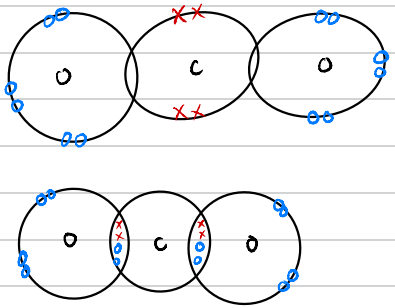
Simple Covalent Bonding

e.g. CO_2

non-metal & non-metal



low mp/bp: weak intermolecular forces which require less energy to break.

do not conduct electricity: no delocalised electrons which are free to move

Ionic Bonding

e.g. NaCl

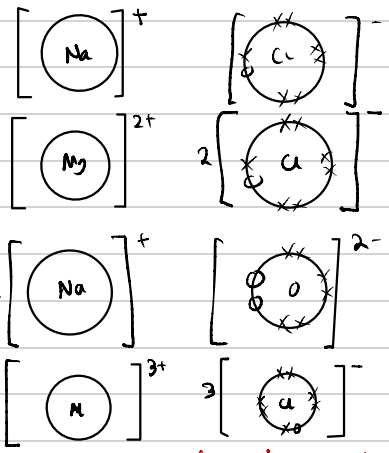
metal & non-metal

Na (1+) Cl (1-) = NaCl

Mg (2+) Cl (1-) = $MgCl_2$

Na (1+) O (2-) = Na_2O

Al (3+) Cl (1-) = $AlCl_3$



high mp/bp: strong electrostatic attraction between opposite ions, which require a lot of energy to overcome → definition of ionic bonding

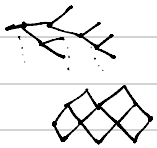
do conduct electricity when molten (liquid/aqueous) as ions are free to move.

do not conduct electricity when solid as ions are not free to move.

Giant Covalent Structures

allotropes of carbon:

- Graphite: each C atom is bonded to 3 other C atoms
- Graphene: single layer of graphite
- Diamond: each C atom is bonded to 4 other C atoms



(All) high mp/bp: lots of covalent bonds which requires a lot of energy to overcome

Graphite/graphene conduct electricity

Diamond doesn't conduct electricity (no free electrons)

Metallic bonding

Between positive ions (metal ions) and delocalised electrons

High mp/bp due to the strong electrostatic attraction between positive ions & delocalised electrons

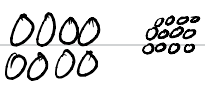
They conduct electricity (free electrons)

Alloys: mixture of 2 or more metals.

Harder than pure metals

The particles are different sizes

No neat rows & columns so layers can't slide



Transition metals

higher mp, more dense, stronger, harder,

less reactive

different charges

form coloured compounds