Basic Energy Overview[1]

A common thread between all petroleum products is they are derived from crude oil. It really is quite astounding this one source provides diesel fuel, gasoline, lube oil, propane, hydraulic oil, grease asphalt and many other products. Through the refining process, crude oil is separated into the many different products.

Crude oil supply, both domestic and foreign, contains various quality characteristics and descriptions. "light crude" refers to relatively low viscosity and "sweet crude" refers to low sulfur content. Light sweet crude requires less requires les processing. In exchange, "sour" crude contains a high level of sulfur and requires additional processing.

What a Barrel of Crude Oil Makes:

Product	Gallons Per Barrel
Gasoline	19.4
Distillate fuel oil	9.7
Kerosene jet fuel	4.3
Residual fuel oil	1.9
Liquefied refinery gasses	1.9
Still gas	1.8
Coke	2.0
Asphalt and road oil	1.4
Petrochemical feedstocks	1.1
Lubricants	.5
Kerosene	.2
Other	.4

Source: API – Figures are based on avg. yields for US refineries. One barrel contains 42 gallons of crude oil. The total volume of products made is 2.6 gallons greater than the original 42 gallons of crude oil. This represents processing gains.

Distallation:

Defined – Distillation is the primary refining step and principal upon which a refinery works. The process begins as crude oil is separated into fractions or components in a distillation tower or pipe still. Heat, usually applied at the bottom of the tower, causes the oil vapors to rise through progressively cooler levels of the tower, where they condense onto plates and are drawn off in order of their respective condensation temperatures, or boiling points. The lighter weight, lower boiling point fractions exist higher in the tower while the heavy materials remain at the bottom.

The primary fractions, from low to high boiling point, are: hydrocarbon gases (ethane/propane), naphtha, (gasoline/kerosene/diesel fuel) and heavy gas oil for cracking.

[1] Courtesy Premcor

Distillate:

Distillate – The distillate or middle range of petroleum liquids produced during the processing of crude oil. Products include diesel fuel, heating oil, kerosene and turbine fuel for airplanes.

Distillate Fuel Descriptions:

#1 – Similar to kerosene; this fraction boils off right after gasoline
#2 – diesel that powers on-road and off-road equipment (i.e. trucks, tractors)
#3 – A distillate fuel oil; rarely used
#4 – Usually a blend of distillate and residual fuel oils (i.e. No. 2 and No. 6); sometimes just a heavy distillate
#5 / #6 – Called residual fuel oils (RFO) or heavy fuel oils
#5 – A mixture of No. 6 (approx. 75-80%) with #2
#6 – May contain a small amount of #2 to meet specifications

Refining Process:

Oil refineries are designed to process a wide range of feed stocks, including crude oil and partially processed feed stocks, through a variety of equipment. Two of the most important crude oil properties are gravity (density) and sulfur content. These properties generally determine the relative price of crude oil types.

Each step in the refining process is intended to improve the value of the feedstock. This generally means squeezing the most transportation fuel (gasoline, diesel and jet fuel) from a barrel of oil, since these products are most profitable. Oil refineries use both thermal and chemical reactions to extract these and other usable products from raw crude oil.

Industry Standards:

An industry organization referred to as ASTM (American Society for Testin Materials) writes specifications for gasoline, diesel fuel and many other petroleum products. By having standard specifications set in place, fuel can be traded on the New York Mercantile Exchange as a commodity product.

However, not all gasoline or diesel fuel is the same. The biggest difference in fuel quality is often additive content.

ASTM specifications for some common petroleum products:

- ASTM D975 – Diesel Fuel
- ASTM D6751 – Biodiesel
- ASTM D396 – Burner Fuel
- ASTM D4814 – Gasoline

Other petroleum products such as crankcase oils, gear lubes, greases, etc. also have standard specifications from industry organizations. These include SAE, API, NLGI, AGMA and others.

Fortunately, when viewing product specification sheets within our Product Catalog you find that FS refined fuels and lubricants are formulated to meet all industry standards, using the best and latest methods.