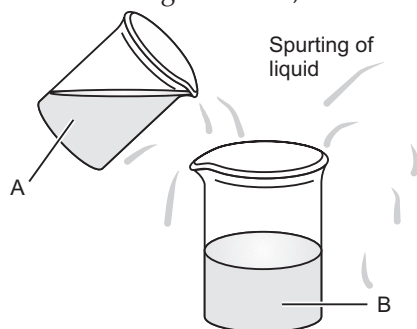


- (vii) The reactants for laboratory preparation of nitric acid are:
- Ammonium hydroxide and sulphuric acid
 - Sodium nitrate and sulphuric acid
 - Sodium nitrate and water
 - Ammonium nitrate and water
- (viii) The process used to convert impure alumina to pure alumina is:
- Roasting
 - Electrolytic refining
 - Purification
 - Bayer's process
- (ix) Calcium oxide reacts with HCl gas to produce _____ and water.
- Calcium chloride
 - Calcium sulphate
 - Hydrogen gas
 - Chlorine gas
- (x) The compound A and B, as shown in the figure below, can be:



- Water and salt solution
- Water and conc. H_2SO_4
- Baking soda solution and water
- Water and NaOH solution

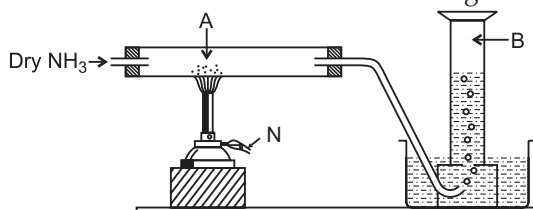
Section-B

Question 2.

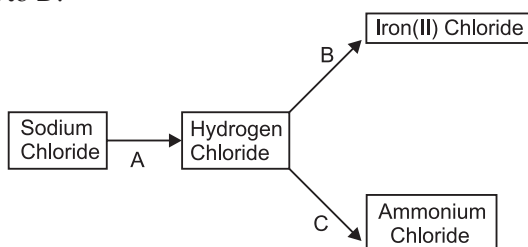
- Define:
 - Homologous series
 - Gangue or Matrix
- Name the compound formed when:
 - Ethene reacts with hydrogen chloride.
 - Sodium aluminate is diluted with water and cooled to 50°C
- Draw the structural diagram of the following isomers:
 - Pentane
 - 2-Methyl butane
 - 2, 2-Dimethyl propane
- Complete and balance the following chemical equations:
 - $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow[\Delta]{\text{Conc. H}_2\text{SO}_4}$
 - $\text{NH}_3 + \text{O}_2 \xrightarrow{\text{Pt}}$
 - $\text{Al} + \text{NaOH} + \text{H}_2\text{O} \xrightarrow{\Delta}$

Question 3.

- Dry ammonia gas is passed over black substance as shown in figure below:



- (a) Name the black substance A.
- (b) Name the gas evolved B.
- (c) Write a balanced equation for the reaction of ammonia with A.
- (ii) State the following:
 - (a) The catalysts used in contact process.
 - (b) The product formed when glass rod dipped in NH_4OH is brought near the mouth of a bottle full of HCl gas.
- (iii) State the observation for the following, when:
 - (a) Concentrated sulphuric acid is added to a lump of blue vitriol.
 - (b) Copper turnings are heated with concentrated nitric acid.
 - (c) Dil hydrochloric acid is added to silver nitrate solution.
- (iv) Refer to the flow chart diagram below and give balanced equations with conditions if any for the following conversions A to D.



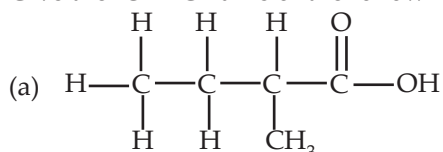
Question 4.

