

Thermochemistry of lithium chromate $\text{Li}_2\text{CrO}_4(\text{cr})$ and lithium molybdate $\text{Li}_2\text{MoO}_4(\text{cr})$

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The standard molar enthalpies of formation $\Delta_f H_m^\circ$ at the temperature $T = 298.15$ K of $\text{Li}_2\text{CrO}_4(\text{cr})$ and $\text{Li}_2\text{MoO}_4(\text{cr})$ have been determined using an isoperibol solution calorimeter. The value of $\Delta_{\text{sol}} H_m^\circ$ for $\text{Li}_2\text{CrO}_4(\text{cr})$ in water at $T = 298.15$ K was found to be $-(45.77 \pm 0.29) \text{ kJ} \cdot \text{mol}^{-1}$ and was used to obtain $\Delta_f H_m^\circ(298.15 \text{ K})$ as $-(1393.7 \pm 0.3) \text{ kJ} \cdot \text{mol}^{-1}$. The $\Delta_{\text{sol}} H_m^\circ$ of $\text{Li}_2\text{MoO}_4(\text{cr})$ and of $\{\text{Li}_2\text{O}(\text{cr}) + \text{MoO}_3(\text{cr})$ in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ at $T = 298.15$ K were used to obtain a value of $-(1519.2 \pm 2.2) \text{ kJ} \cdot \text{mol}^{-1}$ for $\Delta_f H_m^\circ$ for $\text{Li}_2\text{MoO}_4(\text{cr})$.

1. Introduction

Lithium oxide and LiAlO_2 have respectively been proposed as a blanket and breeding material for a thermonuclear reactor.^(1, 2) Some possible container materials for Li_2O are (iron + nickel + chromium) alloys and molybdenum-based alloys. These can react with Li_2O at high temperatures to form compounds like LiCrO_2 , LiCrO_4 , Li_2MoO_4 , etc. Similarly LiAlO_2 can also react with these container materials to form similar compounds if LiAlO_2 is thermodynamically less stable than LiCrO_2 , Li_2CrO_4 , and Li_2MoO_4 . A knowledge of the thermochemistry of these compounds is desirable for understanding these reactions. In the present work the standard molar enthalpies of formation at $T = 298.15$ K of $\text{Li}_2\text{CrO}_4(\text{cr})$ and $\text{Li}_2\text{MoO}_4(\text{cr})$ have been determined using an isoperibol solution calorimeter.

Calorimetric determination of $\Delta_f H_m^\circ$ of $\text{Li}_2\text{CrO}_4(\text{cr})$ has been reported only by Shidlovskii *et al.*⁽³⁾ They calculated $\Delta_f H_m^\circ$ from $\Delta_{\text{sol}} H_m^\circ$ in distilled water with the mole ratio $n(\text{H}_2\text{O})/n(\text{Li}_2\text{CrO}_4) = 800$. This can lead to an error in the extrapolation of $\Delta_{\text{sol}} H_m^\circ$ to infinite dilution which is required for calculating $\Delta_f H_m^\circ$. Hence it was decided to carry out the measurement at higher dilution to reduce the error in extrapolation.

There are three calorimetric determinations^(4–6) of $\Delta_f H_m^\circ$ for $\text{Li}_2\text{MoO}_4(\text{cr})$. Thien and Zharkova⁽⁴⁾ and O'Hare *et al.*⁽⁵⁾ have determined $\Delta_f H_m^\circ$ by measuring the enthalpy of reaction of MoO_3 with $\text{LiOH}(\text{aq})$ and the enthalpy of solution of $\text{Li}_2\text{MoO}_4(\text{cr})$ in $\text{LiOH}(\text{aq})$. Suponitskii *et al.*⁽⁶⁾ have determined $\Delta_f H_m^\circ$ by measuring

the $\Delta_{\text{sol}}H_m^\circ$ of Li_2MoO_4 in $\text{LiOH}(\text{aq}, 0.3 \text{ mol} \cdot \text{dm}^{-3})$. In the present work $\Delta_f H_m^\circ(\text{Li}_2\text{MoO}_4, \text{cr}, 298.15 \text{ K})$ has been determined by adopting a different approach *i.e.* by measuring $\Delta_{\text{sol}}H_m^\circ$ of $\text{Li}_2\text{MoO}_4(\text{cr})$ and of $\{\text{Li}_2\text{O}(\text{cr}) + \text{MoO}_3(\text{cr})\}$ in the same solvent $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$.

