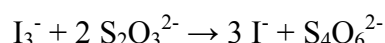


CHEMISTRY

Design 3: Kinetics of the Iodine Clock Reaction

When hydrogen peroxide (H_2O_2) reacts with iodide ions (I^-) in acidic environment (H^+), triiodide ions (I_3^-) are formed. They react with thiosulfate ions ($\text{S}_2\text{O}_3^{2-}$) forming tetrathionate ions ($\text{S}_4\text{O}_6^{2-}$). When all thiosulfate ions are consumed, the new triiodide ions produced give a yellow color to the solution and when bonded to starch they produce a dark blue complex.



The time taken for the color of the solution to change is related to the rate of the reaction of hydrogen peroxide with the iodide and the hydrogen ions (iodine clock reaction).

Design an experiment to investigate a parameter that may affect the rate of the iodine clock reaction.

1. Specify your research question.
2. State all the variables (independent, dependent, controlled)
3. Predict the answer to your question and explain.
4. Describe an experimental procedure that would answer your research question.
5. Prepare a suitable table for the collected data to be inserted.
6. Describe how you will keep the controlled variables constant.

To get the maximum marks, try to answer the following:

If the hydrogen peroxide solution is made by adding 20 ml of a 30% v/v water solution to 380 ml of water, what should be the concentration of I^- , H^+ , and $\text{S}_2\text{O}_3^{2-}$ ions in one solution of 400 ml for the clock reaction to work? Which is the limiting reagent? What masses of CH_3COOH (acid providing H^+), KI (providing I^-) and $\text{Na}_2\text{S}_2\text{O}_3$ (providing $\text{S}_2\text{O}_3^{2-}$) should you add in 400 ml of water to prepare the second solution?