Lesson Overview
Molecular Geometry & Polarity

Objective: The student will be able to apply the postulates of Valence-Shell Electron-Pair Repulsion (VSEPR) theory to deduce the shape of a molecule and its overall molecular polarity.

Valence-Shell Electron-Pair Repulsion Theory (VSEPR)

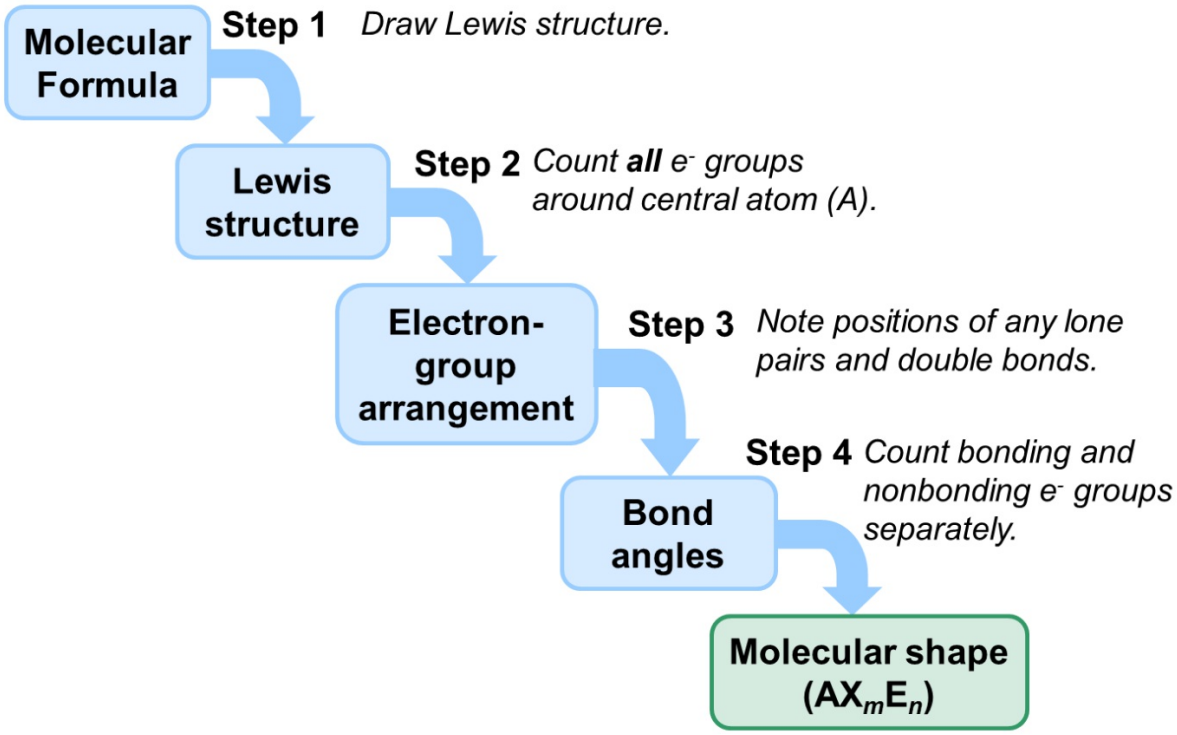
VSEPR theory states that each group of valence electrons around a central atom is located as far as possible from the others, to minimize repulsions.

A "group" of electrons is any number of electrons that occupies a localized region around an atom. The following are all considered to be one (1) electron group:

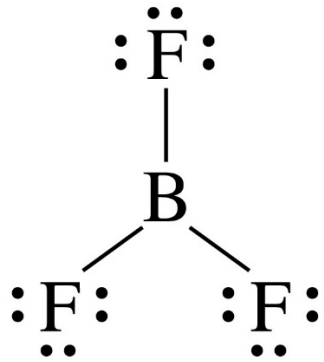
(1) single bond
(2) double bond
(3) triple bond
(4) lone pair
(5) free radical

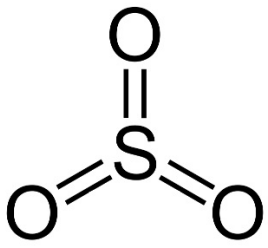
Applying VSEPR Theory

The shape of a molecule can be determined from a *correctly drawn* lewis structure:

