HALF YEARLY EXAMINATION: 2024-2025
CLASS: IX
SUBJECT: CHEMISTRY

NAME OF STUDENT: ..... **MAX. MARKS: 80**
DATE: ..... **TIME: 2 HOURS**

Note: 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 A is compulsory. Attempt any four questions from Section B. The intended marks for questions or parts of questions are given in brackets [ ].

SECTION A (40 Marks)
(Attempt all questions from this Section)

Question 1
Choose the correct answers to the questions from the given options. [15]
(Do not copy the question, write the correct answers only.)

(i) Reaction between an acid and a base that forms salt and water only is known as:
P. Direct combination.
Q. Neutralization.
R. Double decomposition.
(a) Only P (b) Only Q
(c) Both P and Q (d) Both Q and R

(ii) The formula of sodium carbonate is Na_2CO_3 and that of sodium bicarbonate is:
(a) Na_2HCO_3 (b) $Na(HCO_3)_2$
(c) $NaHCO_3$ (d) NaH_2CO_3

(iii) In AℓN the valency of aluminium and nitride respectively are:
(a) 3 and 2 (b) 2 and 3
(c) 3 and 3 (d) 3 and 1

(iv) In $Ca(NO_3)_x$, the value of X is:
(a) 1 (b) 2
(b) 3 (d) 4

(v) Assertion (A): Water acts as a universal solvent.
Reason (R): Water has high specific heat capacity.
(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) A is false but R is true.

(vi) Heating of copper nitrate is a _____ reaction.
(a) Displacement (b) Combination
(c) Decomposition (d) Redox

(vii) Solid solutions are called:
(a) Alloys (b) Allotropes
(c) Isomers (d) Isotopes

(viii) The electronic configuration of Ca^{2+} is:
(a) 2, 8, 2 (b) 2, 8, 8
(c) 2, 8, 8, 2 (d) 2, 8, 8, 4

(ix) Substances which lose their water of crystallisation on exposure to dry air are called:
P. Efflorescent substances
Q. Deliquescent substances
R. Hygroscopic substances
(a) only P (b) only Q
(c) only R (d) Both P and R

(x) The valency of tin in SnO_2 is:
(a) 1 (b) 2
(c) 3 (d) 4

(xi) An example of a double covalent bond is:
(a) Nitrogen molecule (b) Hydrogen molecule
(c) Chlorine molecule (d) Oxygen molecule

(xii) Which of the following substances can act as a dehydrating as well as a drying agent?
(a) Oxalic acid (b) Formic acid
(c) Conc. nitric acid (d) Conc. sulphuric acid

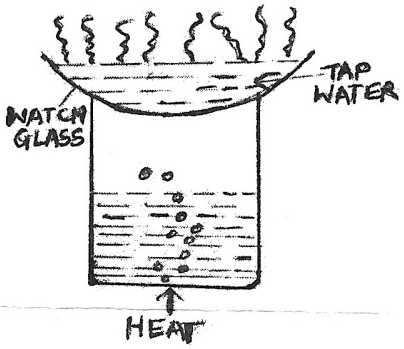
(xiii) According to Bohr-Bury scheme, the maximum number of electrons in a particular shell is given by the formula:
(a) 2n (b) 4n
(c) $2n^2$ (d) $4n^2$

(xiv) Assertion(A) : Blue solution of copper sulphate changes to green when a piece of iron is added to this solution.
Reason(R) : Iron displaces copper.
(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) A is false but R is true.

(xv) The crystalline substance that does not contain water of crystallisation is:
(a) Plaster of Paris (b) Gypsum
(b) Potassium permanganate (d) Epsom salt

Question 2

(i) (a) Sheena performed the following experiment in the laboratory with the given setup: [4]



Answer the following questions based on this experiment:
(1) What did she observe in the experiment?
(2) What did she conclude through this experiment?
(3) What will she observe and conclude when tap water is replaced by rain water?
(b) A solution contains 30gm of sodium chloride in 270gm of water. Calculate the concentration of the solution. [1]

(ii) Give reasons for the following: [5]
(a) Silver nitrate solution is kept in coloured bottles.
(b) Rivers and lakes do not freeze easily.
(c) Physical properties of isotopes are different.
(d) Burns caused by steam are more severe than burns caused by boiling water.
(e) Molybdenum is used in the manufacture of ammonia.

(iii) Name the following: [5]
(a) A compound which produces CO_2 on heating.
(b) A nitrate which produces oxygen as the only gas on heating.
(c) A solution where solvent is a liquid other than water.
(d) A metal carbonate which does not decompose on heating.
(e) The substance that can remove hydrogen atom in the ratio of 2:1 from the compounds.

(iv) State one relevant observation for each of the following: [5]
(a) Zinc carbonated is heated.
(b) H_2S gas is passed through copper sulphate solution.
(c) Silver chloride is exposed to sunlight.
(d) Barium chloride is added to sodium sulphate solution.
(e) Hydrated copper (II) sulphate is heated.

(v) Fill in the blanks by choosing the correct answers from the brackets: [5]
(a) _____ ($FeCl_3$ / KCl) is a deliquescent salt.
(b) _____ (Sodium sulphate/Magnesium bicarbonate) is the cause of hardness in water.

