Board –CBSE	Class –8th	Topic – Combustion and Flame

- **Combustion:**

  It is a chemical reaction in which heat is released by a material when it reacts with oxygen.

  Fuel or Combustible Substance: Any material that undergoes combustion is called a combustible substance. It is also called as fuel. Some examples of fuels are petrol, diesel, etc. The fuel may be in solid, liquid or gas state. Sometimes, light is also given off during combustion, either as a flame or as a glow.

  Ignition Temperature

  (i) It is the minimum temperature at which any material catches fire.

  (ii) If the temperature of combustible substance is lower than the ignition temperature then the substance will not burn.

  Example:

  (i) Cooking oil catching fire when a frying pan is kept for long on a burning stove.

  (ii) Kerosene oil and wood do not catch fire on their own at room temperature. But, if kerosene oil is heated a little, it will catch fire. But if wood is heated a little, it would still not catch fire.

- **Inflammable Substances**

  Those materials which have low ignition temperature and catch fire easily are termed as inflammable substances. Example includes petrol, LPG, etc.

  Things necessary for combustion to take place

  Fuel or Combustible substance, Air $\left(O_2\right)$ and Temperature above Ignition temperature.

- **Measures to control fire**

1 **Fire Brigade Stations -** In case of fire, fire brigades will extinguish the fire by sprinkling the water on the affected areas. The water will bring down the

temperature below its ignition temperature. As a result, fire will stop spreading. Water vapours also surround the combustible material, helping in cutting off the supply of air. So, the fire is extinguished.

2 **Fire Extinguisher -** Carbon dioxide $\left(CO_2\right)$ is best extinguisher. This extinguisher cut off the air supply and thus brings down the temperature below the ignition temperature as a result fire gets extinguished. Moreover, it usually does not damage electrical equipment.

3 **Use of Blankets** - Blankets can be used to extinguish the fire.

4 **Forest Fires -** In summer season, when temperature rises too high then the regions having dry grasses which catches the fire. This fire spreads rapidly from grasses to trees and eventually entire forest is on fire. And it is difficult to manage such fires.

- **Different Types of Combustion**

1. Rapid Combustion - In this type of combustion, the substances burns rapidly and yield light and heat.

Example: Bring a burning matchstick or a gas lighter near a gas stove in the kitchen. Turn on the knob of the gas stove. We find that the gas burns rapidly and produces heat and light.

2. Spontaneous Combustion - In this type of combustion, substances burst out into flames suddenly without any known reason.

Examples: Many disastrous fires in coal mines result due to this kind of combustion. The heat rays coming from the sun or a lightning strike might be responsible for this kind of combustion.

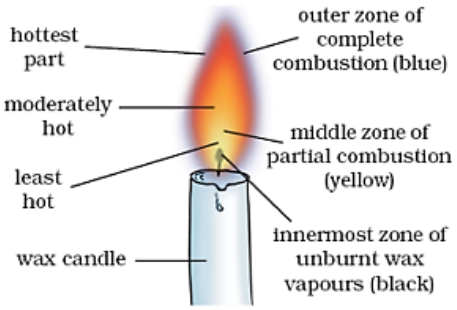
3. Explosion - In this type of combustion, all of a sudden reaction results into heat, light and sound. Moreover, large quantity of gas also gets released.

Example: When a fire cracker is ignited, a sudden reaction takes place with the evolution of heat, light and sound with the large amount of gas.

- **Flame**

When something is burnt, a hot luminous gas emerges out of the substance. This gas

is called as flame. Flames are result of the substances which vaporizes on burning. Example includes kerosene oil, wax, etc. which form flames on burning.



Flame structure

Outermost zone: It is blue in colour and is hottest amongst all the zones. In this portion, complete combustion takes place. Middle zone: It is yellow in colour and is somewhat hot. In this portion, partial combustion takes place.

Innermost zone: It is black in colour and is coolest amongst all the zones.

- **Fuel**

The substance that undergoes combustion is called as fuel. Examples of fuels are wood, charcoal, petrol, kerosene, etc.

Characteristics of good fuel

(i) It should easily be available (ii) It should be cheap. (iii) It should generate large amount of heat.

(iv) It should not leave any unwanted matter after combustion.

Ideal Fuel - Fuel which satisfies all characteristics of good fuel is known as ideal fuel.

Fuel Efficiency - Quantity of heat generated on combustion of 1 kg of a fuel is called its calorific value. Its unit is kilojoule per $kg(kj/kg)$.

- **Harmful Effects of Burning Fuels**

1. Global Warming: Combustion of most fuels the increase the amount of carbon dioxide in the atmosphere that has led to increase in the average temperature on the earth.

Acid Rain: Due to burning of coal and diesel, Chemicals like SO_2, NO_2 are released into the air. Pollutants reacts with water vapour present in the air and forms sulphuric and nitric acid. When it
rains, these acids are also present. Such kind of rain is called Acid Rain. It is very harmful for crops, buildings and soil.

2. Carbon fuels release unburnt carbon particles. These fine particles are dangerous pollutants causing respiratory diseases such as asthma.

3. Incomplete combustion of these fuels gives carbon mono oxide gas. It is dangerous to burn coal in a closed room. It is a very poisonous gas. The carbon mono oxide gas can kill portions sleeping in the room.