ICSE 2024 EXAMINATION

CHEMISTRY

SAMPLE PAPER - 6

Time allowed: Two hours ***Max. Marks : 80***

Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the 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) Which of the following is a common characteristic of a covalent compound?
(a) High melting point. (b) Conducts electricity when it is in the molten state.
(c) Consists of molecules. (d) Always soluble in water.

(ii) Ammonium hydroxide will produce a reddish brown precipitate when added to a solution of :
(a) $CuSO_4$ (b) $Zn(NO_3)_2$ (c) $FeSO_4$ (d) $FeCl_3$

(iii) A salt solution gives a bluish white precipitate with NaOH solution and a white precipitate with $BaCl_2$ solution is :
(a) $CuSO_4$ (b) $FeSO_4$ (c) $Fe_2(SO_4)_3$ (d) $CuCl_2$

(iv) Among the elements given below, the element with the least electronegativity is :
(a) Lithium (b) Carbon (c) Boron (d) Fluorine

(v) During the electrolysis of acidified water which of the following takes place :
(a) Oxygen is released at cathode. (b) Oxygen is released at anode.
(c) Hydrogen is released at anode. (d) Sulphur dioxide is released at anode.

(vi) Duralumin is an alloy of
(a) Al and Cu (b) Cu and Sn (c) Al and Ag (d) Al and Fe

(vii) Hydrogen chloride can be obtained by adding concentrated Sulphuric acid to :
(a) NaCl (b) Na_2SO_4 (c) Na_2CO_3 (d) $NaNO_3$

(viii) Which of the following reactions gives copper as a product?
(a) Passing dry ammonia over heated copper oxide. (b) Adding dilute hydrochloric acid to copper oxide.
(c) Heating copper oxide. (d) Passing oxygen over heated copper oxide

(ix) Formation of chloroform from methane and chlorine is an example of :
(a) Addition (b) Dehydration (c) Substitution (d) Elimination.

(x) The element with the highest ionization potential in the periodic table is :
(a) He (b) Ne (c) Ar (d) Xe

(xi) An electrolyte which completely dissociates into ions is :

(a) Alcohol (b) Carbonic acid (c) Acetic acid (d) Sodium hydroxide

(xii) The inert electrode used in the electrolysis of acidified water is :

(a) Nickel (b) Platinum (c) Copper (d) Silver

(xiii) A compound with low boiling point is :

(a) Sodium chloride (b) Calcium chloride (c) Potassium chloride (d) Carbon tetrachloride

(xiv) The acid which can produce carbon from cane sugar, is :

(a) Concentrated Hydrochloric acid (b) Concentrated Nitric acid

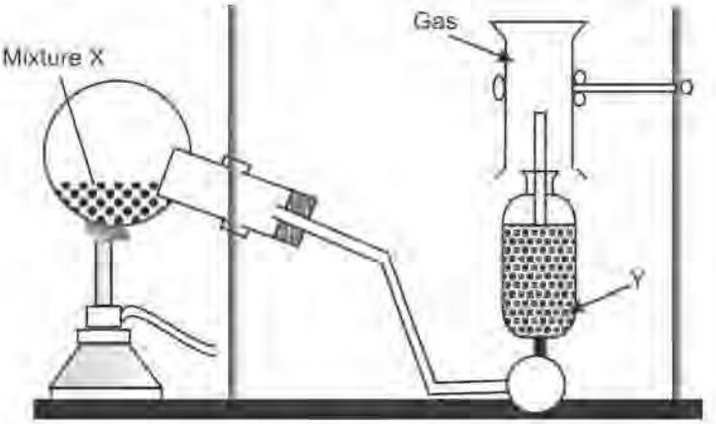
(c) Concentrated Sulphuric acid (d) Concentrated Acetic acid

(xv) The organic compound having a triple carbon-carbon covalent bond, is :

(a) C_3H_4 (b) C_3H_6 (c) C_3H_8 (d) C_4H_{10}

Question 2

(i) The diagram shows an experimental set-up for the laboratory preparation of a pungent smelling gas. The gas is alkaline in nature. [5]



(a) Name the gas collected in the jar. (b) Write the balanced equation for the above preparation.

