CHAPTER 1

Hybridization - also occurs in other atoms such as oxygen, nitrogen, boron, etc. Water (H₂O) is a bent molecule because the two lone pairs reside in hybrid orbitals and defines the sp³ hybridized tetrahedron. BF₃, which has one empty orbital, is trigonal planar due to its sp² hybridization. Note: Empty orbitals are *unhybridized* p orbitals.

![H₂O and BF₃ structures](Image)

CHAPTER 2

Polar Covalent Bonds - Molecules are polar. Bonds are polarized along a continuum from covalent to ionic depending on the difference in electronegativity.

- EN difference >2 -- ionic bond
- EN difference <2 -- polar covalent bond
- EN difference =0 -- nonpolar covalent bond
- there are partially positive (δ+) and partially negative (δ-) atoms in a polarized bond

Electronegativity (EN) - the ability of an atom to attract electrons to itself

Inductive Effect - the polarization of a bond due to differences in electronegativities

Dipole Moment (µ) - Molecules are polar. The dipole moment is a measure of net polarity - the sum of all individual polarities in a molecule - Q x r (charge at end of dipole r distance between charges) - units Debye (D).