

WJEC (Wales) Chemistry A-level

SP 3.5 - Determination of the Order of a Reaction

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SP 3.5 - Determination of the Order of a Reaction

Aim

To determine the **order of reaction** for the **oxidation** of iodide ions by hydrogen peroxide in acid solution.

Apparatus and Chemicals

- Stopwatch
- 100 cm³ conical flask
- Stirring rod
- 4 x 10 cm³ measuring cylinder
- 5 cm³ measuring cylinder
- 1 cm³ measuring cylinder
- 0.1 mol dm⁻³ H₂O₂ solution
- 1.0 mol dm⁻³ H₂SO₄ solution
- 0.1 mol dm⁻³ KI solution
- 0.005 mol dm⁻³ Na₂S₂O₃ solution
- Starch solution

Safety Considerations

- ★ H₂O₂ solution - harmful, oxidising
- ★ H₂SO₄ solution - irritant



Planning

1. Decide what volumes of H₂O₂ solution and deionised water you will mix together to get at least 5 different concentrations of H₂O₂. The total volume must not exceed 5 cm³.





Method

1. Prepare the reaction mixture by adding the following reagents to a 100 cm³ conical flask:
 - 10.0 cm³ H₂SO₄ solution
 - 10.0 cm³ Na₂S₂O₃ solution
 - 15.0 cm³ KI solution
 - 1.0 cm³ starch solution
 - 9.0 cm³ deionised water
2. Be ready with the stopwatch. **Rapidly** add 5.0 cm³ of H₂O₂ solution to the reaction mixture and **simultaneously start the stopwatch**. Ensure the reaction mixture is thoroughly mixed.
3. Stop the watch immediately when the blue colour appears and record the time.
4. Repeat steps 1 through to 3 using the other four concentrations of H₂O₂ solution.
5. Calculate the **rate of reaction** for each experiment.
6. Plot a graph of rate of reaction against [H₂O₂] solution and use this to calculate the order of reaction with respect to [H₂O₂].

