

# $K_2FeO_4$ 的制备、表征及其电化学性能

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**摘要:** 高产率制备  $K_2FeO_4$  以及考察用其制作碱性 Zn/ $K_2FeO_4$  模拟电池的电性能。以 KClO<sub>4</sub>、Fe(NO<sub>3</sub>)<sub>3</sub> 为原料, 用氧化法制备  $K_2FeO_4$ , 研究了反应温度、反应时间以及 KClO<sub>4</sub> 与 Fe(NO<sub>3</sub>)<sub>3</sub> 物质的量比等因素对  $K_2FeO_4$  产率的影响; 用红外光谱对产物进行了分析表征; 还测试了碱性 Zn/ $K_2FeO_4$  模拟电池的电性能。研究表明: 在饱和的 KOH 体系下控制反应温度为 30℃, 反应时间为 90min, KClO<sub>4</sub> 与 Fe(NO<sub>3</sub>)<sub>3</sub> 的物质的量比为 1.5 : 1.0 时制备  $K_2FeO_4$  可得到最佳产率; 红外光谱的分析证实, 所得产物的主要成分是  $K_2FeO_4$ ; 碱性 Zn/ $K_2FeO_4$  模拟电池的电性能与碱性 Zn/MnO<sub>2</sub> 模拟电池的相比, 开路电压达 1.72V(后者为 1.5V), 平均工作电压 1.42V(后者为 1.2V); 放电曲线更平稳,  $K_2FeO_4$  的放电比容量比 MnO<sub>2</sub> 的高 48.7%。

**关键词:** 高铁酸钾; 制备; 正极材料

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## Preparation and characterization of $K_2FeO_4$ and its electrochemical performance

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**Abstract:** In order to synthesize  $K_2FeO_4$  effectively and study electrochemical performance of alkaline Zn/ $K_2FeO_4$  experimental battery,  $K_2FeO_4$  was prepared by using KClO<sub>4</sub> to oxidize Fe(NO<sub>3</sub>)<sub>3</sub>. The effects of reaction temperature, reaction time and the molar ratio of KClO<sub>4</sub> to Fe(NO<sub>3</sub>)<sub>3</sub> on the productivity of  $K_2FeO_4$  were studied. The results showed that the best  $K_2FeO_4$  productivity could be obtained under the saturated KOH solution, the reaction temperature was 30℃, reaction time was 90min and the molar ratio of KClO<sub>4</sub> to Fe(NO<sub>3</sub>)<sub>3</sub> was 1.5 : 1.0. The IR spectroscopy result confirmed that the major component of the product was  $K_2FeO_4$ . Alkaline Zn/ $K_2FeO_4$  experimental battery showed a steady discharge curve and its average discharge potential and open-circuit potential was 1.42V and 1.72V compared with 1.2V and 1.5V of the Zn/ MnO<sub>2</sub> experimental battery, and  $K_2FeO_4$  cathode could get 48.7% more specific capacity than MnO<sub>2</sub>.

**Key words:** potassium ferrate; preparation; cathode material