



ST. JOSEPH'S COLLEGE, PRAYAGRAJ

HALF YEARLY EXAMINATION 2024

CHEMISTRY

CLASS - X

TIME: 2 Hours

MM: 80

Section A is compulsory. Attempt any four questions from Section B.
The intended marks for questions or parts of questions are given in brackets [].

SECTION - A

(Attempt all questions from this Section)

Q D) Choose the correct answers to the questions from the given options:

[15]

- During electrolysis:
 - P. Cations accepts electrons from anode
 - Q. Anions accept electron from cathode
 - R. Anions lose electrons to the anode
 - S. Cations donate electrons to anode

a) only P b) only Q c) only R d) only S
- A compound X on reacting with ammonium hydroxide solution gives a dirty green precipitate. Identify the cation present in X. Which of the following could compound P be?
 - a) Fe^{+2} ion b) Fe^{+3} ion c) Ca^{+2} ion d) Pb^{+2} ion
- One gram of calcium carbonate represents _____ moles of the compound. [Ca= 40, O= 16, C=12]
 - a) 100 moles b) 1 mole c) 0.1 moles d) 0.01 moles
- The equation below shows the reaction between metal 'M' and dilute hydrochloric acid.
 $\text{X(s)} + \text{HCl (dil)} \rightarrow \text{XCl}_2 \text{(aq.)} + \text{H}_2$
 Which particle/s are responsible for conducting electricity in dilute hydrochloric acid and compound XCl_2 ?
 - a) Ions and molecules both b) Only ions c) Only molecules d) Electrons
- The reason for using Aluminium in the alloy Duralumin is:
 - a) aluminium is brittle b) aluminium gives strength
 - c) aluminium brings lightness d) aluminium lowers the boiling point
- Assertion:** Non-metals usually have low I.E.
Reason: Metals and metalloids have low I.E.
 - a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 - b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 - c) Assertion is true but Reason is false
 - d) Assertion is false but Reason is true
- During electrolysis of CuSO_4 using Copper electrode:
 - a) Both cathode and anode become thinner b) Cathode becomes thicker and anode becomes thinner.
 - c) Both cathode and anode become thicker. d) Cathode becomes thinner and anode becomes thicker.
- Elements with same number of shells are placed in
 - a) Same group b) Same group and same period c) Different period d) Same period
- The metal oxide which can react with an acid as well as an alkali is _____
 - a) Silver oxide b) Copper (II) oxide c) Aluminium oxide d) Calcium oxide
- What are the products formed when dilute hydrochloric acid reacts with iron (II) sulphide
 - a) H_2S gas is evolved b) H_2S gas and water c) SO_2 gas is evolved d) H_2S and SO_2 gas are evolved
- Rohan wants to refine a block of impure copper. He should connect
 - a) Impure Cu to Cathode and pure Cu to anode. b) Impure Cu at anode and pure Cu at cathode.
 - c) Pure Cu at both anode and Cathode. d) Impure Cu to both the electrodes.
- A gaseous hydrocarbon contains 82.76% of carbon. Given that its vapour density is 29, find its molecular formula. [C= 12; H=1]
 - a) C_4H_8 b) C_4H_{10} c) C_2H_8 d) C_2H_{10}
- The volume of 320g of sulphur dioxide at STP is? [S= 32, O= 16]
 - a) 112 litres b) 100 litres c) 50 litres d) 200 litres
- Assertion:** Lower the concentration of the ion greater the probability of it being discharged at the respective electrode.
Reason: The preferential discharge of ions present in an electrolyte at the respective electrodes is known as selective discharge of ions.
 - a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 - b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 - c) Assertion is true but Reason is false
 - d) Assertion is false but Reason is true



15. The hydroxide which is soluble in excess ammonium hydroxide:

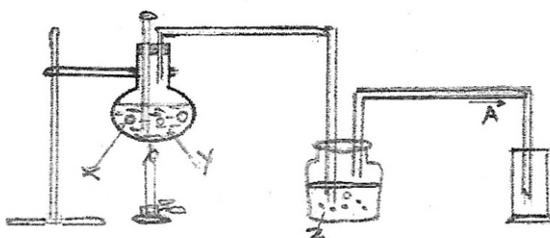
- a) Lead hydroxide b) Ferrous hydroxide c) Zinc hydroxide d) Ferric hydroxide

Q II)

1. Identify the term/ gas/ substance for the following: [5]

- 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.
- A gas evolved on heating a mixture of manganese dioxide and conc. HCl.
- The tendency of an atom in a molecule to attract the shared pair of electrons towards itself.
- Volume occupied by 1 gram molecular weight of a gas at STP.
- A non-conducting vessel containing the electrolyte in fused state.

