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The features of structural transformations of asphaltene molecules during hydro conversion of vacuum residue in the presence of nanosized molybdenum disulfide particles

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Asphaltenes present in a significant amount in heavy petroleum feedstock act as coke precursors which in turn lead to deactivation of the catalyst during processing of heavy oil. And also they are precipitated on the catalyst surface and block the pore mouth. The solution to this problem most effectively implemented in the hydroconversion process in the presence of a nanosized catalyst particles that are synthesized “in situ” in the reaction environment. As catalyst precursors, water-soluble salts of a catalytically active metal are used, which are introduced in the form of a precursor aqueous solution-in-petroleum feedstock emulsion to have ultrafine catalyst particles homogeneously distributed in the reaction volume.

In order to understand the mechanism of transformation of macromolecular components during the hydroconversion of heavy petroleum residues in the present work was to study the character of the structural changes in the asphaltene depending on the conditions of the process (temperature and number stages of conversions of asphaltene in the reaction zone).

The results of this study show that one of the main features of the structural transformations of asphaltene molecules under hydroconversion conditions with the varying parameters of the process is the nonmonotonic character of change in the molecular mass. The molecular structure of asphaltenes depending conditions of the process varies in a discrete manner, passing through a step of transitional state (TS), in which system is the most susceptible to the action of external factor, whereby the qualitative rearrangement of the molecular structure of asphaltenes on a step of TS gives rise to a dramatic fall in molecular masses.

Biography

Olga V Zaitceva has graduated from Gubkin University of Oil and Gas with Bachelor's degree in Chemical Engineering and Biotechnology in 2012. Currently she is a Master student of Gubkin University and a researcher at TIPS RAS. Her research interests cover the following subjects: technology development of catalytic processes, hydroprocessing of heavy oil and oil residues, modern techniques of the analysis of composition and structure of oil components (spectroscopy, mass spectrometry, chromatography), methods of study physical-chemical properties, colloid-dispersed properties of oil and petroleum products, macromolecular compounds of oil – asphaltenes and resins.

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