Ionic Bonding
- metals and non metals
- attraction between oppositely charged ions
- ionic lattice - millions of bones arranged in regular cubic structure, joined by ionic bonds
- high mp/bp - strong forces
- do not conduct when solid
- conduct when molten/in solution
- brittle
- dissolve in polar solvents

Metallic bonding
- strong electrostatic attraction between cations and delocalised electrons
- conduct when solid+liquid
- high mp/bp - strong electrostatic forces of attraction
- insoluble but reactive
- cations fixed - maintain structure and shape

Shapes of Molecules
- 4 BP - 109.5 - tetrahedral (CH4)
- 3 BP 1 LP - 107 - pyramidal (NH3)
- 2 BP 2 LP - 104.5 - non linear (H20)
- 2 BP - 180 - linear (CO2)
- 3 BP - 120 - trigonal planar (BF3)
- 5 BP - 90 and 120 - trigonal bipyramidal (PCl5)
- 6 BP - 90 - octahedral (SF6)

Hydrogen Bonding
- strongest IM bond
- form of PDD
- electronegative atom with lone pair of e-
- H bonded to an electronegative atoms (HO, HN, HF)
- between lone pair on electronegative atom and H of another molecule
- linear, dipoles and lone pairs
- ice less dense than water - open tetrahedral lattice with lots of holes
- high mp and bp
- high surface tension and viscosity

First ionisation energy
- easier to remove if electrons paired in orbital than singular - e- repel
- across period - NC increases - add proton, similar shielding as same shell, nuclear attraction increases, atomic radius decreases therefore IE increases

Covalent bonding
- non metals
- strong electrostatic attraction between a shared pair of electrons and nuclei of bonded atoms - localised
- simple - low mp/bp + don't conduct
- diamond - each C covalently bonded to 4 others, hard, high mp/bp and does not conduct
- graphite - each C covalently bonded to 3 others, rings of 6, layers held by weak forces, soft, conduct
- buckminsterfullerene - 60 carbons, each covalently bonded to 3 others (2 single 1 double) - drug delivery in body
- silicon dioxide - each Si bonded to 4 O, each O bonded to 2 Si

Orbitals
- region around the nucleus that can hold up to 2 electrons with opposite spins - where electron likely to be found
- s - sphere, increase n = increase radius
- p - dumb-bell, increase n = increase distance from nucleus (Px Py and Pz all at 90)

Londons Forces - Induced Dipole Dipole
- uneven distribution of electrons due to movement - instantaneous dipole
- induces dipole on another molecule etc.
- only temporary
- weakest IM force
- more electrons = stronger force - larger dipoles

Permanent Dipole Dipole
- polar molecules - difference in electronegativity
- between permeant dipoles of different polar molecules
- have PDD and Londons forces
- boiling points higher

First ionisation energy
- energy required to remove one electron form one mole of gaseous atoms to produce one mole of gases 1+ ions
- atomic radius, nuclear charge and electron shielding
- large difference = e- removed from different shell
- down group -IE decreases, atomic radios increases, shielding increases and nuclear attraction decreases

Periodic trends in melting points

- mp increase g1-4
- sharp decrease g4-5 - cane from giant to simple molecular structures
- mp comparatively low g5-0
- GIANT METALLIC - GIANT COVALENT - SIMPLE MOLECULAR