GRAHAM'S LAW OF EFFUSION

Graham's Law says that a gas will effuse at a rate that is inversely proportional to the square root of its molecular mass, MM. Expressed mathematically:

$$\frac{\text{rate}_1}{\text{rate}_2} = \sqrt{\frac{MM_2}{MM_1}}$$

Solve the following problems.

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

2. If the carbon dioxide in Problem 1 takes 32 sec to effuse, how long will the hydrogen take?

3. What is the relative rate of diffusion of NH_3 compared to He? Does NH_3 effuse faster or slower than He?

4. If the He in Problem 3 takes 20 sec to effuse, how long will NH_3 take?

5. An unknown gas diffuses 0.25 times as fast as He. What is the molecular (molar mass) mass of the unknown gas?