ABSTRACT

The determination of intrinsic rheological properties of crude oil components using near infrared (NIR) spectroscopy has been found to be a veritable analytical tool. Specifically, the near-infrared region was found between the visible and middle-infrared regions of the electromagnetic spectrum (780-2500nm, 12820 – 4000cm-1). The observed absorption spectra in these region was made up of overtones and combinations of the fundamental molecular vibration bands which were primarily attributed to stretches of available Carbon to Hydrogen, Nitrogen to Hydrogen, Sulphur to Hydrogen and Oxygen to Hydrogen bonds. The spectra were dependent on certain physical parameters. These properties are contributing factors to the overall stability of crude oil emulsion. Molecular exchange mechanisms and the aggregation state of asphaltenes were dependent on concentration. At low frequency range (0.01 – 1Hz), molecular exchange from the bulk oil phase greatly affected the measured dilational parameters.

Keywords: Absorption spectra, rheological properties, molecular vibration bands, dilational parameters, near infrared (NIR) spectroscopy.