ICSE 2024 EXAMINATION

CHEMISTRY

SAMPLE PAPER - 7

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) This metal is a liquid at room temperature.

(a) Potassium   (b) Zinc   (c) Gold   (d) Mercury

(ii) Hydroxide of this metal is soluble in sodium hydroxide solution.

(a) Magnesium   (b) Lead   (c) Silver   (d) Copper

(iii) In the periodic table alkali metals are placed in the group .... :

(a) 1   (b) 11   (c) 17   (d) 18

(iv) Hydrogen chloride gas being highly soluble in water is dried by :

(a) Anhydrous calcium chloride   (b) Phosphorous penta oxide

(c) Quick lime   (d) Concentrated sulphuric acid

(v) The brown ring test is used for detection of :

(a) CO_3^{2-} (b) NO_3^- (c) SO_3^{2-} (d) Cl^-

(vi) When dilute sulphuric acid reacts with iron sulphide, the gas evolved is ....

(a) Hydrogen sulphide   (b) Sulphur dioxide   (c) Sulphur trioxide   (d) Vapour of sulphuric acid

(vii) The functional group present in acetic acid is :

(a) Ketonic $>C = O$ (b) Hydroxyl –OH   (c) Aldehydic –CHO   (d) Carboxyl –COOH

(viii) The unsaturated hydrocarbons undergo :

(a) A substitution reaction   (b) An oxidation reaction

(c) An addition reaction   (d) None of these

(ix) The number of C-H bonds in ethane molecule are :

(a) Four   (b) Six   (c) Eight   (d) Ten

(x) Which of the following property does not match with elements of the halogen family?

(a) They have seven electrons in their valence shell.

(b) They are highly reactive chemically.

(c) They are metallic in nature.

(d) They are distomic in their molecular form.

(xi) An element with the atomic number 19 will most likely combine chemically with the element whose atomic number is :

(a) 17   (b) 11   (c) 18   (d) 20

(xii) If the vapour density of a compound is 252, its molecular formula is

(a) C_2Br_2 (b) C_2Br_4 (c) C_2Br_6 (d) C_2Br_8

(xiii) The two main metals in **Bronze** are :

(a) Copper and zinc   (b) Copper and lead   (c) Copper and nickel   (d) Copper and tin

(xiv) The particles present in **strong electrolytes** are :

(a) only molecules   (b) mainly ions   (c) ions and molecules   (d) only atoms

(xv) The aim of the **Fountain Experiment** is to prove that :

(a) HCl turns blue litmus red   (b) HCl is denser than air

(c) HCl is highly soluble in water   (d) HCl fumes in moist air

Question 2

(i) (a) Copy and complete the following table: [5]

Name of the process	Catalyst	Temperature	Equation for the reaction
Haber's Process			

(b) How is Ammonia separated from unreacted Nitrogen and Hydrogen?

(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 correct answers from the bracket :   [5]

(a) Metals are good _____ (oxidizing agents / reducing agents) because they are electron _____ (acceptors / donors).

(b) Electrovalent compounds have _____ (high / low) melting points.

(c) Higher the pH value of a solution, the more _____ (acidic / alkaline) it is.

(d) _____ (AgCl / $PbCl_2$), a white precipitate is soluble in excess NH_4OH.

(e) Conversion of ethene to ethane is an example of _____ (hydration / hydrogenation).

(iv) Identify the following :   [5]

(a) The tendency of an atom to attract electrons to itself when combined in a compound.

(b) A substance that conducts electricity in molten or aqueous state.

(c) The catalyst used in the conversion of ethyne to ethane.

(d) The type of reactions alkenes undergo.

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

(v) (a) Give the structural formulae of each of the following   [5]

1. 2-methyl propane   2. Ethanoic acid   3. Butan – 2– ol

(b) Equation for the reaction when **compound A** is bubbled through bromine dissolved in carbon tetrachloride is as follows :

$$A \xrightarrow{Br_2/CCl_4} \begin{array}{c} CH_2Br \\ | \\ CH_2Br \end{array}$$
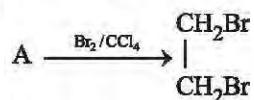
1. Draw the structure of A.
2. State your observation during this reaction.

Section B
(Attempt *any four* questions.)

