ICSE Board
Chemistry
Sample Paper – 2

Time: 2 hrs **Total Marks: 75**

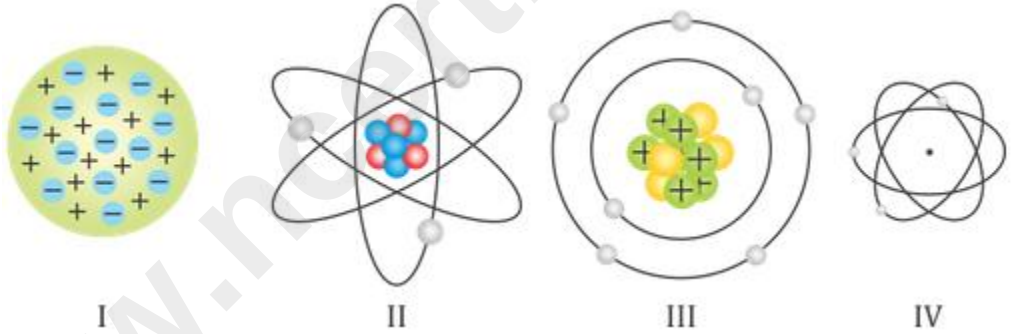
General Instructions:

1. ***All*** *questions are* ***compulsory****.*
2. *Questions 1 to 15 carry one mark each.*
3. *Questions in 2A and 2B carry one mark each.*
4. *Questions in 3A and 3B carry one mark each.*
5. *Question 4A and 4B carry five marks each.*
6. *Questions in 5A and 5B carry one mark each.*
7. *Questions in 6A and 6B carry one mark each.*
8. *Questions 7A and 7B carry five marks each.*

Question 1

Choose the correct answer out of the four available choices given under each question. [15]

1. Which of the following pictures represent the Bohr's model of an atom?



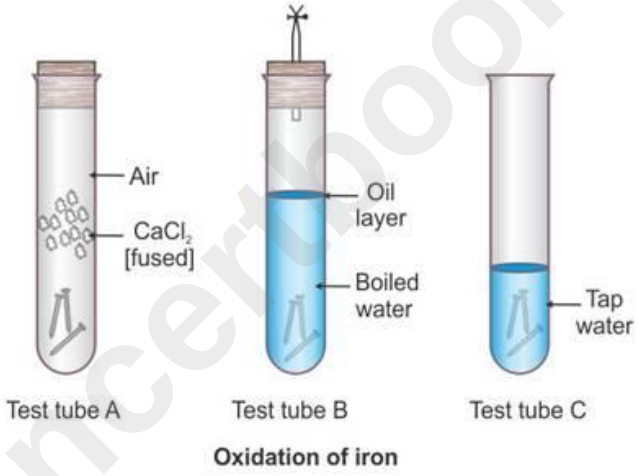
(a) I
(b) II
(c) III
(d) IV

2. Sodium forms sodium cation by loss of?
(a) One electron
(b) Two electrons
(c) Three electrons
(d) Four electrons

3. Hydrogen frees metals from their
(a) Sulphates
(b) Oxides
(c) Nitrates
(d) Chlorides

4. Which of the following metals starts floating in water when allowed to react with it?
(a) Sodium
(b) Calcium
(c) Potassium
(d) Iron

5. In which case will the iron nail not corrode?



Oxidation of iron

(a) Test tube A
(b) Test tube B
(c) Test tube C
(d) Both test tubes A and B

6. Which of the following is not a deliquescent substance?
(a) Concentrated sulphuric acid
(b) Sugar
(c) Common salt
(d) Copper sulphate

7. The process of sterilisation of water by the addition of chlorine which acts as a treatment against bacterial infection is
(a) Chlorination
(b) Precipitation
(c) Sedimentation
(d) Decantation

8. Which of the following is a solid fuel?
(a) Petrol
(b) Kerosene
(c) Coke
(d) Methanol

9. Allotropes have
(a) Similar chemical properties
(b) Similar physical properties
(c) Different chemical properties
(d) Similar physical and chemical properties

