

ICSE Chemistry: MCQ Question Bank

SECTION I (40 Marks)

Attempt *all* questions from this Section

Question 1:

a) State the following:

1. The number of elements in period 1, period 2, and period 3 of the Periodic Table.
2. Name the elements in Period 1.
3. What is the common feature of the electronic configuration of the elements at the end of Period 2 and Period 3?
4. What does a Group in the periodic Table mean?
5. Within a group where would you expect to find the element with the greatest metallic character and the largest atomic size?
6. State whether the ionization potential increases or decreases on going down a Group.

b) Choose the correct answers from:

Parts (i) to (v) refer to changes in the properties of elements on moving left to right across a period of the Periodic Table. For each property, choose the letter corresponding to the correct answer from the choices A, B, C and D.

(i) The non-metallic Character of the elements:

- (x) Decreases (y) increases
(z) Remains the same (w) depends on the period.

(ii) The electro-negativity:

- (x) Depends on the number of valence electrons (y) Increases
(z) Remains the same (w) Decreases.

(iii) The ionization potential:

- (x) Goes up and down (y) decreases
(z) Increases (w) remains the same.

(iv) The atomic size:

- (x) Decreases (y) increases
(z) Remains the same (w) sometimes increases or decreases.

(v) The electron affinity of the elements in groups 1 to 7:

- (x) Goes up and then down (y) decreases and then increases
(z) Increases (w) decreases.

c) Copy and complete the following table:

	Sodium	Potassium	Phosphorus	Carbon	Hydrogen
Formula of chloride					
Physical state of chloride at room temperature					
Nature of bonding					

d) Answer the following:

- Electrons are getting added to an element X,
 - Is it getting oxidized or reduced?
 - What changes will X have after the addition of electrons?
 - Which electrode will X migrate to during the process of electrolysis?
- Element X is a metal with a valence 2, and element Y is a non-metal with a valence 3.
 - If Y is a diatomic gas, write the equation for the direct combination of X and Y to form a compound.

(e) Select the correct word/words from the brackets to make the sentences correct:

(i) When sodium chloride is formed, the sodium atom loses an electron its valence shell and hence is _____ [oxidized/reduced].

(ii) When magnesium oxide is formed, the magnesium atom loses two electrons from its valence shell and hence is a _____ [reducing agent/oxidizing agent].

(iii) When sodium sulphide is formed, the Sulphur atom gains two electrons in its valence shell and hence is a _____ [reducing agent/oxidizing agent].

(iv) Covalent bond is formed when the participating atoms are two _____ [metals/non-metals] in a chemical reaction.

(v) The _____ [ionic/covalent] compound in fused state or aqueous solution is good conductor of electricity.

(vi) When the participating atoms in a chemical reaction are metal and a non-metal the compound so formed has _____ [higher/lower] boiling point.

(vii) A covalent compound in which a shared pair of electrons is _____ [equally/unequally] distributed between the atoms is called polar covalent compound.

(f) Draw electron dot diagram for the formation of:

- Magnesium oxide formed by combining $^{[mass\ no.]}_{24}Mg_{12[at.no.]}$ and $^{[mass\ no.]}_{16}O_{8[at.no.]}$.
- A molecule of chlorine from two atoms of $^{35}Cl_{17}$.
- Sodium chloride from $^{23}Na_{11}$ and $^{35}Cl_{17}$.
- Hydrogen sulphide from 1H_1 and $^{32}S_{16}$.

(g) From the list of substances, choose the pair required to prepare:

From the substances: Copper, Lead, Sodium, Zinc, Copper oxide, Lead carbonate, Iron, Sodium nitrate solution, Lead nitrate solution, Iron [III] carbonate, Iron [III] hydroxide, Sodium hydroxide solution, Copper carbonate, Sodium carbonate solution, dilute hydrochloric acid, dilute nitric acid, dilute Sulphuric acid, Hydrogen chloride, Chlorine.

- Zinc sulphate,
- Copper sulphate,
- Sodium sulphate,
- Lead sulphate,
- Sodium chloride,
- Lead chloride,

7. Anhydrous iron [III] chloride,
8. Iron [II] sulphate
9. Zinc carbonate.

Write equations for the reactions that you would use in the laboratory to prepare above substances.

