

ICSE Chemistry: Model Paper 6

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.

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

The intended marks for questions or parts of questions are given in brackets [].

SECTION I (40 Marks)

Attempt all questions from this Section

Question 1.

a) **Answer the questions below, relating your answers only to salts in the following list:**

Sodium Chloride, anhydrous calcium chloride, copper sulphate - 5- water.

1. What name is given to the water in the compound copper sulphate 5-water?
2. If copper sulphate -5 - water is heated, the water is driven off leaving anhydrous copper sulphate.
 - i) What is the colour of anhydrous sulphate?
 - ii) By what means, other than heating, could you dehydrate copper sulphate -5-water and obtain anhydrous copper sulphate?
3. What is deliquescence?
4. Which one of the salts in the given list is deliquescent?

b) **State what you see when:**

1. A piece of moist blue litmus paper is placed in a gas jar of chlorine.
2. A piece of moist red litmus paper is placed in a gas jar of ammonia.
3. Silver nitrate solution is added to dilute hydrochloric acid.
4. Zinc oxide is heated.
5. A glowing splint is introduced into a gas jar containing oxygen.

c) **Write correctly balanced equations for the following reactions:**

1. Molten sodium and chlorine.
2. Nitrogen and oxygen when lightning strikes.
3. Iron and dilute sulphuric acid.
4. Decomposition of hypochlorous acid, HClO, in the sunlight.
5. Action of heat on potassium nitrate.

d) **Answer the following:**

Water can be split into hydrogen and oxygen under suitable conditions. The equation representing the change is: $2\text{H}_2\text{O}(\text{l}) \xrightarrow{\quad} 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$.

1. If a given experiment results in 2500 cm^3 of hydrogen being produced, what value of oxygen is liberated at the same time under the same conditions of temperature and pressure?
2. The 2500 cm^3 of hydrogen is subjected to $2\frac{1}{2}$ times increases in pressure (temperature remaining constant). What volume will the hydrogen now occupy?
3. Taking the volume of hydrogen calculated in Question (d) part 2, what change must be made in the Kelvin (absolute) temperature to return the volume to 2500 cm^3 (pressure remaining constant)?

- e) The compound $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ is commonly known as borax. When litmus is added to a solution of borax solution, it turns blue
1. What can you say about the pH of borax solution?
 2. Calculate the percentage of boron (B) in borax. (H = 1, B = 11, O = 16, Na = 23)

(f) **Answer the following:**

Sodium hydroxide solution can be used to distinguish between iron (II) sulphate solution and iron (III) sulphate solution because these solution give different coloured precipitates with sodium hydroxide solutions. Give the colour of the precipitate formed with:

1. Iron (II) sulphate solution;
2. Iron (III) sulphate solution.
3. What will you see when barium chloride solution is added to iron (II) sulphate solution?
4. How will the action of dilute hydrochloric acid on sodium carbonate and sodium sulphite enable you to distinguish between these two compounds?

(g) **Choosing the correct words to fill in the blanks (i) to (v) below:**

[Anions, anode cathode, cations, electrode, electrolyte, nickel, voltmeter]

To electroplate an article with nickel requires an (i) _____ which must be a solution containing (ii) _____ ions. The article to be plated is placed as the (iii) _____ of the cell in which the plating is carried out. The (iv) _____ of the cell is made from pure nickel. The ions which are attracted to the negative electrodes and discharged are called (v) _____.

h) **The following question result to the Nitrogen Cycle.**

1. What is the soluble nitrogen compounds absorbed by the roots of plants?
2. What kinds of plants directly absorb nitrogen from the atmosphere?
3. What term is applied to the conversion of atmosphere nitrogen to useful compounds of nitrogen?
4. Compounds such as ammonium nitrate, urea and super - phosphate are used to replace nitrogen and other elements loss from the soil as a result of cultivation. What is the common name given to these compounds?
5. What insoluble substance is used in making super-phosphate?

SECTION - II (40 Marks)

Answer any four questions

Question 2

- a) Name the oxide of sulphur that react with water to give sulphuric acid.
- b) In the contact Process the direct reaction between the oxide of sulphur and water is avoided. In the process,
 1. What does the oxide of sulphur react with instead of water and
 2. What is the name of the product?
 3. Give the name and formula of the acid salt that can give sodium ions and sulphate ions in solution.
- c) The metal zinc is extracted from the ore zinc blend.
 1. Name the zinc compound in zinc blend.

