Preparation of salts

Question Paper 1

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Acids, bases and salts
Sub-Topic	Preparation of salts
Booklet	Question Paper 1

Time Allowed: **39 minutes**

Score: **/32**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

1. 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 and 3

2. 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

3. 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, 3 and 4

    B 1, 2, 4 and 3

    C 2, 1, 2 and 3

    D 2, 1, 2 and 4

4. 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

5. 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.

6. 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	$AgNO_3$

7. 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

8. 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

9. 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

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

A hydrochloric

B nitric

C phosphoric

D sulfuric

11 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

12. 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 $4 \rightarrow 2 \rightarrow 1 \rightarrow 3$

13. 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

14. 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

15. 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 $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$

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

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

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

16. 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

17. 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 and 3

18. 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

19. 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

20. 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

21. 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

22. Which substance reacts with dilute sulfuric acid to form a salt that can be removed from the resulting mixture by filtration?

A aqueous barium chloride

B aqueous sodium hydroxide

C copper

D copper(II) carbonate

23. Silver chloride is insoluble in water and is prepared by precipitation.

Which two substances can be used to make silver chloride?

A barium chloride and silver nitrate

B hydrochloric acid and silver

C hydrochloric acid and silver bromide

D sodium chloride and silver iodide

24. Barium sulfate is an insoluble salt.

It can be made by reacting copper(II) sulfate solution with barium nitrate solution.

$$CuSO_4(aq) + Ba(NO_3)_2(aq) \rightarrow Cu(NO_3)_2(aq) + BaSO_4(s)$$

What is the correct order of steps to obtain a pure, dry sample of barium sulfate from the reaction mixture?

	step 1	step 2	step 3
A	filter	evaporate the filtrate to dryness	leave the solid formed to cool
B	filter	evaporate the filtrate to the point of crystallisation	leave the filtrate to cool
C	filter	leave the residue in a warm place to dry	wash the residue with water
D	filter	wash the residue with water	leave the residue in a warm place to dry

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

How is the excess metal oxide removed from the mixture?

A chromatography

B crystallisation

C distillation

D filtration

26. Zinc sulfate is made by reacting an excess of zinc oxide with dilute sulfuric acid.

The excess zinc oxide is then removed from the solution.

Which process is used to obtain solid zinc sulfate from the solution?

A crystallisation

B dissolving

C filtration

D fractional distillation

27. Copper(II) sulfate can be prepared by adding excess copper(II) carbonate to sulfuric acid.

Why is an **excess** of copper(II) carbonate added?

A to ensure all the copper(II) carbonate has reacted

B to ensure all the sulfuric acid has reacted

C to increase the rate of reaction

D to increase the yield of copper(II) sulfate

28. Three solids, P, Q and R, all react with dilute sulfuric acid to produce zinc sulfate.

P and R produce gases during the reaction.

The gas produced when P reacts will not burn. The gas produced when R reacts will burn.

What are P, Q and R?

	P	Q	R
A	zinc	zinc hydroxide	zinc carbonate
B	zinc carbonate	zinc	zinc oxide
C	zinc carbonate	zinc hydroxide	zinc
D	zinc oxide	zinc carbonate	zinc

29. 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

30. A pure sample of the insoluble salt barium carbonate can be made using the method given.

step 1 Dissolve barium chloride in water.

step 2 Separately dissolve sodium carbonate in water.

step 3 Mix the two solutions together.

step 4 Filter the mixture.

step 5

step 6 Dry the residue between two sheets of filter paper.

Which instruction is missing from step 5?

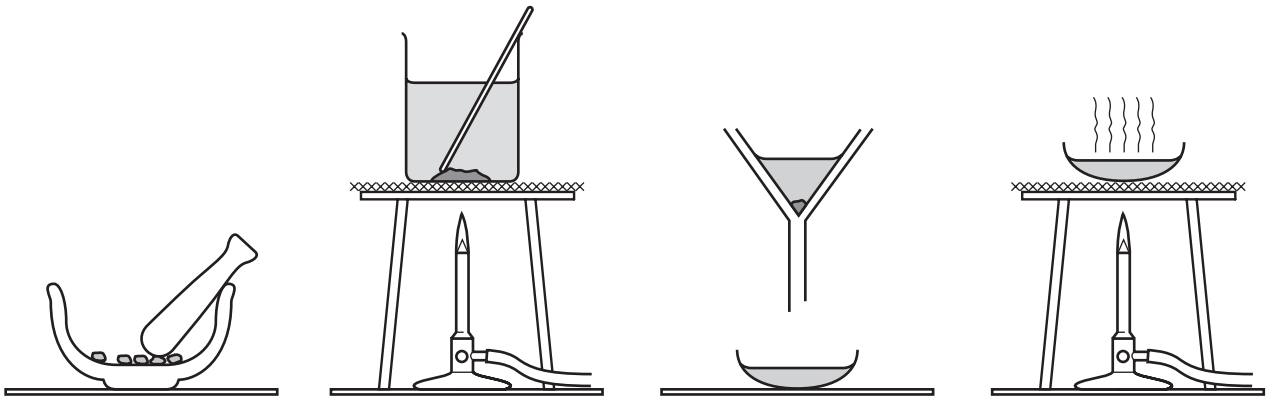
A Heat the residue to dryness.

B Heat the residue to the point of crystallisation.

C Place the filtrate in an evaporating basin.

D Wash the residue with water.

31. The diagram shows the steps in the preparation of a salt.



step 1 step 2 step 3 step 4

Which salt is prepared by this method?

A barium sulfate

B copper(II) sulfate

C potassium sulfate

D sodium sulfate

32. Pure copper(II) sulfate crystals can be made by adding copper(II) oxide to hot dilute sulfuric acid.

The copper(II) oxide is added until it .....1..... .

The solution is .....2..... and then .....3..... to obtain the pure crystals.

Which words complete gaps 1, 2 and 3?

	1		
A	is in excess	cooled	filtered
B	is in excess	filtered	cooled
C	changes colour	cooled	filtered
D	changes colour	filtered	cooled