(h) Which of the following hydroxides is not an alkali:

- (A) Ammonium hydroxide (B) calcium hydroxide
(C) Copper hydroxide (D) sodium hydroxide

(i) Write the colour of precipitate when sodium hydroxide solution is added in small quantity to the following salt solution:

1. Iron [II] sulphate,
2. Iron [III] chloride,
3. Copper [II] sulphate,
4. Zinc sulphate,
5. Zinc nitrate,
6. Lead nitrate,
7. Magnesium sulphate,
8. Zinc chloride,
9. Ammonium sulphate.

What is the colour when excess of NaOH is added.

(j) What is colour of the precipitate formed when aqueous ammonia is added to the following solution? Also state the colour when excess of NH_4OH is added

1. Magnesium sulphate,
2. Iron [II] sulphate,
3. Iron [III] chloride,
4. Lead nitrate,
5. Zinc chloride.

(k) State the action of alkalis on: Zn, PbO, $\text{Pb}(\text{OH})_2$, Al_2O_3 and $\text{Al}(\text{OH})_3$.

(l) Choosing only words from the following list write down the appropriate word to fill in the blanks below:

Anion, anode, cathode, cations, electrode, electrolyte, nickel, voltmeter, oxidized, reduced, higher, lower, ions, molecules, will, will not
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To electroplate an article with nickel requires an [i] _____ which must be a solution containing [ii] _____ ions. The article to be plated is placed at the [iii] _____ of the cell in which the plating is carried out. The [iv] _____ of the cell is made from pure nickel. The ions that are attracted to the negative electrode and discharged are called [v] _____. Pure water consists almost entirely of [vi] _____. We can

expect that pure water [vii] _____ normally conduct electricity. With platinum electrodes hydrogen is liberated at the [viii] _____ and oxygen at the [ix] _____. As we descend the electrochemical series containing cations, the tendency of the cations to get [x] _____ at the cathode increases. The [xi] _____ the concentration of an ion in a solution, the greater is the probability of its being discharged at the appropriate electrode.

(m) Name the following:

1. The metal which is liquid at room temperature,
2. The allotrope of a non-metal which conducts electricity,
3. A carbonate not decomposed by heat,
4. A green carbonate which turns black on heating,
5. An alloy of copper and zinc,
6. A non-metal that has a metallic luster and sublimates on heating,
7. A compound added to lower the fusion temperature of the electrolytic bath in the extraction of Al,
8. The process of heating an ore to a high temperature in the presence of air,
9. A metal which has a low melting point,
10. A metal which can be cut by knife,
11. A metal from activity series which forms an oxide on exposure to air,
12. A metal that displaces hydrogen from steam.

(n) Write the observation and balanced chemical equation for reactions of

1. Dilute hydrochloric acid with:
 - a. Zinc,
 - b. Copper oxide
 - c. Lead nitrate solution,
 - d. Calcium carbonate,
 - e. Magnesium ribbon,
 - f. Sodium sulphide,
 - g. Calcium bicarbonate,
 - h. Ammonium hydroxide,
 - i. Silver nitrate solution;
2. Concentrated hydrochloric acid with:
 - a. Red lead with heating.

(o) From the given compound/gas, select the correct one that matches the description given below:

Ammonia, chlorine, hydrogen chloride, Sulphur dioxide, hydrogen sulphide, copper oxide, copper sulphate, lead bromide, ammonium sulphate, lead carbonate, copper nitrate, ferrous sulphate.

1. A compound which on heating with sodium hydroxide produces a gas which forms dense white fumes with hydrogen chloride.
2. Although this compound is not a metal hydroxide, its aqueous solution is alkaline in nature.
3. When this gas bubbled through copper sulphate solution, a deep blue coloured solution is formed.

4. This gas burns in oxygen with a green flame.
5. The gas turns moist red litmus paper blue.
6. This gas is passed over heated CuO to reduce it.
7. The gas, whose solution in water is alkaline
8. Conc. sulphuric acid is not used for the drying of this gas

(p) **Choose the correct word from the brackets for each sentence and write a balanced equation for the same:**

1. Ammonium chloride is a soluble salt prepared by _____ [precipitation / neutralization].
2. When ammonium chloride is heated, it undergoes thermal _____ [decomposition / dissociation].
3. Heating ammonium chloride with sodium hydroxide produces _____ [ammonia / nitrogen].
4. Sodium nitrate reacts with _____ [concentrated / dilute] sulphuric acid to produce nitric acid. Write balanced equation also.

