CHAPTER- 6.
COMBUSTION AND FLAME

SOLUTIONS:

EXERCISES

Q1. List conditions under which combustion can take place

Ans-Conditions under which combustion can take place are-

a.Presence of a combustible substance

b. Presence of oxygen i.e; supporter of combustion

c. Attainment of ignition temperature.

Q2. 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.

Q3. Explain how the use of CNG in automobiles has reduced pollution in our cities.

Ans- The use of CNG in automobiles has reduced pollution in our cities because it produces the harmful products in very small amounts. CNG is a cleaner fuel.

Q4. Compare LPG and wood as fuels.

Ans-

LPG	Wood
1. No residue after burning.	1. Leave a lot of ash on burning
2. Low ignition temperature	2. High ignition temperature
3. Burn easily and no smoke on burning	3. Burn with more difficulty.
4. Can be transport through pipe lines and cylinder.	4. Cannot be transport easily like LPG.

Q5 Give reasons

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

b. LPG is 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- a) Water is not used to control the fire involving electrical equipment because water may conduct electricity and harm those trying to douse the fire.

b) LPG is better domestic fuel than wood because it neither produces gases nor residues that pollute the environment.

c) The paper by itself catches fire easily because its ignition temperature is low while a piece of paper wrapped around an aluminium pipe does not catches fire because its ignition temperature rises.

Q6. Make a labelled diagram of a candle flame

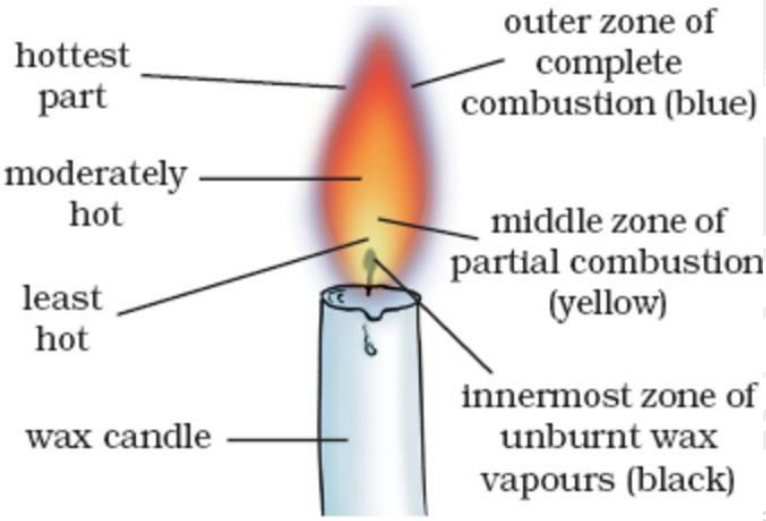

Fig: Different zones of a candle flame

Q7. Name the unit in which the calorific value of fuel is expressed.

Ans. The calorific value of a fuel is expressed in a unit called Kilo joule per Kg (Kj/ Kg).

Q8. Explain how CO_2 is able to control fires.

Ans. CO_2, being heavier than oxygen covers the fire like blanket and also brings down the temperature of fuel. Since the contact between the fuel and oxygen is cut off, the fire is controlled.

Q9. It is difficult to burn a heap of green leaves but dry leaves catch fire easily. Explain.

Ans. Green leaves contain moisture whereas dry leaves do not contain moisture. As a result, the ignition temperature of green leaves is higher than that of dry leaves. Due to this reason, it is difficult to burn a heap of green leaves but dry leaves catch fire easily.

Q10. Which zone of a flame does a goldsmith use for melting gold and silver and why?

Ans. A Goldsmith uses the outermost zone of a flame for melting gold and silver because it is the hottest zone of the flame and is non-luminous in nature.

Q11. In an experiment 4.5 kg of a fuel was completely burnt. The heat produced was measured to be 180,000KJ. Calculate the calorific value of the fuel.

Ans. Calorific value = KJ/Kg=180,000/40,000 KJ/Kg

The calorific value of the fuel is 40,000KJ/Kg

Q12. Can the process of rusting be called combustion? Discuss.

Ans. In combustion, release of energy takes place with heat and light. Therefore, the process rusting cannot be called as combustion as no energy is obtained in a rusting process.

Q13. Abida and Ramesh were doing an experiment in which water was to be heated in a beaker. Abida kept the beaker near the wick in the yellow part of the flame. Ramesh kept the beaker in the outer most part of the flame. Whose water will get heated in a shorter time?

Ans. Ramesh's water will get heated in a shorter time because he kept the beaker in the hottest outermost part of the flame.

EXTRA SOLVED QUESTIONS

Q1. What is combustion?
Ans. A chemical process in which a substance reacts with oxygen to give off heat is called combustion.

Q2. Define combustible substance.
Ans. The substance that undergoes combustion is said to be combustible substance (or, a fuel).

Q3. Mark the combustible and non combustible substances of your daily life with the help of given table

Material	Combustible/ Non-combustible
Wood Paper Iron nails Kerosene oil Stone piece Straw Charcoal Match sticks Glass	

Ans.

Material	Combustible/ Non- combustible
Wood Paper Iron nails Kerosene oil Stone piece Straw Charcoal Match sticks Glass	Combustible Combustible Non-combustible Combustible Non combustible Combustible Combustible Combustible Non combustible.

Q4. With the help of an experiment, show that oxygen (air) is necessary for burning of a candle.

Ans. To show that oxygen (air) is necessary for burning of a candle, we have to fix three lighted candle on a table and put a glass chimney over it.

