

**CHEMISTRY**  
**SCIENCE Paper – 2**

*(Two hours)*

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

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

**SECTION I (40 Marks)**

*Attempt **all** questions from this Section*

**Question 1**

- (a) Fill in the blanks with the choices given in brackets. [5]
- (i) Metals are good \_\_\_\_\_ (*oxidizing agents / reducing agents*) because they are electron \_\_\_\_\_ (*acceptors/ donors*).
- (ii) Electrovalent compounds have \_\_\_\_\_ (*high / low*) melting points.
- (iii) Higher the pH value of a solution, the more \_\_\_\_\_ (*acidic / alkaline*) it is.
- (iv) \_\_\_\_\_ (*AgCl / PbCl<sub>2</sub>*), a white precipitate is soluble in excess  $\text{NH}_4\text{OH}$ .
- (v) Conversion of ethene to ethane is an example of \_\_\_\_\_ (*hydration / hydrogenation*).

This Paper consists of 9 printed pages and 1 blank page.



- (b) Choose the *correct answer* from the options given below: [5]
- (i) 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
- (ii) The ratio between the number of molecules in 2g of hydrogen and 32g of oxygen is:
- A. 1:2
  - B. 1:0.01
  - C. 1:1
  - D. 0.01:1 [Given that H=1, O=16]
- (iii) The two main metals in *Bronze* are:
- A. Copper and zinc
  - B. Copper and lead
  - C. Copper and nickel
  - D. Copper and tin
- (iv) The particles present in *strong electrolytes* are:
- A. only molecules
  - B. mainly ions
  - C. ions and molecules
  - D. only atoms.
- (v) 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.



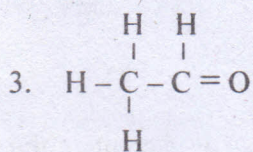
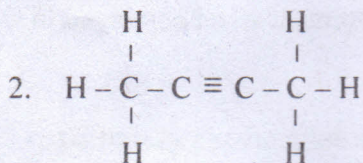
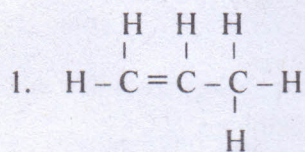
- (c) Write *balanced chemical equations* for each of the following: [5]
- Action of warm water on AlN.
  - Action of hot and concentrated Nitric acid on copper.
  - Action of Hydrochloric acid on sodium bicarbonate.
  - Action of dilute Sulphuric acid on Sodium Sulphite.
  - Preparation of ethanol from Ethyl Chloride.
- (d) State your *observations* when: [5]
- Dilute Hydrochloric acid is added to Lead nitrate solution and the mixture is heated.
  - Barium chloride solution is mixed with Sodium Sulphate Solution.
  - Concentrated Sulphuric acid is added to Sugar Crystals.
  - Dilute Hydrochloric acid is added to Copper carbonate.
  - Dilute Hydrochloric acid is added to Sodium thiosulphate.
- (e) Identify the *term/substance* in each of the following: [5]
- The tendency of an atom to attract electrons to itself when combined in a compound.
  - The method used to separate ore from gangue by preferential wetting.
  - The catalyst used in the conversion of ethyne to ethane.
  - The type of reactions alkenes undergo.
  - The electrons present in the outermost shell of an atom.
- (f) (i) A gas of mass 32gms has a volume of 20 litres at S.T.P. Calculate the gram molecular weight of the gas. [5]
- (ii) How much Calcium oxide is formed when 82g of calcium nitrate is heated? Also find the volume of nitrogendioxide evolved:
- $$2\text{Ca}(\text{NO}_3)_2 \longrightarrow 2\text{CaO} + 4\text{NO}_2 + \text{O}_2$$
- (Ca = 40, N = 14, O = 16)



- (g) Match the salts given in Column I with their *method of preparation* given in Column II: [5]

Column I	Column II
(i) $\text{Pb}(\text{NO}_3)_2$ from $\text{PbO}$	A) Simple displacement
(ii) $\text{MgCl}_2$ from $\text{Mg}$	B) Titration
(iii) $\text{FeCl}_3$ from $\text{Fe}$	C) Neutralization
(iv) $\text{NaNO}_3$ from $\text{NaOH}$	D) Precipitation
(v) $\text{ZnCO}_3$ from $\text{ZnSO}_4$	E) Combination

- (h) (i) Write the IUPAC names of each of the following: [5]



- (ii) *Rewrite* the following sentences by using the correct symbol > (*greater than*) or < (*less than*) in the blanks given:

- The ionization potential of Potassium is \_\_\_\_\_ that of Sodium.
- The electronegativity of Iodine is \_\_\_\_\_ that of Chlorine.



**SECTION II (40 Marks)**

Attempt any four questions from this Section

**Question 2**

- (a) Use the **letters** only written in the Periodic Table given below to answer the questions that follow: [4]

	I	II	GROUPS										III	IV	V	VI	VII	0
PERIODS	1																	L
2	Q												E	G	J	Z	M	
3	R																	
4	T																	
5																		

- (i) State the number of **valence electrons** in atom J.
- (ii) Which element shown forms **ions** with a single negative charge?
- (iii) Which **metallic element** is more reactive than R?
- (iv) Which element has its electrons arranged in **four shells**?
- (b) Fill in the blanks by selecting the correct word from the brackets: [2]
- (i) If an element has a low ionization energy then it is likely to be \_\_\_\_\_  
(*metallic / non metallic*).
- (ii) If an element has seven electrons in its outermost shell then it is likely to have the \_\_\_\_\_ (*largest / smallest*) atomic size among all the elements in the same period.
- (c) The following table shows the electronic configuration of the elements W, X, Y, Z:

