Synthesis, characterization, and application of nano-perfluorooctyl alumina for adsorption of methyl tertiary-butyl ether (MTBE) from aqueous medium

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Received 14 April 2014; Accepted 18 April 2015

ABSTRACT

In this work, adsorptions of Methyl tertiary-butyl ether (MTBE) onto two novel adsorbents, i.e. nano-perfluorooctyl alumina was prepared using nano-γ-alumina (nano-PFOALG) and nano-boehmite (nano-PFOALB) as the supports were investigated. The surface areas of the nano-γ-alumina and nano-boehmite were determined as 265.7 and 319.5 m²/g, respectively. The equilibrium adsorption behavior of the nanoadsorbents was studied for adsorption of (MTBE) in a wide range (100–1,750 mg/L) of aqueous phase concentrations. The maximum adsorption capacities were 46.0 and 44.4 mg MTBE/g adsorbent for nano-PFOALG and nano-PFOALB, respectively. The Freundlich, Langmuir, and Brunauer–Emmet–Teller (BET) isotherms were used for modeling of MTBE adsorption on nano-PFOALG and nano-PFOALB from aqueous medium. The experimental results of MTBE adsorption on the surface of nano-PFOAL adsorbents obeyed a type IV van der Waals adsorption trend, which can be modeled best by the BET isotherm up to pore filling concentration.

Keywords: Adsorption; Nano-γ-alumina; Nano-perfluorooctyl alumina; MTBE; BET isotherm