2. The diagram shows an apparatus for the laboratory preparation of hydrogen chloride: [5]



- Identify X and Y.
- Write the equation for the reaction.
- How would you check whether or not the gas jar is filled with hydrogen chloride?
- What does the method of collection tell you about the density of hydrogen chloride?

3. Complete the following by choosing the correct answers from the bracket: [5]

- A compound having one lone pair of electrons is _____ (water/ ammonia)
- Alkali metals are good _____ (oxidising / reducing) agents.
- Electron affinity generally _____ (increases/ decreases) as you move from left to right across a period.
- Electrode connected to the positive terminal of the battery is _____ (anode/ cathode).
- The process of heating the concentrated ore in presence of excess supply of oxygen is _____ (roasting/ calcination).

4. State your observations: [5]

- When sodium hydroxide is added to zinc nitrate solution first drop wise then in excess.
- At cathode during the electrolysis of copper (II) sulphate using platinum electrode.
- When sodium hydroxide is added to ferrous sulphate solution first drop wise and then in excess.
- When ammonium salt is heated with caustic soda.
- When ammonium hydroxide is added to calcium nitrate solution first drop wise then in excess.

5. a) Draw the electron dot structure for the following compounds: [5]

- Magnesium chloride
- Carbon tetrachloride
- Water

b) Name the anion in each of the following compounds:

- Compound 'Y' on heating with dilute sulphuric acid, liberates a gas which turns lime water milky but has no effect on potassium permanganate solution.
- Compound 'X' on heating with concentrated sulphuric acid, liberates a gas which on bubbling through silver nitrate solution gives a white precipitate, soluble in liquor ammonia.

SECTION - B

(Attempt any four questions)

Q III)

1. Name the following: [2]

- The main ore of iron.
- Alloy used for making statues.

2. Give reason for the following: [2]

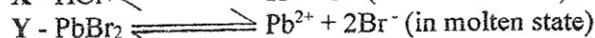
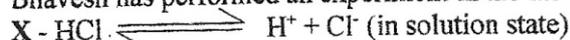
- Carbon tetrachloride is a liquid but does not conduct electricity.
- The anode has to be replaced from time to time in the electrolytic reduction of alumina.

3. Baeyer's process is used to concentrate bauxite ore to alumina. Give the balanced chemical equations for the reaction taking place for its conversion from bauxite to alumina. [3]

4. Name the following elements: [3]
- An alkaline earth metal present in group 2 and period 3.
 - A trivalent metal used to make light tools.
 - A monovalent non-metal present in fluorspar.

Q IV)

1. Bhavesh has performed an experiment in the lab and given the following reactions as: [2]



From the above reactions X and Y, identify the reaction which exhibits-

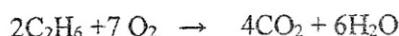
- Ionisation.
 - Electrolytic dissociation
2. Give reason: [2]
- Ionic compounds have high melting and boiling point.
 - Electroplating is performed by using a source of direct current.
3. a) State Gay-Lussac's law. [3]
 b) 500cm³ of nitrogen monoxide and 200cm³ of oxygen are mixed together and ignited, calculate the composition of the resulting mixture.



4. An aluminium based industry extracts the aluminium from alumina. Answer the following questions based on the same: [3]
- Name the process involved.
 - What is the function of cryolite used along with alumina as the electrolyte?
 - Why is the powdered coke sprinkled on top of the electrolyte?

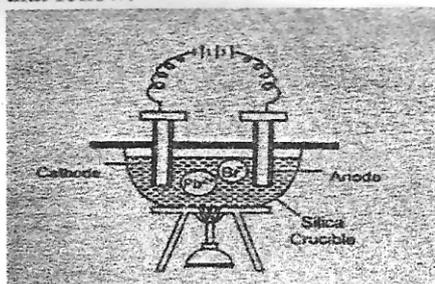
Q V)

1. Draw the electron dot diagram for the formation of ammonium ion. [2]
 2. What volume of oxygen would be required for the complete combustion of 100 litres of ethane according to the following equation: [2]



3. Mr. Gupta was given a salt 'S' which was white in colour for analysis. On strong heating it produced a residue which is yellow when hot and white when cold, a colourless gas and a reddish-brown gas. The solution of the salt 'S' when tested with ammonium hydroxide produced a gelatinous white precipitate. [3]
- Name the coloured gas evolved when Mr. Gupta heated the salt strongly.
 - Which cation was present in the sample given to Mr. Gupta?
 - Identify the salt given to Mr. Gupta for analysis.

