Adsorption Equilibrium of VOCs in Washcoated Monolith with MCM-48

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The ordered mesoporous materials have great potential and new opportunities in the fields of adsorption application area. Adsorption properties of these materials have been widely studied by using various gases, organic solvents, heavy metals, and bio chemicals. A cordierite honeycomb ceramic substrate with 600cells cm-2 was used as starting material of the monolith adsorbent. The sample employed in this work was obtained by using the washcoat method. Cylindrical ceramic substrate of 2.54 cm in diameter and 5.7 cm in length was washcoated with MCM-48. Nitrogen adsorption and desorption isotherms at 77 K were measured using a Micrometrics ASAP 2020. Adsorption experimental equilibrium data in wide range of temperature and concentration is essential for design and optimization of the adsorption processes. Therefore, the adsorption equilibria for several organic vapors on washcoated monolith adsorbent were measured using a gravimetric method. The equilibrium data were obtained at various temperatures. The Hybrid isotherm equations were successful in correlating the experimental isotherms. Moreover, the surface heterogeneity of washcoated monolith was evaluated in terms of an isosteric enthalpy of adsorption.