Kerosene, or paraffin

is a combustible hydrocarbon liquid which is derived from petroleum. It is widely used as a fuel in aviation as well as households.

Kerosene is widely used to power jet engines of aircraft (jet fuel), as well as some rocket engines in a highly refined form called RP-1. It is also commonly used as a cooking and lighting fuel, and for fire toys.The name "paraffin" is also used to refer to a number of distinct petroleum byproducts other than kerosene. For instance, liquid paraffin (called mineral oil in the US) is a more viscous and highly refined product which is used as a laxative. Paraffin wax is a waxy solid extracted from petroleum.

The World Health Organization considers kerosene to be a polluting fuel, as kerosene smoke contains high levels of harmful particulate matter**.**

Properties and grades

Kerosene is a low-viscosity, clear liquid formed from hydrocarbons obtained from the fractional distillation of petroleum between 150 and 275 °C (300 and 525 °F), resulting in a mixture with a density of 0.78–0.81 g/cm3. It is miscible with petroleum solvents, but not with water. It is composed of hydrocarbon molecules that typically contain between 6 and 20 carbon atoms per molecule predominantly containing 9 to 16 carbon atoms.

Regardless of crude oil source or processing history, kerosene's major components are branched- and straight-chain alkanes (hydrocarbon chains) and naphthenes (cycloalkanes), which normally account for at least 70% of volume. Aromatic hydrocarbons such as alkylbenzenes (single ring) and alkylnaphthalenes (double ring), do not normally exceed 25% by volume of kerosene streams. Olefins are usually not present at more than 5% by volume.

The heat of combustion of kerosene is similar to that of diesel fuel; its lower heating value is 43.1 MJ/kg (around 18,500 Btu/lb), and its higher heating value is 46.2 MJ/kg (19,900 Btu/lb).

National and international standards define the properties of several grades of kerosene used for jet fuel. Flash point and freezing point properties are of particular concern for operation and safety; the standards also define additives for control of static electricity and other purposes.

Melting, freeze and flash points

Kerosene is liquid around room temperature: 25 °C (77 °F). The flash point of kerosene is between 37 °C (99 °F) and 65 °C (149 °F), and its autoignition temperature is 220 °C (428 °F).[18] The freezing point of kerosene depends on grade, with commercial aviation fuel standardized at −47 °C (−53 °F). Grade 1-K kerosene freezes around −40 °C (−40 °F, 233 K).

Diesel fuel, also called diesel oil, fuel oil

(historically), or simply diesel, is any liquid fuel specifically designed for use in a diesel engine, a type of internal combustion engine in which fuel ignition takes place as a result of compression of the inlet air and then injection of fuel without a spark. Therefore, diesel fuel needs good compression ignition characteristics.

Petroleum diesel

Petroleum diesel is the most common type of diesel fuel. It is produced by the fractional distillation of crude oil between 200 and 350 °C (392 and 662 °F) at atmospheric pressure, resulting in a mixture of carbon chains that typically contain between 9 and 25 carbon atoms per molecule.[23] This fraction is subjected to hydrodesulfurization.

Cetane number

The principal measure of diesel fuel quality is its cetane number. A cetane number is a measure of the delay of ignition of a diesel fuel. A higher cetane number indicates that the fuel ignites more readily when sprayed into hot compressed air. European (EN 590 standard) road

diesel has a minimum cetane number of 51. Fuels with higher cetane numbers, normally "premium" diesel fuels with additional cleaning agents and some synthetic content, are available in some markets.

Usually such "straight-run" diesel is insufficient in supply and quality, so other sources of diesel fuels are blended in. One major source of additional diesel fuel is obtained by cracking heavier fractions, using visbreaking and coking. This technology converts less useful fractions but the product contains olefins (alkenes) which require hydrogenation to give the saturated hydrocarbons as desired. Another refinery stream that contributes to diesel fuel is hydrocracking. Finally, kerosene is added to modify its viscosity.

Chemical composition

Diesel does not mix with water. This picture also showcases the phenomenon of thin-film interference.

In the United States, petroleum-derived diesel is composed of about 75% saturated hydrocarbons (primarily paraffins including n, iso, and cycloparaffins), and 25% aromatic hydrocarbons (including naphthalenes and alkylbenzenes). The average chemical formula for common diesel fuel is $C_{12}H_{23}$, ranging approximately from $C_{10}H_{20}$ to $C_{15}H_{28}$.

Chemical properties

Most diesel fuels freeze at common winter temperatures, even though temperatures vary widely. Petrodiesel typically freezes around temperatures of −8.1 °C (17.4 °F), whereas biodiesel freezes between temperatures of 2 to 15 °C (36 to 59 °F).The viscosity of diesel noticeably increases as the temperature decreases, changing it into a gel at temperatures of −19 to −15 °C (−2 to 5 °F), that cannot flow in fuel systems. Conventional diesel fuels vaporise at temperatures between 149 °C and 371 °C. Conventional diesel flash points vary between 52 and 96 °C, which makes it safer than petrol and unsuitable for spark-

ignition engines.Unlike petrol, the flash point of a diesel fuel has no relation to its performance in an engine nor to its auto ignition qualities.