
SORPTION PROPERTIES OF NATURAL CARBON MATERIALS IN THE SEPARATION OF SURFACTANTS FROM WATER SOLUTIONS

© **I.V. Yakupova, I.M. Kosygina**, Phd, **A.S. Makarov**, Doctor Of Technical Sciences, I.M. Kryuchko (INSTITUTE OF COLOID AND WATER CHEMISTRY NAS OF UKRAINE, Akademika Vernadskogo Blvd., 42, Kyiv, 03142, Ukraine)

More than 40 % of the world's electricity production comes from thermal power plants. The main (97.5 %) type of fuel for Ukrainian thermal power plants is coal, which is explained by the cheapness and availability of this raw material. Low efficiency and environmental problems in the use of coal determine the relevance of the search for alternative fuels in Ukraine, and one of the main ones is coal-water fuel – a highly concentrated dispersed system in which a dispersed fraction of coal of any calorific value and a liquid phase consisting of water with plasticizer additives are used as a combustible base and stabilizers. To give stability and the necessary fluidity, a small amount of a surfactant plasticizer is introduced into the suspension. The formation of surfactant adsorption layers on the surface of particles of the dispersed phase is a necessary condition for the formation of the structure of suspensions and its stabilization. The amount of surfactant adsorption, in addition to the physicochemical composition of coal, is largely affected by the nature of the surface and the cellular structure of materials.

To study the sorption efficiency of carbon materials, rigid surfactants widely used in the construction industry were used: sodium salt of sulfonated naphthalene formaldehyde (NF), dophene (technical NF), sulfomelamin formaldehyde (SMF), sodium lignosulfonate (LSTNa). The processes of surfactant adsorption on coal of Ukraine with different degrees of metamorphism have been studied. Conclusions are drawn that allow a better understanding of the processes of interaction of surfactants with solid particles of sorbents. It has been established that the sorption properties of surfactants with the use of carbon sorbents decrease in the series LST → dophene → NF → SMF, which is explained by the structure of surfactants. Comparative characterization of the data obtained also allows us to state that the sorption properties with respect to surfactant compounds increase in a number of studied carbon sorbents: lean coal (P) → long-flame gas coal (DG) → anthracite. The similarity of adsorption processes on the surface of coal grade DG and anthracite gives grounds for the assumption that the mechanisms of stabilization of water-coal suspensions by surfactant compounds during the creation of water-coal fuel are similar.

Keywords: natural coal, surfactant, adsorption, outer layer, micelles, aggregation.

Corresponding author I.M. Kosygina, e-mail: kosygina@ukr.net
