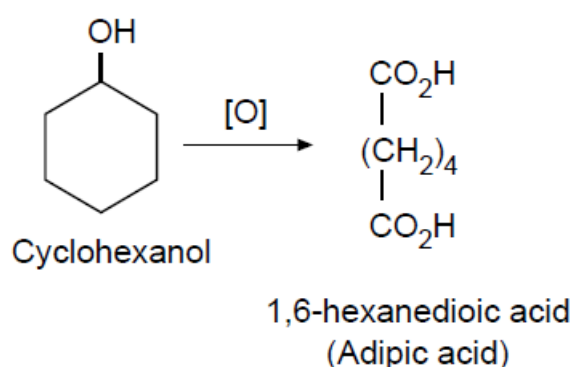


The oxidation of cyclohexanol by nitric acid – student sheet

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:



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](#)
- 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](#)).
- Nitric acid, 5 mol dm⁻³ HNO₃ (aq), is CORROSIVE (see CLEAPSS HazCard [HC067](#)).