8.3 Preparation of salts

01. 0620_s21_qp_21 Q: 19

Copper(II) sulfate is prepared by adding excess copper(II) oxide to warm dilute sulfuric acid.

Which purification methods are used to obtain pure solid copper(II) sulfate from the reaction mixture?

1 crystallisation

2 filtration

3 chromatography

4 distillation

A 1 and 4 **B** 1 and 2 **C** 2 and 3 **D** 3 and 4

02. 0620_s21_qp_22 Q: 19

Information about the solubility of salts is shown.

salt	solubility
chlorides	soluble (except for lead(II) chloride and silver chloride)
nitrates	soluble
sulfates	soluble (except for barium sulfate and lead(II) sulfate)

Aqueous solutions of which two compounds would produce a precipitate when added together?

A $Ba(NO_3)_2$ and $CaCl_2$

B $CuSO_4$ and $Zn(NO_3)_2$

C KCl and Na_2SO_4

D $Pb(NO_3)_2$ and $MgSO_4$

03. 0620_s21_qp_23 Q: 19

Aqueous solutions of sodium sulfate and barium chloride are mixed.

$$Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$$

Which process is used to separate a sample of barium sulfate from the reaction mixture?

A precipitation

B filtration

C evaporation

D distillation

---

04. 0620_w21_qp_21 Q: 19

Copper(II) chloride crystals are made by adding solid copper(II) carbonate to dilute hydrochloric acid until no more dissolves.

Which process is used to obtain pure copper(II) chloride crystals from the mixture?

A distillation of the mixture

B evaporation of the mixture

C filtration followed by drying of the residue

D filtration followed by evaporation of the filtrate

---

05. 0620_m20_qp_22 Q: 20

The following substances can be reacted together to prepare salts.

1 copper(II) oxide and excess hydrochloric acid

2 hydrochloric acid and excess sodium hydroxide

3 hydrochloric acid and excess zinc carbonate

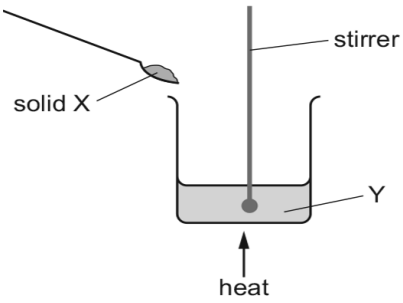
In which reactions can the excess reactant be separated from the solution by filtration?

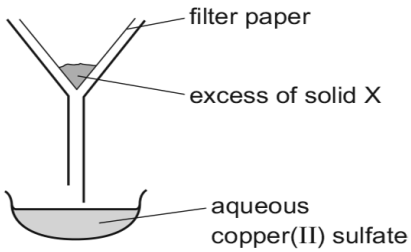
A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

---

06. 0620_s20_qp_21 Q: 20

The apparatus shown is used to prepare aqueous copper(II) sulfate.





What are X and Y?

	X	Y
A	copper	aqueous iron(II) sulfate
B	copper(II) chloride	dilute sulfuric acid
C	copper(II) oxide	dilute sulfuric acid
D	sulfur	aqueous copper(II) chloride

---

07. 0620_s20_qp_21 Q: 21

Lead(II) sulfate is an insoluble salt.

Which method is suitable for obtaining solid lead(II) sulfate?

A Mix aqueous lead(II) nitrate and aqueous potassium sulfate, heat to evaporate all of the water, collect the solid and then wash and dry it.

B Mix aqueous lead(II) nitrate and aqueous potassium sulfate, filter, collect the filtrate, crystallise, then wash and dry the crystals.

C Mix aqueous lead(II) nitrate and dilute sulfuric acid, filter, then wash and dry the residue.

D Titrate aqueous lead(II) hydroxide with dilute sulfuric acid, crystallise, then wash and dry the crystals.

---

08. 0620_s20_qp_22 Q: 21

Which process is **not** used in the preparation of an insoluble salt?

A filtration

B washing

C crystallisation

D drying

---

09. 0620_s20_qp_23 Q: 21

Which two compounds would react together to form the insoluble salt lead(II) chloride?

	compound	solubility in water
1	lead(II) nitrate	yes
2	lead(II) sulfate	no
3	silver chloride	no
4	sodium chloride	yes

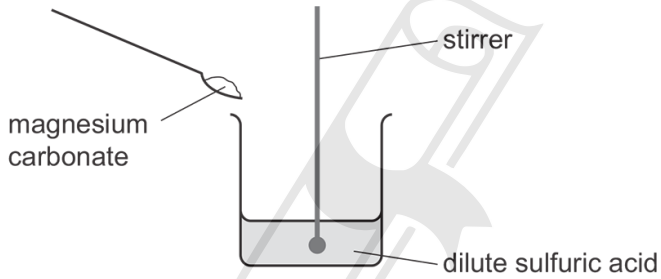
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

---

10. 0620_w20_qp_21 Q: 24

A student carries out an experiment to prepare pure magnesium sulfate crystals.

