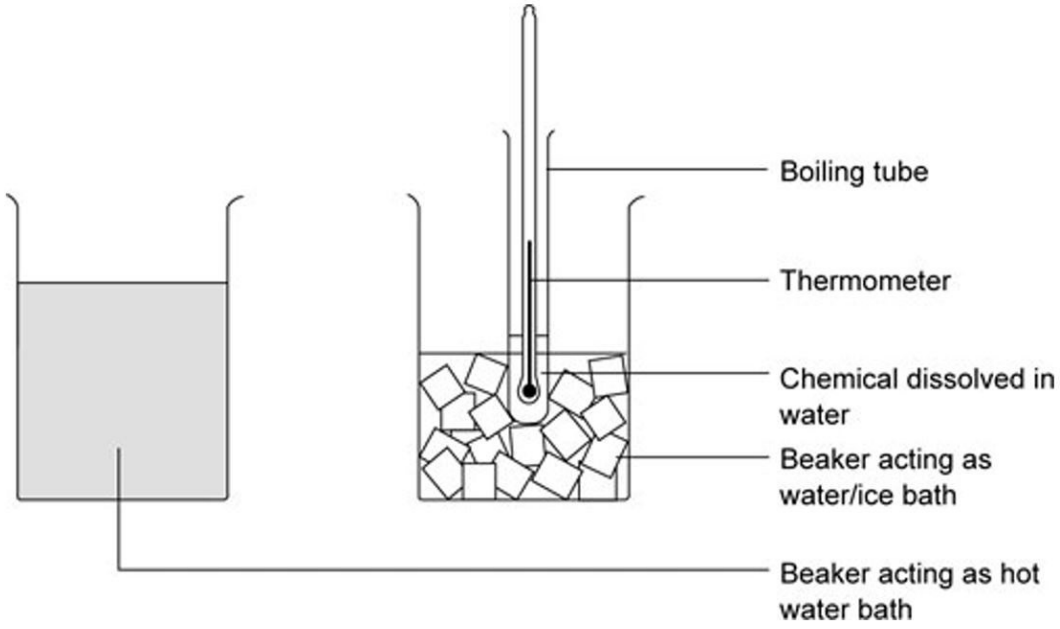
The effect of temperature on solubility – student sheet

Introduction

Most solid substances that are soluble in water are more soluble in hot water than in cold water. This experiment examines solubility at various temperatures.



Equipment

Apparatus

- Eye protection
- Boiling tubes
- Beaker to act as ice bath, 250 cm^3
- Beaker to act as a hot water bath, 250 cm^3
- Stirring thermometer (-10 –110 °C)
- Measuring cylinder or graduated pipette, 250 cm^3
- Wooden tongs to hold hot boiling tube

Chemicals

- Ammonium chloride
- Ice

Health, safety and technical notes

- Read our standard health and safety guidance here https://rsc.li/3iFPxff
- Always wear eye protection.
- Ammonium chloride is harmful if swallowed and an eye irritant, see CLEAPSS Hazcard HC009a.

Procedure

1. Set up a hot water bath and an ice bath. Put 2.6 g of ammonium chloride into the boiling tube. Add 4 cm^3 water.
2. Warm the boiling tube in the hot water bath until the solid dissolves.

3. Put the boiling tube in the ice bath and stir with the thermometer. Use wooden tongs to hold it if necessary.
4. Note the temperature at which crystals first appear and record it in the table
5. Add 1 cm^3 water. Warm the solution again, stirring until all the crystals dissolve.
6. Then repeat the cooling and note the new temperature at which crystals appear.
7. Repeat steps 5, 6 and 7 until 10 cm^3 water has been used.

Question

1. Complete the table

Volume of water $cm/^3$	Solubility/g dm^3	Crystallisation temperature /° C
4	650	
5	520	
6	433	
7	371	
8	325	
9	289	
10	260	

(The crystallisation temperature is the temperature at which crystals appear).

2. Plot a graph showing solubility on the vertical axis and temperature on the horizontal axis.