

Class 9 Chemistry - Chapter 1 Notes

Fundamentals of Chemistry | Branches, elements, compounds, mole concept | Punjab Boards (PCTB)

Branches of Chemistry

- Organic: study of carbon compounds (hydrocarbons and their derivatives).
- Inorganic: study of all other elements and their compounds.
- Physical: laws and theories explaining chemical behaviour (energy, rates, equilibrium).
- Analytical: composition of substances - qualitative (what is present) and quantitative (how much).
- Biochemistry: chemical processes in living organisms. Environmental chemistry: chemicals and pollution in the environment.

Element, Compound, Mixture

- Element: pure substance made of one kind of atoms, e.g. O₂, Fe, S. There are 118 elements; symbols come from English/Latin names (Na = Natrium, K = Kalium, Fe = Ferrum).
- Compound: two or more elements chemically combined in a fixed ratio, e.g. H₂O, CO₂, NaCl - properties are totally different from its elements.
- Mixture: substances mixed physically in any ratio, separable by physical methods, e.g. air, salt solution.
- Atom: smallest particle of an element taking part in a chemical reaction. Molecule: smallest independent particle of a substance. Ion: charged atom or group (cation +, anion -).

Formulas

- Molecular formula shows the actual number of atoms, e.g. glucose C₆H₁₂O₆.
- Empirical formula shows the simplest whole-number ratio, e.g. glucose = CH₂O.
- Formula unit: for ionic compounds (no separate molecules), e.g. NaCl.

Atomic Mass and Molecular Mass

- Atomic mass is measured in amu; 1 amu = 1/12 of the mass of a carbon-12 atom.
- Molecular mass = sum of atomic masses: H₂O = 2(1) + 16 = 18 amu; CO₂ = 12 + 32 = 44 amu.
- Gram atomic mass / gram molecular mass = mass of one mole in grams.

The Mole (Most Important Numerical Topic)

- 1 mole = 6.022×10^{23} particles (Avogadro number).
- Moles = mass in grams / molar mass. Particles = moles $\times 6.022 \times 10^{23}$.
- Volume of 1 mole of any gas at STP = 22.4 dm³.
- Example: 8 g of CH₄ (molar mass 16) = 0.5 mol = $0.5 \times 6.022 \times 10^{23} = 3.011 \times 10^{23}$ molecules.

Exam Tips

- Learn symbols of the first 20 elements plus common metals (Fe, Cu, Zn, Ag, Au, Pb, Sn, Hg).
- Practise mole numericals daily - they appear in every board paper.
- Write definitions exactly as in the textbook for short questions.

Quick Revision Table

Term	Meaning
Avogadro number	6.022×10^{23} particles per mole
1 amu	1/12 mass of one carbon-12 atom
Molar volume at STP	22.4 dm ³
Empirical formula of benzene C ₆ H ₆	CH
Symbol of potassium	K (Kalium)
Symbol of iron	Fe (Ferrum)

Practice MCQs (answers at the end)

Q1. The empirical formula of hydrogen peroxide H₂O₂ is:

A. HO **B.** H₂O **C.** HO₂ **D.** H₂O₂

Q2. How many moles are in 44 g of CO₂?

A. 0.5 **B.** 1 **C.** 2 **D.** 44

Q3. The symbol Pb stands for:

A. Phosphorus **B.** Lead **C.** Platinum **D.** Polonium

Q4. Which is a mixture?

A. Distilled water **B.** Air **C.** Glucose **D.** Iron sulphide

Q5. Number of atoms in 1 mole of helium is:

A. 6.022×10^{23} **B.** 3.011×10^{23} **C.** 1.2×10^{24} **D.** 22.4