The diagram shows the first stage of the preparation.



He adds magnesium carbonate until no more reacts.

Which process should he use for the next stage?

A crystallisation

B evaporation

C filtration

D neutralisation

---

11. 0620_w20_qp_22 Q: 22

The equations for three reactions are shown.

1 $Pb(NO_3)_2(aq) + 2KI(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$

2 $2AgNO_3(aq) + CuI_2(aq) \rightarrow Cu(NO_3)_2(aq) + 2AgI(s)$

3 $CuO(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + H_2O(l)$

Which reactions are suitable for making a salt by precipitation?

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

---

12. 0620_m19_qp_22 Q: 23

Four stages used to prepare an insoluble salt are listed.

1 drying

2 filtration

3 precipitation

4 washing

In which order are the stages done?

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

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

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

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

---

13. 0620_w19_qp_21 Q: 21

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 the excess of copper(II) oxide
C	to speed up the reaction	to obtain solid copper(II) sulfate
D	to speed up the reaction	to remove the excess of copper(II) oxide

---

14. 0620_w19_qp_21 Q: 22

Lead(II) sulfate is an insoluble salt.

Which process is **not** used to prepare a pure sample of this salt?

A crystallisation

B drying

C filtration

D precipitation

---

15. 0620_w19_qp_22 Q: 22

Lead(II) sulfate is an insoluble salt.

Which reaction produces a mixture from which lead(II) sulfate is obtained by filtration?

A adding solid lead(II) carbonate to dilute sulfuric acid

B adding solid lead(II) hydroxide to dilute sulfuric acid

C adding metallic lead to dilute sulfuric acid

D adding aqueous lead(II) nitrate to dilute sulfuric acid

---

16. 0620_w19_qp_23 Q: 22

Lead(II) iodide is formed as a precipitate in the reaction shown.

$$Pb(NO_3)_2(aq) + 2NaI(aq) \rightarrow PbI_2(s) + 2NaNO_3(aq)$$

Which method is used to separate the lead(II) iodide from the mixture?

A crystallisation

B distillation

C evaporation

D filtration

---

17. 0620_m18_qp_22 Q: 20

Which method is used to make the salt copper(II) sulfate?

A dilute acid + alkali

B dilute acid + carbonate

C dilute acid + metal

D dilute acid + non-metal oxide

---

18. 0620_s18_qp_21 Q: 19

A student mixes silver nitrate and barium chloride to form a white precipitate of silver chloride.

The equation is shown.

$$2AgNO_3 + BaCl_2 \rightarrow 2AgCl + Ba(NO_3)_2$$

Which row describes the solubility of the salts?

	soluble	insoluble
A	silver nitrate	barium chloride, barium nitrate and silver chloride
B	silver nitrate and barium chloride	barium nitrate and silver chloride
C	silver nitrate, barium chloride and barium nitrate	silver chloride
D	silver nitrate, barium chloride and silver chloride	barium nitrate

---

19. 0620_s18_qp_21 Q: 20

Which methods are suitable for preparing **both** zinc sulfate and copper(II) 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, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

20. 0620_s18_qp_22 Q: 19

The solubility of some salts is shown.

	chloride	nitrate	sulfate	carbonate
barium	soluble	soluble	insoluble	insoluble
lead(II)	insoluble	soluble	insoluble	insoluble
potassium	soluble	soluble	soluble	soluble
zinc	soluble	soluble	soluble	insoluble

Which two aqueous solutions produce an insoluble salt when mixed together?

A barium chloride and zinc nitrate

B barium nitrate and lead(II) nitrate

C lead(II) nitrate and potassium carbonate

D potassium nitrate and zinc sulfate

---

21. 0620_s18_qp_23 Q: 19

An excess of aqueous sodium sulfate was added to aqueous barium chloride and the mixture was filtered.

Which row shows the identity of the residue and the substances present in the filtrate?

	residue	substances in filtrate
A	barium sulfate	barium chloride and sodium chloride
B	barium sulfate	sodium chloride and sodium sulfate
C	sodium chloride	barium chloride and sodium sulfate
D	sodium chloride	barium sulfate and sodium sulfate

---

22. 0620_w18_qp_21 Q: 20

Some general rules for the solubility of salts in water are listed.

- Carbonates are insoluble (except ammonium carbonate, potassium carbonate and sodium carbonate).
- Chlorides are soluble (except lead(II) chloride and silver chloride).
- Nitrates are soluble.
- Sulfates are soluble (except barium sulfate, calcium sulfate and lead(II) sulfate).

Which substances produce an insoluble salt when aqueous solutions of them are mixed?

A barium chloride and magnesium nitrate

B calcium chloride and ammonium nitrate

C silver nitrate and zinc chloride

D sodium carbonate and potassium sulfate

---

23. 0620_w18_qp_23 Q: 18

A white precipitate is produced when small amounts of two colourless solutions are mixed together.

