Lesson 6. Combustion and Flame
Grade VIII

Basic concepts – A Flow Chart

COMBUSTION

The process of burning of a substance in the presence of air (oxygen) and undergoes a chemical reaction to produce heat and light.

Condition Required for combustion

- Presence of a combustible substance (a substance which can burn).
- Presence of a supporter of combustion (like air or Oxygen).
- Attainment of ignition temperature.

Types of combustion

Spontaneous combusting

- Combustion of a substance on its own without being ignited.
- Example: White phosphorus undergoes spontaneous combustion when the room temperature is 35° C , which is its ignition temperature.

Rapid Combustion

- A substance burns as soon as it is ignited, producing large amount of heat and light.
- Example : Burning of cooking gas in a gas stove, burning of paper and kerosene oil, explosion of fire crackers.

Slow Combustion

- A substance undergoes combustion without any ignition or external heat. This process produces very little heat and no light.
- Example : Rusting of iron.

Flame

- It is a zone of burning vapour.
- The substances which vapourise during burning, give flames. Example: kerosene oil and molten wax.

Fuel

The concentrate storehouse of energy and are burnt to produce heat energy. For example, Kerosene, diesel, Petrol, coal, domestic gas (LPG) and wood.

Fuel Efficiency Calorific Value

- The amount of heat energy produced on complete combustion of 1 kg of a fuel.
- It is expressed in kilojoules per kg.

Types of Fuels

- Solld fuels : Combustible substances which are solid at room temperature. Example: coal, coke, wood, charcoal, animal, dung cakes, etc.
- Liquid Fuels: Volatile liquids which produce combustible vapour. Example: Petrol, Kerosene, alcohol, diesel, etc.
- Gaseous fuels; Combustible gases or mixtures of combustible gases. Example: natural gas, LPG, Biogas, Coal gas, Water gas, CNG, etc.

Effects of Burning of Fuels

- Carbon fuels .like wood. Coal, petroleum release unburnt carbon particles. These are dangerous pollutants causing respiratory diseases,such as asthma.
- Incomplete combustion of carbon fuels gives carbon monoxide which is a poisonous gas.
- Increased concentration of carbon dioxide in the air is believed to cause global warming.
- Oxides of sulphur and nitrogen dissolve in rain water and form acids. Such rain is called acid rain. It is very harmful for crops, buildings and soil

Know the Terms

- **Inflammable Substances :** The substances which have very low ignition temperature and can catch fire easily with a flame are called inflammable substances, e.g, Petrol, alcohol, LPG etc.
- **Fuel :** A substance which produces heat on burning is called a fuel. These are the sources of heat energy. These fuels can be in solid, liquid or in gaseous state.

Objective Type Questions

(1 Mark each)

I. Multiple Choice Questions

1. A substance which reacts with oxygen giving heat is called a combustible substance. Which one of the following is a combustible substance? **(NCERT Exemplar)**

   (a) Iron nail (b) glass (c) stone piece (d) wood

2. Which one of the following has the highest calorific value? **(NCERT Exemplar)**

   (a) Kerosene (b) biogas (c) LPG (d) petrol

3. Magnesium ribbon on burning in air produces : **(NCERT Exemplar)**

   (a) magnesium oxide, water and light (b) magnesium oxide, and heat

   (c) magnesium oxide, heat and light (d) magnesium oxide, water and heat

4. Which of the following is not a combustible substance ? **(NCERT Exemplar)**

   (a) camphor (b) glass (c) straw (d) charcoal

5. The substance that does not burn with flame is **(NCERT Exemplar)**

   (a) LPG (b) camphor (c) dry grass (d) charcoal

6. On placing an inverted tumbler over a burning candle, the flame extinguishes after some time. This is because of non-availability of : **(NCERT Exemplar)**

   (a) oxygen (b) water vapours (c) carbon dioxide (d) wax

7. If a person's clothes catch fire, the best way to extinguish the fire is to : **(NCERT Exemplar)**

   (a) throw water on the clothes (b) use fire extinguisher

   (c) cover the person with a woollen blanket (d) cover the person with a polythene sheet

8. The substance expected to have the highest ignition temperature out of the following is :

(NCERT Exemplar)

(a) kerosene (b) petrol (c) coal (d) alcohol

9. Choose the correct statement about inflammable substance from the following :

(NCERT Exemplar)

(a) low ignition temperature and can catch fire easily

(b) high ignition temperature and can catch fire easily

(c) low ignition temperature and cannot catch fire easily

(d) high ignition temperature and cannot catch fire easily

10. Choose the incorrect statement from the following: Forest fires are usually due to :

(NCERT Exemplar)

(a) Carelessness of humans (b) Cutting of trees

(c) Heat of sun (d) Lightning strike

11. The calorific value of a fuel is expressed in a unit called **(NCERT Exemplar)**

(a) kilojoule per litre (b) kilogram per milliliter

(c) kilojoule per gram (d) kilojoule per kilogram

12. In villages people use wood as fuel because :

(a) it is considered to be an ideal fuel. (b) of its easy availability and low cost

(c) it is environment friendly (d) it catches fire easily.

13. Which among the following is considered as the cleanest fuel ? **(NCERT Exemplar)**

(a) cowdung cake (b) kerosene (c) petrol (d) hydrogen gas

14. Choose the incorrect statement from the following : A good fuel is one which :

(NCERT Exemplar)

(a) is readily available (b) produces a large amount of heat

(c) leaves behind many undesirable substances. (d) burns easily in air at a moderate rate

15. Shyam was cooking potato curry on a chulha. To his surprise he observed that the copper vessel was getting blackened from outside. It may be due to : **(NCERT Exemplar)**

(a) proper combustion of fuel (b) improper cooking of potato curry

(c) improper combustion of the fuel (d) burning of copper vessel.

1. (d)	2. (c)	3. (c)	4. (b)	5. (d),	6. (a)	7. (c)	8. (b)
9. (c)	10. (d)	11. (d)	12. (b)	13. (d)	14. (b)	15. (c)	

II. Multiple Choice Questions

1. The substances which give heat and light after combustion are called

a. Flame
b. Fuel
c. Combustion
d. None of these

2. Like fuels, the sun also provides heat and light. The process taking place in he sun is called

a. Combustion
b. Nuclear process
c. Burning
d. All of these

3. Coal burns with

a. Flame
b. Only glow
c. Both flame and glow
d. None of these

4. Burning of charcoal in a closed room will produce

a. Carbon dioxide
b. Nitrogen dioxide
c. Carbon monoxide
d. All of these

5. The substances which have very low ignition temperature will

a. Catch fire easily
b. Will not catch fire
c. Catch fire after some time
d. None of these

6. CNG and LPG are the examples of

a. Solid fuels
b. Liquid fuels
c. Gaseous fuels
d. They are not fuels

7. Ignition temperature is

a. Lowest temperature to catch fire
b. Higher temperature to catch fire
c. Any temperature
d. None of these

8. Combustion is a

a. Chemical process
b. Physical process
c. Both of these processes
d. None of these processes

9. The products of combustion are

a. Carbon dioxide and water
b. Oxygen and water
c. Only carbon dioxide
d. Only oxygen

10. There are following zones of a flame

a. Two
b. Three
c. Four
d. No any zone

11. Which is the best domestic fuel?

a. Wood b. Dung cake

c. Coal d. L.P.G

1. b	2. b	3. b	4. c	5. a	6. c	7. a	8. a	9. a	10. b	11. d

I. Fill in the blanks

1. A _____ process in which a substances reacts with _____ to give off heat is called combustion.
2. When the clothes of a person catch _____ the person is covered with a _____ to extinguish fire.
3. The _____ temperature at which a substances catches fire is called its _____ temperature.
4. The substance which have very _____ ignition temperature and can easily catch fire with a flame are called _____ substances.
5. The substances which vaporise during _____ gives flame.
6. _____ in air is essential for combustion.
7. _____ is commonly used to control fire.
8. Fuels differ in their _____ and _____.
9. Incomplete combustion of a fuel gives poisonous _____ gas.
10. _____ is the rise in temperature of the atmosphere of the earth.

