

Carbon dioxide capture by as-prepared and amine-group modified HMS

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The mesoporous molecular sieve with wormhole framework structure denoted HMS was synthesized, using alkylamine as the structure director. We studied the CO₂ adsorption performance of as-prepared HMS because the surfactant was supposed to have an adsorption capacity of CO₂. At 25°C, we got a capacity of 34mg/g and the capacity decreased with the temperature increasing. After removing the surfactant, we impregnated PEI (polyethylenimine) and TEPA (tetraethylene pentamine) on the mesoporous material and used them for the CO₂ adsorption test. At same loading amount, TEPA/HMS always showed better performance than that of PEI work. Both of them gave best results at 90°C when using high purity CO₂ for the test, whereas these hybrid materials were not stable enough for prolonged operation at this temperature. They were very stable within 4 runs when we did the cyclic experiment at 75°C. The highest CO₂ adsorption capacity appeared at lower temperature when we used 5% CO₂ for the test which was due to the partial pressure decreasing of CO₂. The capacity was no big difference when we compared it with that for high purity CO₂ at 75°C. This good performance in diluted CO₂ will be very useful for the practical application.