Name_____ Period_____ Date_____

CONCEPTUAL PHYSICS | **Activity**

21.1 Temperature

DANCE OF THE MOLECULES

Purpose

In this activity, you will investigate the difference between hot water and cold water—on the ***molecular*** level.

Required Equipment and Supplies

source of cold water
source of hot water
two empty baby food jars or small beakers
food coloring

Discussion

The difference between hot things and cold things is referred to as *temperature*. The temperature of an object depends on the kinetic energy of the random motions of its molecules. A thermometer can be used to measure temperature, but we can't always tell a hot thing from a cold thing just by looking at it. Consider a glass of hot water and a glass of cold water side by side. The water molecules in each glass don't appear to be moving differently from each other. But they are. Follow the steps below to ***see*** the difference.

Procedure

Step 1: Fill one jar with cold water and the other with hot water.

Step 2: Spend a minute or two making a prediction. What will happen if a few drops of food coloring are added to each jar of water? Record your prediction using words and pictures. (Let the water stand while you record your prediction. This will allow swirling currents and turbulence in the water to diminish.)

Step 3: Carefully add just a drop or two of food coloring to each jar. Watch the coloring spread out for one minute before recording your observations, taking care not to disturb the water in any way. Record your observations using words and pictures.

Summing Up

1. How do your observations support the principle that the molecules in hot objects move faster than the molecules in cold objects?

2. Suppose you let the experiment continue for several hours. What would the jars of water and food coloring look like afterward?

3. Consider a fragrant candle burning in the corner of one side of a large room. It would be possible to smell the fragrance on the other side of the room after a short period of time. Use your observations to explain how this is so.

4. Would the fragrance get to you more quickly, more slowly, or in the same amount of time if the air in the room were colder?