(c) How is the gas being collected? (d) Name the drying agent used.

(e) How will you find that the jar is full of gas?

(ii) Match the salts given in column I with their **method of preparation** given in Column II. [5]

Column I	Column II
(a) $Pb(NO_3)_2$ from PbO	1. Simple displacement
(b) $MgCl_2$ from Mg	2. Titration
(c) $FeCl_3$ from Fe	3. Neutralization
(d) $NaNO_3$ from NaOH	4. Precipitation
(e) $ZnCO_3$ from $ZnSO_4$	5. Combination

(iii) Complete the following by choosing the correct answers from the brackets : [5]

(a) Conversion of ethanol to ethene by the action of concentrated sulphuric acid is an example of _____ (dehydration / dehydrogenation / dehydrohalogenation)

(b) When sodium chloride is heated with concentrated sulphuric acid below 200°C, one of the products formed is _____. (sodium hydrogen sulphate / sodium sulphate / chlorine)

(c) Ammonia reacts with excess chlorine to form _____. (nitrogen / nitrogen trichloride / ammonium chloride)

(d) Substitution reactions are characteristic reactions of _____. (alkynes / alkenes / alkanes)

(e) In Period 3, the most metallic element is _____. (sodium / magnesium / aluminium)

(iv) Identify the following : [5]

(a) An acidic gas which gives dense white fumes with NH_3 .

(b) An alkane whose molecular mass is 58. (H = 1; C = 12)

(c) A solid which when kept in the open, forms a solution after sometime.

(d) An alloy used in electrical fittings.

(e) A metal which gives hydrogen gas on reacting with both dilute acid and alkali.

(v) (a) Draw the structural formula for each of the following: [5]

1. But-1-ene 2. Propanoic acid 3. Ethanol

(b) Draw the structural isomers of C_4H_{10}.

Section B

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

Question 3

(i) An element E donates electrons so as to have electronic configuration like that of nearest noble gas. [2]

(a) What charge E will have after donating electrons?

(b) On which electrode the ions of E will discharge during electrolysis?

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

(a) $C_2H_5OH + H_2SO_4 \xrightarrow{> 160°C}$

(b) $C + H_2SO_4$ (conc.) $\longrightarrow$

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

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

(b) Na, K, Cl, S, Si (increasing order of ionization energy)

(c) Cl, F, Br, I (increasing order of electron affinity)

(iv) Complete the following by selecting the correct option from the choices given : [3]

(a) pH of acetic acid is greater than dilute sulphuric acid. So acetic acid contains _____ concentration of H^+ ions. (greater, same, low)

(b) The indicator which does not change colour on passage of HCl gas is _____. (methyl orange, moist blue litmus, phenolphthalein)

(c) The acid which cannot act as an oxidizing agent is _____. (conc. HCl, conc. HNO_3, conc. H_2SO_4)

Question 4

(i) (a) What is the role played by the flourspar (CaF_2) in the extraction of aluminium? [2]

(b) Why is powdered coke sprinkled over the electrolytic mixture?

(ii) A compound made up of two elements X and Y has an empirical formula X_2Y. If the atomic weights of X is 10 and that of Y is 5 and the compound has a vapour density 25, find its molecular formula. [2]

(iii) In the laboratory preparation of hydrochloric acid, HCl gas is dissolved in water. [3]

(a) Draw a diagram to show the arrangement used for the absorption of HCl in water.

(b) Why is such an arrangement necessary? Give two reasons.

(c) Write the chemical equations for the laboratory preparation of HCl gas when the reactants are:

1. below 200°C 2. Above 200°C

(iv) (a) What is the special feature of the apparatus that is used in the laboratory preparation of nitric acid? [3]

(b) Why should the temperature of the reaction mixture of nitric acid not be allowed to rise above 200°C?

