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A novel method to harvest *Chlorella sp.* via low cost bioflocculant: Influence of temperature with kinetic and thermodynamic functions

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Abstract

In this study, harvesting efficiency (HE) of bioflocculant (egg shell) was observed with variation in flocculent concentrations (0-100mgL⁻¹), temperature (30°C, 35°C 40°C, 45°C and 50°C) and variable contact time (0-50 minutes). It was found maximum (≈95.6%) with 100 mgL⁻¹ bioflocculant concentration whereas influence of temperature was also observed with optimized concentration of bioflocculant (100 mgL⁻¹) at 40°C (≈ 98.1%) and 50°C (≈99.3%), in 30 minutes of contact time. Significant changes in algal cell structures were also analyzed after exposure to various temperatures with microscopy, SEM (Scanning electron microscopy) and EDS (Energy dispersive X-ray spectroscopy) images with and without bioflocculant. The experimental data was found to be a good fit with pseudo-second order kinetic model. The thermodynamic functions such as ΔG (Gibbs free energy), ΔH (Enthalpy), ΔS (Entropy) were also determined. The negative value of ΔG and positive value of ΔH and ΔS shows the spontaneous and endothermic nature of flocculation process.

Keyword: Bioflocculant, low-cost, biomass harvesting, kinetic models, thermodynamic functions.

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