(q) **Answer the following:**

X, Y and Z are three crystalline solid soluble in water and have a common anion. To help you to identify X, Y and Z, following experimental observation are provided. Now complete the following:

1. A reddish-brown gas is obtained when X, Y and Z are warmed separately with concentrated sulphuric acid and copper turnings. The common anion is the _____ ion.
2. When X is heated, it melts and gives off only one gas which relights a glowing splint. The cation in X is either _____ or _____ .
3. The action of heat on Y produces a reddish-brown gas and a yellow residue which fuses with the glass of the test tube. The metal ion present in Y is the _____ ion.
4. When Z is heated it leaves no residue. Warming Z with sodium hydroxide solution liberates a gas which (i) turns moist red litmus paper blue. Z contains the _____ cation.
5. Write the equations of X and concentrated H₂SO₄ (below 200°C).
6. Write the equation for the action of heat on Y.

(r) **Write balanced chemical equations for each of the following reactions :**

1. Conversion of sulphur dioxide to sulphur.
2. Conversion of Sulphur dioxide to sodium sulphite.
3. Conversion of sodium sulphite to Sulphur dioxide.
4. For the laboratory preparation of Sulphur dioxide from sodium sulphite.
5. Reaction of iron and dilute sulphuric acid.
6. Reaction of copper carbonate and dilute sulphuric acid.
7. Reaction of lead nitrate solution and dilute sulphuric acid.
8. Reaction of zinc hydroxide and dilute sulphuric acid.
9. Reaction between zinc and dilute sulphuric acid.
10. Reaction between SO₂ and sodium hydroxide solution.
11. Reaction between HCl and sodium sulphite.
12. Dilute sulphuric acid producing hydrogen.
13. Laboratory preparation of sodium sulphate using dilute sulphuric acid.

14. Laboratory preparation of lead sulphate using dilute sulphuric acid.
15. Laboratory preparation of copper sulphate using sulphuric acid.
16. Reaction between potassium hydrogen carbonate and dilute sulphuric acid.
17. Reaction between sodium nitrate and concentrated sulphuric acid.

(s) Write structural formula of the following:

1. Ethene
2. Ethyne
3. Marsh gas (Methane)
4. Vinegar (Acetic acid)
5. A saturated hydrocarbon
6. An alcohol containing two carbon atoms
7. An alkane with a carbon to carbon single bond
8. The compound with $-OH$ as the part of the structure
9. The compound with $-COOH$ as the part of the structure
10. An unsaturated hydrocarbon with a carbon-carbon triple bond
11. An unsaturated hydrocarbon with a double bond.

(t) Give the IUPAC name and homologous series for the following compounds:

- | | |
|------------------|--------------------------------------|
| i) C_nH_{2n+2} | xiii) C_4H_6 |
| ii) CH_4 | xiv) $CH_3 - OH$ |
| iii) C_2H_6 | xv) $CH_3 - CH_2 - OH$ or C_2H_5OH |
| iv) C_3H_8 | xvi) $CH_3 - CH_2 - CH_2 - OH$ |
| v) C_4H_{10} | xvii) $H - CHO$ |
| vi) C_nH_{2n} | xviii) $CH_3 - CHO$ |
| vii) C_2H_4 | xix) $CH_3 - CH_2 - CHO$ |
| viii) C_3H_6 | xx) $H - COOH$ |
| ix) C_4H_8 | xxi) $CH_3 - COOH$ |
| x) C_nH_{2n-2} | xxii) $CH_3 - CH_2 - COOH$ |
| xi) C_2H_2 | xxiii) $CH_3 - CH_2 - CH_2 - COOH$. |
| xii) C_3H_4 | |

(u) The following salt solutions are provided:

- | | | |
|-------------------|-----------------------|------------------------|
| A: Copper nitrate | B: Iron [II] sulphate | C: Iron [III] chloride |
| D: Lead nitrate | E: Magnesium sulphate | F: Zinc chloride |

1. Which two solutions will give a white precipitate when treated with dilute hydrochloric acid followed by barium chloride solution? [i.e. white precipitate insoluble in dilute hydrochloric acid]
2. Which two solutions will give a white precipitate when treated with dilute HNO_3 & $AgNO_3$ solution?
3. Which solution will give a white precipitate when either dilute HCl or dilute H_2SO_4 is added to it.
4. Which solution becomes a deep/inky blue colour when excess of ammonium hydroxide is added to it.
5. Which solution gives a white precipitate with excess ammonium hydroxide solution?

