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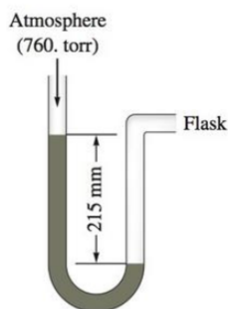
Honors Chemistry Unit 5 Practice Sheet

*Chapter 13 and 15:

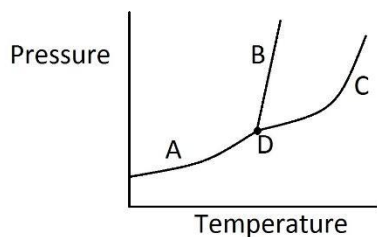
There are only a few questions about Chapter 13 or 15 on this practice sheet, but you still need to know the information. Most students need the most practice on Chapter 14 because of the math. Chapter 13 and 15 are covered more on the Unit 5 Study Guide.

*Chapter 13:

1. List the four assumptions of the kinetic theory.
2. Convert 207 kPa to torr.
3. What is sublimation?
4. Calculate the pressure (torr) of the gas in the flask using the manometer diagram below.



5. Is the following phase diagram for water? How do you know?



*Chapter 14:

6. What are 3 factors that affect gas pressure?
7. If you triple the number of particles of a gas, then the pressure _____.
8. If you double the volume of a gas, then the pressure _____.
9. If you halve the temperature of a gas, then the pressure _____.

***For questions 10 – 13, write the answer to the question **AND** the gas law that you had to use.

10. A gas occupies a volume of 4.0 L at 95 kPa. The conditions are changed to 6000 mL at 760 torr and 198°C. What was the original temperature?
11. Chlorine gas occupies a volume of 1.2 liters at 720 torr pressure. What volume will it occupy at 1 atm pressure?
12. Fluorine gas exerts a pressure of 900 torr. When the pressure is changed to 1.50 atm, its volume is 250 mL. What was the original volume?
13. A gas is at a temperature of 75°C. The temperature is decreased to 300K and the pressure is 1.7atm. What was the original pressure in mm Hg?
14. Find the number of grams of CO₂ that exert a pressure of 785 torr at a volume of 32.5 L and a temperature of 32°C.
15. At what temperature will 5.00g of Cl₂ exert a pressure of 900 torr at a volume of 750 mL?
16. What volume will 454 grams of hydrogen occupy at 1.05 atm and 25°C?
17. What is the density of NH₃ at 800 torr and 25°C? (density is mass over volume)
18. At which temperatures and pressures are real gases the most like ideal gases?

19. A mixture of gases contains oxygen, helium, and carbon dioxide. The oxygen gas is at 1.4 atm, the helium gas is at 800 mm Hg, and the carbon dioxide gas is at 97.1 kPa. What is the total pressure of the gases in torr?
20. A 250 mL sample of oxygen is collected over water at 25°C and 760 torr pressure. What is the pressure of the dry gas alone? (Vapor pressure of water at 25°C is 23.8 torr)
21. Compare the rates of effusion of nitrogen gas and sulfur trioxide gas.
22. Compare the rates of diffusion of helium gas and hydrogen gas.

***Chapter 15:**

23. What attractions hold water molecules together?
24. What is a solute in sweet tea?
25. Draw a diagram of an ionic compound dissolving in water.
26. How does the entropy of a system change when
- a gas liquefies
 - a solid sublimates
 - ethanol and water are mixed to form a solution

27. Identify the following as a strong electrolyte, weak electrolyte, or nonelectrolyte.
- a. HF
 - b. HClO_4
 - c. P_2O_5

***Additional Exercises:**

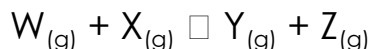
28. A sample of 9.00 grams of aluminum metal is added to an excess of hydrochloric acid. The volume of hydrogen gas produced at standard temperature and pressure is ...
- a. 22.4L b. 11.2L c. 7.46L d. 5.60L e. 3.74L
29. A 2.00-liter sample of nitrogen gas at 27°C and 600. millimeters of mercury is heated until it occupies a volume of 5.00 liters. If the pressure remains unchanged, the final temperature of the gas is ...
- a. 68°C b. 120°C c. 477°C d. 677°C e. 950°C
30. A sample of 0.0100 moles of oxygen gas is confined at 37°C and 0.216 atmospheres. What would be the pressure of this sample at 15°C and the same volume?
- a. 0.088atm b. 0.175atm c. 0.201atm d. 0.233atm e. 0.533atm
31. A sample of 3.0 grams of an ideal gas at 121°C and 1.0 atmospheres pressure has a volume of 1.5 liters. Which of the following expressions is correct for the molar mass of the gas? ($R = 0.082 \text{ L-atm/mole-K}$)
- a. $[(0.082)(394)]/[(3.0)(1.0)(1.5)]$
b. $[(1.0)(1.5)]/[(3.0)(0.082)(394)]$
c. $[(0.082)(1.0)(1.5)]/[(3.0)(394)]$
d. $[(3.0)(0.082)(394)]/[(1.0)(1.5)]$
e. $[(3.0)(0.082)(1.5)]/[(1.0)(394)]$
32. A rigid metal tank contains oxygen gas. Which of the following applies to the gas in the tank when additional oxygen is added at constant temperature?

