Chapter – 6

Combustion and Flame

- **Combustion**: The process of burning a substance in the presence of air (oxygen) and undergoes a chemical reaction to produce heat and light.
- The substances which burn in air are called combustible.
- Oxygen (in air) is essential for combustion.
- During the process of combustion, heat and light are given out.
- Ignition temperature is the lowest temperature at which a combustible substance catches fire.
- **Flame**: It is a zone or burning vapour. The substances which vapourise during burning give flames. Example: Kerosene oil and molten wax.
- Inflammable substances have very low ignition temperature.
- Fire can be controlled by removing one or more requirements essential for producing fire.
- Water is commonly used to control fires.
- Water cannot be used to control fires involving electrical equipments or oils.
- There are various types of combustions such as rapid combustion, spontaneous combustion, explosion, etc.
- There are three different zones of a flame dark zone, luminous zone and non-luminous zone.
- An ideal fuel is cheap, readily available, readily combustible and easy to transport. It has high calorific value. It does not produce gases or residues that pollute the environment.
- Fuels differ in their efficiency and cost.
- Fuel efficiency is expressed in terms of its calorific value which is expressed in units of kilojoule per kg.
- Types of Fuels:
 - (i) **Solid Fuels:** Combustile substances which are solid at room temperature. Example: coal, coke, wood, charcoal, etc.
 - (ii) **Liquid fuels:** Volatile liquids which produce combustible vapour. Example: Petrol, kerosene, alcohol, diesel, etc.

(iii) **Gasous fuels:** Combustible gases or mixture of combustile gases. Example: Natural gas, LPG, biogas, coal gas, etc.

• Effects of Burning of Fuels:

- (i) Carbon fuels like wood, coal petroleum release unburnt carbon particles. These are dangerous pollutants causing respiratory diseases, such as asthma.
- (ii) Incomplete combustion of carbon fuels gives carbon monoxide which is a poisonous gas.
- (iii) Increased concentration of carbon dioxide in the air is believed to cause global warming.
- (iv) Oxides of Sulphur and nitrogen dissolve in rain water and form acids. Such rain is called acid rain. It is very harmful for crops, buildings and soil.
- Unburnt carbon particles in air are dangerous pollutants causing respiratory problems.
- Incomplete combustion of a fuel gives poisonous carbon monoxide gas.
- Increased percentage of carbon dioxide in air has been linked to global warming.
- Oxides of sulphur and nitrogen produced by the burning of coal, diesel and petrol cause acid rain which is harmful for crops, buildings and soil.