

GCSE



CCEA GCSE TEACHER GUIDANCE

Chemistry Practical Manual

Unit 3: Practical Skills

C3: Investigate the preparation of
soluble salts

Investigate the preparation of soluble salts

Experiment 1

Making a soluble salt from a base

In this experiment you will be making a salt using a metal carbonate. The use of a metal carbonate allows us to easily see when all the acid has been used up in the reaction. As the reaction proceeds the metal carbonate will neutralise the acid and form a soluble salt. However, when all the acid has reacted any excess metal carbonate will be left over. We can use this to find out when all the acid has reacted and simply filter off the excess metal carbonate, leaving only the soluble salt and water behind.

Apparatus and Chemicals

Copper(II) carbonate (approx 4 g)
Sulfuric acid (1 mol/dm³ 25 cm³)
100 cm³ beakers (x2), glass rod
Tripod, gauze, Bunsen burner, heat proof mat
Filter funnel, filter paper and conical flask
Evaporating basin

Safety

Follow safety advice as given by teacher

Method

1. Place 4 g of copper(II) carbonate in a beaker
2. Warm 25 cm³ of 1 mol/dm³ sulfuric acid in another beaker, the acid should be no hotter than 60°C
3. Add the copper(II) carbonate to the sulfuric acid and stir until there is no further reaction and unreacted copper(II) carbonate is present
4. Allow to cool and filter the mixture and retain the filtrate
5. Heat the filtrate in an evaporating basin on a tripod and gauze until the volume is about one half of what it was originally
6. Allow the basin to cool and the crystals will form
7. When the crystals have formed, filter if necessary, dry (between two sheets of filter paper or using a desiccator or in a low temperature oven)

Experiment 2

Making a soluble salt from an alkali

In this experiment it is not as easy to determine when all the acid has been used up as the alkali is a soluble base. Therefore, we have to use an indicator to determine when neutralisation has taken place. We can either remove the indicator by using decolourising charcoal, or, once we know the volumes required for neutralisation, we can repeat the experiment using the exact volumes without an indicator.

Apparatus and Chemicals

Burette, retort stand and burette clamp
Pipette (25 cm³) and pipette filler
Conical flask
Phenolphthalein indicator
HCl 1 mol/dm³ (50 cm³)
NaOH 1 mol/dm³ (25 cm³)
Decolourising charcoal (if following method 2)
Evaporating basin
Filter funnel and filter paper

Safety

Follow the safety advice of your teacher

Method 1

1. Fill the burette with hydrochloric acid
2. Using the pipette and pipette filler, place 25cm³ of sodium hydroxide solution into a conical flask
3. Add 2 drops of phenolphthalein indicator to the conical flask (it should go pink)
4. Carefully add the hydrochloric acid from the burette into the conical flask, swirl gently and rinse any droplets down into the flask with deionised water
5. Stop adding the hydrochloric acid when the indicator turns colourless and record the volume added by carefully reading the burette
6. Repeat steps 1-5 with fresh chemicals, but this time without the indicator, adding the recorded volume of hydrochloric acid
7. Carefully pour the solution into an evaporating basin
8. Place onto a tripod and gauze and heat gently using a Bunsen burner until about ½ of the solution remains
9. Leave to cool and crystallise, remove crystals and dry between two sheets of filter paper or in a low temperature oven or in a desiccator.

Method 2

Alternative method, using charcoal to remove indicator colour (1/2 the class could follow this method and then compare crystals).

Follow steps 1-5 then:-

- a) After step 4, add 2 spatulas of decolourising charcoal to the conical flask
- b) Heat gently, using tripod, gauze, Bunsen burner and heatproof mat – do not boil
- c) Allow to cool slightly, then filter the mixture into an evaporating basin
- d) Place onto a tripod and gauze and heat gently using a Bunsen burner until about ½ of the solution remains
- e) Leave to cool and crystallise, remove crystals and dry between two sheets of filter paper or in a low temperature oven or in a desiccator.