

**ICSE Board  
Class X Chemistry  
Sample Paper - 4**

**Time: 2 hrs**

**Total Marks: 80**

**General Instructions:**

- 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.** Name the following: [5]

- An alloy which expands on cooling.
- Metallic oxides reduced by aluminium.
- Metals obtained by electrolytic reduction.
- A metal which exists in the liquid state at room temperature.
- Allotropic modification of carbon which conducts electricity.

**b.** Choose from the following list: [5]

Pyridine, methanol, ethanol, lead nitrate, hydrogen sulphide, methane, chlorine, sodium bisulphate, copper carbonate

- A green salt which on heating produces a residue which is black in colour.
- A salt which decrepitates on heating.
- An acid salt.
- Compound added to denature alcohol.
- Turns lead acetate solution black.

**c.** Write balanced chemical equations for the following: [5]

- Lead carbonate is heated.
- Dilute nitric acid is added to copper chips.
- Sulphur dioxide is passed through hydrogen sulphide solution.
- Ammonia is passed over heated copper oxide.
- Dilute sulphuric acid is added to lead nitrate solution.

**d.** Complete the following statements: [5]

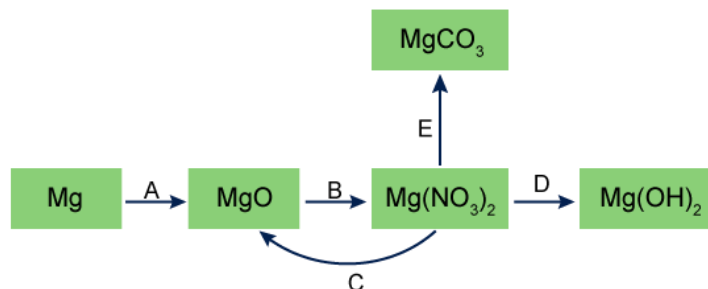
- As we move across a period, \_\_\_\_\_ increases (atomic size, electron affinity).
- As we move down a group, \_\_\_\_\_ decreases (metallic character, ionisation potential).
- Inert gases have complete \_\_\_\_\_ (octet, triplet).
- Ionisation potential is the energy \_\_\_\_\_ (required/released).
- The vertical column in a periodic table is called a \_\_\_\_\_ (group/period).

**e.** Choose from the following list only: [5]

Carbon dioxide, bleaching powder, hydrogen chloride gas, nitrogen, hydrogen, oxygen, ammonia, dilute hydrochloric acid

- Two elements which combine to give basic gas.
- Two gases which combine to form a solid.
- Two neutral gases which combine to give another neutral gas.

**f.** [5]



Write balanced chemical equations for the conversion A to E.

**g.** Name the products formed when the following chemical reactions take place: [5]

- $\text{C}_2\text{H}_5\text{COONa} + \text{NaOH} \xrightarrow{\text{CaO}}$
- $\text{C}_2\text{H}_5\text{I} + 2[\text{H}] \rightarrow$
- $\text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{Al}_2\text{O}_3}$
- $\text{Al}_4\text{C}_3 + \text{H}_2\text{O} \rightarrow$
- $\text{C}_2\text{H}_2 + \text{H}_2\text{O} \rightarrow$

**h.** Give the appropriate terms for the following: [5]

- The number of atoms present in one molecule of an element.
- A formula of a chemical substance which represents the actual number of atoms of each element present in its one molecule.
- The number of atoms which represents how many times one molecule of a substance is heavier than  $1/12$  of the mass of an atom of carbon-12.
- One twelfth mass of  $\frac{12}{6}\text{C}$
- Hydrated hydrogen ion

**SECTION II (40 Marks)**

*Attempt any **four** questions from this section.*

**Question 2**

- a.** Name all the particles present in [4]
- Sodium chloride solution
  - Molten sodium chloride
  - Sulphurous acid
  - Carbon tetrachloride
- b.**
- Under the same conditions of temperature and pressure, you collect 2 litres of carbon dioxide, 3 litres of chlorine, 5 litres of hydrogen, 4 litres of nitrogen and 1 litre of sulphur dioxide. In which gas sample will there be the [4]
    - Greatest number of molecules?
    - Least number of molecules? Justify your answer.
  - Find the total percentage of oxygen in magnesium nitrate  $[\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  crystals. [2]  
(H = 1, N = 14, O = 16, Mg = 24)

**Question 3**

In order to obtain 1 tonne of aluminium, the following inputs are required: 4 tonnes of bauxite, 150 kg of sodium hydroxide and 600 kg of graphite. The aluminium compound in bauxite is aluminium oxide and the main impurity is iron (III) oxide. Aluminium is obtained by the electrolysis of aluminium oxide dissolved in cryolite.

