— University of Mosul —
College of Petroleum & Mining Engineering

Petroleum Chemistry

Lecture 5

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The geographic location is important because it affects transportation costs to the refinery . Light crude oil is more desirable than heavy oil since it produces a higher yield of gasoline , while sweet oil commands a higher price than sour oil because it has fewer environmental problems and requires less refining to meet sulfur standards imposed on fuels in consuming countries . Each crude oil has unique molecular characteristics which are understood by use of crude oil assay analysis in petroleum laboratories.

Barrels from an area in which the crude oil's molecular characteristics have been determined and the oil has been classified are used as pricing references throughout the world. Some of the common reference crudes are:

* West Texas Intermediate (WTI), a very high-quality, sweet, light oil delivered at Cushing, Oklahoma for North American oil.

* Brent Blend, comprising 15 oils from fields in the Brent and Ninian systems in the East Shetland Basin of the North Sea. Oil production from Europe, Africa and Middle Eastern oil flowing West tends to be priced off the price of this oil which forms a benchmark.

* Dubai-Oman, used as benchmark for Middle East sour crude

* Asia-Pacific region .

* Tapis (from Malaysia, used as a reference for light Far East oil).

* Minas (from Indonesia, used as a reference for heavy Far East oil).

- The OPEC Reference Basket, a weighted average of oil blends from various OPEC (The Organization of the Petroleum Exporting Countries) .

Classification of crude oil

Classification of crude oil refers to natural and type of crude oil (type of hydrocarbons in crude oil) by simplified tests. Four mainly methods are used:

Characterization Factors

A- Key Fraction (APl gravity):

API = American Petroleum Institute

The density of petroleum oils is expressed in the united states in terms of API gravity rather than specific gravity; it is related to specific gravity in such a fashion that an increase in API gravity corresponds to a decrease in specific gravity. The units of API gravity are API and can be calculated from specific gravity by the following:

$$APIgravity = \frac{141.5}{Sp.Gr60/60^{\circ}F} - 131.5$$

In this equation, specific gravity and API gravity refer to the weight per unit volume at 60°F as compared to water at 60°F .

API gravities are not linear and, therefore, cannot be averaged. For of 30°API gravity hydrocarbons when mixed with a gallon of 40°API hydrocarbons will not yield two gallons of 35°ApI hydrocarbons, but will give two gallons of hydrocarbons with an API gravity different from 35°API . Specific gravities can be averaged.

crude oil classified by API gravity according to distillate pressure as follows:

1- when the distillate at atmospheric pressure (*Press. = 1 atm*) as follows:

1 - API gravity > 40 paraffinic (or light) based crude oil

2-APIgravity=33-40mixed(or intermediate)based crude oil

3- API gravity < 33 naphthenic (asphaltic or heavy) based crude oil.

2- when the distillate at vacuum pressure (*Press. = 40 mmHg*) as follows:

1- API gravity > 30 paraffinic (or light) based crude oil

2-APIgravity=20-30rnixed(or intermediate)based crude oil

3- API gravity < 20 naphthenic (asphaltic or heavy) based crude oil