

Catalytic intensification of in-situ conversion of high-viscosity oil in thermal steam extraction methods

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Abstract

© 2016, International Journal of Pharmacy and Technology. All rights reserved. In the near future hydrocarbons will remain the main source of energy. Now there is a growing interest in the development of the reserves of unconventional hydrocarbon resources: Shale oil and gas, heavy crude oil and natural bitumen, which world reserves are comparable to traditional. The main obstacle in the extraction of heavy crude oils is their high viscosity due to a significant content of resinous-asphaltene compounds. The thermal-steam formation treatment creates conditions for aquathermolysis - decomposition of high molecular oil components, which produces gas, as well as changes its elemental, group and fractional composition. The thermal-steam impact leads to the destruction of the least stable carbon heteroatoms with the separation of peripheral fragments from the resinous asphaltene compounds and the formation of hydrocarbons, heteroatomic compounds, and benzene resins. Bituminous oil from Ashalchinskoye deposit (Republic of Tatarstan) is used as an object of study in the work. Molecular catalyst precursor is synthesized using the distillate tall oil as ligand former. The active catalyst's form is generated during the thermal exposure. The experimental results show the possibility to intensify the process of in-situ upgrading of high-viscosity oil in the deposit's thermal-steam treatment. Use of the catalyst, which active form is generated in situ, can achieve reduction of resinous-asphaltene substances, which provides an irreversible reduction in the produced oil viscosity and facilitates further transportation and processing.

Keywords

Aquathermolysis, Catalyst precursors, Heavy crude oil, In-situ Conversion, Steam treatment