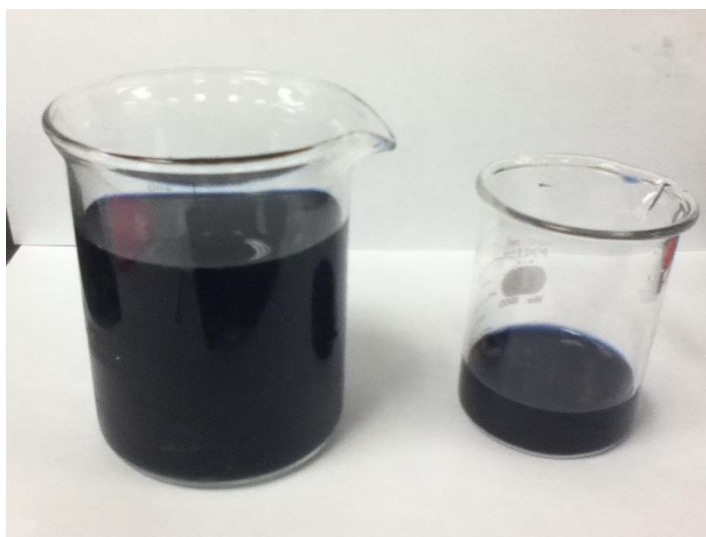




California State University of Bakersfield, Department of Chemistry

Classic Iodine Clock Reaction



Standards:

HS-PS1-6. Define the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

Introduction:

The sudden change from a colorless solution to the blue-black solution is the result of four sequential reactions. First, the bisulfite ions (HSO_3^-) reduce some of the iodate ions (IO_3^-) to form iodide ions (I^-). Next, the iodide ions (I^-) are oxidized by the remaining iodate ions (IO_3^-) to form triiodide ions (I_3^-). The solution now consists of triiodide ions (I_3^-) and soluble starch. In the third reaction, the triiodide ions (I_3^-) get reduced by the bisulfite ions (HSO_3^-) to become iodide ions (I^-). That continues until all of the bisulfite has been consumed. Finally, the triiodide ions and starch combine to form the dark blue-black starch complex that looks like ink.

Materials:

- 250 mL beaker
- 2 100 mL beakers
- 2 1000 mL beakers or flasks
- 1.2 g sodium metabisulfite
- 10 mL ethanol
- 4 g concentrated sulfuric acid
- 4.3 g potassium iodate
- 2 g starch soluble

- Distilled water
- Stopwatch

Safety:

- Always have an adult with you to help you during your experiment.
- Always wear eye protection and gloves when doing chemistry experiments

Procedure:

Preparation:

Solution A

In 1-Liter of distilled water add 1.2 grams of sodium metabisulfite. Carefully add 4 grams of concentrated sulfuric acid and 10 mL of ethanol.

Solution B

Add 4.3 grams of potassium iodate to 1000 mL of distilled water.

Solution C

Boil water and measure out 50 mL. Add 2 grams of soluble starch and allow to cool.

Presentation Time

In a 250 mL beaker, combine 50 mL of Solution A with 50 mL of distilled water. Now, add 10 mL of Solution C to the mixture.

In a 100 mL beaker, combine 50 mL of Solution B and 50 mL of distilled water.

Get ready to start your stopwatches! Pour the solution in the second beaker into the first beaker. Keep pouring the solutions back and forth into the beakers for about 8-10 seconds.

Data and Observations:

Record your observations in this space.

What did you see? Anything you were not expecting? Something really awesome? Describe it here.

Questions:

1. How long did it take for the water to change color?

References:

1. Spangler, S. Classic Iodine Clock Reaction. Steve Spangler Science.
<http://www.stevespanglerscience.com/lab/experiments/iodine-clock-reaction>