ICSE 2025 EXAMINATION

Sample Question Paper - 7

Chemistry

Time: 2 Hours. **Total Marks: 80**

Maximum Marks: 80
Time allowed: Two hours
Answers to this paper must be written on the paper provided separately.
You will not be allowed to write during first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this paper is the time allowed for writing the answers.

***Section A** is compulsory. Attempt any four questions from **Section B**.*
The intended marks for questions or parts of questions are given in brackets [ ].

SECTION-A

(*Attempt **all** questions from this Section*)

Question 1

Choose one correct answer to the questions from the given options: [15]

(i) In the periodic table, alkaline earth metals are placed in the group:
(a) 1
(b) 2
(c) 3 to 12
(d) 18

(ii) From the pairs of elements listed below, the one which will undergo ionic bond formation, is:
(a) C and O
(b) C and Cl
(c) H and Cl
(d) Na and Cl

(iii) Nilesh added dilute sulphuric acid to four different solutions of compounds as given below in four different test tubes. Which will produce a white precipitate?
(a) Copper nitrate
(b) Zinc nitrate
(c) Lead nitrate
(d) Sodium nitrate

(iv) The property of concentrated sulphuric acid that allows it to be used in the preparation of hydrogen chloride and nitric acid is:

(a) Acid
(b) Oxidising agent
(c) Non-volatile acid
(d) Dehydrating agent

(v) **Assertion (A)**: Ethane is a greenhouse gas.
Reason (R): The gas that absorbs the outgoing radiations from the earth is termed as greenhouse gas.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

(vi) The pair of metals that are extracted only by electrolysis is:
(a) Na, Pb
(b) Ca, Cu
(c) Na, Ca
(d) Ag, K

(vii) Gay Lussac's law is applicable:

(a) Only to solids
(b) Only to liquids
(c) To both liquids and solids
(d) Only to gases

(viii) The substance that is commonly known as oil of vitriol is:
(a) Ferrous sulphate
(b) Hydrochloric acid
(c) Sulphuric acid
(d) Nitric acid

(ix) An example of an acid salt is:
(a) Sodium sulphate
(b) Sodium chloride
(c) Sodium zincate
(d) Sodium hydrogen sulphate

(x) Nitrogen can be obtained by heating:
(a) Ammonium nitrate
(b) Ammonium nitrite
(c) Magnesium nitride
(d) Ammonium nitroxide

(xi) **Assertion (A)**: Molecular formula of glucose is $C_6H_{12}O_6$.
Reason (R) : Molecularity of glucose is 6.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

(xii) The empirical formula of the compound having molecular formula $C_2H_2O_4$ is:
(a) CHO_2
(b) $C_2H_2O_4$
(c) C_4H_4O8
(d) CHO

