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生物沥浸对精对苯二甲酸化工污泥脱水性能的提高及其重金属脱除效果

Removal of heavy metals and dewaterability of pure terephthalic acid sludge facilitated by bioleaching

关键词: [化工污泥](#) [生物沥浸](#) [脱水性能](#) [重金属](#) [厢式压滤机](#)

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摘要: 通过摇瓶培养试验研究了生物沥浸处理对精对苯二甲酸(PTA)化工污泥脱水性能和重金属去除效果的影响.研究表明,PTA污泥经生物沥浸后脱水效果得到了较好的改善,且营养剂最佳投加量为 $5\text{g} \cdot \text{L}^{-1}$.经生物沥浸2d后污泥的pH从7.37下降到2.29,比阻从 $62.64 \times 10^{12} \text{m} \cdot \text{kg}^{-1}$ 下降到 $2.36 \times 10^{12} \text{m} \cdot \text{kg}^{-1}$,降低了96.23%.在最佳处理条件下对该化工污泥进行多批次生物沥浸中试试验,并对沥浸后污泥采用厢式压滤机脱水.结果表明,经生物沥浸处理后污泥静置24h,污泥沉降率可从2%提高到33%,厢式压滤脱水后泥饼含水率下降到45.9%,与对照相比,污泥体积减少了91.1%.泥饼中Cu、Cd、Pb、Zn、Co的去除率分别为95.15%、85.20%、42.11%、82.59%和64.42%;滤液中COD和氨态氮去除率分别为42.82%和74.98%.可见,生物沥浸法不仅能够较好地改善化工污泥的脱水性能,还能脱除污泥中的重金属.这对生物沥浸技术在PTA化工污泥上的应用和推广具有重要意义.

Abstract. Removal of heavy metals and dewaterability effect of pure terephthalic acid sludge during bioleaching were investigated through batch flask experiments. Results showed that the dewaterability of chemical sludge was improved after bioleaching. The optimum dosage of microbial nutritional substance was $5 \text{g} \cdot \text{L}^{-1}$. Under this condition, the pH in the sludge system declined from 7.37 to 2.29, and the specific resistance to filtration (SRF) value decreased from $62.64 \times 10^{12} \text{m} \cdot \text{kg}^{-1}$ to $2.36 \times 10^{12} \text{m} \cdot \text{kg}^{-1}$ after 2 days of bioleaching. The waste bioleached sludge was collected and dewatered by chamber filter press after multi-batch experiments under the optimum operation conditions. It was found that the 24h sedimentation rate of sludge was improved from 2% to 33% after the third batch of bioleaching process. The moisture of dewatered sludge was reduced to 45.9% by chamber filter press, and the sludge volume reduced 91.1% compared with the control. The removal efficiency of Cu, Cd, Pb, Zn and Co in sludge cake were 95.15%, 85.20%, 42.11%, 82.59% and 64.42%, respectively. At the same time, the removal rate of COD and $\text{NH}_3\text{-N}$ in filtrate was 42.82% and 74.98% after sludge dewatering. It is obvious that the bioleaching technology could not only improve the dewaterability of chemical industry sludge but also remove the heavy metals to some extent. This study has a significant implication for the bioleaching method application and promotion in the chemical industry field.

Key words. [pure terephthalic acid sludge](#) [bioleaching](#) [dewaterability](#) [heavy metals](#) [chamber filter press](#)

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