

Study of adsorption properties of mesoporous silica by reversed gas chromatography

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Abstract

The mesoporous silica material was synthesized by the template method in a high-pressure autoclave. In addition, the texture characteristics (specific surface, volume and pore diameter) and the size of the obtained particles have been studied. The thermodynamic characteristics of sorption (sorption heat and entropy of sorption) of model organic compounds were obtained by inverse gas chromatography in the region of extremely low sorbate concentrations (Henry's region). Likewise the energy contributions of specific interactions to the total energy for the sorption of sorbates from the gas phase on the synthesized mesoporous silica material were calculated for the sorption of substances from the gas phase on the synthesized mesoporous silica material. For a comparative evaluation of the sorption mechanism of the model organic compounds were studied on porous silica, and the relationship between the energy component of the process (the heat of adsorption) and the change in entropy were analyzed. Also it is shown that a linear correlation is observed between these thermodynamic quantities, which indicates a certain similarity of the mechanism of sorption of the sorbates studied on synthesized mesoporous silica. Furthermore it was established that the entropy component of the process predominates in the sorption of model organic compounds on the mesoporous siliceous material studied.

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