CP Chemistry
Chapter 12 ***

Name: Key

ALL NUMERIC ANSWERS MUST BE ROUNDED TO 3 SIG. FIGS. AND HAVE A UNIT!!

Perform the following pressure conversions. (2 points each)

1. 125950 Pa = 945 torr $\quad 125950\ Pa \left| \frac{1\ atm}{101325\ Pa} \right. = 1.243\ atm \left| \frac{760\ Torr}{1\ atm} \right.$ 944.7

2. 9.57 kPa = 0.0944 atm $\quad 9.57\ kPa \left| \frac{1\ atm}{101.325\ kPa} \right. = 0.094449$

3. 1250 psi = 2540 in of Hg $\quad 1250\ psi \left| \frac{1\ atm}{14.7\ psi} \right. = 85.03\ atm \left| \frac{760\ mmHg}{1\ atm} \right.$

Fill out the following chart comparing the three individual gas laws. (2 points each) $64625.85\ mmHg \left| \frac{1\ in\ Hg}{25.4\ mm\ Hg} \right.$ 2544.72

	Charles' Law	Avogadro's Law	Boyle's Law
What is the mathematical expression used to represent this law.	4. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$	5. $\frac{V_1}{n_1} = \frac{V_2}{n_2}$	6. $P_1V_1 = P_2V_2$
What 2 things were studied to determine the relationship between them in gases	7. Volume Temperature	8. Volume # of moles	9. Volume Pressure
What 2 things were held constant to be able to study the relationship	10. Pressure # of moles	11. Temperature Pressure	12. Temperature # of moles

The following questions refer to the Ideal Gas Law. (2 points each)

13. Temperature must be entered into the ideal gas law in units of Kelvin.

14. Pressure must be entered into the ideal gas law in units of ATM.

15. Volume must be entered into the ideal gas law in units of Liters.

Name the five (5) principles from the Kinetic Molecular Theory. (2 points each)

16. Gases are made of tiny particles
17. Volume of an individual particle is assumed to be zero
18. particles collide with the container which we measure as pressure
19. particles do not attract nor repell eachother
20. Kinetic energy of particles is directly proportional to Kelvin temperature

Fill in the following. (2 points each) Include units!!

21. What is the pressure indicated by STP? 1 atm

22. What temperature is indicated by STP? 0°C

Individual gas laws are used to solve the following questions (Boyle's, Charles', or Avogadro's Law) Round all answers to 3 significant digits. Include units!! (6 points each)

23. If my gas sample had an original volume of 15.7 liters at 65.1°C to what temperature must I take my sample in order to have 5.8 liters of gas in my sample?

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{15.7}{338.1} = \frac{5.8}{T_2}$ 124.9

125 Kelvin

24. If my gas sample had an original volume of 15.7 liters at 65.1°C and I raise the temperature to 101 °C, what is the new volume of my gas?

$\frac{15.7}{338.1} = \frac{V_2}{374}$ 17.37

17.4 Liters

25. If I have a sample of gas that contains 1.99 moles of gas and takes up 2.95 liters of space, how many moles are in my sample that is 18.3 liters?

$\frac{V_1}{n_1} = \frac{V_2}{n_2}$

$\frac{2.95}{1.99} = \frac{18.3}{n_2}$ 12.344

12.3 moles

26. If I have a sample of gas that contains 1.99 moles of gas and takes up 2.95 liters of space, how much volume will my 0.245 mole sample occupy?

$\frac{2.95}{1.99} = \frac{V_2}{0.245}$ 0.36319

0.363 Liters

$P_1V_1 = P_2V_2$

27. If I have a 12.9 liter sample of gas at 885 mm Hg and I increase the pressure to 1045 mm Hg, what is the new volume of the gas?

$(885)(12.9) = (1045)(V_2)$ 10.92

10.9 Liters

28. If I have a 4.73 liter sample of gas at 85 psi and I increase the volume of the container to 8.15 liters, what is the new pressure of the gas sample?

$(85)(4.73) = (P_2)(8.15)$

49.33 49.3 psi

$PV = nRT$

Use the Ideal Gas Law to solve the following problems. Round all answers to 3 significant digits. Include units!! (6 points each)

29. What is the Volume of 15.89 moles of a gas at 1.37 atm of pressure at 45.49°C?

$(1.37)(V) = (15.89)(.0821)(318.49)$

303.2 303 Liters

30. What is the Pressure exerted by 1.45 moles of gas in a 3.11 liter container at 25.3°C?

$(P)(3.11) = (1.45)(.0821)(298.3)$

11.418 11.4 atm

31. What is the Temperature of 2.76 mole of gas in a 15.3 liter container at 2.09 atm?

$(2.09)(15.3) = (2.76)(.0821)(T)$

141.118 141 Kelvin

32. How many Moles of gas are in a 45.1 liter container at 25.1°C and 3.88 atm of pressure?

$(3.88)(45.1) = (n)(.0821)(298.1)$

7.149 7.15 moles

Use Dalton's Law of Partial Pressures to solve the following question. Round all answers to 3 significant digits. Include units!! (6 points)

33. If I collect a sample of gas over water (by water displacement) what is the pressure of my pure gas if my total pressure is 829 mm Hg and the vapor pressure of water at the temperature at which my gas was collected is 29.6 mm Hg?

$P_{Total} = P_a + P_b$

$829 = 29.6 + P_{gas}$

799.4 → 799 mm Hg

Solve the following problems. You may need more than 1 equation to solve the problems. Round all answers to 3 significant digits. Include units!! (6 points each)

34. What would be the ~~total~~ pressure in a 10.76 liter tank at 18.2°C, if I put 5.07 moles of Hydrogen gas and 4.29 moles of Helium gas in the tank?

Dalton + Ideal

Add moles $5.07 + 4.29 = 9.36$

$(P)(10.76) = (9.36)(.0821)(291.2)$

20.796

20.8 atm

35. How many moles of gas did I add if my initial sample held 1.52 moles of argon at 2.65 atm and 23.2°C and now my sample is at 5.52 atm and 29.8°C?

$\frac{P_1 V_1}{n_1 T_1} = \frac{P_2 V_2}{n_2 T_2}$

$\frac{(2.65)}{(1.52)(296.2)} = \frac{(5.52)}{n_2(302.8)}$

$n = 3.097$

$3.097 - 1.52 = 1.577$

Added 1.58 moles