

Name _____

The Disappearing x, the kinetics of reaction of sodium thiosulfate with hydrochloric acid

Chemicals used

0.15 M $\text{Na}_2\text{S}_2\text{O}_3$

2.0 M HCl

Prelab

Write a purpose for this lab

Create a table of reagents with hazard warnings

Determine the concentration of $\text{Na}_2\text{S}_2\text{O}_3$ and HCl in the data table for all 4 test tubes.

Introduction

In this lab we are investigating the effect of sodium thiosulfate concentration on the rate of reaction of sodium thiosulfate with hydrochloric acid. The reaction, which produces solid sulfur, will be followed by measuring the time needed for the reaction mixture to become opaque. Chemical reaction rate can be difficult to measure. However, if we can get a point, in this case when a 50 mL solution becomes to cloudy to see through, then the inverse of the time to get to that point will be proportional to the rate.

Directions

1. Obtain and wear safety goggles.
2. Obtain a 50 mL and a 5 mL graduated cylinder, distilled water and a test tube.
3. Using the 50 mL graduated cylinder obtain 40.0 mL 0.15 M $\text{Na}_2\text{S}_2\text{O}_3$, and add in 5.0 mL of water to bring to total volume to 45.0 mL.
4. Obtain 5.0 mL of 2 M HCl in the 10 mL graduated cylinder.
5. Write an x on a piece of paper.
6. Pour the 45 mL $\text{Na}_2\text{S}_2\text{O}_3$ solution into the test tube. Add the 5.0 mL of HCl to the test tube and start a timer simultaneously.
7. Place the bottom of the test tube on the x. Look through the test tube at the x. Stop the timer when you can no longer see the x. Record this as Reaction time in the data table.
8. Convert Reaction Time to a Reaction Rate by taking the inverse of the value.
9. Complete this three more times using the volumes from the data table.
10. Determine the order of the reaction with respect to $\text{Na}_2\text{S}_2\text{O}_3$ and HCl.

Data Table

Test tube	Volume of $\text{Na}_2\text{S}_2\text{O}_3$	Volume of H_2O	Volume of HCl	$[\text{Na}_2\text{S}_2\text{O}_3]$	$[\text{HCl}]$	Reaction time (s)	Reaction Rate (s^{-1})
1	40	5	5				
2	20	25	5				
3	40	0	10				
4	20	20	10				

Determine the order of the reaction with respect to $\text{Na}_2\text{S}_2\text{O}_3$ and HCl . Show work.