

The melting point of aspirin – student sheet

Introduction

Measuring the melting point of a substance is a good way to test for purity. In this experiment you use the melting point as a way of investigating the purity and identity of laboratory prepared aspirin samples.

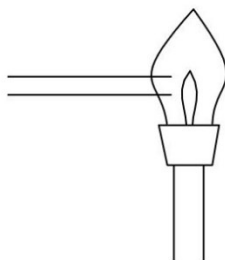
A pure substance usually has a sharp melting point – ie a narrow temperature range during which it changes from a solid to a liquid. A substance which contains impurities often melts over a range of several degrees.

Any impurities in the substance cause a lowering and broadening of this characteristic temperature.

Substance	Melting point
2-Hydroxybenzoic acid	158–160 °C
Aspirin	138–140 °C

Method

1. If you do not have sealed melting point tubes, heat the end of a capillary tube in a Bunsen burner flame until the glass softens and the end is sealed.
Do not heat the tube so strongly that it bends. Leave it on a heatproof mat to cool.



2. Make sure that your samples of solid are dry, by leaving them in a desiccator or an oven at 50 °C overnight. Fill the melting point tube to a depth of about 0.5 cm with dry impure aspirin sample.
3. Seal a second tube and fill it to a depth of about 0.5 cm with dry crystals of purified aspirin.
4. Place each tube in the melting point apparatus, slowly increase the temperature and note the temperature range over which the substances melt. A simple but effective apparatus consists of a beaker of oil or glycerol in which is supported a 0–360 °C thermometer. The two melting point tubes are attached to the thermometer close to the bulb using a rubber band. This apparatus makes it easy to compare the behaviour of the two solids.
An electric melting point apparatus can also be used.

Record the melting point ranges of the pure and impure samples and include a description of the melting process in each case.

Questions

1. On the basis of melting point is it reasonable to conclude that the substances tested contain aspirin?
2. Account for any difference between the melting points of the crude and recrystallised samples of aspirin.
3. What other impurities could there be in the aspirin made in the laboratory?
4. Describe in molecular terms your ideas of what happens when a substance melts.
5. Why does this explanation support the fact that aspirin has a lower melting point than 2-hydroxybenzoic acid?