Practical 7 – Chapter 6

Effect of concentration on reaction rate

Hydrogen peroxide will react with potassium iodide to produce iodine:

$$H_2O_2 + 2KI + H_2SO_4 \rightarrow 2H_2O + I_2 + K_2SO_4$$

The rate of this reaction can be followed by looking at how quickly the iodine is produced.

For an iodine clock reaction we add a fixed amount of sodium thiosulfate ($Na_2S_2O_3$) solution to the reaction mixture and then add a small amount of starch solution. The sodium thiosulfate reacts with the iodine as soon as it is formed but when all the sodium thiosulfate is used up the iodine reacts with the starch to give the characteristic blue-black colour. We are therefore measuring the time for a fixed amount of iodine to be formed.

Safety

- 1 mol dm^{-3} H_2SO_4 is an irritant.
- Wear eye protection.

What to do

You are going to carry out a series of experiments to investigate how changing the concentration of the potassium iodide changes the rate of the reaction.

Make up the following mixtures:

Expt No.	**Volume H_2SO_4 / cm^3**	**Volume KI / cm^3**	**Volume H_2O / cm^3**	**Volume $Na_2S_2O_3$ / cm^3**
1	10	25	0	10
2	10	20	5	10
3	10	15	10	10
4	10	10	15	10
5	10	5	20	10

To each mixture add 1 cm^3 of starch solution.

Add 5 cm^3 of hydrogen peroxide solution, start the stopwatch and swirl the mixture to ensure complete mixing.

Stop the stopwatch when the mixture becomes blue-black.

You must use a different measuring cylinder for each solution – label the measuring cylinders so that you don't get them mixed up.

Concentrations of solutions

1 mol dm^{-3} H_2SO_4 (**Care!**)

0.1 mol dm^{-3} KI

0.1 mol dm^{-3} H_2O_2

0.005 mol dm^{-3} $Na_2S_2O_3$