

Edexcel International Chemistry A Level

CP9 - Following the rate of the iodine-propanone reaction by a titrimetric method and investigating a 'clock reaction' (Harcourt-Esson, iodine clock)

(A Level only)

Flashcards

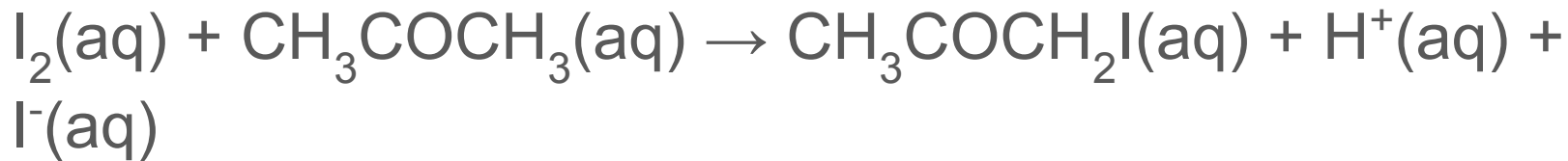
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Write an equation for the reaction
between iodine and propanone



Write an equation for the reaction between iodine and propanone



What is the catalyst for the reaction between propanone and iodine?



What is the catalyst for the reaction between propanone and iodine?

Sulfuric acid



Why is a large excess of propanone and sulfuric acid used in the reaction between iodine and propanone?



Why is a large excess of propanone and sulfuric acid used in the reaction between iodine and propanone?

To ensure that their concentrations remain constant throughout the reaction. This means that the influence of iodine alone on the rate of reaction can be measured.



How can the rate of the
iodine-propanone reaction be
measured?



How can the rate of the iodine-propanone reaction be measured?

Make up a single reaction mixture.

Withdraw samples at regular intervals, quench and titrate them against sodium thiosulfate.

Plot a graph of titres against the time of quenching.



What is used to quench a sample taken from the iodine-propanone reaction mixture?



What is used to quench a sample taken from the iodine-propanone reaction mixture?

Sodium hydrogencarbonate



What indicator is used when the quenched iodine-propanone reaction mixture is titrated against sodium thiosulfate? Describe the colour change



What indicator is used when the quenched iodine-propanone reaction mixture is titrated against sodium thiosulfate? Describe the colour change

Starch

Colour change from blue-black to colourless



In the iodine-propanone reaction, what is the order of reaction with respect to iodine?



In the iodine-propanone reaction, what is the order of reaction with respect to iodine?

Zero order



In the iodine-propanone reaction, what is the order of reaction with respect to hydrogen ions and propanone?



In the iodine-propanone reaction, what is the order of reaction with respect to hydrogen ions and propanone?

First order



Write the rate equation for the reaction
between iodine and propanone



Write the rate equation for the reaction between iodine and propanone



If the concentration of iodine is doubled during the iodine-propanone reaction, what will happen to the rate of reaction?



If the concentration of iodine is doubled during the iodine-propanone reaction, what will happen to the rate of reaction?

Rate will remain the same



How will the rate of the iodine-propanone reaction be affected if the concentration of hydrogen ions is doubled?



How will the rate of the iodine-propanone reaction be affected if the concentration of hydrogen ions is doubled?

Rate will double



In the iodine-propanone reaction, the first reaction is not the rate determining step.
What does this mean?



In the iodine-propanone reaction, the first reaction is not the rate determining step. What does this mean?

The first step is not the slowest step.



What safety precautions should be taken when investigating the rate of the iodine-propanone reaction?



What safety precautions should be taken when investigating the rate of the iodine-propanone reaction?

- Propanone is irritant so avoid contact with skin. It is also highly flammable so keep away from naked flames.
- Sulfur dioxide is released during the reaction so ensure the room is well ventilated or use a fume cupboard.



A graph is plotted after an iodine-propanone reaction showing titre volume and time after hydrogencarbonate was added. What shape will this graph be?



A graph is plotted after an iodine-propanone reaction showing titre volume and time after hydrogencarbonate was added. What shape will this graph be?

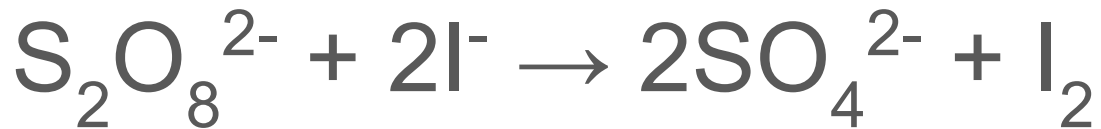
Linear (increasing time decreases titre volume)



Write an equation for the reaction
between peroxodisulfate ions and iodide
ions



Write an equation for the reaction between peroxodisulfate ions and iodide ions



Write an equation for the reaction
between acidified hydrogen peroxide and
iodide ions



Write an equation for the reaction between acidified hydrogen peroxide and iodide ions



Write an equation for the reaction between sodium thiosulfate and iodine. What is observed during this reaction in the presence of starch?



Write an equation for the reaction between sodium thiosulfate and iodine. What is observed during this reaction in the presence of starch?



Colour change from blue-black to colourless



What is measured during the iodine clock reaction?



What is measured during the iodine clock reaction?

The time taken for the blue-black colour to appear



A straight line graph is plotted after an iodine clock reaction showing $1/t$ and the concentration of I^- . What can be concluded about the order of the reaction with respect to I^- ?



A straight line graph is plotted after an iodine clock reaction showing $1/t$ and the concentration of I^- .

What can be concluded about the order of the reaction with respect to I^- ?

The reaction is first order with respect to I^-



What is the initial rate proportional to in an iodine clock reaction?



What is the initial rate proportional to in an iodine clock reaction?

$1/t$

Where t is time taken for colour change



The concentration of potassium iodide is changed during the reaction between iodide ions and persulfate ions. What must be kept the same to make sure conclusions are valid?



The concentration of potassium iodide is changed during the reaction between iodide ions and persulfate ions. What must be kept the same to make sure conclusions are valid?

- Total volume of solution
- Volume of persulfate
- Concentration of persulfate
- Volume of potassium iodide



What are the possible sources of inaccuracy in an iodine clock reaction?



What are the possible sources of inaccuracy in an iodine clock reaction?

- Timing may lead to inaccuracy as individuals may disagree upon the exact point at which the blue-black colour appears.
- Adding starch slightly increases the volume which affects the concentrations of reactants at the beginning. This will have an impact on how the concentrations change during the reaction.
- All measurement apparatus has a small uncertainty which may mean errors occur when measuring volumes.