10. Allotropes have _____ properties.
(a) similar chemical
(b) similar physical
(c) different chemical
(d) similar physical and chemical

11. Substances used to determine whether a particular substance is an acid or a base are called
(a) Salts
(b) Indicators
(c) Reagents
(d) Catalysts

12. What will be the colour change when phenolphthalein is added to ammonium hydroxide?
(a) Pink
(b) Orange
(c) Colourless
(d) Green

13. Which is the correct balanced equation for the reaction between aluminium and hydrochloric acid?
(a) $Al + 3HCl \rightarrow AlCl_3 + 3H$
(b) $2Al + 3HCl \rightarrow Al_2Cl_3 + 3H$
(c) $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$
(d) $Al + 6HCl \rightarrow Al_2Cl_3 + 3H_2$

14. What is the charge on an electron?

(a) -1
(b) +1
(c) -2
(d) +2

15. Conversion of a solid to a liquid on heating is

(a) Melting
(b) Condensation
(c) Condensation
(d) Freezing

Question 2

(A) State the electronic configuration of the following atoms: [5]

1. Atom 'A' (Atomic number = 12)
2. Atom 'B' (Atomic number = 19)
3. Atom 'C' (Atomic number = 7)
4. Atom 'D' (Atomic number = 26)
5. Atom 'E' (Atomic number = 10)

(B) Fill in the blanks and rewrite the sentences: [5]

1. When few drops of phenolphthalein are added to sodium hydroxide, the solution turns _____.
2. Separation of components of air such as liquid nitrogen and liquid oxygen is possible by _____.
3. The three states of matter are classified on the basis of differences in certain _____ properties.
4. A mixture which has different composition and properties in different parts of their mass is called a _____ mixture.
5. _____ is used in the laboratory for the preparation of hydrogen using dilute hydrochloric acid.

Question 3

(A) State whether the following statements are true or false.
Rewrite the false statement. [5]

1. A compound is a pure substance composed only of one kind of element combined chemically in a fixed proportion by mass.
2. A chemical reaction in which two or more substances combine to form a single product is called a combination reaction or synthesis.
3. In the formation of ammonia from hydrogen and nitrogen iron is used as positive catalyst.
4. Magnesium has atomic number 12 and atomic mass number 24.
5. The insoluble solid settels down in a beaker is called as sediment.

(B) Name the following:

1. Conversion of a solid to a liquid on heating
2. Conversion of a liquid to a vapour (or gas)
3. Conversion of a vapour (or gas) to a liquid
4. Conversion of a liquid to a solid
5. The outermost shell or orbit of an atom. [5]

Question 4

(A) Give distinguishing explanation between alpha rays, beta rays and gamma rays. [5]

(B) What is a metal reactivity series? What are its important features? [5]

Question 5

(A) Define the following: [5]

1. Lamp black
2. Sugar charcoal
3. Chemical equation
4. Orbit
5. Bone charcoal

(B) Match the name of the radical given in **Column A** with its formula given in **Column B**.[5]

Sr. No.	Column A (Name of the radical)	Column B (Formula)
1.	Chlorate	HCO_3^-
2.	Bicarbonate	MnO_4^-
3.	Bisulphate	Cu^{2+}
4.	Permanganate	ClO_3^-
5.	Cupric	HSO_4^-

Question 6

(A) Write the formula of the given compounds: [5]

1. Acetic acid
2. Sodium hydroxide
3. Sulphuric acid
4. Hydrochloric acid
5. Ammonium hydroxide

(B) Write the electronic configuration of the following elements: [5]

1. Sodium
2. Chlorine
3. Hydrogen
4. Nitrogen
5. Oxygen

Question 7

(A)

1. Differentiate between compound and mixture. [3]
2. What is atomicity? Give one example each of mono atomic and diatomic molecule.[2]

(B)

1. Give the chemical equations for a reaction of potassium with [2]

(a) Oxygen

(b) Water

2. Write the main features of Rutherford's atomic model. [3]

Solution

Question 1

1. **(c)** III
   According to Bohr's model of an atom, electrons revolve around the nucleus in certain definite circular paths called orbits.

