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EFFECT OF SYNTHESIS PARAMETERS ON SORPTIVE PROPERTIES OF GLYCEROL-DERIVED MESOPOROUS CARBON

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Abstract

The effects of synthesis conditions on sorptive properties of glycerol-derived mesoporous carbon materials were studied. Sorption properties of the synthesized carbon-based materials regarding to different adsobate molecules, as well as water vapors, phenol and methylene blue molecules were analyzed. The soption capacity of the synthesized mesoporous carbons depends upon synthesis conditions, namely upon pyrolyzing temperature and carbon precursor to silica weight ratio, being determined by the nature of the adsorbate molecule and the chemical and structural properties of carbon-based mesoporous material. The templated mesoporous carbons were synthesized using two different glycerol/silica weight ratios (0.5 and 1) and were pyrolyzed at various temperatures (800 °C and 1000 °C) to study changes in their textural, structural, morphological and chemical surface properties, as well their sorptive properties. The obtained data showed that both considered parameters, glycerol/silica weight ratio and pyrolysis temperature, are important factors in developing the carbon properties. The variation of above mentioned parameters conduct to a progressive deterioration of the carbon structure, associated with structure shrinking and pore walls breaking. Especially significant changes in the structural properties of the studied mesoporous carbon materials occurred for those heated at 1000 °C, which manifested them selves in a loss of the total pore volume. It was found that the mesoporous carbons exhibited better thermal stability reflected by the presence of residual mesopores and/or nanostructure ordering. The studies show that the adsorption of methylene blue and phenol onto glycerol-derived mesoporous carbon materials is influenced by their surface chemistry given by the synthesis conditions.

Key words: mesoporous carbon, sorptive properties, synthesis parameters

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