

Hot and Cold –Teacher’s Instructions



Make Sure You Have...

Calcium Chloride (CaCl_2)

Ammonium Nitrate (NH_4NO_3)

2 x 250 ml beakers

Water

Spoons

Thermometer

What To Do....

1. Fill a beaker with water (100 ml) and measure the temperature.
2. Add 3 spoonfuls of calcium chloride, stir and measure the temperature again.

The temperature should have increased

3. Fill a second beaker with water (100 ml) and measure the temperature.
4. Add 3 spoonfuls of ammonium nitrate, stir and measure the temperature again.

The temperature should have decreased

5. Wash everything up (solutions can go down the sink)

What's Happening

Dissolving calcium chloride in water is an exothermic process. Conversely, dissolving ammonium nitrate in water is an endothermic reaction. Reactions like this have loads of uses in life. For example there is nothing better when you're on a long walk or out fishing on a cold day than something to warm your hand (except perhaps a good cup of tea). Hand warmers are available that are activated by clicking a thin coin inside the warmer. This causes an exothermic crystallisation



process which in turn causes the contents of the bag to heat up. The bag can then be re-generated by boiling it up in water.



A Hand Warmer

Endothermic reactions have their uses too. For example, white wine should always be served cold so you can buy a cooling pad similar to the hand warmer above but this cools down when you initiate the crystallisation. Thus the wine can be brought to a drinkable temperature.