Which pairs of solutions produce a white precipitate?

1 sodium hydroxide and zinc nitrate

2 sodium hydroxide and aluminium chloride

3 barium chloride and sulfuric acid

4 acidified barium nitrate and potassium sulfate

A 1, 2, 3 and 4

B 1, 2 and 4 only

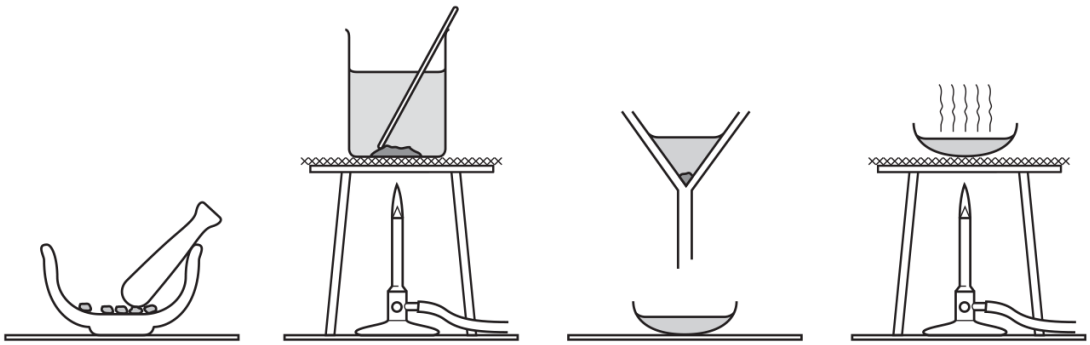
C 1 and 2 only

D 2 only

---

24. 0620_m17_qp_22 Q: 21

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

---

25. 0620_s17_qp_21 Q: 20

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.

---

26. 0620_s17_qp_22 Q: 20

Silver chloride is a white solid which is insoluble in water.

Which statement describes how a sample of pure silver chloride can be made?

A Add aqueous silver nitrate to aqueous sodium chloride and then filter.

B Add aqueous silver nitrate to dilute hydrochloric acid, evaporate and then crystallise.

C Add silver carbonate to dilute hydrochloric acid, evaporate and then crystallise.

D Add silver to dilute hydrochloric acid, filter and then wash the residue.

---

27. 0620_s17_qp_23 Q: 20

Silver nitrate reacts with sodium chloride to produce silver chloride and sodium nitrate. The equation for the reaction is shown.

$$AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$$

How is silver chloride separated from the reaction mixture?

A crystallisation

B distillation

C evaporation

D filtration

---

28. 0620_w17_qp_21 Q: 19

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

---

29. 0620_w17_qp_22 Q: 19

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

---

30. 0620_m16_qp_22 Q: 20

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

---

31. 0620_s16_qp_21 Q: 20

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

---

32. 0620_s16_qp_22 Q: 20

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

---

33. 0620_s16_qp_23 Q: 20

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

---

34. 0620_w16_qp_21 Q: 20

The apparatus shown is used to prepare aqueous copper(II) sulfate.

What are X and Y?

	X	Y
A	copper	aqueous iron(II) sulfate
B	copper(II) chloride	sulfuric acid
C	copper(II) oxide	sulfuric acid
D	sulfur	aqueous copper(II) chloride

SN	Paper	Q. No.	Answer
01	0620_s21_qp_21	19	B
02	0620_s21_qp_22	19	D
03	0620_s21_qp_23	19	B
04	0620_w21_qp_21	19	D
05	0620_m20_qp_22	20	D
06	0620_s20_qp_21	20	C
07	0620_s20_qp_21	21	C
08	0620_s20_qp_22	21	C
09	0620_s20_qp_23	21	B
10	0620_w20_qp_21	24	C
11	0620_w20_qp_22	22	A
12	0620_m19_qp_22	23	B
13	0620_w19_qp_21	21	B
14	0620_w19_qp_21	22	A
15	0620_w19_qp_22	22	D
16	0620_w19_qp_23	22	D
17	0620_m18_qp_22	20	B
18	0620_s18_qp_21	19	C
19	0620_s18_qp_21	20	C
20	0620_s18_qp_22	19	C
21	0620_s18_qp_23	19	B
22	0620_w18_qp_21	20	C
23	0620_w18_qp_23	18	A
24	0620_m17_qp_22	21	B
25	0620_s17_qp_21	20	D
26	0620_s17_qp_22	20	A
27	0620_s17_qp_23	20	D
28	0620_w17_qp_21	19	A
29	0620_w17_qp_22	19	B
30	0620_m16_qp_22	20	D
31	0620_s16_qp_21	20	A
32	0620_s16_qp_22	20	A
33	0620_s16_qp_23	20	D
34	0620_w16_qp_21	20	C