LEACHING PROPERTIES OF LEAD PASTE IN SPENT LEAD-ACID BATTERY WITH A HYDROMETALLURGICAL PROCESS AT ROOM TEMPERATURE

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Abstract

In this study, as part of developing a green recycling process of spent lead-acid battery that can avoid both smelting and electro-winning, leaching agent citric acid and other additives (such as sodium citrate and hydrogen peroxide) in aqueous media were reacted with spent lead-acid battery paste. PbO, PbO₂ and PbSO₄, which are the three main components in a spent lead-acid battery paste, were leached to form lead citrate precursor which was crystallized and then separated from the solution. Reaction between spent lead-acid battery paste and citric acid based reagents at the pH of 3~4, yielded lead citrate, Pb(C₆H₆O₇)·H₂O, which was characterized by XRD, SEM and FT-IR analysis. The optimal conditions for leaching spent lead-acid battery paste at room temperature were found to be: 2.19 mol L⁻¹ of C₆H₈O₇·H₂O, 1.29 mol L⁻¹ of Na₃C₆H₅O₇·2H₂O solution, 1/5 as the starting ratio of spent lead-acid battery paste to water (S/L) and reaction time of 8 h. The results showed that up to 98 % of lead from spent lead-acid battery paste was converted to the lead citrate under the optimal conditions.

Key words: hazardous waste, lead citrate, lead paste, recovery, spent lead-acid battery

Received: August, 2011; Revised final: March, 2012; Accepted: March, 2012

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