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Electrocoagulation for chromium removal in simulated water: response surface methodology

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Wen the global community moves towards a sustainable environmental development concept, providing safe drinking water to the community is a challenge. Cr(VI) is a priority pollutant, released to natural water bodies through industrial processes could pose deleterious health effects on humans and other aquatic organisms. Therefore, the effluents should be treated in such a way to keep the concentration of Cr(VI) below the maximum contaminant level (<0.1 mg/L) and to secure health and wellbeing. Electrocoagulation (EC) is a promising technique for remediation of water and wastewater. A laboratory scale EC batch reactor consisting of two Al electrodes as both anode and cathode arranged in a mono-polar configuration with a distance of 10 mm was employed in this study. Response surface methodology (RSM) statistical approach was used to identify the optimal Cr(VI) removal in simulated water containing 5 mg/L Cr(VI), 150 mg/L Ca^{2+}, 50 mg/L Mg^{2+} and 5 mg/L F^- ions. The initial conductivity and pH were found to be 900 µS cm^{-1} and 6.0 respectively. Under optimized conditions based on RSM analysis, optimal removal efficiency of chromium (100%) was achieved in this reactor at the expense of 2.92 kW h/m^3 electrical energy at initial pH 6.0.

Keywords: Aluminium electrodes, Chromium removal, Electrocoagulation, Response surface methodology

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