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Practical assessment of electrocoagulation process in removing nickel metal from aqueous solutions using iron-rod electrodes

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ABSTRACT

The aim of this study was to investigate the practical application of electrocoagulation (EC) process in removal of nickel from aqueous solutions by iron-rod electrodes. This experimental research was carried out as a pilot scale using forty bipolar iron-rod electrodes in a glass container with a 1.5 l capacity which was connected to an electrical source. The removal efficiency of nickel from synthetic solutions was measured with initial nickel concentrations of 5 and 500 mg l^{-1}, at pH of 3, 7 and 10, reaction times of 20, 40, 60 and 80 min and electrical potentials of 20, 30 and 40 V. Results showed that by increasing pH, nickel removal efficiency for each concentration has increased, as much as 99.9% and 99.8% for 500 and 5 mg l^{-1} concentrations respectively. The optimum removal efficiencies at nickel concentrations of 500 and 5 mg l^{-1} were reached at 20 and 40 min of reaction time and 20 V of potential difference respectively. The final pH of treated solutions has also increased which was due to rise in acidic pH and decrease in alcoholic pH. The results represent that EC process could be introduced as a promising technology and as an alternative method instead of other procedures in removing nickel from tainted aqueous solutions.

Keywords: Electrocoagulation; Industrial wastewater; Nickel removal; Heavy metal; Aqueous solutions; Iron electrode

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