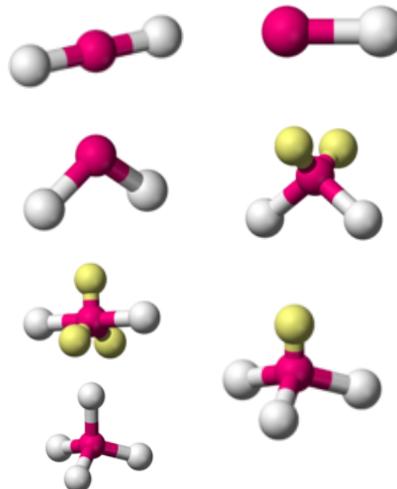


VSEPR Model

- The **shape of a molecule** determines many of its **physical and chemical properties** (**why this is important!**)
- Molecular geometry (shape) can be determined with the **Valence Shell Electron Pair Repulsion model**, or **VSEPR** model which minimizes the **repulsion** of shared and unshared atoms around the central atom.

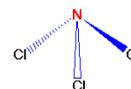
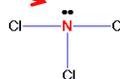


Molecule Shape

Lone Pair

Electron-Pair Geometry

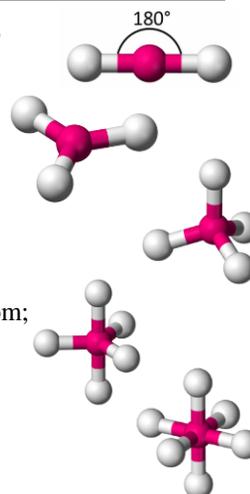
Molecular Geometry



- Molecular geometries take into account the **number of atoms** and the number of **Lone Pair electrons**
 - Electrons will distribute themselves to *minimize repulsions* between pairs of electrons
 - Causing the chemical bonds they form to stay as far apart as possible
- The main geometries without one pair elections are:
 - Linear
 - Trigonal
 - Tetrahedral
 - Trigonal bipyramidal
 - Octahedral

VSEPR geometries

- **Linear:** a simple tri-atomic molecule of the type AX_2 ; its two bonding orbitals are 180° apart.
- **Trigonal planar:** triangular and in one plane, with bond angles of 120° .
- **Tetrahedral:** four bonds on one central atom with bond angles of 109.5° .
- **Trigonal bipyramidal:** five atoms around the central atom; three in a plane with bond angles of 120° and two on opposite ends of the molecule.
- **Octahedral:** six atoms around the central atom, all with bond angles of 90° .

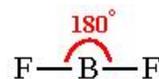


VSEPR geometries

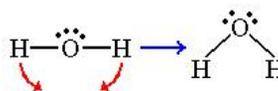
- **Depends on 2 factors**
 1. # of lone pair electrons
 2. # of atoms surrounding central atom
- **Steric Number** is the # of **domains** (atoms & electrons pairs) bonded to the central atom
 - Only worried about electron pairs on **Central Atom**
- **How to Determine Molecular Geometry – YouTube:** This video describes one method for quickly finding the major geometrical shapes for simple molecules. (20 Mins) On my Webpage

VSEPR Model

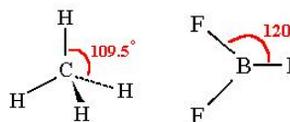
- Electron pairs repel each other and cause molecules to be in fixed positions relative to each other



- Unshared electron pairs also determine the shape of a molecule (LONE PAIRS)

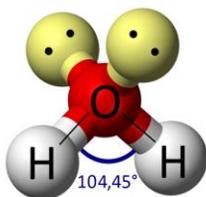


- Electron pairs are located in a molecule as far apart as they can be

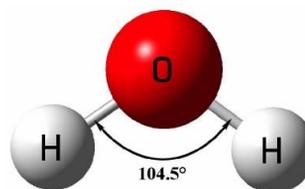


Structural vs Molecular Geometry

- We consider both lone electron pairs and bond electron pairs while determining the shape of the molecule in **Structural/electron geometry**.
- In **molecular geometry** only consider bond atoms.



**Structural/Electronic
Geometry - Tetrahedral**



Molecular Geometry - Bent

VSEPR Model

