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超声置换与机制研究

摘要

目前，利用锌粉去除硫酸锌电解液中的钴存在锌粉结块、包封等问题，导致锌粉用量增加，去除效果差。针对这些问题，提出新型超声波强化锌粉净化方法，以去除硫酸锌电解质中的钴 (II)。在超声条件 60 min，温度 80℃，锌粉用量 3 g/L, 钴 (II) 的去除率为 95.02%，钴 (II) 的剩余浓度为 0.99 mg/L。与常规置换相比，超声强化置换反应将反应时间缩短 100 min，反应温度降低 10℃，锌粉用量降低 50%，去除率提高 23.65%，显著降低钴的浓度。超声波的空化效应与机械效应可以细化颗粒，打破包裹体，加速传质过程，提高钴 (II) 的去除率，从而显著降低锌粉的消耗，减少成本。因此，采用超声强化硫酸锌电解液净化技术对锌电积和钴的综合回收具有重要意义。本研究提出了超声波强化锌粉净化硫酸锌溶液的新工艺，为湿法炼锌企业提供了一个新的研究方向，以期达到节能减排和为企业增效的目的。

关键词

超声，湿法炼锌，净化，锌粉

Abstract

At present, the use of zinc powder to remove cobalt from zinc sulfate electrolyte has problems such as zinc powder agglomeration and encapsulation, resulting in an increase in the amount of zinc powder and a poor removal effect. In order to solve these problems, a new ultrasonic enhanced zinc powder purification method was proposed to remove cobalt (II) from zinc sulfate electrolyte. The removal rate of cobalt (II) was 95.02 % and the residual concentration of cobalt (II) was 0.99 mg / L under the ultrasonic condition of 60 min, 80 ℃ and 3 g / L zinc powder. Compared with conventional replacement, the ultrasonic enhanced replacement reaction shortens the reaction time by 100 min, reduces the reaction temperature by 10 ℃, reduces the amount of zinc powder by 50 %, increases the removal rate by 23.65 %, and significantly reduces the concentration of cobalt. The cavitation effect and mechanical effect of ultrasonic can refine the particles, break the inclusions, accelerate the mass transfer process, improve the removal rate of cobalt (II), thus significantly reducing the consumption of zinc powder and reducing the cost. Therefore, the use of ultrasound-enhanced zinc sulfate electrolyte purification technology is of great significance for the comprehensive recovery of zinc electrowinning and cobalt. This study proposes a new process of ultrasonic strengthening zinc powder to purify zinc sulfate solution, which provides a new research direction for zinc hydrometallurgy enterprises, in order to achieve the purpose of energy saving and emission reduction and efficiency improvement for enterprises.

Keywords

Ultrasonic, zinc hydrometallurgy, purification, zinc powder

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