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Alternative reducing agents for Lithium-Ion batteries recycling via hydrometallurgical process

Maria del Mar Cerrillo-Gonzalez, Maria Villen-Guzman, Carlos Vereda-Alonso, Juan Manuel Paz-Garcia, Jose Miguel Rodriguez-Maroto

Lithium-ion batteries (LIB) are a key factor in the transition to a decarbonised and clean energy system due to their application in the power sector and electric transport. However, a growing demand of these batteries involves two direct problems: an increase in the generation of spent LIBs as well as in the demand of raw materials. Hence, the development of efficient recycling treatment of LIBs is crucial to make them a true enabler of the green transition.

Currently, the LIBs recycling process can be divided into pyrometallurgical and hydrometallurgical. The first one is based on the treatment of LIBs at high temperatures to produces metal pyrolysis and metal reduction, while the second method consists in the recovery of metals via acidic leaching. Although pyrometallurgical method is the most used in the industry, hydrometallurgical process presents a series of advantages, such as low energy consumption, high metal recovery and high product purity, that make it more promising in the search of more effective recycling method. In the hydrometallurgical process, the addition of acids and reducing agents is required to dissolve the solid particles and extract the valuable metals.

The purpose of this work was to evaluate the effect of alternative reducing agent in the leaching process to maximize the amount of metal (Mn, Li, Ni, Co) recovered from a real LIBs waste. With this aim, the leaching processes were carried out using as reducing agent H_2O_2, Fe and NH_4Cl. According to the experimental results, Fe and NH_4Cl enhance the extraction yield as well as the reaction time comparing with the results obtain using H_2O_2.

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