(v) Give one test each to distinguish between the following pair of chemicals:

1. Zinc nitrate solution and calcium nitrate solution.
2. Sodium nitrate solution and sodium chloride solution.
3. Iron [III] chloride solution and copper chloride solution.
4. Iron [III] sulphate solution and iron [III] sulphate solution.
5. Manganese dioxide solution and copper [II] oxide solution.

(w) Calculate the following:

1. Calculate the percentage of phosphorus in the fertilizer super phosphate, $\text{Ca}(\text{H}_2\text{PO}_4)_2$ correct up to 1 decimal place (1dp) (H = 1; P = 31; Ca = 40).
2. Solid ammonium dichromate of relative molecular mass 252, on heating decomposes as follows:



- (1) Calculate the volume of nitrogen at STP that will be evolved when 31.5 g of ammonium dichromate is heated, and
 - (2) The mass of chromium [III] oxide formed at the same time. [H = 1; N = 14; O = 16; Cr = 52].
 - (3) What will be the loss of mass if 31.5 g of ammonium dichromate is heated above 100 °C?
2. When excess of lead nitrate solution is added to a solution of sodium sulphate, 15.15 g of lead sulphate is precipitated. What mass of sodium sulphate is present in the original solution?
 3. Find the empirical and molecular formula of an acid of phosphorus which has the following composition: Hydrogen = 2.47 %, phosphorus = 38.27 %, Oxygen = 59.26 %. The relative molecular mass is 162. (H = 1; O = 16; P = 31).

SECTION – II (40 Marks)

Answer ANY FOUR questions

Question 2

With reference to the first three periods of the modern periodic table, answer the following questions:

- (i) Write the formula of the sulphate of the element with atomic number 13.
- (ii) What type of bonding will be present in the oxide of the element with atomic number 1?
- (iii) Which feature of the atomic structure accounts for the similarities in the chemical properties of the elements in group 7A of the periodic table.
- (iv) Name the element that has the highest Ionisation potential.
- (v) How many electrons are present in the valence shell of the element with the atomic number 18.
- (vi) What is the electronic configuration of the element in the third period that gains one electron to change into an anion?
- (vii) What is the name given to the energy released when an atom in its isolated gaseous state accepts an electron to form an anion?

Question 3

- (a) Why the atomic size of an element decreases in a period as we move from left to right?

- (b) Explain why the elements placed in the same group of the periodic table have the same chemical properties?
(c) Predict the group of an element X if its atomic number is 16.

Question 4.

- (a) Why do covalent compounds not conduct electricity and ionic compound in the solid state do the same thing?
(b) Why do ionic compounds have high melting points and boiling points while covalent compound have low melting points and boiling points?
(c) Why are covalent compound generally liquids or gases? State two differences between ionic compound and covalent compound.

Question 5.

- (a) Define the following terms: (i) Acid (ii) p^H scale (iii) Neutralization.
(b) What is the purpose of the p^H scale. State the p^H of pure water.
(c) Differentiate between the chemical nature of an aqueous solution of HCl and an aqueous solution of ammonia.
(d) Acids dissolve in water to produce positively charged ions. Draw the structure of these ions.

Question 6.

- (a) Which reagent can be used to distinguish a solution containing a lead salt from a solution containing a zinc salt?
(b) Name a metal which is present in the group 3 of the periodic table and which can evolve hydrogen gas when treated with sodium hydroxide solution.

Question 7.

- (a) State:
(i) Avogadro's Law
(ii) Gay-Lussac's Law of Gaseous Volumes.
(b) Express Kelvin Zero in degree centigrade.
(c) What is meant by the atomicity of a gas? Name a gas that is diatomic.

