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ABSTRACT BOOK

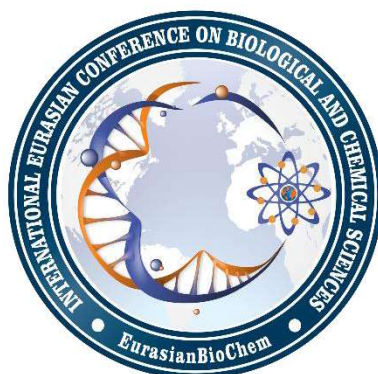


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➤ POSTER PRESENTATION

Adsorption of NO_x on Barium-Based MCM-41 Sorbents

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Abstract

Nitrogen oxides (NO_x) are discharged by atmospheric organic decays, forest fires, lightning, and microbiological processes in the earth. The main source of NO_x is partial lean burn gasoline engines and diesel engines. NO_x trap catalysts are the newest control technology for NO_x emissions that consist of mostly NO and NO₂ which are corrosive on materials and toxic for human health. In atmospheric conditions NO oxidize directly to the NO₂. NO_x trapping materials can be found among the alkali and alkaline earth metal oxides, in which BaO has been extensively studied. In this study, NO₂ adsorption were investigated on Ba-based MCM-41 sorbents that are synthesized both direct hydrothermal synthesis and wet impregnation method. MCM-41, which stands for Mobil Composition of Matter No. 41 discovered in 1992, shows a highly ordered hexagonal array of unidimensional pores with a very narrow pore size distribution. MCM-41 supported sorbents were characterized by XRD, N₂ adsorption-desorption and SEM-EDS analysis. It was observed from XRD analysis that in Ba-based adsorbents, barium oxide and barium species were determined besides silicate formation. Adsorption-desorption isotherms showed type IV isotherm according to the IUPAC classification of adsorption isotherms typical of mesoporous solids. Homogeneous pore size distributions were obtained. Pore size of the sorbent prepared by impregnation method is larger than the sorbent prepared by direct hydrothermal method. EDS results showed that Ba had been incorporated into the structure effectively with good dispersion in both sorbents. NO_x adsorption studies were conducted in a quartz-tubular continuous flow reactor (i.d.= 10 mm) using 0.2 g fresh sorbent at 200 °C. The outlet concentration of NO, NO₂ and total NO_x were monitored online by a chemiluminescence NO_x analyzer. As a result of the experimental studies, 20% Ba impregnated MCM-41 adsorbent showed better performance (39 mg NO_x/ g Adsorbent) due to the surface barium oxide species that characterized by XRD analysis.

Keywords: NO_x, adsorption, barium, MCM-41.

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