2. Experimental

Lithium chromate (Li_2CrO_4 , anhydrous) was prepared by the addition of $\text{LiCl}(\text{aq})$ (purity of LiCl , 99.99 mass per cent) to a suspension containing excess of $\text{Ag}_2\text{CrO}_4(\text{cr})$. The precipitated $\text{AgCl}(\text{cr})$ and unreacted Ag_2CrO_4 were filtered and the filtrate was concentrated to obtain crystals of $\text{Li}_2\text{CrO}_4 \cdot 2\text{H}_2\text{O}$.⁽⁷⁾ Purification was achieved by repeated crystallization. The product was dehydrated by heating at $T = 498 \text{ K}$ in flowing dry argon and stored in a dry-argon glove box (mass fractions: $\text{O}_2, \text{N}_2: < 10^{-5}$; $\text{H}_2\text{O}: < 5 \cdot 10^{-6}$). The X-ray diffraction pattern of the material agreed with that reported in the literature and the mass fraction of chromium corresponded to the formula Li_2CrO_4 .

Lithium molybdate $\{\text{Li}_2\text{MoO}_4(\text{cr})\}$ was prepared by heating $\{0.5\text{Li}_2\text{CO}_3(\text{cr}) + 0.5\text{MoO}_3(\text{cr})\}$ of high purity in flowing dry argon. $\text{Li}_2\text{CO}_3(\text{cr})$ of purity 99.997 mass per cent, and $\text{MoO}_3(\text{cr})$ of purity 99.99 mass per cent, were obtained from Aldrich, U.S.A. The required amounts of reactants were loaded into a gold boat and heated at $T = 1000 \text{ K}$ for 18 h. The product was cooled and ground to a fine powder in an agate mortar and was recrystallized from water. The crystals were heated in dry argon at $T = 500 \text{ K}$ to obtain moisture-free $\text{Li}_2\text{MoO}_4(\text{cr})$. The product was cooled to room temperature and stored in an argon-atmosphere dry box. The X-ray diffraction pattern of the sample agreed with that reported in the literature and the chemical analysis indicated the mole ratio $n(\text{Li})/n(\text{Mo})$ as 2.00.

Lithium oxide was prepared by the decomposition of $\text{Li}_2\text{CO}_3(\text{cr})$ under vacuum.⁽⁸⁾ $\text{Li}_2\text{CO}_3(\text{cr})$ was loaded in a platinum boat and heated at $T = 1100 \text{ K}$ for 50 h under a vacuum of $1.33 \cdot 10^{-4} \text{ Pa}$. The product was further purified by heating in helium gas at $T = 1250 \text{ K}$ for 8 h and after cooling was transferred to a dry-argon box. The X-ray diffraction pattern of the sample agreed with that reported in the literature.

Lithium hydroxide solution ($\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3}$) was prepared by dissolving high-purity $\text{LiOH} \cdot \text{H}_2\text{O}$ (99.95 mass per cent obtained from Aldrich, U.S.A.) in air-free deionized distilled water and stored in an air-tight container.

The calorimeter used has already been described.⁽⁹⁾ Electrical calibration experiments were performed immediately before and after each measurement of enthalpy of solution/reaction. The energy equivalent of the calorimeter was obtained from the average of both the calibration experiments. The corrected temperature change was evaluated using Newton's law of cooling. The heater and thermistor were protected against possible acid or alkali attack by enclosing them in thin-walled glass tubes filled with oil.

The calorimetric samples were weighed into pre-dried glass bulbs. The performance of the calorimeter was checked by measuring the enthalpy of solution on N.B.S. KCl SRM 1655 in distilled water and of tris(β -hydroxyaminomethane) SRM 724 in $\text{HCl}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$. The measured values were in close agreement

TABLE 1. Standard molar enthalpy of solution $\Delta_{\text{sol}} H_m^\circ$ at the temperature 298.15 K of $\text{Li}_2\text{CrO}_4(\text{cr})$ in water. In every run 350.0 g of water was used. Molar mass of $\text{Li}_2\text{CrO}_4(\text{cr})$ was taken as $129.8716 \text{ g} \cdot \text{mol}^{-1}$, $\Delta_f H_m^\circ$ values at 298.15 K for $\text{Li}^+(\text{aq}, \infty)$ and $\text{CrO}_4^{2-}(\text{aq}, \infty)$ were taken as $-278.461 \text{ kJ} \cdot \text{mol}^{-1}$ and $-882.514 \text{ kJ} \cdot \text{mol}^{-1}$, respectively. The uncertainty is equal to twice the standard deviation of the mean

