Chemistry – Mock Test Paper

[Time: $1\frac{1}{2}$ hrs] **[M. Marks : 80]**

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 doe writing the answers.

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

Section I (40 Marks)

Attempt all questions from this section

Question 1.

(a) Choose the most appropriate answer.

(i) Elements belonging to the same group have similar properties, because :

A. they have similar electronic configuration in valence shell.
B. their atomic numbers increase as we move down a group.
C. they are all metallic or non-metallic elements.
D. their number of electrons increase steadily.

(ii) With the increase in atomic number in a period :

A. the metallic character increases. **B.** the metallic character decreases.
C. the chemical reactivity decreases. **D.** the chemical reactivity increases.

(iii) Amongst lithium, sodium and potassium the atomic size of :

A. All of them is same. **B.** Sodium has the largest atomic size.
C. Lithium has the largest atomic size. **D.** Potassium has the largest atomic size.

(iv) Amongst Be, B, Si, C and Cl :

A. Be and B are metalloids. **B.** B and Si are metalloids.
C. Si and Cl are metalloids. **D.** Si and C are metalloids.

(v) On moving horizontally across a period, the number of electrons in outermost shell increase from :

A. 2 to 8 **B.** 1 to 8 **C.** 1 to 18 **D.** 2 to 18.

(vi) Magnesium atom loses 2 electrons in its valence shell to acquire the stable configuration of nearest noble gas is :

A. Neon **B.** Argon **C.** Helium **D.** None of these

(vii) A compound of two non-metals which dissolves in water to form an alkali is :

A. methane **B.** carbon dioxide
C. Phosphorous penta oxide **D.** Ammonia.

(viii) One twelfth mass of carbon atom ${}_6C^{12}$ is called :

A. Atomic mass **B.** Atomic number **C.** Atomic mass unit **D.** All of these.

(ix) The electrolyte used during silver plating is :

A. silver nitrate solution **B.** fused silver chloride
C. sodium argento cyanide solution **D.** all the above

(x) Non-metals are generally :

A. oxidizing agents **B.** reducing agents
C. bleaching agents **D.** neutral in nature. [10]

(b) Write fully balanced equations for the following reactions :

(i) Magnesium nitride and water.

(ii) Ammonium chloride and sodium nitrite on heating.

(iii) Potassium nitrate and conc sulphuric acid heated below 200°C.

(iv) Ammonia gas catalytically oxidised with oxygen.

(v) Magnesium bicarbonate and dilute nitric acid. [5]

(c) (i) State Gay Lussac's Law of combining gases. [1]

(ii) (1) Nitrogen and oxygen react as illustrated by an equation below :

$$N_2(g) + O_2(g) \longrightarrow 2NO$$

Calculate the volume of nitrogen gas to produce 5.6 dm^3 of nitric oxide gas at S.T.P. [2]

(2) How many molecules of oxygen are required to produce 5.6 dm^3 of nitric oxide gas at S.T.P. [Avogadro's number = 6×10^{23}] [2]

(d) The questions from (i) to (v) refer to the following salt solutions listed from A to F.

A. Copper sulphate **B.** Sodium sulphate **C.** Potassium chloride

D. Lead acetate **E.** Magnesium sulphate **F.** Zinc chloride

(i) Which two solutions will give white precipitate when treated with dilute hydrochloric acid followed by barium chloride?

(ii) Which two solutions will give white precipitate when treated with dilute nitric acid followed by silver nitrate solution?

(iii) Which solution will give white precipitate when treated with dilute sulphuric acid or dilute hydrochloric acid?

(iv) When solution will form deep blue inky colour on treating with excess of ammonia solution?

(v) Which solution will give white precipitate with excess of ammonium hydroxide solution? [5]

(e) A to D below relate to the extraction of zinc and iron.

A. Zinc blende **B.** Haematite **C.** Magnetite **D.** Zincite

(i) Write down the ores which are relevant to the extraction of

(1) Zinc (2) Iron

(ii) Fill in the blank space :

The zinc blende is subjected ___(1)___ before reduction with coke. The Haematite is mixed with coke and ___(2)___ for reduction in blast furnace.

(iii) Write an equation for the roasting of zinc blende in air. [5]

(f) Match the descriptions (i) to (v) below with appropriate term from list A to F.

A. Neutral oxide **B.** Cation **C.** Hydrocarbons

D. Hygroscopic **E.** Alkynes **F.** Calcination

(i) The process of heating concentrated ore in the absence of air.

(ii) The process by which a substance absorbs moisture from air, but does not change its state.

(iii) The compounds of carbon and hydrogen.

(iv) A homologous series with general formula C_nH_{2n-2}.

(v) An oxide which is neither acidic nor basic in nature. [5]

(g) Hydrogen gas is burnt in a gas **P**. When another gas **R** is formed. Gas **R** gives dense white fumes with ammonia liquor.

(i) Name the gases P and R.

(ii) Write relevant equations for

(1) the formation of gas R.

(2) the formation of dense white fumes.

