

Preparation and characterization of CO₂ adsorbents based on amine-attached mesoporous molecular sieve MCM-41

고용식*, 장현태¹, 박윤국²
신성대학; ¹한서대학교; ²홍익대학교
(ysko@shinsung.ac.kr*)

Two different types of amine-attached mesoporous silica MCM-41 using 3-aminopropyltriethoxysilane were prepared and investigated for CO₂ adsorption. The pore structures and amino group content in these modified silicas were investigated by XRD, FT-IR, TGA, N₂ adsorption-desorption and CHN analysis, which confirmed that in all cases the amino groups were attached to the pore surface of mesoporous silica MCM-41. The CO₂ adsorption capacity of the adsorbent prepared by grafting method was compared with that of the adsorbent prepared by coating method. The N₂ adsorption-desorption analysis showed a considerable decrease of the pore volume and surface area for the amine-attached mesoporous silica MCM-41 samples. The amine-coated mesoporous silica samples showed higher CO₂ adsorption capacity than amine-grafted MCM-41. The adsorption-desorption isotherms of CO₂ and thermogravimetric analysis of the sorbents showed that these sorbents can be regenerated completely under mild conditions such as those used in pressure swing or temperature swing adsorption processes.