**Assignment**

**Kinetic theory of Molecules**

1. If two different gases are at the same temperature, which of the following must also be equal, (*a*) their pressures, (*b*) their average molecular velocities, or (*c*) the average kinetic energies of their molecules?
2. Does the kinetic molecular theory state that all the molecules of a given sample of gas have the same velocity since they are all at one temperature?
3. If the molecules of a gas are compressed so that their average distance of separation gets smaller, what should happen to the forces between them? To their ideal behavior?
4. Suppose that we double the length of each side of a rectangular box containing a gas. (*a*) What will happen to the volume? (*b*) What will happen to the pressure? (*c*) Explain the effect on the pressure on the basis of the kinetic molecular theory.
5. If the velocity of a single gas molecule doubles, what happens to its kinetic energy? (*b*) If the average velocity of the molecules of a gas doubles, what happens to the temperature of the gas?
6. (*a*) Is the ratio

Total volume of gas molecules/ Volume of gas sample

smaller for a given sample of gas at constant pressure at 300 K or at 400 K? (*b*) Will the gas exhibit more ideal behavior at 300 K or at 400 K?

1. (*a*) Is the ratio

Total volume of gas molecules/Volume of gas sample

smaller for a given sample of gas at constant temperature at 1.00 atm or at 2.00 atm? (*b*) Will the gas exhibit more ideal behavior at 1.00 atm or at 2.00 atm?

1. Contrast the motions of the molecules of a sample of gas at rest to those in a hurricane wind.
2. Oxygen gas and sulfur dioxide gas are at the same temperature. What is the ratio of the “average” velocities of their molecules?

**Chemical Kinetics**

1. Calculate the value of the equilibrium constant in the following reaction if 1.50 mol of A and 2.50 mol of B are placed in 1.00 L of solution and allowed to come to equilibrium. The equilibrium concentration of C is found to be 0.45 *M*.

A+B → C+D

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