

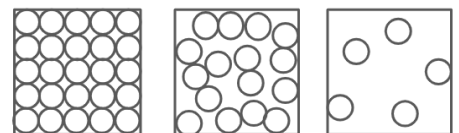


2.2 HOW BONDING AND STRUCTURE ARE RELATED TO THE PROPERTIES OF SUBSTANCES

Properties of ionic compounds

- Lots of energy needed to break forces
- Strong electrostatic forces between ions
- High melting and boiling points
- Ions are free to move to carry charge
- Conduct electricity when molten or aqueous

Diagrams



- Fixed positions
- Free to move
- Particles spaced far apart
- Strong forces
- Weak forces
- Very weak forces
- Solid
- Liquid
- Gas
- No fixed shape

Particle theory

States of matter

State symbols

(s), (l), (g), (aq)

Limitations of simple model

Particles represented as solid spheres with no forces between them

Melting, boiling, condensing, freezing

Energy required to change state

Amount depends on strength of forces between particles

AQA

Properties of metals and alloys

- Conductors of electricity
 - Delocalised electrons carry charge
- Strong metallic bonding
 - High melting and boiling points
- Atoms arranged in regular layers
 - Malleable as the layers slide over each other
- Alloys
 - Pure metals often too soft
 - Distortion of layers
 - Makes alloys harder

- Intermolecular forces get stronger as the molecule gets bigger
- Low melting and boiling points
- Weak intermolecular forces
- No charged particles
- Do not conduct electricity
- Small molecules
- Liquids or gases at room temperature
- Polymers
- Solids at room temperature
- Relatively strong intermolecular forces

Properties of covalent compounds

- Giant covalent structures
 - Solids at room temperature
 - E.g. diamond, graphite, silicon dioxide
 - Very high melting points
 - Strong covalent bonds between atoms

Bonds must be broken to melt the solid

KEY
'Higher only' written in yellow.