1. chemical, oxygen	2. fire, blanket	3. lowest, ignition
4. low, combustible	5. burning	6. Oxygen
7. Water	8. Efficiency, cost	9. carbon monoxide
10. Global warming		

II. Fill in the blanks

1. CNG is a _____ fuel.
2. The substances which are combustible are also called _____.
3. There are three essential conditions of combustion. Present of fuel, ignition temperature and presence of _____.

4. The lowest temperature at which a substance catches fire is called its _____ temperature.

5. The type of combustion in which any substance starts to burn on its own is called _____ combustion.

6. L.P.G is a _____ fuel which is _____ to use at domestic level.

7. There are _____ types of fuels.

8. Fuel provides heat and _____ .

9. All the fuels do not burn with _____.

10. L.P.G burns with _____ flame.

11. The hottest zone of hte flame is _____

1. Gaseous	2. Fuels	3. Oxygen (air)	4. Ignition	5. Spontaneous	6. Gaseous , best
7. Three	8. Light	9. Flame	10. Blue	11. Outermost zone	

I. Match the following.

I. Column A		Column B	
(i)	Wood	(a)	Gaseous fuel
(ii)	Iron nail	(b)	Flame
(iii)	L.P.G	(c)	Solid Fuel
(iv)	Candle	(d)	Combustible
(v)	Coal	(e)	Non-combustible

(i). (d)	(ii). (e)	(iii) . (a)	(iv) . (b)	(v) . (c)

II. Column A		Column B	
(i)	L.P.G	(a)	Global warming
(ii)	Kerosene	(b)	Oxides of sulphur and nitrogen
(iii)	Luminous zone	(c)	Electric short circuit
(iv)	Carbon dioxide	(d)	Clean fuel
(v)	Acid rain	(e)	Kerosene oil
(vi)	Carbon dioxide and sand	(f)	Candle flame

(i). (d)	(ii). (e)	(iii) . (f)	(iv) . (a)	(v) . (b)	(vi). (c)

II. Match the following.

I. Column A	Column B
1. Oxides of sulphur and nitrogen	i. Fire extinguisher
2. CNG	ii. Incomplete combustion of coal
3. Oxygen	iii. Very low ignition temperature
4. Inflammable	iv. Acid rain
5. Carbon dioxide	v. Necessary for combustion
6. Carbon monoxide	vi. Fuel for automobiles

1. iv	2. vi	3. v	4. iii	5. i	6. ii

II. Column A	Column B (zone)	Column C (colour)
a. hottest part	i. innermost zone of unburnt wax vapour	x. blue
b. moderately	ii. middle zone of partial combustion	y. black
c. least hot	iii. outer zone of complete combustion	z. yellow

1. iii – x	2. ii – z	3. i - y

III. Match the following.

I. Column A	Column B
a. Oxides of sulphur and nitrogen	i. Fire extinguisher
b. CNG	ii. Incomplete combustion of coal
c. Oxygen	iii. very low ignition temperature
d. Inflammable substance	iv. acid rain
e. Carbon dioxide	v. Necessary for combustion
f. Carbon monoxide	Vi . Fuel for automobiles

a. iv	b. vi	c. v	d. iii	e. i	f. ii

II. Column A	Column B	Column C
a. Hottest part	i. Innermost zone of unburnt wax vapours	x. Blue
b. Moderately hot	ii. Middle zone of partial combustion	Y. Black
c. Least hot	iii. Outer zone of combustion	z. yellow

a. iii, x	b. ii,z	c. i, y

I. True or False

1. Air is necessary for combustion.
2. Magnesium is a non-combustible metal.
3. Carbon dioxide is an excellent fire extinguisher.
4. Calorific value of wood is higher than that of coal.
5. A physical process in which a substance reacts with oxygen to give off heat is called combustion.
6. Water is the best extinguisher for fires involving electrical equipment.
7. Alcohol, CNG and LPG are inflammable substances.
8. Increased concentration of nitrogen in air is believed to cause global warming.
9. Greater the calorific value, better is the fuel.

10. Middle zone is the hottest zone of a flame.

11. The substances which vaporize during burning, give flame.

1. True	2. False	3. True	4. False	5. False	6. False
7. True	8. False	9. True	10. True	11. True	

II. True or False

1. Coal is a fuel which can produce flame.
2. The innermost part of the flame has very least temperature.
3. CNG stands for Common Natural Gas.
4. Carbon monoxide is a poisonous gas
5. Acid rain is very useful for the crops, buildings and the soil.
6. Oxygen is required for the burning of any substance.
7. The lowest temperature at which any substance catches fire is called ignition temperature.
8. Oxygen is the product of any burning process
9. C.N.G and L.P.G burns with sooty flame.
10. All the fuels burn with blue flame.
11. The dark zone has very less amount of heat.

1. False	2. True	3. False	4. True	5. False	6. True
7. True	8. False	9. False	10. False	11. True	

Quiz Time

1. Name the clean fuel recommended for use in buses.

2. What is this temperature called, when a substance catches fire?

3. Which part of the candle flame is hottest?

4. What are three zones of a candle flame?

5. What substances are generally used to extinguish fire caused by an electric short circuit?

6. Which gas is released from soda fire extinguisher to extinguisher to extinguish fire?

7. In what unit the calorific value of a fuel expressed?

8. What are two natural causes of spontaneous forest fires?

9. What is global warming?

10. Why are we advised not to sleep in a room with burning or smouldering coal fire in it?

Answers:

1. CNG
2. Ignition temperature
3. Outermost non-luminous blue zone of the flame
4. The outermost blue zone of complete combustion, the middle yellow zone of partial combustion and the innermost black zone of unburnt wax vapour.
5. Sand and carbon dioxide.
6. Carbon dioxide
7. Kilojoule per kg (kJ/kg)
8. (i) Due to heat of the sun (ii) Due to lightning strike
9. Global warming is the rise in temperature of the atmosphere of the earth.
10. Incomplete burning of coal produces carbon monoxide which can kill persons sleeping in that room.

NCERT Corner

Intext Questions

1. Boojho : We were told that food is a fuel for our body. Why?

In our body food is broken down by reaction with oxygen and heat is produced.

2. Boojho: We have read that the sun produces heat and light. Is that through a combustion process? Paheli : How can it be? There is no air in the sun.

In the sun, heat and light are produced by nuclear reactions.

3. Why are we advised never to sleep in a room with burning coal fire in it ?

We are advised never to sleep in a room with burning coal fire because incomplete combustion of these fuels gives carbon monoxide gas. It is a very poisonous gas, it can kill persons sleeping in that room.

