

Chemical evaluation and kinetics of Siberian, north regions of Russia and Republic of Tatarstan crude oils

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Abstract

© 2016 Taylor & Francis Group, LLC. In this research, thermal characteristics and model free kinetics of five different °American Petroleum Institute gravity crude oil samples from different locations were studied using combustion calorimetry and thermogravimetry (TGA) techniques. Higher heating values of crude oils were determined from the combustion calorimetry experiments. It was shown that these values increase with an increase in saturate fraction and °API gravity of studied samples and decrease with an increase in viscosity, aromatics fraction, and resin fraction of crude oils. In thermogravimetry, experiments were performed at 10, 20, and 30°C/min heating rates under an air atmosphere. Thermal characteristics of the samples such as reaction intervals and corresponding peak temperatures, mass loss, and residue of the crude oil samples were also determined. Two different model free kinetic methods, known as Ozawa-Flynn-Wall (OFW) and Kissinger-Akahira-Sunose (KAS), were used in order to determine the activation energy values of the crude oil samples studied.

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Keywords

Activation energy, combustion calorimetry, crude oil, higher heating value, in-situ combustion, kinetics, thermogravimetry