Question 3

(i) (a) Name the product formed at the anode during the electrolysis of acidified water using platinum electrodes. [2]

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

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

(a) $NH_3 + Cl_2 \longrightarrow$ (b) $CuO + NH_3 \longrightarrow$

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

(a) He, Ar, Ne (Increasing order of the number of electron shells)

(b) Na, Li, K (increasing Ionisation Energy)

(c) F, Cl, Br (Increasing electronegativity)

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

(a) The metal which does not react with water or dilute H_2SO_4 but reacts with concentrated H_2SO_4 is _____. (Al/Cu/Zn/Fe)

(b) The metal whose oxide, which is amphoteric, is reduced to metal by carbon reduction _____.

(Fe/Mg/Pb/Al)

(c) The divalent metal whose oxide is reduced to metal by electrolysis of its fused salt is _____.

(Al/Na/Mg/K)

Question 4

(i) (a) Name the process by which impure ore of aluminium gets purified by using concentrated solution of an alkali. [2]

(b) Write the equation for the formation of aluminium at the cathode during the electrolysis of alumina.

(ii) (a) If 6 litres of hydrogen and 4 litres of chlorine are mixed and exploded and if water is added to the gases formed, find the volume of the residual gas.

(b) If the empirical formula of a compound is CH and it has a vapour density of 13, find the molecular formula of the compound. [2]

(iii) Answer the following questions pertaining to laboratory preparation of Hydrogen chloride: [3]

(a) Write an equation for the laboratory preparation of Hydrogen Chloride.

(b) Name the drying agent used.

(c) Name the method of collecting Hydrogen chloride gas.

(iv) Explain the following : [3]

(a) Direct absorption of HCl gas in water is not preferred.

(b) All glass apparatus is used in the laboratory preparation of HNO_3.

(c) NaCl has a high melting point.

Question 5

(i) (a) Name the drying agent used for drying ammonia. [2]

(b) Why should the apparatus for the collection of ammonia gas be perfectly dry?

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

(a) NaOH solution when added to the Solution (A) gives a reddish brown precipitate.

(b) NH_4OH solution when added to the Solution (B) gives white precipitate which does not dissolve in excess of NH_4OH.

(iii) Write a **balanced chemical equation** for each of the following : [3]
    (a) Burning of ethane in plentiful supply of air.
    (b) Action of water on Calcium carbide.
    (c) Heating of Ethanol at 170°C in the presence of conc. Sulphuric acid.

(iv) State **one** relevant observation for each of the following reactions : [3]
    (a) Addition of ethyl alcohol to acetic acid in the presence of concentrated sulphuric acid.
    (b) Action of dilute Hydrochloric acid on iron (II) sulphide.
   (c) Action of Sodium hydroxide solution on ferrous sulphate solution.

Question 6

(i) (a) If 150 cc of gas A contains X molecules, how many molecules of gas B will be present in 75 cc of B? [2] The gases A and B are under the same conditions of temperature and pressure.
    (b) Name the law on which the above problem is based.

(ii) What volume of oxygen is required to burn completely 90 dm^3 of butane under similar conditions of temperature and pressure?

$$2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O$$ [2]

(iii) Solution A is a sodium hydroxide solution. Solution B is a weak acid. Solution C is dilute sulphuric acid. Which solution will [3]
    (a) liberate sulphur dioxide from sodium sulphite.
    (b) give a white precipitate with zinc sulphate solution.
    (c) contain solute molecules and ions?

(iv) Mention the property of conc. H_2SO_4 exhibited in each of the following reactions with: [3]
    (a) sugar   (b) metallic chloride   (c) non-metal such as carbon.

Question 7

(i) A compound gave a following data: [2]
C = 57.82%, O = 38.58% and the rest hydrogen. Its relative molecular mass is 166.
Find its empirical formula and molecular formula.
        [C = 12, O = 16, H = 1]

(ii) (a) Name a gaseous hydrocarbon commonly used for welding purposes. [2]
    (b) What is the number of C-H bonds in ethane molecule?

