6 COMBUSTION AND FLAME

Q.1. Why are we told that food is a fuel for our body.

Ans. In our body food is broken down by reaction with oxygen and thus heat is produced. So, food acts as a fuel for our body.

Q.2. You might have heard that when clothes of a person catch fire, the person is covered with a blanket to extinguish fire. Can you guess why ?

Ans. Blanket is so thick that it stops the supply of oxygen (air) to the burning person and the fire is extinguished immediately that's why burning person is covered with a blanket to extinguish fire.

Q.3. Does a matchstick burn by itself ? How does it burn ?

Ans. No, a matchstick does not burn by itself. The matchstick starts burning while rubbing it on the side of the matchbox.

Q.4. Can you burn a piece of wood by bringing a lighted matchstick near it ?

Ans. No, you cannot burn a piece of wood by bringing a lighted matchstick near it, because wood has high ignition temperature and so it requires longer time to start burning, whereas the lighted matchstick extinguishes very soon.

Q.5. Why do you have to use paper or kerosene oil to start fire in wood or coal ?

Ans. The ignition temperature of wood or coal is very high. So, it requires a lot of time to be heated before burning can take place.

Paper or kerosene oil has low ignition point, so it catches fire immediately and helps the wood to reach its ignition temperature.

Q.6. Goldsmiths blow the outermost zone of a flame with a metallic blow - pipe for melting gold and silver. Why do they use the outermost zone of the flame ?

Ans. Goldsmiths use the outermost zone of the flame because the outermost part (non-luminous zone) of the flame is the hottest.

Q.7. Make a list of fuels familiar to you. Group them as solid, liquid and gaseous fuels.

Types of fuels

S.No.	Solid fuels	Liquid fuels	Gaseous fuels

Ans.

S.No.	Solid fuels	Liquid fuels	Gaseous fuels
1.	Coal	Kerosene oil	Natural gas
2.	Wood	Petrol	LPG
3.	Upla	Diesel	Bio gas

Q.8. Why are we advised never to sleep in a room with burning or smouldering coal fire in it.

Ans. Incomplete combustion of coal produces carbon monoxide gas. It is very poisonous gas, which can kill persons. So we are advised never to sleep in a room with burning or smouldering coal fire in it.

Q.9. List conditions under which combustion can take place.

Ans. There are three essential conditions of combustion –

1. There should be proper supply of air.

2. The substance should be combustible.

3. The ignition temperature should reach soon.

During the process of combustion, heat and light are given out.

Q.10. Fill in the blanks :

(a) Burning of wood and coal causes _____ of air.

(b) A liquid fuel, used in homes is _____ .

(c) Fuel must be heated to its ____ before it starts burning.

(d) Fire produced by oil cannot be controlled by ____.

Ans. (a) Pollution

(b) LPG

(c) Ignition temperature

(d) Water

Q.11. Explain how the use of CNG in automobiles has reduced pollution in our cities.

Ans. Burning of petrol and diesel in automobiles releases gaseous oxides of carbon dioxide, nitrogen oxides and sulphur oxides alongwith a lot of unburnt carbon particles. These all are poisonous and cause various environmental hazards.

But, now in metropolitan cities the use of diesel and petrol as fuels in automobiles is being replaced by CNG (Compressed Natural Gas), because CNG produces the harmful products in very small amount. CNG is a cleaner fuel thus reducing pollution in cities.

Q.12. Compare LPG and Wood as fuels.

Ans.

LPG	Wood
1. It has more calorific value i.e. 55000 kJ/kg. 2. It does not cause any environment problem. 3. It is smoke free fuel. 4. It is easy to transport through pipeline and	1. It has calorific value. i.e. 17000 to 22000 kJ/ kg. 2. On burning wood release unburnt carbon particles. These particles are dangerous pollutants causing diseases such as asthma. 3. It gives out lot of smoke.

cylinder. 5. It is easily stored in cylinders. 6. Low ignition temperature.	4. It is difficult to transport. 5. It is difficult to store. 6. High ignition temperature.

Q.13. Give reasons :

(a) Water is not used to control fires involving electrical equipment.

Ans. (a) If electrical equipment is on fire, then water is not used to control it because water conduct electricity and harm those trying to douse the water. It may cause danger of electric shocks.

(b) LPG is a better domestic fuel than wood.

Ans. (b) For long time, wood was used as domestic and industrial fuel. But, now, it has been replaced by LPG because

1. Burning of wood gives a lot of smoke, which is very harmful for human beings while LPG is smoke free fuel.

2. Cutting of tree for getting wood leads to deforestation. Which is quite harmful to the environment.

While using LPG, it does not cause any environmental problem.

CNG produces the harmful products in very small amount and act as a cleaner fuel. Therefore, LPG is a better domestic fuel than wood.

