Section A: Competency Based MCQs

(1 × 10 = 10 marks)

1. On increasing temperature, the kinetic energy of particles:

   (a) Decreases

   (b) Remains same

   (c) Increases

   (d) First increases then decreases

2. Evaporation causes cooling because:

   (a) High energy particles escape

   (b) Low energy particles escape

   (c) Temperature increases

   (d) Pressure decreases

3. Which of the following is a true solution?

   (a) Milk

   (b) Smoke

   (c) Salt in water

   (d) Muddy water

4. The ratio of hydrogen and oxygen by mass in water is always:

   (a) 1 : 1

   (b) 2 : 1

   (c) 1 : 8

   (d) 8 : 1

5. Which law explains the above statement?

   (a) Law of conservation of mass

   (b) Law of constant proportions

   (c) Law of multiple proportions

   (d) Avogadro's law

6. Number of atoms present in 1 mole of aluminium is:

   (a) 6.022×10^{23}

   (b) 3.011×10^{23}

   (c) 1.204×10^{24}

   (d) Depends on mass

7. If atomic number of an element is 15, then number of neutrons is:

   (Mass number = 31)

   (a) 15

   (b) 16

   (c) 31

   (d) 46

8. Which model could explain the stability of atom?

   (a) Dalton's model

   (b) Thomson's model

   (c) Rutherford's model

   (d) Bohr's model

9. Maximum electrons present in N-shell is:

   (a) 8

(b) 18

(c) 32

(d) 2

10. Isotopes are useful in medical field because they:

(a) Are radioactive

(b) Are chemically different

(c) Have same atomic mass

(d) Are unstable elements

Section B: Assertion & Reason

(1 × 5 = 5 marks)

For the following questions, choose the correct option:

(a) Both A and R are true and R is the correct explanation

(b) Both A and R are true but R is not the correct explanation

(c) A is true but R is false

(d) A is false but R is true

Assertion (A): Evaporation takes place at all temperatures.

Reason (R): Particles of liquid have different kinetic energies.

Assertion: Colloids show Tyndall effect.

Reason: Colloidal particles are large enough to scatter light.

Assertion: Mass is conserved in a chemical reaction.

Reason: Atoms are neither created nor destroyed.

Assertion: Isotopes have same chemical properties.

Reason: Chemical properties depend on electronic configuration.

Assertion: Rutherford's model failed to explain atomic stability.

Reason: Revolving electrons should lose energy continuously.

Section C: Numerical & Analytical Questions

(2 × 6 = 12 marks)

16. Write the difference between physical and chemical change.

17. Write molecular mass of

    a) Ammonium sulphate
    b) Calcium carbonate
    c) Zinc oxide
    d) Potassium nitrate

18. A solution contains 20 g of salt in 180 g of water.

    Calculate mass percentage of salt.

19. Determine the number of neutrons in an atom having atomic number 11 and mass number 23.

20. Write electronic configuration of an element having atomic number 13. Identify the element.
21. Why does evaporation increase with increase in surface area and temperature?

Section D: Long Answer / HOTS

(4 × 2 = 8 marks)

(a) Explain interconversion of states of matter on the basis of kinetic energy and intermolecular forces.

OR

Explain the effect of pressure on boiling point of liquids.

Describe Bohr’s atomic model. How did it overcome the limitations of Rutherford’s model?

Section E: Case-Based Question

(5 marks)

A student was given a mixture of ammonium chloride, sand and common salt.

(a) Which substance can be separated by sublimation?

(b) Name the process used to separate sand.

(c) How will salt be obtained from the remaining mixture?

(d) Classify the mixture as homogeneous or heterogeneous.

(e) Which property of matter is used in sublimation?

Numericals

Chapter 1: Matter in Our Surroundings

Convert 27°C into Kelvin.

Convert 300 K into degree Celsius.

Calculate the density of a substance of mass 200 g and volume 100 cm^3.

Which has higher density: 1 kg of iron or 1 kg of cotton? (Explain numerically)

Chapter 2: Is Matter Around Us Pure

Calculate the mass percentage of salt in a solution containing 20 g salt in 180 g water.

Find the concentration (g/L) of a solution containing 10 g sugar dissolved in 200 mL water.

How much solute is present in 500 g of a 10% salt solution?

A solution contains 5 g of solute in 95 g of water. Find mass percent.

How much water should be added to 20 g of salt to make a 5% solution?

Chapter 3: Atoms and Molecules

How many molecules are present in 18 g of water?

Find the mass of 0.5 mole of oxygen gas.

Chapter 4: Structure of the Atom

Find the number of electrons, protons, and neutrons in an atom of atomic number 11 and mass number 23.

Calculate the number of neutrons in Cl-35.

How many electrons are present in Mg^{2+} ion?

Write the electronic configuration of an element with atomic number 17.

Find the valency of an element having atomic number 12.