



Unit

3

CHEMISTRY

AIR

TEXT BOOK EXERCISES

I. Choose the correct answer.

1. Which of the following is true about oxygen?

- a) Completely burning gas b) Partially burning gas
c) Doesn't support burning d) Supports burning [Ans: d) Supports burning]

2. Aerated water contains

- a) air b) oxygen
c) carbon di oxide d) nitrogen [Ans: c) carbon di oxide]

3. Solvay process is a method to manufacture

- a) lime water b) aerated water
c) distilled water d) sodium carbonate [Ans: d) sodium carbonate]

4. Carbon dioxide with water changes

- a) blue litmus to red b) red litmus to blue
c) blue litmus to yellow d) doesn't react with litmus
[Ans: a) blue litmus to red]

5. Which of the following is known as azote?

- a) Oxygen b) Nitrogen
c) Sulphur d) Carbon dioxide [Ans: b) Nitrogen]

II. Fill in the blanks.

1. _____ is called as vital life. [Ans: oxygen]
2. Nitrogen is _____ than air. [Ans: slightly lighter]
3. _____ is used as a fertilizer. [Ans: urea]
4. Dry ice is used as a _____. [Ans: refrigerant]
5. The process of conversion of iron into hydrated form of oxides is called _____. [Ans: rusting]



III. Match the following.

- | | | |
|-------------------|---|----------------------------------|
| 1. Nitrogen | - | a) Respiration in living animals |
| 2. Oxygen | - | b) Fertilizer |
| 3. Carbon dioxide | - | c) Refrigerator |
| 4. Dry ice | - | d) Fire extinguisher |
- [Ans: 1.b 2.a 3.d 4.c]**

IV. Answer briefly.**1. What are the sources of oxygen?**

Oxygen occurs both in free state and combined state, it exists as silicates, carbonates oxides and water. Most of oxygen is been produced by the process of photosynthesis.

2. Mention the physical properties of oxygen.

- Oxygen is a colourless, odourless and tasteless gas.
- It is a poor conductor heat and electricity.
- Oxygen dissolves readily in cold water.
- It is denser than air.
- It can be made into liquid at high pressure and low temperature.
- It supports combustion.

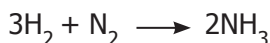
3. List out the uses of nitrogen.

- Liquid nitrogen is used as a refrigerant.
- It is used to prepare ammonia gas by Haber's process which is converted into fertilizers and nitric acid.
- It is used for inflating tyres of vehicle.
- Many explosives like TNT (Trinitrotoluene) Nitroglycerins and gun powder contain nitrogen.
- It is used for the preservation of fresh foods, manufacture of stainless steel, reducing fire hazards and as part of the gas in incandescent light bulbs.

4. Write about the reaction of nitrogen with non metals.

Nitrogen reacts with non-metals like hydrogen, oxygen etc, at high temperature to form their corresponding nitrogen compounds.

Eg: Hydrogen + Nitrogen $\longrightarrow$ Ammonia.

**5. What is global warming?**

- The green house gases are CO_2 , N_2O , CH_4 , CFC etc. The increases in the levels of these gases results in the gradual increase of temperature of the earth's surface.





- This increased green house effect caused due increase in the air pollutants and results in the average increases of temperature of the atmosphere.
- This is called global warming.

6. What is dry ice? What are its uses?

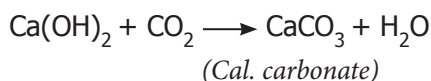
Carbon-di-oxide can be liquefied under high pressure and can also be solidified this solid form of CO_2 is called dry ice uses of dry ice:

- Dry ice is used as a refrigerant
- CO_2 gas is so cold that moisture in the air condenses on it creating a dense fog used in stage shows and movie effects.

V. Answer in detail.

1. What happens when carbon dioxide is passed through lime water? Write the equation for this reaction.

- When CO_2 is passed through lime water it turns milky due to formation of insoluble calcium carbonate.



- When an excess amount of CO_2 is passed through lime water, it first turns milky and the milkyness disappears due to the formation of soluble calcium hydrogen carbonate (calcium bi carbonate) ie $\text{Ca(HCO}_3)_2$

2. Name the compounds produced when the following substances burn in oxygen.

Reactivity of oxygen with

	Element	Products (Compounds) formed
a)	Carbon	carbon dioxide - CO_2
b)	Sulphur	sulphur dioxide - SO_2
c)	Phosphorous	phosphorus trioxide (P_2O_3) or phosphorous pentaoxide P_2O_5
d)	Magnesium	magnesium oxide - MgO
e)	Iron	ferric oxide - Fe_3O_4
f)	Sodium	sodium oxide - Na_2O

3. How does carbon dioxide react with the following?

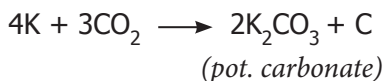
a) Potassium b) Lime water c) Sodium hydroxide

Reactivity of CO_2 with

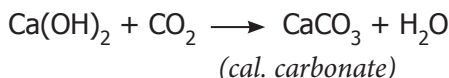
a) Potassium (k)

Lighter metals like Na, K and Ca. Combine with CO_2 to form their carbonates

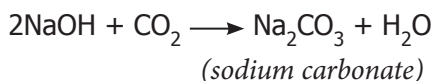


**b) With Lime water ($Ca(OH)_2$)**

When CO_2 is passed through lime water, it turns milky due to the formation of insoluble calcium carbonate.

