

### 论文摘要

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## Pb/Zn冶炼废渣生物浸提后余渣的潜在毒性

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**摘 要:** 在pH为1.5、温度为65 °C、废渣浓度为5%的优化浸出条件下, 通过摇瓶实验, 结合扫描电子显微镜、X射线衍射仪和BCR法三步连续提取, 研究生物浸提Pb/Zn冶炼废渣后余渣中重金属元素的潜在毒性。结果表明: 生物浸出3d后, 废渣中As、Cd、Cu和Zn含量分别由原渣中的5 055、20.7、10 718和29 681 g/t降至1 107、2.5、410和4 821 g/t; 而Pb主要以硫酸铅及黄钾铁矾类物质等形式沉积在浸出渣中。余渣中As、Cd、Cu、Pb和Zn等重金属主要以残留态存在, 其环境活性和潜在危害远低于中国有色金属工业固体废物污染控制标准(GB5085—85)的规定, 生物浸出能有效实现Pb/Zn冶炼废渣的无害化机理。

**关键字:** Pb/Zn冶炼废渣; 生物浸出; 浸出毒性; 无害化机理

## Potential toxicity of bioleached residues from Pb/Zn smelting slag

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**Abstract:** Shaking flask experiments were used to study the bioleaching of heavy metals from Pb/Zn smelting slag under the optimized conditions, which are determined to be pH1.5, 65 °C and pulp density of 5%. The residues from the bioleaching were analyzed by scanning electron microscopy, XRD and three-stage BCR sequential extraction procedure. The results show that the heavy metal contents (As, Cd, Cu and Zn) are sharply decreased after 3-day leaching, from 5 055, 20.7, 10 718 and 29 681 g/t to 1 107, 2.5, 410 and 4 821 g/t, respectively. However, the lead mainly deposits in the residues as lead sulfate and jarosite-type compounds. As, Cd, Cu, Pb and Zn in the residues mainly exist in residual form. The environmental availability and potential risk of heavy metals are significantly less than those commended by the Standard for Solid Wastes From Nonferrous Metal Industry of China (GB5085—85), proving that bioleaching can effectively reduce the potential toxicity of Pb/Zn smelting slags.

**Key words:** Pb/Zn smelting slag; bioleaching; leaching toxicity; innocuous treatment

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