ASSESSMENT -I
CHEMISTRY (GRADE –X)

Maximum Marks : 80
Time Allowed: Two hours

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

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Section A is compulsory. Attempt any 4 questions from Section B. The intended marks for questions or parts of questions are given in brackets

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SECTION A (40 Marks)

(Attempt all questions from this section)

Question 1

Choose the correct answers to the question from the given options: **[15]**

i) The modern periodic law states that the properties of elements are a periodic function of their:
a) Mass number b) Atomic mass c) Atomic number d) Number of neutrons

ii) Across a period in the periodic table, the atomic size:
a) Increases b) Decreases c) Remains the same d) First increases then decreases

iii) Which of the following elements has the highest electronegativity?
a) Sodium b) Oxygen c) Fluorine d) Chlorine

iv) Metallic character increases:
a) From left to right in a period b) From top to bottom in a group
c) From right to left in a period d) Both b and c

v) Which group of the periodic table contains noble gases?
a) Group 1 b) Group 7 c) Group 0 or 18 d) Group 17

vi) Which of the following elements has the smallest atomic radius?
a) Lithium b) Beryllium c) Boron d) Fluorine

vii) The number of valence electrons in all Group 17 elements is:
a) 7 b) 1 c) 17 d) 8

viii) **Assertion(A):** Noble gases are unreactive, while atoms of other aliments are chemically reactive.
Reason(R): Atoms of other elements complete their update by losing or gaining electrons.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) Both A and R are false.

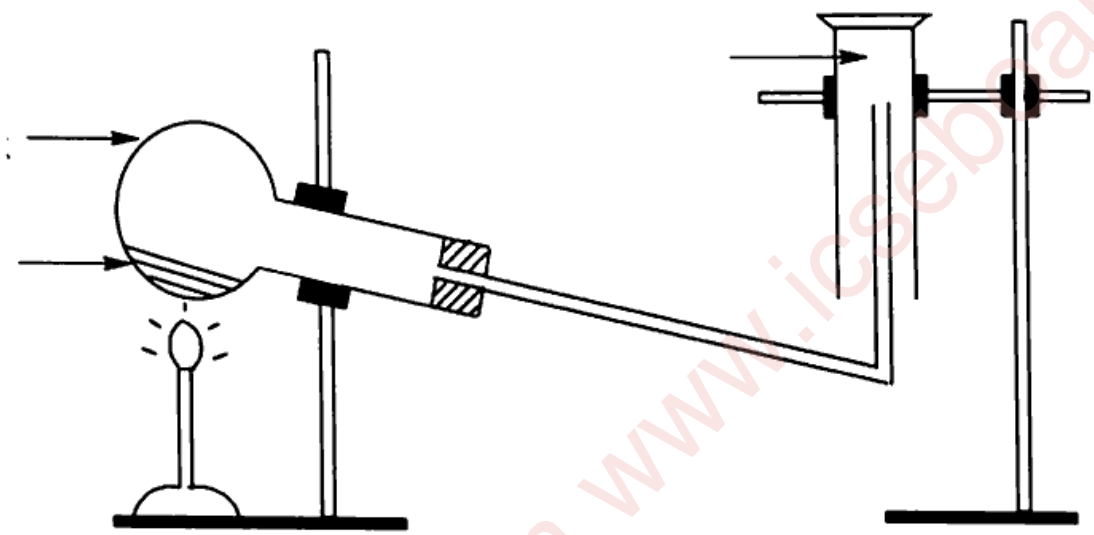
ix) Which of the following is a characteristic property of acids?
a) They feel soapy b) They turn blue litmus red
c) They turn red litmus blue d) They are bitter in taste

x) Which of the following is a strong base?
a) Ammonium hydroxide b) Calcium hydroxide
c) Sodium hydroxide d) Magnesium hydroxide

xi) A salt is formed when:
a) An acid reacts with a base b) A base reacts with metal
c) An acid reacts with a non-metal d) A base reacts with salt
xii) The pH of a neutral solution is:
a) 0 b) 7 c) 14 d) Depends on temperature
xiii) Which of the following salts is acidic in nature?
a) Sodium chloride b) Ammonium chloride c) Sodium carbonate d) Potassium nitrate
xiv) Which acid is present in vinegar?
a) Formic acid b) Acetic acid c) Citric acid d) Oxalic acid
xv) What is the nature of a solution with pH = 3?
a) Neutral b) Weakly acidic c) Strongly acidic d) Weakly basic

Question 2

(i) Diagram shows an apparatus for the laboratory preparation of ~~hydrogen chloride.~~ Ammonia [5]



(a) Name the solid reactants used in the test tube for the preparation of ammonia.
(b) What is the role of quicklime in the preparation of ammonia?
(c) Which physical property of ammonia allows it to be collected by downward displacement of air?
(d) Why is water not used as a drying agent for ammonia gas?
(e) Name the method used to collect ammonia gas in this experiment.

(ii) Match the following: [5]

	Column A	Column B
(a)	Sodium Chloride (NaCl)	(i) has low boiling and melting point
(b)	Water (H_2O)	(ii) Electrovalent bond
(c)	Shared pair of electrons	(iii) Lewis dot structure
(d)	Transfer of electrons	(iv) Covalent compound
(e)	Electron dot representation	(v) Ionic compound

(iii) Fill in the blanks: [5]

(a) When sodium hydroxide is added to a solution containing copper(II) ions, a _____[blue/white] precipitate is formed.
(b) The ammonium ion can be identified by the release of a gas with a pungent smell when heated with _____. [sodium hydroxide/magnesium hydroxide]

(c) A white precipitate formed with barium chloride solution indicates the presence of _____ [sulphate /sulphite]_ ions.

