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Recovery of nickel with the addition of boric acid using an electrodeposition reactor

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ABSTRACT

Nickel pollution is usually caused by several industrial processes such as electroplating, plastics manufacturing, nickel–cadmium batteries, fertilizers, pigments, mining and metallurgy. The development of the effective and inexpensive methods is necessary for the removal and/or recovery of nickel. In this work, the electro-treatment of a high strength industrial lead frame nickel-plating wastewater ([Ni] = 1,600 mg/L) was studied through a newly designed electrodeposition reactor. The electrolyte was circulated rapidly past the anode and cathode at a higher flow rate, allowing for improvements in efficiency and recovery, and nickel electrodeposition on the surface of cathode. The results showed that increasing boric acid concentration could increase the efficiency of nickel removal. The pH decreased during the electro-treatment was due to the production of H^+ on the cathode surface. Therefore, the optimum pH periodically controlled was found to be 2.9±0.2, and the lower current density was accompanied with the higher current efficiency. This study successfully proposed a newly designed reactor to recover 99.9% nickel from simulated wastewater.

Keywords: Nickel-plating wastewater; Boric acid; Electrodeposition

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