Combustion and Flame

Fuels

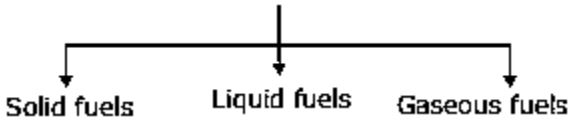
Introduction

A combustible substance which on burning produces a large amount of heat and light is called a fuel. Ex. Coal, LPG, Petrol, Kerosene, wood etc.

➢ Classification of Fuels

Fuels are classified on the basis of physical states in which they occur. So fuels are classified as solid, liquid and gaseous fuels.

Classification of Fuels



(i) **Solid fuels :** Combustible substances which are solid at room temperature are called solid fuels. Solid fuels contain mainly carbon both as free and combined carbon. In rural areas, Firewood, Agricultural wastes, Animal-dung cakes are the major source of energy.

Examples : Some solid fuels are :

(a) Coal (b) Coke

(c) Wood (d) Charcoal

(e) Animal-dung cakes (f) Bagasse, Agricultural wastes

(ii) **Liquid fuels :** Volatile liquids which produce combustible vapour are called liquid fuels. Kerosene is the most commonly used liquid fuel.

Examples : Some common liquid fuels are :

(a) Petrol

(b) Diesel

(c) Kerosene

(d) Alcohol Petrol, diesel and kerosene are mixtures of hydrocarbons.

(iii) **Gaseous fuels** : Combustible gases or mixtures of combustible gases are called gaseous fuels.

Examples : Some commonly used gaseous fuels are :

(a) Natural gas

(b) Liquefied petroleum gas (LPG)

(c) Biogas (or Gobar gas)

(d) Coal gas

(e) Water gas

(f) Producer gas

(g) Hydrogen gas

(h) Compressed Natural (CNG) Gas Petroleum gas is obtained as a by-product during the fractional distillation of petroleum.

➢ Characteristics of an ideal fuel

An ideal fuel should have the following characteristics:

(i) It should be fairly cheap and easily available.

(ii) It should burn at moderate rate.

(iii) It should not produce any poisonous and irritating fumes during burning.

(iv) It should leave no residue (ash) after burning.

(v) It should produce large amount of heat per unit mass i.e., it should have high calorific value.

(vi) It should be safe and convenient from the storage and tranportation point of views.

(vii) Its ignition temperature should be above room temperature. So that it is safe to use such a fuel.

- **Uses of Fuels**

(i) **Cooking and Heating:** The most common use of fuels is for cooking and heating. The commonly used domestic fuels are wood, dry cattle dung, coal, charcoal, kerosene (in rural areas) and coal, kerosene, LPG (in urban areas).

(ii) **For Transportation:** Fuels such as petrol, diesel and CNG are used for running cars, scooters, buses, trucks and trains. These automobiles are used for transportation from one place to another. The fuel used in aero planes is called aviation fuel.

(iii) **For Generating Electricity:** Fuels such as coal and natural gas are used for generating electricity on a commercial scale, in thermal power stations. Petrol, diesel and kerosene are also used for generating electricity in smaller generators commonly used at homes and shops, etc.

(iv) **In Industry:** Fuels such as coal, natural gas, diesel and furnace oil are used in the industry for generating steam in boilers. Steam is required in industry for heating purposes and also for generating electricity for their own use in factory. Industry in the rural areas also uses biomass such as bagasse—the cellulose material left after extracting juice from the sugarcane for running boilers.

(v) **For Launching Space Vehicles:** Space vehicles are launched with the help of rockets. Rockets use special fuels called propellants. A propellant is a combination of a fuel and an oxidizer.