BONDING

non-metals
low boiling point
Don't conduct electricity

metals
Shiny solids
High melting points
High density
Conduct electricity

Limitations of models
dot and cross: presents electrons from both elements as if different & no size/arrangement
ball & stick models: don't show correct scale for atoms/ions & appear to have big gaps between atoms
2D: no shape/size
3D: only show outer layer of substance

Ionic Bonding
'–ide' ending: negative ions of only **one element** (except hydroxide)
Oxide: O^{2-}
Hydroxide: OH^-
Halide:
'–ate' ending: negative ions of **oxygen + another element**
Nitrate: $NO3^-$
Carbonate: $CO3^{2-}$
Sulphate: $SO4^{2-}$

ion: atom with charge – lost/gained electron
cation: + electron lost
anions: – electron gained

Positive **metal** + negative **non-metal**
Metal ion: group number 1/2 = electrons lost = positive charge
Non-metal ion: 8 – group number 6/7 = electrons gained = negative charge

Ionic equations
Magnesium + copper sulphate → magnesium sulphate + copper redox reaction
$Mg(s) + Cu^{2+}(aq) + SO4^{2-}(aq) \rightarrow Mg^{2+}(aq) + SO4^{2-}(aq) + Cu(s)$
Remove 'Sulphate' – spectator ions, doesn't change in reaction
$Mg(s) + Cu^{2+}(aq) \rightarrow Mg^{2+}(aq) + Cu(s)$
Oxidation: $Mg \rightarrow Mg^{2+}$ – magnesium lost electrons, positive
Reduction: $Cu^{2+} \rightarrow Cu$ – copper gained electrons, negative

Giant ionic lattice
High melting point: strong electrostatic forces of attraction between oppositely charged ions in all directions
Don't conduct as solid: charged ions in fixed position
Conduct when melted/dissolved in water: charged ions free to move
Some soluble

Covalent bonding
Non-metal molecule
Electrostatic forces of attraction between 2 nuclei & shared pair of electrons – very strong
Number of covalent bonds formed = number of electrons needed for full outer-shell
Molecule size increase = intermolecular force increase – melting/boiling point increase