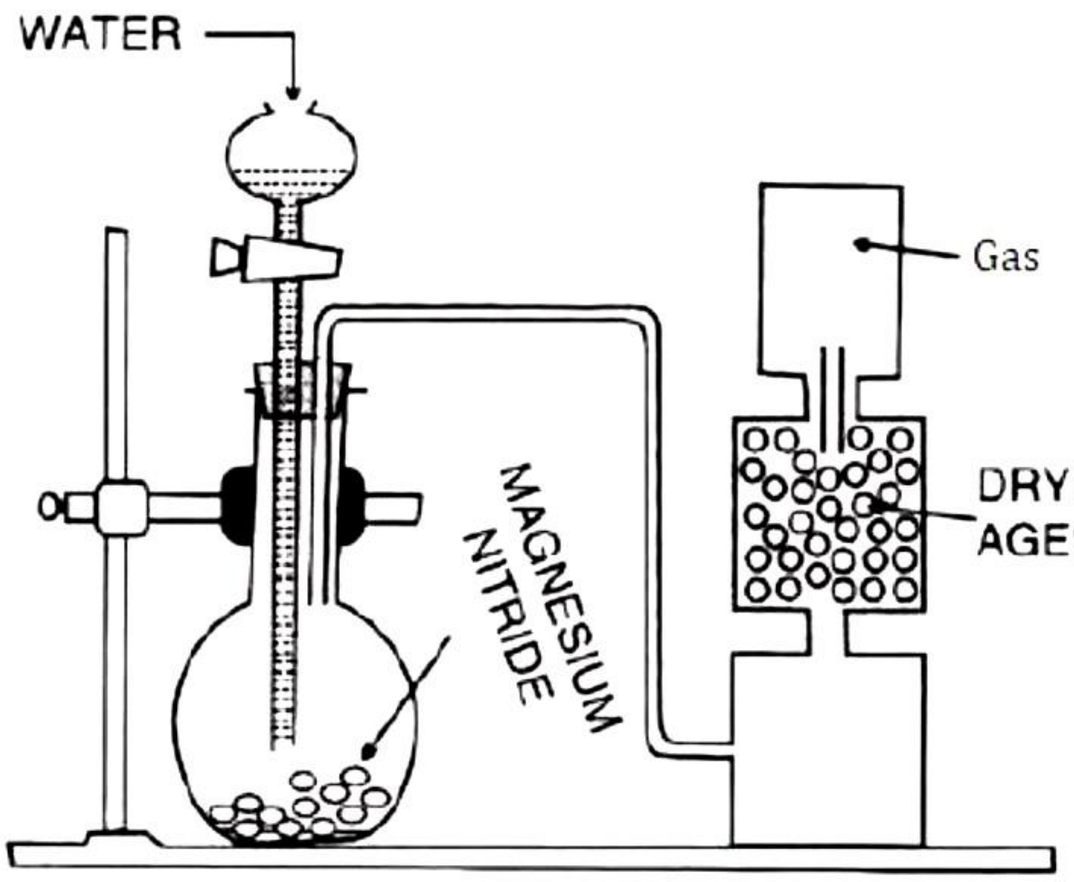
(xiii) Identify the effect of dry hydrogen chloride gas on litmus paper:
(a) No effect on litmus paper
(b) Turns red litmus blue
(c) Turns blue litmus red
(d) Turns red litmus black

(xiv) Non-electrolytes contain:
(a) Only anions
(b) Only cations
(c) Only molecules
(d) Both cations and anions

(xv) Nitric acid is very strong:
(a) Monobasic acid
(b) Dibasic acid
(c) Tribasic acid
(d) All of the above

Question 2

(i) Study the figure given below and answer the questions which follow: [5]



(a) Name the gas collected in the gas jar.
(b) Write a balanced chemical equation for the above preparation.
(c) How is the gas being collected?
(d) Name the drying agent in this experiment.
(e) Write an experiment to identify the presence of the gas in the gas jar.

(ii) Match the following: [5]

Column A	Column B
(a) Acid salt	(i) Phenolphthalein
(b) Basic salt	(ii) Mixture of organic dyes
(c) Neutral salt	(iii) Mg(OH)Cl
(d) Acid-Base indicator	(iv) NaCl
(e) Universal indicator	(v) $NaHSO_4$

(iii) Fill in the blanks:
(a) The covalent bond is called ____ bond.
(b) The electron pair which do not take part in bond formation is called as _____ pair of electrons.
(c) _____ compounds are usually insoluble in water and insoluble in organic solvents.
(d) Hydrogen molecule is a _____ molecule.
(e) _____ single covalent bonds are formed between the nitrogen and hydrogen atoms.

(iv) Name the following: [5]

(a) Element with atomic number 11

(b) The noble gas with 3 shells

(c) The noble gas element from period 2.

(d) The element of period 2 with valency 4.

