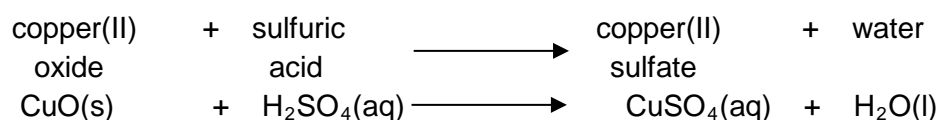
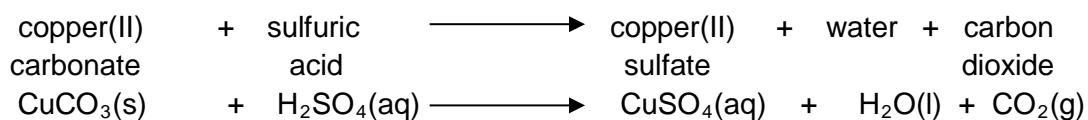


## Preparation of crystals of a soluble salt from an insoluble base or carbonate

### Introduction

In this experiment you will make crystals of copper sulfate. This can be done using either copper(II) carbonate or copper(II) oxide.



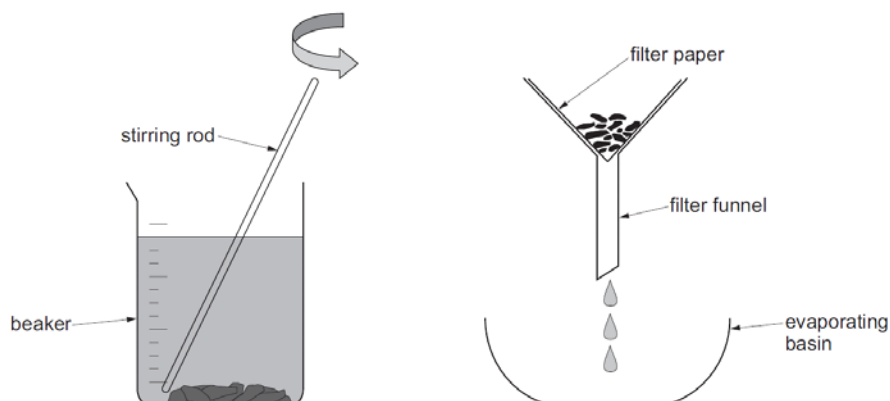
### Apparatus

100 cm<sup>3</sup> beaker  
 stirring rod  
 filter funnel and paper  
 evaporating basin  
 50 cm<sup>3</sup> measuring cylinder  
 0.5 mol/dm<sup>3</sup> H<sub>2</sub>SO<sub>4</sub>  
 copper(II) oxide or copper(II) carbonate  
 spatula  
 indicator paper

### Access to:

electronic balance  $\pm 0.1$  g

## Diagram of Apparatus



### Method

1. Measure  $50\text{ cm}^3$  of sulfuric acid and pour into the beaker.
2. Measure approximately 4g copper(II) oxide **or** 5g copper(II) carbonate. (This does not need to be precise as the solid will be in excess.)
3. Add the solid to the acid and stir thoroughly.
4. To ensure all the acid has reacted, touch the glass rod onto a piece of indicator paper. If it is acidic continue stirring.
5. If the solution is neutral, pour the mixture into the filtration apparatus above the evaporating basin.
6. Allow to evaporate for several days until dry.

## Risk Assessment

Hazard	Risk	Control measure
Sulfuric acid is corrosive	Risk of splashing into eyes whilst stirring	Take care whilst stirring and wear eye protection
Copper sulfate is harmful	Risk of splashing into eyes whilst stirring	Take care whilst stirring and wear eye protection
Hot tripod and evaporating basin can burn	Risk of burning hands when touching hot tripod / basin	Leave apparatus to cool before moving

## Teacher / Technician notes

### Reagents:

- Copper(II) oxide - Refer to CLEAPSS hazard card 26
- Copper(II) carbonate - Refer to CLEAPSS hazard card 26
- Sulfuric acid [ $0.5 \text{ mol/dm}^3$ ] - Refer to CLEAPSS hazard card 98A
- Copper(II) sulfate solution - Refer to CLEAPSS hazard card 26

$50 \text{ cm}^3$  of copper sulfate solution requires medium to large evaporating basins. Quantities can be reduced to suit available equipment. However it is vital that the solid is always in excess.

It can be emphasised that the reason for adding the insoluble base in excess is to ensure all of the acid has reacted and that a pure sample of the salt can thus be obtained.

At method point 6, it is possible to heat the evaporating basin to reduce the volume of copper(II) sulfate solution by approximately a third using a Bunsen burner. This will reduce the time needed to reach dryness.

There is also scope for extension work – the mass of the base added could be weighed accurately and recorded. The mass of excess could then be obtained and thus the number of moles of copper(II) sulfate produced could be calculated.

## Working scientifically skills covered

### **2. Experimental skills and strategies**

Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.

Apply a knowledge of a range of techniques, instruments, apparatus and materials to select those appropriate to the experiment.

Carry out experiments appropriately having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations.