

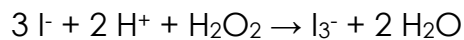
Iodine Clock Experimental Design

In this module you will have to submit a practical report (with a word limit of 1500 words) based upon a starch-iodine "clock reaction".

The Reaction

When starch binds to a triiodide (I_3^-) anion the resulting complex is a characteristic blue-black colour. In this practical the triiodide ion will be generated by the reaction between iodide ions (I^-) from potassium iodide and hydrogen peroxide (H_2O_2).

This reaction is:



However, ascorbic acid (vitamin C) rapidly scavenges the I_3^- ion and converts it back to I^- (which does not interact with starch) in the following reaction:



This means that if ascorbic acid is added, the appearance of the blue-black colour can be delayed until it is consumed. Alternatively the colour can be made to disappear by addition of ascorbic acid and it will then reappear after the ascorbic acid has been used up.

The Practical

In this practical we will give each group a time between 20 and 90 seconds and the group must achieve sufficient control of the system to delay appearance of colour by this time.

Each group will be provided with:
10 ml 3% Hydrogen Peroxide Solution
10 ml 1% Potassium Iodide Solution
5 ml 50 mM Ascorbic Acid
5 ml Starch Water (Starch Solution)
Distilled Water

24 Test Tubes (you will be able to rinse these out so don't expect to have to limit yourself to twenty runs in total)

A Stopwatch or Stopclock

A P1000 Micropipette and several blue tips

A P200 Micropipette and several yellow tips

Graph Paper

You will not be given a schedule to follow and must plan the experiments yourselves with the others in your group. You will be given advice on your plans in a tutorial before the practical.

The design you have used for your experiments to achieve your primary objective (achieving the time you were given) will be considered in marking.

Bonus Work

You can receive additional marks if you are able to design and perform additional experiments in addition to achieving your time. You will be supplied with lemon juice, which you may wish to use. We also don't know whether ascorbic acid can react with hydrogen peroxide directly and you may be able to test this (note that it would be wise to consider this possibility in planning your experiments).

Let us know if you would like any additional reagents or equipment well in advance and we will see what can be done.