Nanoporous silica and carbon materials for effective removal of pharmaceuticals for waters and wastewaters

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Pharmaceuticals are considered nowadays as the main group of the so-called emerging pollutants, and are thought of as potential threats to the environmental ecosystems as well as human health and safety [1]. Although present in trace amounts, their persistent influence can adversely affect human health and the environment. Thus, a serious concern regarding their adverse effects on the ecosystem and public health has been observed. Providing fast and reliable methods of their elimination became a very urgent issue as far as administration of the pharmaceutical emission is concerned. Adsorption is considered as one of the most promising techniques, and the proper choice of the sorbent plays a crucial role here [2]. Nanotechnology offers broad range of opportunities for designing and fabrication of new types of sorbents with enhanced properties. Outstanding properties of nanoporous silica and carbon materials such as high specific surface area, high pore volume, and well defined pores with adjustable sizes are very attractive for the adsorption of biological molecules [3].

In this work we investigate adsorption of the selected biomolecules (ibuprofen, diclofenac, L-histidine) on nanoporous SBA-15 silicas and nanoporous CMK-3 carbons. Both groups of materials are magnificent examples of novel sorbents with enhanced properties obtained by methods offered by nanotechnology. The sorption efficiency of above-mentioned biomolecules (as representatives of pharmaceuticals) is compared with traditional silica and carbon sorbents.

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References

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