(iii) Fill in the blanks space :

The gas R fumes strongly in moist air, because it is highly _____ in water. [5]

Section II (40 Marks)

Attempt all **four** questions from this section

Question 2.

(a) Draw the structure of a compound with ***three*** carbon atoms in the following cases :

(i) An alkane with carbon to carbon single bond.

(ii) An alcohol containing three carbon atoms.

(iii) An unsaturated hydrocarbon with a double bond between any two carbon atoms. [3]

(b) Methane, methene, methanoic acid and methanol.

From the list of compounds given above name :

(i) A compound which is not possible.

(ii) A compound used to denaturing ethanol.

(iii) A compound which is the first member of alkanoic acids. [3]

(c) Write equations for the laboratory preparation of :

(i) Methane from sodium ethanoate.

(ii) Ethene from ethanol.

(iii) Ethyne from calcium carbide.

(iv) Ethanol from monochloroethane. [4]

Question 3.

(a) State your observations when :

(i) Barium chloride solution is added to sodium sulphate solution.

(ii) Neutral litmus solution is added to solution of carbon dioxide in water.

(iii) Small piece of copper is placed in silver nitrate solution. [3]

(b) The preparation of calcium sulphate from calcium carbonate is a two step process as calcium sulphate cannot be prepared by adding dilute sulphuric acid.

(i) What is the first step that is required to prepare calcium sulphate from calcium carbonate?

(ii) Write an equation for the reaction that takes place when first step is carried out.

(iii) Why is the direct addition of dilute sulphuric acid to calcium carbonate an impractical method for preparing calcium sulphate. [3]

(c) Fill in the blank spaces :

A base is substance which reacts with ___(1)___ ions of an acid to form a ___(2)___ and ___(3)___ as the only products. The process by which an acid reacts with a base is called ___(4)___. [4]

Question 4.

(a) A compound is formed when sulphur vapour are passed over red hot carbon.

(i) Name the compound formed and support your answer by a chemical equation.

(ii) Is the compound formed likely to have :

(1) Low melting point and high boiling point?

(2) High melting point and high boiling point?

(3) Low melting point and low boiling point?

(iii) What type of bonding is between carbon and sulphur atoms? [3]

(b) An element E donates electrons so as to have electronic configuration like that of nearest noble gas.

(i) Is element E getting oxidised or reduced?

(ii) What charge E will have after donating electrons?

(iii) On which electrode the ions of E will discharge during electrolysis. [3]

(c) (i) Ammonia gas dissolves in water to form positively charged ions. Name the positively charged ions and draw their structure.

(ii) Explain, why benzene does not dissolve in water.

(iii) What kind of elements are required to produce an ionic compound?

(iv) Explain why ionic compounds are soluble in water. [4]

Question 5.

(a) (i) A hydroxide of sodium is made to react with ammonium sulphate by heating. Write a fully balanced equation for the reaction.

(ii) The gas evolved during the reaction in (i) is passed through (1) neutral litmus solution (2) copper (II) chloride solution. State your observations in each case. [3]

(b) (i) Ammonia gas can be prepared from magnesium nitride. Write a fully balanced equation for the preparation of gas.

(ii) Why ammonia gas is not prepared in laboratory by above mentioned method.

(iii) The solution of ammonia in water behaves as an alkali. Explain. [3]

(c) (i) How the carbonate ore of iron is converted into iron (III) oxide before it is reduced in blast furnace? Support your answer by two chemical equations.

(ii) How the calcium carbonate acts as a flux and removes sand in the formation of slag during the reduction of iron (III) oxide in a blast furnace. Support your answer by two chemical equations. [4]

Question 6.

(a) (i) Name two acids used in the formation of aqua regia.

(ii) What is the ratio of these acids.

(iii) Write a chemical equation to show, how gold dissolves in aqua regia. [3]

(b) (i) Ammonia gas can act as a reducing agent. Explain the statement by writing a fully balanced chemical equation.

(ii) What will you observe when chlorine gas mixed with excess of ammonia gas. Write a chemical equation for the reaction between excess of ammonia and chlorine gas. [3]

(c) When concentrated hydrochloric acid is treated with potassium permanganate crystals a greenish yellow gas is given out.

(i) Name the gas evolved. (ii) Write a fully balanced equation for the reaction.

(iii) Is hydrochloric acid acting as oxidising agent or reducing agent?

(iv) State one test of hydrochloric acid gas. [4]

Question 7.

(a) Calculate the percentage of water of crystallisation in hydrated iron (II) sulphate [$FeSO_4.7H_2O$]. [Fe = 56, S = 32, O = 16; H = 1] [3]

(b) 500 g of magnesium carbonate of 64% purity dissolves in excess of HCl as under.

$$MgCO_3 + 2HCl \longrightarrow MgCl_2 + H_2O + CO_2(g)$$

Calculate the weight of pure CO_2 formed. [Mg = 24, C = 12, O = 16, H = 1, Cl = 35.5] [3]

(c) (i) What do you understand by the term empirical formula?

(ii) A gaseous hydrocarbon of vapour density 29, contains 82.76% of carbon. Calculate its empirical formula and molecular formula. [C = 12, H = 1] [4]
