Experiment to find the rate order for the reaction between acid and thiosulfate

Equipment per student
Comboplate
Propettes (x3)
Stopwatch
Laminated sheet with cross (X)

Chemicals
Hydrochloric acid (2moldm^{-3})
Sodium thiosulfate (46gdm^{-3} or 0.25moldm^{-3})
Distilled water

In this investigation you are asked to find how the rate of the following reaction depends on the concentration of $H^+(aq)$ and $S_2O_3^{2-}(aq)$ ions.
The equation for the reaction is: $2H^+(aq) + S_2O_3^{2-}(aq) \rightarrow S(s) + SO_2(g) + H_2O(l)$

Make sure your propettes are kept separate and **do not mix them up.** If you do then you will contaminate your solutions.

METHOD

1. Using a micropipette add sodium thiosulfate solution and water to wells [A1] to [A10] as shown in the table below: -

Well	Drops of sodium thiosulfate	Drops of water
[A1]	1	9
[A2]	2	8
[A3]	3	7
[A4]	4	6
[A5]	5	5
[A6]	6	4
[A7]	7	3
[A8]	8	2
[A9]	9	1
[A10]	10	0

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2. Using a pen or pencil draw a 'X' on some white paper or the laminated sheet with an X already on it if one is supplied. Place well [A1] **over the 'X'** so that you can see the 'X' from above.
3. Using a **clean** micropipette add **5** drops of hydrochloric acid to well [A10] and on the 5th drop start your stopwatch.
4. View the 'X' from above and stop your stopwatch the instant you can no longer see it.
5. Record the time in the table below.
6. Repeat steps 3 to 5 with wells [A2] up to [A10].

RESULTS

Well	Concentration of sodium thiosulfate /moldm^{-3}	Time taken for 'X' to disappear/s	1/time S^{-1}
[A1]			
[A2]			
[A3]			
[A4]			
[A5]			
[A6]			
[A7]			
[A8]			
[A9]			
[A10]			

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Presentation of results

Plot a graph of: -

Concentration of sodium thiosulfate (horizontal or x-axis) against 1/Time (s^{-1}) taken for 'X' to disappear (vertical or y-axis).

Conclusions

Explain why 1/time was plotted and not time.

_____

_____

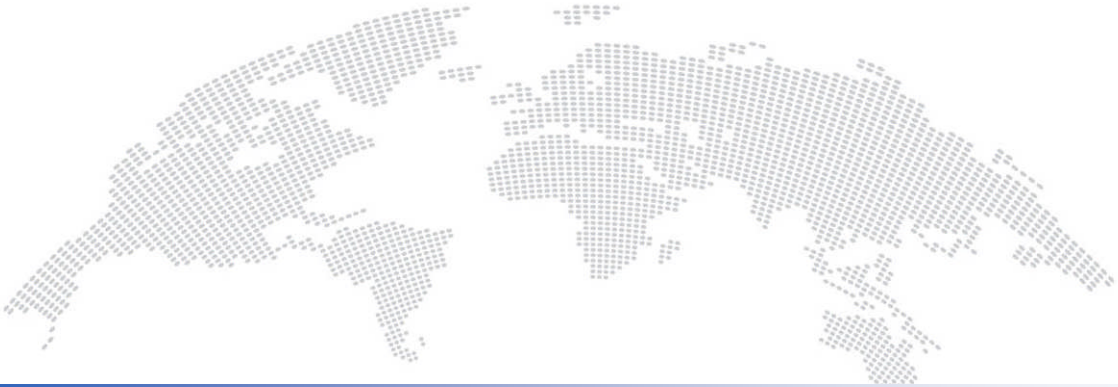
What does your plot of [$S_2O_3^{2-}$] against 1/time show?

_____

_____

_____

Now investigate how changing the concentration of hydrochloric acid affects the rate of the reaction.



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