Question 5

(i) (a) What is the property of concentrated sulphuric acid which allows it to be used in the preparation of hydrogen chloride and nitric acid? [2]

(b) What property of hydrogen chloride gas is demonstrated when it is collected by the downward delivery (upward displacement)?

(ii) (a) Name the probable hydroxide of a metal which is bluish white in colour. [2]

(b) Which salt solution will form a deep blue coloration when treated with excess of NH_4OH solution?

(iii) Write ***balanced chemical equations*** for each of the following : [3]

(a) Action of warm water on AlN.

(b) Action of Hydrochloric acid on sodium bicarbonate.

(c) Preparation of ethanol from Ethyl Chloride.

(iv) State one relevant **observation** for each of the following : [3]

(a) Dilute Hydrochloric acid is added to Lead nitrate solution and the mixture is heated.

(b) Barium chloride solution is mixed with Sodium Sulphate Solution.

(c) Concentrated Sulphuric acid is added to Sugar Crystals.

Question 6

(i) From the list of terms given, choose the most appropriate term to match the given description (calcination, roasting, pulverisation, smelting) [2]

(a) Crushing of ore into a fine powder.

(b) Heating of the ore in the absence of air to a high temperature.

(ii) The equation $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$, represents the catalytic oxidation of ammonia. If 100 cm^3 of ammonia is used, calculate the **volume of oxygen required** to oxidise the ammonia completely. [2]

(iii) (a) Calculate the number of gram atoms in 4.6 grams of sodium (Na = 23). [3]

(b) Calculate the percentage of water of crystallization in $CuSO_4.5H_2O$ (H = 1, O = 16, S = 32, Cu = 64)

(iv) A, B, C and D summarize the properties of **sulphuric acid** depending on whether it is **dilute** or **concentrated.** [3]

A = Typical acid property

B = Non Volatile acid

C = Oxidizing agent

D = Dehydrating agent

Choose the property (A, B, C or D) depending on which is relevant to each of the following :

(a) Preparation of Hydrogen chloride gas.

(b) Preparation of Copper sulphate from copper oxide.

(c) Action of conc. Sulphuric acid on Sulphur.

Question 7

(i) The percentage composition of a gas is : [2]

Nitrogen 82.35%, Hydrogen 17.64%.

Find the empirical formula of the gas. [N = 14, H = 1]

(ii) (a) Name an unsaturated hydrocarbon used for welding purposes. [2]

(b) Name an organic compound whose functional group is carboxyl.

(iii) Choose the correct word which refers to the process of electrolysis from A to D, to match the description (a) to (c): [3]

A. Cathode B. Anode C. An electrolyte D. Reduction

(a) Conducts electricity in aqueous or in molten state.

(b) A reducing electrode.

(c) Electrode connected to the positive end or terminal of the battery.

(iv) State the observations at the anode and at the cathode during the electrolysis of : [3]

(a) fused lead bromide using graphite electrodes.

(b) copper sulphate solution using copper electrodes.

Question 8

(i) Select the ion in each case, that would get selectively discharged from the aqueous mixture of the ions listed below: [2]

(a) SO_4^{2-}, NO_3^- and OH^-

(b) Pb^{2+}, Ag^+ and Cu^{2+}

(ii) Distinguish between the following pairs of compounds using the reagent given in the bracket. [2]

(a) Manganese dioxide and copper (II) oxide. (using concentrated HCl)

(b) Ferrous sulphate solution and ferric sulphate solution. (using sodium hydroxide solution)

(iii) Name the following : [3]

(a) The process of coating of iron with zinc

(b) An alloy of lead and tin that is used in electrical circuits

(c) An ore of zinc containing its sulphide.

(iv) The following table represents the elements and the atomic number. With reference to this, answer the following using only the alphabets given in the table. [3]

Element	Atomic number
P	13
Q	7
R	10

(a) Which element combines with hydrogen to form a basic gas?

(b) Which element has an electron affinity zero?

(c) Name the element, which forms an ionic compound with chlorine.

