

The effect of concentration on reaction rate

Sodium thiosulfate solution is reacted with acid – a sulfur precipitate forms. The time taken for a certain amount of sulfur to form can be used to indicate the rate of the reaction.

This experiment should take around 60 minutes.

Apparatus and chemicals

Eye protection

Each group will need:

- 250 cm³ Conical flask
- 100 cm³ Measuring cylinder
- Sodium thiosulfate solution 50 g dm⁻³ (**Low hazard**)
- Hydrochloric acid 2 mol dm⁻³ (**Low hazard**)

Technical notes

Sodium thiosulfate solution 50 g dm⁻³ (**Low hazard**)

Dilute hydrochloric acid (**Low Hazard** at concentration used). Refer to SSERC or CLEAPSS Recipe and Hazcards.

Teaching notes

HEALTH & SAFETY: Wear eye protection. Sulfur dioxide (**Toxic gas**) forms as a by-product. Ensure good ventilation. If there are asthmatics in the class, the risk assessment should take this into account and necessary adjustments made, such as working in a fume cupboard, reducing the scale etc.

As soon as the reaction is complete pour the solutions away, preferably into the fume cupboard sink. Wash away with plenty of water.

The method for this experiment is best understood when the teacher demonstrates it first.

A light sensor can be used to monitor the precipitation on a computer. The result, in the form of graphs on the computer, can be analysed using data logging software. A light sensor clamped against a plastic cuvette filled with the reactants substitutes for a colorimeter. The data logging software shows the turbidity on a graph and this tends to yield more detail than the standard end-point approach. The rate of change can be measured using the slope of the graph or the time taken for a change to occur.

Background theory

Basic collision theory.

Reference

This experiment has been adapted from *Classic Chemistry Demonstrations*, Royal Society of Chemistry, London, p.162-164



Useful resource

An alternative, microscale version of this experiment can be used to minimise the exposure to SO₂. See CLEAPSS® Guide, L195 Safer chemicals, safe reactions p.43: *A safer procedure for the thiosulfate/acid reaction* or the SSERC website

(<http://www.sserc.org.uk/chemistry-resources/microscale-chemistry/1477-microscale-experiments/3915-thiosulphate-acid-reaction-microscale>)

Credits

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Health & safety checked January 2018

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