(iii) Copy and complete the following table related to electrolysis. [3]

S. No.	Name of Electrolyte	Name of Cathode	Name of Anode	Product at Cathode	Product at Anode
1.	$CuSO_4$ (aq.)	Copper	Copper		
2.	$PbBr_2$ (molten)	Platinum	Platinum		

(iv) Refer to the flow chart diagram below and give balanced equations with conditions, if any, for the following conversions A to D. [3]
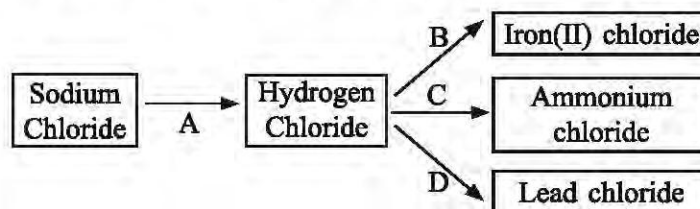
Question 8

    (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) Answer the following questions: [2]

        (a) How will you distinguish between Ammonium hydroxide and Sodium hydroxide using copper sulphate solution?

        (b) How will you distinguish between dilute hydrochloric acid and dilute sulphuric acid using lead nitrate solution?

    (iii) Identify the substance underlined, in each of the following cases :   [3]

        (a) **Cation** that does not form a precipitate with ammonium hydroxide but forms one with sodium hydroxide.

        (b) The **electrolyte** used for electroplating an article with silver.

        (c) The **particles** present in a liquid such as kerosene, that is a non-electrolyte.

    (iv) In Period 3 of the Periodic Table, element B is placed to the left of element A.   [3]

    On the basis of this information, choose the correct word from the brackets to complete the following statements:

        (a) The element B would have (lower/higher) metallic character than A.

        (b) The element A would probably have (lesser/higher) electron affinity than B.

        (c) The element A would have (greater/smaller) atomic size than B.

❖ ❖ ❖

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) This metal is a liquid at room temperature.
   (a) Potassium   (b) Zinc   (c) Gold   (d) Mercury

(ii) Hydroxide of this metal is soluble in sodium hydroxide solution.
   (a) Magnesium   (b) Lead   (c) Silver   (d) Copper

(iii) In the periodic table alkali metals are placed in the group ....
   (a) 1   (b) 11   (c) 17   (d) 18

(iv) Hydrogen chloride gas being highly soluble in water is dried by :
   (a) Anhydrous calcium chloride   (b) Phosphorous penta oxide
   (c) Quick lime   (d) Concentrated sulphuric acid

(v) The brown ring test is used for detection of :
   (a) CO_3^{2-} (b) NO_3^- (c) SO_3^{2-} (d) Cl^-

(vi) When dilute sulphuric acid reacts with iron sulphide, the gas evolved is ....
   (a) Hydrogen sulphide   (b) Sulphur dioxide   (c) Sulphur trioxide   (d) Vapour of sulphuric acid

(vii) The functional group present in acetic acid is :
   (a) Ketonic $>C = O$ (b) Hydroxyl –OH   (c) Aldehydic –CHO   (d) Carboxyl –COOH

(viii) The unsaturated hydrocarbons undergo :
   (a) A substitution reaction   (b) An oxidation reaction
   (c) An addition reaction   (d) None of these

(ix) The number of C-H bonds in ethane molecule are :
   (a) Four   (b) Six   (c) Eight   (d) Ten

(x) Which of the following property does not match with elements of the halogen family?
   (a) They have seven electrons in their valence shell.
   (b) They are highly reactive chemically.
   (c) They are metallic in nature.
   (d) They are diatomic in their molecular form.

(xi) An element with the atomic number 19 will most likely combine chemically with the element whose atomic number is :

(a) 17   (b) 11   (c) 18   (d) 20

(xii) If the vapour density of a compound is 252, its molecular formula is

(a) C_2Br_2 (b) C_2Br_4 (c) C_2Br_6 (d) C_2Br_8

(xiii) The two main metals in **Bronze** are :

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(xiv) The particles present in **strong electrolytes** are :

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(xv) The aim of the **Fountain Experiment** is to prove that :

(a) HCl turns blue litmus red   (b) HCl is denser than air

(c) HCl is highly soluble in water   (d) HCl fumes in moist air

ANSWERS

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

Question 2

(i) (a) Copy and complete the following table: [5]

Name of the process	Catalyst	Temperature	Equation for the reaction
Haber's Process			

(b) How is Ammonia separated from unreacted Nitrogen and Hydrogen?