Run	$\frac{m(\text{Li}_2\text{CrO}_4)}{\text{g}}$	$\frac{-\Delta_{\text{sol}} H^\circ}{\text{J}}$	$\frac{-\Delta_{\text{sol}} H_m^\circ}{\text{kJ} \cdot \text{mol}^{-1}}$	$\frac{-\Delta_{\text{sol}} H_m^\infty}{\text{kJ} \cdot \text{mol}^{-1}}$	$\frac{-\Delta_f H_m^\circ}{\text{kJ} \cdot \text{mol}^{-1}}$
1	0.09465	33.3	45.69	46.17	1393.3
2	0.13650	46.9	44.62	45.19	1394.2
3	0.12891	44.3	44.63	45.19	1394.2
4	0.13417	46.7	45.20	45.77	1393.7
5	0.10480	36.2	44.86	45.36	1394.1
6	0.13260	46.1	45.15	45.72	1393.7
7	0.20610	72.8	45.87	46.58	1392.9
8	0.02831	9.9	45.42	45.68	1393.8
9	0.14110	49.4	45.47	46.05	1393.4
10	0.13256	46.4	45.46	46.02	1393.4

$$\Delta_{\text{sol}} H_m^\circ(\text{Li}_2\text{CrO}_4, \text{cr}, 298.15 \text{ K}) = -(45.24 \pm 0.28) \text{ kJ} \cdot \text{mol}^{-1}$$

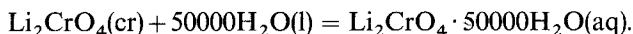
$$\Delta_{\text{sol}} H_m^\infty(\text{Li}_2\text{CrO}_4, \text{cr}, 298.15 \text{ K}) = -(45.77 \pm 0.29) \text{ kJ} \cdot \text{mol}^{-1}$$

$$\Delta_f H_m^\circ(\text{Li}_2\text{CrO}_4, \text{cr}, 298.15 \text{ K}) = -(1393.7 \pm 0.3) \text{ kJ} \cdot \text{mol}^{-1}$$

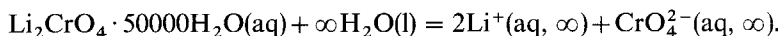
with the N.B.S. reported values. Calorimetric experiments consisted of breaking of bulbs containing samples Li_2CrO_4 , Li_2MoO_4 , or $(\text{Li}_2\text{O} + \text{MoO}_3)$ in the respective solvents. The standard molar enthalpy of solution $\Delta_{\text{sol}} H_m^\circ$ at $T = 298.15 \text{ K}$ of Li_2CrO_4 was measured in deionized distilled water. The $\Delta_{\text{sol}} H_m^\circ$ of MoO_3 , Li_2MoO_4 , and $(\text{Li}_2\text{O} + \text{MoO}_3)$ were measured in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3}, 298.15 \text{ K})$. The molar enthalpy of solution of Li_2O at $T = 298.15 \text{ K}$ was also measured in distilled water. Since the materials involved are hygroscopic in nature all the weighing and loading operations were performed in an argon-atmosphere dry box.

3. Results and discussion

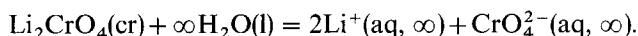
The standard molar enthalpies of solution $\Delta_{\text{sol}} H_m^\circ$ at $T = 298.15 \text{ K}$ for $\text{Li}_2\text{CrO}_4(\text{cr})$ in water are given in table 1 along with the derived values. The enthalpy of solution of Li_2CrO_4 in water corresponds to the reaction:



The enthalpy of dilution to infinite dilution $\Delta_{\text{sol}} H_m^\infty$ was calculated using the Debye-Hückel limiting law⁽¹⁰⁾ and corresponds to the reaction:



The standard molar enthalpy of formation was calculated from the reaction:



The standard molar enthalpy of solution $\Delta_{\text{sol}} H_m^\circ$ and the standard molar enthalpy of solution at infinite dilution $\Delta_{\text{sol}} H_m^\infty$, were found to be $-(45.27 \pm 0.28) \text{ kJ} \cdot \text{mol}^{-1}$, and $-(45.77 \pm 0.29) \text{ kJ} \cdot \text{mol}^{-1}$, respectively. Combining $\Delta_{\text{sol}} H_m^\infty$ with the $\Delta_f H_m^\circ$ for

