ABSTRACT

Thermal Properties of Reservoir Rocks and Fluids in the Southern Basin of Trinidad

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Thermal properties of reservoir constituents have been determined for use in simulation studies. The parameters investigated were volumetric heat capacity, thermal conductivity and thermal diffusivity. These properties were measured as functions of temperature and water/oil saturations. Samples used were unconsolidated sands fully or partially saturated with air, oil and water. The oils used varied in API (12° - 25°), and experiments were carried out within the temperature range 303 K - 573 K, or 30°C - 300°C.

Differential scanning calorimetry was used for measurements of volumetric heat capacity, while those of thermal conductivity involved a modification of the Lees' disc method.

Volumetric heat capacity increased with an increase in temperature except from 373 K - 413 K

for samples saturated with water, where it increased then decreased. Increases with temperature were observed when calculations of either water or steam existed.

For all saturations, thermal conductivity decreased with an increase in temperature.

As the water saturation increased so did the volumetric heat capacity and thermal conductivity for temperatures below the boiling point of water into steam.

Thermal diffusivity followed a reversal in the trend observed for the volumetric heat capacity.

A change in API oil gravity (12° - 25°), did not show significant changes in the thermal properties determined.

Correlations were developed which could be used in any field application when predictions of thermal properties are needed.

In general, the data obtained showed similar trends in behaviour to those obtained by other workers in the limited ranges of the dependent variables.