

intermolecular force (IMF)

- force between molecules, not within a molecule, i.e. it's not a chemical bond
- examples of context of its application
 - enzyme – substrate binding
 - basis of drug action / design
 - DNA; mRNA, tRNA, rRNA interaction; i.e. double helix; transcription / translation
 - Role in N95 mask; e.g. <https://www.youtube.com/watch?v=eAdanPfQdCA>
 - chromatography
- basis of IMF
 - electrostatic force; i.e. apply Coulomb's law

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Types of IMF – covalent compounds

- Hydrogen bond IMF
 - it's not a chemical bond
 - involves polar compounds with hydrogen attached to F, O, N

ex. δ^+ δ^-

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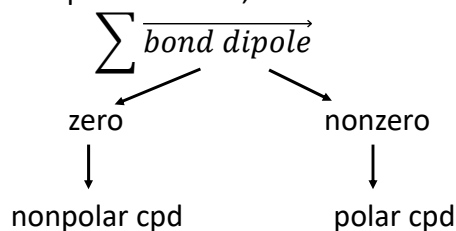
      H – F
      ⋮   ⋮
      F – H
       $\delta^-$   $\delta^+$ 
    
```
- Dipole-dipole IMF
 - involves polar compounds
- London IMF
 - involves both polar and nonpolar compounds

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to identify / determine type of IMF in a molecule

1. get its chemical formula
2. draw its Lewis structure
3. apply VSEPR
4. evaluate the molecule's dipole moment,



5. refer to prior slide

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London IMF

- present in both polar and nonpolar compounds
- due to random motion of electrons in the compounds, which changes the molecule's dipole moment

Polarizability = "ease" to change a molecule's dipole moment

increase # electrons in a molecule increases its polarizability

e.g. polarizability: $\text{Br}_2 > \text{Cl}_2$; $\text{H}_2 < \text{N}_2$

	H - H	N - N
# electrons:	1 1	7 7
	2 0	8 6
	0 2	6 8
		5 9
		etc

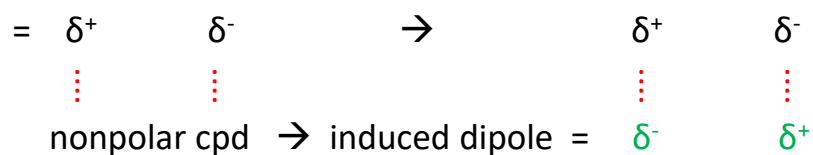
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continue – London IMF

1. nonpolar cpd $\xrightarrow{\text{due to random electron motion}}$ transient dipole

2. transient dipole = temporary polar cpd



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relative strength of IMF

- for molecules of similar polarizability; i.e. similar # electrons
H-bond IMF > dipole-dipole IMF > London IMF
- for simplicity, in this class, **assume** molecules have similar polarizability
- also, increase polarizability \rightarrow increase strength of London IMF

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