

GRADE 9 | 2024

Chemistry: Atoms, Elements and Compounds

Natural Sciences

CAPS ALIGNED

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1. Structure of the Atom

All matter is made of atoms. An atom has a nucleus (protons + neutrons) surrounded by electrons in shells.

- Proton: positive charge, in nucleus
- Neutron: no charge, in nucleus
- Electron: negative charge, orbits the nucleus in energy levels

FORMULA: Atomic number (Z) = number of protons

Mass number (A) = protons + neutrons

Number of electrons = number of protons (in neutral atom)

2. The Periodic Table

Elements are arranged in order of atomic number. Elements in the same GROUP (column) have similar properties.

- Period: a horizontal row
- Group: a vertical column
- Metals: left side, good conductors
- Non-metals: right side, poor conductors
- Metalloids: along the staircase line

3. Chemical Bonding

Ionic Bonds

Formed between a metal and a non-metal. Electrons are TRANSFERRED. The metal loses electrons to form a positive ion (cation); the non-metal gains electrons to form a negative ion (anion).

EXAMPLE: Ionic compound

NaCl (sodium chloride / table salt):

Na loses 1 electron to become Na⁺

Cl gains 1 electron to become Cl⁻

Electrostatic attraction holds them together.

Covalent Bonds

Formed between two non-metals. Electrons are SHARED. Both atoms benefit from the shared electrons.

EXAMPLE: Covalent molecule

H₂O (water): O shares 2 electrons with 2 H atoms.

CO₂: C shares 4 electrons with 2 O atoms (double bonds).

4. Chemical Formulae and Equations

FORMULA: Law of Conservation of Mass: mass of reactants = mass of products

Balanced equation: same number of each atom on both sides

EXAMPLE: Balance equation

H₂ + O₂ → H₂O (unbalanced)

2H₂ + O₂ → 2H₂O (balanced)