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Full Papers

# 苏糖酸钾的低温热溶及标准摩尔生成焓测定

魏青[1]，陈三平[1]，高胜利[*,1]，谭志诚[2]，史启祯[1]

a西北大学化学系，西安，710069
b中科院大连化学物理研究所热化学研究实验室，大连，116023

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摘要 以苏糖酸与碳酸氢钾反应制得苏糖酸钾$K(C_4H_7O_5)\cdot H_2O$，通过红外光谱、热重、化学分析及元素分析等对其进行了表征。用精密自动绝热热量计测量了该化合物在78K-395K温区的摩尔热容。实验结果表明，该化合物存在明显的脱水转变，其脱水浓度、摩尔脱水焓以及摩尔脱水熵分别为：(380.524 ± 0.093) K，(19.655 ± 0.012) kJ/mol 和 (51.618 ± 0.051) J/（K·mol）。将78K-362K和382K-395K两个温区的实验热容值用最小二乘法拟合，得到了两个表示热容随温度变化的多项式方程。以RBC-II型恒容转动弹热量计测定目标化合物的恒容燃烧能为(-1749.71 ± 0.91) kJ/mol，计算得到其标准摩尔生成焓为(-1292.56 ± 1.06) kJ/mol。

关键词 苏糖酸钾,低温热容,绝热量热,转动弹燃烧量热,标准摩尔生成焓

分类号



## Low-temperature Heat Capacity and Standard Molar Enthalpy of Formation of Potassium *L*-Threonate Hydrate $K(C_4H_7O_5)\cdot H_2O$

WEI Qing[1], CHEN San-Ping[1], GAO Sheng-Li[*,1], DI You-Ying[2], TAN Zhi-Cheng[2], SHI Qi-Zhen[1]

[1] *Department of Chemistry, Northwest University, Xi'an, Shaanxi 710069, China*

[2] *Thermochemistry Laboratory, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, Liaoning 116023, China*

**Abstract** The solid potassium *L*-threonate hydrate, $K(C_4H_7O_5)\cdot H_2O$, was synthesized by the reaction of *L*-threonic acid with aqueous potassium hydrogen carbonate and characterized by means of chemical and elemental analyses, IR and TG-DTG. Low-temperature heat capacity of $K(C_4H_7O_5)\cdot H_2O$ has been precisely measured with a small sample precise automated adiabatic calorimeter over the temperature range from 78 to 395 K. An obvious process of the dehydration occurred in the temperature region of 364—382 K. The peak temperature of the dehydration of the compound has been observed to be (380.524±0.093) K by means of the heat capacity measurements. The molar enthalpy, $\Delta_d H_m$, and molar entropy, $\Delta_d S_m$, of the dehydration of $K(C_4H_7O_5)\cdot H_2O$ were calculated to be (19.655±0.012) kJ/mol and (51.618±0.051) J/(K•mol) by the analysis of the heat-capacity curve. The experimental molar heat capacities of the solid from 78 to 362 K and from 382 to 395 K have been respectively fitted to two polynomial equations of heat capacities against the reduced temperatures by least square method. The constant-volume energy of combustion of the compound, $\Delta_c U_m$, has been determined to be (−1749.71±0.91) kJ•mol$^{-1}$ by an RBC-II precision rotary-bomb combustion calorimeter at 298.15 K. The standard molar enthalpy of formation of the compound, $\Delta_f H_m^{\theta}$, has been calculated to be (−1292.56±1.06) kJ•mol$^{-1}$ from the combination of the standard molar enthalpy of combustion of the compound with other auxiliary thermodynamic quantities.

**Key words** potassium *L*-threonate hydrate low-temperature heat capacity adiabatic calorimetry rotary-bomb combustion calorimetry standard molar enthalpy of formation

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通讯作者 高胜利 gaoshli@nwu.edu.cn