**c) With sodium hydroxide solution – ($NaOH$)**

sodium hydroxide (base) is neutralized by CO_2 (acidic) to form sodium carbonate salt and water.

**4. What are the effects of acid rain? How can we prevent them?****Effects of acid rain :**

Some of the consequences of acid rain are

- It irritates eyes and skin of human beings.
- It inhibits germination and growth of seedlings.
- It causes corrosion of many buildings bridges etc.

Preventive measures:

- Acid rain and its effect can be controlled by the following ways.
- Minimizing the usage of fossil fuel such as petrol, diesel etc.
- Using CNG (Compressed Natural Gas)
- Using non-conventional source of energy.
- Proper disposal of the industrial water.

VI. Higher Order Thinking Questions.**1. Soda bottle bursts sometimes when it is opened during summer. Why?**

In hot weather, due to high temperature, the CO_2 in the soda water is released in the air inside the bottle and creates pressure, which makes the bottle to burst.

2. It is said that sleeping beneath the tree during night is bad for health. What is the reason?

The trees leave CO_2 at night. So if we sleep under the tree, we will not get oxygen for breathing. Thus it causes breathing problem, suffocation etc. So it is not advisable to sleep beneath the tree during night time.



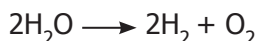


3. Why does the fish die when it is taken out of water?

The gills of the fishes are richly supplied with blood capillaries and can readily absorb the oxygen dissolved in water. When fishes are taken out of water, the supply of oxygen to the fishes is cut as the fishes cannot absorb and breathe using the oxygen present in the atmosphere. Hence they die after sometime.

4. How do astronauts breathe when they go beyond earth's atmosphere?

The astronauts get oxygen by splitting water with electricity.



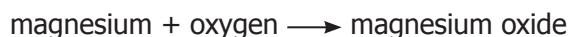
This oxygen is recycled into the atmosphere and the Hydrogen will combine with the exhaled carbon di oxide to form water and Methane. Then this is recycled into hydrogen and oxygen.

Activity

1

B.P.No.27

Heat a strip of magnesium ribbon in the flame till it catches fire and introduce it into the jar containing oxygen. It burns with a dazzling bright light and white ash of magnesium oxide is formed.



Activity

2

B.P.No.28

Heat a small piece of phosphorous and introduce it into the oxygen jar. Phosphorous burns with suffocating smell and gives phosphorous pentaoxide (white fumes).



ADDITIONAL QUESTIONS

I. Choose the best answer.

1. This gas is called fire air or vital life because it supports burning _____.

- a) hydrogen
- c) nitrogen

- b) oxygen
 - d) carbon di oxide
- [Ans: b) oxygen]**



2. The tri oxygen molecules is known as _____.

- a) oxygen molecules b) oxide
c) ozone d) dioxide [Ans: c) ozone]

3. Phosphorous burns with suffocating smell and gives _____ of white fumes.

- a) phosphorous trioxide b) phosphorous oxide
c) phosphorous tetraoxide d) phosphorous pentaoxide
[Ans: d) phosphorous pentaoxide]

4. Compounds containing carbon and Hydrogen are called _____.

- a) hydrides b) carbonates
c) hydrocarbons d) carbides [Ans: c) hydrocarbons]

5. Oxy-acetylene torch is used for _____ of metals.

- a) welding b) extracting
c) painting d) coating [Ans: a) Welding]

6. Oxygen mixed with powdered charcoal is used as _____.

- a) welding torch b) artificial respiration
c) explosives d) fertilizes [Ans: c) explosives]

7. Nitre is _____.

- a) potassium nitrate b) potassium sulphate
c) potassium carbonate d) potassium chlorate [Ans: a) potassium nitrate]

8. Ammonia is synthesized by _____ process.

- a) photosynthesis b) Haber's process
c) nitrogen fixation d) carbon cycle [Ans: Haber's process]

9. Carbon dioxide is _____ in nature.

- a) basic b) neutral
c) acidic d) none of the above [Ans: c) acidic]

10. The hottest planet in our solar system is _____.

- a) Venus b) Mercury
c) Pluto d) Earth [Ans: a) Venus]

