



The National
Orthodox School
Shmaisani

The National Orthodox School/ Shmessani

Name:

Lab report (3) / Temperature and reaction rate

Date:

Grade 8CS all sections

1) Writing a fully focused research question

What is the effect of changing the temperature on the rate of the reaction of sodium thiosulfate with hydrochloric acid measured by the time taken for a certain quantity of Sulphur to form and cause the 'X' mark to disappear in seconds?

2) Hypothesis: Outline a hypothesis to predict the outcome of the experiment and explain it using logical scientific reasoning (what do you think is going to happen).

If the temperature of the solution increases, then the time taken for a certain quantity of Sulphur to form will decrease.

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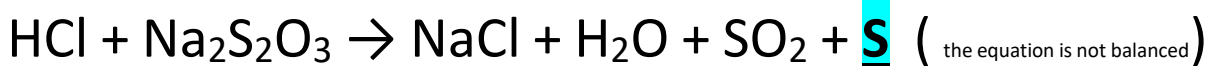


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3) Scientific explanation for hypothesis (This is the explanation to the previous hypothesis.
Why do you think that your hypothesis is correct? Explain it in detail with reasons and causes.

In this experiment you will measure the rate of the reaction between a sodium thiosulfate solution and hydrochloric acid at different temperatures.

The equation for the reaction is:



The precipitate of sulfur formed gradually and makes the solution cloudy yellow.

The rate of reaction can be measured by timing how long it takes for the solution to become cloudy and the precipitation of sulfur causes the 'X' mark to disappear

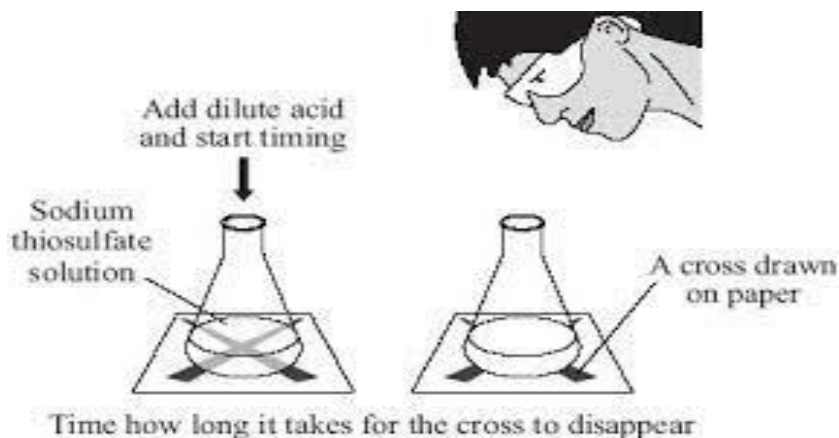
Since temperature is a measure of the average kinetic energy of a substance, an increase in temperature increases the kinetic energy of the reactant particles. This result in an increase in the movement of particles and therefore, increase in the collisions between them and in a given period of time. Thus, the rate of reaction will increase.

4) Manipulating the variables:

Controlled Variable	How will you keep this controlled? Stating the values and the equipment that you will be using	How could it affect your results if not controlled?
The volume of the acid/ sodium thiosulfate	Using a measuring cylinder	Using different volume will change the amount of sulfur produced
Concentration of acid/ Concentration of sodium thiosulfate	Use the same sample	Changing the concentration will change the amount of particles involved in the reaction.

5) Materials and Method:

- State your materials [number needed + units] (Be descriptive, example: 10cm³ graduated cylinder)



.5. ml hydrochloric acid

..50.. ml sodium thiosulfate

Conical flasks

Thermometer

Water bath (hot/ cold)

Measuring cylinder

Stop watch

White paper with cross on it

- **Method : What are the steps of the investigation?**
 1. Put .50.. cm³ of sodium thiosulfate solution into a conical flask.
 2. Measure ..5.. cm³ of hydrochloric acid in a small measuring cylinder.
 3. Warm the sodium thiosulfate solution to bring it to the required temperature. The object is to repeat the experiment different times with temperatures in the range 0 – 60 °C.
 4. Put the conical flask over a piece of paper with a cross drawn on it.

- Add the acid and start the clock. Swirl the flask to mix the solutions and place it on the paper.
- Look down at the cross from above. When the cross disappears, stop the clock and note the time taken.

<https://www.youtube.com/watch?v=nFZp-siAycg>

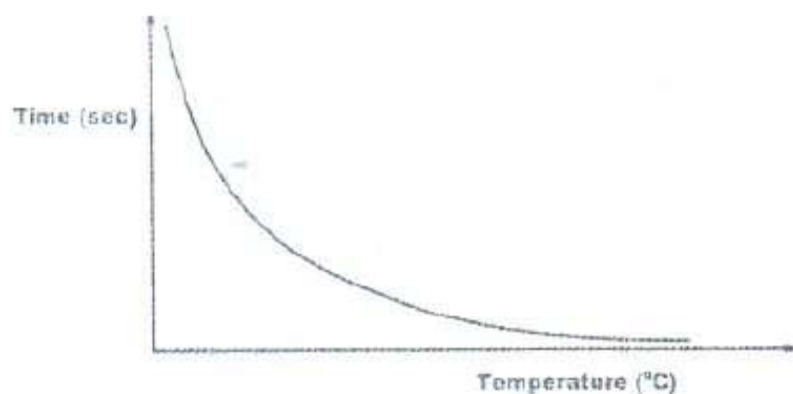
6) Safety precautions

Wear eye protection. Take care not to inhale fumes.

7) Results

- Data

Volume of the acid/ cm ³	Concentration of the acid	Volume of the sodium thiosulfate solution/ cm ³	Temperature of the solution/ °C	Time taken for the X to disappear/sec
5	1M	50	0	48
5	1M	50	25	31
5	1M	50	60	10



8) Conclusion and evaluation:

- Restating the purpose (hypothesis)
If the temperature of the reactants increases then the time taken for a certain quantity of Sulphur to form will decrease.
- Interpret your data and describe a conclusion based on your results.

The table shows that as the temperature increases it takes less time for the reaction to be done. For example, it took 31 sec for the X mark to disappear at 25°C where it took only 10 sec for the X mark to disappear at the highest temperature.

- Determine whether the original hypothesis was supported or rejected by the investigation?

Yes, it was supported.