SOLUTION

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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) Which of the following is a common characteristic of a covalent compound?
(a) High melting point. (b) Conducts electricity when it is in the molten state.
(c) Consists of molecules. (d) Always soluble in water.

(ii) Ammonium hydroxide will produce a reddish brown precipitate when added to a solution of :
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(iii) A salt solution gives a bluish white precipitate with NaOH solution and a white precipitate with $BaCl_2$ solution is :
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(iv) Among the elements given below, the element with the least electronegativity is :
(a) Lithium (b) Carbon (c) Boron (d) Fluorine

(v) During the electrolysis of acidified water which of the following takes place :
(a) Oxygen is released at cathode. (b) Oxygen is released at anode.
(c) Hydrogen is released at anode. (d) Sulphur dioxide is released at anode.

(vi) Duralumin is an alloy of
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(vii) Hydrogen chloride can be obtained by adding concentrated Sulphuric acid to :
(a) NaCl (b) Na_2SO_4 (c) Na_2CO_3 (d) $NaNO_3$

(viii) Which of the following reactions gives copper as a product?
(a) Passing dry ammonia over heated copper oxide. (b) Adding dilute hydrochloric acid to copper oxide.
(c) Heating copper oxide. (d) Passing oxygen over heated copper oxide

(ix) Formation of chloroform from methane and chlorine is an example of :
(a) Addition (b) Dehydration (c) Substitution (d) Elimination.

(x) The element with the highest ionization potential in the periodic table is :
(a) He (b) Ne (c) Ar (d) Xe

(xi) An electrolyte which completely dissociates into ions is :

(a) Alcohol (b) Carbonic acid (c) Acetic acid (d) Sodium hydroxide

(xii) The inert electrode used in the electrolysis of acidified water is :

(a) Nickel (b) Platinum (c) Copper (d) Silver

(xiii) A compound with low boiling point is :

(a) Sodium chloride (b) Calcium chloride (c) Potassium chloride (d) Carbon tetrachloride

(xiv) The acid which can produce carbon from cane sugar, is :

(a) Concentrated Hydrochloric acid (b) Concentrated Nitric acid

(c) Concentrated Sulphuric acid (d) Concentrated Acetic acid

(xv) The organic compound having a triple carbon-carbon covalent bond, is :

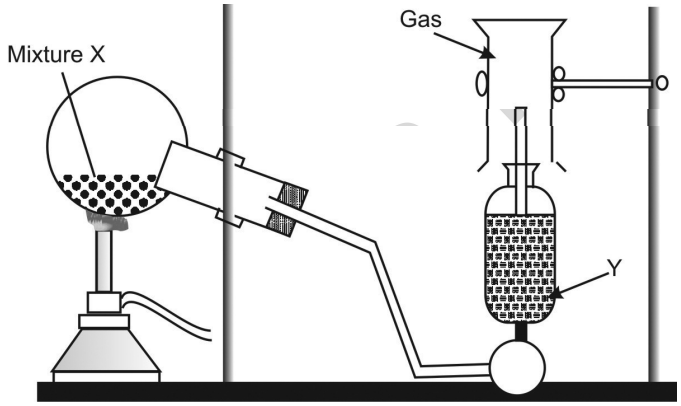
(a) C_3H_4 (b) C_3H_6 (c) C_3H_8 (d) C_4H_{10}

ANSWERS

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

Question 2

(i) The diagram shows an experimental set-up for the laboratory preparation of a pungent smelling gas. The gas is alkaline in nature. [5]



(a) Name the gas collected in the jar. (b) Write the balanced equation for the above preparation.

(c) How is the gas being collected? (d) Name the drying agent used.

(e) How will you find that the jar is full of gas?

Ans. (a) The gas collected is ammonia

(b) $2NH_4Cl + Ca(OH)_2 \xrightarrow{heat} CaCl_2 + 2H_2O + 2NH_3$

(c) The gas being lighter than air is collected by the downward displacement of air.