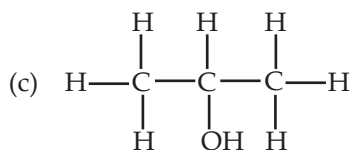
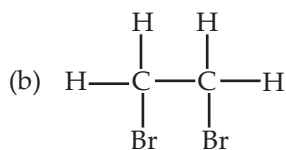
- (i) State the relevant reason for the following:
 - (a) Methane is called as marsh gas. Why?
 - (b) All glass apparatus are used in the laboratory preparation of HNO_3 .
- (ii) Name the ores of the given metals :
 - (a) Aluminium
 - (b) Zinc
- (iii) Identify the terms for the following:
 - (a) Another name of nitric acid
 - (b) The catalyst used in the conversion of ethyne to ethane.
 - (c) A mixture of three parts of conc. HCl and one part of conc. HNO_3 .
- (iv) Copy and complete the following table : Column 3 has the names of gases to be prepared using the substance you enter in column 1 alongwith dilute or concentrated sulphuric acid as indicated by you in column 2.

Column 1 Substance reacted with acid	Column 2 Dilute or concentrated sulphuric acid (H_2SO_4)	Column 3 Gas
(a)		Hydrogen
(b)		Carbon dioxide
(c)		Only chlorine

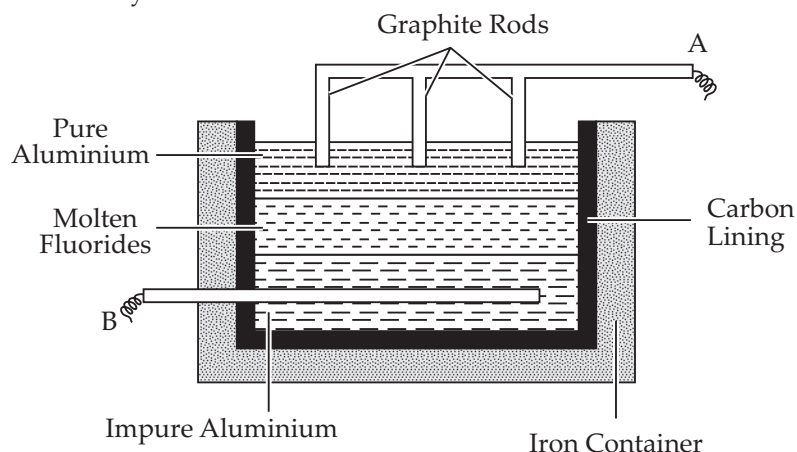
Question 5.

- (i)
 - (a) Write a balanced chemical equation for the laboratory preparation of nitric acid.
 - (b) Mention two precautions to be followed while carrying on the above experiment.
- (ii) Select the correct answer from the brackets to complete the following statements:
 - (a) Haber's process is used for industrial preparation of _____(ammonium hydroxide/ammonium chloride/ammonia).
 - (b) Pure nitric acid is _____. (brown coloured/yellow coloured/colourless)
- (iii) Give the IUPAC name of the following:





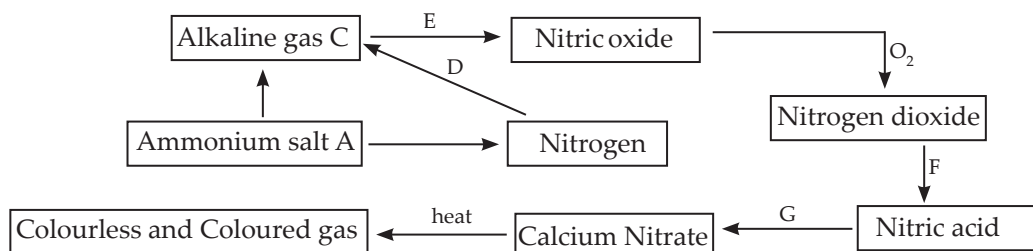
- (iv) (a) Which of A and B is the cathode and which one is the anode?
 (b) What is the electrolyte in the tank?



- (c) What material is used for the cathode?

Question 6.

