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Comparative Analysis of Different Carboxylic Leaching Agents for Lead Battery Recycling

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Extended Abstract

Lead batteries account about 60% of the world's electric power storage batteries. An automobile lead battery weighing approximately 17 Kg contains 35% lead paste and 29% lead. About 50% of the world's lead consumption derive from recycled and reused materials [1]. Currently, pyrometallurgical methods account for more than 90% of lead recovery technology. However, they are severely criticized because the emission of sulfur dioxide by decomposing lead sulphate at elevated temperatures in addition to emissions of particulate matter [2].

The lead recovery from the recycling of batteries by hydrometallurgical processes has been investigated as an alternative to the pyrometallurgical processes. Therefore, a comparative thermodynamic analysis was studied by leaching of lead from carboxylic leaching agents (Citrate, Acetic, oxalic, EDTA and NTA). Three levels conditions were established, varying the concentration factors and S / L ratio, setting the temperature, pH and agitation speed. Hydrazine was used as reducing agent and hydrogen peroxide as oxidizing agent [3]. Also, the behaviour of lead at electrolysis step was analyzed.

The results obtained showed recoveries of up to 90% in the above-mentioned conditions, being Citrate the leaching agent with greater efficiency.

References

[1] A. Smaniotto, A. Antunes, I. D. N. Filho, L. D. Venquiaruto, D. de Oliveira, A. Mossi, M. Di Luccio, H. Treichel, and R. Dallago, "Qualitative lead extraction from recycled lead-acid batteries slag.," *J. Hazard. Mater.*, vol. 172, no. 2-3, pp. 1677-80, 2009.

[2] M. S. Sonmez and R. V. Kumar, "Leaching of waste battery paste components. Part 1: Lead citrate synthesis from PbO and PbO2," *Hydrometallurgy*, vol. 95, no. 1-2, pp. 53-60, 2009.

[3] R. Zárate-Gutiérrez and G. T. Lapidus, "Anglesite (PbSO4) leaching in citrate solutions," *Hydrometallurgy*, vol. 144-145, pp. 124-128, 2014.