

Chem 2 AP Homework #5-2: Ideal Gas Law, Gas Stoichiometry

Problems pg. 204-205 #5.27, 5.29, 5.32, 5.34, 5.38-5.44 (even), 5.48, 5.50, 5.54, 5.58, 5.60, 5.130*

- 27 List the characteristics of an ideal gas.**
- 29 What are standard temperature and pressure? What is the significance of STP in relation to the volume of 1 mole of an ideal gas?**
- 32 Given 6.9 moles CO in 30.4 L at a temperature of 62°C, what is the pressure (in atm)?**
- 34 A certain amount of gas at 25°C and at a pressure of 0.800 atm is contained in a glass vessel. Suppose that the vessel can withstand a pressure of 2.00 atm. How high can you raise the temperature of the gas without bursting the vessel?**
- 38 A gas evolved during the fermentation of glucose has a volume of 0.78 L and 20.1 °C and 1.00 atm. What was the volume of this gas at the fermentation temperature of 36.5°C and 1.00 atm pressure?**
- 40 Calculate the volume (in liters) of 88.4 g of CO₂ at STP.**

- 42 Dry ice is solid carbon dioxide. A 0.050g sample of dry ice is placed in an evacuated 4.6L vessel at 30°C. Calculate the pressure inside the vessel after all the dry ice has been converted to CO₂ gas.
- 44 At 741 torr and 44°C, 7.10 g of a gas occupy a volume of 5.40 L. What is the molar mass of the gas?
- 48 Calculate the density of hydrogen bromide (HBr) gas in grams per liter at 733 mm Hg and 46°C.
- 50 A compound has the empirical formula of SF₄. At 20°C, 0.100 g of this gaseous compound occupies 22.1 mL at a pressure of 1.02 atm. What is the molecular formula?
- 54 In alcohol fermentation, yeast converts glucose to ethanol and carbon dioxide:
$$\text{C}_6\text{H}_{12}\text{O}_6(\text{s}) \rightarrow 2 \text{C}_2\text{H}_5\text{OH}(\text{l}) + 2 \text{CO}_2(\text{g})$$

If 5.97 g of glucose produce 1.44 L of CO₂ at 293 K and 0.984 atm, what is the % yield?

- 58 Reacting 3.00 g of an impure sample of calcium carbonate with hydrochloric acid produced 0.656 L of CO_2 (carbonic acid dissociates into carbon dioxide and water) at 20.0°C and 792 mmHg. Write the chemical equation and calculate the % by mass of calcium carbonate in the sample.
- 60 Determine the volume of air (21.0% O_2 by volume) needed to burn 227 g of ethanol, $\text{C}_2\text{H}_5\text{OH}$, at 35.0°C and 790 mmHg. Write and balance the chemical equation first.
- 130 One oxide of nitrogen has a density of 1.33 g/L at 764 mm Hg and 150°C . What is its formula?

Answers: 32) 6.2 atm; 34) $745\text{ K} = 472^\circ\text{C}$; 38) 0.82 L; 40) 45.0 L; 42) $6.1 \times 10^{-3}\text{ atm}$; 44) 35.0 g/mol; 48) 2.97 g/L; 50) SF_4 ; 54) 88.9%; 58) 94.9%; 60) 1710 L; 130) 45.9 g/mol