

Some Basic Concepts of Chemistry — Assignment 1

Class 11 Chemistry · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Laws of Chemical Combination

MCQ Questions (choose the correct option)

- The law of conservation of mass states that matter can neither be
(A) created nor destroyed in a chemical reaction
(B) heated nor cooled
(C) oxidised nor reduced
(D) dissolved nor precipitated
- The law of definite proportions was given by
(A) Proust
(B) Dalton
(C) Gay-Lussac
(D) Avogadro
- The law of multiple proportions is illustrated by
(A) CO and CO₂
(B) NaCl and KCl
(C) H₂O only
(D) O₂ and O₃ only
- Gay-Lussac's law of gaseous volumes applies to
(A) gases
(B) solids
(C) liquids
(D) all states

1 Mark Questions

- State the law of conservation of mass.
- State the law of definite proportions.
- What is the law of multiple proportions?

2 Mark Questions

- State the law of multiple proportions and illustrate it with an example.
- State Gay-Lussac's law of gaseous volumes and give one example.

3 Mark Questions

- State and explain the five laws of chemical combination with suitable examples.
- Explain the law of definite proportions and the law of multiple proportions with examples, and state Avogadro's law.

Atomic and Molecular Mass, Avogadro's Number

MCQ Questions (choose the correct option)

- One atomic mass unit (1 u) is equal to
 - 1.66×10^{-24} g
 - 1.66×10^{-27} g
 - 6.022×10^{23} g
 - 1 g
- Avogadro's number is
 - 6.022×10^{23}
 - 6.022×10^{-23}
 - 3.011×10^{23}
 - 1.66×10^{-24}
- The molar mass of a substance is the mass of
 - 1 mole of the substance
 - 1 molecule
 - 1 atom
 - 1 dm³
- The number of atoms in 1 mole of a substance is
 - Avogadro's number
 - one
 - half of Avogadro's number
 - twice Avogadro's number

1 Mark Questions

- Define atomic mass unit.
- What is Avogadro's number?
- What is molar mass?

2 Mark Questions

- Define atomic mass, molecular mass and molar mass with one example each.
- Calculate the number of moles in 22 g of CO₂. (Ans: 0.5 mol)

3 Mark Questions

- Explain atomic mass and molecular mass with examples, and state the relation between the mole and Avogadro's number.
- Calculate the number of molecules and atoms in 11.2 L of oxygen gas at STP. (Ans: 3.011×10^{23} molecules, 6.022×10^{23} atoms)

Stoichiometry and the Mole**MCQ Questions (choose the correct option)**

- One mole of a gas at STP occupies a volume of
 - 22.4 L
 - 11.2 L
 - 44.8 L
 - 1 L

2. The number of moles is equal to
 - (A) mass / molar mass
 - (B) molar mass / mass
 - (C) mass $\times$ molar mass
 - (D) mass + molar mass
3. The number of molecules in 1 mole of water is
 - (A) 6.022×10^{23}
 - (B) 3.011×10^{23}
 - (C) 1.204×10^{24}
 - (D) 1
4. The molar volume of a gas at STP is
 - (A) 22.4 L
 - (B) 24.4 L
 - (C) 44.8 L
 - (D) 2.24 L

1 Mark Questions

1. Define a mole.
2. What is the molar volume of a gas at STP?
3. Write the relation between the number of moles, mass and molar mass.

2 Mark Questions

1. Define mole and state the molar volume of a gas at STP.
2. Calculate the number of moles in 5.6 L of nitrogen at STP. (Ans: 0.25 mol)

3 Mark Questions

1. Explain the concept of the mole and use it to calculate the number of molecules in 100 g of water. (Ans: 3.34×10^{24})
2. Calculate the mass of 2.24 L of CO_2 at STP and the number of molecules present. (Ans: 4.4 g, 6.022×10^{22} molecules)

Percentage Composition, Empirical and Molecular Formulas

MCQ Questions (choose the correct option)