II. Fill in the blanks.

- Process of conversion of solid directly to vapour without reaching the liquid state is called _____. [Ans: sublimation]
- Solid carbon di oxide called dry ice is used as a _____. [Ans: refrigerant]
- CO_2 , N_2O , CH_4 , CFC are known as _____. [Ans: green house gases]
- Water produced when carbon di oxide is dissolved in water under pressure is _____. [Ans: soda water]





5. _____ causes irritation in eyes and skin human beings [Ans: acid rain]
6. The PH of acid rain is _____. [Ans: less than 5.6]
7. Liquid Nitrogen is used as a _____. [Ans: refrigerant]
8. Rust is _____. [Ans: hydrated ferric oxide]
9. _____ is a mixture of gases that surrounds our planet earth. [Ans: Air]
10. Oxygen is _____ but it supporter of combustion. [Ans: Non-combustible]

III. Say True or False. If false, correct the statment.

1. Oxygen is a poor conductor of heat but good conductor electricity. [Ans: False]
Correct Statement: Oxygen is a poor conductor of heat and electricity.
2. Metallic Oxides are generally acidic in nature. [Ans: False]
Correct Statement: Metallic oxides are generally basic in nature.
3. Oxygen is used to remove carbon impurities from steel. [Ans: True]
4. Now a days, nitrogen is used as a substitute for compressed air in tires. [Ans: True]
5. Fixation of nitrogen is carried out only by man. [Ans: False]
Correct Statement: Fixation of Nitrogen is carried out both naturally and by man.

IV. Match the following.

- | | | | | |
|-----|-----------------------------|---|----------------------------|--------------------------------|
| I. | 1. Ozone (O_3) | - | a) welding metals | |
| | 2. Oxy-acetylene torch | - | b) compounds having C & H | |
| | 3. Hydro Carbons | - | c) $NaNO_3$ | |
| | 4. Azote | - | d) tri molecules of oxygen | |
| | 5. Chile salt petre | - | e) no life | [Ans: 1.d 2.a 3.b 4.e 5.c] |
| II. | 1. TNT | - | a) Compressed Natural Gas | |
| | 2. Habers process | - | b) green house gas | |
| | 3. Carbon di oxide | - | c) Corrosion of buildings | |
| | 4. CO_2 , N_2O , CH_4 | - | d) preparation of ammonia | |
| | 5. Acid rain | - | e) trinitrotoluene | |
| | 6. CNG | - | f) fire extinguishes | [Ans: 1.e 2.d 3.f 4.b 5.c 6.a] |

V. Answer Briefly.

1. What is Rusting?

- The process of conversion of iron into its hydrated form of oxide in the presence of air and moisture is called rusting.
- Rust is hydrated ferric oxide. ($Fe_2O_3 \cdot xH_2O$).



2. Mention the uses of Oxygen.

- Oxygen is used as oxy-acetylene torch for cutting and welding metals.
- Oxygen is used to remove carbon impurities from steel.
- Oxygen is used to oxidize rocket fuel.
- Oxygen is mixed with powdered charcoal and used as explosives.
- Oxygen is used in the synthesis of methanol and ammonia.
- Oxygen is used for respiration and also for artificial respiration by scuba divers, mountaineers, astronauts, patients etc.

3. What is Haber's process?

- Manufacturing of ammonia gas is known as Haber's process. In this process, 3 volumes of hydrogen gas combines with 1 volume of Nitrogen gas under high pressure of 250 atmospheric pressure, and a temperature of 500c , using iron as a catalyst.
- This reaction is an exothermic reaction since large amount of heat is released along with ammonia gas.



4. Why do people prefer nitrogen instead of compressed air in tyres?

- Now-a-days, nitrogen is used as a substitute for compressed air in tyres because, Nitrogen can fill in the rubber tyre more faster than oxygen.
- In nitrogen filled tyres, pressure will remain more stable over a long period of time.
- Tyres filled with nitrogen exhibit less pressure change with temperature change.

5. What is meant by nitrogen fixation?

- Any process that converts nitrogen in the air into a useful nitrogen compound is called the nitrogen fixation.
- Fixation of nitrogen is carried out both naturally and by man.

6. What is green house effect?

- The solar radiation is absorbed by the Earth's surface and gets heated up.
- Some solar radiation is reflected by the earth as infrared radiation.
- Certain gaseous molecules like CO_2 , N_2O , CH_4 and CFC present in the atmosphere absorbs the infrared rays and re-emitt them in all directions.
- The effect of this is to warm the Earth's surface and its lower atmosphere.
- The gases which absorbs these radiation are called green house gases and this effect is called green house effect.





