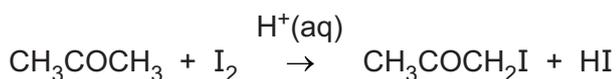


The iodination of propanone

A group of students completes a practical to confirm the rate equation for the iodination of propanone. They use this information to identify the rate-determining step and a possible mechanism for the reaction.

Introduction

The equation for the reaction is:



Reagents

2.0 mol dm⁻³ propanone solution (highly flammable, irritant)  

2.0 mol dm⁻³ hydrochloric acid (low hazard)

0.010 mol dm⁻³ iodine solution (low hazard)

Health and safety note



The organic product of the reaction, iodopropanone, is strongly irritant to eyes.

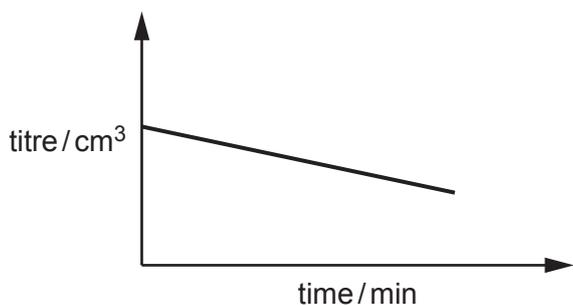
Experiment 1

This experiment determines how the rate of reaction varies with the concentration of iodine.

Method

- Set up two flasks **A** and **B**
 Flask **A** containing: 25 cm³ of 2.0 mol dm⁻³ propanone and 25 cm³ of 2.0 mol dm⁻³ hydrochloric acid.
 Flask **B** containing 50 cm³ of 0.010 mol dm⁻³ iodine solution.
- Noting the time, pour the contents of flask **A** into flask **B** and shake well.
- At known times (5–10 minute intervals), withdraw a 10 cm³ portion from the reaction flask, quench with sodium hydrogencarbonate solution and titrate with 0.010 mol dm⁻³ sodium thiosulfate.
- Plot a graph of titre against time.

Results



Experiment 2

This experiment determines how the rate of reaction varies with the concentrations of propanone and hydrochloric acid.

Method

1. Make up three mixtures of hydrochloric acid, propanone solution and water in conical flasks as in **Table 4.1** below, using burettes.
Note: water is added to some of the mixtures to keep the total volume of solution constant.
2. Add 4.0 cm³ of iodine solution to each flask in turn, shake and measure the time for the iodine colour to disappear.
3. Calculate the rate of reaction for each run as follows:

$$\text{rate/cm}^3 \text{ s}^{-1} = \frac{\text{volume of iodine solution used}}{\text{time for iodine colour to disappear}}$$

Results

Table 4.1

	Run A	Run B	Run C
Volume of 2.0 mol dm ⁻³ HCl/cm ³	20.0	10.0	20.0
Volume of 2.0 mol dm ⁻³ propanone/cm ³	8.0	8.0	4.0
Volume of water/cm ³	0	10.0	4.0
Volume of 0.01 mol dm ⁻³ iodine/cm ³	4.0	4.0	4.0
Time for colour to disappear/sec	115	234	240

END OF INSERT

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of Cambridge University Press & Assessment, which is itself a department of the University of Cambridge.