



Crude Oil and Heavy Metal Removal from Produced Water Using Pomegranate Peel Powder

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Abstract

This work was carried out to detect the effectiveness of pomegranate peel powder (PPP) as an adsorbent for removing crude oil (CO) and toxic compounds from produced water (PW). The variables studied were contact time (CT), pH, adsorbent dose PPP, and adsorbate concentration CO. The PPP adsorbents were analyzed using scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR). The results showed that the percentage of adsorption increased with increasing CT, pH, and adsorbent dose, while decreasing with increasing adsorbate concentration. In the current study, CO and heavy metals were removed from the PW of the Bazargan oilfield. The best result of CO removal was (98.57%) obtained in condition (CT=60 min, pH=9.0, adsorbent dose=2.75 g/L, and adsorbate concentration=210 mg/L, which pertains to the initial concentration). Heavy metals were removed with high efficiency (90–96%). Adsorption data from the experiments were analyzed using the Langmuir, Freundlich, and Temkin equations. The experimental data were best described by the Langmuir model, with a correlation coefficient of $R^2 = 0.988$. The maximum adsorption capacity obtained experimentally is 383 mg/g, which is close to the value calculated using the Langmuir model (473.2 mg/g).

Keywords Pomegranate peel · Adsorption · Equilibrium isotherms · Produced water · Natural material