NAME: HONORS CHEMISTRY

SECTION: Graham's Law Problems

Graham's Law states that the relative rates of diffusion of two gases vary inversely with the square roots of the gram formula masses.

$$\frac{rate_1}{rate_2} = \sqrt{\frac{gfm_2}{gfm_1}}$$

Remember to follow the general strategy:

List what you know
Set up the problem—
List your variables
Rearrange the equation, then substitute values
Estimate and calculate

Examples

- A helium atom travels an average 1000. m/s at 250^{o}C. How fast would an atom of radon travel at the same temperature?

- An unknown gas effuses through an opening at a rate 3.16 times slower than that of helium gas. What is the gfm of this unknown gas?

Problems for you to solve

1. Under the same conditions of temperature and pressure, how many times faster will helium effuse compared to carbon monoxide?

2. If the carbon monoxide in problem 1 takes 45 seconds to effuse, how long will the helium take?

3. What is the relative rate of diffusion of N_2O_4 compared to neon? Does N_20_4 effuse faster or slower than neon?

4. If the neon in problem 3 takes 15 seconds to effuse, how long will N_2O_4 take?

5. An unknown gas diffuses .677 times as fast as neon. What is the gram formula mass of the unknown gas?

Answers

1. He is 2.65x faster
2. 17 s
3. N2O4 is 0.468 x slower
4. 32 s
5. 44 g/mol