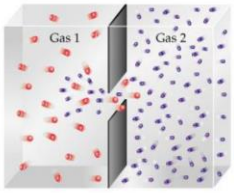
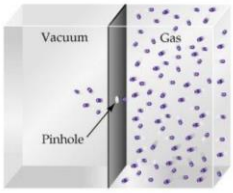
N27 – Gas Density and More



Diffusion



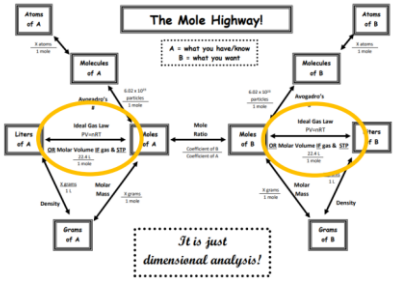
Effusion

Rate of Effusion:

$$\frac{Rate\ of\ effusion\ for\ gas\ 1}{Rate\ of\ effusion\ for\ gas\ 2} = \frac{\sqrt{M_2}}{\sqrt{M_1}}$$

Rate of Diffusion:

$$\frac{Distance\ traveled\ by\ gas\ 1}{Distance\ traveled\ by\ gas\ 2} = \frac{\sqrt{M_2}}{\sqrt{M_1}}$$



N26 – Ideal Gases and Laws

Ideal Gas Law

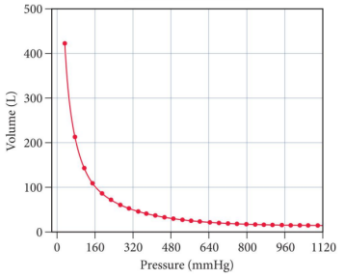
$$PV = nRT$$

Molar Mass Kitty

$$M = \frac{DRT}{P}$$

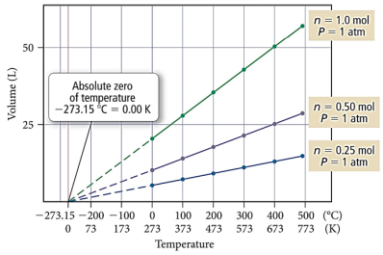
Boyle's Law

$$P_1V_1 = P_2V_2$$



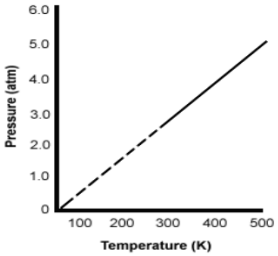
Charles's Law

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$



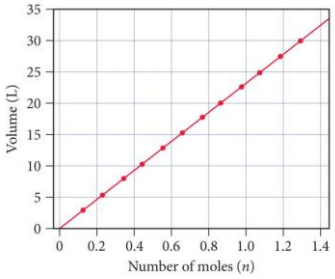
Gay-Lussac's Law

$$\frac{P}{T_1} = \frac{P_2}{T_2}$$



Avogadro's Law

$$\frac{V_1}{n_1} = \frac{V_2}{n_2}$$



Dalton's Partial Pressure

$$P_{total} = P_1 + P_2 + \cdots$$

Mole Fraction

$$X_a = \frac{n_a}{n_{total}} \qquad P_a = X_a P_{total}$$

N25 – Gases Review

KMT = Kinetic Molecular Theory

1. Gases consist of large numbers of tiny particles that are far apart relative to their size
   – the volume of each gas molecule is considered negligible, they are treated as point particles.
2. Gas particles undergo elastic collisions
   – meaning they do not lose energy when colliding.
3. Gas particles are in a constant, rapid, straight line, "chaotic" motion
   – they possess kinetic energy (motion energy).
4. Gases are "Ideal Gases" – meaning they do not interact with each other.
   – There are no forces of attraction or repulsion between particles.
5. The average kinetic energy of the particles is proportional to temperature
   – (in Kelvin!!!) – T ↑, KE ↑
   – There is a distribution of speeds, some go faster than others
   so overall there is an average kinetic energy of the sample.