

## EXPERIMENT NUMBER : 4

### RATE OF REACTION AGAINST CONCENTRATION

#### AIM:

To study the effect of concentration on the rate of reaction between sodium thiosulphate and HCl.

#### APPARATUS:

Five 250 ml conical flasks, three burettes, 10 ml pipette, stop watch, test tubes.

#### CHEMICALS REQUIRED:

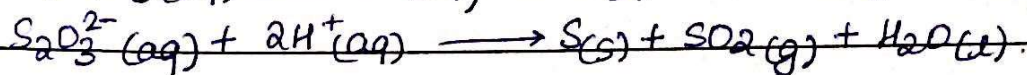
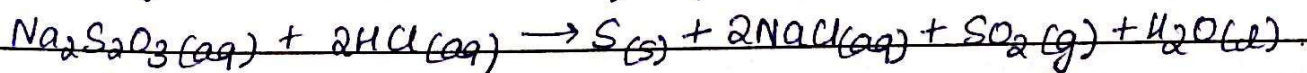
0.1 M sodium thiosulphate solution ( $\text{Na}_2\text{S}_2\text{O}_3$ ).

1 M hydrochloric acid (HCl)

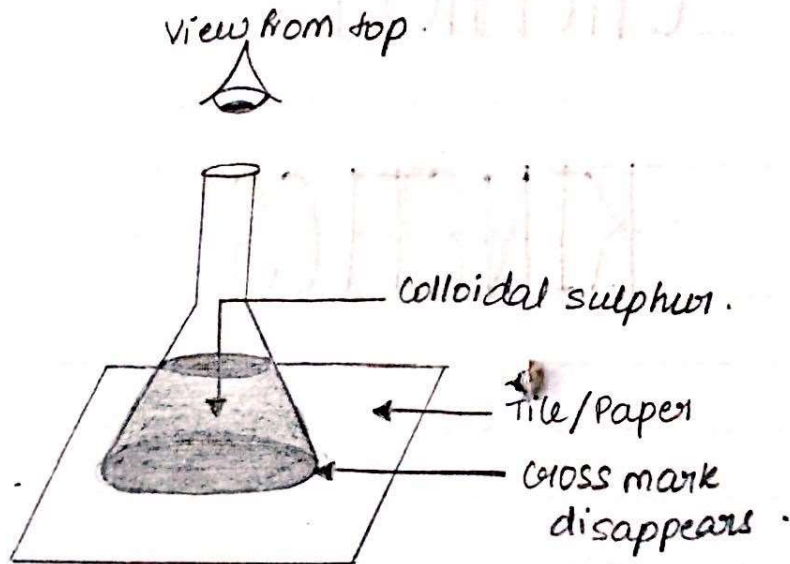
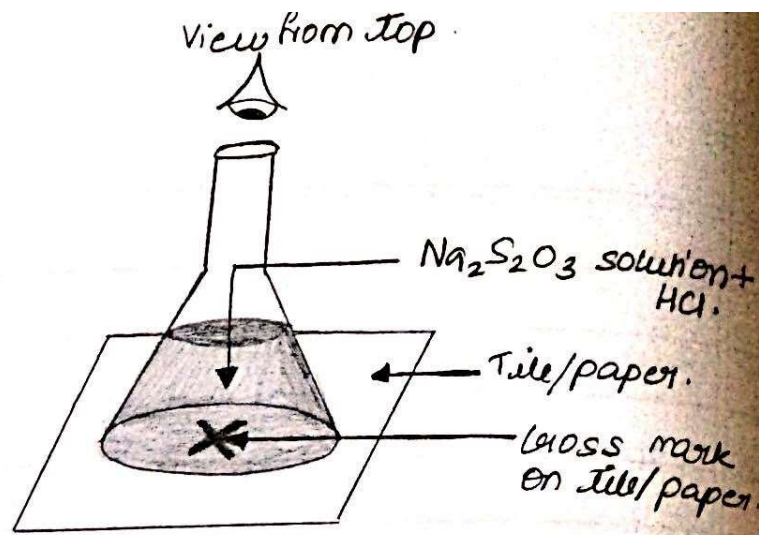
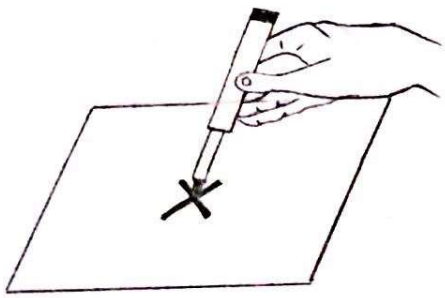
Distilled water.

#### THEORY:

Sodium thiosulphate reacts with hydrochloric acid to form colloidal sulphur along with the evolution of sulphur dioxide.



This colloidal sulphur gives a milky appearance and as the reaction proceeds, a stage is reached when there is enough precipitate of sulphur which makes the solution opaque. The rate of reaction can be followed by measuring the time taken for a reference mark on the tile to become invisible (The reaction flask is kept above the marked tile).



RATE OF REACTION AGAINST CONCENTRATION

## PROCEDURE:

(Amount of 1M HCl is constant and amount of 0.1M  $\text{Na}_2\text{S}_2\text{O}_3$  is varied)

Wash the five conical flasks with distilled water and label them as 1, 2, 3, 4, 5.

Take three clean burettes and fill them up with 0.1M Sodium thiosulphate, 1M HCl and distilled water respectively.

Add 10, 20, 30, 40, and 50 mL of 0.1M  $\text{Na}_2\text{S}_2\text{O}_3$  from the burette into the conical flasks labelled 1, 2, 3, 4 and 5.

Now add 40, 30, 20, 10 mL of distilled water from the burette into the flasks 1, 2, 3 and 4 respectively so that the total volume in each flask is 50 mL. (Do not add any water in flask no 5).

Take 5 mL of 1M HCl in a test tube accurately from the burette and keep it in a test tube stand.

Take a white tile and put a cross mark on it.

Keep the conical flask no. 1 on the tile just above the cross mark and view from above. The cross should be visible.

Now quickly add 5 mL of 1M HCl from the test tube into the conical flask and swirl it. Keep it back on the cross mark immediately.

→ OBSERVATION TABLE :

SR.No.	Volume of 0.1M $\text{Na}_2\text{S}_2\text{O}_3$ .	Volume of distilled $\text{H}_2\text{O}$ .	Total Volume	Volume of 1M $\text{HCl}$ .	Time taken (s)
1.	10ml	40ml	50ml	5ml	108
2.	20ml	30ml	50ml	5ml	54
3.	30ml	20ml	50ml	5ml	28
4.	40ml	10ml	50ml	5ml	23
5.	50ml	0ml	50ml	5ml	13.8

Simultaneously start the stop watch, when half of the HCl has been added, view the flask from above.

9. Observe the reaction by viewing the solution from top. You will notice the appearance of cloudiness. Then the solution turns milky. Finally the precipitate will form so that the cross is not visible. Stop the stop watch at this time when the cross mark 'just vanishes' from sight. Record the time taken for this to happen in the observation table.
10. Repeat the same procedure by taking of 5ml of HCl from the burette each time and adding it to the conical flask numbered 2, 3, 4 and 5. Note down the time taken for the cross to disappear (from sight) and enter it in the observation table.

→ RESULT:

Rate of reaction between  $\text{Na}_2\text{S}_2\text{O}_3$  and HCl increases with concentration of  $\text{Na}_2\text{S}_2\text{O}_3$ .

→ PRECAUTIONS:

1. View the cross mark from the top of the conical flask.
2. Start the stop watch immediately with addition of HCl.

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