TABLE 2. The standard molar enthalpy of solution of MoO_3 in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ at $T = 298.15 \text{ K}$. In each run the mass of solvent $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ was taken as 350.0 g . Molar mass of $\text{MoO}_3(\text{cr})$ was taken as $143.9382 \text{ g} \cdot \text{mol}^{-1}$. Uncertainty is equal to twice the standard deviation of the mean

Run	$\frac{m(\text{MoO}_3)}{\text{g}}$	$\frac{-\Delta_{\text{sol}} H^\circ}{\text{J}}$	$\frac{-\Delta_{\text{sol}} H_m^\circ}{\text{kJ} \cdot \text{mol}^{-1}}$
1	0.15375	82.3	77.05
2	0.15543	83.4	77.23
3	0.15045	80.4	76.92
4	0.15210	81.4	77.03
5	0.15565	83.5	77.13
6	0.15435	82.6	77.03
$\Delta_{\text{sol}} H_m^\circ(\text{MoO}_3, \text{cr}, 298.15 \text{ K}) = -(77.06 \pm 0.09) \text{ kJ} \cdot \text{mol}^{-1}$			

$\text{Li}^+(\text{aq}, \infty)^{(11)}$ and $\text{CrO}_4^{2-}(\text{aq}, \infty)^{(12)}$ $\Delta_f H_m^\circ(\text{Li}_2\text{CrO}_4, \text{cr}, 298.15 \text{ K})$ was derived as $-(1393.7 \pm 0.3) \text{ kJ} \cdot \text{mol}^{-1}$. The only reported value: $-(1394.6 \pm 1.9) \text{ kJ} \cdot \text{mol}^{-1}$ by O'Hare *et al.*⁽¹³⁾ based on $\Delta_{\text{sol}} H_m^\circ$ of Shidlovskii *et al.*, agrees very well with the present value.

The molar enthalpy of solution at $T = 298.15 \text{ K}$ of Li_2O was obtained as $-(133.01 \pm 0.20) \text{ kJ} \cdot \text{mol}^{-1}$ in close agreement with the value $-(132.80 \pm 0.33) \text{ kJ} \cdot \text{mol}^{-1}$ reported in the JANAF tables.⁽¹⁴⁾ This confirms the purity of Li_2O used in the present study. The molar enthalpies of solution of MoO_3 , Li_2MoO_4 , and $(\text{Li}_2\text{O} + \text{MoO}_3)$ at $T = 298.15 \text{ K}$ in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ are given in tables 2, 3, and 4, respectively.

The molar enthalpy of solution of MoO_3 at $T = 298.15 \text{ K}$ in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ was found to be $-(77.06 \pm 0.09) \text{ kJ} \cdot \text{mol}^{-1}$ and the molar enthalpies of solution of Li_2MoO_4 and $(\text{Li}_2\text{O} + \text{MoO}_3)$ were found to be $-(31.69 \pm 0.47) \text{ kJ} \cdot \text{mol}^{-1}$ and $-(207.11 \pm 0.07) \text{ kJ} \cdot \text{mol}^{-1}$ respectively. The molar enthalpies of solution of MoO_3 and Li_2MoO_4 are listed in table 5 for comparison with the literature, with which the present values are in good agreement, with the

TABLE 3. The standard molar enthalpy of solution of $\text{Li}_2\text{MoO}_4(\text{cr})$ at $T = 298.15 \text{ K}$ in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$. In every run 350.0 g of $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ was used as the solvent. Molar mass of $\text{Li}_2\text{MoO}_4(\text{cr})$ was taken as $173.8156 \text{ g} \cdot \text{mol}^{-1}$. Uncertainty is equal to twice the standard deviation of the mean

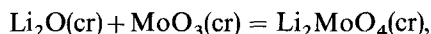
Run	$\frac{m(\text{Li}_2\text{MoO}_4, \text{cr})}{\text{g}}$	$\frac{-\Delta_{\text{sol}} H^\circ}{\text{J}}$	$\frac{-\Delta_{\text{sol}} H_m^\circ}{\text{kJ} \cdot \text{mol}^{-1}}$
1	0.12260	22.9	32.43
2	0.13370	24.4	31.75
3	0.10540	19.4	31.98
4	0.13800	24.5	30.93
5	0.12870	23.5	31.80
6	0.16350	29.4	31.28
$\Delta_{\text{sol}} H_m^\circ(\text{Li}_2\text{MoO}_4, \text{cr}, 298.15 \text{ K}) = -(31.69 \pm 0.47) \text{ kJ} \cdot \text{mol}^{-1}$			