Element	W	X	Y	Z
Electronic configurations	2,8,1	2,8,7	2,5	1

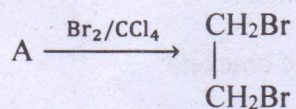
Answer the following questions based on the table above:

- (i) What type of Bond is formed between: [2]
1. W and X    2. Y and Z
- (ii) What is the formula of the compound formed between : [2]
1. X and Z    2. W and X



### Question 3

- (a) Write a **balanced chemical equation** for each of the following: [3]
- Burning of ethane in plentiful supply of air.
  - Action of water on Calcium carbide.
  - Heating of Ethanol at  $170^{\circ}\text{C}$  in the presence of conc. Sulphuric acid.
- (b) Give the structural formulae of each of the following [3]
- 2-methyl propane
  - Ethanoic acid
  - Butan - 2 - ol
- (c) Equation for the reaction when **compound A** is bubbled through *bromine* [2]  
dissolved in *carbon tetrachloride* is as follows:



- Draw the structure of A.
  - State your observation during this reaction.
- (d) Fill in the blanks using the appropriate words given below: [2]  
(*Sulphur dioxide, Nitrogen dioxide, Nitric oxide, Sulphuric acid*)
- Cold, dilute nitric acid reacts with copper to give \_\_\_\_\_.
  - Hot, concentrated nitric acid reacts with sulphur to form \_\_\_\_\_.

### Question 4

- (a) Identify the **gas evolved** and give the **chemical test** in each of the following [2]  
cases:
- Dilute hydrochloric acid reacts with sodium sulphite.
  - Dilute hydrochloric acid reacts with iron (II) sulphide.



- (b) State your observations when *ammonium hydroxide solution is added drop by drop and then in excess* to each of the following solutions: [2]
- (i) copper sulphate solution
  - (ii) zinc sulphate solution.
- (c) Write equations for the *reactions taking place at the two electrodes* (mentioning clearly the name of the electrode) during the electrolysis of: [4]
- (i) Acidified copper sulphate solution with copper electrodes.
  - (ii) Molten lead bromide with inert electrodes.
- (d) (i) Name the *product formed* at the *anode* during the electrolysis of acidified water using platinum electrodes. [2]
- (ii) Name the *metallic ions* that should be present in the electrolyte when an article made of copper is to be electroplated with silver.

#### Question 5

- (a) A gas cylinder contains  $12 \times 10^{24}$  molecules of oxygen gas. [2]
- If Avogadro's number is  $6 \times 10^{23}$ ; Calculate:
- (i) the mass of oxygen present in the cylinder.
  - (ii) the volume of oxygen at S.T.P. present in the cylinder. [O=16]
- (b) A gaseous hydrocarbon contains 82.76% of carbon. Given that its vapour density is 29, find its *molecular formula*. [C=12, H=1] [3]
- (c) The equation  $4\text{NH}_3 + 5\text{O}_2 \longrightarrow 4\text{NO} + 6\text{H}_2\text{O}$ , represents the catalytic oxidation of ammonia. If  $100 \text{ cm}^3$  of ammonia is used calculate the *volume of oxygen required* to oxidise the ammonia completely. [3]
- (d) By drawing an *electron dot diagram* show the formation of *Ammonium Ion* [2]
- [Atomic No.: N = 7 and H = 1]

#### Question 6

- (a) *Name the gas* evolved when the following mixtures are heated: [2]
- (i) Calcium hydroxide and Ammonium Chloride
  - (ii) Sodium Nitrite and Ammonium Chloride



- (b) Write *balanced chemical equations* for each of the following: [2]
- (i) When excess of ammonia is treated with chlorine.
  - (ii) An equation to illustrate the reducing nature of ammonia.
- (c) 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:

- (i) Preparation of Hydrogen chloride gas.
  - (ii) Preparation of Copper sulphate from copper oxide.
  - (iii) Action of conc. Sulphuric acid on Sulphur.
- (d) Give *reasons* why: [3]
- (i) Sodium Chloride will *conduct electricity* only in fused or aqueous solution state.
  - (ii) In the electroplating of an article with silver, the electrolyte sodium argento-cyanide solution is preferred over silver nitrate solution.
  - (iii) Although copper is a good conductor of electricity, it is a non-electrolyte.

#### Question 7

- (a) (i) Name the *solution* used to react with **Bauxite** as a first step in obtaining pure aluminum oxide, in the Baeyer's process. [5]
- (ii) *Write the equation* for the reaction where the aluminum oxide for the electrolytic extraction of aluminum is obtained by heating aluminum hydroxide.



- (iii) Name the *compound* added to pure alumina to lower the fusion temperature during the electrolytic reduction of alumina.
- (iv) *Write the equation* for the reaction that occurs at the cathode during the extraction of aluminum by electrolysis.
- (v) Explain why it is preferable to use a number of graphite electrodes as anode instead of a single electrode, during the above electrolysis.

(b) *State* what would you *observe* when: [2]

- (i) Washing Soda Crystals are exposed to the atmosphere.
- (ii) The salt ferric chloride is exposed to the atmosphere.

(c) Identify the *cations* in each of the following case: [3]

- (i) NaOH solution when added to the Solution (A) gives a reddish brown precipitate.
- (ii) NH<sub>4</sub>OH Solution when added to the Solution (B) gives white ppt which does not dissolve in excess.
- (iii) NaOH Solution when added to Solution (C) gives white ppt which is insoluble in excess.