Adsorptive desulfurization of model fuel by activated oil palm shell

Abstract

The suitability and effectiveness of oil palm shells (OPS) as low cost adsorbents via physical activation for desulphurization of a model fuel under different concentrations have been studied. Batch mode experiments have been conducted to remove benzothiophine (BT) concentrations from the model fuel prepared from n-octane and p-xylene. The activated carbon (AC) has been characterized with fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM). The specific surface area and the pore-size distribution are determined using the Brunauer, Emmet and Teller (BET) and Barret, Joyner and Halenda (BJH) methods, respectively. The surface area is found to be 15.41 m2/g while total pore volume is 0.028cm3/g. The activated OPS is categorized as mesophorous adsorbent since the average pore size is 4.2 nm. The equilibrium data is best described by the Langmuir isotherm model and maximum adsorption capacity of this adsorbent is 2.75 mg/g. In addition, the rate of adsorption of BT is found to follow the pseudo-second-order kinetic model.