(d) Quick lime(CaO) is the drying agent.

(e) Hold a glass rod dipped in HCl near the mouth of gas jar. Formation of dense white fumes confirms that it is filled.

(ii) Match the salts given in column I with their **method of preparation** given in Column II. [5]

Column I	Column II
(a) $Pb(NO_3)_2$ from PbO	1. Simple displacement
(b) $MgCl_2$ from Mg	2. Titration
(c) $FeCl_3$ from Fe	3. Neutralization
(d) $NaNO_3$ from NaOH	4. Precipitation
(e) $ZnCO_3$ from $ZnSO_4$	5. Combination

Ans. (a) $Pb(NO_3)_2$ from PbO — 2. Titration
(b) $MgCl_2$ from Mg — 1. Simple displacement
(c) $FeCl_3$ from Fe — 5. Combination
(d) $NaNO_3$ from NaOH — 3. Neutralisation
(e) $ZnCO_3$ from $ZnSO_4$ — 4. Precipitation

(iii) Complete the following by choosing the correct answers from the brackets : [5]

(a) Conversion of ethanol to ethene by the action of concentrated sulphuric acid is an example of _____ (dehydration / dehydrogenation / dehydrohalogenation)

(b) When sodium chloride is heated with concentrated sulphuric acid below 200°C, one of the products formed is _____. (sodium hydrogen sulphate / sodium sulphate / chlorine)

(c) Ammonia reacts with excess chlorine to form _____. (nitrogen / nitrogen trichloride / ammonium chloride)

(d) Substitution reactions are characteristic reactions of _____. (alkynes / alkenes / alkanes)

(e) In Period 3, the most metallic element is _____. (sodium / magnesium / aluminium)

Ans. (a) dehydration (b) sodium hydrogen sulphate (c) nitrogen trichloride
(d) alkanes (e) sodium

(iv) Identify the following : [5]

(a) An acidic gas which gives dense white fumes with NH_3 .

(b) An alkane whose molecular mass is 58. (H = 1; C = 12)

(c) A solid which when kept in the open, forms a solution after sometime.

(d) An alloy used in electrical fittings.

(e) A metal which gives hydrogen gas on reacting with both dilute acid and alkali.

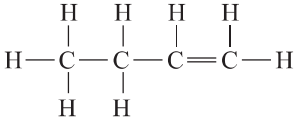
Ans. (a) HCl gas (b) Butane (c) Anhydrous calcium chloride
(d) Brass (e) Zinc metal

(v) (a) Draw the structural formula for each of the following: [5]

1. But-1-ene 2. Propanoic acid 3. Ethanol

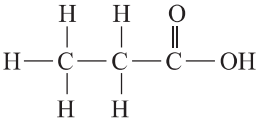
(b) Draw the structural isomers of C_4H_{10}.

Ans. (a) 1.



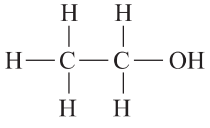
But-1-ene

2.



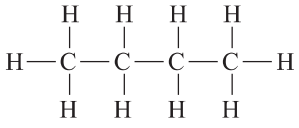
Propanoic acid

3.

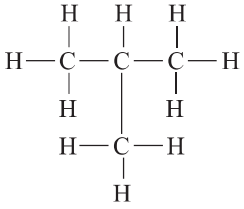


Ethanol

(b)



Normal butane



Iso-butane

Section B

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

Question 3

(i) An element E donates electrons so as to have electronic configuration like that of nearest noble gas. [2]

(a) What charge E will have after donating electrons?

(b) On which electrode the ions of E will discharge during electrolysis?

Ans. (a) The element E will change into positively charged ion (cation).

(b) The ion E will discharge at cathode during electrolysis.

