MAGNETIC SORBENTS BASED ON ACTIVATED CARBONS FOR ORGANICS' PRECONCENTRATION[*]

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The sorbents for organic substances concentration are widely applied in the field of natural water and soil purification. They are used in the chromatographic analysis of the pollutants in the complex natural objects. Such sorbents should fulfill a number of requirements: high sorption capacity for selected organic substances from aqueous and air medium, high sorption rate, easy desorption, readily separation from the purified medium or analyzed sample. These requirements could be met by magnetic sorbents on the carbonaceous base. The magnetization simplifies the particles' separation from the sample or the desorbing medium. It allows one to decrease the grain size of the sorbent that facilitates the diffusion of the sorbate. In spite of numerous papers and patents in the field of magnetic sorbents few of them are devoted to their preparation on the carbonaceous base. The activated carbons are classical sorbents for the extraction of organic substances from the aqueous and air medium. Thus the research into the possibility of carbonaceous magnetic sorbents preparation for the organic substances concentration is a relevant field of the contemporary chemistry.

The aim of the present work is synthesis of the magnetic sorbents on the carbonaceous base, their complex physical and chemical characterization, and the experimental estimation of their performance in the concentration of organic substances-pollutants from aqueous medium.

The literature survey on the approaches of magnetic carbonaceous sorbents was done. The main methods of magnetic sorbents on the carbon base preparation include:

1. Mixing of the carbon-containing precursor with magnetic particles or their precipitation from the solution followed by carbonization and activation of the material [1];

2. Precipitation of magnetic particles on the high-porous carbon matrix [2];

3. Mechanochemical synthesis using a paste of magnetic particles and carbonaceous sorbent [3].

The main synthetic approaches used in the present work for preparation of magnetite particles were co-precipitation of iron hydroxides II and III or iron hydroxide II oxidation in various conditions. We used commercial samples of the activated carbons as well as selected sorbents prepared from Kuzbass coals activated with potassium hydroxide. The appropriate methods of synthesis were selected and their application range was revised.

The porous structure of the magnetic sorbents obtained was studied with standard methods of low-temperature nitrogen sorption, sorption of methylene blue from aqueous solution, and benzene vapors. We estimated the possibility of prepared magnetic sorbents utilization for concentration of phenol, which is a model organic contaminant of natural water with low maximum permissible concentration.

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