1991 SCA Conference Paper Number 9131

LIQUIFIED-GAS EXTRACTION AND NEAR-INFRARED ANALYSIS OF CORE

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ABSTRACT

This paper describes two new techniques, liquified-gas extraction and near-infrared analysis, which can be used separately or in tandem to analyze core and the crude oil in core.

Liquified-gas extraction of core utilizes solvents such as cyclopropane or vinyl chloride (which boil far below room temperature) to clean core in a pressurized Soxhlet. Because the extraction is conducted at or below room temperature, it can be performed on heat-sensitive core such as those containing gypsum.

After the liquified gas is vented, essentially pure crude oil remains in the boiling flask and recovered water is collected in a desiccant trap. The weights of extracted crude oil and water are obtained from the weight changes of the boiling flask and desiccant, respectively. When sufficient crude is extracted, one can directly measure physical properties such as API gravity (requires ≥ 0.1 ml) or viscosity (requires ≥ 1.0 ml) as well.

Near-infrared analysis is a powerful technique for estimating properties of crude oils or other materials from their near-infrared spectra. One can perform near-infrared analysis on the liquified-gas extracted crude oil to predict percentage of asphaltenes, gas-oil ratio, API gravity, and viscosity, not only of the extract, but of the corresponding produced crude (before the loss of light ends). Near-infrared analysis can be done using as little as 0.012 ml of sample.