



ST. JOSEPH'S COLLEGE, PRAYAGRAJ
HALF-YEARLY EXAMINATION 2025-26

CHEMISTRY
CLASS – X

TIME: 2 Hours

MM: 80

SECTION – A

(Attempt **all** questions from this Section)

Question 1. Choose the correct answers to the questions from the given options.

(Do not copy the question, write the correct answers only)

(i) The salt solution which does not react with ammonium hydroxide.

- (a) Zinc nitrate (b) Calcium nitrate (c) Lead nitrate (d) Copper nitrate

(ii) A compound with low boiling point is:

- (a) Sodium chloride (b) Calcium chloride
(c) Potassium chloride (d) Carbon tetrachloride

(iii) The number of lone pair of electron(s) on the Oxygen atom in water molecule is

- (a) one (b) two (c) three (d) four

(iv) Thickness of metal coating during electroplating depends on

- (a) Duration of current passed (b) A low current (c) Nature of Cathode (d) Purity of anode

(v) **Assertion (A):** Acids have a pH of more than 7.

Reason (R): Acids produce hydronium ions as the only positively charged ion in solution.

- (a) Both Assertion and Reason are true.
(b) Both Assertion and Reason are false.
(c) Assertion is true and Reason is false.
(d) Assertion is false but Reason is true.

(vi) **Assertion (A):** A block of pure nickel metal is used as anode during nickel plating.

Reason (R): Nickel ions are deposited as metal at the anode.

- (a) Both Assertion and Reason are true, R is the correct explanation of A.
(b) Both Assertion and Reason are true, R is not the correct explanation of A.
(c) Assertion is false but reason is true.
(d) Assertion is true but Reason is false.

(vii) The atomic masses of sulphur(S), Oxygen(O) and helium(He) are approximately 32, 16 and 4 respectively. Which of the following statements regarding the number of atoms in 32g of sulphur, 16g of oxygen and 4g of helium is correct?
P : 16g of oxygen contains four times the number of atoms as 4g of helium.

Q : 16g of oxygen contains half the number of atoms as 32g of sulphur.

- (a) Only P (b) Only Q (c) Both P and Q (d) Neither P nor Q

(viii) A compound with empirical formula XY_2 has the vapour density equal to its empirical formula weight, its molecular formula is:

- (a) X_2Y_4 (b) X_2Y_2 (c) XY (d) X_4Y_2

(ix) A compound which liberates reddish brown gas around anode during electrolysis in molten state is:

- (a) Sodium chloride (b) Copper sulphate (c) Copper oxide (d) Lead bromide

(x) What happens to an atom's size when an electron is added to its outermost shell

- (a) size decreases (b) size increases (c) remains same (d) none of these

(xi) The compound which contains all three types of bond i.e. Ionic covalent and co-ordinate is:

- (a) NaCl (b) NH_3 (c) $CaCl_2$ (d) NH_4Cl

(xii) Hydracids are those acids which contain:

- (a) hydrogen and a metal (b) hydrogen, a non-metal and oxygen
(c) hydrogen and a non-metal other than oxygen (d) hydrogen and oxygen only

(xiii) Chlorine gas evolves when concentrated HCl is added to

- (a) Sodium sulphite (b) Calcium carbonate (c) Zinc metal (d) Manganese dioxide

(xiv) **Assertion(A):** NH_3 is a polar covalent compound.

Reason(R): The shared pair of electrons is unequally distributed between the nitrogen and hydrogen atom in ammonia.

- (a) Both Assertion and Reason are true, R is the correct explanation of A.
(b) Both Assertion and Reason are true, R is not the correct explanation of A.
(c) Assertion is true and Reason is false.
(d) Assertion is false but Reason is true.

(xv) Phosphorous acid (H_3PO_3) is:

- (a) monobasic acid (b) dibasic acid (c) tribasic acid (d) monoacidic base

Question 2.

(i) Identify the term/ process/ substance for the following-

[5]

- (a) The process by which sulphide ore is concentrated.
- (b) Formation of ions from molecules.
- (c) The compounds of various metals found in nature with earthly impurities.
- (d) A non-conducting vessel containing the electrolyte in fused state.
- (e) The ratio of the mass of a certain volume of a gas to the mass of an equal volume of hydrogen at the same temperature and pressure.

