

Functionalized Mesoporous Silica: Absorbents for Water Purification

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Abstract : The release of heavy metals into the environment is a potential threat to water and soil quality as well as to plant, animal and human health. In current research work, organically functionalized mesoporous silicates (MSU-H) were prepared by the co-condensation between sodium silicate and organo alkoxy silanes in the presence of the nonionic surfactant triblock copolymer P104. The surfactant was used as a template for improving the porosity of the hybrid gels. Synthesized materials were characterized by TEM, FT-IR, SEM/EDX, TG, surface area analysis. The surface morphology and textural properties of such materials varied with various kinds of groups in the channels. In this study, removal of some heavy metals ions from aqueous solution by adsorption process was investigated. Batch adsorption studies show that the adsorption capacity of metal ions on the functionalized silicates is more than that on pure MSU-H. Data shows adsorption on synthesized materials is a time efficient process, suggesting adsorption on external surface as well as the mesoporous process. Adsorption models of Langmuir, Freundlich, and Temkin depicted equal goodness for all adsorbents, whereas pseudo 2nd order kinetics is in best agreement with experimental data.

Keywords : heavy metals, mesoporous silica, hybrid, adsorption, freundlich, langmuir, temkin

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