Combustion and Flame

Check point 1

Q. 1. Give one example of each combustible and non-combustible substance.

Answer: Combustible substance – The substance that undergoes combustion is said to be combustible.

Example - Petrol

Non-combustible substance - The substance that does not undergo combustion is said to be non-combustible.

Example – Iron

Q. 2. What is the fuel of our body?

Answer: Food is the fuel for our body because in our body food is broken down by reaction with oxygen and heat is produced.

Q. 3. Write the products which are formed when magnesium burns with oxygen.

Answer: When magnesium burns with oxygen the products formed are magnesium oxide, heat and light.

Q. 4. If we cut off the supply of air for combustion of a substance, what will happen?

Answer: For the combustion reaction to be successful a continuous supply of oxygen is required. Normally this demand of oxygen is met with normal air supply. Hence, if we cut off the supply of air for combustion of a substance then the combustion reaction will stop and the substance will stop burning.

Q. 5. At which temperature, a substance catches fire and starts burning?

Answer: The temperature at which a substance catches fire and starts burning is called its ignition temperature.

Check point 2

Q. 1. Water is not suitable for firs involving oil and petrol. Why?

Answer: Water is not suitable for fires involving oil and petrol because water is heavier than oil and petrol. Hence, when we spray water on a fire involving oil and petrol the water sinks below the oil and petrol and the oil keeps on burning at the top.

Q. 2. Why we cover the fire (like a blanket) to extinguish fire?

Answer: One of the necessary condition to continue the process of combustion is the continuous supply of oxygen. When we cover the fire with a blanket or anything we cut-off the supply of air to the fire. Hence, the fire extinguishes.

Q. 3. Write phosphorus burns in air at room temperature on its own. Which type of combustion is it?

Answer: The type of combustion in which a substance suddenly bursts into flames, without the application of any apparent cause is called spontaneous combustion.

Here, phosphorus burns in air at room temperature on its own hence, it is a spontaneous combustion.

Check point 3

Q. 1. If the supply of oxygen is not sufficient, will the fuels burn completely?

Answer: Supply of oxygen is one of the necessary condition for combustion. Hence, if the supply of oxygen is not sufficient then the fuel will not burn completely.

Q. 2. LPG stoves burn with which colour of flame? Why?

Answer: LPG stoves burn with a blue colour of the flame because in case of LPG the fuel burns completely.

Q. 3. A candle consists of unburnt wax vapours. Which zone is this?

Answer: The unburnt wax vapours of a burning candle constitutes the innermost zone of the flame which is least hot.

Check point 4

Q. 1. Fuels can be in solid or liquid state only. Is it correct?

Answer: The above statement is not correct fuels can be in all the three states i.e solid liquid and gas.

An example of fuel of each state is-

Solid – Coal

Liquid – Kerosene oil

Gas – Natural gas

Q. 2. Write the unit of calorific value.

Answer: The unit of calorific value is – kilojoule per kg (KJ/Kg).

Q. 3. Burning of wood is harmful for human beings. How?

Answer: Burning of woods produces smokes and a lot of particulate pollutants. It also produces unburnt carbon particles. These fine particles are dangerous pollutants causing respiratory diseases.

Incomplete combustion of theses fuels gives carbon monoxide gas which is a poisonous gas. Moreover they produce carbon dioxide upon combustion which causes global warming.

Chapter Test

Q. 1. Write the causes of global warming.

Answer: i. The burning of any fuel releases carbon dioxide into the environment.

