

分离工程

二(2-乙基己基)磷酸萃取Cr(III)的陈化特性

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摘要 近年来, 关于溶剂萃取法回收Cr(III)的文献报道较多, 而对其反萃行为的研究则较少。酸性磷氧类萃取剂负载Cr(III)后易发生缩合反应, 形成难以被反萃的稳定缩合物, 萃取剂难以再生, 即发生“陈化”现象。本文使用10% D2EHPA/10%正辛醇/磺化煤油为萃取剂, 0.6 mol·L⁻¹ H₂SO₄为反萃剂, 以反萃为手段研究了陈化现象的机理。考察了Cr(III)浓度和实验温度对陈化速率的影响, 进而提出了缩合反应的机理和数学模型, 并据此拟合了反应动力学参数, 计算了反应活化能。结果显示, 陈化反应速率随温度的升高而加快, 反应级数为1.57, 反应速率常数约(2.49×10⁻³)~(4.06×10⁻²), 反应活化能(43.0 kJ·mol⁻¹)较低, 在常温下极易自发反应。采用拟合参数对陈化过程进行模拟, 提出若以30 min内的陈化率控制在3%以下为目标, 工业操作温度应控制在23℃以下。

关键词

[D2EHPA](#) [Cr\(III\)](#) [反萃](#) [陈化现象](#) [动力学](#)

分类号

Aging behavior of Cr(III) extracted with D2EHPA

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Abstract

In recent years, the extraction characteristics of Cr(III) with the acidic organophosphate extractants have been studied, while the researches on the back-extraction of Cr(III) were seldom reported. The acidic extractants loaded with Cr(III) condense easily and form stable complex which can be hardly back-extracted to the aqueous phase, *i.e.*, the extractant can't be regenerated. This is so-called 'aging'. In this paper, 10% D2EHPA/10% 1-octanol/kerosene was used as the solvent, 0.6 mol·L⁻¹ H₂SO₄ was used as the back-extraction agent, and the back-extraction was used as a method to study the aging process. The effect of Cr(III) concentration and temperature on the aging process was investigated. The condensation reaction mechanism and a mathematic model were proposed. The aging dynamic parameters were simulated on the basis of this model, and the activation energy of aging process was obtained by regressing the experimental data. The results showed that the condensation reaction rate increased with temperature quickly. The reaction order was 1.57 and the rate constants varied between 2.49×10⁻³ and 4.06×10⁻². The activation energy of aging process was low enough for a spontaneous reaction (43.0 kJ·mol⁻¹). Furthermore, the operating temperature of below 23℃ in an industrial process is suggested on the condition of aging efficiency below 3% within 30 min.

Key words

[D2EHPA](#) [Cr\(III\)](#) [back-extraction](#) [aging](#) [dynamics](#)

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