Edexcel Chemistry A-Level

Core Practical 04 - Rates of hydrolysis of halogenoalkanes

Flashcards

What is a hydrolysis reaction?

What is a hydrolysis reaction?

Hydrolysis is a type reaction where water is used to break (hydrolyse) chemical bonds and split a reactant into two.

How do you test the rate of hydrolysis of different haloalkanes? (chloro-, bromo-, iodo-)

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- In 3 different test tubes add 4 drops of 1-chlorobutane, 1-bromobutane and 1-iodobutane.
- To each test tube add 5 cm^3 of ethanol. Place all test tubes in a 50°C water bath.
- Pour about 5 cm^3 of silver nitrate into 3 test tubes. Place the test tubes in the water bath.
- When all the solutions have reached 50°C, add the silver nitrate to the haloalkane–ethanol solutions.
- Start the stop clock. Measure the time taken for each precipitate to appear.

What are the expected results of these reactions?

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Haloalkane	Result
1-chlorobutane	White precipitate forms slowly.
1-bromobutane	Cream precipitate forms faster than that of 1-chlorobutane but slower than 1-iodobutane.
1-iodobutane	Yellow precipitate forms very quickly.

How do you test the rate of hydrolysis of different haloalkanes? (primary, secondary, tertiary)

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- In 3 different test tubes add 4 drops of 1-bromobutane, 2-bromobutane and 2-bromo-2-methylpropane.
- To each test tube add 5 cm^3 of ethanol. Place all test tubes in a 50°C water bath.
- Pour about 5 cm^3 of silver nitrate into 3 test tubes. Place the test tubes in the water bath.
- When all the solutions have reached 50°C, add the silver nitrate solution to the haloalkane–ethanol solutions.
- Start the stop clock. Measure the time taken for each precipitate to appear.

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Haloalkane	Result
1-bromobutane	Slow formation of cream precipitate.
2-bromobutane	Medium formation of cream precipitate.
2-bromo-2-methylpropane	Fast formation of cream precipitate.

What kind of reaction is the hydrolysis of haloalkanes?

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Nucleophilic substitution

Why are water baths used?

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To keep the temperature constant (as temperature is a control variable) so it doesn't interfere with the rate of hydrolysis.

What is an uncertainty?

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The uncertainty in a measurement is the interval within which the true / actual value is expected to lie.

What is percentage uncertainty and how do you calculate it?

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Percentage uncertainty in a measurement =

$$100 \times \frac{absolute\ uncertainty}{calculated\ value}$$

How can you decrease the uncertainty in time taken?

How can you decrease the uncertainty in time taken?

Use a lower temperature to reduce the rate of reaction. This will make the time taken longer and so the percentage uncertainty will be lower.