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

(a) $C_2H_5OH + H_2SO_4 \xrightarrow{> 160°C}$

(b) $C + H_2SO_4$ (conc.) $\longrightarrow$

Ans. (a) $C_2H_5OH + H_2SO_4 \xrightarrow{> 160°C} C_2H_4 + H_2SO_4.H_2O$

(b) $C + 2H_2SO_4$ (conc.) $\longrightarrow 2H_2O + 2SO_2 + CO_2$

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

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

(b) Na, K, Cl, S, Si (increasing order of ionization energy)

(c) Cl, F, Br, I (increasing order of electron affinity)

Ans. (a) Na, Mg, Si, S and Cl

(b) K, Na, Si, S and Cl

(c) I, Br, F and Cl

(iv) Complete the following by selecting the correct option from the choices given : [3]

(a) pH of acetic acid is greater than dilute sulphuric acid. So acetic acid contains _____ concentration of H^+ ions. (greater, same, low)

(b) The indicator which does not change colour on passage of HCl gas is _____. (methyl orange, moist blue litmus, phenolphthalein)

(c) The acid which cannot act as an oxidizing agent is _____. (conc. HCl, conc. HNO_3, conc. H_2SO_4)

Ans. (a) Low

(b) Phenolphthalein

(c) Conc. HCl

Question 4

(i) (a) What is the role played by the flourspar (CaF_2) in the extraction of aluminium? [2]

(b) Why is powdered coke sprinkled over the electrolytic mixture?

Ans. (a) Flourspar (CaF_2) increases mobility of ions in the mixture as it acts as solvent for alumina and cryolite.

(b) Powdered coke prevents (i) heat loss from the electrolyte and (ii) burning of electrodes projecting out of electrolyte.

(ii) A compound made up of two elements X and Y has an empirical formula X_2Y. If the atomic weights of X is 10 and that of Y is 5 and the compound has a vapour density 25, find its molecular formula. [2]

Ans. Empirical formula weight of $X_2Y = 2(10) + 1(5) = 25$

Vapour density of $X_2Y = 25$

$\therefore$ Molecular weight of X_2Y = 2 × Vapour density

= 2 × 25 = 50

Now, $n = \dfrac{\text{Molecular weight}}{\text{Empirical formula weight}} = \dfrac{50}{25} = 2$

$\therefore$ Molecular formula of compound = n × Empirical formula

= 2 × $[X_2Y] = X_4Y_2$

(iii) In the laboratory preparation of hydrochloric acid, HCl gas is dissolved in water. [3]

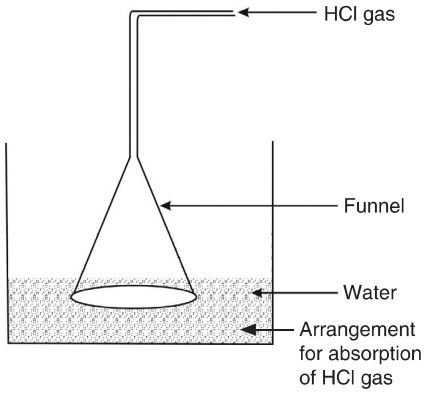
(a) Draw a diagram to show the arrangement used for the absorption of HCl in water.

(b) Why is such an arrangement necessary? Give two reasons.

(c) Write the chemical equations for the laboratory preparation of HCl gas when the reactants are:

1. below 200°C 2. Above 200°C

Ans. (a)



(b) (1) It prevents the back suction of the gas.

(2) It helps in concentration of hydrochloric acid as it provides large surface area for the absorption of HCl gas.

(c) 1. $NaCl + H_2SO_4 \xrightarrow{<200°C} NaHSO_4 + HCl$

2. $NaHSO_4 + NaCl \xrightarrow{>200°C} Na_2SO_4 + HCl$

(iv) (a) What is the special feature of the apparatus that is used in the laboratory preparation of nitric acid? [3]

(b) Why should the temperature of the reaction mixture of nitric acid not be allowed to rise above 200°C?

Ans. (a) The apparatus is all glass as nitric acid vapour is highly corrosive and can be attack cork or rubber.

(b) If the temperature rises above 200°C, sodium sulphate is formed, which partially fuses in glass apparatus. Thus, glass apparatus becomes useless for further use.

