

# Valence Shell Electron Pair Repulsion



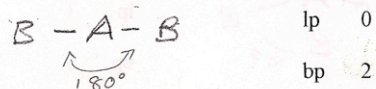
## VSEPR THEORY

"The pairs of electrons that surround the core of an atom in a molecule, repel each other and arrange themselves in such way that they are as far away as possible from each other."

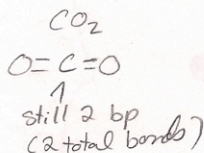
R. GILLESPIE

Shapes of molecules with a central atom can be predicted if the number of bonded and lone pairs are known.

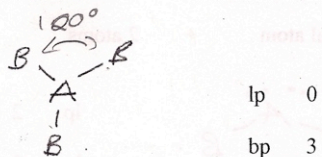
1. Central atom + 2 bonded atoms



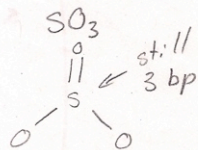
ex.  $BeH_2, BeF_2$  bond angle 180°, linear shape  
2-D



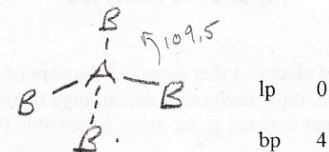
2. Central atom + 3 bonded atoms



ex.  $BF_3$  bond angle 120°, trigonal planar  
2-D



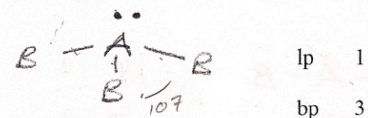
3. Central atom + 4 atoms



ex. methane,  $CH_4$ , bond angle 109.5°  
tetrahedral

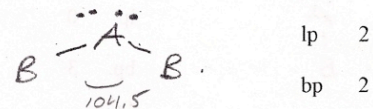
most common

4. central atom + 3 atoms



ex. ammonia,  $NH_3$ , bond angle 107°  
trigonal pyramidal

5. central atom + 2 atoms



ex. water,  $H_2O$ , bond angle 104.5°  
bent or angular