- (i) Distinguish between the following:
 (a) Alkane, alkene and alkyne [using potassium permanganate solution]
 (b) Ethylene and Acetylene [ammonical solution of silver nitrate]
 (ii) Give the formula of the next higher homologue of the following:
 (a) Ethane. (b) Ethene.
 (iii)



- (a) Name (i) the ammonium salt A (ii) alkaline gas C.
 (b) How the conversion D is carried out? State all the conditions like temperature, pressure and catalyst.
 (c) (i) How is C converted to nitric oxide? Write the equation.
 (ii) How is temperature maintained in above process?
 (iii) Write the equation for conversion of F and G.
 (iv) Draw the structural formula for each of the following:
 (a) Isomer of n-butane.
 (b) A three membered unsaturated hydrocarbon with a triple bond.
 (c) The straight chain structure of 2-methyl butane.
 (d) The mono-substituted product formed when ethane reacts with bromine gas.

Section-A

Answer 1.

- (i) (a) C_nH_{2n-2}

Explanation :

The general formula of alkyne is C_nH_{2n-2}

- (ii) (d) CaO

Explanation :

The drying agent used to dry NH_3 is quicklime (CaO).

- (iii) (b) Bauxite

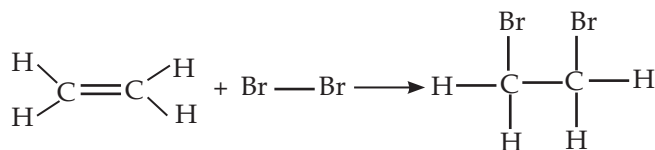
Explanation :

The main ore used for the extraction of aluminium is bauxite and Hall – Heroult process is the major industrial process for extraction of aluminium from its oxide alumina.

- (iv) (d) Addition reaction

Explanation :

The reaction of ethene with Br_2 to form 1, 2-Dibromoethane (Ethylene bromide) is an addition reaction. The atoms that add to the double bond are located on adjacent carbon atoms, a common characteristic of addition reactions of alkenes.



- (v) (c) Concentrated sulphuric acid

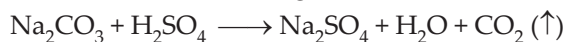
Explanation :

The delivery tube is dipped in concentrated sulphuric acid so that easy movement of HCl gas takes place and no impurity can add to it. It also helps in making the HCl gas moisture-free.

- (vi) (c) evolution of CO_2 gas

Explanation :

The reaction of sulphuric acid and sodium carbonate produces sodium sulphate, water, and brisk effervescence of carbon dioxide. The reaction is given as:



- (vii) (b) Sodium nitrate and sulphuric acid

Explanation :

Nitric acid in the laboratory is prepared by reaction of sodium or potassium nitrate and sulphuric acid. They are distilled to produce the required ammonia.

- (viii) (d) Bayer's process

Explanation :

Concentration of ore or purification of ore, i.e., conversion of bauxite (impure alumina) to pure alumina, is known as Bayer's process. Roasting refers to the heating of compounds in the presence of air, while electrolytic refining is the process of purification of metal using electrolysis.

- (ix) (a) Calcium chloride

Explanation :

The reaction of calcium chloride with water is neutralisation and a double displacement reaction, which produces salt and water. The chlorine atom of HCl displaces oxygen from CaO and hence produces calcium chloride ($CaCl_2$).

- (x) (b) Water and conc. H_2SO_4

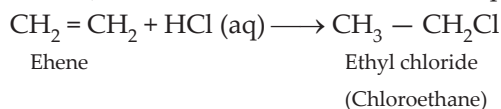
Explanation :

When water is added to concentrated sulphuric acid, a highly exothermic reaction occurs, leading to the spurting of the acid. This can be very dangerous.

