



Experimental evaluation of Farashband gas refinery wastewater treatment through activated carbon and natural zeolite adsorption process

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ABSTRACT

The treatment of oily wastewater produced from Farashband gas refinery through adsorption process has been presented using activated carbon (AC) and natural zeolite (NA). For the purpose of identifying the characteristics of the adsorbents, scanning electron microscopy, X-ray diffraction, and Brunauer–Emmett–Teller analysis were performed. According to the results, since the specific surface area of AC was around 897 m²/g which was much greater than 19.87 m²/g of NA, AC had considerably better performance than NA for oily wastewater treatment. The comparison between the adsorptive capacity of adsorbents revealed that using 30 g/L of activated carbon at 300 rpm reduced the amount of chemical oxygen demand (COD) from 848 to less than 60 ppm (93% removal) while within the examined dosage range of NA (5–40 g/L), the COD decreased only from 848 to 756 ppm (10% removal). Moreover, the modification of AC with phosphoric acid improved the adsorption efficiency significantly in terms of adsorbent consumption. The removal percentage which was acquired by applying 20 g/L of the modified AC (33% reduction in AC consumption) was equivalent to that attained by 30 g/L of unmodified AC. Kinetic analysis signified that the adsorption for both adsorbents followed the pseudo-first-order kinetic model equation.

Keywords: Oily wastewater treatment; Adsorption process; Activated carbon; Natural zeolite

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