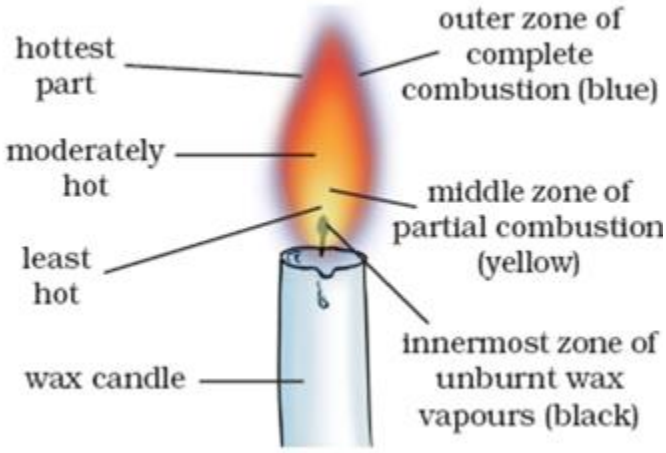
ii. This increased concentration of carbon dioxide above the normal level is believed to cause global warming.

Q. 2. Name the most common fire extinguisher.

Answer: The most common fire extinguisher is water but it could not be used in fire involving electric current and oil.

Q. 3. How many zones are there in a flame?

Answer: There are three zones in a flame as shown in the following diagram:-



Q. 4. How does pouring water extinguish a fire?

Answer: When we pour water on the fire it cools the temperature of the combustible material so that its temperature is brought below its ignition temperature. This prevents fire from spreading. Water vapours also surround the combustible material, helping in cutting off the supply of air. So, the fore is extinguished.

Q. 5. Write an example of gaseous fuel.

Answer: An example of gaseous fuel is compressed natural gas (CNG).

Q. 6. Carbon dioxide causes acid rain. Is it correct?

Answer: No, it is not correct carbon dioxide does not cause acid rain but it leads to global warming.

Acid rain is caused by oxides of sulphur and nitrogen.

Q. 7. What gives a pollution free environment when burnt?

Answer: Compressed natural gas (CNG) gives a pollution free environment when burned.

Q. 8. Define the word 'explosion'.

Answer: The reactions which proceed suddenly with the evolution of heat, light and sound along with the formation of a large amount of gas is called explosion.

Q. 9. What is meant by rapid combustion? Give two examples.

Answer: The combustion reactions in which a substance burns rapidly and produces heat and light are known as rapid combustion.

Two examples of such a combustion are:

Burning of CNG, Burning of kerosene oil.

Q. 10. Explain how the use of CNG in automobiles has reduced pollution in cities?

Answer: The burning of carbon fuels produces unburnt carbon particles, particulate pollutants, smoke, oxides of sulphur and nitrogen, carbon dioxide etc into the environment which pollutes our cities. Use of CNG in our automobiles has rapidly decreased the level of pollution as CNG being a cleaner fuel produces the harmful products in very small amounts and hence, protects our environment.

Q. 11. Give two examples each of (i) solid fuels and (ii) liquid fuels.

Answer: Two example of: -

i. Solid fuel – Wood, Coal

ii. Liquid fuel – Kerosene, Petrol

Q. 12. State the disadvantages of burning wood as a fuel.

Answer: The disadvantages of burning wood as a fuel are: -

i. It releases unburnt carbon particles into the atmosphere. These fine particles are dangerous pollutants causing respiratory diseases like asthma.

ii. Incomplete combustion of it produces carbon monoxide gas. It is a very poisonous and suffocating gas.

iii. Burning of wood releases carbon dioxide into the environment. Increased concentration of carbon dioxide leads to global warming.

Q. 13. Water can boil in a paper cup. How?

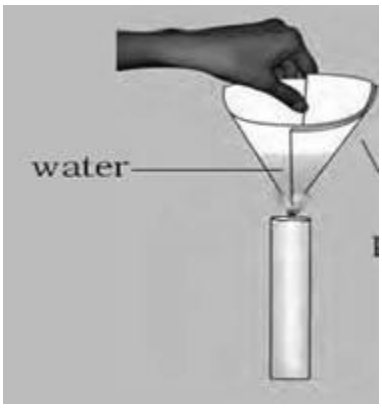
Answer: Water can be boiled in a paper cup the method is as described below: -

i. Make a paper cup as shown in the figure.

ii. Pour about 50ml of water in it.

iii. Heat it on a flame as shown in the figure.

iv. After a few minutes of heating you will find that the water in the cup is boiling.



