

NMR and X-ray diffraction studies of the influence of adsorbed molecule nature on phase transitions in a ZSM-5 silicalite

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Abstract

Pulsed NMR and X-ray diffraction analysis are employed to study the influence of adsorbed toluene, p-xylene, acetone, and di(ethylene glycol) (DEG) molecules on phase transitions in a ZSM-5 silicalite. In the region of phase transitions, times T1 and T2 of longitudinal and transverse magnetic relaxation of apolar molecules adsorbed in silicalite micropores increase and decrease in a jumpwise manner, respectively, with a rise in the total content of the liquid. Such changes in T1 and T2 occur for hexane, decane, toluene, and p-xylene molecules. Qualitatively different concentration dependences of T1 and T2 are observed for polar acetone and DEG molecules, because these liquids do not cause a rearrangement in the crystal lattice of silicalite; this is confirmed by the X-ray diffraction data.
