Oil-in-water Emulsion Breaking by Electrocoagulation in a Modified Electrochemical Cell

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Separation of oil from oil-in-water (O/W) emulsion using the electrocoagulation technique was investigated in an electrochemical cell employing new anode geometry. The anode was a horizontal coiled aluminum cylinder with an outer diameter of 1 cm and 0.5 cm gap between turns, the cathode was a horizontal Al disc placed at the bottom of the cell. The present anode geometry allows the use of the anode outer surface for electrocoagulation and the inner surface as a heat exchange facility to control the solution temperature. Variables studied are applied current density, electrolyte conductivity, initial pH of the electrolyte and initial oil concentration. Within the range of parameters studied, the % removal was found to increase with increasing current density, solution conductivity and initial pH in the range (3-8) with the increase in initial oil concentration has a negative effect on the % removal. In order to optimize (technical and economical) the parameters of the present study, electrical energy consumption ($\text{kW}\cdot\text{h}/\text{m}^3$) was calculated at various operating conditions.

Keywords: Electrocoagulation; Wastewater; Emulsion; Oil removal

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