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铬酸酐电化学合成中阳极液在钛基多元金属氧化物复合电极上的电化研究

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摘要 针对铬酸酐传统生产技术中存在问题, 开发了电化学合成铬酸酐的绿色新技术. 本技术所用阳极液为重铬酸钠水溶液, 阳极为自制钛基多元金属氧化物复合电极. 作为该技术系列基础研究的一部分, 本文用循环伏安法研究了重铬酸钠水溶液在钛基复合电极上的电化性能. 通过160个循环的电氧化反应, 表明该电极具有很稳定的电化性能. 实验测得不同温度、不同扫描速度 v 、不同浓度重铬酸钠溶液即重铬酸钠存在下水在电极上的氧化峰峰电流 i_p 和峰电位 E_p , 建立了 $i_p \sim v^{1/2}$ 和 $E_p \sim \ln v$ 方程, 表明电极反应是主要受扩散控制的不可逆反应. 求得电极反应的动力学参数和反应活化能, 初步讨论了温度的影响.

关键词 [重铬酸钠](#) [电化学合成](#) [循环伏安法](#) [不可逆反应](#) [动力学参数](#)

分类号

Electrochemical study on anolyte for electrosynthesis of chromic anhydride on combination electrode of titanium matrix with multiple-unit metal oxides coating

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Abstract

A new green technology of producing chromic anhydride with an electrochemical synthesis method was studied to solve the pollution problems in the traditional production process of chromic anhydride. The anolyte used was sodium dichromate solution, and the anode used was a self-made combination electrode of titanium matrix with a multiple-unit metal oxides active coating. The electrochemical behavior of sodium dichromate solution on a combination electrode of titanium matrix was studied with cyclic voltammetry as a part of the fundamental researches of this technique. The electrooxidation reaction of 160 cycles indicated that the electrode possessed a very stable electrochemical behavior. The peak currents i_p and peak potentials E_p of the oxidation peaks for sodium dichromate solution of different concentrations, *i.e.*, water under the existence of sodium dichromate, were experimentally measured at different temperatures and sweep rates v on the electrode. The equations of peak current I_p versus $v^{1/2}$ and peak potential E_p versus $\ln v$ were established, indicating that the electrode reaction was an irreversible diffusion-controlled reaction. The kinetic parameters and activation energy of electrode reaction was calculated, and the effects of temperature on the kinetic parameters and activation energy were preliminarily discussed.

Key words [sodium dichromate](#) [electrochemical synthesis](#) [cyclic voltammetry](#) [irreversible reaction](#) [kinetic parameter](#)

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