

Unit 6(Combustion and Flame)

Multiple Choice Questions

Question. 1 A substance which reacts with oxygen giving heat is called a combustible substance. Which one of the following is a combustible substance?

(a) Iron nail (b) Glass (c) Stone piece (d) Wood

Answer. (d) Wood is a combustible substance. It is a solid fuel and produces smoke during combustion.

Question. 2 Which one of the following has the highest calorific value?

(a) Kerosene (b) Biogas (c) LPG (d) Petrol

Answer. (c) LPG has the highest calorific value, i.e. 55000 kJ/kg.

It means that if 1 kg of LPG is burnt completely, then it will produce 55000 kilojoules of heat energy.

Note

Calorific value

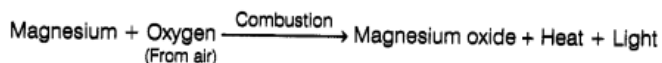
45000 kJ/kg 35000 to 40000 kJ/kg 45000 kJ/kg

Question. 3 Magnesium ribbon on burning in air produces

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

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

Answer. (c) Magnesium ribbon on burning in air produces magnesium oxide, heat and light, Magnesium ribbon is a very reactive metal.



Question. 4 Which of the following is not a combustible substance?

(a) Camphor (b) Glass (c) Straw (d) Alcohol

Answer. (b) Those substances which do not burn are called non-combustible substance.

Some of the non-combustible substances are stone, glass, cement, soil, sand, iron nails, etc.

Question. 5 The substance that does not burn with flame is

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

Answer. (d) Charcoal is a solid fuel which does not vaporise on heating. So, charcoal does not burn by producing a flame. It only glows on combustion.

Question. 6 On placing an inverted tumbler over a burning candle, the flame extinguishes after some time. This is because of non-availability of (a) oxygen (b) water vapours (c) carbon dioxide (d) wax

Answer. (a) The flame extinguishes because of non-availability of oxygen. Air or oxygen is necessary for combustion.

Question. 7 If a person's clothes catch fire, the best way to extinguish the fire is to

- (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**

Answer. (c) Cover the person with a woollen blanket so that the supply of air to the burning clothes is cut off and hence, the burning (or fire) stops.

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

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

Answer. (c) Coal has the highest ignition temperature.

Note The lowest temperature at which a substance catches fire and starts burning, is called its ignition temperature. Kerosene, petrol and alcohol have low ignition temperature.

Question. 9 Choose the correct statement about inflammable substances from the following.

They have

- (a) low ignition temperature and cannot catch fire easily
(b) high ignition temperature and can catch fire easily
(c) low ignition temperature and can catch fire easily
(d) high ignition temperature and cannot catch fire easily**

Answer. (c) Inflammable substances have low ignition temperature and can catch fire easily.

Question. 10 Choose the incorrect statement from the following.

Forest fires are usually due to

- (a) carelessness of humans (b) heat of Sun
(c) cutting of trees (d) lightning strike**

Answer. (c) Forest fires are not due to cutting of trees,

Question. 11 The calorific value of a fuel is expressed in a unit called

- (a) kilojoule per litre (b) kilogram per millilitre
(c) kilojoule per gram (d) kilojoule per kilogram**

Answer. (d) The calorific value of a fuel is expressed in the unit of kilojoule per kilogram (kJ/kg),

Question. 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**

Answer. (b) In villages, people use wood as fuel because of its easy availability and low cost.

Question. 13 Which one among the following is considered as the cleanest fuel?

- (a) Cowdung cake (b) Petrol**

(c) Kerosene (d) Hydrogen gas

Answer. (d) Hydrogen gas is considered as cleanest fuel. Unlike carbon based fuels, hydrogen produces no harmful by-products on combustion. Only energy and clean water are produced.

Question. 14 Choose the incorrect statement from the following.

A good fuel is one which

- (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**

Answer. (c) A good fuel does not produce any harmful gases or leaves any residue after burning. So, incorrect statement is option (c).

Q. 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 –

- (a) proper combustion of fuel (b) improper cooking of potato curry**
- (c) improper combustion of fuel (d) burning of copper vessel**

Answer. (c) Due to incomplete combustion of fuel, copper vessel was getting blackened from outside.

Very Short Answer Type Questions

Question. 16 Fill in the blanks.

