California State University of Bakersfield, Department of Chemistry

Briggs-Rauscher Oscillating Color Change Reaction

Standards:

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Introduction:

The Briggs-Rauscher reaction, also known as 'the oscillating clock', is one of the most common demonstrations of a chemical oscillator reaction. The reaction begins when three colorless solutions are mixed together. The color of the resulting mixture will oscillate between clear, amber, and deep purple for about 3-5 minutes. The solution ends up as a purple-black mixture.

Materials:

- Distilled water
- 21.5 g potassium iodate
- 2.25 mL sulfuric acid
- 7.8 g malonic acid
- 1.7 g manganese sulfate monohydrate
- 2 g of vitex starch
- 200 mL of 30% hydrogen peroxide
- 3 600 mL beakers
- 2 L beaker

- Magnetic stir bar
- Stir plate

Safety:

- Always wear eye protection and gloves when doing chemistry experiments
- Conduct this experiment in a well-ventilated area.

Procedure:

1. Solution A:

   Add 21.5 g potassium iodate (KIO_3) to ~400 mL distilled water. Stir in 2.5 mL sulfuric acid (H_2SO_4). Continue stirring until the potassium iodate is dissolved. Dilute to 500 mL.

2. Solution B:

   Add 7.8 g malonic acid ($HOOCCH_2COOH$) and 1.7 g manganese sulfate monohydrate ($MnSO_4 \cdot H_2O$) to ~400 mL distilled water. Add 2 g of vitex starch. Stir until dissolved. Dilute to 500 mL.

3. Solution C:

   Dilute 200 mL of 30% hydrogen peroxide (H_2O_2) to 500 L.

4. Place the stirring bar into the large beaker.
5. Pour solutions A and B into the beaker.
6. Turn on the stirring plate. Adjust the speed to produce a large vortex.
7. Add solution C into the beaker. Enjoy!

Data and Observations:

What did you see? Anything you were not expecting?

References:

Helmenstine, Ph. D, Anne Marie. Briggs-Rauscher Oscillating Color Change Reaction.chemistry.about. http://chemistry.about.com/cs/demonstrations/a/aa050204a.htm (accessed July 31, 2013)