The preparation of 2-hydroxybenzoic acid – Teacher notes

Introduction
Many organic compounds are found in plants. 2-Hydroxybenzoic acid (salicylic acid) can be made from methyl 2-hydroxybenzoate which is obtained as oil of wintergreen by distillation from the leaves of Gaultheriae procunbers.

Oil of wintergreen is 98% methyl 2-hydroxybenzoate. This oil can be hydrolysed by boiling with aqueous sodium hydroxide for about 30 minutes. The reaction produces sodium 2-hydroxybenzoate which can be converted into 2-hydroxybenzoic acid by adding hydrochloric acid.

Health, safety and technical notes
- Read our standard health and safety guidance here https://rsc.li/3KS5qK2
- Wear eye protection.
- Sodium hydroxide can cause severe burns to the skin and is dangerous to the eyes., see CLEAPSS Hazcard HC091a.

Apparatus
- Measuring cylinder, 10 cm³
- Pear shaped flask fitted with a reflux condenser, 50 cm³
- Anti-bumping granules
- Water bath

NB the reaction can be heated directly over a low Bunsen burner flame, but care must be taken not to heat too strongly, causing bumping.
• Beaker surrounded with ice and water in a larger beaker, 100 cm³
• Stirring rod
• Buchner flask and suction apparatus
• Watch glass

Chemicals
• Oil of wintergreen
• Aqueous sodium hydroxide, 50 cm³ of 2 mol dm⁻³
• Red litmus paper

Answers
1. There are two layers in the flask at the start of the preparation but when the reaction is complete the mixture is homogeneous.
2. The methanol produced remains in the filtrate because it is completely miscible with water.
3. Oil of wintergreen is 98% methyl salicylate and it shows the medicinal properties of salicylates in general. It is not usually given by mouth but is readily absorbed by the skin. It is applied as a liniment for the relief of pain in lumbago, sciatica and rheumatic conditions, as well as for minor sports injuries.
4. A good yield can be obtained in this experiment. Two grams produces 1.7 g of dry 2-hydroxybenzoic acid.

Further investigations
• The melting point of 2-hydroxybenzoic acid could be determined (158–160 °C)
• Other examples of ester hydrolysis could be investigated – e.g. soap making
• Other natural oils could be extracted from natural materials using steam distillation e.g. limonene from orange peel.