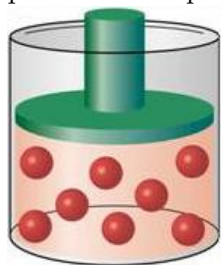


Name: _____ Class: _____ Date: _____

Instructions: Answer the following questions. Show ALL work for problems to receive full credit. Make sure to include proper units and significant figures for all answers. You are allowed the use of a molecular model kit.

- [6 pt] 1. Assume that you have a sample of gas in a cylinder with a movable piston, as shown below. Will the piston move up or down after each of the following changes are made. Explain.



(a) The temperature is increased 1(a) _____

(b) The atmospheric pressure is increased. 1(b) _____

(c) If you remove 5 mols of gas. 1(c) _____

- [5 pt] 2. Consider the following chemical reaction: $4\text{Al(s)} + 3\text{O}_2\text{(g)} \longrightarrow 2\text{Al}_2\text{O}_3\text{(s)}$. What is the 2. _____ volume (in L) of O_2 required to form 50.0 grams of Al_2O_3 at a temperature of 315 K and pressure of 1.0 atm?

- [5 pt] 3. What is the Pressure in a cylinder containing 25.6 many mols of Argon with a volume of 50.0 L at a temperature of 100.0°C ? 3. _____



- [6 pt] 4. Assume that you have a sample of gas in a cylinder with a movable piston. Will the piston move up or down **AND** by what factor/amount) after each of the following changes are made. Explain.
- (a) If the number of moles is decreased by half, while the pressure and temperature are held constant? 4(a) _____
- (b) If the temperature is doubled while the pressure and number of moles of gas is kept constant 4(b) _____
- (c) The pressure is halved and the temperature is doubled? 4(c) _____
- [5 pt] 5. How many moles of gas is contained in a standard scuba cylinder that is 80.0 L at pressure of 3,500. PSI at a temperature of 25 °C ? 5. _____
- [5 pt] 6. Given the reaction: $3\text{H}_2\text{SO}_4(\text{aq}) + 2\text{Al}(\text{s}) \longrightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2(\text{g})$. If 300.0 grams of Al are reacted with excess sulfuric acid, how many Liters of Hydrogen gas at 400. mmHg and 20.0 °C are created? 6. _____
- [5 pt] 7. What is the Pressure in a scuba cylinder that contains 265 mol of air at 25.0 °C in an 80.0 gallon tank? 7. _____

[10 pt] 8. For each of the following situations state whether the indicated variable will (D)ecrease, (I)ncrease, or (S)tay the same **AND** indicate by what factor it will change. Explain your answers.

(a) Will the pressure (D/I/S) if in a **sealed container** the temperature is increased by a factor of 4? 8(a) _____

(b) Will the volume (D/I/S) if in a **movable piston** the number of mols of gas is doubled and the temperature is doubled? 8(b) _____

(c) Will the volume (D/I/S) in a **sealed container** if the Temperature is decreased by half? 8(c) _____

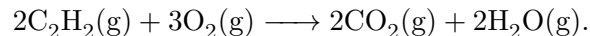
(d) Will the pressure in a **movable piston** (D/I/S) if the volume is doubled while at the same time the temperature is cut in half? 8(d) _____

(e) In a balloon at room temperature (25 °C) will the volume (D/I/S) if the pressure is doubled? 8(e) _____

[5 pt] 9. A hot air balloon is inflated to a volume of 500.0 L at a pressure of 650. mmHg and a temperature of 35.0 °C. The balloon is taken to an altitude of 15,000 feet into the air where the volume has increased to 550.0 L and the temperature is -18.0 °C. What is the pressure at this altitude (in atm) 9. _____

[5 pt] 10. Consider the following chemical reaction:

10. _____



What is the volume (in L) of O_2 required to combust 250.0 grams of C_2H_2 at a temperature of 365 K and pressure of 2.50 atm?

[10 pt] 11. For each of the following situations state whether the indicated variable will (D)ecrease, (I)ncrease, or (S)tay the same **AND** indicate by what factor it will change. Explain your answers.

