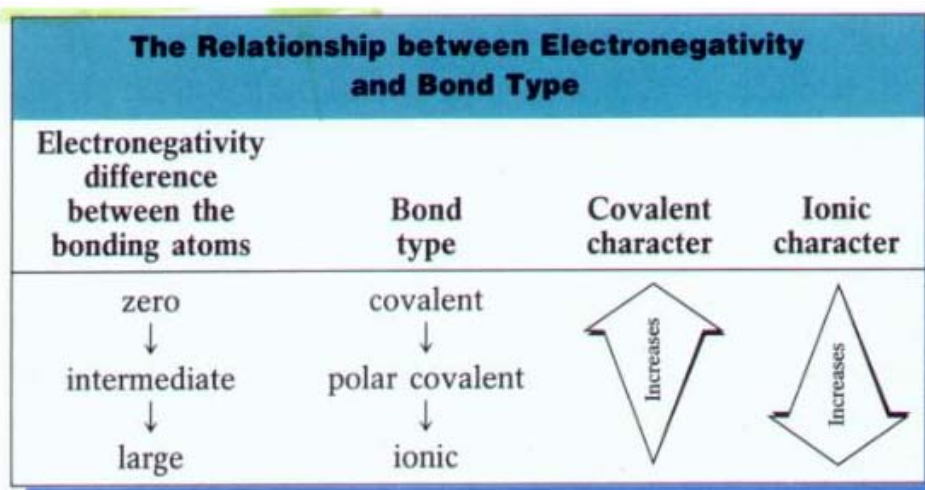


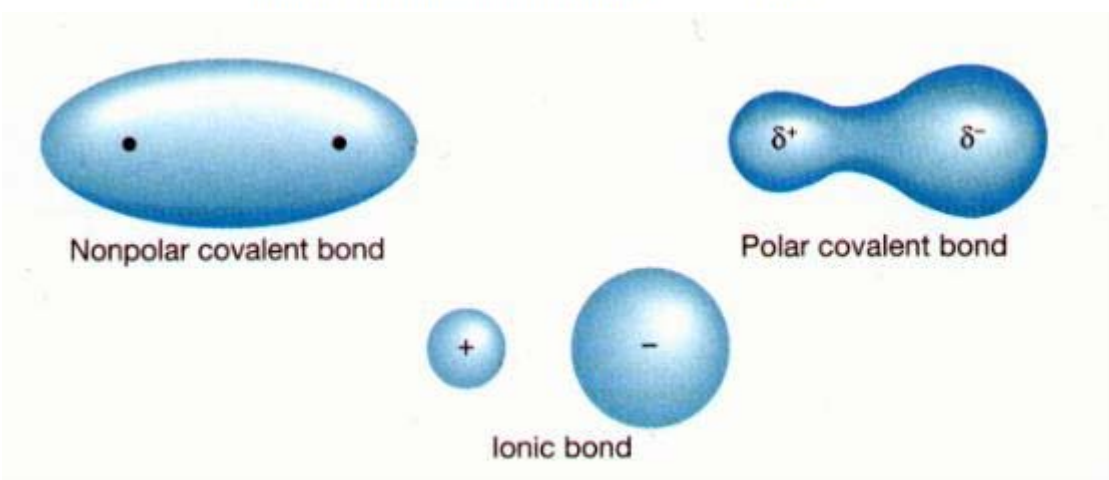
The Partial Ionic Character of Polar Covalent Bonds

The existence of partial charges means that a polar covalent bond behaves as if it were partially ionic.

The partial ionic character of a bond is related directly to the electronegativity difference (ΔEN): a greater ΔEN results in larger partial charges and a higher partial ionic character.



http://www.avon-chemistry.com/lewis_dot_12.jpg



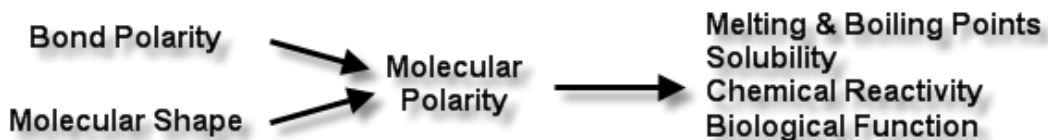
http://www.avon-chemistry.com/lewis_dot_13.jpg

In order to determine the character of a bond we can follow these rules:

