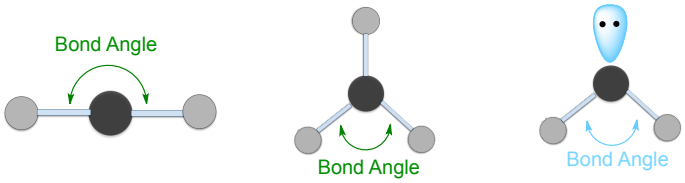
CONCEPT: BOND ANGLES

- The angle between two bonds that begins from the same element within a molecule.
  - □ When the central element has ____ lone pair(s) it possesses an *ideal bond angle*.
  - □ **Ideal Bond Angle:** The _____ angle elements take in order to minimize repulsion between one another.
    - When the central element has ___ or more lone pairs its ideal bond angle will be decreased.



EXAMPLE: If the H–C–H angle within the CH_4 molecule is 109.5º, what is the H–N–H bond angle within NH_3?

a) 120º b) 109.5º c) 107.3º d) 180º

- Bond angles can further differentiate molecules that possess the same number of electron groups.

Bond Angles

Electron Groups	Ideal Bond Angle	1 Lone Pair	2 Lone Pairs	3 Lone Pairs
2	180º			
3	120º			
4	109.5º			
5	120º, 90º			
6	90º			

EXAMPLE: Determine the F–I–F bond angle for the following ion: IF_4^-.

CONCEPT: BOND ANGLES

PRACTICE: Determine the bond angle for the thiocyanate ion, SCN^-.

a) 180º b) 90º c) 120º d) 109.5º

PRACTICE: In the PCl_3F_2 molecule the chlorine atoms exist on the equatorial positions and the fluorine atoms exist in the axial positions. Based on this information, predict the Cl–P–Cl bond angle.

a) 90º b) 180º c) 109.5º d) 120º

PRACTICE: Determine the O–N–O bond angle for N_2O_4, which exists as $O_2N–NO_2$.

a) 120º b) 109.5º c) 180º d) 90º