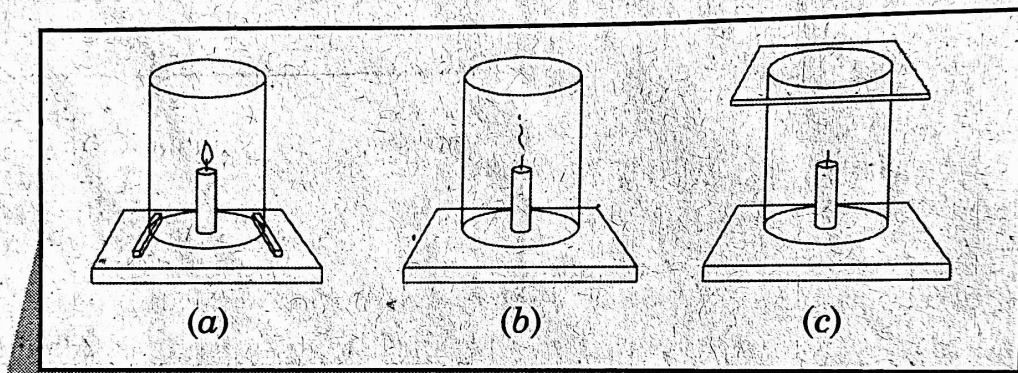


INTEXT QUESTION-ANSWERS

Questions

Q. 1. What happens in the three cases ?



Ans. (1) In figure (a), the candle remains burning due to free flow of air from below the chimney.

(2) In figure (b), the flame of the candle flickers and produces smoke as the amount of oxygen (air) entering the chimney is less than required amount.

(3) In figure (c), the candle is extinguished due to complete absence of air supply, so, it is concluded that air is necessary for burning process.

Q. 2. When does the flame flicker off ?

Ans. Candle flame flickers off when the supply of oxygen (air) is stopped.

Q. 3. When does it flicker and give smoke ?

Ans. The flame flickers and gives smoke when supply of oxygen is reduced.

Q. 4. Does it burn unaffected ?

Ans. The candle burns unaffected if it has regular and free supply of air.

Q. 5. Can you infer anything at all about the role played by air in the process of burning ?

Ans. Air helps in the process of burning.

TEXTBOOK EXERCISES (SOLVED)

(A) Choose the Correct Answer

1. Which of the following gases is used in combustion ?

- (a) Hydrogen (b) Oxygen
(c) Nitrogen (d) Carbon dioxide.

Ans. (b) Oxygen.

2. The burning of CNG. (Compressed Natural Gas) is an example of :

- (a) Rapid combustion
(b) Spontaneous combustion
(c) Slow combustion
(d) None of the above.

Ans. (a) Rapid combustion.

3. Which of the following is an example of spontaneous combustion ?

- (a) Burning of petrol
(b) Burning of magnesium ribbon
(c) Burning of camphor
(d) Burning of white phosphorous.

Ans. (d) Burning of white phosphorous.

4. The minimum temperature at which a fuel catches fire is :

- (a) Melting temperature
(b) Boiling temperature
(c) Ignition temperature
(d) None of these.

Ans. (c) Ignition temperature.

(B) Fill in the Blanks

- Calorific value of LPG is
- part of a flame is the hottest.
- is necessary for combustion.
- Burning of wood and coal causes
- A liquid fuel, used in homes is
- Fuel must be heated to its..... before it starts burning.
- Fire produced by oil cannot be controlled by

Ans. 1. 55000 kJ/kg, 2. Outermost, 3. Oxygen (air), 4. pollution, 5. L.P.G., 6. ignition temperature, 7. water.

(C) Write True (T) or False (F)

- Burning of camphor is rapid combustion.
- Combustion is a physical change.
- Air is essential for combustion.
- Fire caused due to oil can be extinguished by water.

Ans. 1. (F), 2. (F), 3. (T), 4. (F).

(D) Match Column 'A' with Column 'B'

Column 'A'	Column 'B'
1. LPG	(a) kJ/kg
2. Caloric value	(b) Rapid combustion
3. Fire extinguisher	(c) Non-combustible
4. Glass	(d) CO ₂

Ans.

Column 'A'	Column 'B'
1. LPG	(b) Rapid combustion
2. Caloric value	(a) kJ/kg
3. Fire extinguisher	(d) CO ₂
4. Glass	(c) Non-combustible

(E) Very Short Answer Type Questions

★ Q. 1. List the conditions under which combustion can take place.

Ans. Necessary conditions for combustion : There are three necessary conditions for combustion :

- (1) Presence of oxygen
- (2) Availability of fuel
- (3) Ignition temperature of the substance.

★ Q. 2. Define ignition temperature.

Ans. It is the minimum temperature at which a substance catches fire and it starts burning.

(F) Short Answer Type Questions

★ Q. 1. Water is not used to control fires involving electrical equipment why?