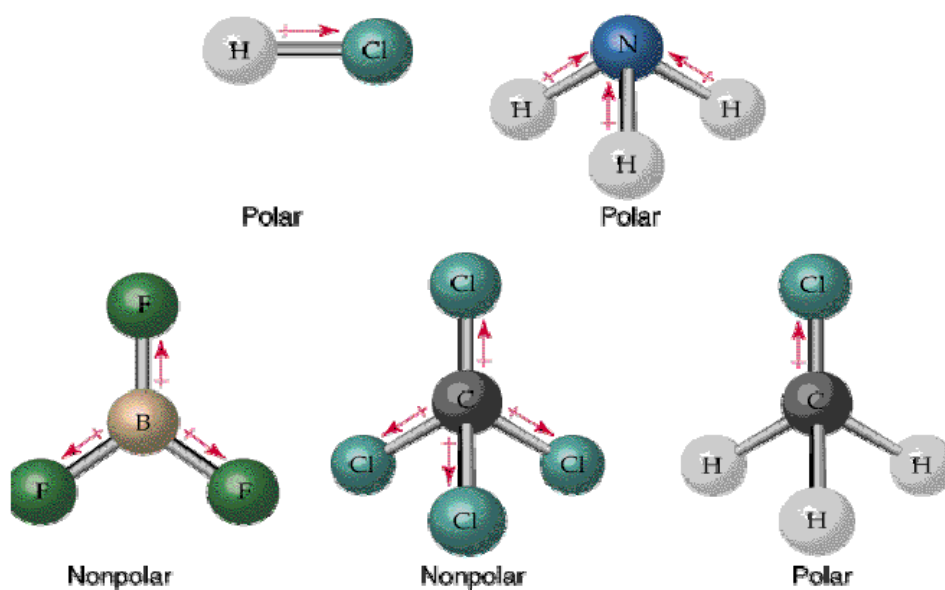
- If the electronegativity difference is less than 0.4 then the bond is nonpolar covalent
- If the electronegativity difference is between 0.4 and 1.7 the bond is considered polar covalent
- If the electronegativity difference is greater than 1.7 the bond is ionic.

Molecular Polarity

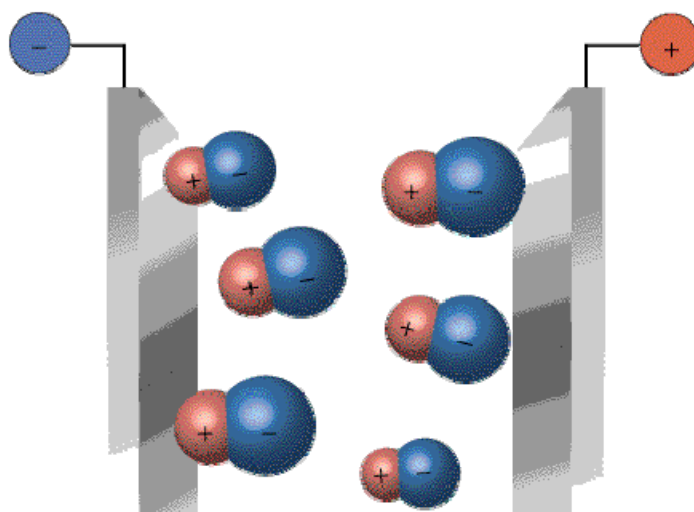
Knowing the shape of the molecules is a key to understanding its physical and chemical behavior. One of the most important and far-reaching effects of molecular shape is molecular polarity, which can influence melting and boiling points, solubility, chemical reactivity, and even biological function.

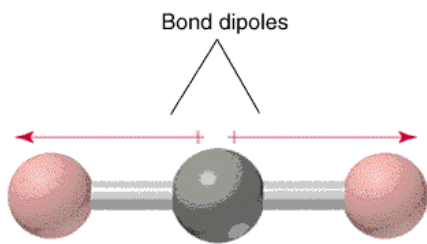


In molecules with more than two atoms, both **shape and bond polarity** determine the molecular polarity.



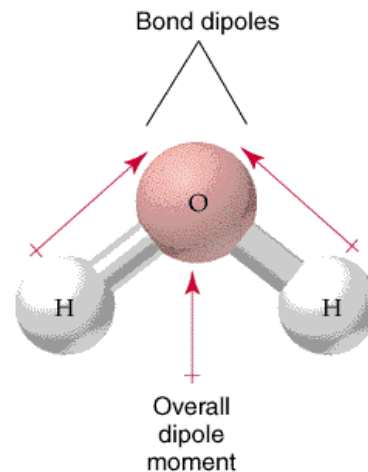
In an electric field, polar molecules become oriented with their partial charges pointing toward the oppositely charged electric plates.





