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Study of the film of *n*-hexane insoluble asphaltene produced from coal-tar pitch

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Abstract

This work is devoted to the investigation of the composition and crystal structure of asphaltenes. The films of n-hexane insoluble asphaltenes are produced from the toluene solution of coal tar pitch. An important property of high molecular weight asphaltenes is the ability to self-organize into supramolecular associates with a graphite-like structure that is the precursors of the formation of the structure of carbon-graphite materials. The authors show the possibility to obtain *n*-hexane insoluble asphaltene films from a toluene solution of medium-temperature coal tar pitch. To improve the uniformity of the film it is used a hydrophobized glass substrate. Some structural features of asphaltene films are carried out by complex of physicochemical methods: elemental chemical analysis by XRD analysis, SEM and TEM. Thermal decomposition is studied by derivate-analyzer in addition with thermo-gravimetric analysis with observations of thermal effects in argon. Inductively coupled plasma-optical emission spectroscopy analysis is used for compositional characterization of the films. It is shown that the film of *n*-hexane insoluble asphaltenes is formed by agglomerates with sizes up to 100 μm, which in turn consisted of particles of ~50 nm in diameter. The process of thermal decomposition of *n*-hexane insoluble asphaltenes is studied in the temperature range from 20 to 800 ° C. It is founded that the film is structured at 495 ° C. According to ICP OES analysis, there is sulfur, iron, and silicon in the samples of asphaltenes. Results of XRD analysis and IR spectroscopy show that graphite-like structures are formed during the heating of films.

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