Transition task: Finding the best solvent for recrystallisation

Education in Chemistry
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One of the key skills of a synthetic chemist is finding a suitable solvent for recrystallisation – now it's your turn to try

Introduction

Recrystallisation is a technique used to purify crude solid products and remove impurities. The method of purification is based on the principle that the solubility of most solids increases with increased temperature. This means that as temperature increases, the amount of solute that can be dissolved in a solvent also increases.

A successful recrystallisation depends on the proper choice of solvent. The compound must be soluble in the hot solvent and insoluble in the same solvent when it is cold.

Key steps in recrystallisation

- **Solvent**: the solvent should be chosen such that the solid is sparingly soluble (ie, the solid does not immediately dissolve at room temperature but requires some additional heating).
- **Concentration**: the solution should be made as concentrated as possible (ie, only the amount of solvent necessary to dissolve the solid should be added).
- **Hot filtration**: where insoluble particles remain in a heated solution, hot filtration is used to remove them before precipitation of the product.
- **Slow cooling**: the solution should be cooled as slowly as possible to enable large crystals to grow.
- **Drying the solid**: once collected, the solid should be dried for a sufficiently long time to enable the solvent to evaporate.

Further reading on recrystallisation: https://edu.rsc.org/resources/recrystallisation/1065.article

Your task

You have a sample of crude acetylsalicylic acid and should carry out a series of experiments to determine the best solvent or solvent mixture for recrystallisation. Do this on a small scale, using test tubes, before you carry out your final recrystallisation on a larger sample.

You will need to take notes about the relative solubility at different temperatures as you go along.

The following solvents are available: water, ethyl acetate, acetone, ethanol, methanol, cyclohexane.

Also available to you: a kettle for a hot water bath, beaker, test tubes, jewellery balance, filter paper, filter funnel, conical flask.