

研究论文

配合物  $\text{Zn}(\text{Met})\text{SO}_4 \cdot \text{H}_2\text{O}(\text{s})$  的低温热容和标准摩尔生成焓

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摘要 利用精密自动绝热热量计直接测定了配合物  $\text{Zn}(\text{Met})\text{SO}_4 \cdot \text{H}_2\text{O}(\text{s})$  在 78~370 K 温区的摩尔热容.

通过热容曲线的解析得到该配合物的起始脱水温度为  $T_0 = 329.50 \text{ K}$ .

将该温区的摩尔热容实验值用最小二乘法拟合得到摩尔热容 ( $C_{p,m}$ ) 对温度 ( $T$ ) 的多项式方程, 并且在此基础上计算出了它的舒平热容值和各种热力学函数值. 依据 Hess 定律, 通过设计热化学循环, 选择体积为  $100 \text{ cm}^3$ 、浓度为  $2 \text{ mol} \cdot \text{L}^{-1}$  的盐酸作为量热溶剂, 利用等温环境溶解-反应热量计, 测定和推算出该配合物的标准摩尔生成焓为  $\Delta_f H_m^0 = -(2069.30 \pm 0.74) \text{ kJ} \cdot \text{mol}^{-1}$ .

关键词 [Zn\(Met\)SO<sub>4</sub>·H<sub>2</sub>O\(s\)](#) [绝热量热法](#) [低温热容](#) [溶解-反应量热法](#) [标准摩尔生成焓](#)

分类号

## Low-Temperature Heat Capacities and Standard Molar Enthalpy of Formation of Complex $\text{Zn}(\text{Met})\text{SO}_4 \cdot \text{H}_2\text{O}(\text{s})$

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**Abstract** Low-temperature heat capacities of complex  $\text{Zn}(\text{Met})\text{SO}_4 \cdot \text{H}_2\text{O}(\text{s})$  have been precisely measured with a small sample precision automated adiabatic calorimeter over the temperature range from 78 to 370 K. The initial dehydration temperature of the complex ( $T_0 = 329.50 \text{ K}$ ) has been obtained by means of the analysis of a heat capacity curve. The experimental values of molar heat capacities have been fitted to a polynomial equation of heat capacities ( $C_{p,m}$ ) vs. the temperature ( $T$ ) with the least square method. The smoothed heat capacities and the thermodynamic functions of the complex have been calculated on the basis of the equation. In accordance with Hess law, the standard molar enthalpy of formation for the complex was determined as  $\Delta_f H_m^0 = -(2069.30 \pm 0.74) \text{ kJ} \cdot \text{mol}^{-1}$ , by using an isoperibol solution-reaction calorimeter, designing a thermochemical cycle and choosing  $100 \text{ mL}$  of  $2 \text{ mol} \cdot \text{dm}^{-3} \text{ HCl}$  as calorimetric solvent.

**Key words** [Zn\(Met\)SO<sub>4</sub>·H<sub>2</sub>O\(s\)](#) [adiabatic calorimetry](#) [low-temperature heat capacity](#) [isoperibol solution-reaction calorimetry](#) [standard molar enthalpy of formation](#)

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