Comparative analysis of structure and texture of industrial coke

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Abstract

In this work, industrial samples of coke from two different manufacturers were studied using a complex of structural methods: phase and structural analysis by powder X-ray diffraction, analytical scanning electron microscopy and adsorption porosimetry. The main structural parameters (longitudinal and transverse dimensions of packets and lamellas that fit into packets) and textural characteristics (specific surface area, pore space structure) of the studied samples of industrial coke were determined, and an analysis of the features of their microstructure was made. The results obtained in this work make it possible to unambiguously divide the studied cokes into 2 types: "anisotropic" and "isotropic". For anisotropic coke samples, the longitudinal size of the lamellas that fit into the packs is several times larger than the transverse size of these packets (La >> Lc), and this type of coke is characterized by a pronounced lamellar microstructure. Samples of "isotropic" cokes are characterized by comparable sizes of packets of lamellar layers in the longitudinal and transverse directions (La ≈ Lc) and an amorphous microstructure. Because of the work, a complete relationship was revealed between the structural parameters, shape, morphology and texture characteristics of the particles of coke samples, as well as a sufficient correspondence between the data obtained by three independent methods. The consistency of the conclusions drawn from the results of the analysis of the data of the performed complex of physicochemical studies makes it possible to consider X-ray diffraction analysis in combination with analytical electron microscopy and adsorption porosimetry as the necessary complementary tools for assessing the main properties of cokes with a view to their possible use in various technological processes.

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