In this process the water is boiled in the paper cup without the cup being burning because when we add water to the cup the ignition temperature of the paper is increased and hence it keeps on transferring the heat that it receives from the candle to the water by the process of conduction and causes the water to boil.

Q. 14. Why does charcoal not produce a flame?

Answer: The substances which get vapourised during burning gives flames. Charcoal while burning do not vapourise and so does not produce a flame while burning.

Q. 15. Define calorific value.

Answer: Calorific value – The amount of heat energy produced on complete combustion of 1kg of a fuel is called its calorific value. It is expressed in a unit called Kilojoule per kg (KJ/Kg).

Q. 16. How luminous flames differ non-luminous flames?

Answer:

Luminous flame	Non-luminous flame
It consists of unburnt carbon particles.	It does not consist of unburnt carbon particles and is the zone of complete combustion.
It is the least hot part of the flame.	It is the hottest part of the flame.

Q. 17. Explain how burning of fuels such as coal, petrol and diesel leads to acid rain. Give the harmful effects of acid rain.

Answer: The burning of fuels such as coal, petrol and diesel releases sulphur dioxide and gaseous oxides of nitrogen into the air. These gases are extremely suffocating and corrosive. When these oxides of sulphur and nitrogen dissolve in rainwater they form acids. Such a rain is called an acid rain.

The harmful effects of acid rain are that it is very harmful to crops, buildings and soil and leads to extensive loss of property.

Q. 18. With the help of an experiment, show that air is necessary for burning of a candle.

Answer: An experiment to show that air is necessary for burning of a candle is as follows: -

i. At first, light a candle on a table.

ii. A glass chimney is then put over the candle which is being rested on a few wooden blocks in such a way that air can enter the chimney from the bottom.

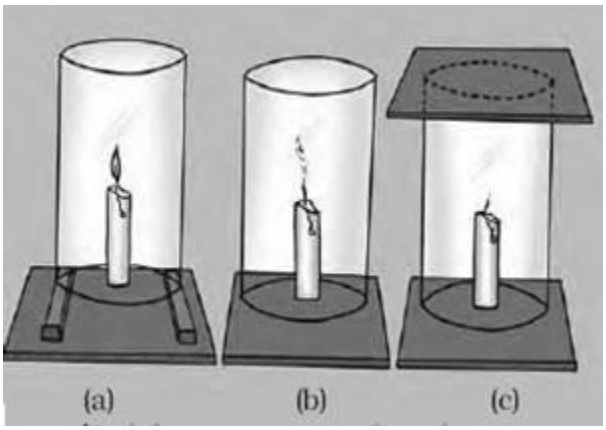
iii. It will be seen that in this case, the candle burns freely in this case.

iv. In the second set, we had removed the woods and had allowed the chimney to rest on the table.

v. In this case, the flame of the candle flickers and produces smoke.

vi. In the third arrangement, we had put a glass plate over the chimney of the second arrangement above.

vii. In this case, the flame finally goes off.



From the above three experimental setups we can see that the candle burns freely when there was a continuous supply of air as in the first case. The candle started flickering when we had stopped the air supply from the bottom as in the second case. Finally in the third case when we had removed the supply of air from both the bottom and above the candle goes off.

The above observations clearly suggest that air is necessary for the burning of a candle.

Q. 19. Write the conditions necessary for combustion.

Answer: The conditions necessary for combustion are:-

i. Fuel - There must be something to burn.

ii. Air – There must be a continuous supply of oxygen to support the process of combustion.

iii. Heat – The temperature of the fuel must be raised above the ignition temperature to start the process of combustion.

Q. 20. Draw a diagram showing zone containing very hot carbon particles.

Answer: A diagram showing zone containing very hot carbon particles is: -