7	108.4
$\text{Pb(l)} + \text{Cl}_2(\text{g}) = \text{PbCl}_2(\text{g})$	1227 - 2023	-	-	(-2.0)	(0.5)	-	(0.6)	(43.64)	(-16.7)	(-18.7)
$\text{Pb(g)} + \text{Cl}_2(\text{g}) = \text{PbCl}_2(\text{g})$	2023 - 2500	-	-	(0.8)	(-0.3)	-	(0.6)	(-2.974)	(24.0)	(24.8)
$\text{Pb(s)} + 2\text{Cl}_2(\text{g}) = \text{PbCl}_4(\text{l})$	298 - 400	(114)	(98)	(16.8)	(-2.8)	-	(1.3)	(-4.452)	(149.4)	(166.3)
$\text{Pb(s)} + 2\text{Cl}_2(\text{g}) = \text{PbCl}_4(\text{g})$	400 - 600.6	-	-	(2.8)	(-2.8)	-	(1.3)	(8.848)	(45.1)	(48.0)
$\text{Pb(l)} + 2\text{Cl}_2(\text{g}) = \text{PbCl}_4(\text{g})$	600.6 - 2023	-	-	(0.7)	(0.2)	-	(-0.7)	(8.426)	(35.3)	(36.1)
$\text{Pb(g)} + 2\text{Cl}_2(\text{g}) = \text{PbCl}_4(\text{g})$	2023 - 2500	-	-	(3.5)	(-0.5)	-	(-0.7)	(-38.19)	(76.1)	(79.6)
$\text{Pd(s)} + \text{Cl}_2(\text{g}) = \text{PdCl}_2(\text{s})$	298 - 951	44 (b)	(33)	(1.4)	(6.4)	-	(0.6)	(-0.490)	(45.8)	(47.3)
$\text{Pd(s)} + \text{Cl}_2(\text{g}) = \text{PdCl}_2(\text{l})$	951 - 1300	-	-	(11.4)	(-1.6)	-	(0.6)	(3.317)	(96.6)	(108.1)
$\text{Pd(s)} + \text{Cl}_2(\text{g}) = \text{PdCl}_2(\text{g})$	1300 - 1828	-	-	(0.4)	(-1.6)	-	(0.6)	(47.62)	(-5.3)	(-4.8)
$\text{Pd(l)} + \text{Cl}_2(\text{g}) = \text{PdCl}_2(\text{g})$	1828 - 2500	-	-	(-2.8)	(-0.3)	-	(0.6)	(47.04)	(-24.5)	(-27.2)
$\text{Po(s)} + \text{Cl}_2(\text{g}) = \text{PoCl}_2(\text{s})$	298 - 450	(50)	(40)	(2.0)	(3.7)	-	(0.6)	(-0.586)	(47.1)	(49.2)
$\text{Po(s)} + \text{Cl}_2(\text{g}) = \text{PoCl}_2(\text{l})$	450 - 525	-	-	(12.0)	(-3.5)	-	(0.6)	(-0.857)	(97.2)	(109.3)
$\text{Po(l)} + \text{Cl}_2(\text{g}) = \text{PoCl}_2(\text{l})$	525 - 650	-	-	(8.2)	(-0.3)	-	(0.6)	(-1.703)	(79.6)	(87.9)
$\text{Po(l)} + \text{Cl}_2(\text{g}) = \text{PoCl}_2(\text{g})$	650 - 1235	-	-	(-2.8)	(-0.3)	-	(0.6)	(21.45)	(-16.3)	(-19.0)
$\text{Po(g)} + \text{Cl}_2(\text{g}) = \text{PoCl}_2(\text{g})$	1235 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(-8.133)	(32.4)	(33.7)
$\text{Po(s)} + 2\text{Cl}_2(\text{g}) = \text{PoCl}_4(\text{s})$	298 - 525	(80)	(60)	(11.1)	(0.3)	-	(1.3)	(-2.873)	(130.6)	(141.6)
$\text{Po(l)} + 2\text{Cl}_2(\text{g}) = \text{PoCl}_4(\text{s})$	525 - 567	-	-	(7.3)	(3.5)	-	(1.3)	(-3.719)	(113.0)	(120.2)
$\text{Po(l)} + 2\text{Cl}_2(\text{g}) = \text{PoCl}_4(\text{l})$	567 - 750	-	-	(18.5)	(-0.5)	-	(1.3)	(-4.226)	(172.5)	(190.9)
$\text{Po(l)} + 2\text{Cl}_2(\text{g}) = \text{PoCl}_4(\text{g})$	750 - 1235	-	-	(-6.5)	(9.5)	-	(1.3)	(30.71)	(-10.8)	(-17.4)
$\text{Po(g)} + 2\text{Cl}_2(\text{g}) = \text{PoCl}_4(\text{g})$	1235 - 2500	-	-	(-2.5)	(9.5)	-	(1.3)	(1.132)	(37.9)	(35.4)
$\text{Pr(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PrCl}_3(\text{s})$	298 - 1049	253.02 (f)	(235.4)	(3.7)	(3.4)	-	(1.0)	(-0.900)	(80.2)	(83.9)
$\text{Pr(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PrCl}_3(\text{l})$	1049 - 1205	-	-	(13.9)	(-5.0)	-	(1.0)	(1.022)	(134.7)	(148.5)
$\text{Pr(l)} + 3/2\text{Cl}_2(\text{g}) = \text{PrCl}_3(\text{l})$	1205 - 1980	-	-	(10.9)	(-0.4)	-	(1.0)	(-1.202)	(121.1)	(132.0)
$\text{Pr(l)} + 3/2\text{Cl}_2(\text{g}) = \text{PrCl}_3(\text{g})$	1980 - 2500	-	-	(-1.1)	(-0.4)	-	(1.0)	(68.56)	(6.8)	(5.7)
$\text{Pt(s)} + 1/2\text{Cl}_2(\text{g}) = \text{PtCl(s)}$	298 - 1000	13 (d)	(9)	(1.3)	(1.3)	-	(0.2)	(-0.364)	(22.3)	(23.5)
$\text{Pt(s)} + \text{Cl}_2(\text{g}) = \text{PtCl}_2(\text{s})$	298 - 854	29 (d)	(19)	(1.7)	(4.6)	-	(0.6)	(-0.524)	(45.1)	(46.8)
$\text{Pt(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PtCl}_3(\text{s})$	298 - 708	(43) (d)	(28)	(3.3)	(6.1)	-	(0.9)	(-0.961)	(71.2)	(74.5)
