OCR (B) Chemistry A-Level

PAG 10 - Rates of Reaction

Initial Rates Method

Iodine Clock Reaction

(A level only)

Flashcards

What is a ‘clock reaction’?

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A reaction in which the concentration of a reagent quickly changes after a certain time period, causing a colour change

Briefly describe a method that could be followed to find the order of reaction with respect to iodide ions in the iodine clock reaction

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1. Mix potassium iodide, sodium thiosulfate and starch solutions in a conical flask
2. Add potassium peroxodisulphate and start the timer
3. Record the time taken for the solution to turn blue-black
4. Repeat steps 1-3 with varying concentrations of KI

How can the order of a reactant be deduced from the rate of reaction?

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The rate of reaction is proportional to 1/time. Use changes in the rate of reaction and concentrations to deduce the order with respect to each reagent.

Write the word and chemical equations for the reaction between potassium iodide and potassium peroxodisulphate ($K_2S_2O_8$)

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Potassium peroxodisulphate + potassium iodide → potassium sulphate + iodine

$$K_2S_2O_8 + 2KI \rightarrow 2K_2SO_4 + I_2$$

What equation links moles, volume and concentration?

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Moles = volume x concentration

n = V x C

How can the initial rate be calculated for an iodine clock reaction?

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$$\text{Initial rate} = \frac{\text{Moles of iodine (mol)}}{\text{Time taken for colour change (s)}}$$

Give 2 possible sources of error in an iodine clock experiment

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- Inaccurate timing of the appearance of blue colour:

  → Could have two students timing the experiment and calculate an average value.

- Adding starch slightly increases the volume which affects the concentrations of the reactants and thus the amount they change over time.

Suggest some control variables for this experiment

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- Total volume of reactants
- Volume of starch and thiosulfate used
- The concentrations of all the reagents (except potassium iodide solution)
- Temperature (as this can also affect the rate of reaction)

Write the rate equation for the reaction between iodide ions and peroxodisulphate ions

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$$\text{Rate} = k [I^-] [S_2O_8^{2-}]$$

What is the overall order of the reaction between iodide ions and peroxodisulphate ions?

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