

Characterization of crude oils by thermal analysis techniques

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Abstract

This research focused on the combustion kinetics and oxidation mechanisms of light crude oils in limestone matrix. TG-DTA curves were produced for three different crude oil-limestone mixtures. Effect of crude oil type and heating rate on the TG-DTA curves were studied. In combustion with air, three main transitional stages are detected: distillation between room temperature and about 300 °C, low-temperature combustion between about 300 °C and 460 °C and coke combustion between about 460 °C and 620 °C, respectively. These main transitional stages are observed in all of the samples studied, although to different extends. It was also observed that the heating rate employed in TG-DTA analysis significantly affects fuel lay down, peak and burn-out temperatures. The effect of high heating rate was to cause the reactions to occur at higher temperatures, where probably overlapping and incomplete reactions caused the TG-DTA curves to change. Throughout the study, it was observed that the activation energy values of the samples are varied between 71.3 - 104.3 kJ/mol in low temperature combustion and 88.0 - 122.7 kJ/mol in coke combustion region.