(c) Paper by itself catches fire easily whereas a piece of paper wrapped around an aluminium pipe does not.

Ans. (c). Paper by itself catches fire easily because it has low ignition temperature but when it wrapped around an aluminium pipe then heat supplied to the paper is transferred to the aluminium pipe by conduction. So, aluminium foil absorbed the heat supplied to the paper. Thus ignition temperature of paper is not reached. So it does not burn.

Q.14. Make a labelled diagram of a candle flame.

Ans.

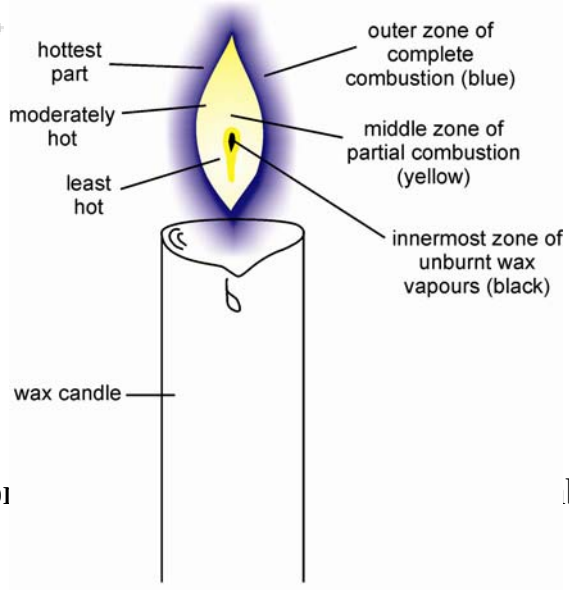

Fig. Different Zones of candle flame

Q.15. Name the unit in which the calorific value of a fuel is expressed.

Ans. The calorific value of a fuel is expressed in kilojoules per kg (kJ / kg).

Q.16. Explain how CO_2 is able to control fires.

Ans. For fires involving electrical equipments and inflammable materials like petrol, carbon dioxide (CO_2) is the best extinguisher. CO_2, being heavier than oxygen, covers the fire like a blanket. Since the contact between the fuel and oxygen is cut off, the fire is controlled.

Q.17. It is difficult to burn a heap of green leaves but dry leaves catch fire easily. Explain.

Ans. Green leaves contain lot of water, which lowers their temperature so that its temperature is brought below its ignition temperature. This prevents the burning of green leaves.

In case of dry leaves, they do not contain any water. So when burning process starts, its temperature is raised drastically above its ignition temperature and the leaves catch fire easily.

Q.18. Which zone of a flame does a goldsmith use for melting gold and silver and why ?

Ans. The goldsmith uses the outermost zone of a flame with a metallic blow-pipe for melting gold and silver.

The outermost zone is the hottest zone of the flame (temperature = 800° C), which is sufficient to melt the gold and silver.

Q.19. In an experiment 4.5 kg of a fuel was completely burnt. The heat produced was measured to be 180,000 kJ. Calculate the calorific value of the fuel.

Ans. $$\text{Calorific value of fuels} = \frac{\text{Total heat produced}}{\text{Total mass burnt}} \quad \frac{(\text{kJ})}{(\text{kg})}$$

Here, the mass of fuel = 4.5 kg

The heat produced = 180,000 kJ

$$\therefore \quad \text{Calorific value of fuel} = \frac{180,000 \text{ kJ}}{4.5 \text{ kg}}$$

$$= 40,000 \text{ kJ per kg.}$$

[Ans. calorific value of fuel will be 40,000 kJ per kg]

Q.20. Can the process of rusting be called combustion ? Discuss.

Ans. No, the process of rusting cannot be called combustion because

1. In the process of combustion energy is released while in the process of rusting no energy is released.

2. During the process of combustion, heat and light are produced while in the process of rusting, no heat and light are evolved.

3. Rusting takes place on the surface of iron, while combustion cannot take place over the iron surface.

Q.21. Abida and Ramesh were doing an experiment in which water to be heated in a beaker. Abida kept the beaker near the wick in the yellow part of the candle flame. Ramesh kept the beaker in the outermost part of the flame. Whose water will get heated in a shorter time ?

Ans. Ramesh's water will get heated in a shorter time. As Ramesh kept the beaker in the outermost part of the flame, which is the hottest part of the flame.

Q.22. Talk to people who use LPG at home. Find out what precautions they take in using LPG.

Ans. 1. Switch off the regulators of the cylinder after using it.

2. Check the pipe from time to time, it should not be cracked from anywhere.

3. Keep the cylinder in standing position.

4. Firstly light the match-stick and then turn-on the nozzle of the burner.

5. Do not let the children to handle the cylinder.