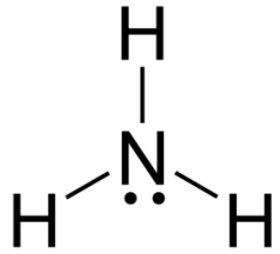


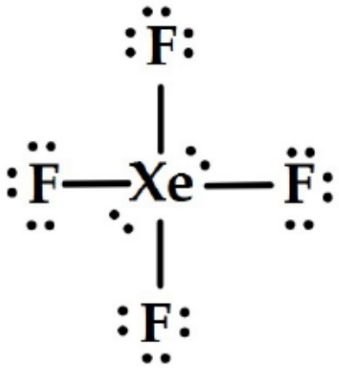
Examples of Molecular Shapes





Examples of Molecular Shapes



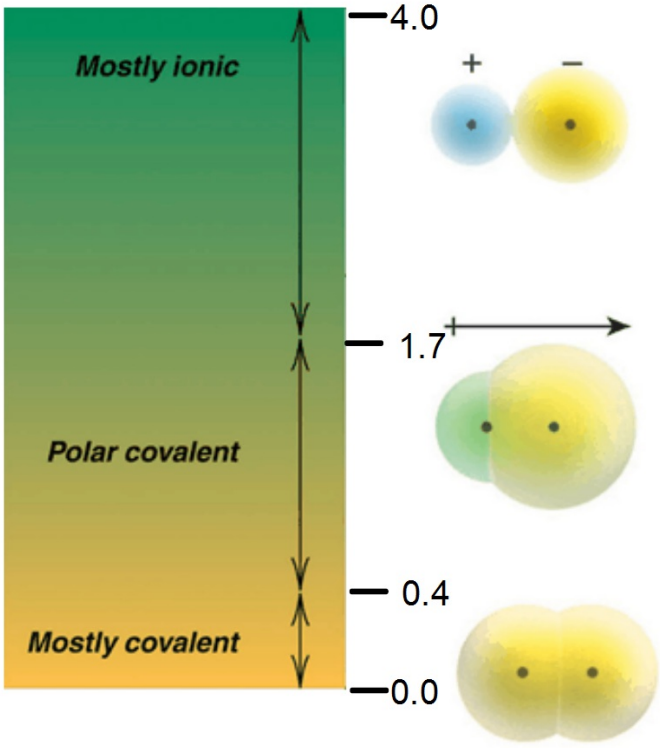


Electronegativity Difference Scale

Bond Polarity

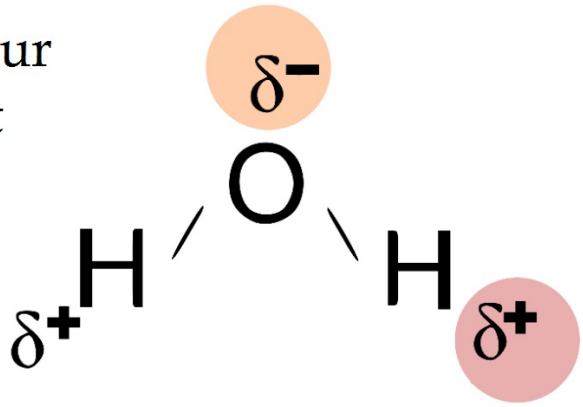
ΔEN	IONIC CHARACTER
>1.7	Mostly ionic
0.4-1.7	Polar covalent
<0.4	Mostly covalent
0	Nonpolar covalent

Boundary ranges for classifying ionic character of chemical bonds.