Question 5

(i) (a) What is the property of concentrated sulphuric acid which allows it to be used in the preparation of hydrogen chloride and nitric acid? [2]

(b) What property of hydrogen chloride gas is demonstrated when it is collected by the downward delivery (upward displacement)?

Ans. (a) Conc. sulphuric acid is the least volatile acid and hence, does not distil over while preparing HCl or HNO_3.

(b) It shows HCl gas is heavier than air.

(ii) (a) Name the probable hydroxide of a metal which is bluish white in colour. [2]

(b) Which salt solution will form a deep blue coloration when treated with excess of NH_4OH solution?

Ans. (a) Copper (II) hydroxide

(b) $CuSO_4$ sol.

(iii) Write ***balanced chemical equations*** for each of the following : [3]

(a) Action of warm water on AlN.

(b) Action of Hydrochloric acid on sodium bicarbonate.

(c) Preparation of ethanol from Ethyl Chloride.

Ans. (a) $AlN + 3H_2O \longrightarrow Al(OH)_3 + NH_3\ (g)$

(b) $NaHCO_3 + HCl \longrightarrow NaCl + H_2O + CO_2(g)$

(c) $C_2H_5Cl + NaOH(aq) \longrightarrow NaCl + C_2H_5OH$.

(iv) State one relevant **observation** for each of the following : [3]

(a) Dilute Hydrochloric acid is added to Lead nitrate solution and the mixture is heated.

(b) Barium chloride solution is mixed with Sodium Sulphate Solution.

(c) Concentrated Sulphuric acid is added to Sugar Crystals.

Ans. (a) 1. A white precipitate of lead chloride is formed.

2. On heating the white precipitate of lead chloride dissolves to form a colourless solution.

(b) A white precipitate of barium sulphate is formed.

(c) A lot of effervescence takes place and the sugar crystals first turn brown and then black on account of dehydration caused by sulphuric acid.

Question 6

(i) From the list of terms given, choose the most appropriate term to match the given description (calcination, roasting, pulverisation, smelting) [2]

(a) Crushing of ore into a fine powder.

(b) Heating of the ore in the absence of air to a high temperature.

Ans. (a) Pulverisation

(b) Calcination

(ii) The equation $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$, represents the catalytic oxidation of ammonia. If 100 cm^3 of ammonia is used, calculate the **volume of oxygen required** to oxidise the ammonia completely. [2]

Ans. $4NH_3(g) + 5O_2(g) \longrightarrow 4NO(g) + 6H_2O(l)$

4 vols 5 vols (By Gay Lussac's Law)

1 vol $\frac{5}{4}$ vols

100 cm^3 $\frac{5}{4} \times 100 = 125$ cm^3.

$\therefore$ Volume of oxygen required = **125 cm^3**.

(iii) (a) Calculate the number of gram atoms in 4.6 grams of sodium (Na = 23).

(b) Calculate the percentage of water of crystallization in $CuSO_4.5H_2O$ (H = 1, O = 16, S = 32, Cu = 64)

Ans. (a) 23 g of sodium = 1 g-atom

$\therefore$ 4.6 g of sodium = $\frac{4.6}{23}$ = **0.2 g-atom.**

(b) Molecular weight of $CuSO_4.5H_2O = 64 + 32 + 64 + 5(18) = 250$ amu

Molecular weight of $5H_2O = 5 \times 18 = 90$ amu.

$\therefore$ % of water of crystallisation = $\frac{90}{250} \times 100$ = **36%.**

(iv) A, B, C and D summarize the properties of **sulphuric acid** depending on whether it is **dilute** or **concentrated**. [3]

A = Typical acid property

B = Non Volatile acid

C = Oxidizing agent

D = Dehydrating agent

Choose the property (A, B, C or D) depending on which is relevant to each of the following :

(a) Preparation of Hydrogen chloride gas.

(b) Preparation of Copper sulphate from copper oxide.

(c) Action of conc. Sulphuric acid on Sulphur.