Ans. (a)

Name of the process	Catalyst	Temperature	Equation for the reaction
Haber's Process	Ferric oxide (Fe_2O_3) containing 1% K_2O and 3% Al_2O_3	450°C – 500°C	$N_2 + 3H_2 \underset{200 \text{ Atms} - 900 \text{ Atms}}{\overset{(Fe+MO) \text{ at } 450°C - 500°C}{\rightleftharpoons}} 2NH_3 + 22400 \text{ cals.}$

(b) The mixture of gases is suddenly allowed to expand by passing it through a nozzle with a very small orifice. The ammonia gas on sudden expansion liquefies, but not hydrogen and nitrogen (Boiling point of NH_3 is –33°C, whereas that of N_2 is –196°C and H_2 is –253°C).

The recovery of ammonia is achieved either by liquefaction (discussed above) or by absorption of water.

(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
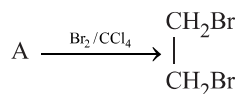
(e) $ZnCO_3$ from $ZnSO_4$ 4. Precipitation

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

    (a) Metals are good _____ (oxidizing agents / reducing agents) because they are electron _____ (acceptors / donors).

    (b) Electrovalent compounds have _____ (high / low) melting points.

    (c) Higher the pH value of a solution, the more _____ (acidic / alkaline) it is.

    (d) _____ ($AgCl$ / $PbCl_2$), a white precipitate is soluble in excess NH_4OH.

    (e) Conversion of ethene to ethane is an example of _____ (hydration / hydrogenation).

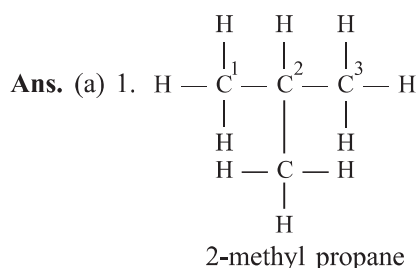**Ans.** (a) 1. Reducing agents 2. Donors   (b) High   (c) Alkaline   (d) AgCl   (e) Hydrogenation

(iv) Identify the following : [5]

    (a) The tendency of an atom to attract electrons to itself when combined in a compound.

    (b) A substance that conducts electricity in molten or aqueous state.

    (c) The catalyst used in the conversion of ethyne to ethane.

    (d) The type of reactions alkenes undergo.

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

Ans. (a) Electronegativity   (b) Electrolyte   (c) Nickel

    (d) Addition reaction   (e) Fusible alloy (solder)

(v) (a) Give the structural formulae of each of the following [5]

        1. 2-methyl propane

        2. Ethanoic acid

        3. Butan – 2– ol

   (b) Equation for the reaction when **compound A** is bubbled through bromine dissolved in carbon tetrachloride is as follows :

$$A \xrightarrow{Br_2/CCl_4} \begin{matrix} CH_2Br \\ | \\ CH_2Br \end{matrix}$$

    1. Draw the structure of A.

    2. State your observation during this reaction.

Ans. (a) 1. 2-methyl propane (structural formula)   2. Ethanoic acid (structural formula)   3. Butan – 2 – ol (structural formula)

   (b) 1.
$$\begin{matrix} H - C - H \\ \| \\ H - C - H \end{matrix}$$
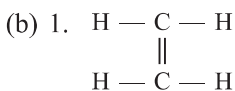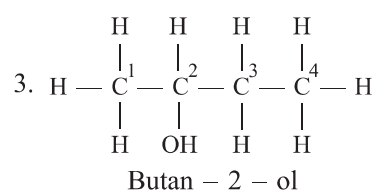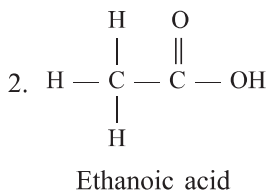
    2. The bromine solution in carbon tetrachloride gets decolorised.
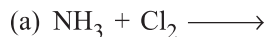

Section B
*(Attempt **any four** questions.)*

Question 3

 (i) (a) Name the product formed at the anode during the electrolysis of acidified water using platinum electrodes. [2]

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

Ans. (a) Oxygen gas   (b) Silver ions

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

(a) $NH_3 + Cl_2 \longrightarrow$

(b) $CuO + NH_3 \longrightarrow$

Ans. (a) $8NH_3 + 3Cl_2 \longrightarrow 6NH_4Cl + N_2$ (b) $3CuO + 2NH_3 \xrightarrow{\Delta} 3H_2O + 3Cu + N_2$

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

(a) He, Ar, Ne (Increasing order of the number of electron shells)

(b) Na, Li, K (increasing Ionisation Energy)

(c) F, Cl, Br (Increasing electronegativity)

Ans. (a) He, Ne, Ar (increasing number of electron shells)

(b) K, Na, Li (increasing ionisation energy)

(c) Br, Cl, F (increasing electronegativity)

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

(a) The metal which does not react with water or dilute H_2SO_4 but reacts with concentrated H_2SO_4 is _____. (Al/Cu/Zn/Fe)

(b) The metal whose oxide, which is amphoteric, is reduced to metal by carbon reduction _____.