Question 8.

- (a) What do you mean by the term molar volume of a gas?
(b) The gases hydrogen, oxygen, carbon dioxide, Sulphur dioxide and chlorine are arranged in order of their increasing relative molecular mass. Given 8 g of each gas at STP, which gas will contain the least number of molecules and which gas the most?

Question 9.

- (a) Name a liquid that is a non-electrolyte.
(b) What kind of particles will be found in a liquid compound that is a non-electrolyte?
(c) Name a solid that undergoes electrolysis when molten.
(d) Explain why solid chloride does not allow electricity to pass through.

Question 10.

- (a) If fused metallic chloride is electrolyzed, at which electrode would the metal be obtained?
(b) What should be the physical state of lead bromide if it is to conduct electricity?

- (c) What particles are present in pure lead bromide?
(d) Write the equation for the reactions that take place at the electrodes during the electrolysis of lead bromide.

Question 11.

- (a) When the electrolysis of acidified water is carried out:
(i) What is the ratio of the volume of hydrogen produced to the volume of oxygen?
(ii) Give the equation for the discharge of ions at the cathode.
(b) State what is observed when copper sulphate solution is electrolyzed using a platinum anode.
(c) Write two applications of electrolysis in which the anode diminishes in mass.
(d) Explain how electrolysis is an example of 'redox reaction'.
(e) Explain why copper, though a good conductor of electricity is a non-electrolyte.

Question 12.

- (a) By what chemical process is the amount of carbon in cast iron decreased to make steel.
Or, By what chemical process is the impurity present in the iron, removed in steel making.
(b) Which metal is added to steel to make stainless steel?
(c) To protect iron from rusting it is coated with a thin layer of zinc. Name this process.
(d) Which particular property of cast iron makes it unsuitable for the construction of bridges?

Question 13.

- (a) Write a balanced chemical equation for the reaction of iron [III] oxide and carbon monoxide.
(b) Write a balanced chemical equation for the preparation of the following compounds (as the major product) starting from iron and using only one other substance:
(i) Iron [II] chloride (ii) iron [III] chloride (iii) iron [II] sulphate (iv) iron [II] sulphide.

Question 14.

- (a) Write the equations for the reaction of zinc with each of the following:
(i) Sodium hydroxide solution.
(ii) Dilute sulphuric acid.
(iii) Copper sulphate solution.
(b) Are liquid zinc and liquid lead miscible or immiscible?
(c) Name the alloy formed between Zn & Cu.
(d) Calcium, Copper, Lead, Aluminium, Zinc, Chromium, Magnesium, Iron. Choose the major metals from the list given above to make the following alloys:
(i) Stainless steel. (ii) Brass.
(e) Match the metals/alloys in list 1 with their uses in list 2.
Metal/Alloy: (i) aluminium (ii) lead (iii) brass (iv) iron (v) zinc
Uses: (1) steel making (2) aeroplane wings (3) galvanizing (4) radiation shield
(5) Electrical fitting.

Question 15.

- (a) Explain why dilute hydrochloric acid cannot be concentrated by distilling the dilute acid.
(b) Write a balanced equation for the preparation of hydrogen chloride from sodium chloride and sulphuric acid. State whether the acid should be concentrated or dilute.
(c) Name one lead compound that can be used to oxidize hydrogen chloride to chlorine.
(d) Which gas is evolved when manganese dioxide is heated with concentrated hydrochloric acid?

Question 16.

- (a) Name all the products formed when ammonia is passed over heated copper oxide.
- (b) Under what conditions do nitrogen and hydrogen combine to form ammonia ?
- (c) What happens when : (i) ammonium chloride, (ii) ammonium nitrate are heated separately ?
- (d) Name : (i) a drying agent for ammonia, (ii) the gas produced on warming ammonium sulphate with sodium hydroxide solution.

Question 17.

- (a) State what is observed when nitric acid is kept in a reagent bottle for a long time.
- (b) Write a balanced equation for the reaction of conc. HNO_3 with (i) Sulphur, (ii) copper.
- (c) The first step in the manufacture of HNO_3 is the catalytic oxidation of NH_3 . Name the catalyst used .
- (d) Potassium nitrate is prepared from KOH and nitric acid, State the type of reaction involved. Which gas is produced when potassium nitrate is heated. Write the equation for the reaction.

