Intermolecular Forces, Polarity, M.P ↔ B.P.

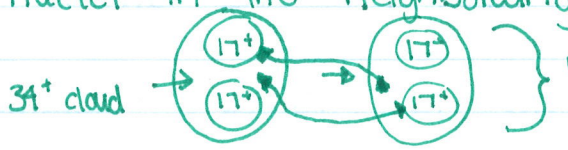
Intermolecular forces - weak forces that exist between discrete covalent molecules (organic molecules)

increasing polarity ↓

1. Vander Waals (London forces)
2. Dipole
3. Hydrogen Bond

Vander Waals

- only force present between non polar molecules.
- attraction between electrons in one molecule with the nuclei in the neighboring molecule



The bigger the molecule, the stronger the force.

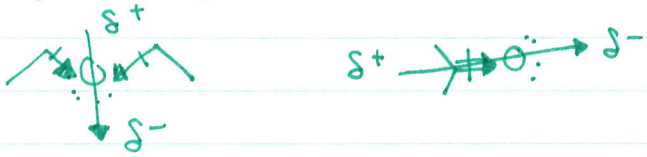
- Alkane, Alkene, Alkyne = vander Waal only

	M.P	B.P	
CH_4	-183°C	-162°C	- bigger molecule
—	-183°C	-89°C	- stronger only vander waal
∧	-182°C	-42°C	- higher M.P + B.P.
∧∧	-138°C	-0.5°C	

Solid ↔ liquid ↔ gas
M.P B.P

Dipole

- requires polar molecules



- Ethers + amine = slightly polar, weak dipole
- aldehydes, ketone, amides + esters = moderately polar
- stronger dipoles lead to higher M.P + B.P.

	M.P	B.P	
V O V	-116°C	35°C	dipole.
	-86°C	80°C	better dipole
V	-138°C	-0.5	vander waal only

Hydrogen bond (H-bond)

- used only for alcohols + carboxylic acids in organic chemistry.
- when H is bonded to N, O, F a very polar covalent bond is the result.

3.04 N 2.44 O 3.98 F ← EN

← high EN and small

δ+ H ↔ Ö: δ-

highly positive ↑ → H δ+

hydrogen is like an "exposed proton"

- the hydrogen can then interact with the lone pair of electrons on a second N, O, F (only N, O, F lone pairs are small and hard enough to interact strongly with the hydrogen).

δ+ H ↔ Ö: δ- ..... δ+ H ↔ Ö: δ-

H δ+ (under Ö) H δ+ (under Ö)

H-Bond.