The rate of a reaction can be calculated by studying the change in the amount of a

product or a reactant at different times intervals.

The average rate of reaction can be calculated using the following formula:

$$Average Rate= \frac{Δ Amount of Substance}{Δ Time}$$

$$Average Rate= \frac{(Amount of DFinal Substance-Amount of Initial Substance)}{(Final Time-Initial Time)}$$

This calculation, the average rate of reaction over a time interval. This means that over time the rate of the reaction will change as reactants are used up and products are produced. This is similar to the overall speed it takes you to drive a distance and the variations in speed as you drive the distance. We will only calculate Average Rate in this Lab and tackle other rates later in the class.

Purpose:

In this lab activity, you will measure the loss of mass of a produced product at several times

during a chemical reaction. This will show that the speed of a reaction will change over its time.

The reaction involved is

2H2O2(l) --> 2H2O(l) + O2(g)

You will measure the loss of mass in this reaction as the Oxygen is released

Procedures:

1. Wash your 125ml flask before each trial and your 50ml graduated cylinder before each measurement.
2. Place the 125 ml flask on the digital scale and zero out the flask.
3. Using your 50ml graduated cylinder get 50 ml of 3% hydrogen peroxide and pour it into the 125 ml flask.
4. Record the mass of H2O2
5. Have a lab partner ready with the timer because you want to start the timer when you add the potassium iodide.
6. Using your 50ml graduated cylinder get 5 ml of potassium iodide from the 50ml beaker using the pipet.
7. Pour the potassium iodide into the flask and start the timer.
8. Trials
9. Trial 1: Record mass at 0, 5, 10, 15
10. Repeat for Trail 2: Record mass at 0, 5, 10, 15
11. Discard the solution down the sink.
12. Calculate your Average rates for each trial using Δ grams of oxygen/Δ Time.

Trial Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trail | Initial mass of H2O2 | 0 min Mass | 5 min Mass | 10 min Mass | 15 min Mass |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |

Questions:

1. What is the Avg Rate = M/time for H2O2 for 5min, 10min, and 15min? Use one trial, Stoichiometry, 3% Hydrogen peroxide and the equation below.

$$Average Rate= \left|\frac{Final Molarity of H\_{2}O\_{2}-Initial Molarity of H\_{2}O\_{2} }{Coefficient\*(Final Time-Initial Time)}\right|$$

1. What did you observe in the average rate from beginning to end?
2. Why do you think the average rate changed over time?
3. How does the average rate you calculated relate to the decomposition of hydrogen peroxide?
4. What main Theory explains the change in the reaction rate?
5. Why was the temperature kept constant for all reaction trials?