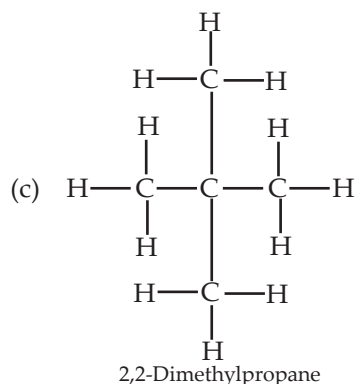
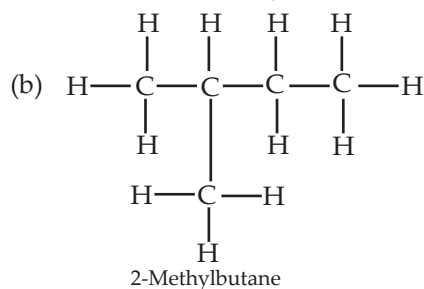
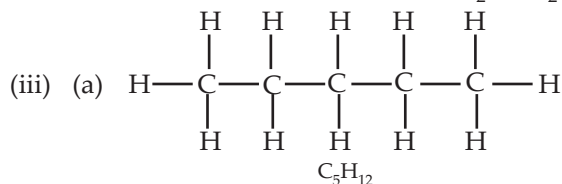
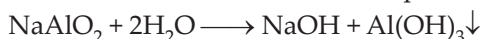
Section-B

Answer 2.

- (i) (a) A series of compounds of the same family in which each member differ from its adjacent member by one CH_2 unit is called homologous series.
 (b) The unwanted impurities which are associated with ore are called gangue or matrix. e.g., stone, clay etc.
 (ii) (a) Ethyl chloride (chloroethane) is formed. The reaction can be represented as follows:



- (b) Aluminium hydroxide is formed. The reaction can be represented as follows:

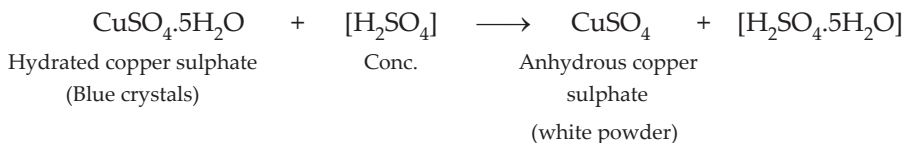


- (iv) (a) $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow[\Delta]{\text{Conc. H}_2\text{SO}_4} 6\text{C} + 6\text{H}_2\text{O}$
 (b) $4\text{NH}_3 + 5\text{O}_2 \xrightarrow{\text{Pt}} 4\text{NO} \uparrow + 6\text{H}_2\text{O}$
 (c) $2\text{Al} + 2\text{NaOH} + 2\text{H}_2\text{O} \xrightarrow{\Delta} 2\text{NaAlO} + 3\text{H}_2 \uparrow$

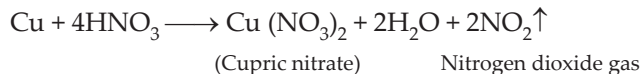
Answer 3.

- (i) (a) Copper (II) oxide
 (b) Nitrogen gas
 (c) $3\text{CuO} + 2\text{NH}_3 \xrightarrow{\Delta} 3\text{Cu} + 3\text{H}_2\text{O} + \text{N}_2 \uparrow$

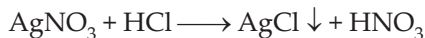
- (iii) (a) The blue coloured hydrated copper sulphate loses its water of crystallisation and white anhydrous copper (II) sulphate is formed.:



- (b) The reddish brown nitrogen dioxide gas which has pungent smell is evolved along with the formation of (Cupric nitrate) and water.



- (c) A thick curdy white precipitate of silver chloride is formed.



- (iv) (a) $\text{NaCl} + \text{H}_2\text{SO}_4 \xrightarrow{\Delta < 200^\circ\text{C}} \text{NaHSO}_4 + \text{HCl}\uparrow$
(Conc.) (Hydrogen chloride)
- (b) $2\text{HCl} + \text{Fe} \longrightarrow \text{FeCl}_2 + \text{H}_2\uparrow$
(Iron(II) chloride)
- (c) $\text{HCl}_{(\text{g})} + \text{NH}_{3(\text{g})} \longrightarrow \text{NH}_4\text{Cl}$
Ammonium chloride

Answer 4.

