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Effect of Electrodes Spacing on Energy Consumption of Electrocoagulation Cells

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Abstract : In spite of the acknowledged advantages of the electrocoagulation (EC) method to remove a wide range of pollutants from waters and wastewaters, its efficiency is limited by several operational parameters (such as electrolysis time, current density, electrode material, distance between electrodes, and water temperature). Hence, optimizing these key operating parameters is considered a vital step to remove a pollutant efficiently. In this context, the present study has been carried out to explore the influence of electrodes spacing on energy consumption, temperature of the water being treated, and iron removal from water. To achieve this target, iron containing synthetic water samples were electrolysed for 20 min, using a new flow column electrocoagulation reactor (FCER), at three different gaps between electrodes (5, 10, and 20 mm). These batch experiments were commenced at a constant current density of 1.5 mA/cm^2 and initial pH of 6. The obtained results demonstrated that increasing gap between electrodes negatively influenced the performance of the EC method. It was found that increasing the gap between electrodes from 5 to 20 mm increased the energy consumption from about 3.3 to 7.3 kW.h/m^3, and water temperature from 20.2 to 22 °C, respectively. In addition, it has been found, after 20 min of electrolysing, that increasing the gap between electrodes from 5 to 20 mm increased the residual iron concentration from 0.05 to 1.01 mg/L, respectively.

Keywords : electrocoagulation, water, electrodes, iron
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