

Homopiperazine grafted mesoporous materials for CO₂ adsorption

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Chlorofunctionalized mesoporous MCM-41, SBA-15, MCM-48 and KIT-6 were synthesized by co-condensation of 3-chloropropyl-trimethoxy-silane (CPTMS) and sodium silicate solution obtained from Rice Husk Ash (RHA) and subsequently grafted with homopiperazine (HPZ). X-ray powder diffraction (XRD) and BET results of the parent mesoporous silica suggested their closeness of structural properties to those obtained from conventional silica sources. CO₂ adsorption studies of all homopiperazine grafted mesoporous silicas showed 7-10 wt% of CO₂ adsorption capacity and adsorption reaction is through the established carbamate mechanism. The order of CO₂ adsorption was observed to be MCM-48/TREN > MCM-41/TREN > SBA-15/TREN.