

Chapter-6 Combustion and Flame

Notes-

Combustion -

A chemical process in which a substance burns in the presence of oxygen (o₂) to give off heat and light (that may or may not be produced) is called combustion.

Combustible Substance-

The substances that burn easily in air (or oxygen) to produce heat and light (that may or may not be produced) are called combustible substances.
Example - Cloth, wooden stick, dry leaves etc.

Non-combustible Substance -

The substance that do not burn in air (or oxygen) are called non-combustible substances.
Example - Iron nail, Glass piece, Stone etc.

TYPES OF COMBUSTION -

There are three types of combustion -
Rapid Combustion, Spontaneous combustion and Explosion.

① Rapid Combustion - When a combustible substance burns at a rapid speed, producing large amount of heat and light.



in a short period of time, is known as Rapid Combustion.
Example - Wax candle, LPG (cooking gas)

② Spontaneous Combustion - When a combustible substance burns on its own without the help of any external heat, is known as Spontaneous Combustion. Ex - Fire in coal mines.

③ Explosion - When a combustion reaction occurs suddenly with the evolution of a large amount of gases, heat, light and sound, it is known as Explosion.
Example - firecrackers

Ignition Temperature -
The lowest temperature at which a substance must be heated, to catch fire and start burning, is known as its ignition temperature.

Inflammable Substances -
The substances that have low ignition temperature & can easily catch fire with a flame are called inflammable substances.
Ex - LPG, Kerosene, alcohol, paper, fabrics, straw (dry grass) etc...

Flame -
The flame is a region where combustion (or burning) of a fuel (in its gaseous form) takes place to produce heat & light.

Fuels -

The material that are burnt to produce a large amount of heat energy are called fuels.

Calorific Value of Fuels -

The amount of heat

energy produced on complete combustion of 1 kg of a fuel is called its calorific value. The calorific value of a fuel is called its calorific expressed as kilojoule per kilogram (KJ/Kg)

Short Answer [1 & 11]

Q-1 Which zone of the candle flame is luminous and why?

Ans. The middle zone of candle flame is luminous because the glow of hot carbon particles that makes that middle zone luminous.

Q-2 How it is possible that water can be boiled in a paper cup without burning it?

Ans. It is possible that water can be boiled in paper cup without burning it because a combustible substance does not catch fire if its temperature is lower than its ignition temperature.

Q-3 What is meant by combustible substance and inflammable substances?

Ans. Combustible substances - substances that burn easily in air (or oxygen) to produce

heat and light (that may or may not be produced and called combustible substance

Inflammable substances -

The substances that have very low ignition temperature & can easily catch fire with a flame are called inflammable substances.

Q-4 What is meant by flame?
Ans. Flame -

A flame is a region where combustion (or burning) of a fuel (in its gaseous form) takes place to produce heat and light.

Q-5 What is meant by ignition temperature?
Ans. Ignition Temperature -

The lowest temperature to which a substance must be heated to catch fire and start burning, is called its ignition temperature.

Q-6 Define Calorific Value?
Ans. Calorific Value -

Amount of heat energy produced on complete combustion of 1 kg of fuel is called its calorific value.

Q-7 What is meant by spontaneous combustion?
Ans. Spontaneous Combustion -

When a combustible substance burns on its own without the help of any external heat, it is called

Spontaneous Combustion.

Q-8 Why is an incomplete combustion of fuel more harmful to human beings?

Ans. When a fuel (containing hydrocarbon) burn in insufficient supply of oxygen, it leads to incomplete combustion of fuel & produces carbon monoxide. It is very poisonous gas. This can lead to suffocation or may even causes death.

Q-9

Nikita is reading a book in her balcony. Suddenly she observed that fire at her neighbour's house in kitchen. It immediately rushes and inform the old lady, who is only one there. Finding out overturned kerosene can, that causes fire, Nikita immediately opens fire extinguisher & put out fire.

a) Why do you think Nikita used fire extinguisher not water?

Ans. By using water extinguisher fire gets stop immediately, so she uses it.

b. Which value is shown by Nikita in this act?
Ans. Neighbourhood.

Q-10 Describe the conditions required for combustion of a substance?

Ans. Conditions necessary for combustion are as follows

- i) Presence of combustible substances.
- ii) Presence of supporter of combustion
- iii) attainment of ignition temperature of a combustible substances.

These three conditions necessary for combustion, are also called triangle of fire.

Q-11 Name the different type of combustion & define any two types.

Ans. There are three type of combustion -
Rapid combustion, spontaneous combustion & explosion.

Two of them are-

1. Rapid combustion -

When a combustible substance burns at rapid rate, producing a very large amount of heat and light in short period of time, it is called rapid combustion.

2. Explosion -

When combustion reaction occurs suddenly with evolution of large amount of gases, heat, light & sound, it is called explosion.

Q-12 How are combustible substances different from Non-combustible substances?

Ans. Combustible substance -
The substance that burns easily in air to produce heat & light are called combustible substances.

Non-combustible substances - The substances that do not burn in air are called Non-combustible substances.



Long Answers -

Q-1 Write the characteristics of an ideal fuel.

Ans-1 Characteristics of an ideal fuel are:

- # It should be fairly cheap and easily available.
- # It should burn smoothly.
- # It should have a high calorific value.
- # It should not leave ash (residue) after burning.

Q-2 Briefly describe the different zones of a candle flame?

Ans-2 There are 3 main zones of a candle flame. These are -

① The Innermost Zone -

1. It is the least hot region of flame.
2. In this zone, no combustion takes place.

② The Middle Zone -

1. It is the moderately hot region of flame.
2. This zone is luminous.

③ The Outermost Zone -

1. It is the hottest zone of candle flame.
2. In this, combustion takes place.