Ans. We should never control a fire involving electrical circuit by using water, as water is a conductor of electricity and may give you an electric shock. Sometimes it can even lead to death.

★ Q. 2. Paper by itself catches fire easily where as a piece of paper wrapped around an aluminum pipe does not. Why?

Ans. Paper itself is combustible and because of its low ignition temperature, it catches fire easily. Now when the paper is wrapped around the aluminium pipe and heated, the heat given to it is transferred to the aluminium pipe as a result of which the temperature of the paper does not reach its ignition temperature. So the paper does not catch fire.

★ Q. 3. Name the unit to measure calorific value of fuel.

Ans. The unit of calorific value of fuel is kilojoules per kilogram (KJ/Kg).

★ Q. 4. It is difficult to burn leap of green leaf but dry leaves catch fire easily. Explain.

Ans. Moisture content is very high in the green leaves and the supply of oxygen in leap of green leaf is low but the moisture content is less in the dry leaves and they have more oxygen in them. That's why leap of dry leaves catch fire easily.

(G) Long Answer Type Questions

Q. 1. What are the different parts of candle flame? Explain using labelled diagram.

Ans. Zones of Candle Flame : Candle flame has three parts :

(i) innermost part (ii) middle part (or luminous zone) (iii) outer part (or non-luminous zone)

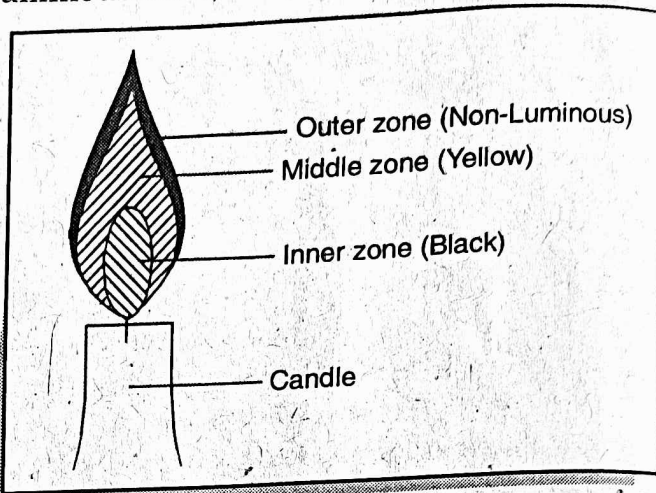


Fig. (i) Zone of Candle

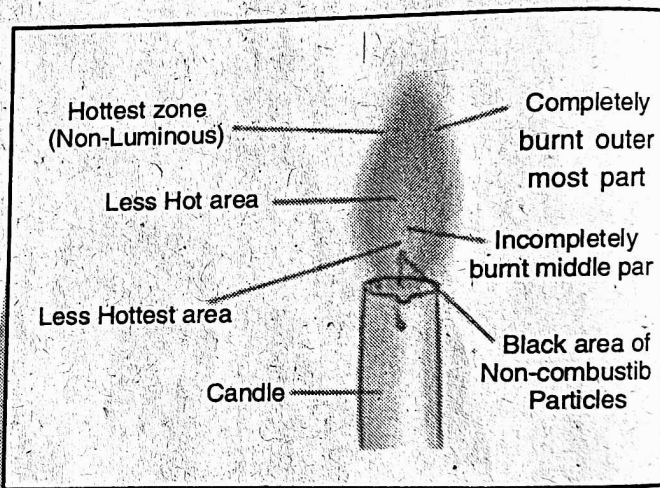


Fig. (ii) Candle Flame

1. Innermost part ; This is the innermost least hot part of the candle flame. This part contains unburnt carbon particles. The colour of this part is black due to the presence of carbon particles.

2. Middle part (or luminous zone) : The middle part of the flame is the luminous part. In this region there are fine particles of carbon which are not completely burnt. Due to these particles, this area is bright. These particles are produced in the form of smoke and soot from the flame.

3. Outermost part (or non-luminous part) : This is the outermost part of the candle flame, which appears light blue in colour or

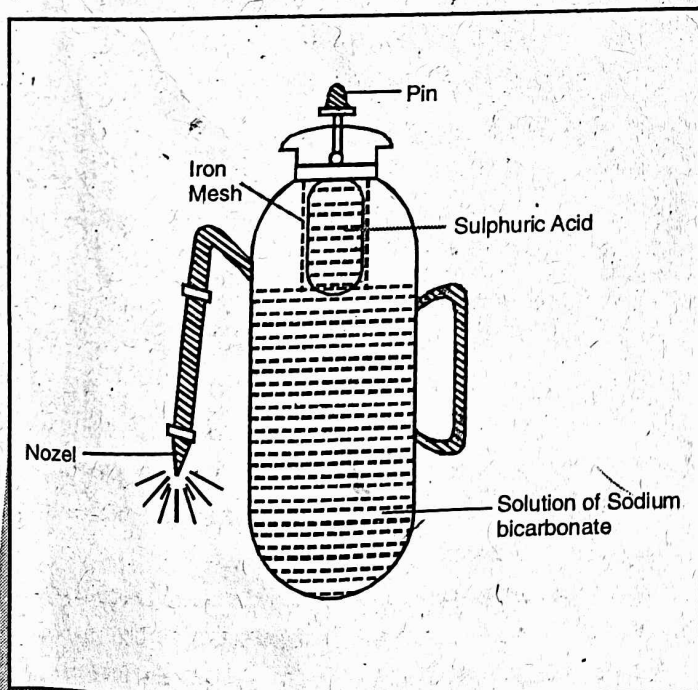
non-luminous. In this part, the oxygen combines with the fuel for complete combustion. This is the hottest part and has a temperature of about 1800°C .