(e) The most electronegative element

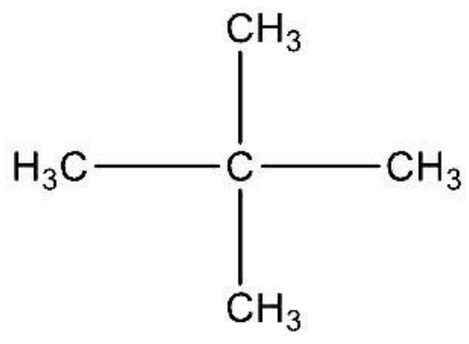
(v) [5]

(a) Draw the structural formula for the following:

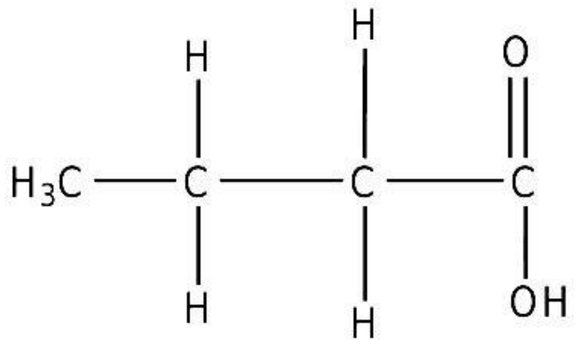
1. Porpanone
2. Pentanal
3. Acetylene

(b) Name the following organic compounds in IUPAC system:

1.



2.



SECTION-B

*(Attempt any **four** questions)*

Question 3

(i) Draw an electron dot diagram to show the formation of each of the following compounds. [2]

(a) Methane

(b) Magnesium chloride

[H =1, C = 6, Mg = 12, Cl = 17]

(ii) Write the products and balance the equations. [2]

(a) $Mg_3N_2 + H_2O \rightarrow Mg(OH)_2 + NH_3$

(b) $FeSO_4 + H_2SO_4 + HNO_3 \longrightarrow Fe_2(SO_4)_3 + H_2O + NO$

(iii) Arrange the following as per the instruction given in the brackets: [3]

(a) Cs, Na, Li, K, Rb (increasing order of metallic character)

(b) Mg, Cl, Na, S, Si (decreasing order of atomic size)

(c) Na, K, Cl, S, Si (increasing order ionisation energy)

(iv) Teacher asked three students to conduct following experiments. Identify the cations in each of the following cases: [3]

(a) Sonali added NaOH solution to solution (A) which gave reddish precipitate.

(b) Aaryan added NH_4OH solution to solution (B) that gave a white ppt. which does not dissolve in excess.

(c) Mahesh added NaOH solution to solution (C) that gave a white ppt. which is sparingly soluble in excess.

Question 4

(i) State the type of bonding in following molecules: [2]

(a) Ammonia.

(b) Calcium oxide.

(ii) Identify the cation in each of the following case: [2]

(a) Nisha added sodium hydroxide solution to solution 'C' which gives bluish white precipitate which is insoluble in excess.

(b) Jayashree added ammonium hydroxide solution to solution 'D' which gives dirty green precipitate that changes to reddish brown after sometime.

(iii) Name the following: [3]

(a) Second member of alkene series

(b) First member of alkane series

(c) Third member of aldehyde series

(iv) Write equations for the following reactions: [3]

(a) Ammonia and nitric acid.

(b) Copper oxide and carbon

(c) Magnesium with steam

Question 5

(i) Name the most common ore of Aluminium, Zinc and Iron. Name the processes by which the named ores are concentrated. [2]

(ii) [2]

(a) Name the product formed at the anode during the electrolysis of acidified water using platinum electrodes.

(b) Name the metallic ions that should be present in the electrolyte when an article made of copper is to be electroplated with silver.

(iii) What happens when: [3]

(a) What are redox reactions?

(b) Why is the reaction between manganese dioxide and hydrochloric acid a redox reaction?

(c) Identify the substance oxidised and the substance reduced in the above reaction.

(iv) [3]

(a) Write the equation for the laboratory preparation of ethyne (acetylene) from calcium carbide.

(b) What is the special feature of the structure of ethyne?

(c) What would you see when ethyne is bubbled through a solution of bromine in carbon tetrachloride?