(Fe/Mg/Pb/Al)

(c) The divalent metal whose oxide is reduced to metal by electrolysis of its fused salt is _____.
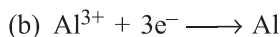
(Al/Na/Mg/K)

Ans. (a) Cu (Copper) (b) Pb (Lead) (c) Mg (Magnesium)

Question 4

(i) (a) Name the process by which impure ore of aluminium gets purified by using concentrated solution of an alkali. [2]

(b) Write the equation for the formation of aluminium at the cathode during the electrolysis of alumina.

Ans. (a) Baeyer's process

(b) $Al^{3+} + 3e^- \longrightarrow Al$

(ii) (a) If 6 litres of hydrogen and 4 litres of chlorine are mixed and exploded and if water is added to the gases formed, find the volume of the residual gas.

(b) If the empirical formula of a compound is CH and it has a vapour density of 13, find the molecular formula of the compound. [2]

Ans. (a) $H_2(g) \quad + \quad Cl_2(g) \quad \longrightarrow \quad 2HCl(g)$
    1 vol   1 vol   2 vol
    4 lt   4 lt   8 lt
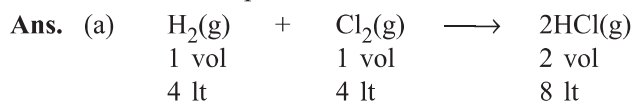
As 8 lt of HCl formed will dissolve in water, volume of residual hydrogen gas is $(6\,lt - 4\,lt) = 2\,lt$.

(b) Empirical formula weight of CH = 12 + 1 = 13

Vapour density of CH = 13

∴ Molecular weight of compound of CH = 2 × vapour density = 2 × 13 = 26

Now, $n = \dfrac{\text{molecular weight}}{\text{empirical formula weight}} = \dfrac{26}{13} = 2$

Thus, molecular formula = n × empirical formula = 2[CH] = C_2H_2.

(iii) Answer the following questions pertaining to laboratory preparation of Hydrogen chloride: [3]

(a) Write an equation for the laboratory preparation of Hydrogen Chloride.

(b) Name the drying agent used.

(c) Name the method of collecting Hydrogen chloride gas.

Ans. (a) $NaCl + H_2SO_4$ (Conc.) $\xrightarrow{\ <\ 200°C\ }$ $NaHSO_4 + HCl$ (g)

(b) Conc. H_2SO_4

(c) Bring a glass rod dipped in ammonia solution near the mouth of the gas jar. Formation of dense white fumes around the glass rod confirms that gas jar is completely filled with the HCl gas.
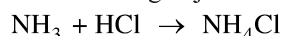
$$NH_3 + HCl \rightarrow NH_4Cl$$

(iv) Explain the following : [3]

(a) Direct absorption of HCl gas in water is not preferred.

(b) All glass apparatus is used in the laboratory preparation of HNO_3.

(c) NaCl has a high melting point.

Ans. (a) It is because, the reverse rise in level of water in the delivery tube which is known as back suction. Due to back suction the water enters hot flask and breaks it.

(b) The glass apparatus is purposely used because HNO_3 vapours are highly corrosive in nature and corrodes cork, rubber, etc., if used as stopper.

(c) NaCl is a electrovalent (ionic) compound. Its cations and anions are held very strongly due to strong electrostatic forces. Thus, a large amount of heat energy is required to snap the electrostatic bonds, before the ions could actually start interchanging their positions. Due to this large requirement of heat energy, NaCl has high melting and boiling points.

Question 5

(i) (a) Name the drying agent used for drying ammonia. [2]

(b) Why should the apparatus for the collection of ammonia gas be perfectly dry?

Ans. (a) Quicklime (CaO) is used as drying agent.

(b) Ammonia gas is extremely soluble in water. Thus, if the apparatus is not dry, the gas will dissolve in moisture.

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

(a) NaOH solution when added to the Solution (A) gives a reddish brown precipitate.

(b) NH_4OH solution when added to the Solution (B) gives white precipitate which does not dissolve in excess of NH_4OH.

