

Geochemical modeling with the use of vertical and horizontal relative concentrations of oil compounds for the heavy oil fields

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Abstract

© 2018 Taylor & Francis Group, LLC. The purpose of this study is to detect lateral and vertical gradients of relative concentrations of compounds presented in oil, which allows assessing potential drainage zones in the reservoir during the reservoir production by steam injection. In this research new method for monitoring of steam chamber development in 2D model was created and tested. Methodology: Total hydrocarbon fraction was isolated from core extracts and analyzed by GCMS method (TIC) for detection of various compounds and assessment of lateral and vertical gradients of their concentration in lateral. It was found that the ratio of 4- and 1-methyldibenzothiophenes (MDBT) changes in lateral and in vertical directions. These changes are caused by biodegradation of organic matter. Laboratory research shows that 1-MDBT/4-MDBT ratio in native reservoir rocks is stable under high temperatures and pressure and can be easily measured by GC-MS. This measurement will allow assessment of location and direction of steam chamber propagation. In recent work the authors have developed geochemical model which can be used for assessment of oil flow directions during the development of heavy oil fields by SAGD method.

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Keywords

biodegradation of oil, heteroatomic compounds, isomers, oil-water transition zone, SAGD modeling

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