2. **(b)** one electron
   Sodium forms sodium cation by loss of one electron

3. **(b)** Oxides
   Hydrogen reduces metal oxides to give metals. That is, hydrogen is a reducing agent. Thus, metal is liberated from metal oxide when hydrogen gas is passed over strongly heated metal oxide. In this reaction, hydrogen itself gets oxidised into water.
   Example: $CuO + H_2 \rightarrow Cu + H_2O$
   Cupric oxide Copper

4. **(b)** Calcium
   Calcium reacts less vigorously with water, and the heat evolved is not sufficient for hydrogen to catch fire. Calcium starts floating in water when allowed to react with it.

5. **(d)** Both test tubes A and B
   Rusting requires moisture and oxygen. Thus, in test tubes A and B, the iron nail will not corrode.

6. **(a)** Concentrated sulphuric acid
   Concentrated sulphuric acid (H_2SO_4) is a hygroscopic substance.

7. **(a)** Chlorination
   Chlorination is the process of sterilisation of water by the addition of chlorine. It is used as a treatment against bacterial infection.

8. **(c)** Coke
   Coke is a solid fuel. Others are liquid fuel.

9. **(a)** Similar chemical properties
   Allotropes have different physical properties and similar chemical properties.

10. Similar chemical properties.

    Allotropes have similar chemical properties.

10. (b) Indicators

An indicator is a dye which is a weak organic acid or a base which changes colour when it is added to an acid or a base.

An indicator gives different colours in acidic and basic media. Thus, an indicator tells us whether the substance we are testing is acidic or basic.

11. (a) Pink

When phenolphthalein indicator is added to ammonium hydroxide (a base), it changes its colour from colourless to pink.

12. (c) $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$

The correct balanced equation for the reaction between aluminium and hydrochloric acid is

$2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$

13. (c) Respiration

Plants and animals are dependent on oxygen for respiration.

14. (b) -1

-1 is the charge on an electron

15. (a) Melting

Conversion of a solid to a liquid on heating is melting

Question 2

(A)

1. Electronic configuration of atom 'A' = (2, 8, 2)
2. Electronic configuration of atom 'B' = (2, 8, 8, 1)
3. Electronic configuration of atom 'C' = (2, 5)
4. Electronic configuration of atom 'D' = (2, 8, 8, 8)
5. Electronic configuration of atom 'E' = (2, 8)

(B)

1. When few drops of phenolphthalein are added to sodium hydroxide, the solution turns **Pink**
2. Separation of components of air such as liquid nitrogen and liquid oxygen is possible by **fractional distillation**.
3. The three states of matter are classified on the basis of differences in certain **physical properties**.
4. A mixture which has different composition and properties in different parts of their mass is called a **heterogeneous** mixture.
5. **Granulated zinc** is used in the laboratory for the preparation of hydrogen using dilute hydrochloric acid.

Question 3

(A)

1. False. A compound is a pure substance composed of two or more elements combined chemically in a fixed proportion by mass.
2. True
3. True.. When catalyst increases the rate of reaction it is known as positive catalyst. Finely divided iron is used as positive catalyst in the manufacture of ammonia from hydrogen and nitrogen.
4. True
5. True

(B)

1. Melting
2. Vaporisation
3. Condensation
4. Freezing
5. Valence shell

Question 4

(A)

Alpha rays	Beta rays	Gamma rays
1. It contains positively charged particles called alpha particles.	1. It contains negatively charged particles called beta particles.	1. These are electromagnetic radiations.
2. They are helium nuclei (He^{2+}) each containing two neutrons but no electrons.	2. –	2. –
3. These rays have 2 unit positive charge and 4 amu mass.	3. These rays have 1 unit negative charge and negligible mass (mass of an electron).	3. They have neither mass nor charge.

