

## Some Basic Concepts of Chemistry — CBSE Pattern Test 1

Class 11 Chemistry · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

### Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Chemistry · Some Basic Concepts of Chemistry · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A ( $1 \times 10$ ), Section B ( $2 \times 4$ ), Section C ( $3 \times 4$ ) and Section D ( $5 \times 2$ ) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take  $g = 10 \text{ m/s}^2$ . All symbols carry their usual meaning. Use of a calculator is not permitted.

#### Section A — MCQ & VSA ( $10 \times 1 = 10$ marks)

1. 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

2. One atomic mass unit (1 u) is equal to

- (A)  $1.66 \times 10^{-24} \text{ g}$
- (B)  $1.66 \times 10^{-27} \text{ g}$
- (C)  $6.022 \times 10^{23} \text{ g}$
- (D) 1 g

3. Avogadro's number is

- (A)  $6.022 \times 10^{23}$
- (B)  $6.022 \times 10^{-23}$
- (C)  $3.011 \times 10^{23}$
- (D)  $1.66 \times 10^{-24}$

4. One mole of a gas at STP occupies a volume of

- (A) 22.4 L
- (B) 11.2 L
- (C) 44.8 L
- (D) 1 L

5. The number of moles is equal to

- (A) mass / molar mass
- (B) molar mass / mass
- (C) mass  $\times$  molar mass
- (D) mass + molar mass

6. The empirical formula gives the

- (A) simplest whole-number ratio of atoms
- (B) actual number of atoms
- (C) molar mass
- (D) percentage composition

7. 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
8. The reactant that is completely consumed is called the  
(A) limiting reagent  
(B) excess reagent  
(C) catalyst  
(D) product
9. State the law of definite proportions.
10. Define a mole.

**Section B — Short Answer I ( $4 \times 2 = 8$  marks)**

11. Calculate the number of moles in 22 g of  $\text{CO}_2$ .
12. Calculate the number of moles in 5.6 L of nitrogen at STP.
13. Calculate the mass of water formed when 4 g of  $\text{H}_2$  reacts with excess  $\text{O}_2$ .
14. Calculate the molarity of a solution containing 5.85 g of NaCl in 500 mL.

**Section C — Short Answer II ( $4 \times 3 = 12$  marks)**

15. State and explain the five laws of chemical combination with suitable examples.
16. Explain the concept of the mole and use it to calculate the number of molecules in 100 g of water.
17. A compound contains 40% C, 6.7% H and 53.3% O by mass. Determine its empirical formula.
18. Define and explain molarity, molality, mass percentage and mole fraction with units.

**Section D — Long Answers ( $2 \times 5 = 10$  marks)**

19. Explain the concept of the mole. Calculate the number of molecules in 100 g of water and the mass of 2.24 L of  $\text{CO}_2$  at STP.
20. In the reaction  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ , 28 g of  $\text{N}_2$  reacts with 6 g of  $\text{H}_2$ . Identify the limiting reagent, calculate the mass of  $\text{NH}_3$  formed, and explain the concept of a limiting reagent.

**Answer Key (Marking Scheme)**

- Q1 — (A) created nor destroyed in a chemical reaction. Q2 — (A)  $1.66 \times 10^{-24}$  g. Q3 — (A)  $6.022 \times 10^{23}$ . Q4 — (A) 22.4 L.
- Q5 — (A) mass / molar mass. Q6 — (A) simplest whole-number ratio of atoms. Q7 — (A) litre of solution. Q8 — (A) limiting reagent.
- Q9 — A pure compound always has a fixed composition by mass.
- Q10 — A mole is  $6.022 \times 10^{23}$  particles and equals the molar mass in grams.
- Q11 —  $22/44 = 0.5$  mol.
- Q12 —  $5.6/22.4 = 0.25$  mol.
- Q13 — 2 mol  $\text{H}_2$  gives 2 mol  $\text{H}_2\text{O} = 36$  g.
- Q14 —  $5.85/58.5 = 0.1$  mol in 0.5 L = 0.2 M.

Q15 — See notes; laws of conservation of mass, definite proportions, multiple proportions, gaseous volumes and Avogadro's law.

Q16 —  $100 \text{ g water} = 5.56 \text{ mol} = 3.34 \times 10^{24} \text{ molecules}$ .

Q17 —  $\text{CH}_2\text{O}$ .

Q18 — See notes for definitions and units.

Q19 —  $3.34 \times 10^{24} \text{ molecules}$ ;  $2.24 \text{ L CO}_2 = 0.1 \text{ mol} = 4.4 \text{ g}$ .

Q20 —  $\text{H}_2$  is limiting;  $2 \text{ mol NH}_3 = 34 \text{ g}$ ; limiting reagent is completely consumed and determines product mass.