

GRADE 10 | 2024

Physical Sciences: Matter and Atomic Structure

Physical Sciences

CAPS ALIGNED

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1. Models of the Atom

- Dalton (1803): atoms are indivisible solid spheres
- Thomson (1904): plum pudding model - electrons embedded in positive sphere
- Rutherford (1911): atom is mostly empty space with dense positive nucleus
- Bohr (1913): electrons orbit nucleus in fixed energy levels

2. The Periodic Table

Elements are arranged by atomic number (protons). Periodic table shows: symbol, atomic number, mass number.

Periodicity

- Period: elements in same horizontal row; number of energy levels increases across periods
- Group: elements in same vertical column; same number of valence electrons; similar chemical properties

3. Chemical Bonding

Ionic Bonding

Transfer of electrons from metal to non-metal. Forms ionic lattice held by electrostatic forces.

FORMULA: Ionic compounds have high melting points, conduct electricity when dissolved or molten

Covalent Bonding

Sharing of electrons between non-metals. Can form single (2 electrons shared), double (4), or triple (6) bonds.

Metallic Bonding

Metal atoms release their outer electrons into a "sea of electrons". This explains conductivity, malleability, and ductility of metals.

4. Intermolecular Forces

- London forces (dispersion): weakest; present in all molecules
- Dipole-dipole: between polar molecules
- Hydrogen bonds: between H and N, O, or F; strongest intermolecular force