- (a) A process in which a substance reacts with to give off heat is called combustion.**
- (b) When the clothes of a person catch the person is covered with a to extinguish fire.**
- (c) The temperature at which a substance catches fire is called its temperature.**
- (d) The substances which have very ignition temperature and can easily catch fire with a flame are called substances.**
- (e) The substances which vaporise during give flame.**

Answer. (a) chemical, oxygen

(b) fire, blanket

(c) lowest, ignition

(d) low, inflammable

(e) burning

Question. 17 Some words (underlined> in the following sentences are jumbled up. Write them in their correct form.

- (a) Seldie is a combustibile substance.**
- (b) Slaas is a non-combustible material.**
- (c) Chittsmack does not burn by itself.**
- (d) Some substances on combustion produce thea and mafel.**
- (e) The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its ficalroic value.**

Answer. (a) Diesel (b) Glass

(c) Matchstick (d) heat, flame

(e) calorific

Question. 18 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?

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

of combustion. So, we can say that oxygen (air) is necessary for combustion to take place.

Question. 19 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.

Answer. 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.

In the outer zone of a flame, complete combustion of the fuel takes place because there is plenty of air around it so, water in a test tube will boil quickly in this zone.

Question. 20 Why is the use of diesel and petrol as fuels in automobiles being replaced by Compressed Natural Gas (CNG) in big cities?

Answer. It is because when CNG burns, it produces harmful products in very small amount. It is a clean fuel because it burns without producing smoke. The use of CNG as fuel in automobiles has reduced air pollution in big cities.

Short Answer Type Questions

Question. 21 Boojho wants to separate the following materials as combustible and non-combustible. Can you help him? Charcoal, chalk, stone, iron rod, copper coin, straw, cardboard, glass, paper, candle, wood.

Answer. 1. Combustible – charcoal, straw, cardboard, paper, candle, wood.

2. Non-combustible – chalk, stone, iron rod, copper coin, glass.

Question. 22 State whether the following statements are True/False.

(i) Air is necessary for combustion.

(ii) Magnesium is a non-combustible metal.

(iii) Carbon dioxide is an excellent fire extinguisher.

(iv) Calorific value of wood is higher than that of coal.

Answer. 1. True, air contains oxygen and oxygen is a supporter of combustion.

2. False, magnesium is a combustible metal.

3. True

4. False, calorific value of coal is higher than that of wood.

Question. 23 Match the items of Column I with the items of Column II.

Column I		Column II	
(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

Answer. The correct matching is as given:

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

Question. 24 Match the following for the flame of a candle.

Column I		Column II (zone)		Column III (colour)	
(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 complete combustion	(z)	Yellow

Answer. The correct matching is as given:

(a)–(iii) (x), (b)–(ii) (z), (c)–(i) (y)

Question. 25 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?

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

Question. 26 Fill in the blanks using the words given in the box. ignition, petrol, combustion, calorific value, combustible, inflammable

(a) A chemical process in which a substance reacts with oxygen to give off heat is called

(b) Wood, paper, CNG aresubstances.

(c) The lowest temperature at which a substance catches fire is called its temperature.

(d) Ignition temperature of..... is lower than that of wood.

(e) The substances which have very low..... temperature and can easily catch fire with a flame are called..... substances.

(f) The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its

Answer. (a) combustion

(b) combustible (c) ignition

(d) petrol

(e) ignition, inflammable

(f) calorific value

Question. 27 People usually keep angithi/burning coal in their closed rooms during winter season. Why is it advised to keep the door open?

Answer. When coal burns in air, it produces carbon dioxide which is non-poisonous. But, when angithi or coal burns in a closed room, the air or oxygen cannot enter the room.

So, in the incomplete supply of oxygen, coal burns to produce carbon monoxide which is highly poisonous gas. It causes suffocation in a closed room. So, door and windows should be open.

Question. 28 Write True/False against the following statements and also correct the false statement.

(a) A physical process in which a substance reacts with oxygen to give off heat is called combustion.

(b) Water is the best extinguisher for fires involving electrical equipment.

(c) Alcohol, CNG and LPG are inflammable substances.

(d) Increased concentration of nitrogen in air is believed to cause global warming.

(e) Greater the calorific value, better is the fuel.

(f) Middle zone is the hottest zone of a flame.

(g) The substances which vaporise during burning, give flame.

Answer. (a) False, a chemical process in which a substance reacts with oxygen to give off heat is called combustion.

