

308c Effect of Surface Chemistry on the Sorption, Wetting and Phase Behavior of Water and Simple Fluids in Novel Ordered Mesoporous Materials

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Significant progress has been achieved during recent years with regard to the understanding of the sorption- and phase behavior of fluids in ordered mesoporous materials. This has led to important improvements in the physical adsorption characterization of porous materials. However, the influence of the chemical nature and heterogeneity of the pore walls on adsorption/desorption isotherms is still under investigation. In order to address some of these problems we performed a systematic experimental study on the adsorption- and phase behavior of simple fluids (nitrogen, argon) and water in novel mesoporous adsorbents consisting of similar ordered and well defined pore structure, but very different surface chemistry (e.g, CMK 1, CMK 3 mesoporous carbons, various periodic mesoporous organosilicas i.e. so-called PMO's, and SBA-15 silica). A detailed analysis of our water sorption isotherms in comparison with the sorption results obtained for simple fluids on the same materials leads to a better understanding of the interplay of confined geometry effects and the strength of the adsorption forces on the sorption, wetting and phase behavior of pore fluids. Our results are therefore important for an accurate physical adsorption characterization of mesoporous materials.