Q. 2. Explain how a fire extinguisher works.

Ans. The most important thing to extinguish a fire is to break the fire triangle. The three elements of the fire triangle are : (i) heat (ii) oxygen (from air) and (iii) fuel.

To break this fire triangle, it is necessary to remove one of the elements. Fire extinguishers also work on the same principle. An ordinary fire can be extinguished by pouring water on it. If the fire is caused by an electric appliance or electric wire water cannot be used since water is a conductor of electricity and it can harm the firefighters. Oil, petrol fires also cannot be extinguished with water because water is heavier than oil and the water moves to the bottom. Oil comes to the surface of the water so the oil remains in contact with air due to which the fire does not go out.

Principle of Fire Extinguisher : Carbon dioxide gas (CO_2) is used in most of the fire extinguishers. CO_2 creates a blanket around the fire and thus cuts off the supply of oxygen (air) to the fire. Apart from this, CO_2 also reduces the temperature of the fuel. So CO_2 is a good fire extinguishing agent.



The diagram shows soda acid fire extinguisher. It consists of an iron cylinder filled with sodium bicarbonate. Sulphuric acid is kept in a glass bottle inside an iron mesh at the top of the cylinder. At the upper end of the cylinder, something is projecting out resembling iron nail may be called pin. When the fire needs to be extinguished, the cylinder is turned upside down and the nail is hit hard on the ground, which causes the iron nail to hit the glass bottle and thus the acid bottle breaks. Now the sulphuric acid reacts with sodium bicarbonate solution. CO_2 gas is produced due to the chemical reaction between the two. This gas comes out in the form of foam through the nozzle under high pressure and surrounds the fire like a blanket from all the sides, as a result of which the oxygen supply to the fire is stopped and the fire is extinguished.

Q. 3. Define calorific value of a fuel. Give units.

Ans. Calorific Value of fuel : The calorific value of a fuel is the amount of heat energy produced on complete combustion of one kilogram of the fuel.

Unit of calorific value : The unit of calorific value of fuel is kilojoule per kilogram (kJ/kg).

Example : Suppose in an experiment 4.5 kg of fuel is burnt from which 180000 kJ of heat energy is obtained, then what will be the calorific value of the fuel ?

Heat energy obtained from burning 4.5 kg of fuel = 180000 kJ

\therefore Heat energy obtained after burning 1 kg of fuel = $\frac{180000 \text{ kJ}}{4.5 \text{ kg}}$

Handwritten: $\frac{180000 \times 10}{4.5}$

i.e. Calorific value of fuel = $4 \times 10^4 \text{ kJ/kg}$.

Handwritten: 4×10^4

Q. 4. What is combustion ? Write its types.

Ans. Combustion : Combustion is also called burning. It is a chemical reaction

between fuel, when it attains its ignition temperature and the mixture of air to produce heat and light energy. Combustion is only possible when the following three are together—the fuel, air (to supply oxygen) and when temperature is higher than the ignition temperature of the fuel.

Types of Combustion :

1. Rapid Combustion : The oxidation process in which light and heat are produced in a very short period of time. It is called rapid combustion.

Example :

(1) When a burning match is brought near a gas burner, the gas catches fire quickly and starts burning.

(2) Similarly, when a burning match stick comes in contact with a candle, the vapors of the candle begin to burn rapidly from which the flame of the candle rapidly produces light and heat. The burning of petrol and CNG is also of the same type.

2. Spontaneous Combustion : No external heat is required in this combustion

and the substance starts to burn spontaneously without any assistance. Such combustion is called Spontaneous Combustion.

Example : The burning of white phosphorous is a good example of spontaneous combustion.

3. Slow Combustion : This is a slow oxidation reaction in which no light is produced and the combustion process takes a long time and the substance burns very slowly, the amount of heat released from slow combustion is too small to be experienced.

4. Explosive combustion : The combustion reaction in which a mixture of several gases is produced in large quantity along with lot of Light, heat and loud sound. Such combustion is called explosive combustion. In this type of combustion oxidation of chemicals take place very quickly.

Example : (i) Burning firecrackers on Diwali and weddings.

(ii) A bullet fired from a gun is also an example of an explosive combustion.