

Name: \_\_\_\_\_

Date: \_\_\_\_\_

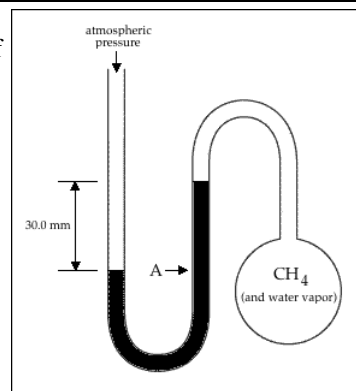
Period: \_\_\_\_\_

Seat #: \_\_\_\_\_

**Directions:** Any worksheet that is labeled with an \* means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website...and the entire internet! See me if you need help finding practice on a topic you are struggling with.

Show work for each problem with boxed answer.

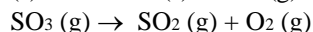
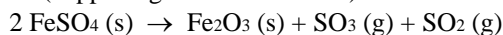
[1] A sample of  $\text{CH}_4$  is confined in a water manometer. The temperature of the system is  $30.0^\circ\text{C}$  and the atmospheric pressure is  $98.70\text{ kPa}$ . What is the pressure of the methane gas, if the height of the water in the manometer is  $30.0\text{ mm}$  higher on the confined gas side of the manometer than on the open to the atmosphere side. (Density of Hg is  $13.534\text{ g/mL}$ ). ( $94.2\text{ kPa}$ )



[2] Three  $1.00\text{ L}$  flasks at  $25.0^\circ\text{C}$  and  $1013\text{ hPa}$  pressure contain:  $\text{CH}_4$  (flask A),  $\text{CO}_2$  (flask B) and  $\text{NH}_3$  (flask C). Which flask (or none) contains  $0.041\text{ mol}$  of gas? (you figure out)

[3] What is height (in mm) of a column of methane if the pressure at the base of the column is  $1.50\text{ atm}$ ? (The density of Hg is  $13.534\text{ g/cm}^3$  and methane is  $0.717\text{ kg/m}^3$ .) ( $2.15\text{E}7\text{ mmCH}_4$ )

[4] Calculate  $K_p$  for each of the two reactions (happening in the same flask):



After equilibrium is reached, total pressure is  $0.836\text{ atm}$  and partial pressure of oxygen is  $0.0275\text{ atm}$ . ( $0.190$  – incorrect, didn't acct for  $\frac{1}{2}\text{ O}_2$ )

[5] The vapor pressure of solid iodine at  $30.0^\circ\text{C}$  is  $0.466\text{ mmHg}$ .

a. How many milligrams of iodine will sublime into an evacuated  $1.00\text{ L}$  flask? ( $6.26\text{ mg}$ )

b. If  $2.00\text{ mg}$  of  $\text{I}_2$  are used, what will the final pressure be? ( $0.149\text{ mmHg}$ )

c. If  $10.00\text{ mg}$  of  $\text{I}_2$  are used, what will the final pressure be? ( $0.466\text{ mmHg}$ )

A gas has a pressure of  $4.62\text{ atm}$  when its volume is  $2.33\text{ L}$ . What will be the pressure in torr when the volume is changed to  $1.03\text{ L}$ ? ( $7940\text{ torr}$ )

A sample of hydrogen at  $47^\circ\text{C}$  exerts a pressure of  $0.329\text{ atm}$ . The gas is heated to  $77^\circ\text{C}$  at constant volume. What will be its new pressure? ( $0.360\text{ atm}$ )

A weather balloon at Earth's surface has a volume of  $4.00\text{ L}$  at  $31^\circ\text{C}$  and  $755\text{ mm Hg}$ . If the balloon is released and the volume reaches  $4.08\text{ L}$  at  $728\text{ mm Hg}$ , what is the temperature in degrees Celsius? ( $26^\circ\text{C}$ )

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  $25.0\text{ L}$  at  $0.850\text{ atm}$  and  $35^\circ\text{C}$ ? ( $18.8\text{ L}$ )

At a deep-sea station  $200.0\text{ m}$  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  $2.00 \times 10^7\text{ L}$  of gas at  $20.0\text{ atm}$ ? ( $4.00 \times 10^8\text{ L}$ )

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  $2.00\text{ g/mol}$ . If the density of the center of the sun is  $1.40\text{ g/cm}^3$  at a pressure of  $1.30 \times 10^9\text{ atm}$ , calculate the temperature in degrees Celsius. ( $2.26 \times 10^7\text{ }^\circ\text{C}$ )

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)

I have a special, ideal balloon. This balloon does not exert any pressure on the gas inside it. I start by taking the balloon and inflating it to 4 L in Wilmington DE last night. The weather channel said that the temperature was 45.0 °F, and the pressure was 30.27 inches of Hg.

- First, I take this balloon scuba diving and go down to a depth of 100 ft where the pressure is 7 atm. and the temperature is 54.2 °F. What is the volume of the balloon?
  - Next I take the balloon out to Colorado. In Denver when I arrive at the airport the temperature is 68.4 °F and the barometric pressure is 640 mmHg. Now what size is the balloon?
  - Next on my trip is a hike up to the top of Longs Peak (14,256 ft) where the pressure is 470 torr and the temperature is -20°C. Now what size is the balloon?
  - Finally, I take the balloon on the airplane for the trip home and let it out the window. The 747 is flying at 40,000 ft where the pressure is about 80.0 torr and the temperature is -60.0 °C. What is the volume of the balloon here?
- And last of all the balloon soars up into the stratosphere where the pressure has dropped to 0.8 torr and the temperature is 0°C, what size is it just before it pops?