1. The empirical formula gives the
 - (A) simplest whole-number ratio of atoms
 - (B) actual number of atoms
 - (C) molar mass
 - (D) percentage composition
2. The molecular formula is related to the empirical formula by
 - (A) $n = \text{molecular mass} / \text{empirical formula mass}$
 - (B) $n = \text{empirical formula mass} / \text{molecular mass}$
 - (C) $n = \text{mass} / \text{volume}$
 - (D) $n = 1$
3. The percentage of an element in a compound equals
 - (A) $(\text{mass of element} / \text{molar mass of compound}) \times 100$
 - (B) molar mass / mass of element

- (C) mass of element $\times 100$
(D) mass of compound / mass of element
4. For a compound with 40% C, 6.7% H and 53.3% O, the empirical formula is
- (A) CH_2O
(B) $\text{C}_2\text{H}_4\text{O}$
(C) CHO
(D) $\text{C}_6\text{H}_{12}\text{O}_6$

1 Mark Questions

1. What is percentage composition?
2. Define the empirical formula of a compound.
3. How is the molecular formula related to the empirical formula?

2 Mark Questions

1. Calculate the percentage composition of carbon dioxide. (Ans: 27.27% C, 72.73% O)
2. A compound has empirical formula CH_2O and molar mass 180 g/mol. Find its molecular formula. (Ans: $\text{C}_6\text{H}_{12}\text{O}_6$)

3 Mark Questions

1. A compound contains 40% C, 6.7% H and 53.3% O by mass. Determine its empirical formula and molecular formula if its molar mass is 60 g/mol. (Ans: CH_2O , $\text{C}_2\text{H}_4\text{O}_2$)
2. Calculate the mass of carbon in 1.5 g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$). (Ans: 0.6 g)

Stoichiometric Calculations and Limiting Reagent

MCQ Questions (choose the correct option)

1. The reactant that is completely consumed in a reaction is called the
(A) limiting reagent
(B) excess reagent
(C) catalyst
(D) product
2. In the reaction $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$, the mole ratio of H_2 to NH_3 is
(A) 3:2
(B) 2:3
(C) 1:1
(D) 3:1
3. The mass of product formed is decided by the
(A) limiting reagent
(B) excess reagent
(C) catalyst
(D) solvent
4. Stoichiometric calculations are based on
(A) the balanced chemical equation
(B) the molecular mass only
(C) the volume only
(D) temperature

1 Mark Questions

1. What is a limiting reagent?
2. What is meant by stoichiometry?
3. Which reactant decides the amount of product formed?

2 Mark Questions

1. Define limiting reagent and give an example.
2. Calculate the mass of water formed when 4 g of H_2 reacts with excess O_2 . ($2H_2 + O_2 \rightarrow 2H_2O$) (Ans: 36 g)

3 Mark Questions

1. In the reaction $N_2 + 3H_2 \rightarrow 2NH_3$, if 28 g of N_2 reacts with 6 g of H_2 , find the limiting reagent and the mass of NH_3 formed. (Ans: H_2 limiting; 34 g)
2. Explain stoichiometric calculations using the reaction of calcium carbonate decomposition. Calculate the mass of CaO formed from 100 g of $CaCO_3$. (Ans: 56 g)

Concentration Terms**MCQ Questions (choose the correct option)**

1. Molarity is defined as the number of moles of solute per
 - (A) litre of solution
 - (B) kilogram of solvent
 - (C) litre of solvent
 - (D) mole of solution
2. Molality is defined as the number of moles of solute per
 - (A) kilogram of solvent
 - (B) litre of solution
 - (C) litre of solvent
 - (D) mole of solvent
3. Mass percentage is the mass of solute per
 - (A) 100 g of solution
 - (B) 100 g of solvent
 - (C) litre of solution
 - (D) mole of solution
4. Mole fraction of a component is the
 - (A) ratio of its moles to the total moles
 - (B) ratio of its mass to total mass
 - (C) moles per litre
 - (D) moles per kilogram

1 Mark Questions

1. Define molarity.
2. Define molality.
3. What is mass percentage?

2 Mark Questions

1. Define molarity and molality and state how they differ.

2. Calculate the molarity of a solution containing 5.85 g of NaCl in 500 mL of solution. (Ans: 0.2 M)

3 Mark Questions

1. Define and explain the terms molarity, molality, mass percentage and mole fraction with their units.
2. Calculate the mole fraction of ethanol and water in a solution containing 46 g of ethanol and 180 g of water. (Ans: 0.1 and 0.9)