Textbook Questions

1. List conditions under which combustion can take place.

Necessary conditions are as follows :

(i) There must be proper supply of oxygen.

(ii) Presence of combustible substance.

(iii) Attainment of ignition temperature.

2. Fill in the blanks :

(i) Burning of wood and coal causes_____of air.

(ii) A liquid fuel used in homes is_____.

(iii) Fuel must be heated to its_____ before it starts burning.

(iv) Fire produced by oil cannot be controlled by _____.

(i) pollution	(ii) kerosene	(iii) ignition temperature	(iv) water

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

The combustion of CNG does not produce any residue and hazardous gases like nitrogen oxide, sulphur dioxide. These gases are main cause of air pollution. Therefore, use of CNG in automobiles helps in reducing pollution.

4. Compare LPG and Wood as fuels.

Differences between LPG and Wood are as follows :

LPG	Wood
(i) It is a gaseous fuel.	(i) It is a solid fuel.
(ii) It does not produce smoke.	(ii) It produces smoke.
(iii) It is easily stored in cylinders.	(iii) It requires more space to store.
(iv) It does not cause any pollution.	(iv) It causes much pollution.
(v) Its calorific value is high i.e., 55000 kJ/kg.	(v) Its calorific value is low i.e., 17000 kJ/kg-22000kJ/ kg

5. Give reasons :

(i) Water is not used to control the fire involving electrical equipment.

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

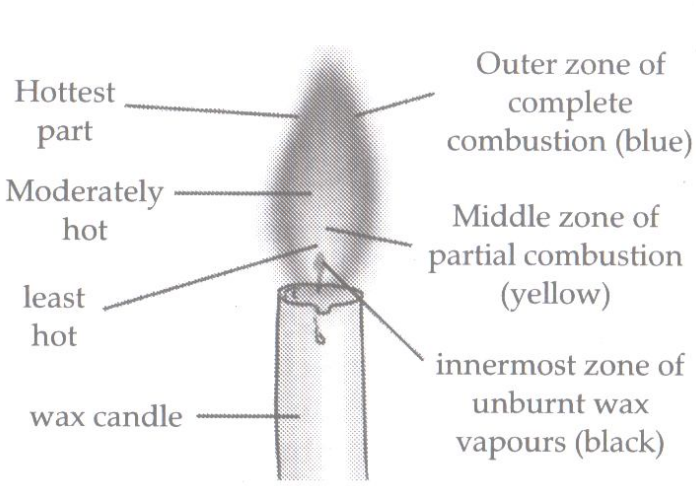
(iii) Paper by itself catches fire easily whereas a piece of paper wrapped around an aluminium pipe does not.

(i) In case of fires produced by electric short circuit or electric equipments, water is not used at all because water is a good conductor of electricity and may result in electrocution or electric shock.

(ii) Wood has less calorific value (17000-22000 kJ/kg) than the calorific value of LPG (55000 kJ/kg). It means that on combustion of 1 kg of LPG, 55000 kJ heat is generated while combustion of 1 kg of wood produces about 20000 kJ of heat only. So LPG is better domestic fuel than wood. Also LPG does not leave any residue after combustion which wood does.

(iii) As paper has low ignition temperature, so it requires less amount of heat to catch fire, while for paper wrapped around the aluminium pipe it must be heated upto ignition temperature of aluminium to ignite. So, it requires large amount of heat.

6. Make a labelled diagram of a candle flame.



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

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

8. Explain how CO_2 is able to control fires.

Actually, CO_2 cuts off supply of air to the combustible substance or it brings down the temperature of the combustible substance below its ignition temperature by forming a layer on that substance due to which it stops the fire.

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

As dry leaves have low ignition temperature than heap of green leaves because green leaves have water and other elements in them. So to ignite the green leaves, we have to heat them up to ignition temperature of their constituents which is comparatively high. So, it is easier to ignite dry leaves than green leaves.

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

The blue, non-luminous zone (outer zone) because this point of the flame has the highest temperature, so it is used for melting gold and silver.

11. 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.

Given : Mass of fuel = 4.5 kg

The heat produced by combustion of 4.5 kg of fuel = 1,80,000 kJ

So, the calorific value of fuel = Heat produced by combustion of 1 kg of fuel

= 1,80,000 / 4.5 kJ/kg.

= 40, 000 kJ/kg.

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

Rusting is the process in which metal reacts with oxygen of air and moisture of air and forms its oxides, which appear on the surface of that metal. While combustion is the process of burning of combustible substance in the presence of oxygen of air. So we cannot call the rusting as combustion.

13. 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 candle flame. Ramesh kept the beaker in the outermost part of the flame. Whose water will get heated in a shorter time ?

As outermost flame is hotter than the middle part or yellow flame, so water of Ramesh will be heated in a shorter time.

I. Very Short Answer Type Questions.

1. What are fuels?

The substances which provide heat and light are called fuels.

2. Name two fuels that are used in your homes.

(i) L.P.G (ii) Kerosene

3. What fuels are used for running automobiles?

Petrol, diesel and CNG

4. What is the full form of CNG?

CNG stands for Compressed Natural Gas.

5. What is the difference between burning of a candle and burning of coal?

A candle burns with a flame, whereas coal does not.

6. Classify the fuels.

The fuels are classified into solid, liquid and gaseous fuels.

7. What are combustible substances?

The substances that undergo combustion are called combustible substances.

8. Do all he fuels burn with a flame?

No, all the fuels do not burn with a flame.

9. What are the products of combustion?

Carbon dioxide, water vapour, heat and light

10. Name some combustible substances.

Wood, paper, kerosene oil, charcoal etc.

11. Write the names of some uncombustible substances.

Mud, stone, glass etc.

12. On the basis of the combustion, classify the substances.

There are two types of substances;

(i) Combustible (ii) Non-combustible

13. What is the source of heat and light in the sun?

In the sun, heat and light are produced by nuclear reactions.

14. What do you mean by an ignition temperature?

The lowest temperature at which any substance catches fire is called its ignition temperature.

15. Do all the substances catch fire at the same temperature?

No, all substances do not catch fire at the same temperature. Different substances catch fire at different temperature.

16. What are inflammable substances?

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

17. Mention some examples of inflammable substances.

Petrol , alcohol and LPG etc.

18. Name the substances used to extinguish fire.

Water, sand and fire extinguishers.

19. Are these substances used to extinguish all the types of fire?

No.

20. What substances are used to extinguish fire, in case of electric short circuit?

Sand or soil and CO_2

21. Does your city/town have a fire brigade station?

Yes, there is a fire brigade station in my city.

22. What are the essential requirements for producing fire?

There are three requirements to produce fire;

(i) Fuel (ii) Air to supply oxygen

(iii) Ignition temperature

23. What is the principle to extinguish fire?

Fire can be controlled by removing one or more of the requirements – air, fuel or heat.

24. Which is the most common fire extinguisher?

Water is the most common fire extinguisher.

25. Write the name of different types of fire extinguisher.

(i) Soda-acid (contains baking soda and acid) fire extinguisher.

26. How many types of combustion are there?

There are three types of combustion :

(i) Rapid combustion

(ii) Spontaneous combustion and

(iii) Explosion

27. What is flame?

The burning of vapours forms flame.

