Chap 5 List

Using the Ideal Gas Law to relate temperature to pressure, volume, or moles. For example, when volume is cut in half, what happens to pressure? (Pressure is doubled)

Using the ideal gas law to calculate temperature, pressure, volume, or moles when 3 out of 4 of the variables are given.

Determining the molar mass of an unknown gas using the Dumas method (lab).

Performing gas stoichiometry problems
- with known amounts of materials (P, V and T supplied for all gases)
- with P when V and T are held constant
- with V when P and T are held constant

Dalton's Law
- $P_{tot} = P_a + P_b$
- collecting gases over water
- $P_{tot} = P_{H2O} + P_{gas}$

Kinetic Molecular Theory
- The relationship between KE and temperature, and the relationship between velocity and temperature

$$KE_{ave} = \frac{3\,RT}{2\,N_A} \qquad {}^1/_2\,mv^2 = \frac{3\,RT}{2\,N_A}\ ^*$$

*$v^2$ is actually the average of the squared velocities, not the square of the average velocity

- On average, the kinetic energy (translational) of a gas particles depends only on its temperature. Thus, at a given temperature, small gas particles are moving faster than large gas particles.

Real Gases
- Why aren't real gases ideal?
- Under what conditions do real gases behave more ideally?

Chap 6 list
Calculate the energy of a photon

Predict whether a photon is absorbed or released by an electronic transition (the movement of an electron from one orbital to another).

The principle difference between Bohr's atom and the quantum mechanical model of the atom.

Bohr model
- the electron is a particle
- one quantum number can be used to specify the energy of an electron
- the path of the electron can be described

Quantum mechanical model
- the electron is a wave
- the probability of finding an electron in a given volume of space can be determined, but the electron does not "orbit" like a moon
- four quantum numbers are required to specify the energy of an electron

Quantum numbers
- allowed values
- correspondence between orbital type and quantum number $l$.
  - e.g. $l = 0$ is an s orbital
- correspondence between number of orbitals in a given type and $m_l$.
  - e.g. $l = 1$ is a p orbital type, and the allowed $m_l$ values for the $l = 1$ type orbital are 1, 0, -1. Thus, there are 3 p orbitals in a given principle energy level

Electron Configuration
- be able to determine ground state electron configurations for neutral elements
- be able to determine ground state electron configurations for monoatomic ions

Energy level diagrams
- be able to fill in the electrons in an energy level diagram

Trends
- Know the trends in the following atomic properties: atomic radius, ionization energy, and electronegativity