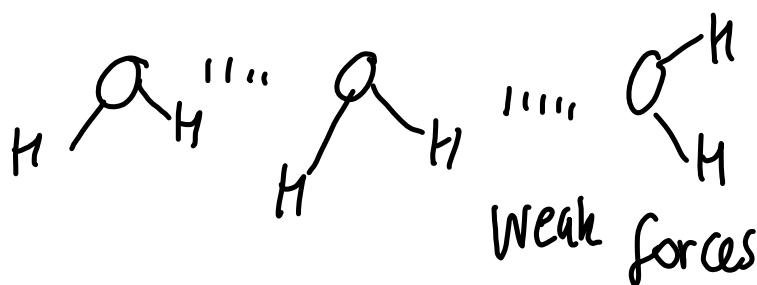


IONIC STRUCTURE AND BONDING (I)



- Sodium Chloride NaCl Magnesium Chloride MgCl₂
Magnesium Oxide MgO all salts from the acids topic
- Formed by the *transfer* of electrons to produce positive ions and negative **ions**. The metal atoms loses electrons, the non-metal atom gains electrons-electrons are NOT SHARED!
- A 3D lattice structure consisting of a regular arrangement of ions held together by strong electrostatic forces between the positive and negative ions (oppositely charged ions attract)
- Always occurs between a metal and a non-metal
- High melting point (solid at room temperature 25 °C)
- A lot of energy is required to overcome /break the attraction between the positive ions and negative ions within the solid lattice
- Only conducts electricity when molten or dissolved in solution (aqueous -aq)
- When molten or dissolved (in solution) the **charged** particles (ions) can **flow** and carry current

SIMPLE MOLECULAR COVALENT (SMC)



Methane CH₄ Water H₂O Chlorine Cl₂
Bromine Br₂ Iodine I₂ Hydrogen bromide HBr ,
Hydrogen Chloride HCl, Fullerene C₆₀ all hydrocarbons in
crude oil

Occurs between non-metal atoms ONLY

Individual Molecules are held together (bonded) by a covalent bond- this is a shared pair of electrons

Low melting point (Liquid or gas at 25°C)

Despite STRONG covalent bonds within the molecules there are WEAK FORCES **between** molecules which don't require MUCH ENERGY to overcome. When these substances melt, the covalent bonds DON'T break

Never conducts electricity

There are no charged particles that can flow.

No ions to flow

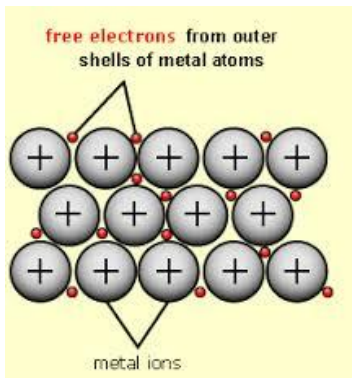
No free electrons

GIANT MOLECULAR COVALENT (GMC)

1. 2. 3. 4.

- Graphite C Diamond C Silicon dioxide SiO₂
- Occurs between PARTICULAR non-metal atoms ONLY
- Held together (bonded) by a pair of electrons shared between two atoms –this is a covalent bond
- Very high melting point
- To melt a lot of ENERGY is required to OVERCOME **many, strong**, covalent bonds.
- Never conducts electricity (EXCEPT graphite-this has free electrons between layers)
- There are no charged particles that can flow. No ions, no free electrons(except in graphite and graphene*)

METALLIC (M)



- Iron Fe Aluminium Al Copper Cu Sodium Na and all alloys
- Occurs between metal atoms
- A regular arrangement of positive ions surrounded by a sea of free electrons
- High melting point (solid at room temperature 25 °C)
- A lot of **energy** is required to **overcome** the attraction between the positive ions and the surrounding free electrons (or metallic bonds are very strong)
- Conducts electricity when solid
- Good conductor of heat when solid
- When solid, *free electrons can flow and* carry thermal energy and charge throughout the solid material so it's a good conductor
- Malleable - Atoms are able to *slide over each other* without breaking the metallic bonds