1 A method used to make copper(II) sulfate crystals is shown.

1 Place dilute sulfuric acid in a beaker.

2 Warm the acid.

3 Add copper(II) oxide until it is in excess.

4 Filter the mixture.

5 Evaporate the filtrate until crystals start to form.

6 Leave the filtrate to cool.

What are the purposes of step 3 and step 4?

	step 3	step 4
A	to ensure all of the acid has reacted	to obtain solid copper(II) sulfate
B	to ensure all of the acid has reacted	to remove excess copper(II) oxide
C	to speed up the reaction	to obtain solid copper(II) sulfate
D	to speed up the reaction	to remove excess copper(II) oxide

2 What is the correct sequence of steps for the preparation of a pure sample of copper(II) sulfate crystals from copper(II) oxide and sulfuric acid?

A dissolving → crystallisation → evaporation → filtration

B dissolving → evaporation → filtration → crystallisation

C dissolving → filtration → crystallisation → evaporation

D dissolving → filtration → evaporation → crystallisation

3 Salts can be made by adding different substances to dilute hydrochloric acid.

For which substance could any excess **not** be removed by filtration?

A copper(II) oxide

B magnesium

C sodium hydroxide

D zinc hydroxide

4 Four stages in the preparation of a salt from an acid and a solid metal oxide are listed.

1 Add excess solid.

2 Evaporate half the solution and leave to cool.

3 Filter to remove unwanted solid.

4 Heat the acid.

In which order should the stages be carried out?

A $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$

B $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

C $4 \rightarrow 1 \rightarrow 3 \rightarrow 2$

D $4 \rightarrow 2 \rightarrow 1 \rightarrow 3$

5 A salt is produced in each of the following reactions.

P magnesium + dilute hydrochloric acid

Q zinc oxide + dilute sulfuric acid

R sodium hydroxide + dilute hydrochloric acid

S copper carbonate + dilute sulfuric acid

Which statements about the products of the reactions are correct?

1 A flammable gas is produced in reaction P.

2 Water is formed in all reactions.

3 All the salts formed are soluble in water.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

6 Zinc sulfate is a soluble salt and can be prepared by reacting excess zinc carbonate with dilute sulfuric acid.

Which piece of equipment would **not** be required in the preparation of zinc sulfate crystals?

A beaker

B condenser

C evaporating dish

D filter funnel

7 Four steps to prepare a salt from an excess of a solid base and an acid are listed.

1 crystallisation

2 evaporation

3 filtration

4 neutralisation

In which order are the steps carried out?

A **2** →

B **3** →

C **4** →

D **4** →

8 Which method is used to make the salt copper sulfate?

A dilute acid + alkali

B dilute acid + carbonate

C dilute acid + metal

D dilute acid + non-metal oxide

9 Which of the following methods are suitable for preparing both zinc sulfate and copper sulfate?

1 Reacting the metal oxide with warm dilute aqueous sulfuric acid.

2 Reacting the metal with dilute aqueous sulfuric acid.

3 Reacting the metal carbonate with dilute aqueous sulfuric acid.

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D **1**, 2

10 Which two processes are involved in the preparation of magnesium sulfate from dilute sulfuric acid and an excess of magnesium oxide?

A neutralisation and filtration

B neutralisation and oxidation

C thermal decomposition and filtration

D thermal decomposition and oxidation

11 How many different salts could be made from a supply of dilute sulfuric acid, dilute hydrochloric acid, copper, magnesium oxide and zinc carbonate?

A 3 **B** 4 **C** 5 **D** 6

12 Which salt preparation uses a burette and a pipette?

A calcium nitrate from calcium carbonate and nitric acid

B copper(II) sulfate from copper(II) hydroxide and sulfuric acid

C potassium chloride from potassium hydroxide and hydrochloric acid

D zinc chloride from zinc and hydrochloric acid

13 Which acid reacts with ammonia to produce the salt ammonium sulfate?

A hydrochloric

B nitric

C phosphoric

D sulfuric

14 Copper carbonate reacts with dilute sulfuric acid to make copper sulfate.

$$CuCO_3(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + CO_2(g) + H_2O(l)$$

Which row gives the correct order of steps for making copper sulfate crystals?

	step 1	step 2	step 3	step 4
A	add excess acid to the copper carbonate	filter	evaporate filtrate to point of crystallisation	leave to cool
B	add excess acid to the copper carbonate	filter	evaporate to dryness	leave to cool
C	add excess copper carbonate to the acid	evaporate to point of crystallisation	leave to cool	filter
D	add excess copper carbonate to the acid	filter	evaporate filtrate to point of crystallisation	leave to cool

15 Which acid reacts with ammonia to produce the salt ammonium sulfate?

A hydrochloric

B nitric

C phosphoric

D sulfuric

16 Anhydrous copper(II) sulfate can be made by heating hydrated copper(II) sulfate.

$$CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$$

What can be added to anhydrous copper(II) sulfate to turn it into hydrated copper(II) sulfate?

A concentrated sulfuric acid

B sodium hydroxide powder

C sulfur dioxide

D water

17 A compound is a salt if it

A can neutralise an acid.

B contains more than one element.

C dissolves in water.

D is formed when an acid reacts with a base.

18 Salts X and Y are separately dissolved in water.

Samples of the solutions obtained are separately tested with dilute hydrochloric acid and with aqueous sodium hydroxide.

In two of the tests, a gaseous product is formed. No precipitate is formed in any of the tests.

What are salts X and Y?

	X	Y
A	$AgNO_3$	$BaSO_4$
B	$BaSO_4$	Na_2CO_3
C	Na_2CO_3	NH_4Cl
D	NH_4Cl	$AgNO_3$

19 A liquid turns white anhydrous copper sulfate blue and has a boiling point of 103°C.

Which could be the identity of the liquid?

A alcohol

B petrol

C salt solution

D pure water

20 A salt is made by adding an excess of an insoluble metal oxide to an acid.

How can the excess metal oxide be removed?

A chromatography

B crystallisation

C distillation

D filtration

21 An excess of copper(II) oxide is added to dilute sulfuric acid to make crystals of hydrated copper(II) sulfate.

The processes listed may be used to obtain crystals of hydrated copper(II) sulfate.

1 concentrate the resulting solution

2 filter

3 heat the crystals

4 wash the crystals

Which processes are needed and in which order?

A 1, 2

B 1, 2

C 2, 1

D 2, 1

22 Salts can be prepared by reacting a dilute acid

1 with a metal;

2 with a base;

3 with a carbonate.

Which methods could be used to prepare copper(II) chloride?

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2