

The preparation of 2-hydroxybenzoic acid

This resource accompanies the article **Fixing the funeral footprint** in *Education in Chemistry* which can be viewed at rsc.li/3shy8Ph.

The activity has been adapted from a chapter in the book **Aspirin**, which can be read in full at: rsc.li/3tWoeTq.

Introduction

The student activity typically takes 1½ to 2 hours to complete in a school laboratory and can be carried out in two sessions as long as the reaction mixture in the flask can be stoppered and safely stored between sessions. Learners will also need a few minutes in a further session to weigh the dried product.

Read our standard health and safety guidance (rsc.li/3KS5qK2) and carry out a risk assessment before running any live practical. See the **teacher notes** and **student sheet** for further instructions to carry out the preparation.

Apparatus











- 10 cm³ and 25 cm³ measuring cylinders
- Weighing balance, ±0.01 g
- 50 cm³ pear-shaped flask fitted with a reflux condenser
- Anti-bumping granules
- Water bath (eg 250 cm³ beaker) or an electric heater
- 100 cm³ beaker surrounded with ice and water in a larger container. A larger plastic beaker is suitable to contain the ice.
- Dropping pipette
- Stirring rod
- Spatula
- Buchner flask and suction apparatus
- Watch glass
- Litmus or universal indicator paper
- Ice-cold water (a wash bottle containing distilled water cooled in ice is suitable).

Safety equipment

- Splashproof goggles
- Chemical resistant gloves should be available for anyone who may have a cut or graze on their hands and for all if necessary.

Preparation and safety

- Work in a well-ventilated laboratory.
- Take particular care when preparing the sodium hydroxide solution from solid sodium hydroxide.
 - Wear splashproof goggles and a face shield and prepare in a fume cupboard.
 - When solid sodium hydroxide is added to water, heat is evolved such that boiling could occur. A coking mist forms as the solid dissolves in water. While this is not a serious safety risk, it is unpleasant and it is best to use a fume cupboard if possible.
 - Sodium hydroxide solutions should be stored in plastic screw cap bottles as they can etch glass when stored for a long period of time.

Chemicals supplied for the practical	Hazards
Oil of wintergreen  WARNING	Causes skin irritation. Causes serious eye irritation. May cause respiratory irritation. See CLEAPSS Hazcard HC052 .
2 mol dm ⁻³ aqueous sodium hydroxide  DANGER	Causes severe burns and eye damage. See CLEAPSS Hazcard HC091a . See CLEAPSS recipe sheet RB085 . Splash-proof goggles must be worn throughout.
2 mol dm ⁻³ hydrochloric acid   DANGER	Causes severe skin and eye damage. May cause respiratory irritation. See CLEAPSS Hazcard HC047a . Splashproof goggles must be worn throughout. Avoid inhaling fumes. Take particular care to avoid skin contact.
Methanol (product)    DANGER	Highly flammable liquid and vapour and toxic if inhaled, swallowed or through skin contact. Causes damage to organs. See CLEAPSS Hazcard HC040b .
2-hydroxybenzoic acid (salicylic acid) (product)    DANGER	Harmful if swallowed. Causes serious eye damage. Suspected of damaging the unborn child. See CLEAPSS Hazcard HC052 . Ensure that the laboratory is well ventilated.

Products and disposal

- See the table on the previous page for hazards associated with the products methanol and 2-hydroxybenzoic acid (salicylic acid).
- 2-hydroxybenzoic acid can be stored out of direct sunlight in a labelled container.
- Slowly add any waste to a 1 mol dm⁻³ solution of sodium carbonate to neutralise. Take care as heat or spray may be produced (wear a face shield or goggles and dilute in a fume cupboard switched off but with the sash down). Check the pH using indicator paper and keep adding sodium carbonate solution until the mixture is just alkaline. Pour the neutralised solution down a foul-water drain and dilute further.
- Wash used filter paper with sodium carbonate solution before disposing in the general waste bin.
- Learners should dilute the filtrate further using distilled water before pouring down a foul-water drain.
- Place all the used indicator paper in a large container of water before disposing of the paper in the general waste bin. Pour the rinsing water down a foul-water drain.