Ans. (a) Ferric (Fe^{3+}) ion.   (b) Plumbous (Pb^{2+}) ion.

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

(a) Burning of ethane in plentiful supply of air.

(b) Action of water on Calcium carbide.

(c) Heating of Ethanol at 170°C in the presence of conc. Sulphuric acid.

Ans. (a) $2C_2H_6 + 7O_2 \longrightarrow 4CO_2 + 6H_2O$.

(b) $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

(c) $C_2H_5OH + H_2SO_4(conc) \xrightarrow{\ 170°C\ } C_2H_4(g) + H_2SO_4.H_2O$

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

(a) Addition of ethyl alcohol to acetic acid in the presence of concentrated sulphuric acid.

(b) Action of dilute Hydrochloric acid on iron (II) sulphide.

(c) Action of Sodium hydroxide solution on ferrous sulphate solution.

Ans. (a) On warming the mixture gives fruity smell.

(b) A foul smelling gas like rotten eggs is given off.

(c) A dirty green precipitate is formed which is insoluble in excess of sodium hydroxide solution.

Question 6

(i) (a) If 150 cc of gas A contains X molecules, how many molecules of gas B will be present in 75 cc of B? [2] The gases A and B are under the same conditions of temperature and pressure.

(b) Name the law on which the above problem is based.

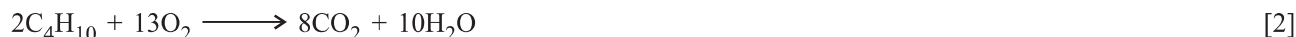**Ans.** (a) 150 cc of gas A contains X molecules

Thus, from Avogadro's law,

150 cc of gas B also contains X molecules

So, 75 cc of gas B contains $\frac{X}{2}$ molecules.

(b) Avogadro's law

(ii) What volume of oxygen is required to burn completely 90 dm³ of butane under similar conditions of temperature and pressure?

$$2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O$$ [2]

Ans. $2C_4H_{10}$ $+$ $13O_2 \longrightarrow$ $8CO_2$ $+$ $10H_2O$

　2Vols.　　　　13 Vols.　　　　8 Vols.　　　Nil　　(By Gay Lussac's law)

1 Vol　　　　　$\frac{13}{2}$ Vols.

90 dm³　　　　$\frac{13}{2}$ × 90 dm³ = **585 dm³.**

(iii) Solution A is a sodium hydroxide solution. Solution B is a weak acid. Solution C is dilute sulphuric acid. Which solution will [3]

(a) liberate sulphur dioxide from sodium sulphite.

(b) give a white precipitate with zinc sulphate solution.

(c) contain solute molecules and ions?

Ans. (a) Solution C(dil sulphuric acid) will liberate sulphur dioxide from sodium sulphite.

(b) Solution A(sodium hydroxide) will give white precipitate with Zinc sulphate solution.

(c) Solution B(weak acid) will contain both ions and molecules.

(iv) Mention the property of conc. H_2SO_4 exhibited in each of the following reactions with: [3]

(a) sugar　　　　　　　(b) metallic chloride　　　　　(c) non-metal such as carbon.

Ans. (a) Dehydration of organic compound

(b) As a non-volatile acid

(c) Oxidising property.

Question 7

(i) A compound gave a following data: [2]

C = 57.82%, O = 38.58% and the rest hydrogen. Its relative molecular mass is 166.

Find its empirical formula and molecular formula.

[C = 12, O = 16, H = 1]

Ans.	Element	Percentage weight	Atomic weight	Relative number of moles	Simple ratio of atoms
	C	57.82	12	57.82 ÷ 12 = 4.82	4.82 ÷ 2.41 = 2 or, 2 × 2 = 4
	O	38.58	16	38.58 ÷ 16 = 2.41	2.41 ÷ 2.41 = 1 or, 2 × 1 = 2
	H	100 − (57.82 + 38.58) = 100 − 96.40 = 3.60	1	3.60 ÷ 1 = 3.60	3.60 ÷ 2.41 ≈ 1.5 or, 2 × 1.5 = 3

Thus, empirical formula of compound = $C_4H_3O_2$

So, empirical formula weight of $C_4H_3O_2 = 4 \times 12 + 3 \times 1 + 2 \times 16 = 48 + 3 + 32 = 83$

Now, $n = \dfrac{\text{Molecular mass}}{\text{Empirical formula mass}} = \dfrac{166}{83} = 2$

Thus, Molecular formula $= 2 \times$ Empirical formula $= 2\,(C_4H_3O_2) = C_8H_6O_4$.

