

PHYSICAL PROPERTIES OF CRUDE OIL

Introduction to Physical Properties

- Crude oil is sometimes classified as:

- paraffinic base,
- naphthenic base,
- or asphaltic base,

According to *the prevalence of the hydrocarbon groups*.

But various physical properties are required in addition to these classification in order to characterize a crude oil.

API gravity

$$API = 141.5/s - 131.5,$$

- API gravity is expressed as the relation developed by the American Petroleum Institute, as
- where “s” is the specific gravity of oil measured with respect to water, both at 60°F (15.5°C). Since oil is lighter than water, API gravity is always greater than 10.
- The lighter the oil, the larger the API gravity.
- However, gravity is not the only measurement of crude oil, but a mere indicator of lightness.
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Characterisation factor (C_F)

$$C_F = (T_B)^{1/3} / s.$$

- A characterization factor of crude oil has been related with the average (molal average) boiling point (T_B in Rankine) of all the fractions separated and its specific gravity “s”, as
- Characterization factor (C_F) is universally accepted as the identity of a crude oil and its products

Various other properties, such as molecular weight, density, viscosity, and thermodynamic properties, are available for any oil product if its characterization factor is determined. Since crude oil is always associated with water and settleable solids, it is essential to determine the relative amount of bottom sludge and water (BSW) after the necessary settling period. Water is separated by the solvent extraction method in the laboratory. Ultimate analysis of crude oil is a method to determine the amount of carbon, hydrogen, and other constituent elements in it. Combustion of crude oil yields ashes of metallic oxides that are analyzed for the metallic components present in crude oil.