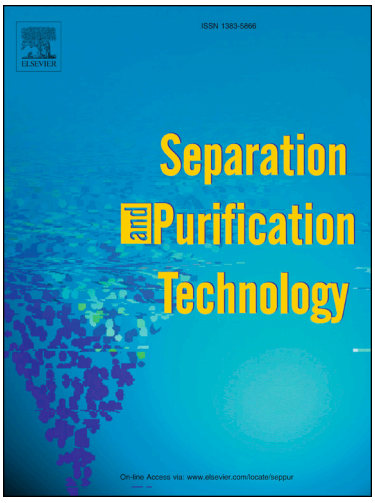

Removal of pharmaceutical from water with an electrocoagulation process; effect of various parameters and studies of isotherm and kinetic

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Removal of pharmaceutical from water with an electrocoagulation process; effect of various parameters and studies of isotherm and kinetic.

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Abstract

Electrocoagulation with different anode-cathode configurations were used for the removal of oxytetracycline hydrochloride. Anode material, time, current density and initial concentration were varied to determine the effect of these parameters on removal efficiency. Specifically, iron and aluminium were used as anode materials and stainless steel was used for the cathode. It was found that aluminum is more effective than iron as an anode material for removing oxytetracycline hydrochloride. The optimum current density was 20 mA/cm^2 for both anodes: iron and aluminium had a removal efficiency of 93.2% and 87.75%, respectively. The effect of initial concentration on removal efficiency was also studied: increasing the initial concentration of oxytetracycline hydrochloride up to 200 mg/L did not have a significant impact on its removal. The pH, E_h and dissolved oxygen of all samples were measured during the experiments: with both anode-cathode combinations, pH was seen to increase considerably, while E_h and dissolved oxygen decreased substantially. The energy consumption of electrocoagulation was also calculated, demonstrating that this method is not energy demanding. Finally, isotherm and kinetic parameters were calculated: Both iron and aluminium anodes obey Sips isotherm and pseudo-first order kinetic.

Keywords: Electrocoagulation, Oxytetracycline hydrochloride, Pharmaceuticals, Kinetic, Isotherm

1. Introduction