(ii) Complete the following by choosing the correct answers from the bracket:

[5]

- (a) The basicity of acetic acid is _____ (3/ 1/ 4)
- (b) _____ (Phosphorous / Nitrogen) element is placed in the period 2 and group 15 of the modern periodic table.
- (c) The substance that conducts electricity in molten or aqueous water is _____ (electrolyte/ electrode).
- (d) Potassium sulphite on reaction with dilute HCl releases _____ ($\text{SO}_2/\text{H}_2\text{S}$) gas.
- (e) Carbon tetrachloride is miscible in _____ (water/ benzene).

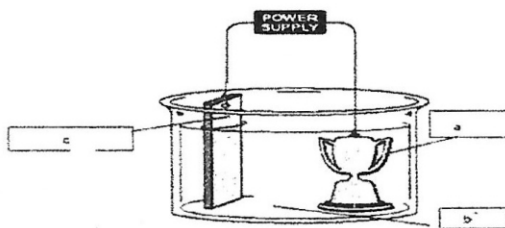
(iii) Match the following column A with column B:

[5]

- | | |
|-------------------|----------------------|
| (a) Water | 1. Lithium |
| (b) Alkali metal | 2. Ionic compound |
| (c) Calcium oxide | 3. Covalent compound |
| (d) Halogen | 4. Sulphuric acid |
| (e) Weak acid | 5. Iodine |
| | 6. Acetic acid |

(iv) Gaurav wants to electroplate his trophy with silver to prevent rusting:

[5]



- (a) Which electrolyte can Gaurav use to electroplate his trophy?
- (b) Name the anode in the above process.
- (c) Write the equation for the reaction taking place at the anode and cathode
- (d) Write any one condition required for electroplating.

(v) Answer the following:

[3]

- (a) Calculate the number of atoms in 4.6 grams of sodium (RAM of Na=23).
- (b) If 150cc of gas A contains X molecule, how many molecules of gas B will be present in 75cc of B. Gases A and B are under the same conditions of temperature and pressure.
- (c) Name the law on which the above question(b) is based.

(vi) Name the following elements:

[2]

- (a) A trivalent metal used to make light tools.
- (b) A monovalent non-metal present in fluorspar.

SECTION – B

(Attempt any four questions)

Question 3. (i) Name the anion present in each of the following compounds:

[2]

- (a) Compound A reacts with barium nitrate solution to give a white precipitate insoluble in dilute nitric acid.
- (b) Compound B on heating with copper and concentrated sulphuric acid liberates a reddish brown gas.

(ii) Write the balanced chemical equation for the following reactions-

[2]

- (a) An alkali is added to ammonium salt.
- (b) Caustic potash (KOH) is added to aluminium oxide.

[2]



(iii) Answer the following questions, if the molten PbBr_2 is electrolysed using graphite electrodes. [3]

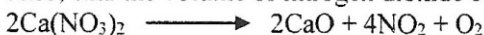
- Graphite anode is preferred over platinum electrode. Give reason.
- State the observation and write the reaction taking place at cathode.
- M is a metal above hydrogen in the activity series and its oxide has the formula M_2O . This oxide when dissolved in water forms the corresponding hydroxide which is a good conductor of electricity. In the above context answer the following: [3]
 - What kind of combination exists between M and O?
 - How many electrons are there in the outermost shell of M?
 - State the reaction taking place at the cathode.

Question 4. (i) Give reasons: [2]

- Ionic compounds conduct electricity in molten or aqueous state.
- Alkali metals are good reducing agents.

(ii) How much calcium oxide is formed when 82g of calcium nitrate is heated? [2]

Also, find the volume of nitrogen dioxide evolved.



[RAM is Ca=40, N=14, O=16]

(iii) (a) What do you understand by lone pair of electrons? [3]

(b) Draw the electron dot diagram of hydronium ion.

(iv) Baeyer's process is used to concentrate the bauxite ore to alumina. [3]

Give the balanced chemical equations for the reaction taking place for its conversion from bauxite to alumina.

