

Assessed criteria

Criteria E: AIE

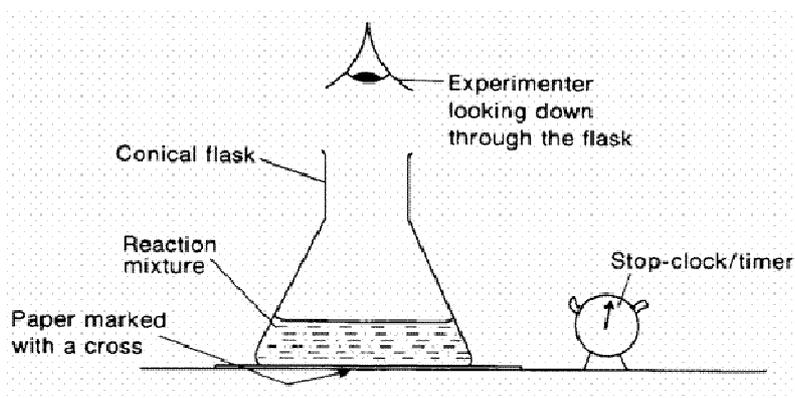
In all lab sessions you will be assessed for AIE: You will gain or lose points on this criteria based on your attitude in the laboratory, things like forgetting equipment, not listening to instructions will result in losing points: helping other students, cleaning up without being asked to, for example, will gain you points.

General Question

'What happens in a chemical reaction when you increase or decrease the concentration of the reactants?'

Background Information

A chemical reaction happens when **reactants** (the substances that you mix together) recombine, or change their arrangement in some way. Today we want you to think about how having more or less of the reactants will affect the reaction. **Concentration** is another way to say the amount of substance in a solution.



When we add $\text{Na}_2\text{S}_2\text{O}_3$ (sodium thiosulfate) to HCl (hydrochloric acid), the solution that starts off **transparent** becomes **cloudier**, as the reaction occurs so that eventually it becomes **opaque**. If we have something that we look at through the reaction, after a time, we will no longer be able to see it.

Hypothesis

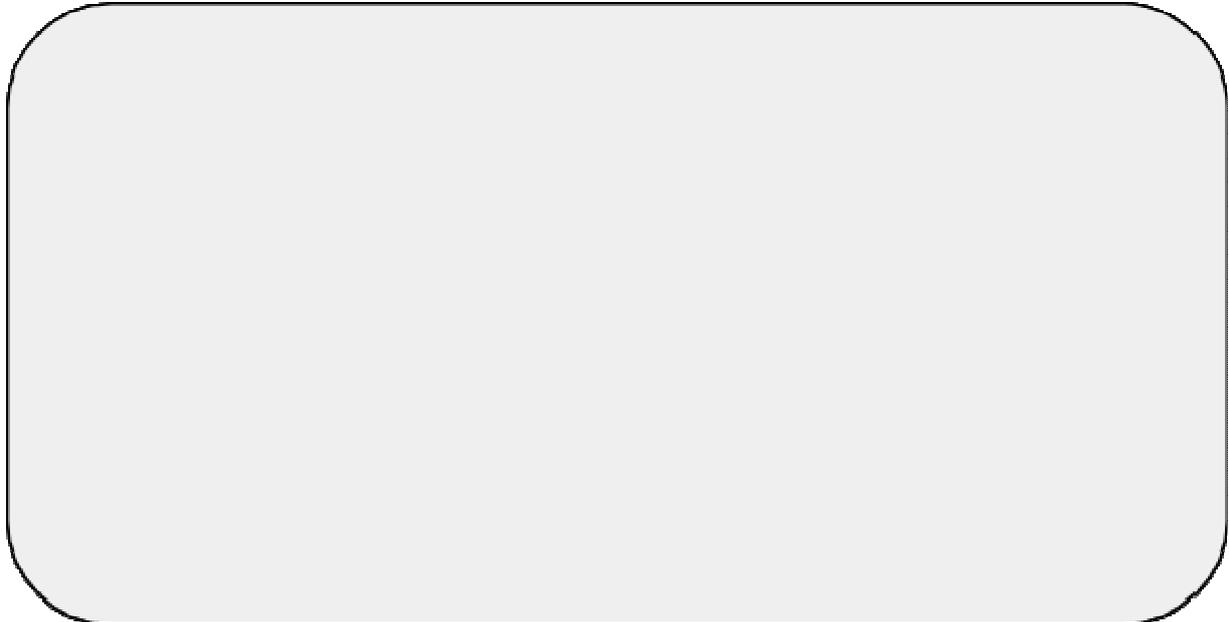


Variables

Independent - the quantity of HCl (hydrochloric acid) added to the experiment - measured in mL

Dependent - the time taken for the reaction to happen, the time for the cross to 'disappear' measured in seconds with a stopwatch

Controlled - the things we have to keep the same.



Materials

- 100mL beaker with a 0.25M sodium thiosulfate solution
- 100mL beaker with a 0.10M hydrochloric acid solution
- 250mL Erlenmeyer flask
- A square white paper of 15 by 15 cm
- Two measuring cylinders
- A ruler
- A stopwatch
- Goggles

Method

1. Put on some safety goggles; do not take them off until your acid has been disposed of.
2. Make sure all the materials from the list above are present on your table.
3. Draw a clearly visible cross in the middle of the square paper and put your Erlenmeyer flask on top.
4. Using the measuring cylinder, measure 50 mL of $\text{Na}_2\text{S}_2\text{O}_3$, place it in the Erlenmeyer flask.
5. USING A CLEAN MEASURING CYLINDER, measure the 10mL of HCl.
6. AT THE SAME TIME, add the acid to Erlenmeyer flask and start the stopwatch.
7. Look vertically through the top of the flask, and stop the watch when you cannot see the cross underneath, record this result in the table below.
8. Repeat steps 4 - 7 with 20mL of HCl, 30mL, 40mL and 50mL.
9. Clean away your material, ask your teacher if you are not sure how to clean something, where to put some something, or what to do.
10. Now copy the table below to your lab notebook, add the times of 2 other teams to it and calculate the average. Draw a graph with the averages and volumes of HCl.
11. Write a conclusion in which you explain the relation between concentration of HCL and the reaction time with Sodium thiosulfate. Maybe you need to do some research!

Table 1. Rate of a chemical reaction due to differences in the concentration of a solution

Volume of $\text{Na}_2\text{S}_2\text{O}_3$ (mL)	Volume of HCl (mL)	Time for the colour to disappear (s)
50	10	
50	20	
50	30	
50	40	
50	50	