

Porosity characteristics and pore developments of various particle sizes palm kernel shells activated carbon (PKSAC) and its potential applications

ABSTRACT

The adsorption behaviour and the micro- and mesopore size distributions of commercial palm kernel shell activated carbons (PKSAC) and other commercial activated carbon are characterized. The results showed that PKSAC are predominantly microporous materials, where micropores account 68–79% of total porosity. On the other hand, commercial activated carbons: Norit SX Plus, Calgon 12×40, and Shirasagi “A” activated carbons contained high mesopore fraction ranging from 33 to 52%. The analysis showed that the degree of mesoporosity of PKSAC is increased steadily with the decrease of particle size. This is due to the presence of channels interconnect the smaller pores in the interior of smaller particle size PKSAC. The smaller size PKSAC particle that is highly mesoporous has performed better on the adsorption of larger molecules such as methylene blue. On the other hand, bigger size PKSAC particle has better performance on the adsorption of smaller adsorbates such as iodine.

Keyword: Palm kernel shell activated carbons; Nanoporous; Mesoporosity; Particle size; Adsorption; Diffusion