

# Edexcel International Chemistry

## A-level

### Practical 5

Investigating the Rates of Hydrolysis of  
Halogenoalkanes

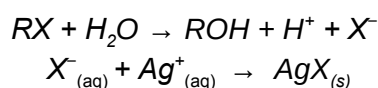


## Method

1. Set up 3 test tubes, each with 1 cm<sup>3</sup> of ethanol and two drops of a different haloalkane (iodo/bromo/chloro alkanes) and label which is which.
2. Place the test tubes in a water bath (60 °C), along with 3 test tubes of 5 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> silver nitrate and leave them all to reach a constant temperature.
3. Quickly add the silver nitrate solution from one test tube to the first test tube containing a haloalkane, and start the stopwatch.
4. Measure and record the time taken for the precipitates to form (this is a measure of the rate of reaction).
5. Repeat steps 3 and 4 for the remaining 2 haloalkanes.

## Key points

- This is a **nucleophilic substitution** reaction where water acts as the nucleophile (hydrolysis).
- Precipitation with Ag<sup>+</sup>:



- The variables you control should be either the **nature of the halide** (changing Cl, Br and I within a particular haloalkane), or the **type of alkane** (primary, secondary, tertiary with one type of halide). **Only change a single variable.**

## Errors

- Use **water bath** to control the temperature.
- Use lower temperatures to reduce the rate of reaction. This will make the time difference between haloalkanes larger, giving a **lower uncertainty**.

## Expected Results

Haloalkane	Result
Chloroalkane	White precipitate forms slowly.
Bromoalkane	Cream precipitate forms faster than chloro but slower than iodo.
Iodoalkane	Yellow precipitate forms quickly.

These results reflect the **relative carbon-halogen bond strengths**. C-I is the weakest bond in this series, so the reaction is the fastest.