(b) False, carbon dioxide is the best extinguisher for fires involving electrical equipment.

(c) True

(d) False, increased concentration of carbon dioxide in air is believed to cause global warming.

(e) True

(f) False, outer zone is the hottest zone of a flame.

(g) True

Question. 29 Cracker on ignition produces sound. Why?

Answer. When a cracker is ignited, a sudden reaction (very rapid) takes place with the

evolution of heat, light and sound and a large amount of gas is liberated. Such a reaction is called explosion. The gases produced are heated by the heat evolved in the reaction. The hot gases expand rapidly and cause an explosion (producing a loud sound).

Question. 30 What do you understand by fuel efficiency?

Answer. 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.

A good fuel should have high calorific value. That means it should produce large amount, of heat per unit mass.

Long Answer Type Questions

Question. 31 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?

Answer. 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.

Question. 32 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?

Answer. Pouring water to extinguish the fire due to oil was not suitable action. It is because oil is lighter than water. So, water will settle down below the oil. The oil floats on water and continues to burn.

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 fuel and oxygen is cut off and the flame will go off,

Question. 33 What are the three essential requirements to produce fire? How fire extinguisher is useful for controlling the fire?

Answer. Three essential requirements to produce fire are as follows:

- (i) Fuel (combustible substance)
- (ii) Air (or oxygen) and
- (iii) Heat to acquire the ignition temperature.

The job of fire extinguisher is to cut off the supply of air or to bring down the temperature of fuel or both.

The most common fire extinguisher is water. But water works only when things like wood and paper are on fire. Water extinguishes fire by cooling the burning substance.

For fires involving electrical equipment and inflammable materials like petrol, then carbon dioxide (CO₂) is the best extinguisher.

CO₂ being heavier than oxygen, covers the fire like a blanket. Since, the contact between the fuel and oxygen is cut off, so the fire can be controlled. The added advantage of CO₂ is that in most cases, it does not harm the electrical equipment.

Question. 34 Give two examples each for a solid, liquid and gaseous fuel along with some important uses.

Answer. 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 to cook food and in lamps 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.

Question. 35 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?

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

Question. 36 Although wood has a very high calorific value, we still discourage its use as a fuel. Explain.

Answer. Burning of wood has several disadvantages. These are as follows:

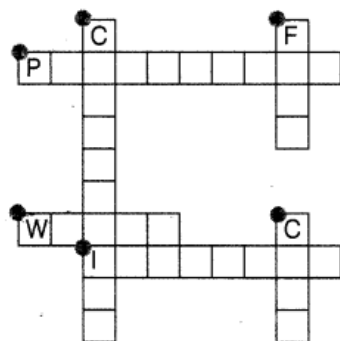
- (i) Burning of wood produces a lot of smoke which causes respiratory diseases.
- (ii) The cutting down of trees to obtain as a wood fuel leads to deforestation which is very harmful to the environment.
- (iii) Trees provide us many-useful substances. To obtain fuel wood, when trees are cut down, then all useful substances which can be obtained from trees are lost.

Question. 37 Forest fire produces a lot of air pollution. Write in brief about the reasons of forest fires.

Answer. Reasons of forest fires are :

- (i) At high temperature, sometimes dry grass catches fire which spreads throughout the forest.
- (ii) Camp fire may also be a reason.
- (iii) Due to the spark of lightning from the sky.
- (iv) The use of fires by villagers to ward off wild animals.
- (v) Fire lit intentionally by people living around forests for recreation.
- (vi) Fires started accidentally by careless visitors to forests. When they throw away lighted cigarettes in the forest.
- (vii) The friction of bamboos due to high wind velocity and rolling stones.

Question. 38 Complete the crossword with the help of the clues.



Across

- 1. Non-metal which catches fire if exposed to air. (10)
- 3. The lowest temperature at which a substance catches fire is called its temperature. (8)
- 5. The most common fire extinguisher. (5)

Down

- 2. A chemical process in which a substance reacts with oxygen to give off heat. (10)
- 4. Petrol is used as a in automobiles. (4)
- 6. It is as hard as stone and black in colour. (4)

Answer. Across

1. Phosphorus 3. Ignition 5. Water

Down

2. Combustion 4, Fuel 6. Coal

PHOSPHORUS
M
B
U
S
WATER
I
G
N
I
T
I
O
N
F
E
L
C
A
L