



Produced water treatment using naturally abundant pomegranate peel

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ABSTRACT

Pomegranate peel powder (PPP) was employed as a low cost adsorbent for the removal of crude oil from simulated produced water (SPW). The effect of contact time, adsorbent dosage, pH, as well as temperature on the efficiency of oil removal was investigated. The optimum parameters for oil removal were: pH 9.5, adsorbent dose = 2.33 g/L, contact time = 50.0 min, and adsorption temperature = 55.0°C. The results showed that as the adsorbent dosage, pH, and salinity of SPW were increased, the removal efficiency increased. The adsorption of crude oil by PPP was found to follow the Langmuir adsorption isotherm, with adsorption capacity of 555 mg/g. The adsorption kinetics of crude oil are best described by a pseudo-second-order kinetic model, with a rate constant of 3.75×10^{-4} g/mg h. These results render PPP as an excellent adsorbent for the removal of oil from produced water with an efficiency exceeding 92% in 50 min.

Keywords: Produced water; Pomegranate peel; Biosorbent; Equilibrium isotherms; Kinetic model; Organic and inorganic pollutants

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