$\text{Pt(s)} + 2\text{Cl}_2(\text{g}) = \text{PtCl}_4(\text{s})$	298 - 600	61.0 (b)	(41.1)	(3.5)	(5.5)	-	(1.2)	(-0.893)	(87.8)	(91.3)
$\text{Pt(s)} + 2\text{Cl}_2(\text{g}) = \text{PtCl}_4(\text{g})$	600 - 2042.5	-	-	(-3.3)	(3.1)	-	(1.2)	(21.62)	(12.8)	(9.5)
$\text{Pu(s)} + 3/2\text{Cl}_2(\text{g}) = \text{PuCl}_3(\text{s})$	298 - 913	229.3 (h)	(213.2)	(4.4)	(2.2)	-	(1.0)	(-1.066)	(79.1)	(83.5)
$\text{Pu(l)} + 3/2\text{Cl}_2(\text{g}) = \text{PuCl}_3(\text{s})$	913 - 1033	-	-	(1.6)	(5.8)	-	(1.0)	(-2.270)	(65.8)	(67.4)
$\text{Pu(l)} + 3/2\text{Cl}_2(\text{g}) = \text{PuCl}_3(\text{l})$	1033 - 2040	-	-	(10.9)	(-0.4)	-	(1.0)	(6.631)	(109.2)	(120.1)
$\text{Pu(l)} + 3/2\text{Cl}_2(\text{g}) = \text{PuCl}_3(\text{g})$	2040 - 2500	-	-	(-1.1)	(-0.4)	-	(1.0)	(77.85)	(-5.1)	(-6.2)
$\text{Pu(s)} + 2\text{Cl}_2(\text{g}) = \text{PuCl}_4(\text{s})$	298 - 730	230 (h)	(209)	(4.2)	(2.9)	-	(1.3)	(-0.932)	(95.6)	(99.7)
$\text{Pu(s)} + 2\text{Cl}_2(\text{g}) = \text{PuCl}_4(\text{l})$	730 - 913	-	-	(16.8)	(-4.1)	-	(1.3)	(1.235)	(160.6)	(177.3)
$\text{Pu(l)} + 2\text{Cl}_2(\text{g}) = \text{PuCl}_4(\text{l})$	913 - 1060	-	-	(14.0)	(-0.5)	-	(1.3)	(0.031)	(147.3)	(161.2)
$\text{Pu(l)} + 2\text{Cl}_2(\text{g}) = \text{PuCl}_4(\text{g})$	1060 - 2500	-	-	(-5.5)	(4.5)	-	(1.3)	(47.89)	(-11.6)	(-17.2)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{298}$ (kcal/mole)	$-\Delta F_f^{298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
Ra(s) + Cl ₂ (g) = RaCl ₂ (s)	298 - 1233	(212) (d)	(201)	(3.8)	(1.1)	-	(0.6)	(-0.974)	(57.6)	(61.5)
Ra(l) + Cl ₂ (g) = RaCl ₂ (s)	1233 - 1300	-	-	(1.6)	(1.3)	-	(0.6)	(-1.473)	(45.4)	(47.1)
Ra(l) + Cl ₂ (g) = RaCl ₂ (l)	1300 - 1700	-	-	(7.2)	(-0.3)	-	(0.6)	(-1.556)	(77.6)	(84.9)
Ra(g) + Cl ₂ (g) = RaCl ₂ (l)	1700 - 1880	-	-	(10.3)	(-0.3)	-	(0.6)	(-40.71)	(120.7)	(131.0)
Ra(g) + Cl ₂ (g) = RaCl ₂ (g)	1880 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(18.21)	(30.5)	(31.8)
Rb(s) + Cl ₂ (g) = RbCl(s)	298 - 312	105.2 (b)	98.8	3.8	-10.7	-	0.3	-0.559	40.3	44.1
Rb(l) + Cl ₂ (g) = RbCl(s)	312 - 952	-	-	-0.7	2.4	-	0.3	-0.302	19.7	18.9
Rb(g) + Cl ₂ (g) = RbCl(s)	952 - 990	-	-	(2.2)	(2.4)	-	(0.3)	(-21.16)	(58.1)	(60.3)
Rb(g) + Cl ₂ (g) = RbCl(l)	990 - 1654	-	-	(6.0)	(-0.1)	-	(0.3)	(-19.30)	(77.4)	(83.4)
Rb(g) + Cl ₂ (g) = RbCl(g)	1654 - 2500	-	-	(-0.41)	(-0.1)	-	(0.3)	(28.14)	(7.4)	(7.0)
Re(s) + 3/2Cl ₂ (g) = ReCl ₃ (s)	298 - 1000	(52)	(37)	(2.8)	(7.4)	-	(1.0)	(-0.835)	(68.5)	(71.3)
Re(s) + 3/2Cl ₂ (g) = ReCl ₃ (l)	1000 - 1100	-	-	(13.0)	(-1.2)	-	(1.0)	(5.265)	(118.3)	(131.3)
Re(s) + 3/2Cl ₂ (g) = ReCl ₃ (g)	1100 - 2500	-	-	(1.0)	(-1.2)	-	(1.0)	(45.46)	(9.7)	(10.7)
Re(s) + 2Cl ₂ (g) = ReCl ₄ (s)	298 - 450	(60) (d)	(40.5)	(2.8)	(6.1)	-	(1.3)	(-0.671)	(82.7)	(85.5)
Re(s) + 2Cl ₂ (g) = ReCl ₄ (l)	450 - 650	-	-	(13.1)	(-1.3)	-	(1.3)	(-0.557)	(133.4)	(146.5)
Re(s) + 2Cl ₂ (g) = ReCl ₄ (g)	650 - 2500	-	-	(-3.4)	(3.7)	-	(1.3)	(23.11)	(8.3)	(4.9)
Re(s) + 5/2Cl ₂ (g) = ReCl ₅ (s)	298 - 530	(70) (d)	(47)	(8.0)	(9.5)	-	(1.6)	(-2.270)	(123.9)	(132.0)
Re(s) + 5/2Cl ₂ (g) = ReCl ₅ (l)	530 - 600	-	-	(17.2)	(-1.5)	-	(1.6)	(3.399)	(158.8)	(176.1)
Re(s) + 5/2Cl ₂ (g) = ReCl ₅ (g)	600 - 2500	-	-	(-7.8)	(13.5)	-	(1.6)	(29.70)	(-15.5)	(-23.2)
Rh(s) + 1/2Cl ₂ (g) = RhCl(s)	298 - 1000	(14)	(10)	(2.0)	(0.7)	-	(0.3)	(-0.492)	(25.3)	(27.3)
Rh(s) + 1/2Cl ₂ (g) = RhCl(l)	1000 - 1900	-	-	(5.7)	(-2.3)	-	(0.3)	(1.508)	(44.3)	(50.0)
