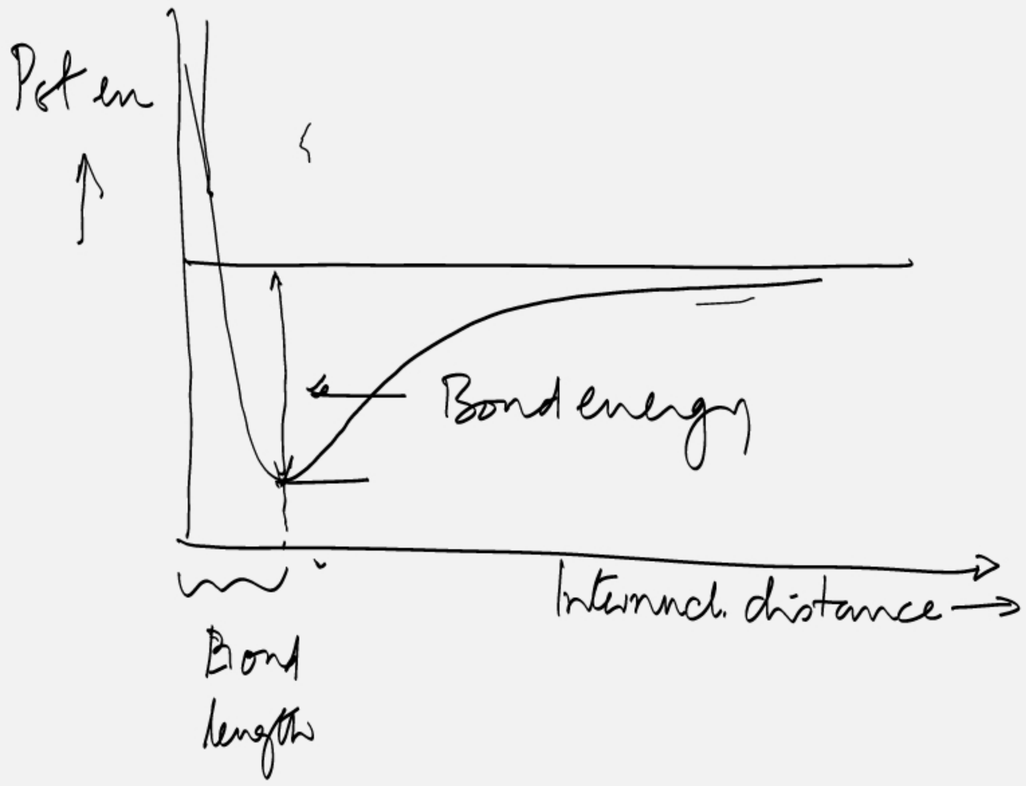


Typical bond energies

Ionic	600 – 4000	kJ/mol
Covalent	100 – 900	—»—
H bond	20 – 50	—»—
van der Waals	< 20	—»—

