

*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.*

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*Section I is compulsory. Attempt any four questions from Section II.*

*The intended marks for questions or parts of questions are given in brackets [ ].*

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**SECTION I (40 marks)**

*Attempt ALL questions from this section*

**Question 1:**

- a) Name the gas evolved in each case (formula is not acceptable)
- The gas produced by the action of concentrated sulphuric acid on sodium chloride
  - The gas produced by the action of dilute nitric acid on copper
  - The gas produced on heating sodium nitrate
  - The gas that burns in oxygen with green flames
  - The gas that can be oxidized to sulphur
- b) Match each substances A to E listed below with the appropriate description in parts (i) to (v) [(A) Sulphur, (B) Silver chloride, (C) Hydrogen chloride, (D) Copper (II) sulphate, (E) Graphite]
- A non-metal, which is a good conductor of electricity
  - A covalent compound that behaves like an ionic compound in aqueous solution
  - A compound that is insoluble in cold water but soluble in excess of ammonia solution
  - A pink metal that is deposited at the cathode during electrolysis of the solution of this salt
  - A non-metal that reacts with concentrated nitric acid to form its own acid as one of the product.
- c) For part (c) (i) – (c)(x), select the correct answer from the choices A, B, C and D that are given. Write only the letter corresponding to the correct answer.
- Among the period 2 elements the one which has highest electron affinity is
    - Lithium
    - Carbon
    - Fluorine
    - Neon
  - Among the following the one which is composed of all the three kinds of bonds, (ionic, covalent and coordinate bond) is
    - Sodium chloride
    - Ammonia
    - Carbon tetrachloride
    - Ammonium chloride
  - Which of the following statement is wrong about alkanes
    - They are all saturated hydrocarbons
    - They can undergo addition as well as substitution reactions
    - They are almost non-polar in nature
    - On complete combustion give out carbon dioxide and water.

- iv) Select the acid which contains four hydrogen atoms in it  
(A) Formic acid  
(B) Sulphuric acid  
(C) Nitric acid  
(D) Acetic acid
- v) A gas cylinder of capacity of  $20\text{dm}^3$  is filled with gas X, the mass of which is 10g when the same cylinder is filled with hydrogen gas, at the same temperature and pressure the mass of the hydrogen is 2 grams, hence the relative molecular mass of the gas is  
(A) 5 g  
(B) 10 g  
(C) 15 g  
(D) 20 g
- vi) The aqueous of the following compounds, which contains both ions and molecules is  
(A) Sulphuric acid  
(B) Hydrochloric acid  
(C) Nitric acid  
(D) Acetic acid
- vii) The metal oxide which can react with acid as well as alkali is  
(A) Silver oxide  
(B) Copper (II) oxide  
(C) Aluminium oxide  
(D) Calcium oxide
- viii) Carbon dioxide and sulphur dioxide gas can be distinguished by using  
(A) Moist blue litmus paper  
(B) Limewater  
(C) Acetified potassium dichromate paper  
(D) None of the above
- ix) The organic compound obtained as the end product of fermentation of sugar solution  
(A) Methanol  
(B) Ethanol  
(C) Ethane  
(D) Methanoic acid.
- x) A black colour solid which on reaction with dilute sulphuric acid, forms a blue colour solution is  
(A) Carbon  
(B) Copper (II) oxide  
(C) Manganese oxide  
(D) Lead (II) oxide
- d) Write a fully balanced equation for each of the following cases:**
- Red lead is warmed with concentrated hydrochloric acid
  - Magnesium metal is treated with dilute hydrochloric acid
  - Lead nitric is heated in a dry test tube
  - Magnesium nitride treated with warm water
  - Acetic acid is warmed with ethanol in the presence of concentrated sulphuric acid
- e) Find the odd one out and explain your choice (note: valance is not a criterion)**
- $\text{Al}(\text{OH})_3$ ,  $\text{Pb}(\text{OH})_2$ ,  $\text{Mg}(\text{OH})_2$ ,  $\text{Zn}(\text{OH})_2$
  - $\text{C}_3\text{H}_8$ ,  $\text{C}_5\text{H}_{10}$ ,  $\text{C}_2\text{H}_6$ ,  $\text{CH}_4$

- iii) Sulphur, Phosphorus, Carbon, Iodine
- iv) Copper, Lead, Zinc, Mercury
- v) Formic acid, Nitric acid, Propionic acid, Acetic acid

**f) Identify the substances P through T, in each case based on the given below**

- i) The deliquescent salt P turns yellow, on dissolving, in water, and gives reddish brown precipitate with sodium hydroxide solution.
- ii) The white crystalline solid Q is soluble in water; it liberates a pungent smelling gas when heated with sodium hydroxide solution.
- iii) The pale green solid R turns reddish brown, on heating; its aqueous solution gives white precipitate with barium chloride. The precipitate is insoluble in mineral acid.
- iv) The reddish brown liquid S is dissolved in water when ethyne gas is passed through it, turns colourless.
- v) The nitrate T does not leave any residue on heating.