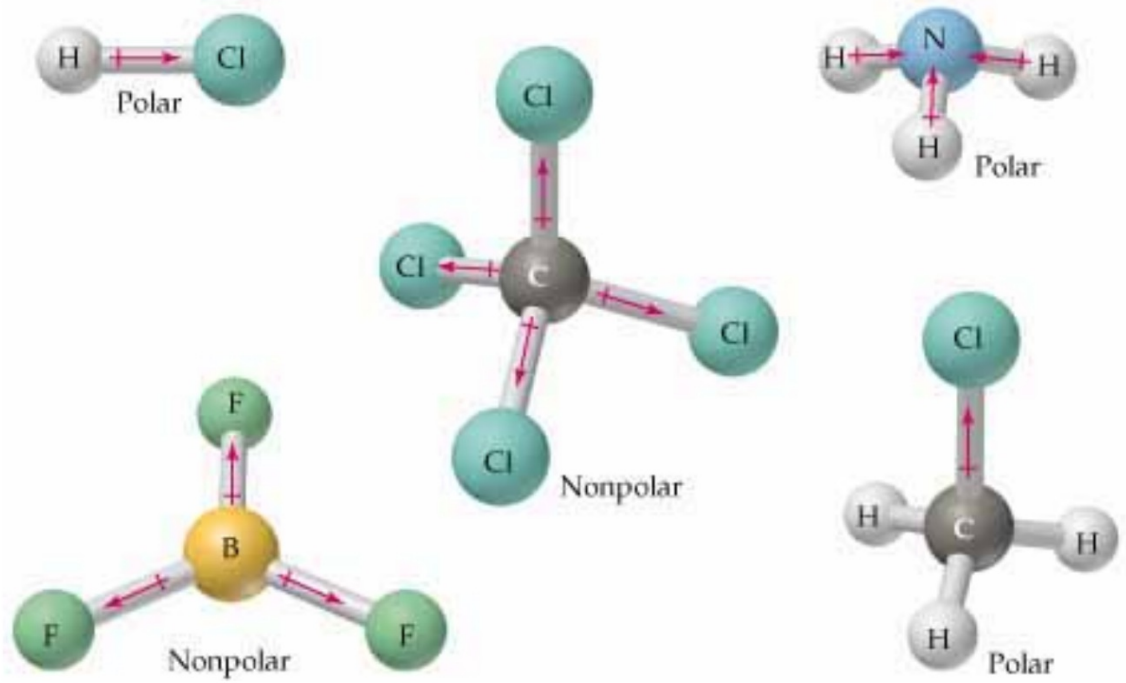
Bond Polarity and Dipoles (REVIEW)

Remember chemical dipoles occur when there is even the slightest difference in electronegativity.



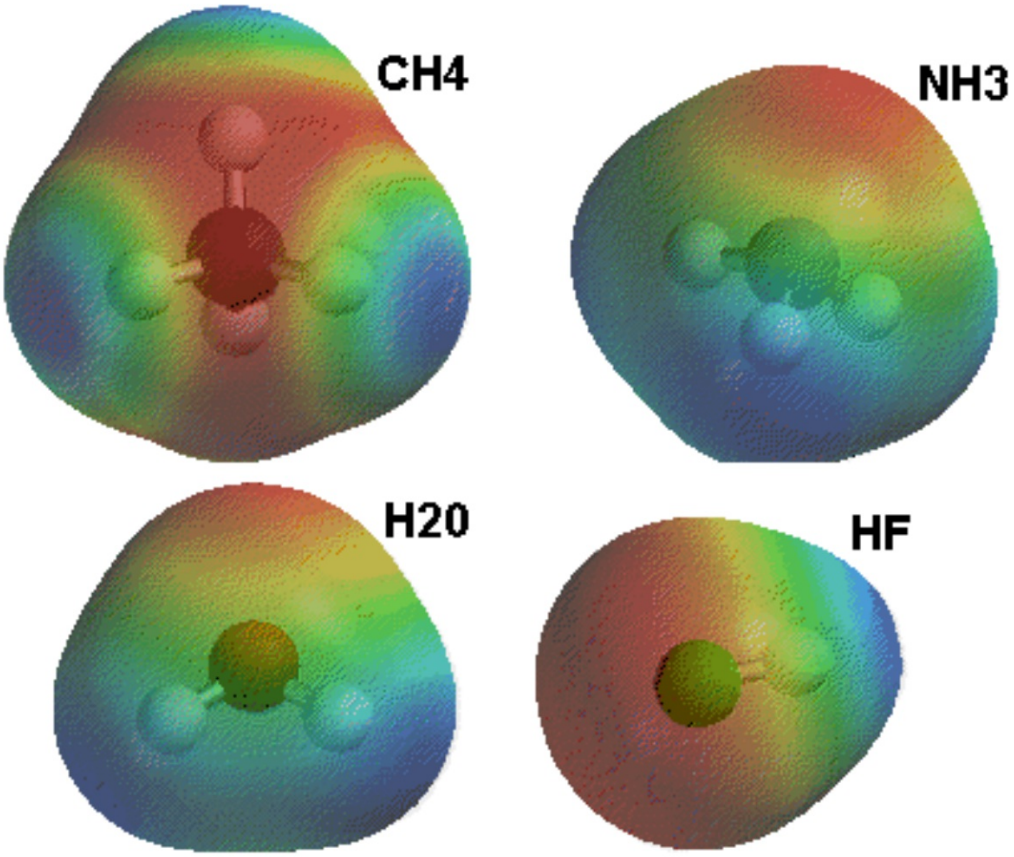
Molecular Polarity

Molecular Polarity and Bond Polarity are connected BUT their significances are completely different.



equal and opposite = nonpolar

Electron Density Maps



Molecular Polarity Examples

CCl_4 PH_3 TeF_4