28. What is the colour of LPG flame?

Blue

29. What is the colour of candle flame?

Yellow

30. What type of substances produce flame?

The substances which vapourise during burning give flame.

31. Give examples of the substances which give flame.

Kerosene oil and molten wax.

32. Why does charcoal not produce flame?

Charcoal does not vapourise, so it does not produce a flame.

33. What are the different zones of flame?

There are three zones of flame;

(i) Non-luminous zone

(ii) Luminous zone and

(iii) Dark zone

34. Which zone of flame has highest temperature?

Non-luminous zone

35. What do you mean by deforestation?

The cutting of trees is called deforestation.

36. Name two fuels which are used in industries.

(i) Coal (ii) Diesel

37. What is the colour of flame when magnesium in burnt?

White flame.

38. What is spontaneous combustion?

The combustion in which materials catch fire of it own suddenly is called spontaneous combustion.

39. Name two substances which does not burn with flame.

(i) Coal (ii) Charcoal

40. Write an effect of deforestation on environment.

The balance of ecosystem is disturbed.

II. Very Short Answer Type Questions.

1. Two glass jars A and B are filled with carbon dioxide and oxygen gases respectively. In each jar, a lighted candle is placed simultaneously. In which jar, will the candle remain lighted for a longer time and why? (NCERT Exemplar)

In jar B, the candle remains lighted for a longer time because oxygen is a supporter of combustion.

2. Anu wants to boil water quickly in a test tube. On observing the different zones of the flame, she is not able to decide which zone of the flame will be best for boiling water quickly. Help her in this activity. (NCERT Exemplar)

Anu should keep her test tube in the outermost zone or non-luminous zone of the flame because it is the hottest zone of a flame and has more temperature.

3. Why is the use of diesel and petrol as fuels in automobiles being replaced by Compressed Natural gas (CNG) in big cities? (NCERT Exemplar)

It is because CNG produces harmful products in very small amount, so it is a clear fuel.

4. What do you understand by fuel efficiency?

Fuel efficiency is determined by its calorific value which is the amount of heat energy produced on complete combustion of 1 kg of a fuel. The calorific value of a fuel is expressed in kJ/kg.

5. What is combustion?

A chemical process in which a substance burns in the presence of oxygen to release heat is called combustion.

6. Name two combustible substances.

Wood, Petrol.

7. What happens when charcoal burns in the air?

Charcoal burns in air producing carbon dioxide, heat and light.

8. Define ignition temperature.

The lowest temperature at which a substance catches fire is called its ignition temperature.

9. Name different zones of flame.

Three zones of a flame are :

(i) Non-luminous zone.

(ii) Luminous zone.

(iii) Dark zone.

10. What is the composition of a match-stick?

A mixture of antimony trisulphide, potassium chlorate and white phosphorous with some glue and starch applied on the head of the match stick.

11. Define inflammable substance.

The substance that has very low ignition temperature and can easily catch fire with a flame is called inflammable substance.

12. Who helps us when a building or an area catches fire?

Fire brigade helps to extinguish the fire in an area or a building.

13. Name the types of combustion.

Types of combustion : (i) Rapid combustion. (ii) Spontaneous combustion. (iii) Explosion.

14. What is global warming?

The rise in temperature of the atmosphere of the earth due to increased concentration of carbon dioxide in the air is called global warming.

15. What is calorific value?

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

16. How is carbon monoxide gas formed?

Incomplete combustion of any fuel is responsible for the formation of carbon monoxide gas.

17. What is the principle to extinguish fire?

Fire can be controlled by removing one or more of the requirements - air, fuel or heat.

18. What types of substances produce flame?

The substances which vaporize during burning give flame.

III. Very Short Answer Type Questions.

1. Two glass jars A and B are filled with carbon dioxide and oxygen gases, respectively, In each jar a lighted candle is placed simultaneously. In which jar will the candle remain lighted for a longer time and why?

In jar B, because oxygen is a supporter of combustion.

2. Anu wants to boil water quickly in a test tube. On observing the different zones of the flame, she is not able to decide which zone of the flame will be best for boiling water quickly. Help her in this activity.

Anu should keep her test tube in the outermost zone which is the hottest part of the flame.

3. Why is the use of diesel and petrol as fuels in automobiles being replaced by compressed Natural Gas (CNG) in big cities?

It is because CNG produces harmful products in very small amount and is cleaner fuel.

4. If you hold a piece of iron wire with a pair of tongs inside a candle flame or a Bunsen burner flame, what will you observe? Will it produce a flame?

Iron wire will become red hot and glow. It will not produce a flame.

5. What is fuel?

The combustible substance that undergoes combustion is termed as fuel.

6. What do you understand by the term ignition temperature?

The lowest temperature at which a combustible substance catches fire is known as ignition temperature.

7. Write some characteristics of an ideal fuel.

An ideal fuel is cheap, readily available, readily combustible and easy to transport. It has high calorific value. It does not produce gases or residues that pollute the environment.

I. Short Answer Type Questions.

1. Separate the following materials as combustible and non-combustible.

Charcoal, Chalk, Stone, Iron rod, Copper coin, Straw, Cardboard, glass, paper, candle, wood

a. Combustible : Charcoal, Straw, Cardboard, Paper, Candle, wood.

b. Non-Combustible : Chalk, Stone, Iron rod, Copper coin, glass.

2. People usually keep angethi /burning coal in their closed rooms during winter season. Why is it advised to keep the door open?

Due to insufficient availability of oxygen in the closed room carbon monoxide gas is produced which can kill persons sleeping in that room.

3. What do you understand by fuel efficiency?

The amount of heat produced by the complete combustion of unit mass of a fuel is known as fuel efficiency or calorific value.

4. Although wood has a very high calorific value, we still discourage its use as a fuel. Explain.

a. Wood produces lot of air pollution.

b. Use of wood as fuel encourages cutting of trees leading to deforestation.

5. You are provided with three watch glasses containing milk, petrol and mustard oil, respectively. Suppose you bring a burning candle near these materials one by one, which material (s) will catch fire instantly and why?

Petrol will catch fire instantly because it is highly inflammable. Mustard oil and milk has very high ignition temperature, so, they will not catch fire instantly.

II. Short Answer Type Questions.

1. What do you mean by the term combustion?

A chemical process in which a substance reacts with oxygen to give off heat and light is called combustion. The substance is said to be combustible substance.

2. What is fuel? Give some examples of a fuel.

The combustible substances which produce heat and sometimes light on combustion is called fuel. Fuel may be solid, liquid and gas.

Wood, charcoal, petrol and kerosene are some of the examples of fuel.

3. What are combustible and non-combustible substances? Explain with examples.

The substances in which combustion takes place are called combustible substances. For example; wood, paper, coal. The substances in which no combustion take space are called non-combustible substances. For example; Glass, iron nail.

4. What are the conditions for combustion?

Conditions of combustion are;

(i) Presence of fuel.

(ii) Presence of air to supply oxygen.

(iii) Ignition temperature.

5. Why does a matchstick not burn of its own?

The ignition temperature for the burning of matchstick is more than room temperature. So it does not catch fire on its own. When the stick is rubbed then due to friction it gets its ignition temperature and starts to burn.

