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- \_\_\_\_\_ 10. The average pressure of carbon dioxide in the atmosphere is 25.1 torr at 273 K. Assuming that our atmosphere is 50 miles high and the temperature and pressure of carbon dioxide constant in this region, calculate the mass of the gas in tons. The radius of the earth is 3963.0 miles.
- a.  $3.0 \times 10^{15}$  tons                      c.  $4.8 \times 10^6$  tons  
b. 50,000 tons                              d.  $6.9 \times 10^9$  tons
- \_\_\_\_\_ 11. A 50.0 L cylinder at temperature of 47°C and a pressure of 50.0 atm contains how many molecules of gas per cm<sup>3</sup>?
- a.  $5.73 \times 10^{25}$                               c.  $2.30 \times 10^{19}$   
b.  $1.15 \times 10^{21}$                               d.  $6.75 \times 10^{18}$
- \_\_\_\_\_ 12. A 50.0 L cylinder of Cl<sub>2</sub> at 20.0°C and a pressure of 103,401 torr springs a leak. The following day the pressure is found to be 41,361 torr. How many moles of chlorine gas escaped during this time?
- a. 170 mol                                      c. 85.0 mol  
b. 280 mol                                      d. 113 mol
- \_\_\_\_\_ 13. Tin reacts with hydrochloric acid to produce hydrogen gas and tin (II) chloride. How many liters of hydrogen gas are produced at 27.0°C and a pressure of 710 torr, if 2.80 g of tin reacts with excess hydrochloric acid?
- $\text{Sn}_{(s)} + 2 \text{HCl}_{(aq)} \rightarrow \text{SnCl}_{2(aq)} + \text{H}_{2(g)}$
- a. 0.620 L                                      c. 2.00 L  
b. 0.320 L                                      d. 1.25 L
- \_\_\_\_\_ 14. How many cm<sup>3</sup> of carbon tetrachloride are produced when 8.0 L of chlorine are allowed to react with 0.75 L of methane at STP?
- $4 \text{Cl}_{2(g)} + \text{CH}_{4(g)} \rightarrow 4 \text{HCl}_{(g)} + \text{CCl}_{4(g)}$
- a. 1500 cm<sup>3</sup>                                      c. 360 cm<sup>3</sup>  
b. 750 cm<sup>3</sup>                                      d. 1080 cm<sup>3</sup>
- \_\_\_\_\_ 15. Calculate the final pressure, in atm, after 9.06 g of krypton reacts with 10.0 g of fluorine at 300 K in a 10.0 L container.
- $\text{Kr}_{(g)} + \text{F}_{2(g)} \rightarrow \text{KrF}_{2(s)}$
- a. 0.591 atm                                      c. 0.700 atm  
b. 0.384 atm                                      d. 1.90 atm
- \_\_\_\_\_ 16. Calculate the density change, g/L, if 700 g of C<sub>2</sub>H<sub>6(g)</sub> are removed from a 200.0 L cylinder at 200.0 psi (lb/in<sup>2</sup>) and a temperature of 20°C.
- a. 3.6 g/L                                      c. 1.7 g/L  
b. 15.0 g/L                                      d. 16.2 g/L
- \_\_\_\_\_ 17. Calculate the density, in g/L, of sulfur dioxide SO<sub>2(g)</sub> at 37°C and a pressure of 1440 torr.
- a. 6.0 g/L                                      c. 2.38 g/L  
b. 0.60 g/L                                      d. 4.76 g/L
- \_\_\_\_\_ 18. Calculate P<sub>total</sub>, in atms, for three different gases at partial pressures of 144.0 cm, 800.0 mm, and 1.3 m of Hg.
- a. 1.90 atm                                      c. 1.06 atm  
b. 2.58 atm                                      d. 4.66 atm

- \_\_\_\_\_ 19. 1.0 L of hydrogen gas is collected over water at 308 K at a pressure of 728 torr. How many grams of iron are required to react with excess  $\text{HCl}_{(aq)}$  to produce this volume of hydrogen gas? The vapor pressure of water is 42.4 torr. The products of the reaction are iron (II) chloride and hydrogen gas.
- a. 4.7 g  
b. 2.35 g  
c. 2.0 g  
d. 1.3 g
- \_\_\_\_\_ 20. Gas A diffuses twice as fast as gas B. Gas B has a molecular weight = 60.0 g/mol. What is the molar mass of gas A?
- a. 15.0 g/mol  
b. 120 g/mol  
c. 30 g/mol  
d. 90 g/mol
- \_\_\_\_\_ 21. If gas B effuses four times as fast as gas A, what is the ratio of the molar masses (A/B)?
- a. 2:1  
b. 4:1  
c. 16:1  
d. 8:1
- \_\_\_\_\_ 22. The rate of effusion of freon-12 to freon-11 is 1.07:1. The molar mass of freon-11 is 137.4 g/mol. Calculate the molar mass, in g/mol, of freon-12.
- a. 100 g/mol  
b. 182 g/mol  
c. 121 g/mol  
d. 118 g/mol
- \_\_\_\_\_ 23. Using the van der Waals equation, calculate the pressure exerted by 10.0 g of methane ( $\text{CH}_4$ ) in a 2.1 L container at 330 K.  $a = 2.253 \text{ L}^3 \text{ atm/mol}^2$ ,  $b = 0.0458 \text{ L/mol}$ . Calculate using the ideal gas equation and find the difference between the ideal gas pressure and van der Waals pressure.
- a. 2.0 atm  
b. 0.5 atm  
c. 0.1 atm  
d. 1.5 atm