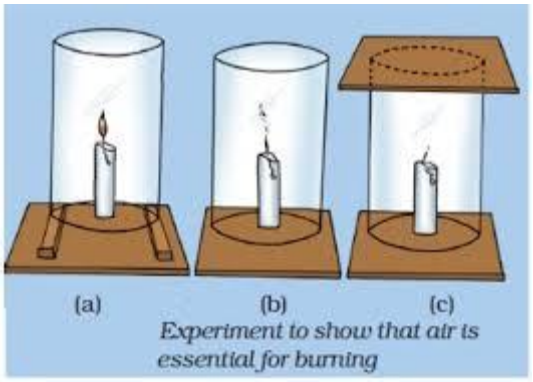

Fig. Showing that air is essential for burning.

In fig. (a) , the chimney rested on wooden blocks in such a way that air can enter the chimney- the candle will continue burning because air can enter the chimney from below.

In fig. (b), the chimney rested on the table with no way for air- the flame flickers and produces smoke.
In fig.(c), the chimney rested on the table and covered from top with glass plate- the flame goes off because the air is not available.

Q5. Why do we wrap a blanket around a person who caught fire?

Ans. We wrapped a blanket around a person who caught fire in order to cut the supply of oxygen from air and extinguish the fire.

Q6. What is ignition temperature?
Ans. The lowest temperature at which a substance catches fire is called its ignition temperature.

Q7. Why does a paper cup with water not burn?

Ans. when a paper cup with water is heated, the heat supplied to the paper cup is transferred to water by conduction. So, in the presence of water, the ignition temperature of paper is not reached. Hence, it does not burn.

Q8. What do you mean by inflammable substances?

Ans. The substances which have very low ignition temperature and can easily catch fire with a flame are called inflammable substances. e.g. Petrol, alcohol, liquified petroleum gas (LPG), etc.

Q9. What are the three essential requirements for producing fire?

Ans. The three essential requirements for producing fire are fuel, air (to supply oxygen) and heat (to raise the temperature of the fuel beyond the ignition temperature)

Q10. How does water put off fire ?

Ans. Water cools the combustible material so that its temperature is brought below its ignition temperature. This prevents the fire from spreading. Water vapours also surround the combustible material helping in cutting off the supply of air. So, the fire is extinguished.

Q11. What is rapid combustion?

Ans. A combustion that takes place rapidly and produces heat and light is known as rapid combustion.

Q12. What is spontaneous combustion?

Ans. The type of combustion in which a material suddenly burst into flames without the application of any apparent cause is called spontaneous combustion.

Q13. What is explosion?

Ans. The process of combustion in which large amount of gases is evolved with the production of heat, light and sound is called explosion.

Q14. Which types of substances give flame?

Ans. The substances which vapourise during burning give flame. e.g. Kerosene oil, molten wax, LPG, etc.

Q15. Describe the various zones of a flame.

Ans. The various zones of a flame are-

1. The outermost thin transparent faint bluish non- luminous region of complete combustion. It is the hottest zone of the flame.
2. The middle bright luminous zone of partial combustion. It is yellow in colour and is moderately hot zone.
3. The innermost, coldest dark zone, consists of hot vapour and called as zone of no combustion.

Q16. What is a fuel? Give the characteristics of ideal fuel?

Ans. A fuel is a substance, which may be burnt to produce large amount of heat without leaving any undesirable substance.

The characteristics of ideal fuel are-

i. It is readily available.
ii. It is cheap
iii. It burns easily at moderate rate
iv. It produces a large amount of heat.
v. It does not leave behind any undesirable substances.

Q17. What is calorific value of fuel?

Ans. The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its calorific value.

Q18. What are the harmful products formed by the burning of a fuel?

Ans. The harmful products formed by the burning of a fuel are-

i. Carbon fuels like wood, coal, petroleum release unburnt carbon particles. These fine particles are dangerous pollutants causing respiratory problems.
ii. Incomplete combustion of carbon fuels gives carbon monoxide gas that can kill persons sleeping in a closed room.
iii. Combustion of most fuels releases carbon dioxide in the environment causing global warming.
iv. Oxides of sulphur and nitrogen produced by the burning of coal, diesel and petrol cause acid rain which is harmful for crops, building and soil.

Q19. What is global warning?

Ans. Global warming is the rise in temperature of the atmosphere of the earth due to increase in the percentage of carbon dioxide in the air.

Q20. Why CNG is preferable for vehicles in respect to petrol and diesel?

Ans. CNG is preferable for vehicles in respect to petrol and diesel because CNG produces the harmful products in very small amounts and it is cleaner fuel.

OBJECTIVE TYPES QUESTIONS:

Q1. What of the following is a supporter of combustion.

a) Cooking gas b) Nitrogen gas c) oxygen gas d) producer gas.

Ans.(c) oxygen gas

Q2. Which one of the following gas is used in fire extinguisher.

a) Hydrogen b) oxygen c) nitrogen d) carbon dioxide.

Ans. (d) carbon dioxide.

Q3. Which of the following has higher ignition temperature?

a) petrol b) Kerosene oil c) Wood d) Diesel

Ans.(c) Wood

Q4. While cooking which of the following activity helps in saving energy.

a) cooking in open vessels. b) Cooking in covered vessels.

c) cooking with lots of water d)Cooking on a high flame.

Ans.(b) Cooking in covered vessels.

Q5. Which of the following is non-combustible?

a) Coke b) coal c) Wood d) Diamond

Ans.(d) Diamond