

Order of reaction between iodine and propanone essay sample



**ASSIGN
BUSTER**

Group A

Time when reaction mixture was added to NaHCO₃ (s)

315

610

886

1220

1500

1808

Volume of Na₂S₂O₃

added (cm³)

19.95

18.70

17.90

16.80

16.10

15.20

Group B

Time when reaction mixture was added to NaHCO₃ (s)

369

638

858

1175

1510

1793

Volume of Na₂S₂O₃

added (cm³)

19.50

18.70

18.60

17.50

16.90

16.30

Group C

Time when reaction mixture was added to NaHCO₃ (s)

339

620

912

1245

1516

1869

Volume of Na₂S₂O₃

added (cm³)

20. 60

20. 00

19. 10

18. 60

17. 70

17. 30

Group D

Time when reaction mixture was added to NaHCO₃ (s)

323

637

922

1209

1496

1791

Volume of Na₂S₂O₃

added (cm³)

22.30

19.35

18.20

17.65

17.15

17.00

Group E

Time when reaction mixture was added to NaHCO₃ (s)

312

608

933

1205

1507

1791

Volume of Na₂S₂O₃

added (cm³)

20. 10

20. 00

19. 70

19. 30

18. 20

17. 80

Questions:

1. Write a balanced chemical equation to represent the reaction between iodine and propanone in acidic medium.
2. What is the function of the sodium hydrogencarbonate?

Sodium hydrogencarbonate solution is used to quench the reaction in this experiment. When the reaction mixture is transferred into the conical flask

<https://assignbuster.com/order-of-reaction-between-iodine-and-propanone-essay-sample/>

containing sodium hydrogencarbonate solution, it neutralizes the sulphuric acid in the reaction mixture.

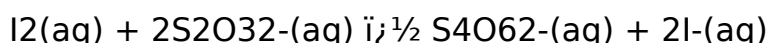


At room temperature, without the presence of hydrogen ions (catalyst),

the rate of the reaction between propanone and iodine is extremely slow and is practically stopped.

3. Explain why the concentration of iodine in the reaction mixture can be expressed in terms of the volume of sodium thiosulphate added.

In the titration, reaction between iodine and thiosulphate(VI) ion:



? no. of mole of iodine in the reaction mixture

$= (1/2) \times (\text{that of sodium thiosulphate added})$

$= (1/2) \times (\text{volume of sodium thiosulphate added}) \times (\text{molarity of sodium thiosulphate added})$

$?$ (no. of mole of iodine in the reaction mixture) / (volume of reaction mixture)

$= [(1/2) \times (\text{volume of sodium thiosulphate added}) \times (\text{molarity of sodium thiosulphate added})] / (\text{volume of reaction mixture})$

? concentration of iodine in the reaction mixture

= $[(1/2) (\text{volume of sodium thiosulphate added})(\text{molarity of sodium thiosulphate added})] / (\text{volume of reaction mixture})$

? The concentration of iodine in the reaction mixture can be expressed in terms of the volume of sodium thiosulphate added.

4. Plot a graph of the time at which the 10cm³ samples of the reaction mixture were added to the sodium hydrogencarbonate solution(x-axis) against the volume of sodium thiosulphate needed to react with the remaining iodine(y-axis).

Attached

5. Determine the concentration of sodium thiosulphate from the graph you plotted.

From the data of Group A , at time= 0, volume of sodium thiosulphate added should be 20. 75cm³.

? concentration of iodine in the reaction mixture

= $[(1/2) (\text{volume of sodium thiosulphate added})(\text{molarity of sodium thiosulphate added})] / (\text{volume of reaction mixture})$

? $0. 0198 = [(1/2) (20. 75/1000) (\text{molarity of sodium thiosulphate added})] / (50/1000)$

molarity of sodium thiosulphate added = 0. 095421686

~0. 0954M

6. What is the order of reaction with respect to iodine? i. e. what is the value of n in the equation:

$$\text{Rate of reaction} = \text{constant}[\text{I}_2]^n$$

Throughout the experiment, the iodine concentration in the reaction fell as iodine was consumed by propanone. In fact, the slope of the straight line in the graph is the rate of equation. From the graph, the iodine concentration changed at a uniform rate throughout the experiment as the slope of the graph is constant. Thus, the rate of iodine concentration is independent on the iodine concentration and hence the reaction is zero order with respect to iodine. The order of reaction with respect to iodine is zero, i. e. $n = 0$

7. Does iodine take part in the rate determining step of the reaction between iodine and propanone?

Since the reaction is zero order with respect to iodine, the iodine plays no part in the rate determining step of the reaction

8. Record the gradients of the graphs obtained by other four groups

Group

A

B

C

D

E

Volume of propanone

added (cm³)

25.0

20.0

15.0

10.0

5.0

Gradient of graph/cm³S⁻¹ -2.92×10^{-3} -2.12×10^{-3} -2.17×10^{-3} -2×10^{-3} -1.86×10^{-3}

9. Plot the gradients of graphs above against the initial volume of propanone solution added.

A graph showing the gradients of graphs above against the initial volume of propanone solution added.

<https://assignbuster.com/order-of-reaction-between-iodine-and-propanone-essay-sample/>

10. What is the order of the reaction with respect to propanone?

The gradient of the graph in (9) is directly proportional to the rate of reaction and volume of propanone solution is also directly proportional to its concentration.

Since a straight line is plotted in the graph above, rate of reaction is directly proportional to the concentration of propanone. Thus, the order of the reaction with respect to propanone is 1.

Conclusion

The order of the reaction with respect to propanone is 1 and the order of the reaction with respect to iodine is 0.

Reference

http://fyk.hkcampus.net/~fyk-nyw/AL_documents/99ALF6Expt10.doc

http://www2.hkedcity.net/sch_files/a/kss/kss-cfm/public_html/content/expts/text/expt/s6expt/s6expta/alp06a.doc

<http://www.nelsonthornes.com/aqagce/A2%20Sample%20material/Science/Chemistry.pdf>

<http://qcrc.qef.org.hk/proposal/2000/2000-1245/2000-1245-D04-32141.DOC>

<http://qcrc.qef.org.hk/proposal/2000/2000-1245/2000-1245-D04-32141.DOC>

<http://qcrc.qef.org.hk/proposal/2000/2000-1245/2000-1245-D04-32141.DOC>

DOC

<http://hk.knowledge.yahoo.com/question/question?qid=7009021900778>

<https://assignbuster.com/order-of-reaction-between-iodine-and-propanone-essay-sample/>

<http://hk.knowledge.yahoo.com/question/question?qid=7007021302105>

F. 6 Chemistry Notes Section V by Ms Sin W L