**Gas Problems #4**

760 torr = 760 mm Hg = 1 atm \hspace{1cm} R = 0.0821 L atm/mol K

1. If 333 mL of an ideal gas at a temperature of 25° C and a pressure of 750. torr has its temperature lowered to -11° C and its pressure lowered to 730. mm Hg, what will its new volume be in milliliters?

2. What will the temperature be in °C if 2.0 liters of an ideal gas at 0° C is expanded to 2.5 liters? Its initial pressure was 750 mm Hg and its final pressure is 740 mm Hg.

3. A sample of an ideal gas occupying 0.50 liters at 0.99 atm pressure and a temperature of 273 K is expanded until its volume is 755 mL and the temperature is 0° C. What will be its pressure in torrs?

4. What will be the volume at STP for an ideal gas which occupies 333 mL at 298 K and 755 mm Hg pressure?

5. What pressure in atmospheres will be exerted by 0.312 moles of an ideal gas at 42° C in a volume of 58.4 mL?

6. How many moles of gas will occupy 5.0 liters at STP?

7. At what temperature must you hold 12.8 g of oxygen gas to have a pressure of 0.20 atm and a volume of 0.50 liters?

8. What is the density in grams/liters of chlorine gas at STP?

9. How many grams will 6.0 liters of nitrogen gas at -23° C and 2.0 atm pressure weigh?

10. What is the molecular weight of a gas if 268 mL at 69° C and 17.9 torr pressure weighs 0.0156 g?

11. How many grams of acetylene, C₂H₂, will occupy 1.00 liter at 24° C and a pressure of 742 mm Hg?
12. What will the total pressure be if a 3.0 liter container at -123˚ C contains 2.8 g nitrogen, 2.2 g of carbon dioxide, and 0.002 g of hydrogen?

13. How many moles of a gas are present if, when the gas is collected over water at 26˚ C, it has a total pressure of 755 torr and a volume of 3.5 liters? The vapor pressure of water at this temperature is 25 mm Hg.

For problems 14 through 15 assume constant temperature.

14. 20.0 mL of a gas at 700.0 mm Hg will occupy what volume at:
   a. 800. mm Hg of pressure?     b. 500. mm Hg of pressure?

15. If a persons lungs can hold 2.30 liters of air at one atmosphere of pressure:
   a. what volume will they hold at 87 ft below the surface of sea water where the pressure is 4.00 atm?
   b. What volume will they hold if they could expand at an altitude where the pressure is 0.68 atm? (Don't fly after diving!)

For problems 16 through 17 assume constant pressure.

16. 500.0 mL of a gas at 40.0˚ C will occupy what volume at:
    a. -30.0˚ C?     b. 90.0˚ C?

17. If 7.4 liters of carbon monoxide at 78.0˚ C is
    a. compressed to 3.48 liters, what will the final temperature of the gas be?
    b. expanded to 19.2 liters, what will the final temperature of the gas be?

Solutions

1. 301 mL
2. 64˚ C
3. 5.0 x 10^2 torr
4. 303 mL
5. 138 atm
6. 0.22 moles
7. 3.0 K
8. 3.17 g/L
9. 16 g
10. 69.3 g/mole
11. 1.04 g
12. 0.62 atm
13. 0.14 mole
14. a. 17.5 mL    b. 28.0 mL
15. a. 0.575 L    b. 3.38 L
16. a. 388.1 mL   b. 579.9 mL
17. a. 170 K or -103˚ C    b. 910 K or 637˚ C