7. What is acid rain?

- Rain water, the purest form of water gets polluted by the NO_2 and SO_2 gases and smoke released from the factories, burning fossil fuels, eruption of volcanoes etc.
- These gases dissolve in rain water forming nitric acid and sulphuric acid, which increase the acidity of rain water. This results in acid rain.

VI. ANSWER IN DETAIL.

1. What are the effects of global warming? What are the preventive measure taken to save the earth and its resource.

a) Effects of global warming:

- Melting of ice cap and glaciers.
- Increase in frequency of floods, soil erosion and unseasonal rains.
- Loss of biodiversity due to the extinction of coral reefs and other species.
- Spreading of water borne and insect borne diseases.

b) Preventive measures:

- Reduction in the use of fossil fuels.
- Controlling deforestation.
- Restricting the use of CFC's
- Planting more trees.
- Reducing, reusing and recycling resources.

2. Write a note on the uses of carbon di oxide .

- CO_2 is used to prepare soft drinks or aerated drinks.
- Solid CO_2 is called dry ice, is used as a refrigerant. This gas is so cold that moisture in the air condenses on it, creating a dense fog used in stage shows and movie effects.
- It is used in the manufacturing of sodium carbonate by solvay process.
- It is used along with ammonia in the manufacturing of fertilizers like urea.
- CO_2 atmosphere can be used in the preservation of food grains, fruits etc.





UNIT TEST : 3

AIR

Time: 30 mins

Marks: 25

I. Choose the correct answer.

4×1=4

1. Which of the following is known as azote?

- a) Oxygen b) Nitrogen
c) Sulphur d) CO₂

2. Nitre is _____.

- a) potassium nitrate b) potassium sulphate
c) potassium carbonate d) potassium chlorate.

3. Oxygen mixed with powdered charcoal is used as _____.

- a) welding torch b) artificial respiration
c) explosives d) fertilizers

4. Solvay process is a method of manufacture of _____.

- a) lime water b) aerated water
c) distilled water d) sodium carbonate

II. Fill in the blanks.

5×1=5

5. Dry ice is used as _____.
6. Green houses are _____, _____, _____, and _____.
7. Soda water contains _____ and _____.
8. _____ causes irritation in the eyes and skin.
9. Haber's process is the manufacturing of _____ gas.

III. Match the following.

5×1=5

10. CNG - soda water
12. TNT - fertilizer
13. Ozone - Compressed Natural Gas
14. Nitrogen - O₃
15. Aerated drinks - trinitro toluene

IV. Answer briefly.

3×2=6

16. What is green house effect?
17. What is acid rain?
18. What is dry ice? Mention its uses.

V. Answer in detail.

1×5=5

19. How does carbon di oxide react with the following?
a) Potassium b) Lime water c) Sodium hydroxide solution





Unit

4

CHEMISTRY

ATOMIC STRUCTURE

TEXT BOOK EXERCISES

1. Choose the best answer.

1. The same proportion of carbon and oxygen in the carbon dioxide obtained from different sources proves the law of _____.

a) reciprocal proportion b) definite proportion
c) multiple proportion d) conservation of mass

[Ans: b) definite proportion]

2. Cathode rays are made up of

a) neutral particles b) positively charged particles
c) negatively charged particles d) None of the above

[Ans: c) negatively charged particles]

3. In water, hydrogen and oxygen are combined in the ratio of _____ by mass.

a) 1 : 8 b) 8 : 1
c) 2 : 3 d) 1 : 3

[Ans: a) 1 : 8]

4. Which of the following statements made by Dalton has not undergone any change?

a) Atoms cannot be broken.
b) Atoms combine in small, whole numbers to form compounds.
c) Elements are made up of atoms.
d) All atoms of an elements are alike

[Ans: c) Elements are made up of atoms.]

5. In all atoms of an element

a) the atomic and the mass number are same.
b) the mass number is same and the atomic number is different.
c) the atomic number is same and the mass number is different
d) both atomic and mass numbers may vary.

[Ans: c) the atomic number is same and the mass number is different]

II. Fill in the blanks.

- _____ is the smallest particle of an element. **[Ans: Atom]**
- An element is composed of _____ called atoms. **[Ans: similar, minute particles]**
- An atom is made up of _____, _____ and _____.
[Ans: electrons, protons and neutrons]
- A negatively charged ion is called _____, while positively charged ion is called _____.
[Ans: electron, proton]
- _____ is a negatively charged particle (Electron/Proton).
[Ans: Electron]
- Proton is deflected towards the _____ charged plate (positively, negatively).
[Ans: negatively]

III. Match the following.

- | | | |
|--------------------------------|---|------------------------|
| 1. Law of conservation of mass | - | a. Sir William Crookes |
| 2. Law of constant proportion | - | b. James Chadwick |
| 3. Cathode rays | - | c. Joseph Proust |
| 4. Anode rays | - | d. Lavoisier |
| 5. Neutrons | - | e. Goldstein |
- [Ans: 1.d 2.c 3.a 4.e 5.b]**

IV. Answer briefly.**1. State the law of conservation of mass.**

It states that during any chemical change, the total mass of the product is equal to the total mass of the reactants.

