

What is the difference between intramolecular and intermolecular?

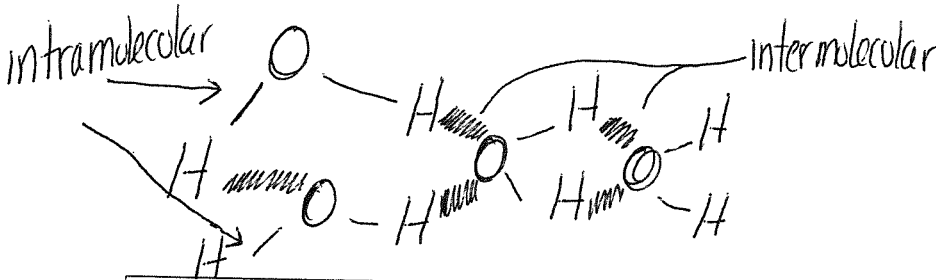
Which are stronger?

→ within molecule.
(covalent, ionic, metallic)

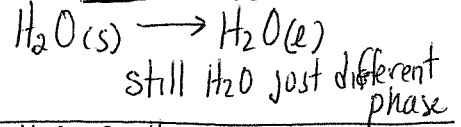
→ between molecules
(LDF, dipole-dipole, H-bond)

→ Intramolecular

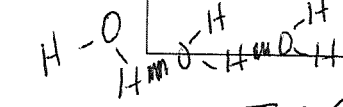
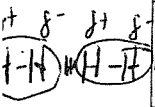
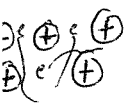
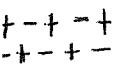
Draw 3 H₂O molecules Lewis structures and show where intramolecular and where intermolecular forces would be.



Phase Changes break:
Intermolecular



Energy to vaporize H₂O(l) → H₂O(g) = 40.6 $\frac{kJ}{mol}$
Bond energy to break O-H bond in H₂O → 934 $\frac{kJ}{mol}$



Intramolecular within	What is it? (give a definition)	Who does it? (what type of molecules or atoms)	Rank (within its type, so only 1, 2, or 3 - 1 being the strongest)	Example
Ionic	transfer of e- - electrostatic attraction between (+) + (-) ion	metals/nonmetals (cations) (anions)	2	NaCl CaCl ₂
Covalent	sharing of e- - equally or unequally	2 nonmetals	1	CO, NO F ₂
Metallic	bonding in metals "sea of electrons"	metal atoms	3	Ag, Cu, Al
Intermolecular between				
Dispersion LDF	attraction between temporary dipoles ⊕ end of one molecule to ⊖ end next molecule	2 nonpolar molecules	3	H ₂ + H ₂ Cl ₂ + Cl ₂
Dipole-Dipole	attraction ⊕ end of one molecule to ⊖ end of next molecule	2 polar molecules	2	CO + CO HCl + HCl
Hydrogen bonding	especially strong dipole-dipole between H-F, H-O, or H-N only	H-F H-N H-O	1	H ₂ O + H ₂ O NH ₃ + NH ₃

NOTES

* ↑ strength of force ↑ BP, ↑
* if same force large has ↑ BP, ↑

IN GENERAL: STRONGEST to WEAKEST
Covalent > IONIC > METALLIC > H-bond > dipole-dipole > LDF