

Molecular Geometry

VSEPR Theory:

- **Valence Shell Electron Pair Repulsion Theory.**
- Attempts to predict the shape of a molecule by assuming that all electron groups (bonds, lone pairs) are as far away from each other as they can be.
- What counts as an electron group?
 - 1 single bond
 - 1 double bond
 - 1 triple bond
 - 1 lone pair
- The “AXE” notation:
 - A shorthand for the different shapes
 - “A” represents the central atom
 - “X” represents the atoms bonded to the central atom
 - “E” represents the lone pairs
- How to predict the shape of a molecule
 - Count the number of electron groups around the central atom
 - This will be your Electron Group Geometry. You can think of it as the “starting shape”
 - 2 EG: Linear
 - 3 EG: Trigonal Planar
 - 4 EG: Tetrahedral
 - Count how many of those electron groups are lone pairs
 - This will be your Molecular Geometry. You can think of it as the “actual shape”
 - 3 EG
 - 3 bonded atoms (AX₃): Trigonal planar (angle 120)
 - 2 bonded atoms, 1 lone pair (AX₂E): Bent (angle less than 120)
 - 4 EG
 - 4 bonded atoms (AX₄): Tetrahedral (angle 109.5)
 - 3 bonded atoms, one lone pair (AX₃E): Trigonal pyramidal (angle 109.5)
 - 2 bonded atoms, two lone pairs (AX₂E): Bent (angle less than 109.5)