6. Can you burn a piece of wood by brining a lighted matchstick near it?

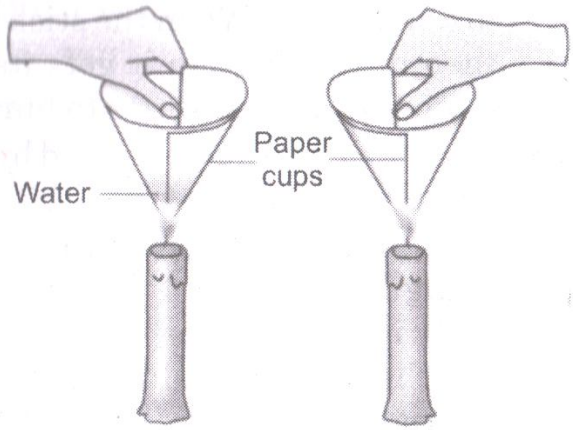
The piece of wood cannot burn by bringing a lighted matchstick near it. It is because the heat produced by matchstick is not sufficient to attain the ignition temperature of wood. So we use paper or kerosene oil to starts fire in wood piece.

7. What do you mean by forest fire?

During extreme heat in the hot summer days, at some places dry grass catches fire. It is because the heat is sufficient to attain ignition temperature of grass. From grass, it spreads to trees and very soon the whole forest is on fire. It is called forest fire. It is very difficult to control forest fire.

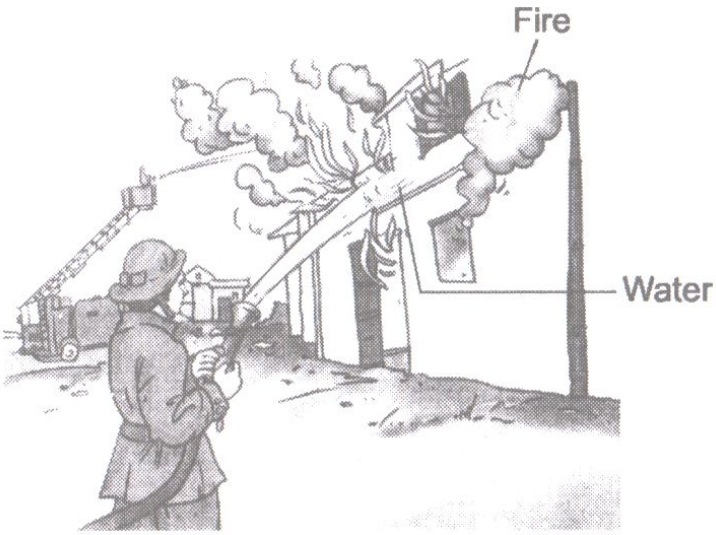
8. We can boil water in a paper cup while paper catches fire easily. Explain the process.

We take two paper cups. Take some water in one cup and keep the other empty. Heat both the cups. Empty cup starts to burn, but the cup containing water does not burn. If we continue heating the water in the cup it starts boiling. 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.



9. How does fire brigade works to extinguish fire?

When fire brigade arrives, it pours water on the fire. Water cools the combustible material, so that its temperature is brought below its ignition temperature. This prevents the fire from spreading. Water vapour also surrounds the combustible material, helping in the cutting off the supply of air. So the fire is extinguished.



10. What is the job of a fire extinguisher?

There are three requirements for production fire : fuel , air, proper temperature. Fire can be controlled by removing one or more of these requirements.

The job of a fire extinguisher is to cut off the supply of air or to bring down the temperature of the fuel or both. In most of the cases fuel cannot be eliminated.

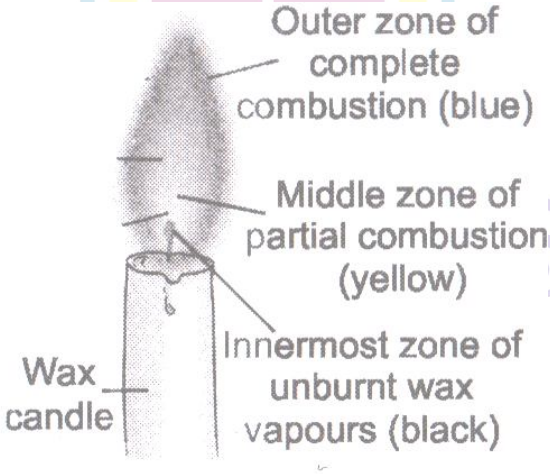
11. Explain the structure of a flame.

There are following three parts of a flame:

(i) Outer Zone : It is non-luminous and the hottest zone.

(ii) Middle zone : It is less hot and yellow coloured zone.

(iii) Inner zone : It is dark zone and least hot part.



12. Why is the colour of outer zone is blue while middle zone is blue while middle zone is yellow coloured?

Outermost zone: It is blue coloured part because complete combustion takes place in this part due to sufficient amount of oxygen. It is the hottest part of the flame.

Middle zone : The colour of the middle zones yellow because incomplete combustion takes place in this part for the lack of oxygen. It is less hot part than outer part of the flame.

13. What is calorific value of a fuel?

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 expressed in kilojoules per kg (kJ/kg).

14. What are the characteristics of a good fuel?

Characteristics of a good fuel.

(i) It should be readily available.

(ii) It should be cheap.

(iii) It burns easily in the air at moderate rate.

(iv) It produces a large amount of heat.

(v) It does not leave behind any undesirable substances.

15. What do you mean by global warming? Write its effects.

The rise in temperature of the atmosphere of the earth is called global warming. This causes melting of polar ice which leads to a rise in the sea level, causing floods in the coastal areas. Low lying coastal areas may even be permanently submerged under water. Global warming is the result of increase of CO_2 concentration in the atmosphere, mostly due to combustion of fuels.

16. What is acid rain? Write its effects.

The oxides of sulphur and nitrogen dissolve in rain water to form acids. Such rain containing acids is called acid rain. It is very harmful for crops, buildings and soil.

III. Short Answer Type Questions-I

1. Boojho wants to separate the following materials as combustible and non-combustible. Can you help him? Charcoal, chalk, stone, iron rod, straw, cardboard, glass, paper, candle, copper coin. (NCERT Exemplar)

(i) Combustible : Charcoal, straw, cardboard, paper, candle.

(ii) Non-combustible : Chalk, stone, iron rod, copper coin, glass.

2. If you hold a piece of iron with a pair of tongs inside a candle flame or a Bunsen burner flame, what will you observe? Will it produce a flame?

Iron piece will become red hot and glow. It will not produce a flame.

3. The calorific values of petrol and CNG are 45000 kJ/kg, and 50000 kJ/kg respectively. If you have vehicle which can run or petrol as well as CNG, which fuel will you prefer and why? (NCERT Exemplar)

We will prefer CNG (Compressed Natural Gas) because the calorific value of CNG is higher than that of petrol. Therefore, CNG will be more economical. CNG will produce larger amount of heat energy than petrol. At the same time, it produces the least air pollutants.

4. What are the characteristics of an ideal fuel?

Characteristics of an ideal fuel :

(i) It is readily available, cheap and can easily be transported.

(ii) It burns easily, has higher calorific value and does not leave behind any undesirable substances.

5. When the clothes of a person catch fire the person is covered with a blanket to extinguish fire. Why?

When the clothes of a person catch fire the person is covered with a blanket to extinguish fire because blanket cuts off the supply of air, that is the supporter of fire.

