

**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.*

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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) 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) \_\_\_\_\_ ( $\text{AgCl}$  /  $\text{PbCl}_2$ ), a white precipitate is soluble in excess  $\text{NH}_4\text{OH}$ .
- (v) Conversion of ethene to ethane is an example of \_\_\_\_\_ (hydration / hydrogenation).

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

(b) Choose the *correct answer* from the options given below:

[5]

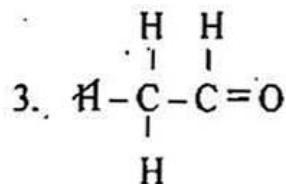
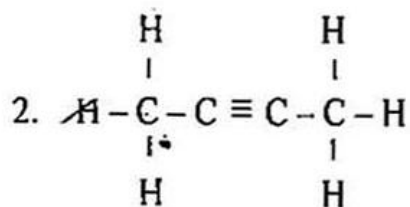
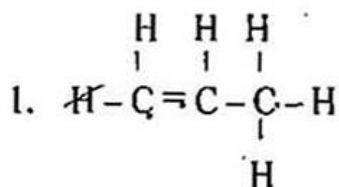
- (i) An element with the atomic number 19 will most likely combine chemically with the element whose atomic number is:
- A. 17
  - B. 11
  - C. 18
  - D. 20
- (ii) The ratio between the number of molecules in 2g of hydrogen and 32g of oxygen is:
- A. 1:2
  - B. 1:0.01
  - C. 1:1
  - D. 0.01:1 [Given 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:

1. The ionization potential of Potassium is \_\_\_\_\_ that of Sodium.

2. 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				
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:

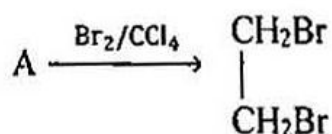
Element	W	X	Y	Z
Electronic configurations	2,8,1	2,8,7	2,5	1

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]
- (i) Burning of ethane in plentiful supply of air.
  - (ii) Action of water on Calcium carbide.
  - (iii) Heating of Ethanol at 170°C in the presence of conc. Sulphuric acid.
- (b) Give the structural formulae of each of the following [3]
- (i) 2-methyl propane
  - (ii) Ethanoic acid
  - (iii) Butan - 2 - ol
- (c) Equation for the reaction when **compound A** is bubbled through *bromine* dissolved in *carbon tetrachloride* is as follows: [2]



- (i) Draw the structure of A.
  - (ii) 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)
- (i) Cold, dilute nitric acid reacts with copper to give \_\_\_\_\_.
  - (ii) 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 cases: [2]
- (i) Dilute hydrochloric acid reacts with sodium sulphite.
  - (ii) 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]
- copper sulphate solution
  - 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]
- Acidified copper sulphate solution with copper electrodes.
  - 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:
- the mass of oxygen present in the cylinder.
  - 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]
- Calcium hydroxide and Ammonium Chloride
  - 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)  $\text{NH}_4\text{OH}$  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.