

WJEC (Wales) Chemistry GCSE

Specified Practical 1.5b

Investigation of the factors that affect the rate of the reaction between dilute hydrochloric acid and sodium thiosulfate

[Methods are adapted from the [Royal Society of Chemistry](#) and the [WJEC SP 1.5b Practical Specification](#).]

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'Disappearing Cross' Method

Aim

Investigate the effect of **changing the temperature** of the sodium thiosulfate solution on the rate of reaction according to colour change or **turbidity**.

Equipment list

- 40 g/cm³ sodium thiosulfate solution at 5°C
- 40 g/cm³ sodium thiosulfate solution in a water bath at 60°C
- 1.0 mol dm⁻³ dilute hydrochloric acid
- 250 cm³ conical flask
- 10 cm³ measuring cylinder
- 25 cm³ measuring cylinder
- Printed black paper cross
- Thermometer
- Stopwatch

Method

1. Measure 25 cm³ of **60°C sodium thiosulfate** into the conical flask using the 25 cm³ measuring cylinder.
2. Record the **temperature** of the solution.
3. Put the conical flask on the **black cross**.
4. Using the 10 cm³ measuring cylinder, measure 5 cm³ of dilute **hydrochloric acid**.
5. Add the acid to the flask. Immediately start the **stopwatch** whilst swirling the mixture.
6. Look down through the mouth of the flask. Stop the clock when you can't see the cross any more. Record the **time** taken for the **cross to disappear**.
7. Repeat steps 1-6, using **different temperatures** of sodium thiosulfate made according to the table below.
8. Repeat steps 1-7 twice more.
9. Calculate the mean time for each of the sodium thiosulfate temperatures. Do not include any anomalous results in mean calculations.

Sodium thiosulfate solution	Volume of sodium thiosulfate solution at 60°C (cm ³)	Volume of sodium thiosulfate solution at 5°C (cm ³)
1	25	0
2	20	5
3	15	10
4	10	15
5	5	20
6	0	25



Analysis

Plot a **graph** of the **temperature** of sodium thiosulfate against **time** taken for the cross to disappear.

Safety Precautions

- **Hydrochloric acid** and **sodium thiosulfate** are **irritants**. Safety goggles must be worn at all times and the skin should be washed immediately if it comes into contact with it.
- Take care when using **glassware**. Clear up any broken glass immediately.
- **Sulfur dioxide** gas produced from the reaction is an **irritant**. Carry out the experiment in a well ventilated space to avoid breathing in sulfur dioxide fumes.
- **Hot liquids** can cause bad burns so the maximum temperature should be kept to 60°C.

Diagram

