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Peculiarities of asphaltene precipitation in n-alkane-oil systems

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Abstract

n-Pentane-, n-hexane-, and n-heptane-insoluble asphaltenes obtained via a standard procedure by precipitating from oil solutions in n-pentane, n-hexane, and n-heptane, respectively, as well as n-pentane/n-hexane/n-heptane-insoluble and n-heptane/n-hexane/n-pentane-insoluble asphaltene constituents prepared through successive washing (fractional dissolution) of n-pentane-insoluble asphaltenes with n-hexane and n-heptane and n-heptane-insoluble asphaltenes with n-hexane and n-pentane, respectively, are studied. Asphaltenes and their constituents extracted from three oils distinguished by high contents of asphaltenes, resins, and paraffins, respectively, are investigated by ^1H NMR spectroscopy in carbon tetrachloride solutions. It is established that the mass fractions and the fragment compositions of asphaltenes and their constituents depend on both the type of oil and the procedure of their preparation; i.e., the precipitation from n-alkane-oil systems or the extraction through the successive washing with a series of n-alkanes. The obtained experimental data made it possible to formulate a hypothesis according to which the precipitation of asphaltenes from oils is controlled by not only the dissolving power of a solvent with respect to molecular components of initial oils, but also (and primarily) by the dissolving power of a solvent with respect to supramolecular structures of asphaltenes formed in n-alkane-oil systems. © 2010 Pleiades Publishing, Ltd.

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