- a. The volume of the gas increases.
- b. The pressure of the gas decreases.
- c. The average speed of the gas molecules remains the same.
- d. The total number of gas molecules remains the same.
- e. The average distance between the gas molecules increases.

33. Samples of F_2 gas and Xe gas are mixed in a container of fixed volume. The initial partial pressure of the F_2 gas is 8.0 atmospheres and that of the Xe gas is 1.7 atmospheres. When all of the Xe gas reacted, forming a solid compound, the pressure of the unreacted F_2 gas was 4.6 atmospheres. The temperature remained constant. What is the formula of the compound?

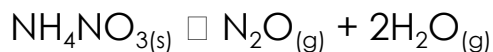
- a. XeF
- b. XeF_3
- c. XeF_4
- d. XeF_6
- e. XeF_8

34. Gas W and X react in a closed, rigid vessel to form Gas Y and Z according to the equation below. The initial pressure of $W_{(g)}$ is 1.20 atm and that of $X_{(g)}$ is 1.60 atm. No $Y_{(g)}$ or $Z_{(g)}$ is initially present. The experiment is carried out at constant temperature. What is the partial pressure of $Z_{(g)}$ when the partial pressure of $W_{(g)}$ has decreased to 1.0 atm?



- a. 0.20atm
- b. 0.40atm
- c. 1.0atm
- d. 1.2atm
- e. 1.4atm

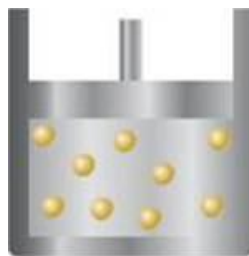
35. A 0.03 mol sample of $NH_4NO_{3(s)}$ decomposes completely according to the balanced equation below in a 1.0L container. The total pressure in the flask measured at 400K is closest to which of the following? ($R = 0.08$ L-atm/mole-K)



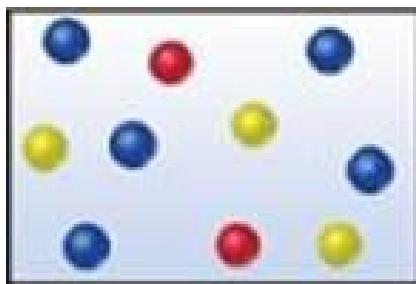
- a. 3atm
- b. 1atm
- c. 0.5atm
- d. 0.1atm
- e. 0.03atm

36. Assume that you have a sample of gas in a container with a movable piston, such as the one in the in the drawing below.

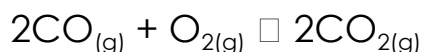
- a. Redraw the container to show what it might look like if the temperature of the gas is increased from 300K to 500K while the pressure is kept constant.
- b. Redraw the container to show what it might look like if the pressure on the piston is increased from 1.0 atm to 2.0 atm while the temperature is kept constant.



37. The drawing below represents a mixture of three different gases.
- Rank the three components in order of increasing partial pressure.
 - If the total pressure of the mixture of 0.90 atm, calculate the partial pressure of each gas.

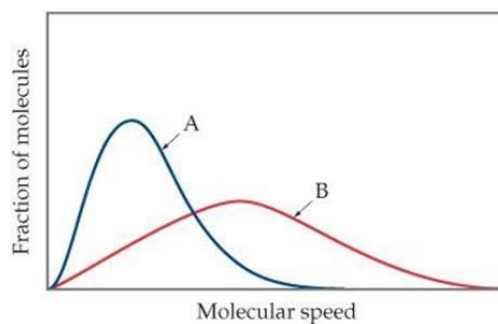


38. Consider the following reaction:

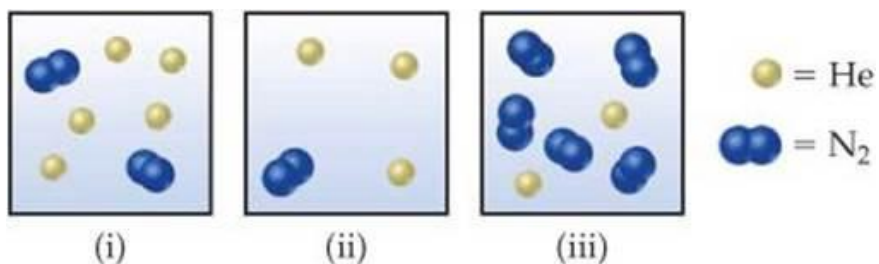


Imagine that this reaction occurs in a container that has a piston that moves to allow a constant pressure to be maintained when the reaction occurs at constant temperature.

- What happens to the volume of the container as a result of the reaction? Explain.
 - If the piston is not allowed to move, what happens to the pressure as a result of the reaction?
39. Consider the following diagram.
- If the curves A and B refer to two different gases, He and O₂ at the same temperature, which is which? Explain,
 - If A and B refer to the same gas at two different temperatures, which represents the higher temperature?



40. Consider the following sample of gases:



If the three samples are all at the same temperature, rank them with respect to

- total pressure
- partial pressure of helium
- density
- average kinetic energy of particles