2. State the law of constant proportions.

It states that, in a pure chemical compound the elements are always present in a definite proportions by mass.

3. Write the properties of anode rays.

- Anode rays travel in straight lines.
- Anode rays are made up of material particles which are deflected towards the negatively charged plate, since they are positively charged particles.
- The properties of anode rays depend upon the nature of the gas taken in the discharged tube.
- The mass of the particle is the same as the atomic mass of the gas taken inside the discharge tube.





4. Define valency of an element with respect to hydrogen.

Valency of an element can be defined as the numbers of hydrogen atoms which combine with one atom of it.

5. Define the term ions or radicals.

- When an unstable atom gains or loses one or more electrons, it becomes an ion.
- Ions formed by losing electrons are positively charged and are called cations or positive radicals (Na^+).
- Ions formed by gaining electrons are negatively charged and are called as anions or negative radicals (Cl^-).

6. What is a chemical equation?

A Chemical equation is a short hand representation of a chemical reaction with the help of chemical symbols and formulae.

7. Write the names of the following compounds.

a) CO b) N_2O c) NO_2 d) PCl_5

	Compounds	Chemical name:
a)	CO	Carbon monoxide
b)	N_2O	Nitrous oxide
c)	NO_2	Nitrogen di oxide
d)	PCl_5	Phosphorous penta chloride

V. Answer the following.

1. Find the valency of the element which is underlined in the following formula.

a) Na Cl b) C O_2 c) Al(PO_4) d) Ba(NO_3) $_2$ e) Ca Cl_2

	Compound	underlined one	Valency
a)	<u>Na</u> Cl	Na	1
b)	<u>C</u> O_2	C	4
c)	<u>Al</u> (PO_4)	Al	3
d)	<u>Ba</u> (NO_3) $_2$	Ba	2
e)	<u>Ca</u> Cl_2	Ca	2

2. Write the chemical formula for the following compounds.

- a) Aluminium sulphate b) Silver nitrate
c) Magnesium oxide d) Barium chloride



	Compound	Chemical or molecular formula
a)	Aluminium Sulphate	$\text{Al}_2 (\text{SO}_4)_3$
b)	Barium Chloride	BaCl_2
c)	Silver Nitrate	AgNO_3
d)	Magnesium Oxide	MgO

3. Write the skeleton equation for the following word equation and then balance them.

- Carbon + Oxygen $\longrightarrow$ Carbon dioxide
- Phosphorus + Chlorine $\longrightarrow$ Phosphorus pentachloride
- Sulphur + Oxygen $\longrightarrow$ Sulphur dioxide
- Magnesium + hydrogen chloride $\longrightarrow$ Magnesium chloride + Hydrogen

Ans:

Skeleton equation

- Carbon + Oxygen $\longrightarrow$ Carbon dioxide
 $\text{C} + \text{O}_2 \longrightarrow \text{CO}_2$
- Phosphorus + Chlorine $\longrightarrow$ Phosphorus pentachloride
 $\text{P} + \text{Cl}_2 \longrightarrow \text{PCl}_5$
- Sulphur + Oxygen $\longrightarrow$ Sulphur dioxide
 $\text{S} + \text{O}_2 \longrightarrow \text{SO}_2$
- Magnesium + hydrogen chloride $\longrightarrow$ Magnesium chloride + Hydrogen
 $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$

4. Balance the following chemical equation.

Answer

- $\text{Na} + \text{O}_2 \longrightarrow \text{Na}_2\text{O}$
 $4\text{Na} + \text{O}_2 \longrightarrow 2\text{Na}_2\text{O}$
- $\text{Ca} + \text{N}_2 \longrightarrow \text{Ca}_3\text{N}_2$
 $3\text{Ca} + \text{N}_2 \longrightarrow \text{Ca}_3\text{N}_2$
- $\text{N}_2 + \text{H}_2 \longrightarrow \text{NH}_3$
 $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$
- $\text{CaCO}_3 + \text{HCl} \longrightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
 $\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
- $\text{Pb}(\text{NO}_3)_2 \longrightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$
 $2\text{Pb}(\text{NO}_3)_2 \longrightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$

VI. Higher Order Thinking Questions.

1. Why does a light paddle wheel placed in the path of cathode rays begin to rotate, when cathode rays fall on it?

A light paddle wheel placed in the path of cathode rays begin to rotate, when cathode rays falls on it. Since cathode rays are made up of small particles that have mass and kinetic energy.