TABLE 4. Enthalpy of reaction at $T = 298.15$ K of $(\text{Li}_2\text{O} + \text{MoO}_3)$ in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$. In each run 350.0 g of $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ was used. Molar mass of $\text{Li}_2\text{O}(\text{cr})$ and $\text{MoO}_3(\text{cr})$ were taken as $29.8774 \text{ g} \cdot \text{mol}^{-1}$ and $143.9382 \text{ g} \cdot \text{mol}^{-1}$, respectively. Uncertainty is equal to twice the standard deviation of the mean

Run	$m(\text{Li}_2\text{O} + \text{MoO}_3)$ g	$-\Delta_r H^\circ$ J	$-\Delta_r H_m^\circ$ $\text{kJ} \cdot \text{mol}^{-1}$
1	0.10384	123.7	207.05
2	0.10559	125.8	207.08
3	0.11100	132.3	207.17
4	0.11548	137.6	207.11
5	0.12153	144.9	207.24
6	0.12234	145.7	207.00
7	0.29082	346.6	207.15
8	0.29495	351.8	207.32
9	0.29710	353.8	206.99
10	0.30278	360.6	207.01
$\Delta_r H_m^\circ(\text{Li}_2\text{O} + \text{MoO}_3, \text{cr}, 298.15 \text{ K}) = -(207.11 \pm 0.07) \text{ kJ} \cdot \text{mol}^{-1}$			

exception of the value reported by Thien and Zharkova. This confirms the accuracy of our method.

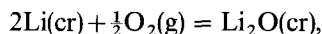
The enthalpy of formation of Li_2MoO_4 from solid oxides, $\Delta_{f, \text{oxide}} H_m^\circ$, at $T = 298.15$ K using the reaction:



was obtained as the difference of enthalpy of solution of Li_2MoO_4 from that of $(\text{Li}_2\text{O} + \text{MoO}_3)$ in the same solvent: $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$:

$$\Delta_{f, \text{oxides}} H_m^\circ(\text{Li}_2\text{MoO}_4, \text{cr}, 298.15 \text{ K}) = \Delta_{\text{sol}} H_m^\circ\{(\text{Li}_2\text{O} + \text{MoO}_3), \text{cr}, 298.15 \text{ K}\} - \Delta_{\text{sol}} H_m^\circ(\text{Li}_2\text{MoO}_4, \text{cr}, 298.15 \text{ K}).$$

The standard molar enthalpy of formation from oxides was obtained as $-(175.42 \pm 0.47) \text{ kJ} \cdot \text{mol}^{-1}$. The thermochemical cycle to derive the standard molar enthalpy of formation from elements at $T = 298.15$ K is given in table 6. The molar enthalpy change for the reaction:



was taken as $-(598.73 \pm 2.09) \text{ kJ} \cdot \text{mol}^{-1}$ from the JANAF tables⁽¹⁴⁾ and for the

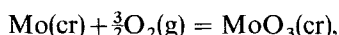
TABLE 5. Comparison of $\Delta_r H_m^\circ$ values of $\text{MoO}_3(\text{cr})$ and $\text{Li}_2\text{MoO}_4(\text{cr})$ in $\text{LiOH}(\text{aq})$ at $T = 298.15$ K

Authors	$-\Delta_r H_m^\circ/(\text{kJ} \cdot \text{mol}^{-1})$	
	$\text{MoO}_3(\text{cr})$	$\text{Li}_2\text{MoO}_4(\text{cr})$
Present work ($0.1 \text{ mol} \cdot \text{dm}^{-3}$)	77.06 ± 0.09	31.69 ± 0.47
O'Hare <i>et al.</i> ($0.2 \text{ mol} \cdot \text{dm}^{-3}$)	77.57 ± 0.17	31.84 ± 0.04
Suponitskii <i>et al.</i> ($0.5 \text{ mol} \cdot \text{dm}^{-3}$)	77.19 ± 0.54	32.25 ± 0.04
Thien and Zharkova ($0.3 \text{ mol} \cdot \text{dm}^{-3}$)	93.47 ± 0.38	38.49 ± 0.42

