Purification and detoxification of petroleumrefinery wastewater by electrochemical process

N. Gousmi, A. Sahmi, H.Z. Li, S. Poncin, R. Djebbar & K. Bensadok

Abstract: The treatment of synthetic oily wastewater having the characteristics of a typical petrochemicalwastewater (PRW) by electrocoagulation (EC) using iron and aluminum electrodes was conducted inan electrolytic reactor equipped with fluid recirculation. During the treatment, the emulsion stabilitywas followed by the measurement of Zeta potential and particle sizes. Effects of some operatingconditions such as electrodes material, current density and electrolysis time on removal efficiencies ofturbidity and chemical oxygen demand (COD) were investigated in details. The PRW purification byEC process was found most effective using aluminum as anode and cathode, current density of 60A/m2 and 30 min of electrolysis time. Under these conditions, the process efficiencies were 83.52% and 99.94% respectively for COD and turbidity removals which correspond to final values of 96 mgO2/L and 0.5 NTU. A moderate energy consumption (0.341 kWh) was needed to treat 1 m3 of PRW.Besides, the ecotoxicicity test proved that toxic substances presented in the PRW, and those inhibitingthe germination growth of whet, were eliminated by the EC technique.

Keywords : petroleum wastewater purification, electrocoagulation, energy consumption, ecotoxicity test.