2. How can we prove that the electrons carry negative charge?

When cathode rays which are made up of electrons are passed through an electric field, the rays are deflected towards the positive plate of electric field. This proves that electrons are negatively charged.

3. Ruthresh, Hari, Kanishka and Thahera collected different samples of water from a well, a pond, a river and underground water. All these samples were sent to a testing laboratory. The test result showed the ratio of hydrogen to oxygen as 1 : 8.

a) What conclusion would you draw from the above experiment?

From this experiment, we can conclude that, water is a pure chemical compound, which contains the elements hydrogen and oxygen in the ratio 1 : 8.

b) Which law of chemical combination does it obey?

Law of constant proportions.

Activity

1

B.P.No.40

Collect more information about the properties of fundamental particles and prepare a chart.

Particle	charge	mass	location	discovered by
Election (e_-)	-1	9.1×10^{-28} g	shells	J.J. Thomson
Proton (p)	+1	1.6×10^{-24} g	nucleus	Goldstein
Newtron (n)	0	1.6×10^{-24} g	nucleus	James Chadwick

Activity

2

B.P.No.43

Classify the following ions into monovalent, divalent and trivalent.

Ni^{2+} , Fe^{3+} , Cu^{2+} , Ba^{2+} , Cs^+ , Zn^{2+} , Cd^{2+} , Hg^{2+} , Pb^{2+} , Mn^{2+} , Fe^{2+} , Co^{2+} , Sr^{2+} , Cr^{3+} , Li^+ , Ca^{2+} , Al^{3+}

Monovalention	Divalentention	Trivalentention	Tetiavalention
CS^+ , Na^+ , Li^+	Ni^{2+} , Cu^{2+} , Ba^{2+} , Zn^{2+} , Cd^{2+} , Hg^{2+} , Pb^{2+} , Ma^{2+} , $\text{Fe}2+$, Ca^{2+} , Si^{2+} , Ca^{2+}	Fe^{3+} , Cr^{3+} , Al^{3+}	C^{4+} , Si^{4+}



Activity 3

B.P.No.44

Write the chemical formula of the compounds.

Compound	Symbols with valencies	Simplest ratio if any	Chemical formula
Magnesium chloride	Mg-2, Cl-1	1 : 2	MgCl ₂
Sodium hydroxide	Na-1, OH-1	1 : 1	NaOH
Calcium oxide	Ca-2, O-2	1 : 1	CaO
Aluminium sulphate	Al-3, SO ₄ ²⁻ -2	1 : 1	Al ₂ (SO ₄) ₃
Calcium phosphate	Ca-2, SO ₄ ³⁻ -3	1 : 1	Ca ₃ (PO ₄) ₂

Activity 4

B.P.No.44

Write the names of the chemical compounds.

Chemical Compound	Name
SO ₃	sulphur trioxide
Na ₂ SO ₃	sodium sulphite
PCl ₅	phosphorous penta chloride
CaCl ₂	calcium chloride
NaNO ₃	sodium nitrate
BaO	barium oxide

Activity 5

B.P.No.46

Take some ice cubes in an air tight container and note the weight of the container with ice cubes. Wait for a while for the ice cubes to become water. It is a physical change i.e., ice cubes melt and they are converted into liquid. Now weigh the container and compare the weight before and after the melting of ice cubes. It remains the same. Hence it is proved that during a physical change, the total mass of matter remains the same.

This proves the law of conservation of mass.

Activity 6

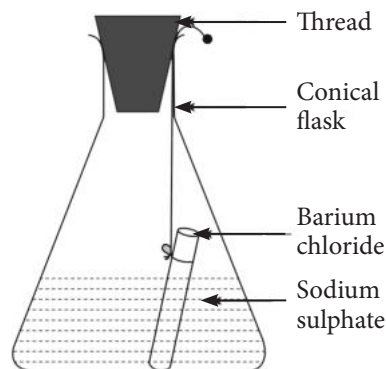
B.P.No.46

Prepare 5% of barium chloride (5g of BaCl₂ in 100 ml of water) and sodium sulphate solutions separately. Take some solution of sodium sulphate in a conical flask and some solution of barium chloride in a test tube.



Weigh the flask with its contents. Now mix the two solutions by tilting and swirling the flask. Weigh the flask after the chemical reaction is occurred. Record your observation. It can be seen that the weight of the flask and the contents remains the same before and after the chemical change. Hence, it is proved that during a chemical change, the total mass of matter remains the same.

Now it is clear that, mass is neither created nor destroyed during a physical or chemical change. Thus law of conservation of mass is proved.



