

The nuclear atom · supported focus

International Baccalaureate · IB Diploma · Chemistry · HL

Scope and prerequisites

Supported HL focus. First assessment 2025; current brief acquired; full Chemistry guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

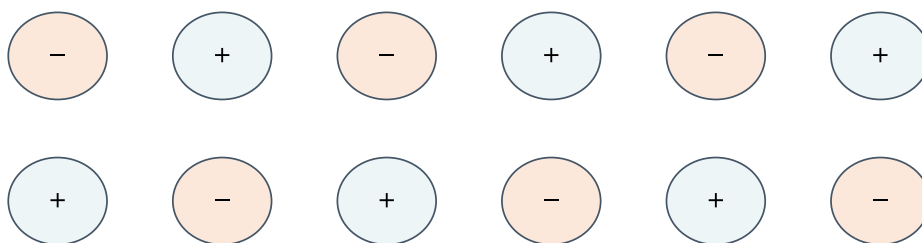
Particles, bonding and bulk properties

■ What would explain this observation?

- A salt crystal conducts when dissolved but not when solid. The ions exist in both states; their ability to move changes.
 - Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.
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■ Build the model

- **Ionic bonding** is electrostatic attraction between oppositely charged ions. A covalent bond involves shared electrons. Metallic bonding involves attraction between positive metal ions and **delocalized electrons**.
- ionic bond : Attraction between oppositely charged ions; delocalized electron : An electron not confined to one atom or bond.



Alternating charges in an ionic lattice

■ Choose evidence that can test it

- To explain a bulk property, name the structure, particles, forces and mobile charge carriers. Simple molecular substances can have strong covalent bonds inside molecules but weak attractions between molecules.
 - Compare substances using evidence such as melting point, conductivity when solid and molten, and solubility. One property rarely proves a structure; use a pattern of evidence.
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■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: an element has atomic number 12 and mass number 24. Protons = 12; neutrons = mass number - atomic number = $24 - 12 = 12$. A 2+ ion has electrons = $12 - 2 = 10$. Charge changes electron count, not the nucleus.

Example:

An atom has atomic number 17 and mass number 35. Find its number of neutrons. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

■ Check the conclusion and its limits

- Melting a simple molecular substance usually overcomes intermolecular attractions; it does not require breaking all covalent bonds within each molecule.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

All covalent substances have low melting points. This claim is false: Melting a simple molecular substance usually overcomes intermolecular attractions; it does not require breaking all covalent bonds within each molecule.

Key:

Particles, bonding and bulk properties: To explain a bulk property, name the structure, particles, forces and mobile charge carriers. Simple molecular substances can have strong covalent bonds inside molecules but weak attractions between molecules.