4. The velocity of a particle is $1/10^{th}$ the velocity of light (velocity of light is 3×10^8 m/sec).	4. The velocity of b particles is equal to the velocity of light (velocity of light is 3×10^8 m/sec).	4. Their velocity is equal to that of light.
5. The penetrating power of a particle is not very high.	5. They have greater penetrating power compared to alpha particles.	5. They have a very high penetrating power, i.e. they can penetrate a 30-cm thick iron plate.
6. They are slightly affected by magnetic and electrical fields.	6. They are strongly affected by magnetic and electrical fields.	6. They are not affected by magnetic and electrical fields.

(B) Metal reactivity series

A list in which metals are arranged in the deceasing order of their chemical reactivity is called the metal reactivity series.

The most active metal (potassium) is placed at the top of the list, and the least active metal (platinum) is placed at the bottom of the list.

Features of the activity series:

i. The ease with which a metal in solution loses electron/s and forms a positive ion deceases down the series, from potassium to gold.
ii. Hydrogen is included in the activity series because hydrogen, like metals, also loses an electron and becomes positively charged (H+) in most chemical reactions.
iii. The series facilitates the comparative study of metals in terms of the degree of their reactivity.
iv. Compounds of metals (oxides, carbonates, nitrates, hydroxides) can also be easily compared.

Question 5

(A)

1. Lamp black is the black smoke which is collected in the form of black powder over damp blankets kept inside the chambers. The collected powder is called lamp black or soot.
2. Sugar charcoal is the purest form of amorphous carbon. It is prepared by heating cane sugar or glucose in the absence of air.
3. The representation of a chemical reaction with the help of chemical formulae of the reactants and products is a chemical equation.
4. Electrons revolve around the nucleus in an imaginary path called orbit or shell.
5. Destructive distillation of bones produces bone charcoal along with bone oil and organic compound pyridine.

(B)

Sr. No.	Column A (Name of the radical)	Column B (Formula)
1.	Chlorate	ClO_3^-
2.	Bicarbonate	HCO_3^-
3.	Bisulphate	HSO_4^-
4.	Permanganate	MnO_4^-
5.	Cupric	Cu^{2+}

Question 6

(A)

1. Acetic acid – CH_3COOH
2. Sodium hydroxide – NaOH
3. Sulphuric acid – H_2SO_4
4. Hydrochloric acid – HCl
5. Ammonium hydroxide – NH_4OH

(B)

1. Sodium – (Na_{11}) – Electronic configuration – (2, 8, 1)
2. Chlorine – (Cl_{17}) – Electronic configuration – (2, 8, 7)
3. Hydrogen – (H_1) – Electronic configuration – (1)
4. Nitrogen – (N_7) – Electronic configuration – (2, 5)
5. Oxygen – (O_8) – Electronic configuration – (2, 6)

Question 7

(A)

1. Differences between compound and mixture:

Compound	Mixture
1. It is obtained by the chemical combination of more than one element.	1. It is obtained by the physical combination of either elements or compounds or both.
2. The composition of elements present in a compound is fixed.	2. The composition of elements present in a mixture is not fixed.
3. The properties of a compound are different from those of its elements.	3. It shows the properties of all its constituent elements.
4. Its constituents can be separated by using only chemical and electrochemical methods.	4. Its constituents can be separated using physical methods.
5. A compound is always homogeneous.	5. A mixture can be homogeneous or heterogeneous.

2 . **Atomicity** is the number of atoms present in a molecule of an element.

Example:

Monoatomic molecule - Helium (He)

Diatomic molecule - Oxygen (O2)

(B)

1. **Compounds:**

(a) Potassium is very reactive and reacts with oxygen in the air at room temperature to form oxide.

- $4K + O_2 \rightarrow 2K_2O$

(b) Potassium reacts vigorously with cold water to evolve hydrogen which immediately catches fire producing a lot of heat.

- $2K + 2H_2O \rightarrow 2KOH + H_2 + Heat$

2. **Main features of Rutherford's theory of an atom**

- There is a positively charged centre in the atom called the nucleus in which nearly all the mass of the atom is concentrated.
- Negatively charged particles called electrons revolve around the nucleus in paths called orbits.
- The size of the nucleus is very small as compared to the size of the atom.
- His model can be compared to the Solar System where the planets are compared with electrons and the Sun with the nucleus.