

Gas Laws Summary problem 5

★ When calcium carbonate, the main component of marble and chalk, is added to a solution of hydrochloric acid a reaction takes place. Indicate this reaction with a balanced chemical equation.

- (+3) a. If 428 mL of carbon dioxide is produced at 23°C and 755 mm Hg, what is the yield of carbon dioxide in moles and in grams?
- (+3) b. The gas collected in (a) is transferred without loss at 23°C to a flask with twice the volume of that in (a). What is the pressure in the larger flask? At what temperature would the pressure in the larger flask return to the original pressure in (a)?
- (+2) c. What is the density of carbon dioxide at 23°C and 755 mm Hg.?
- (+3) d. Suppose that carbon dioxide is collected at 23°C in a flask that contains nitrogen gas with a pressure of 127 mm Hg. After carbon dioxide is collected, the total pressure is 798 mm Hg. What is the partial pressure of carbon dioxide? What mass of carbon dioxide is collected in the 428 mL. Flask?
- (+2) e. What is the mole fraction of nitrogen in the mixture in (d)?
- (+2) f. What volume of 0.200M HCl is required to generate 0.500L of carbon dioxide at 27°C and 1.20 atm.?
- (+2) g. What volume of carbon dioxide can be generated at 27°C and 1.20 atm if 2.00g of calcium carbonate is added to 25.00 mL of 1.00M HCl?
- (+2) h. Compare the rate of effusion of carbon dioxide to that of nitrogen gas at the same temperature and pressure. Compare the time required for equal numbers of moles of carbon dioxide and nitrogen gas to effuse.
- (+2) i. The average speed of a carbon dioxide molecule at 25°C is 411 m/s. What is the average speed of a nitrogen molecule, at the same temperature?

★ *first a double replacement reaction*

*then one product decomposes because heat is generated which causes the decomposition*

*∴ there are 3 products*