

Definitions

- Chemistry: Study of matter
- Organic Chemistry: Study of compounds containing carbon
- Atom: Is the smallest possible particle that defines a complete chemical element
- Molecules: Discrete (bonded) arrangement of atoms
 - o Changing the arrangement or connections changes the molecule and its physical properties
- Compound: Collection of molecules of the same type
 - o Water (H₂O), Cholesterol (27 carbons, white crystalline powder, average male contains 80 g)
- Atomic Number: Number of protons in the nucleus of an atom
- Atomic Weight: Mass of protons and neutrons
- Molecular Weight (MW): Mass of atoms in a molecule
 - o H₂O: MW = [(2 x 1 g/mol)H + (1 x 16 g/mol)O] = 18 g/mol

Mole Concept

- 1 mole = 6.02×10^{23} (Avogadro's number) (can be atoms, molecules etc.)
- 1 mole H = 1 g
- 18 g of H₂O is 6.02×10^{23} molecules = 1 mole of H₂O or 6.02×10^{23} molecules of water

Typical Molecule

- A few Angstroms (Å) in length
- $1 \text{ Å} = 10^{-8} \text{ cm}$

Example: Cholesterol is 18 Å across. If you lined all of the cholesterol molecules in an 80 g bottle end to end it would wrap around the earth roughly 5,000,000 times.

Physical Properties

- Defined by chemical structure
- Melting point (mp) and boiling point (bp): Each compound has a characteristic mp and bp.
- Taste, appearance, odour, and biological properties (how it interacts with other molecules).
- Density (g/cm³)
- Absorption of radiation
- Solubility

Purity of Compounds

- 1 mole of H₂O (6.02×10^{23} molecules) = 18 g, then add 1×10^6 other molecules (e.g. sugar) → the purity of the water would be 99.999 999 999 999%.
- Purity: A pure compound shows no change in physical properties upon attempts to further purify (purity is a relative term).