

The Chemistry Continues

Glow Sticks and the Rate of a Reaction

In chemical reactions, energy can be given off or absorbed in the form of heat but it can also be given off or absorbed in the form of light. Glow sticks use a chemical reaction between a substance called luminol and hydrogen peroxide to release energy in the form of light.

Teacher demonstration

Question to investigate

How does warming or cooling a glow stick affect its chemical reaction?



Materials for the demonstration

- Hot water in an insulated cup
- Ice water in an insulated cup
- 2 glow sticks

Teacher preparation

Be sure not to start the glow sticks as you prepare for the demonstration. Place one glow stick in hot water and another in ice water before students arrive. The glow sticks will need to be in the water for at least a couple of minutes before the demonstration.

Tell students that you have heated one glow stick and cooled another glow stick.

Ask students

- **How do you start a glow stick?**
Bend the stick until you hear a popping sound.
- **What do you do if you want your glow stick to last longer?**
Place the glow stick in the freezer when you are not using it.

Explain that when students bend the stick to start it, they are breaking a small container filled with a chemical inside the light stick. Once broken, the chemicals which were separate combine and react with each other. If putting a glow stick in the freezer makes it last longer, temperature may have something to do with the rate of the chemical reaction.

Procedure

1. Remove the glow sticks from both the hot and cold water.
2. Have two students bend and start the glow sticks.
3. Show students both glow sticks and ask them what they observe. You may pass the sticks around the class so that they can feel the difference in temperature.



Expected results

The warm glow stick will be brighter than the cold one.

Chemistry explanation

When the reactants are heated, the average kinetic energy of the molecules increases. This means that more molecules are moving faster and hitting each other with more energy. Molecules need to hit each other with enough energy in order to react. If more molecules hit each other with enough energy to react, then the rate of the reaction increases.