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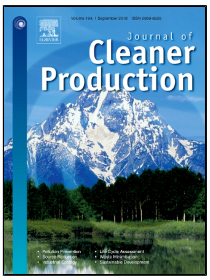

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A Clean Production Process for Edible Oil Removal from Wastewater using an Electroflotation with Horizontal Arrangement of Mesh Electrodes

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Abstract

In this study, a novel electrochemical process using horizontal arrangement of stainless steel mesh electrodes was proposed to improve the flotation rate of oily wastewater treatment with emphasis on kinetic analysis and by-products removal. The effect of the current density (1.64-6.54 mA/cm^2), initial pH (3-9), electrode distance (1-3 cm), supporting electrolyte (50- 350 mg/l), and initial concentration (1000-4000 mg/l as COD) were investigated, and the optimum reaction conditions were found to be 4.11 mA/cm^2, 80 min, pH 7, 1 cm, a NaCl concentration of 150 mg/l, and a chemical oxygen demand concentration (COD) of 4000 mg/l, respectively. The generated sludge and scum were examined through X-ray fluorescence and X-ray diffraction analyses. The types of fatty acids present and their removal efficiencies were evaluated using the gas chromatography-flame ionization detector technique. The surface morphology of the mesh electrodes was studied using scanning electron microscopy. The highest chemical oxygen demand removal efficiency was calculated to be 94.6% ± 0.2%, and gas chromathography analysis showed that 97.71% of fatty acids were removed. The kinetics study showed that the removal reaction was consistent with a pseudo-second order equation.