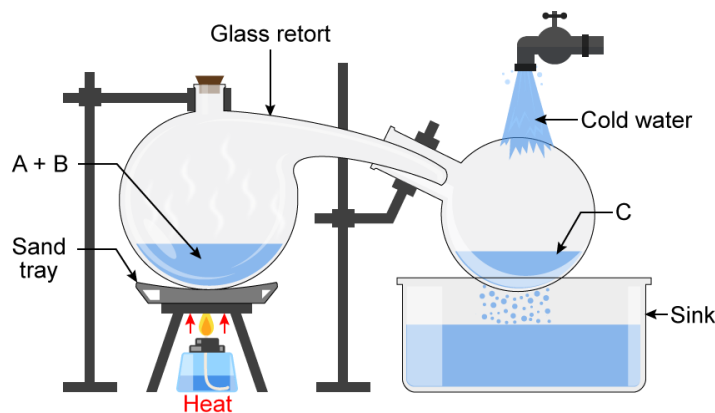
- a.** When bauxite is heated with sodium hydroxide solution, what happens to
- Aluminium oxide
  - Iron oxide [2]
- b.**
- Name the process used for the purification of bauxite.
  - Write the equation for the action of heat on aluminium hydroxide. [2]
- c.**
- Write the formula of cryolite.
  - Write the word which correctly completes the following sentence:  
'By dissolving aluminium oxide in cryolite, a \_\_\_\_\_ (conducting/non-conducting) solution is produced'.
  - Why is so much graphite required for the electrolytic process?
  - Write the equation for the reaction which takes place at the cathode. [4]
- d.** In construction work, why is the alloy of aluminium, i.e. duralumin, used rather than pure aluminium? [2]

**Question 4**

- a. Distinguish between the saturated hydrocarbon ethane and the unsaturated hydrocarbon ethene by drawing their structural formulae. [3]
- b. Addition reactions and substitution reactions are types of organic reactions. Which type of reaction is shown by
  - i. Ethane
  - ii. Ethene
- c. [3]
  - i. Write the equation for the complete combustion of ethane.
  - ii. Using appropriate catalysts, ethane can be oxidised to an alcohol, an aldehyde and an acid. Name the alcohol, aldehyde and acid formed when ethane is oxidised.
- d. [2]
  - i. Why is pure acetic acid known as glacial acetic acid?
  - ii. What type of compound is formed by the reaction between acetic acid and an alcohol?

**Question 5**

- a. Write the equations for the laboratory preparation of [3]
  - i. Sodium sulphate using dilute sulphuric acid
  - ii. Lead sulphate using dilute sulphuric acid
- b. Describe one chemical test which would enable you to distinguish between the following pair of chemicals. Describe what happens with each chemical or state no visible reaction: [2]  
Calcium nitrate and zinc nitrate solution.
- c. The figure given below illustrates the apparatus used in the laboratory preparation of nitric acid. [5]



- i. Name A (a liquid), B (a solid) and C (a liquid) (Do not give the formulae).
- ii. Write an equation to show how nitric acid undergoes decomposition.
- iii. Write the equation for the reaction in which copper is oxidised by concentrated nitric acid.

**Question 6**

- a. Sulphuric acid can be used to prepare several gases in the laboratory. Write balanced equations for reactions in which the following gases are obtained using dilute sulphuric acid as one of the reactants. [2]
- Hydrogen
  - Carbon dioxide
- b. Identify the type of bond expected to form between the pair of elements with the following atomic number. Identify the element and predict their formula also. [3]
- 1, 17
  - 11, 9
  - 6, 1
- c. Supply the missing word from those in the brackets (Do not write out the sentence).
- If an element has low ionisation energy, then it is likely to be \_\_\_\_ (metallic/non-metallic).
  - If an element has seven electrons in its outermost shell, then it is likely to have the \_\_\_\_ (largest/smallest) atomic size among all the elements in the same period. [2]
- d.
- The metals of Group 2 from top to bottom are Be, Mg, Ca, Sr and Ba. Which of these metals will form ions most readily and why?
  - What property of an element is measured by electronegativity? [3]

**Question 7**

- a. What will you observe when [5]
- Dilute sulphuric acid reacts with iron (II) sulphide
  - Dilute sulphuric acid reacts with magnesium
  - Concentrated sulphuric acid is exposed to the atmosphere
  - Water is added to concentrated sulphuric acid in order to make it dilute
  - Lead nitrate solution is mixed with dilute sulphuric acid
- b. Hydrogen chloride dissolves in water forming an acidic solution. [3]
- Name the experiment which demonstrates that hydrogen chloride is very soluble in water.
  - Give three distinct tests (apart from using an indicator) you would carry out with this solution to illustrate the properties of an acid.
- c. Correct the following statement.
- Hydrochloric acid is prepared in the laboratory by passing hydrogen chloride directly through water. [2]