

Terminology

Petroleum Refining Facilities

Atmospheric Distillation Unit

Crude oil is composed of a variety of hydrocarbon compounds. The atmospheric distillation unit takes advantage of the different boiling points of these hydrocarbon compounds to separate crude oil into separate fractions—gasoline, kerosene, diesel fuel, fuel oil, and other materials—at normal atmospheric pressure. In general, the scale of an oil refinery is defined by the capacity of its atmospheric distillation unit.

Vacuum Distillation Unit

A unit which distills in a condition of reduced pressure. When oils with a high boiling temperature, such as heavy fuel oils, are heated, decomposition may occur before vaporization can happen. By reducing the pressure in the unit, the boiling point of the oil is reduced, allowing for its efficient separation.

Hydrodesulfurization Unit

This unit uses a catalyst to react the sulfur in the petroleum with hydrogen, converting the sulfur to hydrogen sulfide which can then be removed. Desulfurization can be performed for each fraction: naphtha, kerosene, diesel fuel, heavy fuel oil, etc.

Heavy fuel oil desulfurization units are further divided into direct and indirect desulfurization units. In the direct desulfurization unit, sulfur is removed from fuel oil emerging from an atmospheric distillation unit; the indirect desulfurization unit is used on fuel oil after the asphalt fraction has been separated in a vacuum distillation unit.

Diesel Fuel Desulfurization Unit

In 1997, the JIS for the sulfur content in diesel fuel was cut from 0.2 percent to 0.05 percent. This meant that a catalyst with higher desulfurization performance and a unit that could cope with the stricter conditions became a requirement. Because the existing hydrodesulfurization units could not meet the new standards, a large number of new desulfurization units were constructed at oil refineries across the country.

Catalytic Reformer

A unit which improves the octane number of naphtha separated by the atmospheric distillation unit. This naphtha with a higher octane number is then the source material for gasoline. Hydrogen, a by-product of this unit, is used in desulfurization.

Fluid Cat Cracker

This unit uses a minute-particle catalyst to crack heavy fuel oil. The cracked oil is divided into LPG, gasoline, diesel fuel and heavy fuel oil. The gasoline component produced by this unit has a high octane number, and a mix proportion rate to products.

Sulfur Recovery Unit

The unit collects sulfur from hydrogen sulfide with other by-product gases emitted by the hydrodesulfurization unit or other refinery facilities. Large quantities of sulfur oxide gas are released when gases containing hydrogen sulfide are directly used as fuel. Oil refineries therefore use sulfur recovery units to remove hydrogen sulfides from the by-product gases so they can be used as fuel.

Sour Water Treatment Unit

The wastewater discharged from hydrodesulfurization units and other refinery equipment contains hydrogen sulfide and other odorants. This unit uses steam injection to remove odorous materials. The hydrogen sulfide removed by this unit is then processed by the sulfur recovery unit.

Blending Unit

In this unit, gasoline, heavy fuel oil and other petroleum products are blended with a variety of manufactured base materials, adjusted to the desired qualities for the given application, then shipped. Each base material flows at a fixed volume, mixed on a continuous basis in the pipes, then moved to a tank and further mixed.

Petroleum Product Quality

Octane Number

Automobile gasoline octane quality regulations have been established because high octane numbers help reduce engine knocking. According to the JIS, regular gasoline has an octane number of 89.0 or higher, premium of 96.0 or higher.

Others

Conversion to Distillates

White oil is the general term for gasoline, kerosene and diesel fuel; conversion to distillates produces white oil by the decomposition of heavy fuel oil, or black oil. The composition of white and black oil depends on the type of crude oil, but various treatments at the refinery can be used to increase the production ratio of white oil.

Barrel

The unit of volume for petroleum. One barrel is approximately 159 liters.

Aromatics

Compounds that have benzene and benzene rings as part of their chemical structure. They may have two or more condensed benzene rings, or the hydrogens on the ring may be substituted by an alkyl group (toluene, xylene, etc.).