Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

Chemicals used

0.15 M Na2S2O3 2.0 M HCl

Prelab

Write a purpose for this lab

Create a table of reagents with hazard warnings

Determine the concentration of Na2S2O3 and HCl in the data table for all 6 beakers.

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 too 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 10 mL graduated cylinder, distilled water and 100 mL, 150, and 250 mL beaker.
3. Obtain about 200 mL of 0.15 M Na2S2O3, in the 250 mL beaker and 60 mL of 2.0 M HCl in 150 beaker.
4. Using the 50 mL graduated cylinder measure 40.0 mL 0.15 M Na2S2O3, and add in 5.0 mL of water to bring to total volume to 45.0 mL.
5. Measure 5.0 mL of 2 M HCl in the 10 mL graduated cylinder.
6. Write an x the size of the bottom of the 100 mL beaker on a piece of paper.
7. Pour the 45 mL Na2S2O3 solution into the 100 mL beaker. Next start a timer and add the 5.0 mL of HCl to the 100 mL beaker simultaneously.
8. Place the bottom of the 100 mL beaker on the x. Look through the beaker at the x. Stop the timer when you can no longer see the x. Record this as Reaction time in the data table.
9. Convert Reaction Time to a Reaction Rate by taking the inverse of the value.
10. Complete this five more times using the volumes from the data table.
11. Determine the order of the reaction with respect to Na2S2O3 and HCl, and the overall reaction order.

Data Table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Beaker | Volume of Na2S2O3 | Volume of H2O  | Volume of HCl | [Na2S2O3] | [HCl] | Reaction time (s) | Reaction Rate (s-1) |
| 1 | 40 | 5 | 5 |  |  |  |  |
| 2 | 30 | 15 | 5 |  |  |  |  |
| 3 | 20 | 25 | 5 |  |  |  |  |
| 4 | 40 | 0 | 10 |  |  |  |  |
| 5 | 30 | 10 | 10 |  |  |  |  |
| 6 | 20 | 20 | 10 |  |  |  |  |

Determine the order of the reaction with respect to Na2S2O3 and HCl and the overall reaction order. Show work.