Lego® Lab

Objective:

Determine how the relative rates of forward and reverse reactions affect equilibrium.

Materials:

- box of Legos®
  - Each box should contain 50 Legos®.
  - Each box of 50 Legos® should contain an equal number of two different-colored pieces.

SAFETY

Follow all regular lab safety precautions.

TEACHER NOTES:

Before starting this experiment, make sure that all Legos® are separate, unconnected pieces.

Procedure:

1. Pair students into groups of two, and assign each group a box of Legos®. In this lab, the students and the Legos® represent a system: one student from each team represents the forward reaction, the other student represents the reverse reaction, each individual Lego® piece represents a chemical reactant, and each connected Lego® piece represents a product.

   a. When the timer starts, the student representing the forward reaction will reach into the box without looking and remove two Lego® pieces. If the two pieces are different colors and neither Lego® is connected to another piece, the student will connect the two Legos® to form a product and return it to the box. If the two pieces are the same color or if one of them is already connected to another piece, the student will return the pieces to the box unchanged.

b. The student representing the reverse reaction will reach into the box without looking and remove one Lego®. If the Lego® removed is a product (two connected pieces), the student will take the product apart to reform reactants, and return the separated pieces to the box. If the Lego® removed is a reactant (one single piece), the student will return it to the box unchanged.

2. Start the timer for one minute, and have the students perform their reactions at a steady pace.

3. While the students work on their forward and reverse reactions, shake each team's box to represent kinetic energy.

4. After one minute, record the number of reactants and products in each box.

5. Repeat steps 1 through 4 until each team's system reaches equilibrium (the number of products and reactants remains constant).

6. Discuss the results.

Questions:

1. What is equilibrium?

2. How many minutes did it take for your system to reach equilibrium?

3. What are some factors that could have affected the time it took for your system to reach equilibrium?