Practical 5 – Chapter 6

Investigating the effect of temperature on reaction rate

Assessed practical – DCP and CE

In this experiment you will study how changing temperature affects the rate of a reaction.

The reaction you will study is that between sodium thiosulfate solution and hydrochloric acid:

$$Na_2S_2O_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + SO_2(aq) + S(s)$$

The reaction produces a precipitate of sulfur. You will time how long it takes to obscure a cross drawn on a piece of paper placed under the reaction flask. In other words, you will measure the time it takes to produce a fixed amount of sulfur.

Safety

- 2 mol dm^{-3} HCl is an irritant.
- The reaction produces SO_2, which is toxic and is an irritant to the eyes and respiratory system.
- Wear eye protection.

What to do

- Use the cross supplied.
- Place the conical flask on the cross.
- Put 50 cm^3 of 0.15 mol dm^{-3} sodium thiosulfate into the flask.
- Measure the temperature of the sodium thiosulfate solution.
- Measure out 5 cm^3 of 2.0 mol dm^{-3} hydrochloric acid using a measuring cylinder.
- Add the hydrochloric acid to the conical flask, start the stopwatch and swirl to mix the chemicals.
- Time how long it takes for the sulfur produced to obscure the cross.
- Measure the final temperature of the mixture.
- Wash the contents of the flask down the sink with lots of water.
- Repeat the experiment for four other temperatures, using a water bath to heat the individual solutions to the required temperature.
- You must be careful to use the same boiling tubes for the hydrochloric acid and sodium thiosulfate each time. Also make sure you do not mix up the thermometers.