Rh(s) + 1/2Cl ₂ (g) = RhCl(g)	1900 - 2240	-	-	(-0.8)	(-2.3)	-	(0.3)	(52.86)	(-25.3)	(-26.1)
Rh(l) + 1/2Cl ₂ (g) = RhCl(g)	2240 - 2500	-	-	(-4.4)	(-0.1)	-	(0.3)	(50.23)	(-45.9)	(-50.3)
Rh(s) + Cl ₂ (g) = RhCl ₂ (s)	298 - 1050	(34)	(24.5)	(2.8)	(4.3)	-	(0.6)	(-0.819)	(49.0)	(51.9)
Rh(s) + Cl ₂ (g) = RhCl ₂ (l)	1050 - 1300	-	-	(11.8)	(-2.5)	-	(0.6)	(-0.221)	(98.5)	(110.4)
Rh(s) + 3/2Cl ₂ (g) = RhCl ₃ (s)	298 - 990	(52)	(37)	(2.0)	(12.4)	-	(1.0)	(-0.804)	(63.9)	(65.9)
Rh(s) + 3/2Cl ₂ (g) = RhCl ₃ (l)	990 - 1250	-	-	(14.5)	(-2.6)	-	(1.0)	(3.072)	(126.3)	(140.8)
Ru(s, α) + 3/2Cl ₂ (g) = RuCl ₃ (s)	298 - 940	46 (d)	(31)	(2.0)	(11.9)	-	(1.0)	(-0.796)	(66.2)	(68.2)
Ru(s, α) + 3/2Cl ₂ (g) = RuCl ₃ (l)	940 - 1225	-	-	(13.6)	(-1.9)	-	(1.0)	(5.397)	(120.9)	(134.5)
Sb(s, α, β and γ) + 3/2Cl ₂ (g) = SbCl ₃ (s)	298 - 346.4	91.4 (d)	77.9	-8.4	4.90	-	1.0	0.641	12.1	3.7
Sb(s, α, β and γ) + 3/2Cl ₂ (g) = SbCl ₃ (l)	346.4 - 492	-	-	13.4	-2.1	-	1.0	-0.774	112.6	125.9
Sb(s, α, β and γ) + 3/2Cl ₂ (g) = SbCl ₃ (g)	492 - 903.7	-	-	1.2	-2.1	-	-0.2	15.334	16.3	17.5
Sb(l) + 3/2Cl ₂ (g) = SbCl ₃ (g)	903.7 - 1713	-	-	(-0.81)	(-0.4)	-	(0.2)	(11.62)	(9.6)	(8.8)
1/2Sb ₂ (g) + 3/2Cl ₂ (g) = SbCl ₃ (g)	1713 - 2500	-	-	(2.22)	(-0.4)	-	(-0.1)	(-40.26)	(59.4)	(61.6)
Sb(s, α, β and γ) + 5/2Cl ₂ (g) = SbCl ₅ (l)	298 - 445	104.9 (d)	(84.4)	(19.6)	(-2.4)	-	(1.6)	(-5.181)	(178.7)	(198.3)
Sb(s, α, β and γ) + 5/2Cl ₂ (g) = SbCl ₅ (g)	445 - 903.7	-	-	(-4.0)	(9.6)	-	(1.6)	(15.70)	(14.1)	(10.1)
Sb(l) + 5/2Cl ₂ (g) = SbCl ₅ (g)	903.7 - 1713	-	-	(-6.0)	(11.3)	-	(1.6)	(11.99)	(7.4)	(1.4)
1/2Sb ₂ (g) + 5/2Cl ₂ (g) = SbCl ₅ (g)	1713 - 2500	-	-	(-3.0)	(11.3)	-	(1.7)	(-39.89)	(57.2)	(54.3)
Sc(s) + 3/2Cl ₂ (g) = ScCl ₃ (s)	298 - 1233	220.8 (a)	(204.4)	(-0.3)	(10.4)	-	(1.0)	(-0.049)	(56.0)	(55.7)
Sc(s) + 3/2Cl ₂ (g) = ScCl ₃ (l)	1233 - 1350	-	-	(13.7)	(-3.4)	-	(1.0)	(10.18)	(125.7)	(139.4)
Sc(s) + 3/2Cl ₂ (g) = ScCl ₃ (g)	1350 - 1670	-	-	(1.7)	(-3.4)	-	(1.0)	(72.38)	(5.1)	(6.8)
Sc(l) + 3/2Cl ₂ (g) = ScCl ₃ (g)	1670 - 2500	-	-	(-0.6)	(-0.4)	-	(1.0)	(68.15)	(-5.1)	(-5.7)
Se(s) + 1/2Cl ₂ (g) = SeCl(l)	298 - 403	11.1 (d)	(9.1)	(7.8)	(-8.9)	-	(0.3)	(-1.823)	(48.4)	(56.3)
Se(s) + 1/2Cl ₂ (g) = SeCl(g)	403 - 490.6	-	-	(1.3)	(-8.9)	-	(0.3)	(9.754)	(-13.1)	(-11.8)
Se(l) + 1/2Cl ₂ (g) = SeCl(g)	490.6 - 1000	-	-	(-2.4)	(-0.1)	-	(0.3)	(9.260)	(-29.2)	(-31.6)
1/2Se ₂ (g) + 1/2Cl ₂ (g) = SeCl(g)	1000 - 2500	-	-	(0.2)	(-0.1)	-	(0.5)	(-7.576)	(2.6)	(2.7)
Se(s) + 2Cl ₂ (g) = SeCl ₄ (s)	298 - 469	46.1 (d)	(25.9)	(8.2)	(-8.3)	-	(1.3)	(-1.626)	(111.1)	(119.3)
Se(s) + 2Cl ₂ (g) = SeCl ₄ (l)	469 - 490.6	-	-	(0.2)	(-4.3)	-	(1.3)	(22.69)	(19.0)	(19.2)
Se(l) + 2Cl ₂ (g) = SeCl ₄ (g)	490.6 - 1000	-	-	(-3.5)	(4.5)	-	(1.3)	(22.19)	(2.9)	(0.6)
1/2Se ₂ (g) + 2Cl ₂ (g) = SeCl ₄ (g)	1000 - 2500	-	-	(-1.0)	(4.5)	-	(1.5)	(5.416)	(34.7)	(33.7)
Si(s) + 2Cl ₂ (g) = SiCl ₄ (l)	298 - 330	150.1 (d)	134.1	10.3	-1.6	-	2.4	-2.198	110.6	120.9
Si(s) + 2Cl ₂ (g) = SiCl ₄ (g)	330 - 1683	-	-	1.03	0.08	-	-0.39	6.791	37.9	38.9
Si(l) + 2Cl ₂ (g) = SiCl ₄ (g)	1683 - 2500	-	-	(-0.7)	(1.1)	-	(-1.4)	(-2.955)	(33.6)	(32.9)
Sm(s) + Cl ₂ (g) = SmCl ₂ (s)	298 - 1013	(195.6) (m)	(184.7)	(0.8)	(5.1)	-	(0.6)	(-0.257)	(42.7)	(43.6)
Sm(s) + Cl ₂ (g) = SmCl ₂ (l)	1013 - 1623	-	-	(9.5)	(-3.7)	-	(0.6)	(1.446)	(88.1)	(97.7)
Sm(l) + Cl ₂ (g) = SmCl ₂ (l)	1623 - 1700	-	-	(7.2)	(-0.3)	-	(0.6)	(-2.999)	(78.9)	(86.2)
Sm(l) + Cl ₂ (g) = SmCl ₂ (g)	1700 - 2500	-	-	(-2.8)	(-0.3)	-	(0.6)	(55.00)	(-19.5)	(-22.2)
