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CHEMICAL PROPERTIES AND SURFACTANT CHARACTERISTICS OF HUMIC ACID FROM LIGNITE

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The article is devoted to the study of some specific physicochemical properties of humic acids, which are attracting increasing attention due to their potential applications. The unique structural composition, which includes both hydrophilic and hydrophobic sites, makes these materials a versatile agent in various technological processes. It has been shown that humic acid solutions have the properties of surfactants and can serve as a natural alternative to surfactants. The paper presents the results of studies of a sample of humic acid obtained from lignite. Infrared spectroscopy has revealed signs of the aromatic structure of humic acid, the presence of phenolic and other functional groups, such as hydroxyl and nitrile. The presence of carboxylic acids, esters, and complex esters was established. The complex and heterogeneous nature of humic acids has been confirmed, which makes them promising for use as surfactants. No clear evidence of the presence of -NH_2 groups was found in the IR spectrum. This suggests that lignite humic acids generally correspond to the structural formula reported in the literature. The potentiometric titration of the lignite humic acid sample made it possible to determine the dissociation constants of functional groups. The obtained values are close to the calculated dissociation constants of carboxyl groups for the model molecule of lignite humic acid. The analysis of the calculated properties of humic acid based on various structural models showed that lignite is a promising raw material for the production of humic acids with certain surface-active properties. Compared to other structures, humic acid from lignite is more hydrophobic and less soluble in water, which indicates the prospects of its use as a surfactant with better interaction with the oil phase.

Keywords: humic acids, lignite, surfactant, infrared spectroscopy, composition, functional groupsб structural model.

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