

# Unit 1: Principles and Applications of Science I

## A Periodicity and properties of elements

### A1 Structure and bonding in applications in science

- Understand the electronic structure of atoms:
  - electronic orbitals
  - Aufbau principle
  - Bohr theory.
- Understand ionic bonding:
  - strong electrostatic attraction between oppositely charged ions
  - effects ionic radius and ionic charge have on the strength of ionic bonding
  - formation of ions in terms of electron loss or gain
  - electronic configuration diagrams of cations and anions.
- Understand covalent bonding:
  - strong electrostatic attraction between two nuclei and the shared pair(s) of electrons between them
  - dot and cross diagrams to show electrons in simple covalent molecules, including those with multiple bonds and dative covalent (coordinate) bonds
  - the relationship between bond lengths and bond strengths in covalent bonds
  - tetrahedral basis of organic chemistry.
- Understand metallic bonding:
  - de-localised electrons
  - positive metal ions
  - regular layer structure.
- Understand the following intermolecular forces:
  - van der Waals
  - dipole-dipole
  - hydrogen bonding.