6. Why is it very difficult to control forest fire?

During extreme heat in the hot summer days, at some places dry grass catches fire. It is because the heat is sufficient to attain ignition temperature of grass. From grass, it spreads to trees and very soon the whole forest is on fire. It is called forest fire. It is very difficult to control forest fire. As fire spreads at a very high speed and in a very large area, it is very difficult to control it.

7. When kerosene oil is heated a little, it will catch fire. But when wood is heated a little, it does not catch fire. Why?

If kerosene oil is heated a little, it catches fire. But if wood is heated a little, it does not catch fire because ignition temperature of kerosene oil is lower than that of wood.

8. Two paper cups, one with water in it and one empty, are heated carefully on candle flame.

(i) What will happen to both the cups?

(ii) Why?

(i) The cup containing water will not burn whereas the empty paper cup will burn rapidly.

(ii) Because 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 attained. Hence, it does not burn. On the other hand the empty paper's ignition temperature is low and it burns rapidly.

9. Why is water used by fire brigade to extinguish fire?

Water is used by fire brigade to extinguish fire as water cools the combustible material so that its temperature is brought below its ignition temperature. This prevents the fire from spreading.

10. Name two substances that burn with flame and without flame?

Substances that burn with flame are candle, oil lamp. Substances that burn without flame are coal, charcoal.

III. Short Answer Type Questions-II

1. Although wood has a very high calorific value, we still discourage its use as a fuel. Explain. (NCERT Exemplar)

Burning of wood has several disadvantages.

These are as follows :

(i) Burning of wood produces a lot of smoke which causes respiratory diseases.

(ii) The cutting down of trees to obtain wood fuel leads to deforestation which is very harmful to the environment.

(iii) Trees provide us many useful substances. To obtain fuel wood, when trees are cut down, then all useful substances which can be obtained from trees are lost.

2. Write an experiment to show that air is necessary for burning of a candle.

To show that air is necessary for burning a candle.

Experiment :

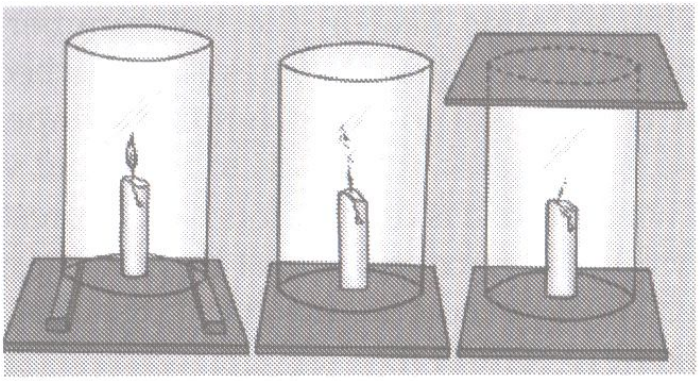
(i) Fix a lighted candle on a table.

(ii) Put a glass chimney over the candle in such a way that air can enter the chimney. We find that candle burns freely.

(iii) Now, fix a glass chimney in a way that no air enters in the glass.

(iv) The flame flickers and produces smoke.

(v) The flame finally goes off because the air is not available. It is already used by the candle to burn So, this concludes that air is necessary for burning a candle.



(A) (B) (C)

3. Manu was heating oil to fry potato chips. The cooking oil all of a sudden caught fire, he poured water to extinguish the fire. Do you think, this action was suitable? If yes, why? If not, why not? In such a condition what should Manu have done?

(NCERT Exemplar)

Pouring water to extinguish the fire due to oil was not a suitable action. It is because oil is lighter than water. So, water will settle down below the oil. In such condition, sand or soil should be used. They cut off the supply of air to the fire. Thus, fire can be controlled. But sand or soil will not be available at that place. So, Manu should have switched off the flame of the burner and put a lid on the frying pan. By doing this, the contact between fire and oxygen is cut off and the flame will go off.

4. Give two examples each for a solid, liquid and gaseous fuel along with some important uses.

Solid Fuels : Examples are wood and coal. These are used to cook food in homes. Coal is also used in industries.

Liquid Fuels : Examples are kerosene and petrol. Kerosene is used in stoves and in lamps to cook food and petrol is used as a fuel in automobiles.

Gaseous Fuels : Examples are natural gas and petroleum gas. These are used in industries. CNG is used to run automobiles.

5. What is acid rain? Describe.

Burning of coal and diesel releases sulphur dioxide gas. It is an extremely suffocating and corrosive gas. Moreover, petrol engines give off gaseous oxides of nitrogen. Oxides of sulphur and nitrogen dissolve in rain water and form acids. Such rain is called acid rain.

6. In many rural parts of India, people still use wood as a fuel. Why? What are its disadvantages?

In many rural parts of our country, people still use wood as a fuel because of its easy availability and low cost. Its disadvantages are :

(i) It gives a lot of smoke which is harmful for living beings.

(ii) It causes respiratory problems.

(iii) Trees provides us many useful substances, which are lost when wood is used as fuel.

7. Explain briefly different types of combustion.

Types of combustion : It is of three types :

(i) Rapid combustion : When gases burn rapidly to produce heat and light, it is called rapid combustion.

(ii) Spontaneous combustion : When material suddenly bursts into flame, without the application of any apparent cause, it is called spontaneous combustion.

(iii) Explosion : When combustion takes place with sudden release of heat, sound, light and gas with a bang it is called explosion.

8. How does a match stick burn? Explain its process.

These days the head of the match sticks contains only antimony trisulphide and potassium chlorate. The rubbing surface has powdered glass and a little red phosphorus. When the match stick is struck against the rubbing surface i.e., some red phosphorus, this immediately reacts with potassium chlorate on the match stick head to produce enough heat to ignite antimony trisulphide and start combustion.

9. What do you mean by global warming? Write its effects?

The rise in temperature of the earth is called global warming. This causes melting of polar ice which leads to a rise in the sea level, causing floods in the coastal areas which may even be permanently submerged under water. Global warming is the result of increase of CO_2 concentration in the atmosphere, mostly due to combustion of fuels.

10. Why is the colour of outer zone blue while middle zone is yellow coloured in a flame?

Outermost Zone : It is blue coloured part because complete combustion takes place in this part due to sufficient amount of oxygen. It is the hottest part of the flame.

Middle Zone : The colour of the middle zone is yellow because incomplete combustion takes place in this part due to the lack of oxygen. It is less hot than other part of the flame.

(iv) It burns completely in the air.

I. Long Answer Type Questions.

1. Forest fire produces a lot of air pollution. Write in brief about the reasons of forest fires.

Reasons of forest fires:

(i) At high temperature, sometimes dry grass catches fire which spreads throughout the forest.

(ii) Camp fire may also be a reason.

(iii) Lightning.

(iv) The use of fires by villagers toward off wild animals.

(v) Fire started accidentally by careless visitors.

(vi) The friction of bamboos due to high wind velocity and rolling stones.

2. What are three essential requirements to produce fire? How are fire extinguishers are useful for controlling the fire?

Three essential requirements to produce fire are as follows :

(i) Fuel

(ii) Air

(iii) Heat to acquire the ignition temperature.

The fire extinguishers cut off the supply of air or bring down the temperature of fuel or both.

For fires involving electrical equipment and inflammable materials like petrol, carbon dioxide (CO_2) is the best extinguisher. CO_2 being heavier than oxygen, covers the fire. Since, the contact between the fuel and oxygen is cut-off, the fire can be controlled. The added advantage of CO_2 is that in most cases, it does not harm the electrical equipments.