ADDITIONAL QUESTIONS

I. CHOOSE THE CORRECT ANSWER.

- 1. The first scientific theory about atom was given by _____.**

a) Avvaiyar
C) Ravoisier

b) John Dalton
d) Gold Steim

[Ans: John Dalton]

- 2. Atoms of the same element have different masses. They are called _____.**

a) isotopes
c) isotones

b) isobars
d) all the above

[Ans: a) isotopes]

3. Substances made up of same kind of atoms may have different properties are called _____.

a) isotopes
c) isobars

b) isotones
d) allotropes

[Ans: d) Allotropes]

4. The discharge tube experiment was first done by _____.

a) William Crooke
c) Johnstone

b) J. J. Thomson
d) Proust

[Ans: a) William Crooke]

- 5. Proton can be defined as _____.**

a) Heliumion
c) Cation

b) Anion
d) Hydrogen ion

[Ans: d) Hydrogen ion]

- 6. The other name of anode rays is _____.**

a) cathode rays
c) x-rays

b) canal rays
d) gamma rays

[Ans: b) canal rays]

7. Mass can neither be created nor destroyed during a physical or chemical change. This is _____ law.

- a) law of conservation of mass b) law of constant proportion
c) Gay Russac's law d) all of the above

[Ans: a) law of conservation of mass]

8. The law of definite proportion is given by _____.

- a) Proust b) Lavoisier
c) Dalton d) Gay Russac

[Ans: a) Proust]

9. An atoms consists of _____ particles.

- a) charged b) uncharged
c) neutral d) partially charged

[Ans: a) charged]

10. The fluorescent material used in the cathode ray tube is _____.

- a) zinc sulphide b) zinc oxide
c) zinc sulphate d) zinc chloride

[Ans: a) zinc sulphide]

II. Fill in the blanks.

1. Water obtained from any source will contain H and O in fixed ratio by mass this law is _____.

[Ans: Law of definite proportions]

2. Crooke's tube experiment is popularly known as _____.

[Ans: CRT]

3. The Nature of the cathode rays _____ depend or the nature of the gas.

[Ans: does not]

4. Anode rays are found as a stream of _____ charged particles.

[Ans: positively]

5. Cathode ray experiment was done at _____ pressure.

[Ans: low]

6. The mass of proton is _____.

[Ans: 1.00778 amu]

7. The combining capacity of an atom is called its _____.

[Ans: Valency]

8. The non-metals will have _____ elections in their outermost orbit of their atoms

[Ans: 4 to 7]

9. The molecular formula for Ammonia is _____.

[Ans: NH_3]

10. The arrangement of electrons in the orbit is known as _____.

[Ans: electronic configuration]

III. Say True of False. If false, correct the statment.

1. The experimental evidences for the electrical nature of matter was proved by Michael Faraday.

[Ans: True]

2. J.J. Thomson invented the anode rays.

[Ans: False]





Correct Statement: Goldstein invented the anode rays.

3. The ratio of mass of hydrogen and oxygen in H_2O is 1 : 8. **[Ans: True]**
4. Atoms of all metals will have 1 to 3 electrons in the outermost orbit. **[Ans: True]**
5. Neon is chemically active because it has eight electrons in its outermost shell. **[Ans: False]**

Correct Statement: Neon is chemically inert because it has eight electrons in its outermost shell.

IV. Match of following.

- I
1. Carbonate ion - a) $Ca_3(PO_4)_2$
 2. Aluminium ion - b) N_2O_5
 3. Calcium phosphate - c) CO_3^{2-}
 4. Nitrogen pentoxide - d) NaCl
 5. Sodium chloride - e) Al^{3+}

[Ans: 1.c 2.e 3.a 4.b 5.d]

- II.
1. Electrons - a) Anode rays
 2. Protons - b) J.J.Thomson
 3. Cathode ray tube - c) negatively charged
 4. Canal rays - d) William Cooke
 5. Cathode rays - e) Positively charged.

[Ans: 1.c 2.e 3.d 4.a 5.b]

V. Answer Briefly.

1. What is meant by variable valency ? Give egs:

When an atom possess more than one valency, it is said to have variable valency.

For eg:

No.	Element	Cation	Name
1.	Copper	Cu^+	cuprous ion
		Cu^{2+}	cupric ion
2.	Iron	Fe^{2+}	Ferrous ion
		Fe^{3+}	Ferric ion

2. Write the molecular formula for the following:

Answer

- a) Magnesium Chloride - $MgCl_2$
- b) Sodium oxide - Na_2O
- c) Calcium Oxide - CaO



- | | | |
|-----------------------|---|------------------------------|
| d) Stannous oxide | - | SnO |
| e) Aluminium Sulphate | - | $\text{Al}_2(\text{SO}_4)_3$ |
| f) Calcium phosphate | - | $\text{Ca}_3(\text{PO}_4)_2$ |

