Service Life Assessment of Lead and its Alloy Anodes During Zinc Electrowinning

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Lead (Pb) and its alloy anodes are widely used in the process of zinc electrowinning. It is important, yet difficult, to evaluate the service life of different anodes with varying components. In this work, electrochemical accelerated corrosion tests were investigated for the prediction of service life. Corrosion of pure Pb, Pb-0.75 wt.% Ag, and Pb-0.287 wt.% Ag-0.914 wt.% Ca anodes were investigated in the simulated electrolyte with and without manganese ion. Corrosion potentials, polarizing resistances, corrosion currents, and current efficiencies of the three typical anodes are further discussed. The semi-empirical relationship between corrosion rate and current density was suggested to obtain consumption rates of Pb-based anodes by rapid evaluation in the bench-scale experiments. Both the service life and the energy efficiency can be acquired according to the expression obtained.

Keywords: Corrosion rate; Pb; Anode; Zinc electrowinning

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