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.