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Thermal Regeneration of CO2 Spent Palm Shell-Polyetheretherketone Activated Carbon Sorbents

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Abstract : Activated carbons (M4P0, M4P2, and M5P2) used in this research were produced from palm shell and polyetherether ketone (PEEK) via carbonization, impregnation, and microwave activation. The adsorption/desorption process was carried out using static volumetric adsorption. Regeneration is important in the overall economy of the process and waste minimization. This work focuses on the thermal regeneration of the CO2 exhausted microwave activated carbons. The regeneration strategy adopted was thermal with nitrogen purge desorption with N2 feed flow rate of 20 ml/min for 1 h at atmospheric pressure followed by drying at 1500C. Seven successive adsorption/regeneration processes were carried out on the material. It was found that after seven adsorption regeneration cycles; the regeneration efficiency (RE) for CO2 activated carbon from palm shell only (M4P0) was more than 90% while that of hybrid palm shell-PEEK (M4P2, M5P2) was above 95%. The cyclic adsorption and regeneration shows the stability of the adsorbent materials.

Keywords : activated carbon, palm shell-PEEK, regeneration, thermal
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