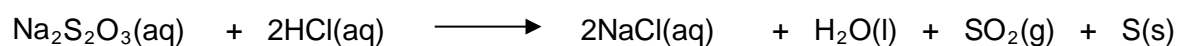


Investigation of the factors affecting the rate of reaction between dilute hydrochloric acid and sodium thiosulfate

Introduction

Sodium thiosulfate reacts with hydrochloric acid to form a solid precipitate of sulfur. The formation of this precipitate makes the solution become cloudy, and so the rate at which this cloudiness appears can be used as a way to measure the rate of the reaction. The equation for this reaction is as follows:

sodium thiosulfate + hydrochloric acid \longrightarrow sodium chloride + water + sulfur dioxide + sulfur



The rate at which this precipitate forms can be changed by changing the conditions under which the reaction is carried out.

In this experiment you will study the effect of changing the temperature of the sodium thiosulfate solution.

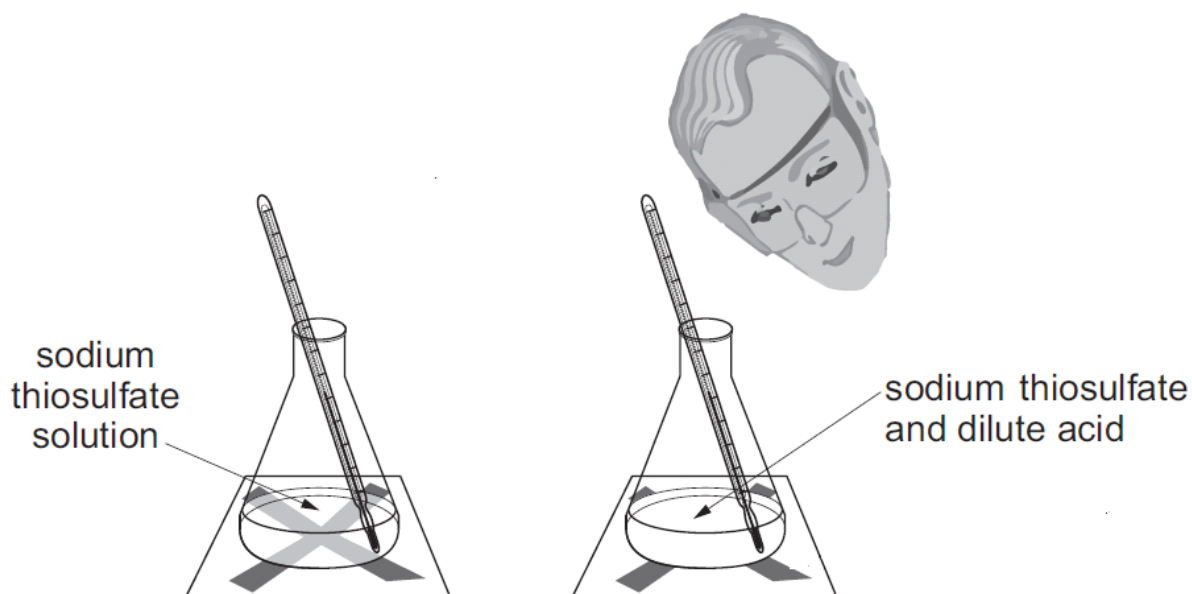
Apparatus

10cm³ measuring cylinder
25cm³ measuring cylinder
250cm³ conical flask
white paper with cross marked on it
stopwatch
1 mol/dm³ hydrochloric acid
thermometer

Access to:

40 g/dm³ sodium thiosulfate solution at 5 °C
40 g/dm³ sodium thiosulfate solution in a waterbath at 60 °C

Diagram of Apparatus



Method

1. Draw a cross on a square of white paper.
2. Measure 25 cm^3 of hot sodium thiosulfate using the 25 cm^3 measuring cylinder and pour into the conical flask. Record the temperature of the solution.
3. Using the 10 cm^3 measuring cylinder, measure out 5 cm^3 of the hydrochloric acid.
4. Place the conical flask onto the cross and add the hydrochloric acid. Swirl the flask to mix the contents and at the same time start the stopwatch.
5. Look down at the cross from above the mixture.
6. Stop the stopwatch as soon as the cross disappears.
7. Record the time taken for the cross to disappear.
9. Repeat steps 2 to 7 for different temperatures of sodium thiosulfate, made according to the table below.

Volume of sodium thiosulfate solution at 60°C (cm^3)	Volume of sodium thiosulfate solution at 5°C (cm^3)
25	0
20	5
15	10
10	15
5	20
0	25

Analysis

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