(c) Chemical formula of Copper (II) oxide is _____. (CuO/ Cu_2O)
(d) Element having atomic number 9 forms _____. (a cation/an anion)
(e) If a salt on heating gives water vapour, then that salt is _____. (hygroscopic/hydrated)

SECTION B (40 MARKS)
(Attempt any four questions from this Section)

Question3

(i) Draw electron dot diagram of : [2]
(a) Nitrogen molecule
(b) Calcium oxide

(ii) $KI + C\ell_2 \rightarrow KC\ell + I_2$ [4]
(a) Balance the chemical equation given above.
(b) Which type of reaction is it?
(c) Which element is more reactive?
(d) What is observed during the reaction?

(iii) The formula of the sulphite of an element M is MSO_3. Write the formula of its : [2]
(a) hydroxide (b) aluminate

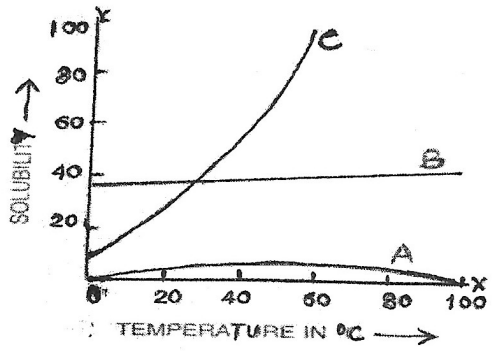
(iv) An element X has 15 electrons and 16 neutrons. What is the atomic number and atomic mass of the element X? [2]

Question 4

(i) An atom of an element Y may be written as ${}^{9}_{4}Y$ [5]
(a) What does the figure 9 indicate?
(b) What does figure 4 indicate?
(c) What is the number of protons in atom Y?
(d) What is the number of neutrons in atom Y?
(e) What is the number of electrons in atom Y?

(ii) (a) In the formation of the compound XY_2, an atom X gives one electron to each Y atom. What is the nature of bond in XY_2? [1]
(b) Draw the electron dot structure of this compound (XY_2) [1]

(iii) The following figure shows the solubility curves of $NaC\ell$, KNO_3 and hydrated calcium sulphate.



Identify and label the curves A, B and C with the salt it represents. [3]

Question 5

(i) Atom A is represented as ${}^{54}_{24}A$ atom B as ${}^{54}_{26}B$ and atom C as ${}^{52}_{24}C$. [4]
(a) Name the term which can be used for A and B atoms.
(b) Name the term which can be used for A and C atoms.
(c) Define the terms mentioned in parts (a) and (b)

(ii) In the formation of $CC\ell_4$ molecule, mention the nearest noble gas configuration attained by carbon and chlorine respectively. [2]

(iii) Draw diagrams representing the atomic structure of the following: [2]
(a) Sodium atom (b) Chloride ion

(iv) Why does temperature in Mumbai and Chennai not fall as low as it does in Delhi? [1]

(v) Rohan heated lead nitrate crystals. What did he observe? [1]

Question 6

(i) State the type of bonding in the following molecules: [3]
(a) Water
(b) Sodium chloride
(c) Methane

(ii) Name: [2]
(a) an element which does not contain neutron.
(b) the sub-atomic particle discovered by Goldstein.

(iii) Which part of an atom was discovered by Rutherford? State one major drawback of Rutherford model. [2]

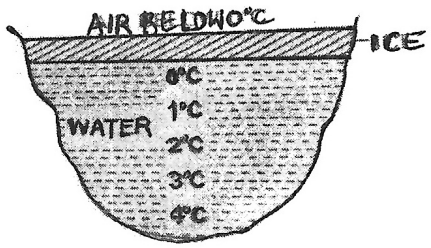
(iv) [3]
(a) Give equation to show what happens when temporary hard water is boiled.
(b) Balance the equation:

$$A\ell_4C_3 + H_2O \rightarrow A\ell(OH)_3 + CH_4$$

(c) Calculate the relative molecular mass of $(NH_4)_2Cr_2O_7$.
[Given Atomic mass: N = 14, Cr = 52, H = 1, O = 16]

Question 7

(i) Answer the following questions based on the following diagram: [3]



(a) Which physical property of water is explained through the given diagram?
(b) At what temperature is the density of water maximum?
(c) How do fishes and aquatic animals survive in winters when the pond gets covered with thick ice?

(ii) Name two compounds that are covalent when taken pure but produce ions when dissolved in water. [2]

(iii) Match the atomic numbers 4, 8, 10, 15 and 19 with each of the following: [5]
(a) Element which can form trivalent ion.
(b) An element with 4 shells.
(c) Element with 6 valence electrons.
(d) Element which does not form an ion.
(e) A metal with valency 2.

Question 8

(i) Give the terms for the following definitions: [2]
(a) A bond formed by a shared pair of electrons, each bonding atoms contributing one electron to the pair.
(b) A bond formed by transfer of electron(s).

(ii) An element: A has atomic number 7 and mass number 14. [5]
B has 13 electrons, 14 neutrons.
C has 18 protons and 22 neutrons.
State: (a) The valency of A and C.
(b) Which one is a metal?
(c) Which one is a non-metal?
(d) Which is an inert gas?

(iii) Complete the table: [3]

Element	Mass no	Atomic no	No of electrons	No of neutrons	Electronic configuration
Potassium	39	19	(a)	(b)	(c)