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CHARACTERIZING FRACTIONS OF HEAVY OIL BY SUPERCRITICAL FLUID EXTRACTION AND FRACTIONATION USING CO₂-BASED SOLVENT

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As is known supercritical fluid extraction and fractionation (SFEF) which resembles the true-boiling-point (TBP) distillation for crude oils may serve as a powerful characterization tool for heavy oils and vacuum residues. If suitable solvent and operating parameters are selected, SFEF will provide high extraction yields and enough amounts of samples for further studies. Supercritical carbon dioxide (scCO₂) is the most common solvent for SFE processes. However, the low solubility of heavy high molecular weight oil components in scCO₂ prevents the use of this solvent for separating heavy oils and petroleum residues into fractions. Main method allowing one to overcome the low solubility of the heavy oil components in scCO₂ is an addition of organic modifiers to scCO₂. In contrast to the traditional SFEF approach based on controlling the density and solvent capacity of the solvent by changing the process parameters, selecting a suitable CO₂ modifier in this case makes it possible to carry out fractionation of oil samples by simply changing the solvent composition. This report presents the experimental results obtained with SFEF of heavy oil by changing the solvent composition based on CO₂. The use of toluene as a modifier allowed us to achieve the high cumulative yield of extract and separate the heavy oil from Ashalchi oilfield by molecular weight. As a result of SFEF 9 narrow fractions with total extraction yield of 83wt% were received. Based on the analysis of narrow cuts distribution of hydrocarbon groups, carbon residue, sulfur and metals between fractions was established.

Biography

Artem V Pripakhaylo is a PhD student in the Laboratory of Concentration at Vernadsky Institute of Geochemistry and Analytical Chemistry and Junior Researcher of the Laboratory of Concentration at Vernadsky Institute of Geochemistry and Analytical Chemistry. His research interests include "Supercritical fluid extraction, separation methods, solvent deasphalting, upgrading and refining of heavy oils and petroleum residues".

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