

عنوان مقاله:

Energetic and economic assessment of electrocoagulation-flocculation process for separation of microalgae biomass

محل انتشار:

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خلاصه مقاله:

The high energy input for harvesting biomass makes current commercial microalgae biodiesel production economically unfeasible. In this study, the effect of current intensity, electrode gap, application time, stirring speed and electrode material on the recovery efficiency, energy consumption, amount of electrode dissolution and operation costs was investigated in batch tests. In addition the optimization of recovery of *Dunaliella salina* microalgae by the electrocoagulation-flocculation (ECF) process was conducted using multifactor response surface methodology (combining categorical with numeric factors) based on the D-optimal design. The results indicated that, maximum microalgae recovery efficiency achieved up to 98.06% with, electrical energy consumption of 2.4 kWh kg⁻¹; electrodes dissolution of 17.117 mmol L⁻¹; electrical energy consumption costs of 0.033 \$ kg⁻¹; electrodes dissolution costs of 0.98 \$ kg⁻¹ and the total consumption cost of 1.013 \$ per kg of microalgae biomass. Multiple response optimization for maximizing recovery efficiency, and minimizing energy consumption and electrodes dissolution showed 93.84% recovery efficiency with electrical energy consumption of 0.3 kWh kg⁻¹; electrodes dissolution of 5.3 mmol L⁻¹; electrical energy consumption costs of 0.004 \$ kg⁻¹; electrodes dissolution costs of 0.28 \$ kg⁻¹ and the total operation cost of 0.284 \$ per kg of microalgae biomass with aluminum as electrode material. Results of the prediction models .were validated through laboratory scale batch experiments

کلمات کلیدی:

Energy consumption, Electrode dissolution, Electrocoagulation-flocculation, Recovery efficiency, Microalgae, Separation

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