TABLE 6. The thermochemical cycle to derive the standard molar enthalpy of formation $\Delta_f H_m^\circ$ at $T = 298.15$ K of $\text{Li}_2\text{MoO}_4(\text{cr})$. Uncertainties in reaction (3) and (4) are quoted from references 14 and 15, respectively. Uncertainty in reaction (5) is the square root of the sum of the uncertainties in reactions (1) to (4)

1. $\text{Li}_2\text{O}(\text{cr}) + \text{MoO}_3(\text{cr}) = \text{Li}_2\text{MoO}_4(\text{cr}); \quad \Delta_{f, \text{oxides}} H_m^\circ = -(175.42 \pm 0.47) \text{ kJ} \cdot \text{mol}^{-1}.$
2. $2\text{Li}(\text{cr}) + \frac{1}{2}\text{O}_2(\text{g}) = \text{Li}_2\text{O}(\text{cr}); \quad \Delta_f H_m^\circ = -(598.73 \pm 2.09) \text{ kJ} \cdot \text{mol}^{-1}.$
3. $\text{Mo}(\text{cr}) + \frac{3}{2}\text{O}_2(\text{g}) = \text{MoO}_3(\text{cr}); \quad \Delta_f H_m^\circ = -(745.09 \pm 0.33) \text{ kJ} \cdot \text{mol}^{-1}.$
4. $2\text{Li}(\text{cr}) + \text{Mo}(\text{cr}) + 2\text{O}_2(\text{g}) = \text{Li}_2\text{MoO}_4(\text{cr}); \quad -\Delta_f H_m^\circ = (175.42 + 598.73 + 745.09 \pm 2.2) \text{ kJ} \cdot \text{mol}^{-1} \approx -(1519.2 \pm 2.2) \text{ kJ} \cdot \text{mol}^{-1}.$

reaction:



as $-(745.09 \pm 0.33) \text{ kJ} \cdot \text{mol}^{-1}$ from Wagman *et al.*⁽¹⁵⁾ The $\Delta_f H_m^\circ$ value for $\text{Li}_2\text{MoO}_4(\text{cr})$ was derived as $-(1519.3 \pm 2.2) \text{ kJ} \cdot \text{mol}^{-1}$ and is in good agreement with the literature values as seen from table 7. The value reported by Thien and Zharkova is about $9 \text{ kJ} \cdot \text{mol}^{-1}$ more negative than the rest of the results and as already pointed out by O'Hare *et al.*⁽⁵⁾ it seems to have calorimetric bias (enthalpy of solution of both MoO_3 and Li_2MoO_4 are 20 per cent more negative). Further the value $-(1522.5 \pm 0.8) \text{ kJ} \cdot \text{mol}^{-1}$ reported by Suponitskii *et al.* is based on the enthalpy of solution of $\text{Li}_2\text{MoO}_4(\text{cr})$ in $\text{LiOH}(\text{aq}, 0.3 \text{ mol} \cdot \text{dm}^{-3})$ and the enthalpy of formation of the ions $\text{Li}^+(\text{aq}, \infty)$ and $\text{MoO}_4^{2-}(\text{aq}, \infty)$, where hydrolysis will affect the result. To account for this hydrolysis effect we have measured the enthalpy of solution of lithium molybdate in water and from the difference of enthalpy of solution of lithium molybdate in $\text{LiOH}(\text{aq}, 0.1 \text{ mol} \cdot \text{dm}^{-3})$ and in water we obtained a value of $3.25 \text{ kJ} \cdot \text{mol}^{-1}$ as the enthalpy of hydrolysis. The result of Suponitskii *et al.*⁽⁶⁾ when corrected for the enthalpy of hydrolysis, yielded a value of $-(1519.3 \pm 0.8) \text{ kJ} \cdot \text{mol}^{-1}$ which is also in excellent agreement with the present value.

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TABLE 7. $\Delta_f H_m^\circ$ values of $\text{Li}_2\text{MoO}_4(\text{cr})$ at $T = 298.15$ K

Authors	$-\Delta_f H_m^\circ / (\text{kJ} \cdot \text{mol}^{-1})$
Thien and Zharkova	1528.2 ± 0.8
O'Hare <i>et al.</i>	1519.8 ± 0.5
Suponitskii <i>et al.</i>	1522.5 ± 0.8
	1519.3 ± 0.8^a
CATCH Table	1518.5 ± 4.4
Present work	1519.2 ± 2.2

^a $\Delta_f H_m^\circ$ value of $\text{Li}_2\text{MoO}_4(\text{cr})$ after correcting for the enthalpy of hydrolysis as determined in the present work.

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