Question 6

(i) The laboratory preparation from sodium acetate of: [2]

(a) Methane

(b) Ethane

(ii) Propane burns in air according to the following equation: [2]

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2$

What volume of propane is consumed on using 1000 cm3 of air, considering only 20% of air contains oxygen?

(iii) Name the probable cation present in each of the following solutions: [3]

(a) Yellow coloured solution,

(b) Blue coloured solution,

(c) Pink colour solution

(iv) Give the name and the balanced equation of hydrolysis of each of the following salt: [3]

(a) Acidic salt
(b) Amphoteric
(c) Neutral solution
Give a balanced equation for each reaction.

Question 7

(i) Write the balanced chemical equations: [3]
(a) Reduction of metallic oxide inside the blast furnace
(b) Heating of aluminium hydroxide
(c) Reduction of zinc oxide

(ii) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ [3]
How many grams of silver nitrate is required to precipitate 287g of silver chloride? (N=14, O=16, Cl=35.5, Ag=108) S_3

(iii) A certain gas at a pressure of 700 mm of Hg and a temperature of 57 °C occupies 700 mL. If the mass of the gas at STP is 1.5 g, then:
(a) Find the vapour density and the molecular mass of the gas (1 L of H_2 at S. T. P. weighs 0.09 g).
(b) Find gram molecules of the gas. [4]

Question 8

(ii) Draw the electron dot structure of the following. [2]
Calcium oxide

(iii) The percentage composition of a gas is Nitrogen 82.35% and Hydrogen 17.64%. Find the empirical formula of the gas. [N = 14, H = 1] [2]

(iv) For each of the substances listed below, describe the role played in the extraction of aluminium. [3]
(a) Cryolite
(b) Sodium hydroxide
(c) Graphite

(v) An element Y has atomic number 19. Answer the following questions. [3]
(a) State the period & group to which it belongs:
(b) Is it a metal or Non Metal?
(c) Write the formula between Y and Hydroxyl group.

Solution

SECTION A

Solution 1

(i) (b)
(ii) (d)
(iii) (c)
(iv) (c)
(v) (d)
(vi) (c)
(vii) (d)
(viii) (c)
(ix) (d)
(x) (b)
(xi) (a)
(xii) (a)
(xiii) (a)
(xiv) (c)
(xv) (a)

Solution 2

(i)

(a) Ammonia (NH_3)

$Mg_3N_2 + 6H_2O \rightarrow 3Mg(OH)_2 + 2NH_3\uparrow$

(b) The ammonia gas collected by holding the jar with its mouth downwards over delivery tube i.e. downward displacement of air.

(c) Quicklime.

(d) Fountain experiment.

Being basic, ammonia gas changes red litmus solution blue.

(ii)

Column A	Column B
(a) Acid salt	(v) $NaHSO_4$
(b) Basic salt	(iii) $Mg(OH)Cl$
(c) Neutral salt	(iv) $NaCl$
(d) Acid-Base indicator	(i) Phenolphthalein
(e) Universal indicator	(ii) Mixture of organic dyes

(iii)

(a) The covalent bond is called a **molecular bond.**

(b) The electron pair which do not take part in bond formation is called as **lone** pair of electrons.

(c) **Covalent** compounds are usually soluble in water and insoluble in organic solvents.

(d) Hydrogen molecule is a **non-polar** molecule.

(e) **Three** single covalent bonds are formed between the nitrogen and hydrogen atoms.