Sm(s) + 3/2Cl ₂ (g) = SmCl ₃ (s)	298 - 951	(248) (d)	(232)	(2.5)	(6.6)	-	(1.0)	(-0.694)	(69.4)	(71.9)
Sm(s) + 3/2Cl ₂ (g) = SmCl ₃ (l)	951 - 1623	-	-	(11.7)	(-3.8)	-	(1.0)	(3.260)	(114.2)	(125.9)
Sm(l) + 3/2Cl ₂ (g) = SmCl ₃ (l)	1623 - 1830	-	-	(9.4)	(-0.4)	-	(1.0)	(-1.185)	(105.0)	(114.4)
Sm(l) + 3/2Cl ₂ (g) = SmCl ₃ (g)	1830 - 2500	-	-	(-2.1)	(-0.4)	-	(1.0)	(66.86)	(-7.1)	(-9.2)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f, 298$ (kcal/mole)	$-\Delta F_f, 298$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$\text{Sn}(\alpha \text{ and } \beta) + \text{Cl}_2(\text{g}) = \text{SnCl}_2(\text{s})$	298 - 505.1	83.6 (a)	(74.2)	3.0	2.69	-	0.6	-0.799	(49.2)	(52.2)
$\text{Sn}(\text{l}) + \text{Cl}_2(\text{g}) = \text{SnCl}_2(\text{s})$	505.1 - 520	-	-	0.1	9.0	-	0.6	-1.838	(37.8)	(38.0)
$\text{Sn}(\text{l}) + \text{Cl}_2(\text{g}) = \text{SnCl}_2(\text{l})$	520 - 925	-	-	8.9	-0.3	-	0.6	-2.112	(82.2)	(91.2)
$\text{Sn}(\text{l}) + \text{Cl}_2(\text{g}) = \text{SnCl}_2(\text{g})$	925 - 2473	-	-	(-1.1)	(-0.3)	-	(0.6)	(26.94)	(-6.5)	(-7.5)
$\text{Sn}(\text{g}) + \text{Cl}_2(\text{g}) = \text{SnCl}_2(\text{g})$	2473 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(-33.83)	(34.0)	(35.3)
$\text{Sn}(\alpha \text{ and } \beta) + 2\text{Cl}_2(\text{g}) = \text{SnCl}_4(\text{l})$	298 - 386	127.4 (d)	110.5	16.5	-6.8	-	1.3	-4.161	147.9	164.3
$\text{Sn}(\alpha \text{ and } \beta) + 2\text{Cl}_2(\text{g}) = \text{SnCl}_4(\text{g})$	386 - 505.1	-	-	3.63	-6.6	-	-0.6	8.617	50.6	54.2
$\text{Sn}(\text{l}) + 2\text{Cl}_2(\text{g}) = \text{SnCl}_4(\text{g})$	505.1 - 2473	-	-	0.75	-0.3	-	-0.6	7.678	39.2	39.9
$\text{Sn}(\text{g}) + 2\text{Cl}_2(\text{g}) = \text{SnCl}_4(\text{g})$	2473 - 2500	-	-	(3.1)	(-0.3)	-	(-0.6)	(-53.19)	(79.7)	(82.7)
$\text{Sr}(\text{s}) + \text{Cl}_2(\text{g}) = \text{SrCl}_2(\text{s})$	298 - 1043	197.8 (d)	(187.5)	(3.8)	(0.81)	-	(0.6)	(-0.959)	(56.3)	(60.1)
$\text{Sr}(\text{l}) + \text{Cl}_2(\text{g}) = \text{SrCl}_2(\text{s})$	1043 - 1145	-	-	(1.7)	(2.2)	-	(0.6)	(-1.714)	(45.2)	(46.9)
$\text{Sr}(\text{l}) + \text{Cl}_2(\text{g}) = \text{SrCl}_2(\text{l})$	1145 - 1657	-	-	(9.7)	(-0.3)	-	(0.6)	(-5.174)	(95.1)	(104.8)
$\text{Sr}(\text{g}) + \text{Cl}_2(\text{g}) = \text{SrCl}_2(\text{l})$	1657 - 2300	-	-	(12.5)	(-0.3)	-	(0.6)	(-43.31)	(135.7)	(148.2)
$\text{Sr}(\text{g}) + \text{Cl}_2(\text{g}) = \text{SrCl}_2(\text{g})$	2300 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(37.45)	(25.1)	(26.4)
$\text{Ta}(\text{s}) + \text{Cl}_2(\text{g}) = \text{TaCl}_2(\text{s})$	298 - 1210	(85)	(75)	(1.8)	(4.6)	-	(0.6)	(-0.524)	(43.6)	(45.4)
$\text{Ta}(\text{s}) + \text{Cl}_2(\text{g}) = \text{TaCl}_2(\text{l})$	1210 - 1650	-	-	(10.9)	(-1.0)	-	(0.6)	(-0.635)	(95.8)	(106.7)
$\text{Ta}(\text{s}) + \text{Cl}_2(\text{g}) = \text{TaCl}_2(\text{g})$	1650 - 2500	-	-	(0.4)	(-1.0)	-	(0.6)	(56.69)	(-6.3)	(-5.9)
$\text{Ta}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{TaCl}_3(\text{s})$	298 - 1300	(115)	(99)	(2.2)	(10.0)	-	(1.0)	(-0.781)	(69.6)	(71.8)
$\text{Ta}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{TaCl}_3(\text{l})$	1300 - 1620	-	-	(13.0)	(-1.2)	-	(1.0)	(6.643)	(123.3)	(136.3)
$\text{Ta}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{TaCl}_3(\text{g})$	1620 - 2500	-	-	(1.0)	(-1.2)	-	(1.0)	(66.08)	(9.9)	(10.9)
$\text{Ta}(\text{s}) + 2\text{Cl}_2(\text{g}) = \text{TaCl}_4(\text{s})$	298 - 570	(140)	(119)	(3.2)	(7.9)	-	(1.3)	(-0.850)	(89.2)	(92.3)
