VSEPR

**V**alence **S**hell **E**lectron **P**air **R**epulsion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Steric # | X | E | “generic”Looking at shape of everything attached | “specific”Only looking at shape of atoms |  |  |
| **Electron Pairs** | **Bonded Pairs** | **Lone Pairs** | **Electron Geometry**(hybridization) | **Molecular Geometry** (AXE Formula) | **Bond Angles** | **3-D example** |
| 2 | 1 | 1-3 | Linear(sp) | Linear(AXE, AXE2, AXE3) | 180 |  |
| 2 | 0 | Linear(AX2) |  |
| 3 | 3 | 0 | Trigonal Planar(sp2) | Trigonal Planar(AX3) | 120 |  |
| 2 | 1 | Bent(AX2E) | < 120 |  |
| 4 | 4 | 0 | Tetrahedral(sp3) | Tetrahedral(AX4) | 109.5 |  |
| 3 | 1 | Trigonal Pyramidal(AX3E) | < 109.5 |  |
| 2 | 2 | Bent(AX2E2) | << 109.5 |  |

Continued on the back!

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Steric # | X | E | “generic”Looking at shape of everything attached | “specific”Only looking at shape of atoms | \*it is unclear if d orbitals hybridize – currently we think they do not. |
| **Electron Pairs** | **Bonded Pairs** | **Lone Pairs** | **Electron Geometry**(hybridization) | **Molecular Geometry** (AXE Formula) | **Bond Angles** | **3-D example** |
| 5 | 5 | 0 | Trigonal Bipyramidal(sp3d\*) | Trigonal Bipyramidal(AX5) | 90Axial(above & below)120 Equatorial(in plane) |  |
| 4 | 1 | Seesaw(AX4E) | 90120180 |  |
| 3 | 2 | T-Shaped(AX3E2) | 90180 |  |
| 2 | 3 | Linear(AX2E3) | 180 |  |
| 6 | 6 | 0 | Octahedral(sp3d2\*) | Octahedral(AX6) | 90 |  |
| 5 | 1 | Square Pyramidal(AX5E) | 90180 |  |
| 4 | 2 | Square Planar(AX4E2) | 90180 |  |
| 3 | 3 | T-Shaped(AX3E3) | 90180 |  |
| 2 | 4 | Linear(AX2E4) | 180 |  |