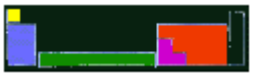
Revised August 2009



HONORS LAB 13b: Iodine Clock

Aim To determine the orders of reaction in a specific chemical reaction

Apparatus Graduated cylinders (various sizes), 400 mL beakers, stopwatch

Chemicals 0.050 M KI, 0.050 M $Na_2S_2O_3$, starch solution, buffer solution (pH = 4.7), 0.80 M H_2O_2, deionized water

Introduction

The chemical reaction to be investigated is given below

$$3I^-_{(aq)} + H_2O_{2(aq)} + 2H^+_{(aq)} \rightarrow I_3^-{}_{(aq)} + 2H_2O_{(l)}$$

Method

1. Obtain three, 400 mL beakers and label them A-C.

2. To the relevant beaker, add deionized water and the KI solution in the quantities specified in the table below.

Beaker	Volume of deionized water in mL	Volume of 0.05 M KI in mL
A	125	25.0
B	100.	50.0
C	115	25.0

3. To each beaker, also add 5.0 mL of the starch solution to act as an indicator, 30.0 mL of the buffer solution and 5.0 mL of the $Na_2S_2O_3$ solution.

4. Starting with beaker A, quickly add 10.0 mL of the H_2O_2 solution while simultaneously starting the stopwatch. Stop the stopwatch when the intense blue/black color is observed. Record the time taken for the blue/black color to appear in the results table.

Beaker	Volume of 0.80 M H_2O_2 in mL
A	10.0
B	10.0
C	20.0

5. Repeat the procedure in # 4 for beakers B and C on each occasion using the volume of H_2O_2 solution specified in the table above.

Results

Given that the TOTAL volume of solution in each beaker is 200. mL, fill in the table below.

Beaker	$[I^-]$	$[H_2O_2]$	Time taken in s
A			
B			
C			

Conclusion/Calculation

1. Use the table that you have completed in #1 to determine the order with respect to iodide ions and hydrogen peroxide.

2. Assuming the order with respect to $[H^+]$ =1, what is the total order of the reaction?

3. How could the whole reaction be modified to reduce the amount of time it takes to complete the lab, but still enable you to determine the orders of the reactants?