Question 5. (i) Select the ion in each case, that would get selectively discharged from the aqueous mixture of the ions listed below: [2]

- SO_4^{2-} , NO_3^- and OH^-
- Pb^{2+} , Ag^+ and Cu^{2+}

(ii) Copy and complete the following table- [2]

	Reaction at Anode	Electrolyte
Purification of Copper		

(iii) The compound A has the following percentage composition by mass: [3]

carbon= 26.7%, Oxygen=71.1%, Hydrogen=2.2%

Determine the empirical formula of A, if the relative molecular mass of A is 90,

What is the molecular formula of A? [Given relative atomic mass of C=12, H=1, O=16]

(iv) Piyush found the light bluish colour salt "A" in the laboratory. On heating, it produced black residue and a colourless gas. Salt "A" also produced brisk effervescence with dil HCl and the gas evolved turns lime water milky, but no action with acidified potassium dichromate solution. [3]

- Name the Cation present in the salt sample that Piyush found in the laboratory.
- Name the gas evolved when the sample was heated.
- What will be the observation of Piyush, if excess of ammonium hydroxide is added to salt A.

Question 6. (i) Name the following: [2]

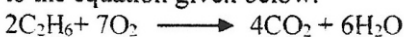
- The main ore of iron.
- The ore of aluminium containing sodium.

(ii) Differentiate between the following on the basis of the parameters given in brackets. [2]

- Ferrous sulphate and ferric sulphate (sodium hydroxide solution).
- Acidic and alkaline solutions (addition of sodium carbonate).

(iii) Answer the following: [3]

- State Gay Lussac's law.
- 300cc of ethane undergoes complete combustion with 1250cc of oxygen to give Carbon dioxide and water according to the equation given below:



- (1) Calculate the total volume of carbon dioxide produced.
(2) Find the volume of unused gas.
(iv) Arrange the following as per the instructions given in the brackets-
(a) F, Cl, Br, I (increasing order of electron affinity).
(b) Li, Na, K, Rb (decreasing order of ionisation potential)
(c) Al, P, Mg, Ar (Increasing order of group number).

[3]

Question 7. (i) Write:

[2]

- (a) The reaction at anode during electrolysis of acidified water.
(b) The reaction at cathode during electroplating of an article with nickel.

(ii) Identify the following:

[2]

- (a) The reducing electrode.
(b) Type of acid that doesn't produce acidic salts.

(iii) Atomic number of element A is 11 and it forms an Ionic compound with B:

[3]

(a) Which of the following atomic numbers will match B?

- (1) 14 (2) 10 (3) 9

(b) Draw the electron dot structure of the compound formed between A and B?

(c) Element _____ is the reducing agent.

(iv) Answer the following questions based on the extraction of aluminium from alumina.

[3]

- (a) Name the process involved.
(b) Why is the powdered coke sprinkled on top of the electrolyte?
(c) Write one importance of cryolite used in the process.

Question 8.

(i) Calculate the mass of

[2]

(a) 0.1 mole of CO_2

(b) 10^{22} atoms of sulphur.

[S=32, C=12 and O=16] [take $N_A = 6 \times 10^{23}$]

(ii) Draw the electron dot structure of:

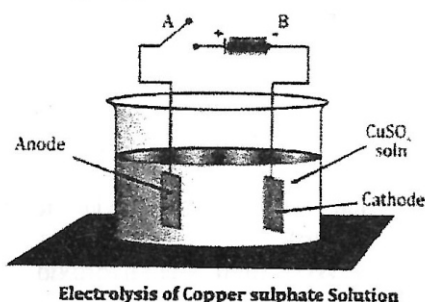
[2]

(a) A molecule of nitrogen.

(b) A compound formed when a metal of electronic configuration 2,8,1 combines with the non-metal of electronic configuration 2,8,7.

(iii) Copper sulphate solution is electrolysed using copper electrode.

[3]



Study the diagram given above and answer the questions that follow:

- (a) Which electrode is known as the oxidising electrode and why?
(b) Write the equation representing the reaction that occurs at the electrode mentioned in (a).

(iv) Electron affinities of two element X and Y are given below-

X = -3.60 eV Y = -3.80 eV

(a) Which of them will ionise more easily and why?

(b) Which element in period 2 has zero electron affinity?

[3]