(a) Will the pressure (D/I/S) if in a **sealed container** the temperature is decreased by half? 11(a) _____

(b) Will the volume (D/I/S) if in a **movable piston** the pressure is halved and the temperature is doubled? 11(b) _____

(c) Will the volume (D/I/S) in a **sealed container** if the number of moles is decreased by half? 11(c) _____

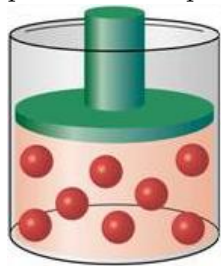
(d) Will the pressure in a **sealed container** (D/I/S) if the volume is doubled while at the same time doubling the temperature? 11(d) _____

(e) In a balloon at room temperature (25°C) will the volume (D/I/S) if it is placed in liquid nitrogen at -196°C ? 11(e) _____

CHE 101 - EP Ch. 8

- [5 pt] 12. What is the Volume (in L) of a cylinder filled with 53.0 mols of O_2 gas at a temperature of 302 K and a pressure of 1500. PSI? 12. _____
- [5 pt] 13. A balloon is inflated to a volume of 500.0 L at a pressure of 800. mmHg and a temperature of 28.0 °C. The balloon is taken to the bottom of the ocean at approximately 1200 feet deep where the volume has decreased to 12.5 L and the temperature is -15.0°C. What is the pressure of the ocean (in atm) at 1200 feet deep? 13. _____
- [5 pt] 14. How many mols of air can a scuba diving cylinder with a volume of 80.0 L at 14. 3.80×10^5 Pa and temperature of 25°C hold? 14. _____
- [5 pt] 15. What is the temperature (in °C) if 1,500. liters of carbon dioxide at 25.0°C is compressed to 2.0 liters at a constant pressure? 15. _____
16. What is the pressure if 1,500. liters of carbon dioxide at 1.0 atm of pressure is condensed (at constant temperature to a volume of 2.0 liters. 16. _____

- [6 pt] 17. Assume that you have a sample of gas in a cylinder with a movable piston, as shown below. Will the piston move up or down after each of the following changes are made. Explain.

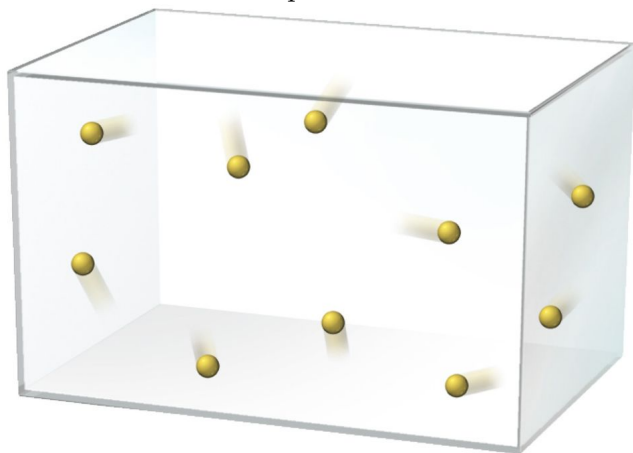


(a) The temperature is decreased at constant pressure.

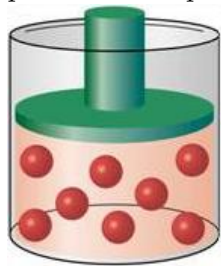
(b) The atmospheric pressure is decreased.

(c) If you add 5 more mols of gas.

- [3 pt] 18. The picture represents a gas sample at a pressure of 1 atm, a volume of 1 L and a temperature of 25°C . Draw a similar picture showing what would happen to the sample if the volume were reduced to 0.5 L while the temperature was increased to 250°C . What would happen to the pressure?



19. Assume that you have a sample of gas in a cylinder with a movable piston, as shown below. Will the piston move up or down after each of the following changes are made. Explain.



(a) The temperature is increased at constant pressure. 19(a) _____

(b) The atmospheric pressure is increased. 19(b) _____

(c) The gas molecules form dimers (two single atoms react to form one new molecule). 19(c) _____

20. How many mols of Argon gas are in a cylinder with a volume of 50.0 L at a pressure of 600 mm Hg at a temperature of 25.0 °C ? 20. _____

- [5 pt] 21. How many moles of gas is contained in a standard scuba cylinder that is 80.0 L at pressure of 3,500. PSI at a temperature of 25 °C ? 21. _____