# The oxidation of cyclohexanol by nitric acid – student sheet

In this experiment you will be oxidising cyclohexanol using nitric acid. In this reaction the nitric acid breaks open the six-carbon ring to form the dicarboxylic acid, 1,6-hexanedioic acid (adipic acid). Whereas cyclohexanol is a liquid, 1,6-hexanedioic acid (adipic acid) is a solid and you can measure its melting point.

The reaction is:

Diagram

Description automatically generated

## Procedure

1. Half-fill a 100 cm3 beaker with deionised water, and heat to 80–90 °C.
2. Add 1 cm3 of nitric acid to a test-tube and place in the water bath.
3. Carefully add six drops of cyclohexanol to the test-tube. You will notice some bubbling and the nitric acid turns brown.
4. Leave for 10 min.
5. Remove the test-tube from the water bath and allow to cool to room temperature.
6. Cool further in an ice bath – crystals should form.
7. Filter off the crystals, wash with 2 cm3 of deionised water and dry them.
8. Measure the melting point of your product.

## Questions

1. What is the melting point of your product?
2. How does it compare with the value from data books?
3. Can you explain any variations?

## Health, safety and technical notes

* Read our [standard health and safety guidance](https://edu.rsc.org/resources/apparatus-and-techniques-for-microscale-chemistry/4013407.article)
* Students must wear suitable eye protection (splash proof goggles to BS EN166 3). The reaction should be done in a fume cupboard.
* Cyclohexanol is a skin and respiratory irritant and is harmful if swallowed or inhaled (see CLEAPSS HazCard [HC084c](https://science.cleapss.org.uk/Resource-Info/HC084C-Other-alcohols.aspx)).
* Nitric acid, 5 mol dm–3 HNO3 (aq), is CORROSIVE (see CLEAPSS HazCard [HC067](https://science.cleapss.org.uk/Resource-Info/HC067-Nitric-V-acid.aspx)).