(iv)

(a) Sodium

(b) Argon

(c) Neon

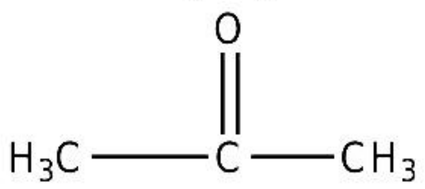
(d) Carbon

(e) Fluorine

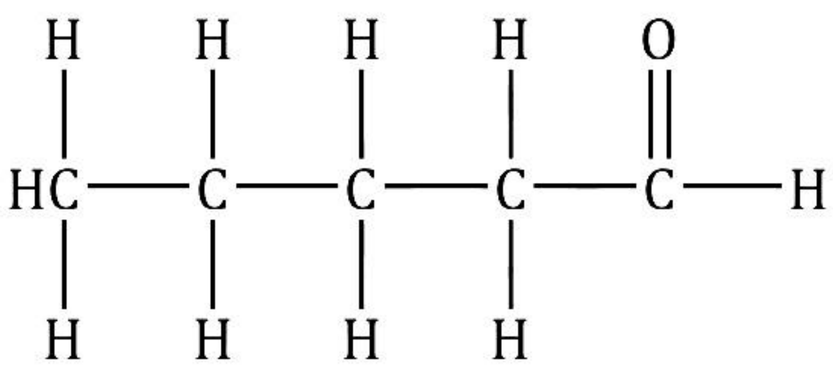
(v)

(a)

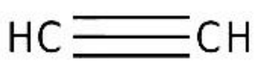
1. Acetone or propanone



2. Pentanal

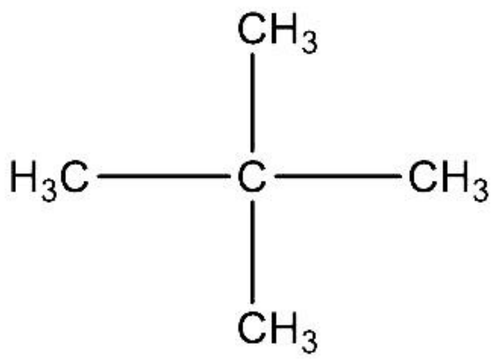


3. Acetylene

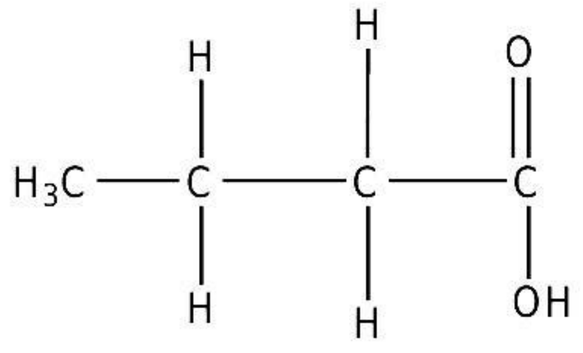


(b)

1. 2,2-dimethyl propane



2. Butanoic acid



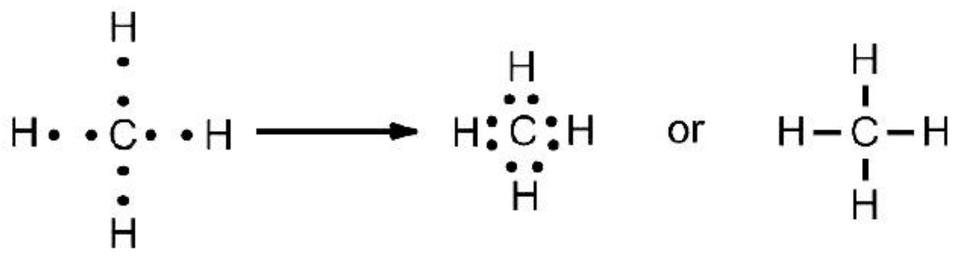
SECTION-B

(Attempt any four questions)

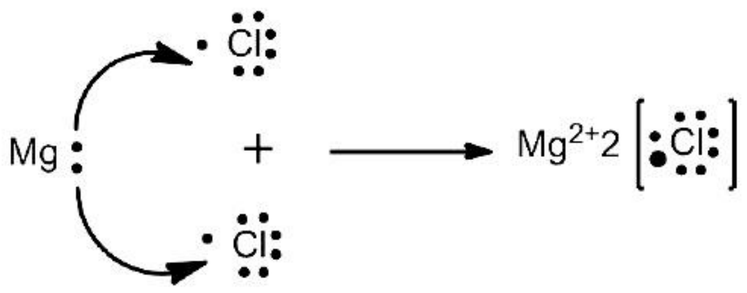
Solution 3

(i) Electron dot structure of:

