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PREPARATION AND PHENOLS ADSORPTION PROPERTY OF POROUS CARBON FROM OIL PALM EMPTY FRUIT BUNCHES

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ABSTRACT

Porous carbons were prepared from the potassium hydroxide (KOH) treated selfadhesive carbon grains (SACG) produced by ball milling and sieving of the precarbonized oil palm empty fruit bunch (EFB). The SACG were treated with KOH at different percentages (0-70 % by weight). The treated SACG was carbonized at 700 °C in nitrogen environment using a multi-steps heating profile. After carbonization, the carbon powders were cooled to room temperature, washed with distilled water and hydrochloric acid solution. Characterization by nitrogen adsorption isotherm at 77 K showed that the surface area and pore volume of the carbon powders increased as the percentages of KOH increased, they are dominated by micropores. The maximum surface area of 432 m_2/g was obtained for the sample treated with KOH 70 wt %. Batch adsorption was carried out at room temperature to determine the adsorption of phenols by the carbon powders. Percentages removal of phenols by the carbon powders using adsorption isotherms found to be increased as the surface area and pore volume increased. The percentages removal of phenol for sample treated with KOH 70 wt % is 72 %, which is only 22 % inferior to the commercial carbon. In order to describe the isotherm mathematically, the experimental data of the removal equilibrium were correlated by the Freundlich and Langmuir equations and the result showed that the phenol adsorption isotherm of all samples seen to fit the Freunlich and Langmuir adsorption isotherm model satisfactorily and indicated that the adsorption condition is favourable. The scanning electron microscopy (SEM) study of the carbon powders showed the enhancement of porous structures as the percentages of KOH increased.

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