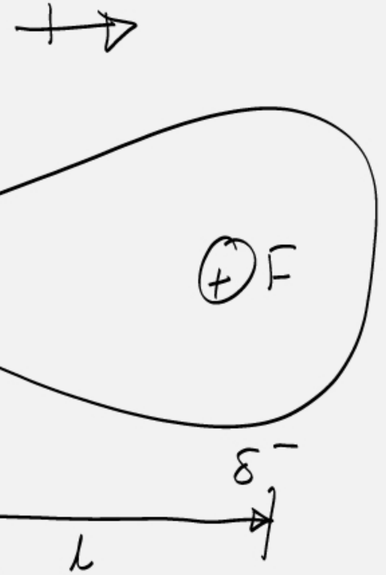
Polar character of Covalent bonds

Dipole moment

$$\vec{\mu} = q\vec{l}$$

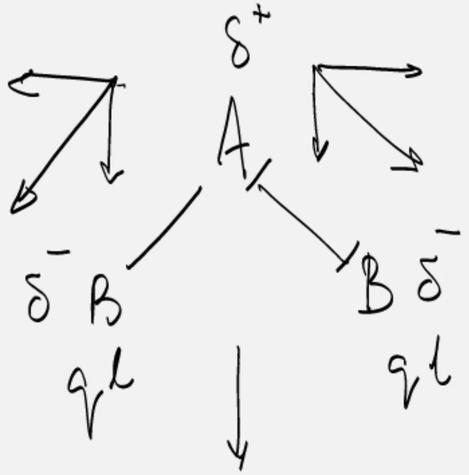
SI

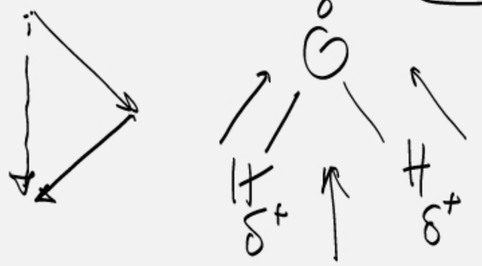
$[C\text{-}m]$

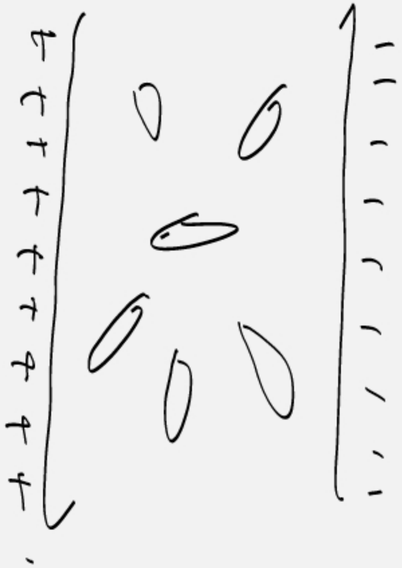


CGS

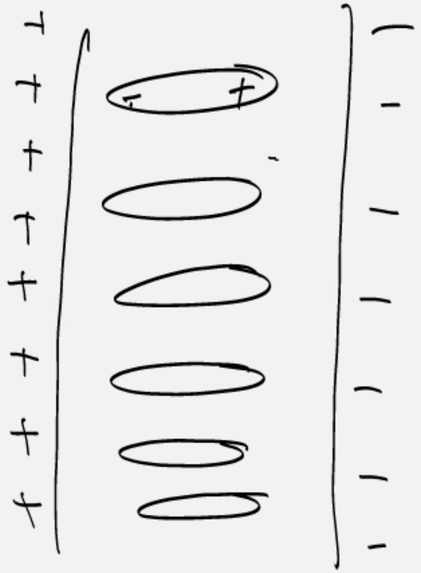
1 Debye = 3.33564×10^{-30} C-m







non polar
Compound



Polar
material

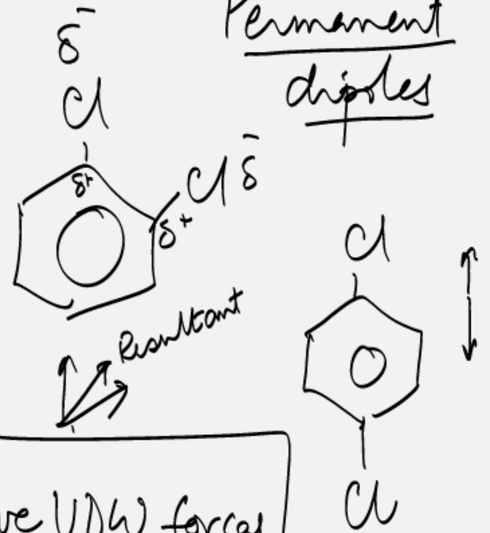
→ Intermolecular forces

van der Waals

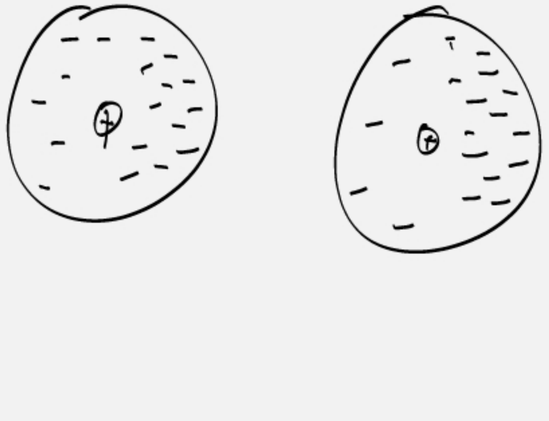
1. Electronic interactions
2. Short range force $\propto \frac{1}{r^7}$
3) Weak, $O(20\ kJ/mol)$
4) Except Ideal gas, all other substs have VDW forces
5) More imp. in large atoms/molecules

Electronic interactions

Permanent dipoles



Temporary dipoles } London force / Dispersive force



$$PV = RT$$

$$\left(P + \frac{a}{V^2}\right)(V - b) = RT$$

→ Hydrogen Bond

H bonded to a highly $\bar{e}$ atom → Strong dipole moment

- Intermolecular H bond
- Intramolecular H bond