(a) Formation of methane



(b) Magnesium chloride



(ii)

(a) $Mg_3N_2 + 6\,H_2O \rightarrow 3\,Mg(OH)_2 + 2NH_3$

(b) $6FeSO4 + 3H2SO4 + 2HNO3 \longrightarrow 3\,Fe_2(SO_4)_3 + 4H_2O + 2NO$

(iii)

(a) Li < Na < K < Rb < Cs

(b) Na > Mg > Si > S > Cl

(c) Na < Si < S < Cl

(iv)

(a) Fe^{3+} ion

$$FeCl_3 + 3NaOH \longrightarrow Fe(OH)_3 + 3NaCl$$

(Reddish brown ppt.)

(b) Pb^{2+} ion

$$Pb(NO_3)_2 + 2NH_4OH \longrightarrow Pb(OH)_2 + 2NH_4NO_3$$

(chalky white ppt. insoluble in excess)

(c) Ca^{2+} ion

$$Ca(NO_3)_2 + 2NaOH \longrightarrow Ca(OH)_2 + 2NaNO_3$$

(White ppt. sparingly soluble)

Solution 4

(i)

(a) Polar covalent bond

(b) Ionic bond

(ii)

(a) Copper ion, Cu^{2+}

(b) errous ion, Fe^{2+}

(iii)

(a) Propene

(b) Methane

(c) Propanal

(iv)

(a) $NH_3 + HNO_3 \rightarrow NH_4NO_3$ Ammonium nitrate

(b) $CuO + C \xrightarrow{\Delta} Cu + CO$

(c) $Mg + H_2O \rightarrow MgO + H_2\uparrow$

Solution 5

(i)

(a)

Metal	**Ore**	**Process by which it is concentrated**
i. Aluminum	Bauxite $Al_2O_3.2H_2O$	i. Baeyer's process or Hall's process
ii. Zinc	Zinc blende ZnS	ii. Froth floatation process
iii. Iron	Haematite Fe_2O_3	iii. Electromagnetic separation

(ii)

(a) In the electrolysis of alumina using the Hall–Héroult process, the electrolyte is covered with powdered coke as it

- reduces heat loss by radiation
- prevents the burning of the anode

(b) Iron sheets are coated with zinc during galvanisation to prevent them from rusting.

(iii)

(a) The reactions in which one reactant gets oxidised, while the other gets reduced during the reaction are called oxidation–reduction reactions or redox reactions.

(b) The reaction between manganese dioxide and hydrochloric acid is a redox reaction because MnO_2 is reduced to $MnCl_2$ and HCl is oxidised to H_2O.

(c) Oxidising agent – HCl; Reducing agent - MnO_2

(iv)

(a) $CaC_2 + 2H_2O \longrightarrow CH = CH + Ca(OH)_2$

(b) Triple bonds between carbon atoms.

(c) The solution of bromine water in carbon tetrachloride becomes colourless.

Solution 6

(i)

(a) $CH_3COONa + NaOH \xrightarrow[300\,^\circ C]{CaO} CH_4 + Na_2CO_3$

(b) $C_2H_5COONa + NaOH \xrightarrow[300\,^\circ C]{CaO} CH_3 - CH_3 + Na_2CO_3$

(ii)

Given:

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

Volume of air = 1000 cm^3

Percentage of oxygen in air = 20%

From the given information,

$C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$

1 vol 5 vols 3 vols 4 vols

According to Gay-Lussac's law,

1 vol. of propane consumes 5 vol. of oxygen.

Volume of oxygen = 1000 cm^3 × 20% = 200 cm^3

Therefore,

Volume of propane burnt for every 200 cm^3 of oxygen,

$= \frac{1}{5} \times 200 = 40\,cm^3$

40 cm^3 of propane is burnt.