$\text{Ta}(\text{s}) + 2\text{Cl}_2(\text{g}) = \text{TaCl}_4(\text{l})$	570 - 1050	-	-	(12.7)	(-1.3)	-	(1.3)	(0.430)	(135.1)	(147.7)
$\text{Ta}(\text{s}) + 2\text{Cl}_2(\text{g}) = \text{TaCl}_4(\text{g})$	1050 - 2500	-	-	(-3.3)	(3.7)	-	(1.3)	(34.47)	(10.0)	(6.6)
$\text{Ta}(\text{s}) + 5/2\text{Cl}_2(\text{g}) = \text{TaCl}_5(\text{s})$	298 - 494	(120)	(96)	(7.1)	(11.1)	-	(1.6)	(-2.053)	(122.9)	(130.0)
$\text{Ta}(\text{s}) + 5/2\text{Cl}_2(\text{g}) = \text{TaCl}_5(\text{l})$	494 - 507	-	-	(18.3)	(-1.5)	-	(1.6)	(2.151)	(169.5)	(187.8)
$\text{Ta}(\text{s}) + 5/2\text{Cl}_2(\text{g}) = \text{TaCl}_5(\text{g})$	507 - 2500	-	-	(-6.7)	(9.5)	-	(1.6)	(25.91)	(-5.3)	(-12.0)
$\text{Tc}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{TcCl}_3(\text{s})$	298 - 1220	(70)	(54.5)	(1.5)	(11.8)	-	(1.0)	(-0.627)	(63.2)	(64.7)
$\text{Tc}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{TcCl}_3(\text{l})$	1220 - 1475	-	-	(13.3)	(-2.4)	-	(1.0)	(8.545)	(119.1)	(132.4)
$\text{Tc}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{TcCl}_3(\text{g})$	1475 - 2400	-	-	(1.3)	(-2.4)	-	(1.0)	(62.24)	(7.2)	(8.5)
$\text{Tc}(\text{l}) + 3/2\text{Cl}_2(\text{g}) = \text{TcCl}_3(\text{g})$	2400 - 2500	-	-	(-4.1)	(-0.4)	-	(1.0)	(63.94)	(-27.7)	(-31.8)
$\text{Tc}(\text{s}) + 5/2\text{Cl}_2(\text{g}) = \text{TcCl}_5(\text{s})$	298 - 425	(80)	(57)	(5.5)	(12.5)	-	(1.6)	(-1.643)	(111.9)	(117.4)
$\text{Tc}(\text{s}) + 5/2\text{Cl}_2(\text{g}) = \text{TcCl}_5(\text{l})$	425 - 505	-	-	(17.0)	(-2.7)	-	(1.6)	(2.642)	(156.7)	(173.7)
$\text{Tc}(\text{s}) + 5/2\text{Cl}_2(\text{g}) = \text{TcCl}_5(\text{g})$	505 - 2400	-	-	(-7.5)	(7.3)	-	(1.6)	(25.54)	(-14.5)	(22.0)
$\text{Te}(\text{s}, \alpha) + \text{Cl}_2(\text{g}) = \text{TeCl}_2(\text{s})$	298 - 448	(55)	(44)	(2.4)	(1.3)	-	(0.6)	(-0.439)	(49.6)	(52.0)
$\text{Te}(\text{s}, \alpha) + \text{Cl}_2(\text{g}) = \text{TeCl}_2(\text{l})$	448 - 595	-	-	(12.7)	(-5.5)	-	(0.6)	(-0.885)	(101.6)	(114.3)
$\text{Te}(\text{s}, \alpha) + \text{Cl}_2(\text{g}) = \text{TeCl}_2(\text{g})$	595 - 621	-	-	(1.7)	(-5.5)	-	(0.6)	(21.01)	(5.6)	(7.3)
$\text{Te}(\text{s}, \beta) + \text{Cl}_2(\text{g}) = \text{TeCl}_2(\text{g})$	621 - 723	-	-	(1.7)	(-5.5)	-	(0.6)	(20.88)	(5.9)	(7.5)
$\text{Te}(\text{l}) + \text{Cl}_2(\text{g}) = \text{TeCl}_2(\text{g})$	723 - 1360	-	-	(-2.8)	(-0.3)	-	(0.6)	(18.42)	(-13.5)	(-16.3)
$1/2\text{Te}_2(\text{g}) + \text{Cl}_2(\text{g}) = \text{TeCl}_2(\text{g})$	1360 - 2500	-	-	(1.8)	(-0.3)	-	(0.8)	(0.363)	(27.9)	(29.7)
$\text{Te}(\text{s}, \alpha) + 2\text{Cl}_2(\text{g}) = \text{TeCl}_4(\text{s})$	298 - 497.3	77.4 (d)	57.6	11.1	-5.8	-	1.3	-2.610	127.3	138.4
$\text{Te}(\text{s}, \alpha) + 2\text{Cl}_2(\text{g}) = \text{TeCl}_4(\text{l})$	497.3 - 621	-	-	31.1	-5.8	-	1.3	-8.046	242.4	273.5
$\text{Te}(\text{s}, \beta) + 2\text{Cl}_2(\text{g}) = \text{TeCl}_4(\text{l})$	621 - 665	-	-	(31.1)	(-5.8)	-	(1.3)	(-8.176)	(242.6)	(273.7)
$\text{Te}(\text{s}, \beta) + 2\text{Cl}_2(\text{g}) = \text{TeCl}_4(\text{g})$	665 - 723	-	-	(-3.6)	(-2.3)	-	(1.3)	(30.93)	(-5.9)	(-9.5)
$\text{Te}(\text{l}) + 2\text{Cl}_2(\text{g}) = \text{TeCl}_4(\text{g})$	723 - 1360	-	-	(-8.0)	(3.0)	-	(1.3)	(28.48)	(-25.3)	(-33.3)
$1/2\text{Te}_2(\text{g}) + 2\text{Cl}_2(\text{g}) = \text{TeCl}_4(\text{g})$	1360 - 2500	-	-	(-3.5)	(3.0)	-	(1.4)	(10.42)	(16.1)	(12.6)
$\text{Th}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{ThCl}_3(\text{s})$	298 - 1100	(230)	(213)	(1.4)	(6.6)	(-2.0)	(1.0)	(-0.185)	(65.0)	(66.3)
