AQA BONDING, STRUCTURE AND THE PROPERTIES OF MATTER 1

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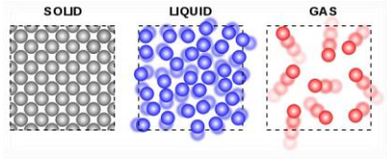
Chemical bonds

Ionic	*Particles are oppositely charged ions*	Occurs in compounds formed from metals combined with non metals.
Covalent	*Particles are atoms that share pairs of electrons*	Occurs in most non metallic elements and in compounds of non metals.
Metallic	*Particles are atoms which share delocalised electrons*	Occurs in metallic elements and alloys.

The three states of matter

Solid, liquid, gas

Melting and freezing happen at melting point, boiling and condensing happen at boiling point.



The amount of energy needed for a state change depends on the strength of forces between particles in the substance.

(HT only)
Limitations of simple model:
- There are no forces in the model
- All particles are shown as spheres
- Spheres are solid

s	solid
l	liquid
g	gas

Properties of ionic compounds

High melting and boiling points	Large amounts of energy needed to break the bonds.
Do not conduct electricity when solid	Ions are held in a fixed position in the lattice and cannot move.
Do conduct electricity when molten or dissolved	Lattice breaks apart and the ions are free to move.

Metals as conductors

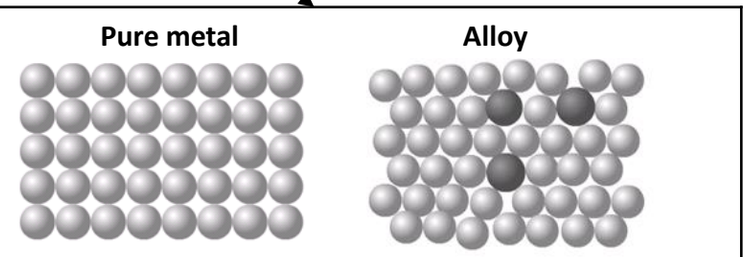
Good conductors of electricity	Delocalised electrons carry electrical charge through the metal.
Good conductors of thermal energy	Energy is transferred by the delocalised electrons.

High melting and boiling points	This is due to the strong metallic bonds.
Pure metals can be bent and shaped	Atoms are arranged in layers that can slide over each other.

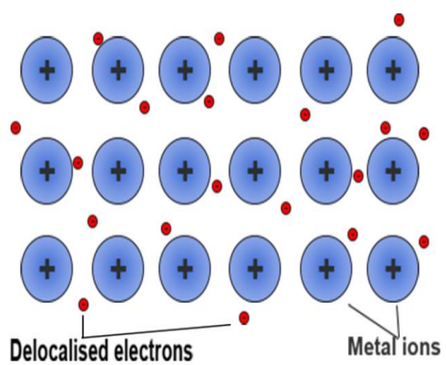
Properties of metals and alloys

Alloys

Mixture of two or more elements at least one of which is a metal	Harder than pure metals because atoms of different sizes disrupt the layers so they cannot slide over each other.



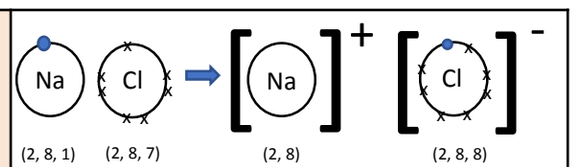
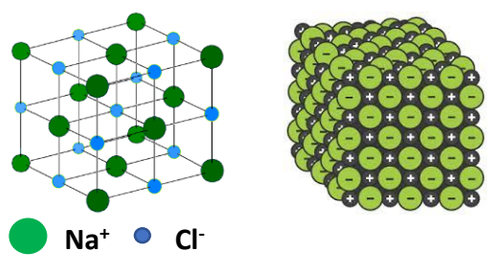
Metallic bonding

Giant structure of atoms arranged in a regular pattern		Electrons in the outer shell of metal atoms are delocalised and free to move through the whole structure. This sharing of electrons leads to strong metallic bonds.

Ionic bonding

Electrons are transferred so that all atoms have a noble gas configuration (full outer shells).	*Metal atoms lose electrons and become positively charged ions*	Group 1 metals form +1 ions Group 2 metals form +2 ions
	Non metals atoms gain electrons to become negatively charged ions	Group 6 non metals form -2 ions Group 7 non metals form -1 ions

Ionic compounds

Dot and cross diagram	
Giant structure	

Structure

- *Held together by strong electrostatic forces of attraction between oppositely charged ions*
- *Forces act in all directions in the lattice*