3. Explain the harmful effects of burning fuels.

The harmful effects of burning-fuels :

(i) Fuels like wood, coal, petroleum etc. which are carbon fuels, produce unburnt carbon particles, which cause respiratory diseases (asthma) and skin diseases.

(ii) Generally CO_2 is released during burning of fuels. It causes the rise in the temperature of the atmosphere of earth, which is called global warming.

(iii) Incomplete combustion of fuel releases many poisonous gases such as carbon monoxide. It can kill people sleeping in a room by causing suffocation.

(iv) Combustion of coal and diesel generates sulphur dioxide. It can kill people sleeping in a room by causing suffocation.

(v) Burning of fuels releases oxides of nitrogen and sulphur. They dissolve in rain water and form acid. Such rain is called acid rain. It is harmful to crops, buildings and soil.

II. Long Answer Type Questions.

1. Complete the following table.

Combustible and Non-combustible Substances

Material	Combustible	Non-combustible
Wood		
Paper		
Iron nail		
Kerosene oil		
Stone piece		
Straw		
Charcoal		
Matchsticks		
Glass		

Ans:

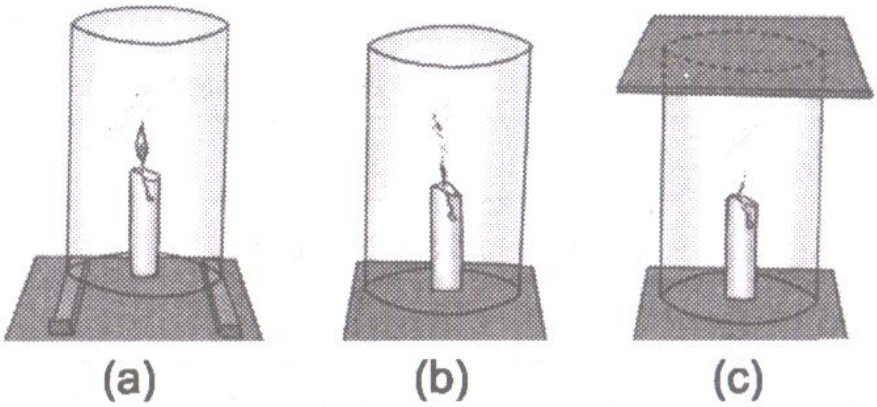
Combustible and Non-combustible Substances

Material	Combustible	Non-combustible
Wood	✓	×
Paper	✓	×
Iron nail	×	✓
Kerosene oil	✓	×
Stone piece	×	✓
Straw	✓	×
Charcoal	✓	×
Matchsticks	✓	×
Glass	×	✓

2. What are the essential conditions for combustion? Explain with the help of an activity.

Take a candle. Light it and fix it on a table. Put a glass chimney over the candle and rest it on wooden blocks in such a way that air can enter the chimney. We see that candle remains lighted. Remove the blocks and let the chimney rest on the table. We see that the flame flickers and flickers and produces smoke. Now put a glass plate over the chimney. We see that flame goes off because air is not available.

This activity shows that air is essential to burn a fuel at its ignition temperature.



3. Describe the history of matchsticks.

History of matchsticks is about five thousand years old. The modern safety match was developed only about 200 years ago.

A mixture of antimony trisulphide, potassium chlorate and white phosphorus with some glue and starch was applied on the head of a match made of suitable wood. When it struck against a rough surface, white phosphorus got ignited and combustion of match-stick started. These days red phosphorus is used in place of white phosphorus.

4. Explain various types of combustion.

Types of Combustion:

(i) Rapid Combustion : The process of combustion in which a fuel burns rapidly to produce more amount of heat and light is known as rapid combustion. For example burning of gas.

(ii) Spontaneous Combustion : The type of combustion in which a material suddenly burns to produce flame without the application of any cause is called spontaneous combustion.

(iii) Explosion : The combustion in which a sudden reaction takes place with the evolution of heat , light, sound and a large amount of gas, is called explosion. Ignition of cracker produces explosion.

5. Complete the following table.

Materials forming Flame on Burning

S.No	Material	Forms flame	Does not form flame
1	Candle		
2	Magnesium		
3	Camphor		
4	Kerosene stove		
5	Charcoal		

Answer:

Materials forming Flame on Burning

S.No	Material	Forms flame	Does not form flame
1	Candle	✓	×
2	Magnesium	✓	×
3	Camphor	✓	×
4	Kerosene stove	✓	×
5	Charcoal	×	✓

6. Write three examples of each type of fuel in tabular form.

S.No	Solid Fuels	Liquid Fuels	Gaseous Fuels
1	Coal	Kerosene oil	Natural gas
2	Wood	Petrol	L.P.G
3	Dung Cake	Diesel	Gobar Gas

7. Make a table to show the calorific value of various fuels.

Name of fuel	Calorific value kJ/kg
Cowdung cake	6000 – 8000
Wood	17000 – 22000
Coal	25000 – 33000
Petrol	45000
Kerosene	45000

Diesel	45000
Methane	50000
CNG	50000
LPG	55000
Biogas	35000 – 40000
Hydrogen	150000

8. What is deforestation? Write its effect on environment.

Cutting of trees is called deforestation.

Effects : Deforestation is very harmful to the environment.

1. The annual rainfall is disturbed in that area.
2. The frequent floods come.
3. Balance of oxygen and carbon dioxide is disturbed.
4. It causes respiratory problem.
5. Tress provide us with useful substances which are lost due to deforestation.

9. What are the ill-effects due to the increasing consumption of fuel?

Harmful effects of using more fuels;

(i) Carbon fuels like wood, coal and petroleum release unburnt carbon particles. These fine particles create respiratory disorders and diseases like asthma.

(ii) Incomplete combustion of these fuels gives carbon monoxide. It is very harmful gas and causes respiratory disorders. It can kill persons sleeping in that room.

(iii) Excessive use of fuels causes global warming.

(iv) They cause acid rain which is harmful for crops, buildings and soil.

III. Long Answer Type Questions.

1. Manu was heating oil to fry potato chips. The cooking oil all of a sudden caught fire; he poured water to extinguish the fire. Do you think this action was suitable? If yes, why? If not, why not? In such a condition what should Manu have done?

No. because water is not suitable for fires involving oil.

Manu should have switched off the flame of the burner and put a lid on the frying manu should have switched off the flame of the burner is cut off and the flame will go off.

2. What are the three essential requirements to produce fire? How fire extinguisher is useful for controlling the fire?

a. Fuel

b. Air

c. Heat to acquire the ignition temperature.

a fire extinguisher is useful in controlling the fire in the following ways.

a. It cools ass the burning substances to a temperature below its ignition temperature.

b. it cuts off the supporter of the burning substance, i.e., oxygen from the combustible substance.

3. Give two example each for a solid, liquid and gaseous fuel along with some types of fuels.

Types of fuels:

Solid fuel	**-**	**Coal, Wood, etc**
Liquid fuel	**-**	**kerosene oil, petrol, etc.**
Gaseous fuel	**-**	**CNG, LPG, etc**
Uses		
Coal	**-**	**Cooking, etc**
Kerosene oil	**-**	**Fuel for stoves, lamps, etc.**

4. The calorific values of petrol and CNG are 45000 kJ/kg and 50000 kJ/kg, respectively if you have vehicle which can run on petrol as well as CNG, Which fuel will you prefer and why?