**g) Answer the following:**

- i) Calcium carbide is used for the artificial ripening of fruits, the actually the fruit ripens because of the heat evolved while the calcium carbide reacts with moisture. During these reactions, calcium hydroxide and acetylene gas is formed. If 20 cm<sup>3</sup> of acetylene is formed from a certain mass, of calcium carbide, find the volume of oxygen required and carbon dioxide formed during the complete combustion. The combustion reaction can be represented as below  $[2C_2H_2 + 5O_2 \longrightarrow 4CO_2 + 2H_2O]$
- ii) A gaseous compound of nitrogen and hydrogen contains 12.5% hydrogen by mass. Find the molecular formula of the compound if its relative molecular mass is 32. [N=14, H=1]

**SECTION II (40 marks)**

Attempt any **FOUR** questions from this section

**Question 2:**

- a) Correct the following statements. For example “chlorine is a bleaching agent” should read “moist chlorine is a bleaching agent”
  - i) Lead bromide conducts electricity
  - ii) Copper reacts with nitric acid to produce nitrogen dioxide
  - iii) Haematite is the cheap ore of aluminium
  - iv) Equal masses of all gases under identical conditions contains the same number of molecules
  - v) Hydrochloric acid is prepared in the laboratory by passing hydrogen chloride directly through water
- b) Consider the following section of the periodic table given below

Group numbers	IA 1	IIA 2	IIIA 13	IVA 14	VA 15	VIA 16	VIIA 17	O 18
	Li		D			O	J	Ne
	A	Mg	E	Si		H	K	
	B	C		F	G			L

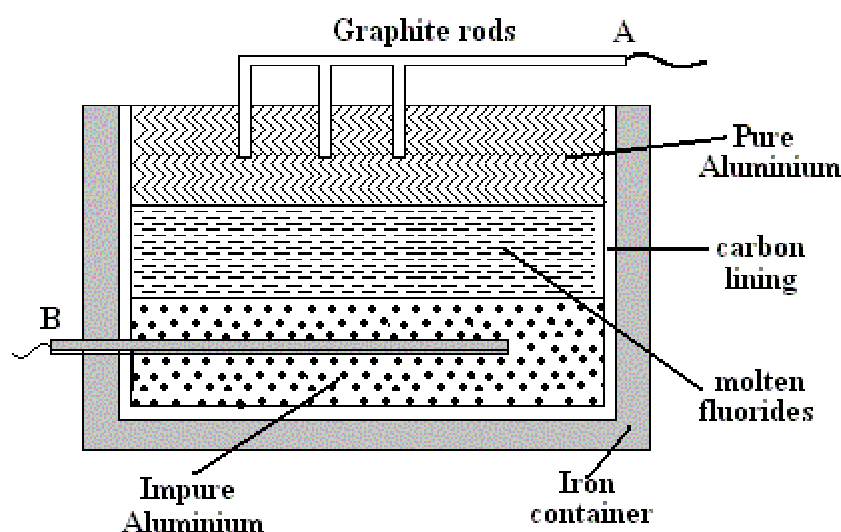
Note in the table B does not represent boron, C does not represent Carbon, F does not represent Fluorine H does not represent hydrogen and K does not represent potassium

You must see the position of the elements in the periodic table. Some elements are given in their own symbol and position in the periodic table, while others are shown with a letter. With reference to the table.

- i) Which is the most electronegative
- ii) How many valence electrons are present in G?
- iii) Write the formula of the compound between B and H
- iv) In the compound between F and J, What type of bond will be formed?
- v) Draw the electron dot diagram structure for the compound formed between C and K

**Question 3:**

- a) A metal article is to be electroplated with silver. The electrolyte selected is sodium argentocyanide. What kind of salt is sodium argentocyanide?
  - i) Why is it preferred over silver nitrate as an electrolyte?
  - ii) State one condition to ensure that the deposit is smooth, firm and long lasting
  - iii) Write the reaction taking place at the cathode
  - iv) Write the reaction taking place at the anode
- b) The sketch below illustrates the refining of aluminium by Hoopes process



- i) Which of A and B is the cathode and which one is anode
  - ii) What is the electrolyte in the tank?
  - iii) What material is used for the cathode?
- c) State the property of the metal being utilized in the following:

Use of metal	Property
Zinc in galvanization	
Aluminium in thermite welding	

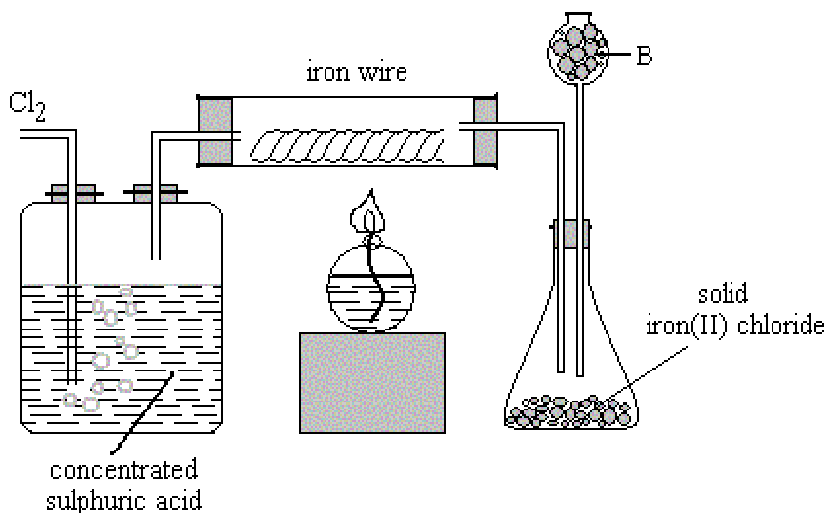
**Question 4:**

- a)
  - i) A Gas cylinder contains  $24 \times 10^{24}$  molecules of nitrogen gas, if Avogadro's number is  $6 \times 10^{23}$  and the relative atomic mass of nitrogen is 14, calculate
    - (A) The mass of nitrogen gas in the cylinder
    - (B) Volume of nitrogen gas at STP in  $\text{dm}^3$ .
  - ii) Commercial sodium hydroxide weighing 30g has some sodium chloride in it. The mixture on dissolving in water and subsequent treatment with excess silver nitrate solution formed a precipitate weighing 14.3g. what is the percentage of sodium chloride in the commercial sample of sodium hydroxide? The equation for the reaction is
 
$$[\text{NaCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{NaNO}_3]$$
 Relative molecular mass of NaCl is 58, AgCl=143.

- iii) A certain gas 'X' occupies a volume of 100 cm<sup>3</sup> at STP and weighs 0.5g. find its relative molecular mass.
- b) Solution A is a strong Acid, Solution B is a weak alkali, and Solution C is a strong alkali which solution contains solute molecules in addition to water molecules?
- Which solution will give a gelatinous white precipitate with zinc sulphate solution? The precipitate disappears when an excess of the solution is added.
  - Which solution could be a solution of glacial acetic acid
  - Give an example of a solution which is a weak alkali

**Question 5:**

- a) The diagram given below is to prepare iron (III) chloride in the laboratory:



- What is substance B?
  - What is the purpose of B?
  - Why is iron (III) chloride to be stored in a closed container?
  - Write the equation for the reaction between iron and chlorine.
- b)
- Write the equation(s) for the reaction(s) to prepare lead sulphate from lead carbonate.
  - Methane is the first member of alkane, when it is treated with excess of chlorine in the presence of diffused sunlight forms carbon tetrachloride, Draw the appropriate structural formula of carbon tetrachloride and state the type of bond present in it
- c) Aqueous solution of nickel sulphate contains Ni<sup>2+</sup> and SO<sub>4</sub><sup>2-</sup> ions.
- Which ion moves towards the cathode
  - What is the product at the anode?
- d) Give one chemical test to distinguish between the following pairs of compounds.
- Zinc sulphate solution and zinc chloride solution.
  - Iron (II) chloride solution and iron (III) chloride solution
  - Calcium nitrate and calcium nitrate solutions.
- e) Define the following terms:
- Mole
  - Neutralisation
  - Ionisation potential
- f) Fill in the blanks with the correct words from the brackets

Generally ionic compounds exist in (I) \_\_\_\_\_ [solid / liquid/ gas] state. Melting and boiling point of covalent compounds are generally (II) \_\_\_\_\_ [high / low] the general formula for alkane is (III) \_\_\_\_\_ [  $C_nH_{2n}$  /  $C_nH_{2n+2}$  /  $C_nH_{2n-2}$  ] and for alkyne the general formula is (IV) \_\_\_\_\_ [  $C_nH_{2n}$  /  $C_nH_{2n+2}$  /  $C_nH_{2n-2}$  ]

**Question 6:**

- a) Give chemical equations for:
  - i) The laboratory preparation of methane from sodium acetate
  - ii) The industrial preparation of methanol from water gas
  - iii) The reaction of one mole of ethane with one mole of chlorine gas
  - iv) The preparation of ethyne from 1,2 dibromo ethane
- b) State how the following conversions can be carried out:
  - i) Ethyl chloride to ethyl alcohol
  - ii) Ethyl chloride to ethane
  - iii) Ethane to ethyl alcohol
  - iv) Ethyl alcohol to ethane
- c) Define isomerism
- d) Give the IUPAC name of the isomer of  $C_4H_{10}$  that has a branch chain