



— University of Mosul —
College of Petroleum & Mining Engineering



Properties of Petroleum Products

Lecture 2

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Example (10): A kerosene product with boiling range of 175-260°C from Mexican crude oil has the API gravity of 43.6 and T_{10} is 449.9K. Estimate its flash point and compare with the experimental value of 59°C.

Solution :

By using the last equation,

$$T_F = 15.48 + 0.70704T_{10}$$
$$= 333.578 \text{ K (K = C + 273.15)}$$

$T_F = 60.4^\circ\text{C}$, which is in good agreement with the experimental value of 59°C.

and we can from a simple relation for estimation of flash point of hydrocarbon mixtures from vapor pressure by the below formula:-

$$T_F = 231.2 - 40 \log P^{vap}$$

Where :

P^{vap} is the vapor pressure at 37.8 oC (100oF) in bar.

T_F : is the flash point Kelvin

4- Fire Point:

Fire point petroleum fractions is the lowest temperature at which vapors arising from the oil will ignite, i.e. fire when exposed to a spark or flame under specified conditions. Therefore the fire point of a fuel indicates the maximum temperature that it must not arrival to it to prevent the combustion of the petroleum fractions.

5- Autoignition Point:

This is the minimum temperature at which hydrocarbon vapor when mixed with air can spontaneously ignite in normal atmosphere without the presence of any external source. Values of autoignition temperature are generally higher than flash point, Values of autoignition temperature for gasoline it is about 280 °C (536 °F) and for ethanol is about 363 °C (685 °F), while values of flash points for gasoline is about -43°C (-45 °F) and for ethanol is about 16.6°C (61.9°F). This temperature is required to supply the activation energy needed for combustion. With an increase in pressure or oxygen concentration the autoignition temperature decreases.

6- Octane number (ON):

Octane number (or octane rating) defined is a measure of fuel's ability to resist autoignition during compression and prior to ignition to prevent the knock characteristic.

What is Engine Knock?

- . Fuel with adequate octane number is required to prevent engine knock
 - . Knock occurs when unburned fuel./air mixture auto-ignites
 - essentially a small explosion in the engine.
 - Higher octane fuel is more resistant to auto-ignition