Question 18.

- (a) In the Contact Process for the manufacture of sulphuric acid
 - (i) Name the catalyst used
 - (ii) Name the substance in which sulphur trioxide is dissolved
 - (iii) Name the substance that is diluted with water.
- (b) Name the substance that acts both as a drying agent and a dehydrating agent.
- (c) What happens when a crystal of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is placed in concentrated sulphuric acid ? Explain your observation.

Question 19.

- (a) Name the drying agent used for drying (i) Sulphur dioxide (ii) hydrogen sulphide
- (b) Write equation for the following reactions : (i) Sulphur dioxide acting as an oxidizing agent. (ii) Sulphur dioxide acting as a bleaching agent. (iii) Sulphur dioxide acting as an acid anhydride.
- (c) Write the observation and the balanced equation when a paper dipped in potassium permanganate solution is put on the mouth of a test tube containing Sulphur dioxide gas.
- (d) Explain why the bleaching action of chlorine is permanent whereas the bleaching action of Sulphur dioxide is temporary.

Question 20.

Write the balanced chemical equations for the following reactions /laboratory preparation:

- (a) Ethane and oxygen in the presence of molybdenum oxide.
- (b) Preparation of methane from anhydrous sodium ethanoate (sodium acetate).
- (c) Heating ethanol at 443 K (170°C) in the presence of concentrated sulphuric acid.
- (d) Ethane from Sodium propionate. (lab. Prep.)
- (e) Ethene from Iodo ethane. (lab. Prep.)
- (f) Ethyne from Calcium carbide. (lab. Prep.)
- (g) Methanol from Iodo methane. (lab. Prep.)
- (h) Ethylene from ethyl alcohol.
- (i) The complete combustion of ethane.
- (j) Ethene from ethanol.
- (k) Ethyne from calcium carbide.
- (l) Ethanoic acid from ethane.

Question 21.

Ethane, Ethene, Ethanoic acid, Ethyne, Ethanol, Calcium carbide, Alumina (Al_2O_3), Bromine water, Tetra-chloro ethane, Di-chloro ethene, Methanol, Methane, Ethene dichloride,

From the box given above, name:

- (a) The compound with – OH as the part of its structure.
- (b) The compound with – COOH as the part of its structure.
- (c) Homologue of Homologous series with general formula C_nH_{2n} .
- (d) A compound that will give acetylene gas when treated with water.
- (e) A solid that can be used instead of concentrated sulphuric acid to prepare ethylene by the dehydration of ethanol.
- (f) A reagent that can be used to distinguish between ethane and ethane.
- (g) The addition product formed by ethylene with chlorine.
- (h) Compound formed by the dehydration of ethanol by concentrated sulphuric acid.
- (i) Compound that will give red precipitate with ammoniacal cuprous chloride solution.
- (j) Compound that forms methanoic acid on oxidation in the presence of copper at 200°C .
- (k) Compound whose vapour density is 14 and turn alkaline potassium permanganate green.
- (l) Compound which forms chloroform on halogenation in presence of sunlight.
- (m) Compound that decolourises bromine solution in carbon tetrachloride.
- (n) Addition product formed between ethane and water.
- (o) The product of the reaction between ethane and chlorine.

Question 22.

Draw the structural formula of the compounds:

- a) Ethene.
- b) Isomers of butane.
- c) A saturated hydrocarbon.
- d) An alcohol containing two carbon atoms.
- e) An alkane with a carbon- carbon single bond.
- f) An unsaturated hydrocarbon with a double bond.
- g) An unsaturated hydrocarbon with a carbon-carbon triple bond.

Question 23.

Give the IUPAC name of the following :

- (a) CH_4 (b) C_2H_6 (c) C_3H_8 (d) C_4H_{10} and its isomers (e) C_5H_{12} and its isomers (f) C_6H_{14} and its isomers (g) C_2H_4 (h) C_3H_6 (i) C_4H_8 (j) C_2H_2 (k) C_3H_4 (l) C_4H_6 (m) CH_3OH (n) $\text{C}_2\text{H}_5\text{OH}$.