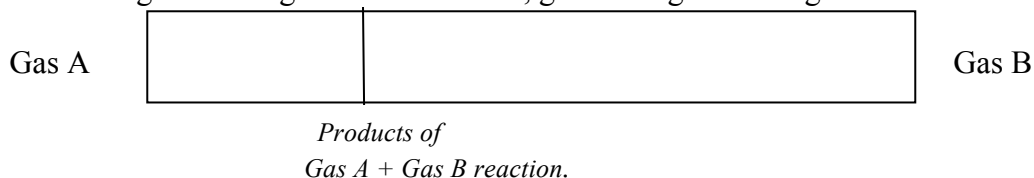


Refer to p. 351-355 in your Modern Chemistry Textbook by Holt for help on this worksheet.

**PART I: Concepts of Temperature, Kinetic Energy and Effusion**

**True or False:** Note--Temperature is a measure of the average kinetic energy of all molecules.

- \_\_\_\_\_ 1) When at the same temperature, all O<sub>2</sub> gas molecules move at the same speed.
- \_\_\_\_\_ 2) When at the same temperature, lighter molecules move, on average, faster than heavier molecules.
- \_\_\_\_\_ 3) According to the diagram shown below, gas A is lighter than gas B.



- \_\_\_\_\_ 4) If Gas X effuses through a tube at twice the speed of Gas Y, then Gas Y is twice as heavy as Gas X.

**PART II: Graham's Law Calculations (Problems taken from Holt, p359 #39-42)**

$$\frac{\text{rate of effusion of Gas A}}{\text{rate of effusion of Gas B}} = \frac{\text{velocity of Gas A}}{\text{velocity of Gas B}} = \frac{\sqrt{\text{molar mass of Gas B}}}{\sqrt{\text{molar mass of Gas A}}}$$

- 5) What is the ratio of the rate of effusion of hydrogen gas (H<sub>2</sub>) to that of nitrogen gas (N<sub>2</sub>)?
  
- 6) What is the ratio of the velocity of hydrogen molecules (H<sub>2</sub>) to that of Ne atoms (Ne)?
  
- 7) At a certain temperature and pressure, chlorine molecules (Cl<sub>2</sub>) have an average velocity of 0.0380 m/s. What is the average velocity of sulfur dioxide molecules (SO<sub>2</sub>) under the same conditions?
  
- 8) A sample of helium (He) effuses through a porous container 6.50 times faster than does unknown Gas X. What is the molar mass of the unknown gas?