$\text{Th}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{ThCl}_3(\text{l})$	1100 - 1890	-	-	(10.7)	(0.4)	(-2.0)	(1.0)	(2.336)	(115.1)	(125.7)
$\text{Th}(\text{s}) + 3/2\text{Cl}_2(\text{g}) = \text{ThCl}_3(\text{g})$	1890 - 2173	-	-	(-1.3)	(0.4)	(-2.0)	(1.0)	(71.02)	(0.3)	(-1.1)
$\text{Th}(\text{l}) + 3/2\text{Cl}_2(\text{g}) = \text{ThCl}_3(\text{g})$	2173 - 2500	-	-	(-1.1)	(-0.4)	-	(1.0)	(60.82)	(7.1)	(5.8)
$\text{Th}(\text{s}) + 2\text{Cl}_2(\text{g}) = \text{ThCl}_4(\text{s})$	298 - 1043	284.5 (i)	(262.5)	(0.3)	(8.2)	(-2.0)	(1.3)	(0.173)	(76.2)	(76.5)
$\text{Th}(\text{s}) + 2\text{Cl}_2(\text{g}) = \text{ThCl}_4(\text{l})$	1043 - 1195	-	-	(14.3)	(0.2)	(-2.0)	(1.3)	(2.922)	(152.7)	(167.0)
$\text{Th}(\text{s}) + 2\text{Cl}_2(\text{g}) = \text{ThCl}_4(\text{g})$	1195 - 2173	-	-	(-5.7)	(5.2)	(-2.0)	(1.3)	(59.75)	(-13.6)	(-19.3)
$\text{Th}(\text{l}) + 2\text{Cl}_2(\text{g}) = \text{ThCl}_4(\text{g})$	2173 - 2500	-	-	(-5.5)	(4.5)	-	(1.3)	(49.56)	(-6.8)	(-12.3)
$\text{Ti}(\text{s}, \alpha) + \text{Cl}_2(\text{g}) = \text{TiCl}_2(\text{s})$	298 - 1030	120.6 (j)	(109.8)	(1.6)	(2.0)	-	(0.6)	(-0.343)	(45.2)	(46.8)
$\text{Ti}(\text{s}, \alpha) + \text{Cl}_2(\text{g}) = \text{TiCl}_2(\text{l})$	1030 - 1155	-	-	(9.0)	(-2.8)	-	(0.6)	(2.081)	(84.3)	(93.3)
$\text{Ti}(\text{s}, \beta) + \text{Cl}_2(\text{g}) = \text{TiCl}_2(\text{l})$	1155 - 1600	-	-	(6.7)	(-0.3)	-	(0.6)	(2.049)	(72.2)	(78.9)
$\text{Ti}(\text{s}, \beta) + \text{Cl}_2(\text{g}) = \text{TiCl}_2(\text{g})$	1600 - 2000	-	-	(-2.3)	(-0.3)	-	(0.6)	(51.45)	(-16.0)	(-18.3)
$\text{Ti}(\text{l}) + \text{Cl}_2(\text{g}) = \text{TiCl}_2(\text{g})$	2000 - 2500	-	-	(-2.6)	(-0.3)	-	(0.6)	(47.45)	(-16.0)	(-18.6)
$\text{Ti}(\text{s}, \alpha) + 3/2\text{Cl}_2(\text{g}) = \text{TiCl}_3(\text{s})$	298 - 1155	170.7 (j)	(155.0)	(2.3)	(4.5)	-	(1.0)	(-0.556)	(66.9)	(69.2)
$\text{Ti}(\text{s}, \beta) + 3/2\text{Cl}_2(\text{g}) = \text{TiCl}_3(\text{s})$	1155 - 1200	-	-	(0.1)	(7.0)	-	(1.0)	(-0.588)	(54.7)	(54.8)
$\text{Ti}(\text{s}, \beta) + 3/2\text{Cl}_2(\text{g}) = \text{TiCl}_3(\text{l})$	1200 - 1600	-	-	(10.4)	(-0.4)	-	(1.0)	(4.380)	(108.8)	(119.2)
$\text{Ti}(\text{s}, \beta) + 3/2\text{Cl}_2(\text{g}) = \text{TiCl}_3(\text{g})$	1600 - 2000	-	-	(-0.6)	(-0.4)	-	(1.0)	(70.98)	(-3.0)	(-3.6)
$\text{Ti}(\text{l}) + 3/2\text{Cl}_2(\text{g}) = \text{TiCl}_3(\text{g})$	2000 - 2500	-	-	(-0.9)	(-0.4)	-	(1.0)	(66.98)	(-3.0)	(-3.9)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_{f,298}$ (kcal/mole)	$-\Delta F_{f,298}$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-A)$
$Ti(s, \alpha) + 2Cl_2(g) = TiCl_4(l)$	298 - 409	192.5 (k)	176.6	12.9	-3.1	-	1.3	-3.277	125.5	138.5
$Ti(s, \alpha) + 2Cl_2(g) = TiCl_4(g)$	409 - 1155	-	-	2.7	-2.8	-	-1.1	8.667	44.3	47.0
$Ti(s, \beta) + 2Cl_2(g) = TiCl_4(g)$	1155 - 2000	-	-	0.4	-0.3	-	-1.1	8.632	32.2	32.6
$Ti(l) + 2Cl_2(g) = TiCl_4(g)$	2000 - 2500	-	-	(0.1)	(-0.3)	-	(-1.1)	(4.632)	(32.2)	(32.3)
$Ti(s, \alpha) + 1/2Cl_2(g) = TiCl(s)$	298 - 508.3	48.99 (a)	44.1	2.4	-1.6	-	0.3	-0.522	29.3	31.6
$Ti(s, \beta) + 1/2Cl_2(g) = TiCl(s)$	508.3 - 576.8	-	-	0.3	1.9	-	0.3	-0.014	18.5	18.8
$Ti(l) + 1/2Cl_2(g) = TiCl(s)$	576.8 - 700	-	-	0.1	1.9	-	0.3	-0.929	19.0	19.1
$Ti(l) + 1/2Cl_2(g) = TiCl(l)$	700 - 1080	-	-	2.3	-0.1	-	0.3	2.281	25.9	28.2
$Ti(l) + 1/2Cl_2(g) = TiCl(g)$	1080 - 1730	-	-	(-2.9)	(-0.1)	-	(0.1)	(32.36)	(-33.4)	(-36.4)
$Ti(g) + 1/2Cl_2(g) = TiCl(g)$	1730 - 2500	-	-	(-0.4)	(-0.1)	-	(0.1)	(-10.83)	(7.9)	(7.5)
$Ti(s, \alpha) + 3/2Cl_2(g) = TiCl_3(s)$	298 - 460	83.9 (a)	(68.9)	(3.6)	(8.5)	-	(1.0)	(-1.121)	(72.8)	(76.4)
