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AMINO-FUNCTIONALIZED MESOPOROUS MATERIALS USED FOR CO_2 ADSORPTION

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Abstract

In this paper CO_2 adsorption over SBA-15 and MCM-41 molecular sieves functionalized by grafting technique with 3-aminopropyl-triethoxy silane was investigated. Starting from commonly used SBA-15 molecular sieve a different sample named SSBA-15 was synthesized by tetraethyl orthosilicate hydrolysis using P123 block copolymer as surfactant and 1-phenyldecane as expansion agent. The surface of SSBA-15 molecular sieve was modified by two ways synthesis steps: first using (3-Glycidyloxypropyl) trimethoxysilane and second by introduction of ethylene diamine (N2) as an amination agent. The prepared amino-functionalized mesoporous materials were further characterized by different investigation methods: FT-IR spectrometry, X-ray diffraction analysis, SEM-EDX, nitrogen physisorption analysis at 77 K. Adsorption-desorption measurements towards CO_2 were investigated using Temperature-Programmed desorption (TPD). In order to find the optimum value of the adsorption–desorption process, the influence of temperature in the range of 50-80 °C was followed. Using a combination of mass spectrometry and thermogravimetry the resulted gases during the adsorption–desorption process of CO_2 was identified. Compared to already published literature, the herein reported results of the studied amino functionalized sieves for CO_2 adsorption-desorption process are significantly better and can be considered as promising. The best results obtained in case of MCM-41-sil were further investigated by adsorption-desorption cycles.

Key words: adsorption-desorption cycles, adsorbent efficiency, CO_2 adsorption, molecular sieves grafted, temperature influence

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