- (i) (a) Methane is called as marsh gas because methane is formed by the decomposition of plant and animal matter lying under water in marshy areas.
(b) All glass apparatus are used in the laboratory preparation of HNO_3 because nitric acid being very corrosive and destroys the rubber or cork of the apparatus.
- (ii) (a) Bauxite
(b) Calamine
- (iii) (a) Aqua fortis
(b) Lindlar catalyst
- (c) Aqua regia

(iv)	Column 1	Column 2	Column 3
	Substance reacted with acid	Dilute or concentrated sulphuric acid (H_2SO_4)	Gas
	(a) Zinc (b) Copper carbonate (c) Sodium chloride + Manganese oxide	Dilute H_2SO_4 Dilute H_2SO_4 Concentrated H_2SO_4	Hydrogen Carbon dioxide Only chlorine

Answer 5.

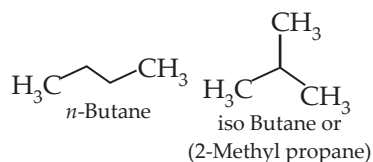
- (i) (a) $\text{KNO}_3 + \text{conc. H}_2\text{SO}_4 \longrightarrow \text{KHSO}_4 + \text{HNO}_3$ (below 200°C)
- (b) 1. The reaction mixture should not be heated beyond 200°C because nitric acid decompose at higher temperatures.
2. The apparatus must be made of all glass as the vapours of nitric acid are corrosive therefore it damages the rubber and cork.
- (ii) (a) Ammonia
- $$\begin{array}{ccccccc} \text{N}_2 & + & 3\text{H}_2 & \xrightleftharpoons[200-300 \text{ bar/Fe}]{773 \text{ K}} & 2\text{NH}_3 & + & \text{heat} \\ (\text{g}) & & (\text{g}) & & (\text{liq. ammonia}) & & \\ & & & & (\text{g}) & & \end{array}$$

- (b) Colourless. (Pure nitric acid is colourless fuming liquid while commercial nitric acid is yellowish brown.)
- (iii) (a) 2-Methyl butanoic acid
 (b) 1,2-Dibromoethane
 (c) Propan-2-ol
- (iv) (a) A is cathode and B is anode.
 (b) Molten fluorides of Al, Na and Ba.
 (c) Graphite rods dipped in pure aluminium.

Answer 6.

(i) (a)	Test	Alkanes	Alkenes	Alkynes
	Alkaline Potassium Permanganate Test : Add a few drops of alkaline potassium permanganate sol. to the hydrocarbon.	No change takes place.	The purple colour of Potassium permanganate is decolourised.	The purple colour of potassium permanganate is decolorised.

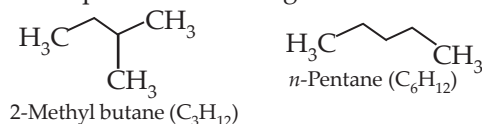
- (b) When acetylene is passed through an ammonical solution of silver nitrate, it gives a white precipitate of silver acetylide, while ethylene does not show any such reaction.
- (ii) (a) Propane — C_3H_8
 (b) Propene — C_3H_6
- (iii) (a) (i) Ammonium nitrate, NH_4NO_3 (ii) Ammonia
 (b) D is mixed with hydrogen in the ratio of 1 : 3, compressed to a pressure of 200 to 500 atmospheres and passes over a catalyst (iron) heated to 450 to 500°C.
 (c) (i) By passing the gas with excess of air over platinum gauze heated to 800°C.
 $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$
 (ii) The oxidation of ammonia of nitric oxide is exothermic reaction and once the reaction is started it maintains the temperature of the platinum gauze.
 $2N_2O + 2H_2O + O_2 \longrightarrow 4HNO_3$
 $Ca(OH)_2 + 2HNO_3 \longrightarrow Ca(NO_3)_2 + 2H_2O$
 (iv) (a) Isomer of *n*-butane



- (b) Propyne is the three membered unsaturated hydrocarbon with a triple bond.



- (c) The compound *n*-pentane represents the straight chain structure of 2-methyl butane.



- (d) The monosubstituted product formed when ethane reacts with bromine gas is bromoethane.

