LATENT HEAT OF SUBLIMATION OF FIFTEEN SALTS FROM SPECTROSCOPIC AND THERMOCHEMICAL DATA

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ABSTRACT. The latent heat of sublimation of fifteen salts, which have not been experimentally determined, are calculated from spectroscopic and thermochemical data.

The latent heat of sublimation $L(MX)$ of a salt MX can be obtained from spectroscopic and thermochemical data by means of the following equations:

$$(MX)_{gas} = M_{gas} + X_{gas} - D_0(MX)$$

$$(MX)_{solid} + L(MX) = (MX)_{gas}$$

$$M_{gas} = M_{solid} + L(M)$$

$$X_{gas} = \tfrac{1}{2}(X_2)_{gas} + \tfrac{1}{2}D_0(X_2)$$

$$\tfrac{1}{2}(X_2)_{gas} = \tfrac{1}{2}(X_2)_{solid} + L(X)$$

$$M_{solid} + \tfrac{1}{2}(X_2)_{solid} = (MX)_{solid} + F$$

or $$L(MX) = F + L(M) + L(X) + \tfrac{1}{2}D_0(X_2) - D_0(MX)$$

where F is the heat of formation of MX ; $L(M)$ and $L(X)$ are the latent heats of M and X respectively, $D_0(M)$ and $D_0(X_2)$ are the heats of dissociation of MX and X_2 respectively.

The calculations for the latent heats of the salts are shown in Table I.

REMARKS

(1) The values of heats of formation are those given by Bichowsky and Rossini (1936).

(2) The values of $L(M)$ are given by Landolt-Börnstein (1936).

(3) The values of $L(X)$ are those used by Mathur (1937).

(4) The values of $D_0(X_2)$ and $D_0(MX)$ are those given by Herzberg (1950) exept those which are marked with asterisks and are given by Gaydon (1947).

(5) Whenever a range is given only the mean value has been used.

(6) Calculated L(PbO) agrees closely with the value 61.6 Kcal./mole given by Landolt-Börnstein, which shows the correctness of D_0(PbO).

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TABLE I

Calculation of latent heats of fifteen salts

S. No.	MX	F in Kcal/mol	$L(M)$ in Kcal/mole	$L(X)$ in Kcal/mole	$D_0(X_2)$ in e. V	$\frac{1}{2}D_0(X_2)$ in Kcal/mole	$F+L(M)+L(X)+\frac{1}{2}D_0X(_2)$ in Kcal/mole	$D_0(MX)$ in e. V.	$D_0(MX)$ in Kcal/mole	$L(MX)$ in Kcal/mole
1	PbO	52.5	47.2	gas	5.080	58.1	157.8	4.3	99.2	58.6
2	PbSe	20.0	47.2	17.4	2.8*	32.3	116.9	4.7	108.4	8.5
3	PbTe	6.0	47.2	13.2	2.3*	26.5	92.9	3.5	80.7	12.2
4	SnO	67.7	68.0	gas	5.08	58.1	193.8	3.2*	73.8	120.0
5	SnS	22.7	68.0	14.7	4.4	50.7	156.1	3.8	90.3	86.8
6	FeO	94.3	96.6	gas	5.08	58.1	219.0	4.8	110.8	108.2
7	CuO	38.5	81.7	gas	5.08	58.1	178.3	4.5*	103.7	74.6
8	MgO	146.1	34.4	gas	5.08	58.1	238.6	3.7	85.3	153.3
9	MnO	96.5	69.0	gas	5.08	58.1	223.6	4.4	101.5	122.1
10	CsH	12.0	18.7	gas	4.476	51.6	82.3	1.9	43.8	38.5
11	KH	16.0	21.9	gas	4.476	51.6	83.5	1.8	41.5	42.0
12	LiH	21.6	36.0	gas	4.476	51.6	109.2	2.5	57.6	51.6
13	NaH	14.0	26.2	gas	4.476	51.6	91.8	2.2	50.7	41.1
14	RbH	12.0	20.6	gas	4.476	51.6	84.2	1.9	43.8	40.4
15	AuCl	8.3	90.7	gas	2.475	28.5	127.5	3.5	80.7	46.8
16	MgS	82.2	34.4	14.7	4.4	50.7	182.0	2.9	66.9	115.1

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