

# College Chemistry

Lesson: 4/9/2020

Learning Topic:

Student will be able to explain and use in calculations: Partial pressure and effusion.

# Prior Knowledge Questions

Answer the following questions:

1. What are the different units for pressure?
2. Give one value for the gas constant (R).

# Answers to Prior Knowledge Questions

1. kPa, atm, torr, mm Hg, psi, etc.
2.  $R = 8.31 \text{ L}\cdot\text{kPa}/(\text{K}\cdot\text{mol}) = 0.821 \text{ L}\cdot\text{atm}/(\text{K}\cdot\text{mol})$

# Learning Material

Watch the following videos:

[Video 1](#)

[Video 2](#)

As you watch the video answer the following questions:

1. What is Dalton's Law?
2. Describe the experiment done to collect the volume of a gas.
3. What is the difference between diffusion and effusion?

# Learning Material Continued

Again remember that you will need to make sure that your gas constant matches your current pressure. Please note the pressure equivalencies and the two values that R can be used.

- Pressure equivalencies:
  - $1 \text{ atm} = 101.3 \text{ kPa} = 760 \text{ mm Hg} = 760 \text{ torr}$
- Gas Constant (R):
  - $R = 8.31 \text{ L}\cdot\text{kPa}/(\text{K}\cdot\text{mol}) = 0.821 \text{ L}\cdot\text{atm}/(\text{K}\cdot\text{mol})$

# Practice Problems

1. A container holds three gases: oxygen, carbon dioxide, and helium. The partial pressures of the three gases are 2.00 atm, 3.00 atm, and 4.00 atm, respectively. What is the total pressure inside the container?
2. 80.0 liters of oxygen is collected over water at 50.0 °C. The atmospheric pressure in the room is 96.00 kPa. What is the partial pressure of the oxygen?
3. A mixture of 2 moles of  $\text{H}_2$ , 3 moles of  $\text{NH}_3$ , 4 moles of  $\text{CO}_2$ , and 5 moles of  $\text{N}_2$  exert a total pressure of 800. torr. What is the partial pressure of each gas?
4. If you place 3.00 mol of  $\text{N}_2$  and 4.00 mol of  $\text{O}_2$  in a 35.0 L container at 25.0 °C, what will the pressure of the resulting mixture of gases be?
5. Of the diatomic molecules, which one will effuse the slowest?

# Answer Key to Practice Problems

1. 9.00 atm
2. 83.66 kPa
3.  $\text{H}_2 = (800. \text{ torr}) (2/14) = 114 \text{ torr}$ ;  $\text{NH}_3 = (800. \text{ torr}) (3/14) = 171 \text{ torr}$ ;  $\text{CO}_2 = (800. \text{ torr}) (4/14) = 228 \text{ torr}$ ;  $\text{N}_2 = (800. \text{ torr}) (5/14) = 286 \text{ torr}$
4. 4.48 atm
5.  $\text{F}_2$  is the largest of the diatomics, thus it will effuse the slowest.

# Extensions to Learning:

Extra information:

[Gas laws and kinetic molecular theory](#)

Practice Worksheets:

[Gases and their laws](#)

- Based on this lesson I suggest:
  - Dalton's Law of Partial Pressures Practice