THE EFFECT OF OZONE ON THE STRUCTURE AND PHYSICO-CHEMICAL PROPERTIES OF NANO-DIAMOND AND SHUNGITE NANOCARBON

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Carbon nanoparticles are used in production of adsorbents and filters for water purification and are considered as promising materials in biology and pharmacology. Aqueous dispersions of naturally and synthetically generated carbonaceous materials, Shungite carbon (ShC) and Nano-diamond (ND), with an average particle size 25-50 nm were prepared and stabilized without surfactants. The dispersions were concentrated to prepare powders for further investigation.

A comparative study of the effect of ozonization on the physico-chemical properties of the nanocarbons, that have a similar two-levelled structural pattern and curved graphene shells or their fragments contribute to the formation of the structure and surface properties of both ShC and ND nanoparticles, was conducted.

The ozonization kinetics of ShC and ND showed their high catalytic activity during ozone decomposition. Upon ozonization, the graphene shell is removed selectively from the surface of the diamond core of ND, as shown by FTIR-spectroscopy and TGA analyses. A distinctive characteristic of ShC is a substantial change in structural parameters upon ozonization: structural porosity increases and the size of coherent domains decreases in the direction perpendicular to graphene layers (as shown by SAXS, TEM and electron diffraction data), which agrees with SANS and adsorption experiments that showed an increase in ultramicroporosity and mesoporosity upon ozonization of ShC. The molecular probe technique was used to monitor changes in microporosity of ShC and ND.