

Chemistry Module 12 Homework

Assignment #1

1. Define pressure.
2. Write the equivalent values to 1 atmosphere:
 - a. 1 atm = ____ Pascals
 - b. 1 atm = ____ kPa
 - c. 1 atm = ____ mmHg
 - d. 1 atm = ____ torr
 - e. 1 atm = ____ psi
3. Convert the units of pressure.
 - a. 850 torr = ____ Pascal
 - b. 3.62 atm = ____ psi
 - c. 0.37 kPa = ____ mmHg
4. How did Jacques Charles' experiments lead to the absolute zero (Kelvin) temperature scale?

For Problems 5 - 12, list the name of the gas law, write the formula, and then solve the problem.

5. A balloon is filled with hydrogen gas at a temperature of 15°C and a pressure of 760 torr. If the balloon's original volume was 1.2 liters, what will the new volume be at a higher altitude where the pressure is only 628 torr? Assume that the temperature stays the same.

Gas Law: Formula: Solve:

6. Five liters of air at -50°C are warmed to 100°C . What is the new volume if the pressure remains constant?

Gas Law: Formula: Solve:

7. The gas in a container has a pressure of 3 atm at 27°C (300 K). What will the pressure be if the temperature is lowered to -173°C (100 K)? Assume that the volume stays constant.

Gas Law: Formula: Solve:

8. A gas with a volume of 4.0 L at a pressure of 0.90 atm is allowed to expand at a constant temperature until the pressure drops to 0.20 atm. What is the new volume?

Gas Law: Formula: Solve:

9. A gas is compressed at a constant temperature from 27 L to 3.0 L. If the initial pressure of the gas is 52 kPa, what is the final pressure?

Gas Law: Formula: Solve:

10. A given mass of air has a volume of 6.0 L at 1 atm. What volume will it occupy at 190 mmHg if the temperature does not change?

Gas Law: Formula: Solve:

11. A 5.0 L air sample at a temperature of -50°C has a pressure of 800 mmHg. What will be the new pressure if the temperature is raised to 100°C and the volume expands to 7.0L?

Gas Law: Formula: Solve:

12. A 11.4 m^3 balloon full of hydrogen gas at a temperature of 20°C has a pressure of 1.2 atm. What will be the new volume if the temperature is lowered to -40°C and the pressure decreases to 0.7 atm?

Gas Law: Formula: Solve:

13. What are the three properties of an ideal gas?
14. Under what conditions do real gases behave like ideal gases?
15. What is the pressure and temperature at STP?

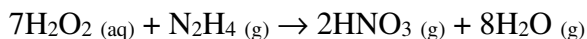
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Assignment #2

- State Dalton's law of partial pressures.
- Two steel containers of equal volume contain two different gases at the same temperature. The first holds 1.3 moles of N₂ gas and the second holds 1.3 moles of CO₂ gas. Would the pressure in the containers be the same or different? If it is different, which container has the higher pressure?
- A metal cylinder contains 1 mole of helium gas at STP. What will be the pressure in the cylinder if another mole of gas is added to the cylinder, but the temperature and volume do not change?
- The temperature of a beaker of isopropyl alcohol is lowered from 40°C to 5°C. Did the alcohol's vapor pressure increase, decrease, or stay the same?
- A chemist collects carbon dioxide over water at 27°C. If the gas in the collection vessel has a pressure of 787 torr, what is the pressure of carbon dioxide in the vessel? Use Table 12.1.
- A steel cylinder is filled with 5.00 atm of nitrogen, 2.00 atm of oxygen, and 1.0 atm of argon. What is the total pressure in the cylinder? What is the mole fraction of each gas?
- A 10.0 gram gas mixture contains N₂ and CO₂. There are 2.0 grams of N₂ in the mixture, and the total pressure of the mixture is 3.00 atm. Find the partial pressures of each gas. Make a table to help you find the answer.

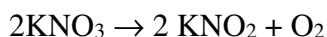
	Grams	Moles	Mole Fraction	Partial Pressure
N ₂				
CO ₂				
Total				

- The mixture of gases released from a factory's smokestack is collected and analyzed. If the mixture is found to contain 15.0 g of SO₂ gas, 12.1 g of NO gas, and 2.5 g of SO₃ gas. The total pressure of the gas is 790 torr. Find the mole fraction and partial pressure of each gas. (Make a table.)
- What is the volume of 12.0 g of fluorine gas at 1.00 atm and 25.0°C?
- Calculate the number of liters occupied at STP by:
 - 2.5 mol N₂
 - 0.60 g H₂
 - 0.350 mol O₂
- What pressure will be exerted by 0.450 mol of helium gas at 25°C if it is contained in a vessel with a volume of 650 cm³?
- One common rocket engine uses the following reaction:



If the rocket engine contains 175.00 grams of H₂O₂ and an excess of N₂H₄, what volume of water vapor will be produced when the rocket fires up to a temperature of 550°C and a pressure of 1.2 atm?

- In the laboratory, oxygen gas is produced by heating potassium nitrate.



- At STP, how many liters of O₂ could be produced from 25.0 g KNO₃?
- If the oxygen was collected at 750 mm Hg and 40°C, what would its volume in mL be?