Treatment of simulated dairy wastewater by electrocoagulation

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Abstract

A study was conducted to assess the potential of electrooxidation and electrocoagulation on the removal of organic matter from simulated dairy industry wastewater. The electrochemical process was carried out in a batch reactor equippped with iron electrodes. The effects of current, contact time, iron production, electrolyte concentration and pH were investigated and optimum operating range for each parameter was experimentally determined. The results obtained were useful to clarify the mechanism that is involved in the electrochemical treatment of this kind of wastewater. Comparing the electrochemical results with the results obtained from conventional coagulation (using $FeCl_3$) and filtration, it was found that electrocoagulation was the only governing mechanism in this research for the removal of COD and turbidity. The current density had a significant effect on the kinetics of the wastewater treatment for both COD and turbidity removal efficiencies. After attaining maximum removal efficiency of 67-69%, for all concentrations under all currents, COD abatement remained the same for higher contact times. 0.4 A current at 10 min of contact time are the optimum ranges determined for obtaining maximum removal efficiency at the initial COD concentrations of 2500 ppm, 5000 ppm and 10000 ppm, respectively. In terms of iron dosage; 69.5, 138.9 & 138.9 mg/l were required to obtain maximum removal for the three initial concentrations. The change in the removal efficiency after increasing the pH and conductivity (by using NaCl) was also analyzed. Increase in pH and conductivity did not show any significant change in the removal efficiency of the process.