- d) Zinc blend when roasted in air gives off a gas that, if allowed to escape, would constitute an atmospheric pollutant.
1. What is the name of the gas?
 2. What particular polluting effect does this gas have?
- e) Write correctly balanced equations for the reaction in dilute sulphuric acid with each of the following:
1. Copper carbonate
 2. Lead nitrate solution
 3. Zinc hydroxide

Question 3

- a) The following reactions are carried out:
- Reaction A: Nitrogen + metal \longrightarrow compound X
- Reaction B: X + water \longrightarrow ammonia + another compound
- Reaction C: Ammonia + metal oxide \longrightarrow metal + water + nitrogen
1. One metal that can be used for reaction A is magnesium. State the conditions for the reaction
 2. Write the formula of the compound X formed when nitrogen and magnesium react together.
 3. Write the correctly balanced equation for reaction B where X as the compound formed between nitrogen and magnesium.
 4. What property of ammonia is demonstrated by reaction C?
- b) Industrially ammonia is obtained by direct combination between nitrogen and hydrogen.
1. Write the correctly balance equation for the direct combination of nitrogen and hydrogen?
 2. Which of the metals iron, platinum or Copper catalyses this direct combination?
 3. Is the formation of ammonia promoted by the use of high pressure or low pressure
 4. Is ammonia more dense or less dense than air?
 5. Write the correctly balanced equation for the reaction between ammonia and sulphuric acid.

Question 4

- a) The compound A has the following percentage composition by mass: carbon 26.7%., Oxygen 71.1%; hydrogen 2.2%. (H = 1: = 12: O = 16)
1. Determine the empirical formula of A (answer should be given up to one decimal place)
 2. If the relative molecular mass of A is 90, what is the molecular formula of A?
- b) The compound A is a weak acid. What does this statement mean?
- c) Ammonia burn in oxygen and the combustion, in the presence of a catalyst, may be represented as
- $$4\text{NH}_3 + 5\text{O}_2 \longrightarrow 4\text{NO} + 6\text{H}_2\text{O}$$
1. What mass of steam is produced when 1.5g of nitrogen monoxide is formed?
 2. What volume of oxygen, at STP, is required to form 10 moles of products?
[H = 1: N = 14 : O = 16. 1 mole of any gas occupies 22.4dm³ at STP].

Question 5

- a) The table below compares some properties of metals and non-metals. Write down the missing statements (i) to (iv):

Metal	Non - Metal
(i)	poor conductors of heat
Malleable	(ii)
Form positive ions	(iii)
(iv)	Form acidic oxides

- b) Metals are generally solid at room temperature.
1. Name the metal that is liquid at room temperature (say 25°C)
 2. Which allotrope of the non - metal carbon conducts electricity?
- c) How many valence electrons are present in:
1. Metals
 2. Non - Metals?
- d) Name all the particles found in a solution of sodium chloride?

Question 6

- a) Ethane and chlorine react together to form mono-chloro ethane (ethyl chloride).
1. Write down the structural formula of ethane.
 2. What type of reaction has taken place between ethane and chlorine?
- b) The type of reaction between ethene and chlorine is different from that between ethane and chlorine.
1. What is the type of reaction between ethene and chlorine?
 2. What structure of the ethene molecule makes such a reaction possible?
 3. Name the product of the reaction between ethene and chlorine.
- c) Ethane burns completely in air or oxygen to give carbon dioxide (and water vapour). With a limited supply of air/oxygen carbon monoxide is formed. The same gases are found in automobile exhaust gases. Both gases can be considered as atmospheric pollutants.
1. Write the equation of the complete combustion of ethane.
 2. What danger is associated with carbon monoxide?
 3. What effect is associated with too much carbon dioxide in the atmosphere
- d) Burning acetylene (Ethyne) in oxygen under appropriate condition produces a very hot flame. What is this hot flame used for?

Question 7

- a) Solution P has a pH of 13, solution Q has a pH of 6 and solution R has a pH of 2.
1. Which solution will liberate ammonia from ammonium sulphate on heating?
 2. Which solution is a strong acid?
 3. Which solution contains solute molecules as well as ions?
- b) From the list of substances given below, choose the pair required to prepare the salts (i) to (iii) in the laboratory and write down the relevant equations. The substances are: [chlorine, iron, lead, lead nitrate solution, sodium nitrate solution, iron (III) carbonate, lead carbonate, iron (III) hydroxide, sodium hydroxide solution and dilute hydrochloric acid]. The salts are:
1. Sodium chloride.
 2. Lead chloride.
 3. Anhydrous iron (III) chloride.
- c) All ammonium salts are decomposed on heating. What other property do ammonium salts have in common?