$U(s, \alpha) + 3/2Cl_2(g) = UCl_3(s)$	298 - 938	212.2 (l)	196.1	4.59	-1.12	-	1.3	-0.866	79.02	83.61
$U(s, \beta) + 3/2Cl_2(g) = UCl_3(s)$	938 - 1049	-	-	-2.44	7.0	-	2.1	1.564	39.2	36.8
$U(s, \gamma) + 3/2Cl_2(g) = UCl_3(s)$	1049 - 1108	-	-	(-1.28)	(7.0)	-	(2.1)	(-0.819)	(48.4)	(47.1)
$U(s, \gamma) + 3/2Cl_2(g) = UCl_3(l)$	1108 - 1405	-	-	(11.7)	(-0.4)	-	(1.0)	(-1.783)	(123.3)	(135.0)
$U(l) + 3/2Cl_2(g) = UCl_3(l)$	1405 - 2000	-	-	(11.9)	(-0.4)	-	(1.0)	(-4.966)	(126.4)	(138.3)
$U(l) + 3/2Cl_2(g) = UCl_3(g)$	2000 - 2500	-	-	(-2.1)	(-0.4)	-	(1.0)	(70.03)	(-3.5)	(-5.6)
$U(s, \alpha) + 2Cl_2(g) = UCl_4(s)$	298 - 863	251.1 (l)	229.8	5.87	0.91	-	0.5	-1.617	104.90	110.77
$U(s, \alpha) + 2Cl_2(g) = UCl_4(l)$	863 - 938	-	-	(19.2)	(-8.7)	-	(0.5)	(1.928)	(173.6)	(192.8)
$U(s, \beta) + 2Cl_2(g) = UCl_4(l)$	938 - 1049	-	-	(12.2)	(-0.5)	-	(1.3)	(4.358)	(133.8)	(146.0)
$U(s, \gamma) + 2Cl_2(g) = UCl_4(l)$	1049 - 1060	-	-	(13.4)	(-0.5)	-	(1.3)	(1.975)	(143.0)	(156.3)
$U(s, \gamma) + 2Cl_2(g) = UCl_4(g)$	1060 - 1405	-	-	(-0.6)	(-0.5)	-	(1.3)	(49.82)	(14.5)	(13.8)
$U(l) + 2Cl_2(g) = UCl_4(g)$	1405 - 2500	-	-	(-0.5)	(-0.5)	-	(1.3)	(46.63)	(17.4)	(16.9)
$U(s, \alpha) + 5/2Cl_2(g) = UCl_5(s)$	298 - 560	262.3 (l)	(237.5)	(9.6)	(2.4)	-	(0.8)	(-2.698)	(138.5)	(148.1)
$U(s, \alpha) + 5/2Cl_2(g) = UCl_5(l)$	560 - 690	-	-	(21.8)	(-8.8)	-	(0.8)	(0.826)	(194.1)	(215.9)
$U(s, \alpha) + 5/2Cl_2(g) = UCl_5(g)$	690 - 938	-	-	(-5.2)	(1.2)	-	(0.8)	(34.03)	(1.3)	(-3.9)
$U(s, \beta) + 5/2Cl_2(g) = UCl_5(g)$	938 - 1049	-	-	(-12.2)	(9.3)	-	(1.6)	(36.46)	(-38.5)	(-50.7)
$U(s, \gamma) + 5/2Cl_2(g) = UCl_5(g)$	1049 - 1405	-	-	(-11.0)	(9.3)	-	(1.6)	(34.08)	(-29.4)	(-40.4)
$U(l) + 5/2Cl_2(g) = UCl_5(g)$	1405 - 2500	-	-	(-10.9)	(9.3)	-	(1.6)	(30.89)	(-26.3)	(-37.2)
$U(s, \alpha) + 3Cl_2(g) = UCl_6(s)$	298 - 452	272.6 (l)	(241.7)	(5.9)	(2.8)	-	(1.2)	(-1.482)	(137.3)	(143.2)
$U(s, \alpha) + 3Cl_2(g) = UCl_6(l)$	452 - 550	-	-	(24.5)	(-9.0)	-	(1.2)	(-3.574)	(234.6)	(259.1)
$U(s, \alpha) + 3Cl_2(g) = UCl_6(g)$	550 - 938	-	-	(0.5)	(-4.0)	-	(1.2)	(20.75)	(64.1)	(64.6)
$U(s, \beta) + 3Cl_2(g) = UCl_6(g)$	938 - 1049	-	-	(6.6)	(4.2)	-	(2.0)	(23.18)	(24.3)	(17.8)
$U(s, \gamma) + 3Cl_2(g) = UCl_6(g)$	1049 - 1405	-	-	(-5.4)	(4.2)	-	(2.0)	(20.80)	(33.5)	(28.1)
$U(l) + 3Cl_2(g) = UCl_6(g)$	1405 - 2500	-	-	(-5.3)	(4.2)	-	(2.0)	(17.61)	(36.6)	(31.3)
$V(s) + Cl_2(g) = VCl_2(s)$	298 - 1273	108 (a)	97	2.92	1.48	-	-0.1	-0.953	54.3	57.2
$V(s) + Cl_2(g) = VCl_2(l)$	1273 - 1650	-	-	(9.2)	(-1.2)	-	(0.6)	(1.350)	(89.2)	(98.3)
$V(s) + Cl_2(g) = VCl_2(g)$	1650 - 2003	-	-	(0.7)	(-1.2)	-	(0.6)	(50.38)	(5.0)	(5.6)
$V(l) + Cl_2(g) = VCl_2(g)$	2003 - 2500	-	-	(-2.4)	(-0.3)	-	(0.6)	(50.50)	(-14.1)	(-16.5)
$V(s) + 3/2Cl_2(g) = VCl_3(s)$	298 - 1100	139 (d)	122	4.28	-2.54	-	-0.7	-1.620	81.2	85.5
$V(s) + 3/2Cl_2(g) = VCl_3(l)$	1100 - 1360	-	-	(12.8)	(-1.4)	-	(1.0)	(4.543)	(124.6)	(137.4)
$V(s) + 3/2Cl_2(g) = VCl_3(g)$	1360 - 2003	-	-	(1.3)	(-1.4)	-	(1.0)	(63.18)	(10.0)	(11.3)
$V(l) + 3/2Cl_2(g) = VCl_3(g)$	2003 - 2500	-	-	(-1.7)	(-0.4)	-	(1.0)	(63.31)	(-9.1)	(-10.8)
$V(s) + 2Cl_2(g) = VCl_4(l)$	298 - 437	138 (a)	(122)	(13.9)	(-1.5)	-	(1.3)	(-3.638)	(130.7)	(144.6)
$V(s) + 2Cl_2(g) = VCl_4(g)$	437 - 2003	-	-	(2.9)	(-1.5)	-	(1.3)	(9.369)	(45.1)	(48.0)
$V(l) + 2Cl_2(g) = VCl_4(g)$	2003 - 2500	-	-	(-0.1)	(-0.5)	-	(1.3)	(9.492)	(26.0)	(25.9)
$W(s) + Cl_2(g) = WCl_2(s)$	298 - 1125	(36) (d)	(27)	(1.5)	(5.8)	-	(0.6)	(-0.483)	(40.2)	(41.7)
