Polarity of Molecules

EN < 0.4	Covalent Bond
0.4 < EN < 1.7	Polar Covalent Bond
EN > 1.7	Ionic Bond

- If a molecule is diatomic (contains two atoms) then the polarity of the bond determines the polarity of the molecule.

- A molecule can contain polar bonds and not be considered polar.
- The polarity of molecules depends on both
  - The polarity of the bonds in the molecules
  - The shape and symmetry of the molecule

EXAMPLE: Carbon Dioxide

- The difference in EN between C-O is 0.89
  - This means the C-O bond is polar
- But the CO_2 is perfectly symmetrical
  - The two dipoles cancel each other out
  - This makes the entire molecule non-polar

EXAMPLE: CSO

- The difference in EN between C-O is 0.89
  - This means the C-O bond is polar
- The difference in EN between C-S is 0.03
  - This means the C-O bond is non-polar
- The C-O bond pulls the bonding pair towards the O, creating a dipole moment
- This makes the molecule polar.

- EXAMPLE: Boron trifluoride BF_3

- The difference in EN between B-F is 1.94
  - This means the bond is polar very polar
- However the molecule is symmetrical, so the dipole moments are pulled in opposite directions cancelling the charge out.
- This means the molecule is non-polar.

EXAMPLE: Ammonia, NH_3

- The difference in EN between N-H is 0.86
  - This means the C-O bond is polar
- The ammonia molecule is not symmetrical (lone pair at the top)
- This makes the molecule polar.