



Implementing eggplant peels as an efficient bio-adsorbent for treatment of oily domestic wastewater

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ABSTRACT

The removal of oil from domestic wastewater was achieved by implementing eggplant peels (EPP) powder as an efficient bio-adsorbent material. The batch adsorption process was adopted to reach the acceptable range that allowed in Iraqi standardizations, which should not exceed (10 mg L⁻¹). The characterization of EPP was conducted with X-ray diffraction (XRD) spectroscopy, scanning electron microscopy (SEM), Fourier transform infrared (FT-IR) spectroscopy, and Brunauer–Emmett–Teller (BET). Two variables were taken into consideration, including time and temperature. It was noticed that these two variables had an essential impact in decreasing oil concentration in domestic wastewater. The temperature has an excellent effect comparing with time in decreasing the oil concentration from domestic wastewater; as both time and temperature increased, the oil concentration decreased. Results manifested that the adsorption method was effective in decreasing the oil concentration. Also, the results elucidated that the adsorption isotherms can be reasonably befitting via the Langmuir model due to the chemisorption that occurs on the surface between bio-adsorbent and pollutant with a determination coefficient of (0.8376). The adsorption kinetics of the oily wastewater upon the adsorbate was vigorously denoted via a pseudo-first-order kinetic model. The thermodynamic variables were assessed for determining free energy change (ΔG°), enthalpy change (ΔH°), and entropy change (ΔS°).

Keywords: Wastewater treatment; Bio-adsorbent; Oily domestic wastewater; Eggplant peels; Adsorption process; Environmental pollution; Low cost adsorbent; Batch adsorption; Environment technology; Natural adsorbent

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