

The Study of Organic Acid Leaching Technology within the Hydrometallurgical Process for Recycling Spent Lithium-Ion Batteries

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Abstract

The rapid growth of the electric vehicle market, the need to recycle spent batteries for metal recovery has become increasingly crucial. Among the various techniques employed, the hydrometallurgical process is predominantly used due to its commercial viability. Yet, this method often involves acid leaching, which raises substantial environmental and economic issues because it generates significant volumes of hazardous gases and wastewater. To mitigate these problems, research is underway to explore alternative leaching agents such as organic acids, alkalis, and microbial solutions. Organic acids are particularly promising owing to their biodegradability, manageable handling, absence of hazardous gas emissions, and potential for reuse. Despite their advantages, the development and application of organic acid leaching techniques remain underdeveloped. This study focuses on enhancing the wet smelting process for recycling batteries by investigating the efficacy of organic acid leaching and elucidating the underlying mechanisms of its leaching performance. The goal is to develop a more sustainable and eco-friendly method for recovering metals from spent electric vehicle batteries.