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) | 90  Axial  (above & below)  120  Equatorial (in plane) |  |
| 4 | 1 | Seesaw  (AX4E) | 90  120  180 |  |
| 3 | 2 | T-Shaped  (AX3E2) | 90  180 |  |
| 2 | 3 | Linear  (AX2E3) | 180 |  |
| 6 | 6 | 0 | Octahedral  (sp3d2\*) | Octahedral  (AX6) | 90 |  |
| 5 | 1 | Square Pyramidal  (AX5E) | 90  180 |  |
| 4 | 2 | Square Planar  (AX4E2) | 90  180 |  |
| 3 | 3 | T-Shaped  (AX3E3) | 90  180 |  |
| 2 | 4 | Linear  (AX2E4) | 180 |  |