We will prefer CNG to run the vehicle. This is because the calorific value of CNG is higher than that of petrol, therefore CNG will be more economical. At the same time it produces the least air pollution than petrol.

5. Forest fire produces a lot of air pollution. Write in brief about the reasons of forest fires.

a. At high temperature. Sometime dry grass catches fire which spreads throughout the forest.

b. campfire may also be a reason

c. Human negligence can also cause forest fires. A lighted cigarette left in the forest can also ignite a forest fire.

c. Lightning.

High Order Thinking Skills (HOTS) Questions

1. Which substances are used to extinguish fire in case of electric short circuit?

Soil, sand and carbon dioxide are used to extinguish fire in case of electric short circuit.

2. People usually keep angithi/burning coal in their closed rooms during winter season. Why is it advised to keep the door open?(NCERT Exemplar)

Due to insufficient availability of oxygen in room, keeping angithi in the closed room is not preferred as carbon monoxide gas is produced which can kill persons sleeping in that room.

3. Which type of substances produce flame? Does charcoal burn with flame?

The substances which vaporize during burning produce flame. No, charcoal does not burn with flame, it glows only because it does not vaporize on burning.

4. You are provided with three watch glasses containing milk, petrol and mustard oil respectively. Suppose you bring a burning candle near these materials one by one, which material will catch fire instantly and why?

The watch glass containing petrol will catch fire instantly because its ignition temperature is very low. Also petrol is an inflammable substance, i.e., it can easily catch fire with a flame.

5. Why can a match stick burn a splinter of wood directly but cannot burn a log of wood directly? How can we burn a log of wood?

A match stick can burn a splinter of wood directly because it has low ignition temperature, whereas a matchstick cannot burn a log of wood directly as it has high ignition temperature. In order to burn a log of wood, a small fire is first started by burning straw (or dry grass), or paper by a matchstick, then the log of wood is placed over this fire. This fire heats the log of wood to its ignition temperature due to which it starts burning.

6. Crackers on ignition produce sound. Why?

When a cracker is ignited, a sudden reaction takes place with the evolution of heat, light and sound and a large amount of gas is liberated. Such a reaction is called explosion. So, cracker on ignition produces sound because of sudden formation of large amount of gas due to chemical reaction.

Value Based Questions

1. Once in a village, there was a fire in a hut. When a lot of dry powder of a substance, A was released over the fire, the fire got extinguished.

(i) Name the substance A.

(ii) How does the substance extinguished fire?

(iii) Give another substance which behaves like substance A.

(i) A is sodium bi-carbonate ($NaHCO_3$).

(ii) The heat of fire decomposes sodium bicarbonate to produce carbon dioxide gas which covers the fire like a blanket. It cuts off supply of fresh air to the burning substance. Thus, fire gets extinguished.

(iii) Potassium hydrogen carbonate.

2. There was a factory near a village, which irritated the villagers by liberating smoke and poisonous vapours. The villagers were suffering from many problems like headache, chest pain, cough, dryness of throat and breathing problems. Villagers blamed the emission from the chimney of the factory for such problems.

Sheela, a social worker reached the village and listened the problems of the villagers. She wrote a complaint letter on behalf of villagers.

Read the given passage and answer the following questions.

i. Explain what could have happened in the village

ii. What values are shown by sheela?

i. The symptoms observed in the villagers show that oxides of nitrogen and sulphur must be coming out of the chimney. This is due to the combustion of fossil fuels like coal, oil, natural gas etc, to produce high temperature at which oxidation of atmospheric nitrogen takes place.

ii. Shella is aware, helpful and intelligent woman.

3. Uneducated and careless people are not aware of saving fossils, such as, coal and petroleum. Discuss some points how you can make them aware regarding this.

All fossil fuels are in limited quantity. Thus we need a very judicious use of these fuels. For this, we must find out some alternative sources of energy as solar energy, water energy, geothermal energy etc. We must ask them to reduce unnecessary use of vehicles e.g, if four people are going from one place to single destination, they should use only one vehicle rather than more than one.

Skill Based Questions

1. Observe the following figure and answer the following questions.

(i) What does this figure show?

(ii) What is the colour of the flame?

(iii) What is the product of this reaction?

(i) This figure shows the burning of magnesium.

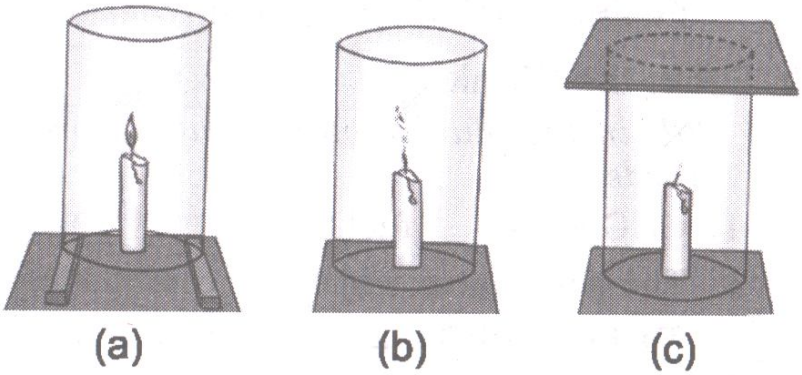
(ii) The colour of flame formed by the burning of magnesium is white.

(iii) Magnesium oxide is formed after the combustion.

2. Observe the figure and find what does it show.

This figure shows a person whose clothes caught fire. It is wrapped around by a blanket to extinguish the fire.

3. Draw a diagram to explain that air is essential for combustion.



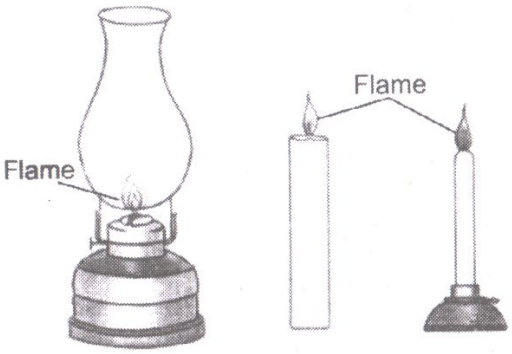
(a) The candle burns freely due to presence of air.

(b) The flame flickers and produces smoke because there is less air available.

(c) In this case flame finally goes off because air is not available.

4. (i) Draw a diagram to show the flames of (a) Kerosene lamp (b) Candle and (c) Bunsen burner.

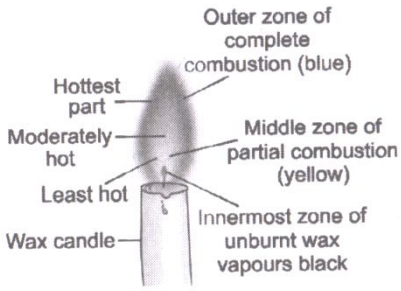
(ii) Write the colour of these flames.



(ii) Colour of kerosene lamp flame : Yellow

Colour of candle flame : Yellow

5. Draw a diagram to show the various zones of burning candle. Which zone is hottest zone?



The hottest zone of candle flame is outer most part of flame which is also called non-luminous zone.