(d) The flame test for calcium gives a _____[brick red/apple green] colour to the flame.

(e) When dilute hydrochloric acid is added to a carbonate. _____ .[CO_2/SO_2] gas is evolved.

(iv) State the term process of the following **[5]**

(a) Identify the name of the constant that represents the number of particles in one mole of a substance.

(b) Identify the name of the formula that gives the simplest whole-number ratio of atoms in a compound.

(c) Identify the term for the amount of substance that contains 6.022×10^{23} particles

(d) Identify the name of the mass of one mole of a substance, expressed in grams.

(e) Identify the name of the calculation method used to determine the quantity of reactants or products in a chemical reaction.

(v) (a) What is the chemical formula of ammonia? **[5]**

(b) Which catalyst is used in the Haber process for the manufacture of ammonia?

(c) Name the gas that is alkaline in nature and turns red litmus blue.

(d) State one use of ammonia in agriculture.

(e) Which drying agent is used to dry ammonia gas in the laboratory?

SECTION B (40 Marks)

(Attempt any four questions from this section)

Question 3

(i) Why does the atomic radius decrease across a period from left to right in the periodic table? Explain with an example. **[2]**

(ii) Compare the ionization potential of sodium and chlorine. Which one is higher and why? **[2]**

(iii) Element A belongs to Group 1 and Period 3, while element B belongs to Group 17 and Period 3. Predict and explain the difference in their: **[3]**

(a) Metallic character

(b) Atomic size

(c) Electron affinity

(iv) Draw electron dot (Lewis) structures for the following compounds and identify the type of bond in each: **[3]**

(a) HCl (b) NaCl (c) O_2

Question 4

(i) What is the difference between an electrovalent bond and a covalent bond? Give one example of each. **[2]**

(ii) Why do ionic compounds have high melting and boiling points? **[2]**

(iii) You are given three colourless solutions labelled A, B, and C. A turns blue litmus red, B turns red litmus blue, and C shows no change. **[3]**

(a) Identify the nature of each solution (acid, base, or neutral).

(b) Which indicator could be used to distinguish between all three more effectively?

(c) Suggest a test to confirm the acidic nature of solution A using a metal.

(iv) You are given an unknown salt solution. You add sodium hydroxide dropwise and then in excess. **[3]**

(a) A reddish-brown precipitate is observed. Which ion is likely present?
(b) Write the name and formula of the precipitate formed.
(c) What will happen if ammonium hydroxide is used instead?

Question 5

(i) (a) A solution turns red litmus blue. What does this indicate about the solution? **[2]**
(b) Give one real-life example where such a solution is commonly used.

(ii) (a) When a bee stings, methanoic acid enters the skin. What should be applied to reduce the pain, and why? **[2]**

(b) What type of chemical reaction is involved here?

(iii) Calculate the percentage composition of elements in sodium carbonate (Na_2CO_3).
(Given: Na = 23, C = 12, O = 16) **[3]**

(iv) Answer the question: **[3]**

(a) Write a balanced chemical equation for the laboratory preparation of hydrogen chloride gas.

(b) Name the reactants used in this preparation.

(c) Why is concentrated sulphuric acid used and not nitric acid?

Question 6

(i) (a) What is observed when aqueous sodium hydroxide is added to a solution containing zinc ions drop by drop? **[2]**
(b) What happens when excess sodium hydroxide is added to the same solution?

(ii) (a) Which gas is released when dilute hydrochloric acid is added to a carbonate salt? **[2]**
(b) How will you confirm the identity of this gas?

(iii) Ammonia shows basic properties and forms salts. **[3]**

(a) What is observed when ammonia gas is passed through hydrochloric acid gas?

(b) Write the balanced chemical equation for this reaction.

(c) What is the name of the salt formed?

(iv) Write a balanced chemical equation **[3]**

(a) For the thermal decomposition of calcium carbonate.

(b) Name the products formed in this reaction.

(c) What mass of calcium carbonate is required to produce 44 g of carbon dioxide?
(Given: Ca = 40, C = 12, O = 16) [3]

Question 7

(i) (a) Define one mole of a substance. (Given: Mg = 24, C = 12, O = 16) **[2]**
(b) How many atoms are there in 1 mole of magnesium?

(ii) (a) What is the molar mass of calcium carbonate ($MgCO_3$)? **[2]**
(b) Calculate the number of moles in 42 g of $MgCO_3$.

(iii) Calculate the percentage composition of elements in sodium carbonate (K_2CO_3).
(Given: K = 39, C = 12, O = 16) **[3]**

(iv) A student performs a flame test on an unknown salt. **[3]**

(a) The flame appears brick red. Which metal ion is present?

(b) Name one other metal ion that gives a characteristic flame colour.

(c) Why is a platinum or nichrome wire used in flame tests?

Question 8

(i) (a) Why is HCl gas highly soluble in water? **[2]**
(b) What is formed when HCl dissolves in water?

(ii) (a) Why is HCl not collected over water during preparation? **[2]**
(b) Which method is used to collect HCl gas and why?

(iii) Convert the following reactions into balanced chemical equation: Ammonia is prepared in the laboratory and in industries. **[3]**

(a) Name the process used for the industrial preparation of ammonia.
(b) Write a balanced chemical equation for the laboratory preparation of ammonia.
(c) Why is ammonia collected by the downward displacement of air?

(iv) Hydrochloric acid reacts with calcium carbonate in the lab. **[3]**

(a) Write a balanced chemical equation for this reaction.
(b) What are the observable products formed during the reaction?
(c) How is this reaction useful in understanding the effect of acid rain on marble structures?