

Polarity (Bond and Molecular)



BOND POLARITY

Polar means opposite. In molecular geometry polar refers to bonds and shapes. Bonds can be one of 3 types.

Type of Bond	Electronegativity Difference	Bonding
1) <u>IONIC</u>	≥ 2.0 (Metal + Non-metal)	Ionic
2) <u>POLAR</u>	2.0-0.4 (Non-metal + non-metal)	Covalent
3) <u>NON-POLAR</u>	$< .4$ (NM + NM, Dr. H. BRONCIIIF)	Covalent

Molecular polarity will depend on two different aspects.

- 1) Bond Polarity 2) Shape

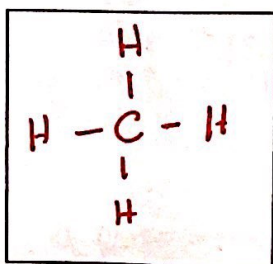
In molecule polarity the bonds must be polar first. This is true in most cases. Then the shape must give rise to a polar molecule. Meaning: One end must be partially positive (δ^+) and another end must be partially negative (δ^-)

Differences in electronegativity give us our partial charges. The more electronegative element will pull the shared electron pair closer, therefore giving it the partially negative δ^- charge. While the other element, the less electronegative, will receive the partial positive δ^+ charge.

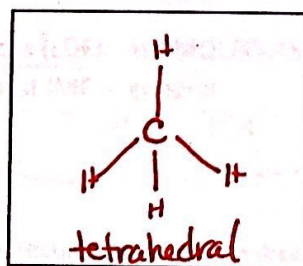
Practice: In the boxes below draw the Lewis structure, molecular geometry, and polar diagram for the two different molecules

A: CH₄

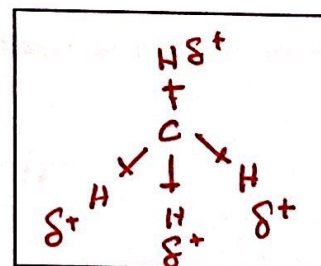
Lewis Structure



Molecular geometry



Polar Diagram

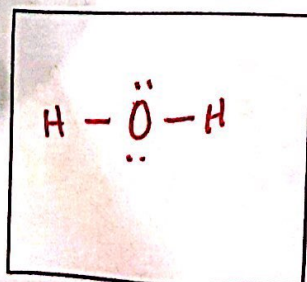


C is more electronegative than H
so $H = \delta^+$
 $C = \delta^-$

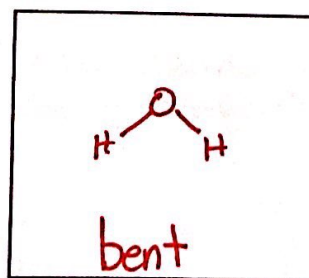
all end are δ^+ so NON-POLAR MOLECULE

A: H₂O

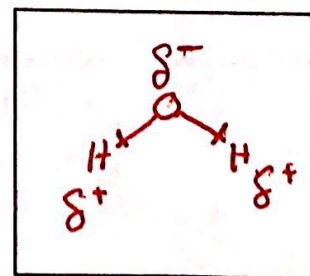
Lewis Structure



Molecular geometry



Polar Diagram

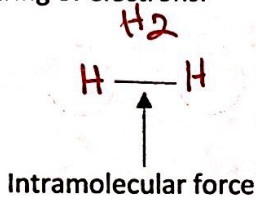


2 end δ^+ + 1 end δ^- so YES
POLAR MOLECULE

BONDING OF MOLECULES

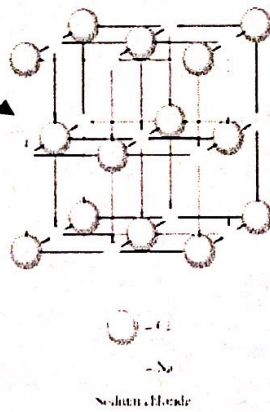
Two terms: 1) **INTRAmolecular forces (NOT IMFs)** is what bonds one atom to another atom. These can be,

- A) **Ionic bonds**-Metal and non-metal. Found in ionic compounds. Electrostatic attraction of ions. Coulombic attraction
- B) **Covalent bonds**-Non-metal and non-metal. Found in molecular(covalent compounds). Sharing of electrons.



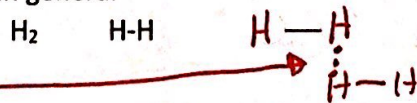
2) **Intermolecular forces (IMFs)**- These are the forces that hold one molecule to another molecule.

A) **Lattice Energy** (Coulombic Attraction) hold one ionic compound to another ionic compound. Very strong.

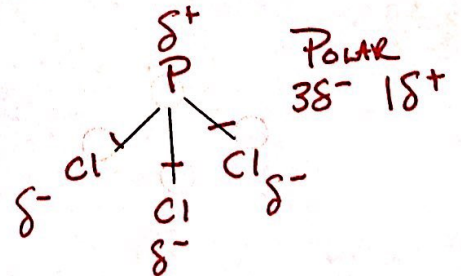
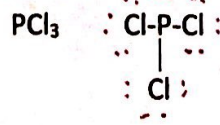
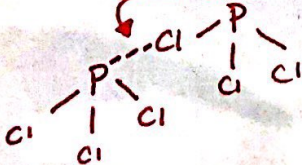


IMFs

1) **London Dispersion Forces (LDF)**: ALL MOLECULES HAVE LDF. Non-polar molecules only have this type of IMF. Weakest IMF in general



2) **Dipole-Dipole**: Polar molecules have dipole-dipole IMF.



a. **Hydrogen Bonding**: Must have a Hydrogen and must be bonded and attracted to a **FON** atom on itself and another molecule. **MUST BE POLAR**

