

Gas Laws Test Review

I. Concepts

1. What is kinetic energy? _____

2. If you had two identical containers at the same the same temperature and pressure and filled one with $\text{H}_2(\text{g})$ and the other with $\text{O}_2(\text{g})$,

a) Which would contain the higher kinetic energy? _____

b) Which would contain the faster moving molecules? _____

3. Describe the demo we did that proved your answer to 2b. _____

4. According to Boyle's law, as the pressure of a gas goes up, what happens to its volume?

a. What needs to be kept constant? _____

b. Is this a direct or inverse proportion? _____

5. According to Charles' law, as the temperature of a gas goes up, what happens to its volume?

a. What needs to be kept constant? _____

b. Is this a direct or inverse proportion? _____

6. What is the formula for the combined gas law? _____

7. If the atmospheric pressure at sea level is 1.00 atmospheres,

a. Is the pressure at an elevation below sea level higher or lower than 1.00 atm? _____

b. Is the pressure at an elevation above sea level higher or lower than 1.00 atm? _____

8. Why did the balloon slide into the bottle? _____

What law did this demonstrate? _____

9. Why was the soda can crushed? _____

10. How does a Cartesian Diver work? _____

11. What was the point of the Charles' Law computer lab? What were you trying to find?

12. According to the kinetic molecular theory, what causes the pressure inside a balloon? _____

13. What is a mole fraction? _____

14. If you're given the mole fraction of a gas, what do you need to know in order to figure out the partial pressure of that gas?

15. If you're given the mole fraction of a gas, what do you need to know in order to figure out the number of moles of that gas?

II Practice

Directions: Show all your set-ups and remember sig figs and units.

STP = 0°C, 1.00 atm 1.00 mole (g) = 22.4 L at STP R = .0821 $\frac{\text{atm L}}{\text{mole K}}$
1.00 atm = 760. torr = 760. mm Hg = 101.325 kPa = 14.7 psi

1. A sample of ammonia gas occupies a volume of 255. mL at 15.5 psi. What volume will it occupy at .672 atm?

a. _____ What formula will you use?

b. _____ Answer

2. What is the pressure in a 450. mL flask containing 158 grams of nitrogen gas at -44°C ?

a. _____ What formula will you use?

b. _____ Answer

3. Argon gas is at a temperature of $37.^{\circ}\text{C}$ when it occupies a volume of 3.98 liters. To what temperature should it be raised to occupy a volume of 6.52 liters?

a. _____ What formula will you use?

b. _____ Answer

4. You start out with 2.12 L of pure neon gas at STP and you triple both the pressure and the volume. What will the gas's final temperature be (in both $^{\circ}\text{C}$ and K)?

a. _____ What formula will you use?

b. _____ Answers

5. Hydrogen gas was cooled from 25°C to $-40.^{\circ}\text{C}$. Its new volume is 100. mL. What was its original volume?

a. _____ What formula will you use?

b. _____ Answer

6. If you start out with some helium gas at 5.00 atm and $0.^{\circ}\text{C}$, then change the conditions to 25°C and 110.psi, the new volume is 750. mL. What was the helium's original volume?

a. _____ What formula will you use?

b. _____ Answer

7) 48.0 grams of carbon dioxide gas occupies a volume of 22.6 liters at 98.5 kPa. What is its temperature in °C?

a. _____ What formula will you use?

b. _____ Answer

8. What mass (in grams) of carbon monoxide gas, CO(g), is needed to fill a 20.0 L tank to a pressure of 750. torr at 20.°C?

a. _____ What formula will you use?

b. _____ Answer

9. A 150. mL sample of xenon is collected over water at 25°C and 772.0 torr. What is the pressure of the dry gas alone? (Vapor pressure of water at 25°C = 23.8 torr.)

10. If a balloon contains 2.45 moles of F₂(g), 3.77 moles of Cl₂(g) and 7.65 moles of CO₂(g), what is the mole fraction of each of the gases?

F₂(g) = _____

Cl₂(g) = _____

CO₂(g) = _____

11. The total pressure of the balloon in problem # 10 is 2.50 atm. What is the partial pressure of each of the gases?

F₂(g) = _____

Cl₂(g) = _____

CO₂(g) = _____