**AP Chemistry – Extra Gas Law Problems**

1. A gas has a pressure of 4.62 atm when its volume is 2.33 L. What will be the pressure in torr when

the volume is changed to 1.03 L? (7940 torr)

2. A sample of hydrogen at 47°C exerts a pressure of 0.329 atm. The gas is heated to 77°C at

constant volume. What will be its new pressure? (0.360 atm)

3. A weather balloon at Earth’s surface has a volume of 4.00 L at 31°C and 755 mm Hg. If the

balloon is released and the volume reaches 4.08 L at 728 mm Hg, what is the temperature in

degrees Celsius? ( 26°C)

4. How big a volume of dry oxygen gas at STP would you need to take in order to have the same

number of oxygen molecules as there are hydrogen molecules in 25.0 L at 0.850 atm and 35°C?

(18.8 L)

5. At a deep-sea station 200. M below the surface of the Pacific Ocean, workers live in a highly

pressurized environment. How many liters of gas at STP must be compressed on the surface to fill

the underwater environment with 2.00 x 107 L of gas at 20.0 atm? (4.00 x 108 L)

6. One method of estimating the temperature of the center of the sun is based on the assumption that the center of the sun consists of gases that have an average molar mass of 2.00 g/mol. If the density of the center of the sun is 1.40 g/cm3 at a pressure of 1.30 x 109 atm, calculate the temperature in degrees Celsius. (2.26 x 107°C).

7. The nitrogen in a 30.0 L container at 740 torr and 55°C and the hydrogen in a 20.0 L container at

650 torr and 15°C are pumped into a 25.0 L container at 32°C. What is the final pressure?

(1376 torr)

8. What pressure of the gas (A) at STP in this open-ended manometer if delta h = 50 mm? (



15. What volume does 50 grams of CO2 occupy if it is at 0oC and 700 mm Hg? (27.65 L)

16. How many grams of CH4 are present if 300 mL of it is at 120 kPa and -25 oC? (0.28 grams)

17. What is the molecular weight of a gas if 2.3 grams of it occupy 230 mL at a pressure of 750

mm Hg and a temperature of 75 oC? (290 g/mole)

18. A gas is 11.8% C, 69.6% Cl and 18.6% F. If 0.107 grams of it fills a 458 mL flask at 25 oC

at a pressure of 21.3 mm Hg, what is the molecular formula of the compound?

(Empirical CCl2F = 102 g/mole MW = 204 so molecular = C2Cl4F2)

19. A container has 10 grams of N2, 100 grams of Xe, and 42 grams of Ar. What is the total pressure in

The container if the volume is 4 L and the temperature is 50C?

nN2 = 0.357 moles nXe = 0.762 moles nAr = 1.053 moles ntotal = 2.17 moles, Ptotal = 14.4 atm

20. Hydrogen gas is collected over water at 15 oC. If the gas was collected at 800 mm Hg

atmospheric pressure, what pressure of H2 gas was collected? VPH2O at 15C = 12.8mm Hg

(PH2 = 800 -12.8 = 787.2 mm Hg)

21. Oxygen gas is collected over water at 22 oC. If the gas was collected in a 250 mL container

at 740 mm Hg atmospheric pressure, how many grams of oxygen were collected? VPH2O at 19.8 mm Hg (PO2 = 740 – 19.8 = 720.2 mm Hg and 0.313 grams of O2)

22. What are the four ideas of the kinetic molecular theory?

*a. Gases consist of particles that are in random, rapid motion*

*b. Kinetic energy of the gas is directly proportional to temperature*

*c. Gases collide with each other and their container with no loss of energy (elastic)*

*d. Gas particles occupy no volume relative to the overall volume of the container itself*

23. Which two of the ideas in #1 are not technically true?

(c & d)

24. What is the Van der Waal’s equation? What does it correct for?

[P+ a(n/V)2][V-bn] = nRT It corrects for c & d above

25. Which gas in each pair would deviate most from ideality and why?

a. N2 vs. CO CO because it is polar at the same mass

b. CH3OH vs. O2 CH3OH has H-bonds at the same mass

26. Two equal balloons are made; one with Helium and one with Neon. How much faster does

the Helium balloon deflate compared to the Neon? (2.25 times as much)

27. SO2 diffuses 1.5 times as fast as an unknown gas. What is the molar weight of the unknown

gas? (144 g/mole)

28. If BH3 is put into one end of a tube marked 0 cm and NF3 is put into the other end marked

100 cm, at what distance mark on the tube do they meet? (69.4 cm)