4.3 VSEPR Theory (Valence Shell Electron Pair Repulsion)

Overview:

- Only the valence shell electrons of the central atom(s) are important for molecular shape.
- Valence shell electrons are paired or will be paired in a molecule or polyatomic ion.
- Bonded pairs of electrons and lone pairs of electrons are treated approximately equally.
- Valence shell electron pairs repel each other electrostatically.
- The molecular shape is determined by the positions of the electron pairs when they are a maximum distance apart (with the lowest repulsion possible).

Shapes of Molecules

- Table 1 on page 245 plus overhead of a few more.
- **Memorize!!!!!**
- Based on 4 shapes: line, triangle, tetrahedron, square and various combinations.

A Few Quirks

- Bonding pairs and lone pairs to be treated equally. However, not always true.
  a) H_2O expect 109.5˚ but get 104.5˚. The lone pairs repulse the bonding pairs.
  b) NH_3 expect 109.5˚ but get 107.3˚. The lone pair repulses the bonding pairs

Homework

- Practice 1,2,3,4,5,8,10,11
- Questions 1,2,3