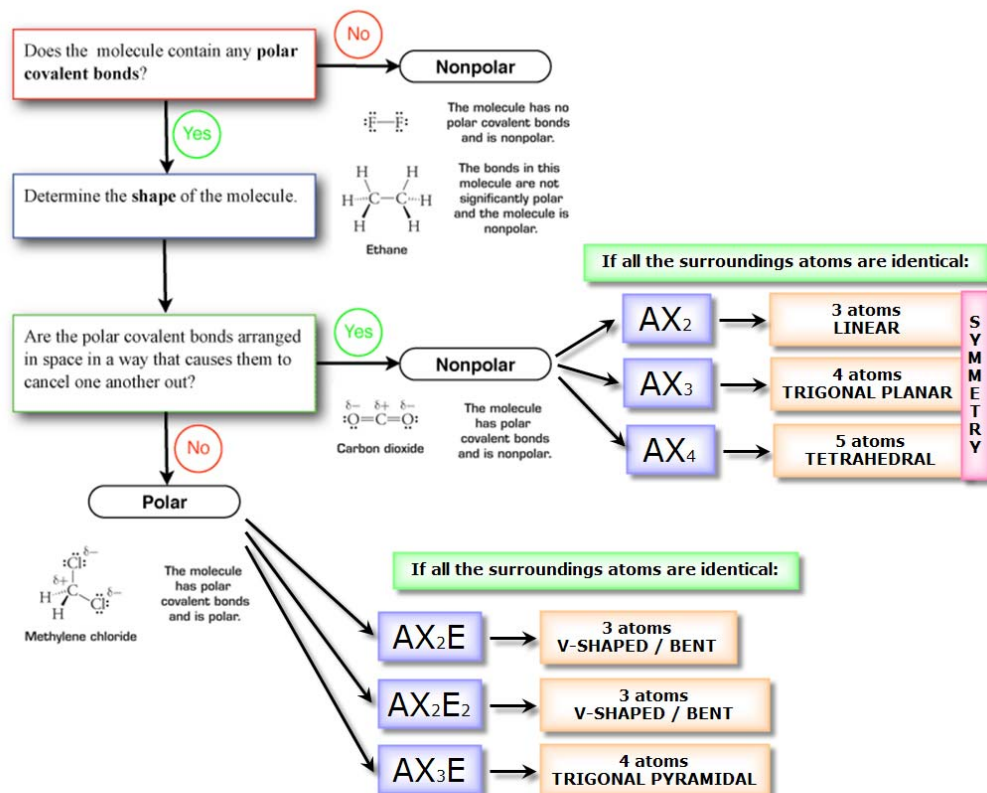
Each C=O bond is quite polar. However, CO₂ is linear, so its bonds point 180° from each other. As a result, these identical bond polarities are counterbalanced and give the molecule no net polarity.

In the case of water the bond polarities are not counterbalanced because the water molecule is V shaped.

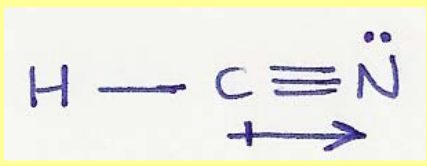
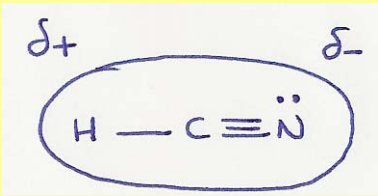


Thus, the O end of the molecule is more negative than the other end.

As a general rule, we can apply the following criteria in order to decide if a molecule is polar or nonpolar:



http://www.chem.uwec.edu/Chem150_S07/elaborations/unit1/unit1-e-polarity/polarity-flowchart.png

| Determine the polar or nonpolar character of these molecules: | | |
|--|---|--|
| HCN |  |  |
| SO ₂ | | |
| SO ₃ | | |
| NH ₃ | | |
| BF ₃ | | |
| H ₂ CO | | |
| Electronegativities: H=2.1; C=2.5; N=3.0; S=2.5; O=3.5; B=2.0; F=4.0 | | |

| BIBLIOGRAPHY |
|--|
| <ul style="list-style-type: none"> • "CHEMISTRY. The Molecular Nature of Matter and Change". Silberberg. McGraw Hill. |