  (ii) (a) Name a gaseous hydrocarbon commonly used for welding purposes. [2]

      (b) What is the number of C-H bonds in ethane molecule?

Ans. (a) Acetylene gas

     (b) Six

(iii) Copy and complete the following table related to electrolysis. [3]

S. No.	Name of Electrolyte	Name of Cathode	Name of Anode	Product at Cathode	Product at Anode
1.	$CuSO_4$ (aq.)	Copper	Copper		
2.	$PbBr_2$ (molten)	Platinum	Platinum		

Ans.

S. No.	Name of Electrolyte	Name of Cathode	Name of Anode	Product at Cathode	Product at Anode
1.	$CuSO_4$ (aq.)	Copper	Copper	**Copper deposits**	**Copper dissolves**
2.	$PbBr_2$ (molten)	Platinum	Platinum	**Lead deposits given out**	**Bromine vapour**

(iv) Refer to the flow chart diagram below and give balanced equations with conditions, if any, for the following conversions A to D. [3]
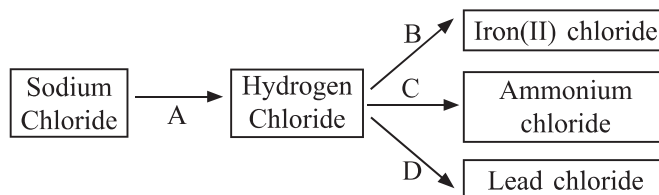
Ans. A. $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$

     B. $Fe + 2HCl \xrightarrow{\;heat\;} FeCl_2 + H_2$

     C. $NH_3 + HCl \rightarrow NH_4Cl$

     D. $Pb(NO_3)_2(aq) + 2HCl \rightarrow PbCl_2(s) + 2HNO_3$

Question 8
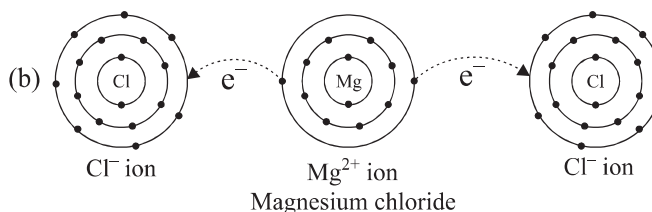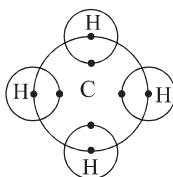
  (i) Draw an electron dot diagram to show the formation of each of the following compounds: [2]

     (a) Methane

     (b) Magnesium chloride

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

Ans. (a) Methane   (b)

(ii) Answer the following questions: [2]
  (a) How will you distinguish between Ammonium hydroxide and Sodium hydroxide using copper sulphate solution?
  (b) How will you distinguish between dilute hydrochloric acid and dilute sulphuric acid using lead nitrate solution?

Ans. (a) Sodium hydroxide forms a pale blue precipitate which is insoluble in excess of sodium hydroxide. Ammonium hydroxide forms a pale blue precipitate which dissolves in excess of ammonium hydroxide to form deep blue coloration.
  (b) Hydrochloric acid forms a white precipitate with lead nitrate solution. This precipitate dissolves on warming the reaction mixture so as to form clear solution. Sulphuric acid forms a white precipitate with lead nitrate solution. This precipitate does not dissolve on warming the reaction mixture.

(iii) Identify the substance underlined, in each of the following cases : [3]
  (a) **Cation** that does not form a precipitate with ammonium hydroxide but forms one with sodium hydroxide.
  (b) The **electrolyte** used for electroplating an article with silver.
  (c) The **particles** present in a liquid such as kerosene, that is a non-electrolyte.

Ans. (a) Magnesium ions
  (b) Sodium argentocyanide solution
  (c) Alkanes molecules

(iv) In Period 3 of the Periodic Table, element B is placed to the left of element A. [3]
  On the basis of this information, choose the correct word from the brackets to complete the following statements:
  (a) The element B would have (lower/higher) metallic character than A.
  (b) The element A would probably have (lesser/higher) electron affinity than B.
  (c) The element A would have (greater/smaller) atomic size than B.

Ans. (a) higher   (b) higher   (c) smaller

∨   ∨   ∨