Ans. (a) B (Non volatile acid)

(b) A (Typical acid property)

(c) C (Oxidising agent)

Question 7

(i) The percentage composition of a gas is : [2]

Nitrogen 82.35%, Hydrogen 17.64%.

Find the empirical formula of the gas. [N = 14, H = 1]

Ans.

Element	Percentage weight	Atomic weight	Relative number of moles	Simple ratio of atoms
Nitrogen	82.35	14	82.35 ÷ 14 = 5.88	5.88 ÷ 5.88 = 1
Hydrogen	17.64	1	17.64 ÷ 1 = 17.64	17.64 ÷ 5.88 = 3

∴ Empirical formula of compound = NH_3.

(ii) (a) Name an unsaturated hydrocarbon used for welding purposes. [2]

(b) Name an organic compound whose functional group is carboxyl.

Ans. (a) Ethyne (C_2H_2)

(b) Acetic acid (CH_3COOH)

(iii) Choose the correct word which refers to the process of electrolysis from A to D, to match the description (a) to (c): [3]

A. Cathode B. Anode C. An electrolyte D. Reduction

(a) Conducts electricity in aqueous or in molten state.

(b) A reducing electrode.

(c) Electrode connected to the positive end or terminal of the battery.

Ans. (a) C. An electrolyte (b) A. Cathode (c) B. Anode

(iv) State the observations at the anode and at the cathode during the electrolysis of : [3]

(a) fused lead bromide using graphite electrodes.

(b) copper sulphate solution using copper electrodes.

Ans. (a) At cathode silvery droplets of molten lead appear.
At anode reddish vapours of bromine are given out.

(b) At cathode a fresh layer of reddish copper is deposited.
At anode fresh layer of copper is exposed on account of dissolving of copper metal in copper sulphate solution.

Question 8

(i) Select the ion in each case, that would get selectively discharged from the aqueous mixture of the ions listed below: [2]

(a) SO_4^{2-}, NO_3^- and OH^-

(b) Pb^{2+}, Ag^+ and Cu^{2+}

Ans. (a) OH^- ion will get discharged in preference to SO_4^{2-} or NO_3^- ions.

(b) Ag^+ ion will get discharged in preference to Pb^{2+} or Cu^{2+} ions.

(ii) Distinguish between the following pairs of compounds using the reagent given in the bracket. [2]

(a) Manganese dioxide and copper (II) oxide. (using concentrated HCl)

(b) Ferrous sulphate solution and ferric sulphate solution. (using sodium hydroxide solution)

Ans. (a) $MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$

In this case greenish yellow chlorine gas is evolved.

$CuO + 2HCl \longrightarrow CuCl_2 + H_2O$

In this case chlorine gas is not evolved but a greenish-blue solution of $CuCl_2$ is formed.

(b) $FeSO_4 + 2NaOH \longrightarrow Na_2SO_4 + Fe(OH)_2\downarrow$

Ferrous sulphate

In this case dirty green precipitate of $Fe(OH)_2$ is formed which is insoluble in excess of alkali.

$Fe_2(SO_4)_3 + 6NaOH \longrightarrow 3Na_2SO_4 + 2Fe(OH)_3\downarrow$

Ferric sulphate

In this case reddish-brown precipitate of $Fe(OH)_3$ is formed which is insoluble in excess of alkali.

(iii) Name the following : [3]

(a) The process of coating of iron with zinc

(b) An alloy of lead and tin that is used in electrical circuits

(c) An ore of zinc containing its sulphide.

Ans. (a) Galvanisation

(b) Fusible alloy (solder)

(c) Zinc blend (ZnS)

(iv) The following table represents the elements and the atomic number. With reference to this, answer the following using only the alphabets given in the table. [3]

Element	Atomic number
P	13
Q	7
R	10

(a) Which element combines with hydrogen to form a basic gas?

(b) Which element has an electron affinity zero?

(c) Name the element, which forms an ionic compound with chlorine.

Ans. (a) Q (b) R (c) P

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