$W(s) + Cl_2(g) = WCl_2(l)$	1125 - 1800	-	-	(10.5)	(-1.0)	-	(0.6)	(1.095)	(89.2)	(99.7)
$W(s) + Cl_2(g) = WCl_2(g)$	1800 - 2500	-	-	(0.5)	(-1.0)	-	(0.6)	(62.10)	(-9.6)	(9.1)
$W(s) + 2Cl_2(g) = WCl_4(s)$	298 - 375	(69) (d)	(79)	(2.9)	(6.7)	-	(1.3)	(-0.712)	(83.7)	(86.6)
$W(s) + 2Cl_2(g) = WCl_4(l)$	375 - 515	-	-	(11.7)	(-1.3)	-	(1.3)	(-0.450)	(124.8)	(136.5)
$W(s) + 5/2Cl_2(g) = WCl_5(s)$	298 - 500	(82) (d)	(59)	(7.1)	(10.8)	-	(1.6)	(-2.030)	(119.7)	(126.8)
$W(s) + 5/2Cl_2(g) = WCl_5(l)$	500 - 549	-	-	(18.4)	(-1.4)	-	(1.6)	(2.745)	(166.0)	(184.4)
$W(s) + 5/2Cl_2(g) = WCl_5(g)$	549 - 2500	-	-	(-7.6)	(8.6)	-	(1.6)	(30.51)	(-19.8)	(-27.4)
$W(s) + 3Cl_2(g) = WCl_6(s)$	298 - 548	96.9 (d)	(67.8)	(8.2)	(12.8)	-	(2.0)	(-2.346)	(146.7)	(154.9)
$W(s) + 3Cl_2(g) = WCl_6(l)$	548 - 610	-	-	(21.0)	(-1.6)	-	(2.0)	(0.602)	(205.3)	(226.3)
$Y(s) + 3/2Cl_2(g) = YCl_3(s)$	298 - 973	235 (d)	(219)	(1.5)	(11.6)	-	(1.0)	(-0.619)	(64.1)	(65.6)
$Y(s) + 3/2Cl_2(g) = YCl_3(l)$	973 - 1725	-	-	(14.3)	(-2.6)	-	(1.0)	(2.650)	(129.1)	(143.4)
$Y(s) + 3/2Cl_2(g) = YCl_3(g)$	1725 - 2500	-	-	(1.3)	(-2.6)	-	(1.0)	(70.08)	(6.1)	(7.4)
$Zn(s) + Cl_2(g) = ZnCl_2(s)$	298 - 556	99.40 (a)	88.2	1.8	5.3	-	0.6	-0.549	48.8	50.6
$Zn(s) + Cl_2(g) = ZnCl_2(l)$	556 - 692.7	-	-	(9.9)	(-2.7)	-	(0.6)	(1.723)	(85.6)	(95.5)
$Zn(l) + Cl_2(g) = ZnCl_2(l)$	692.7 - 1005	-	-	(7.7)	(-0.3)	-	(0.6)	(0.991)	(75.5)	(83.2)
$Zn(l) + Cl_2(g) = ZnCl_2(g)$	1005 - 1180	-	-	(-1.3)	(-0.3)	-	(0.6)	(38.80)	(-15.3)	(-16.6)
$Zn(g) + Cl_2(g) = ZnCl_2(g)$	1180 - 2500	-	-	(1.3)	(-0.3)	-	(0.6)	(8.369)	(25.8)	(27.1)

Table VII (Cont'd.)

Reaction	Temperature Range (°K)	$-\Delta H_f^{\circ}, 298$ (kcal/mole)	$-\Delta F_f^{\circ}, 298$ (kcal/mole)	Δa	Δb	Δc	Δd	ΔA (kcal/mole)	$-\Delta B$ (e.u.)	$-\Delta(B-a)$
$Zr(s, \alpha) + Cl_2(g) = ZrCl_2(s)$	298 - 1000	145 (a)	(134)	(1.7)	(2.8)	-	(1.5)	(-0.122)	(45.3)	(47.0)
$Zr(s, \alpha) + Cl_2(g) = ZrCl_2(l)$	1000 - 1135	-	-	(9.4)	(-1.4)	-	(1.5)	(0.678)	(87.9)	(97.3)
$Zr(s, \beta) + Cl_2(g) = ZrCl_2(l)$	1135 - 1660	-	-	(9.0)	(-0.3)	-	(0.6)	(-0.541)	(86.9)	(95.9)
$Zr(s, \beta) + Cl_2(g) = ZrCl_2(g)$	1660 - 2125	-	-	(-1.0)	(-0.3)	-	(0.6)	(51.06)	(-8.3)	(-9.3)
$Zr(l) + Cl_2(g) = ZrCl_2(g)$	2125 - 2500	-	-	(-1.8)	(-0.3)	-	(0.6)	(47.71)	(-11.6)	(-13.3)
$Zr(s, \alpha) + 3/2 Cl_2(g) = ZrCl_3(s)$	298 - 900	208 (a)	(192)	(1.4)	(11.5)	-	(1.8)	(-0.312)	(65.2)	(66.7)
$Zr(s, \alpha) + 3/2 Cl_2(g) = ZrCl_3(l)$	900 - 1135	-	-	(11.5)	(-1.5)	-	(1.8)	(4.762)	(112.3)	(123.9)
$Zr(s, \beta) + 3/2 Cl_2(g) = ZrCl_3(l)$	1135 - 1480	-	-	(11.1)	(-0.4)	-	(1.0)	(3.543)	(111.4)	(122.5)
$Zr(s, \beta) + 3/2 Cl_2(g) = ZrCl_3(g)$	1480 - 2125	-	-	(-0.4)	(-0.4)	-	(1.0)	(63.56)	(-1.6)	(-2.0)
$Zr(l) + 3/2 Cl_2(g) = ZrCl_3(g)$	2125 - 2500	-	-	(-1.1)	(-0.4)	-	(1.0)	(60.21)	(-4.9)	(-6.0)
$Zr(s, \alpha) + 2Cl_2(g) = ZrCl_4(s)$	298 - 604	230 (d)	209	7.57	-1.7	-	-0.74	-2.425	114.4	122.0
$Zr(s, \alpha) + 2Cl_2(g) = ZrCl_4(l)$	604 - 1135	-	-	(1.6)	(-1.7)	-	(2.2)	(26.92)	(34.2)	(35.9)
$Zr(s, \beta) + 2Cl_2(g) = ZrCl_4(g)$	1135 - 2125	-	-	(1.2)	(-0.5)	-	(1.3)	(25.70)	(33.2)	(34.4)
$Zr(l) + 2Cl_2(g) = ZrCl_4(g)$	2125 - 2500	-	-	(0.5)	(-0.5)	-	(1.3)	(22.36)	(30.0)	(30.5)

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Free Energy of Formation
(kcal/gram-atom of oxygen)

Free Energy of Formation
(kcal/gram-atom of oxygen)

318-69

Free Energy of Formation
(kcal/gram-atom of chlorine)

Figure 3 g.
Chlorides of Elements
of Groups VII and VIII.

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