4. Study the given figure and answer the question that follow: [3]



- Which anode is preferred and why?
- State your observation at cathode?
- Why crucible is heated from outside?

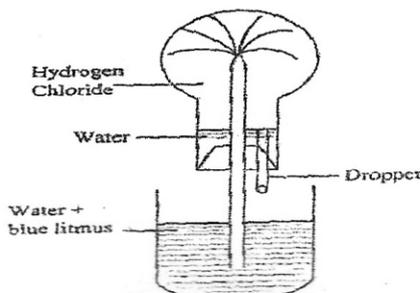
Q VI)

1. Answer: [2]
- What do you understand by a lone pair of electron?
 - Draw the electron dot structure of the hydronium ion.
2. Calculate: [2]
- The gram molecular weight of sulphur dioxide [S=32, O=16]
 - The vapour density of CH₃OH [Atomic weight C=12, H=1, O=16]
3. The electron affinity of an element X is greater than that of element Y- [3]
- How is the oxidising power of X likely to compare with that of Y?
 - How is the electronegativity of X likely to compare with that of Y?
 - State whether X is likely to be placed to the left or to the right of Y in the Periodic Table?

4. Arrange the following as per the instructions given in the brackets: [3]
- Cl, F, Br, I (increasing order of electron affinity).
 - Na, K, Cl, S, Si (increasing order of ionisation energy).
 - Cs, Na, Li, K, Rb (decreasing order of metallic character)

Q VII)

- Write the balanced chemical equation for the following: [2]
 - Reaction of iron (III) oxide with HCl.
 - Reaction of sodium sulphite dilute HCl.
- Empirical formula of a compound is XY_2 . If its empirical formula weight is equal to its vapour density, calculate the molecular formula of the compound. [2]
- Abhijeet wants to electroplate his iron key with silver [3]
 - Name the electrolyte used by him.
 - Which electrode did he make the iron key?
 - Write the reaction taking place at anode.
- Observe the diagram and answer the following questions: [3]
 - Name the experiment illustrated below.
 - Which two properties of hydrogen chloride is demonstrated by this experiment?
 - State the colour of the liquid that has entered the round bottomed flask



Q VIII)

- Complete the following table: [2]

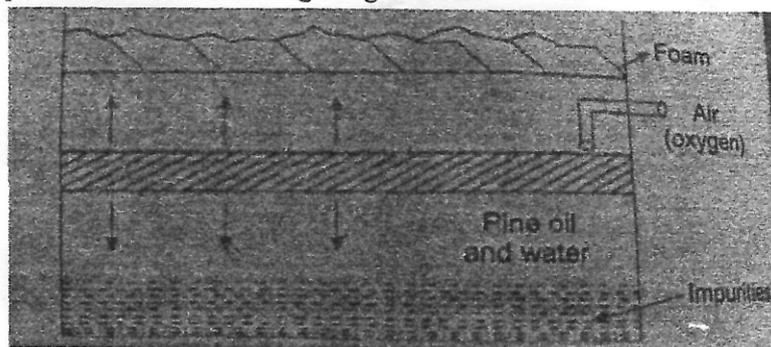
Process	Reaction at Cathode	Reaction at anode
Electro refining of Copper		

- The following table shows the electronic configuration of the elements W, X, Y and Z. [2]

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

Answer the following questions based on the table Above:

- What type of bond is formed between W and X?
 - What is the formula of the compound formed between X and Z?
- An organic compound contains 12.67% carbon, 2.13% hydrogen, and 85.11% bromine. If the vapour density of compound is 94, find the empirical formula and molecular formula. [3]
[Atomic weight of C=12, H=1, Br=80]
 - Answer the following questions based on the diagram given below: [3]



- Which method of the concentration of ore does the diagram represents?
- Give the Principle for this method.
- What type of ore are suitable for this method?