

College Chemistry

Lesson: 4/6/2020

Learning Topic:

Students can explain the movement of gas molecules.

Prior Knowledge Questions

1. List the different states of matter.
2. Explain the difference between solid, liquid, and gas.

Answers to Prior Knowledge Questions

1. Solid, liquid, gas, and plasma
2. Solids have a definite shape and definite volume. Liquids have an indefinite shape and definite volume. Gases have indefinite shape and indefinite volume.

The particles (atoms, formula units, molecules) in solids vibrate in fixed locations. The particles in liquids are free to move, but must stay close together. The particles in gases are free to move and separate from each other.

Learning Material

Watch the following videos:

1. [Video 1](#)
2. [Video 2](#)
3. [Video 3](#)
4. [Video 4](#)

As you watch the video answer each question to the following worksheet:

[Gas Laws Videos Worksheet](#)

Practice Problems:

1. Consider two gases, A and B, in containers of equal volume (see picture to the right). Both are at the same V , T and P . Are the following statements True or False? Why?

A
mass: 0.34 g

B
0.48 g

- a. The number of molecules of A is equal to the number of molecules of B
- b. The molar mass of A is greater than the molar mass of B
- c. Both samples have the same average kinetic energy.
- d. The molecules of A have the same average velocity as the molecules of B
- e. The molecules of A collide with the container walls more frequently than the molecules of B

Answer Key

- a. True – both samples have equal P, V and T, so they must also have the same n
- b. False – since both samples have equal moles, the value of g/mol is smaller for A
- c. True – average kinetic energy depends only on temperature, which is identical for both samples
- d. False – kinetic energy is equal to $\frac{1}{2} \text{ mass} * (\text{velocity})^2$. The masses of the samples are different, so the velocities must also be different to maintain constant kinetic energy
- e. True – the molecules of A are moving at a higher average velocity, so they will collide more frequently with the walls of the container. The total pressures of the two gases can remain equal, however, because the molecules of B collide with the container walls with more force per collision (because B has a higher mass).

Extensions to Learning:

Extra information:

[The Kinetic Molecular Theory of Gases](#)

Practice Worksheet:

[Kinetic Molecular Theory of Gases Worksheet](#)

This [worksheet](#) will help you visualize how the atoms or molecules in a gas relate to the properties of a gas.