3. Write the Chemical names for the following compounds

- | | | |
|-----------------------------|---|---------------------------|
| a) SO_3 | - | Sulphur trioxide |
| b) Na_2SO_3 | - | Sodium sulphite |
| c) PCl_5 | - | Phosphorus penta chloride |
| d) CaCl_2 | - | Calcium chloride |
| e) BaO | - | Barium oxide |

4. Balance the following equations:

Answer

- | | |
|--|---|
| 1. $\text{H}_2 + \text{O}_2 \longrightarrow \text{H}_2\text{O}$ | $4\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$ |
| 2. $\text{HgO} \longrightarrow \text{Hg} + \text{O}_2$ | $2\text{HgO} \longrightarrow 2\text{Hg} + \text{O}_2$ |
| 3. $\text{Na} + \text{H}_2\text{O} \longrightarrow \text{NaOH} + \text{H}_2$ | $2\text{Na} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{H}_2$ |
| 4. $\text{CH}_4 + \text{O}_2 \longrightarrow \text{CO}_2 + \text{H}_2\text{O}$ | $\text{CH}_4 + 2\text{O}_2 \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ |
| 5. $\text{Mg} + \text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$ | $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$ |

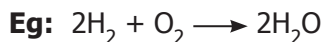
5. Mention the laws of chemical combination.

Laws of chemical combination are:

- Law of conservation of mass.
- Law of constant proportion
- Law of multiple proportion
- Gay Lussac's law of gaseous volume.

6. What are Reactants and products?

- Every chemical reaction has two components ie reactants and products.
- Reactants are the substances that take part in a chemical reaction and the products are the substance that are formed in a chemical reactions.



In this equation, H_2 & O_2 are reactants H_2O is the product.

7. What are fluorescent materials?

When a invisible radiation falls on materials like zinc sulphide, they emit a visible light. These materials are called fluorescent materials.





8. A proton can be defined as an hydrogen ion (H⁺) Why?

- When hydrogen gas is taken in a discharge tube, the positively charged particles obtained from hydrogen gas are called protons.
- Each of these protons is produced when one electron is removed from one hydrogen atom. $H \longrightarrow H^+ + e^-$

VI. Answer in detail.

1. Explain the discovery of electron by J.J.Thomson.

- When a high electron voltage of 10,000v was applied between the electrodes at a pressure of 0.01mm mercury, a bright spot of light was formed on the screen coated with a fluorescent material.
- The screen started to glow because it was struck by the ray which originated from the cathode. Since these rays were emitted by the cathode, these rays are named as cathode rays and later on named as electrons by Thomson.

2. Write down the postulates of Dalton's atomic theory.

The main postulates of Dalton's atomic theory are:

- All the matters are made up of very tiny particles called atoms.
- Atoms of the same element are identical in all respects (size, shape, mass and properties)
- Atoms of different elements have different sizes and masses and possess different properties.
- Atoms can neither be created nor be destroyed
- Atoms of different elements may combine with each other in a fixed simple ratio to form molecules or compounds.
- An atom is the smallest particle of matter that takes part in a chemical reaction.



UNIT TEST – 4

ATOMIC STRUCTURE

Time : 1.15 hrs

Marks: 25

I. Choose the correct answer.

4×1=4

- _____ can be defined as hydrogen ion.
a) Election b) Proton c) Neutron d) Position
- Cathode rays are made up of _____.
a) Neutral particles b) positively charged particular
c) negatively charged particles d) none of the above.
- An atom consists of _____ particles.
a) uncharged b) charged
c) neutral d) partially charged particles
- The fluorescent material used in the cathode ray tube is _____.
a) zinc sulphide b) zinc oxide c) zinc sulphate d) zinc carbonate

II. Fill in the blanks.

5×1=5

- Anode rays were found as a stream of _____ charged particles.
- In water, hydrogen and oxygen are combined in the ratio of _____ by mass.
- _____ is a negatively charged particle.
- Atoms of different elements are _____ in all aspects.
- The valency of SO_4^{2-} is _____.

III. Match the following.

5×1=5

- | | | |
|------------------|---|-----------------------------|
| 10. Dalton | - | Law of conservation of mass |
| 11. Goldstein` | - | Law of definite proportions |
| 12. Lavoisier | - | Atomic theory |
| 13. Prout | - | plum pudding model |
| 14. J.J. Thomson | - | protons |

IV. Answer briefly.

3×2=6

- State the law of conservation of mass.
- Write the chemical names for the following compounds.
a) CO_2 , b) SO_3 , c) $\text{Ca}_3(\text{PO}_4)_2$ d) PCl_5
- Balance the equations:
a) $\text{Pb}(\text{NO}_3)_2 \longrightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$ b) $\text{N}_2 + \text{H}_2 \longrightarrow \text{NH}_2$

V. Answer in detail.

1×5=5

- What are the postulates of Dalton's atomic theory?