(iii)

(a) Fe^{3+}

(b) Cu^{2+}

(c) Mn^{2+}

(iv)

(a) Iron chloride ($FeCl_3$)

$FeCl_3 + 3H_2O \rightarrow 3HCl + Fe(OH)_3$

(b) Ammonium acetate (CH_3COONH_4)

$CH_3COONH_4 + H_2O \rightarrow CH_3COOH + NH_4OH$

(c) Sodium chloride

$NaCl(s) + H_2O \rightarrow Na+(aq)\ OH-(aq) + H_2O$

Solution 7

(i)

(a) $Fe_2O_3 + 3CO \xrightarrow{\Delta} 2Fe + 3CO_2$

(b) $2Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + 3H_2O$

(c) $ZnO + C \longrightarrow Zn + CO$

(ii) Molar mass of $AgNO_3$=108+14+48

= 170 g

Molar mass of AgCl = 108+35.5

143.5 g

143.5 of AgCl was precipitated by 170g of $AgNO_3$

287g of AgCl will be precipitated by = $\frac{170}{143.5} \times 287$

= 340g of $AgNO_3$

(iii) P_1 = 700 mm of Hg

V_1 = 700 mL

P_2 = 760 mm of Hg

V_2 = x mL

T_1 = 57 + 273 K = 330 K

T_2 = 273 K

By Gas Equation:

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} = \frac{700 \times 700}{330} = \frac{760 \times V_2}{273}$$

$$\therefore V_2 = \frac{700 \times 700 \times 273}{760 \times 330}$$

$$= 533.37\,mL$$

$533.37\,mL$ of the gas at STP weighs 1.5g

$1000mL$ of the gas $weighs = 2.8123\,g$

$$\text{Vapour density} = \frac{\text{Wt. of 1000 mL of the gas at S.T.P.}}{\text{Wt. of 1000 mL of } H_2 \text{ at S.T.P.}}$$

$$= \frac{2.8123}{0.09} = 31.25$$

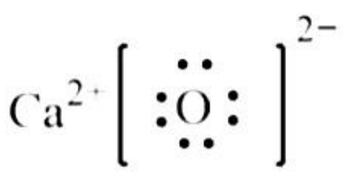
$$\text{Molecular mass} = 2 \times \text{V.D.} = 2 \times 31.25 = 62.50\,g$$

$$\text{No. of gram molecules of the gas} = \frac{\text{Mass in grams of water}}{\text{Gram molecular mass}}$$

$$= \frac{1.5\,g}{62.50} = 0.024\,g$$

Solution 8

(i) Calcium oxide CaO



(ii)

Given:

N = 82.35%

H =17.64%

Element	% composition	Atomic mass	Atomic ratio	Simplest ratio
H	17.64	1	17.64	3
N	82.35	14	5.8	1

So, the empirical formula is NH_3.

(iii) In the extraction of aluminium, the given compounds play the following roles:

(a) Cryolite: It lowers the fusion temperature from 2050°C to 950°C and enhances conductivity.

(b) Sodium hydroxide:

Two roles are played by sodium hydroxide in the extraction of aluminium.

First, finely ground bauxite (ore of aluminium) is heated under pressure with conc. caustic soda solution (NaOH solution) for 2–8 hours at 140°C to 150°C to produce sodium aluminate. The chemical equation is as follows:

$Al_2O_3.2H_2O + 2NaOH \longrightarrow 2NaAlO_2 + 3H_2O$

Second, on diluting sodium aluminate with water and cooling to 50°C, sodium aluminate is hydrolysed to give aluminium hydroxide as a precipitate. Here, the impurities dissolve in sodium hydroxide.

(c) Graphite: Thick rods of graphite are suspended in the fused electrolyte. They act as an anode where oxygen is discharged.

(iv)

(a) The element with atomic number 19 is nothing but Potassium.

Period = 4

Group = 1

(b) It is metal.

(c) KOH