

Methods of purification

Question Paper 1

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Experimental techniques
Sub-Topic	Methods of purification
Booklet	Question Paper 1

Time Allowed: 33 minutes

Score: /27

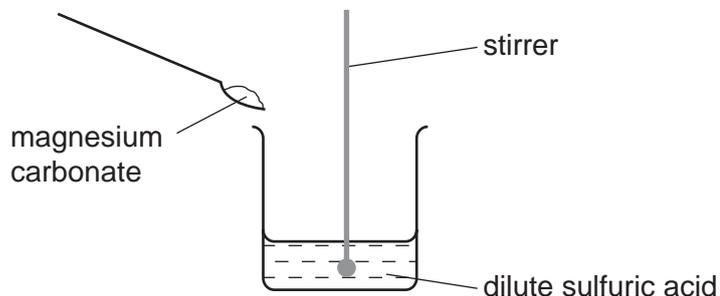
Percentage: /100

Grade Boundaries:

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

- 1 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
- 2 A student separates salt from a mixture of salt and sand.

What is the correct order of steps for the student to take?

- A filter → evaporate → shake with water
 - B filter → shake with water → evaporate
 - C shake with water → evaporate → filter
 - D shake with water → filter → evaporate
- 3 A mixture of ethanol and methanol are separated by fractional distillation.
- This method of separation depends on a difference in property X of these two alcohols.
- What is property X?
- A boiling point
 - B colour
 - C melting point
 - D solubility

- 4 A fruit drink coloured orange contains a dissolved mixture of red and yellow colouring agents. One of these colouring agents is suspected of being illegal.

Which method could be used to show the presence of this illegal colouring agent?

- A chromatography
- B distillation
- C evaporation
- D filtration

- 5 Mixture 1 contains sand and water.

Mixture 2 contains salt and water.

Which method of separation could be used to obtain each of the required products from each mixture?

	mixture 1		mixture 2	
	to obtain sand	to obtain water	to obtain salt	to obtain water
A	crystallisation	distillation	filtration	filtration
B	crystallisation	filtration	filtration	distillation
C	filtration	distillation	crystallisation	filtration
D	filtration	filtration	crystallisation	distillation

6 The table gives the solubility of four substances in ethanol and in water.

A mixture containing all four substances is added to ethanol, stirred and filtered.

The solid residue is added to water, stirred and filtered.

The filtrate is evaporated to dryness, leaving a white solid.

Which is the white solid?

	solubility in	
	ethanol	water
A	insoluble	insoluble
B	insoluble	soluble
C	soluble	insoluble
D	soluble	soluble

7 A mixture of sulfur and iron filings needs to be separated. The solubilities of sulfur and iron filings in water and carbon disulfide are shown in the table below.

	solubility in water	solubility in carbon disulfide
sulfur	x	✓
iron filings	x	x

What are possible methods of separating the sulfur and iron filings?

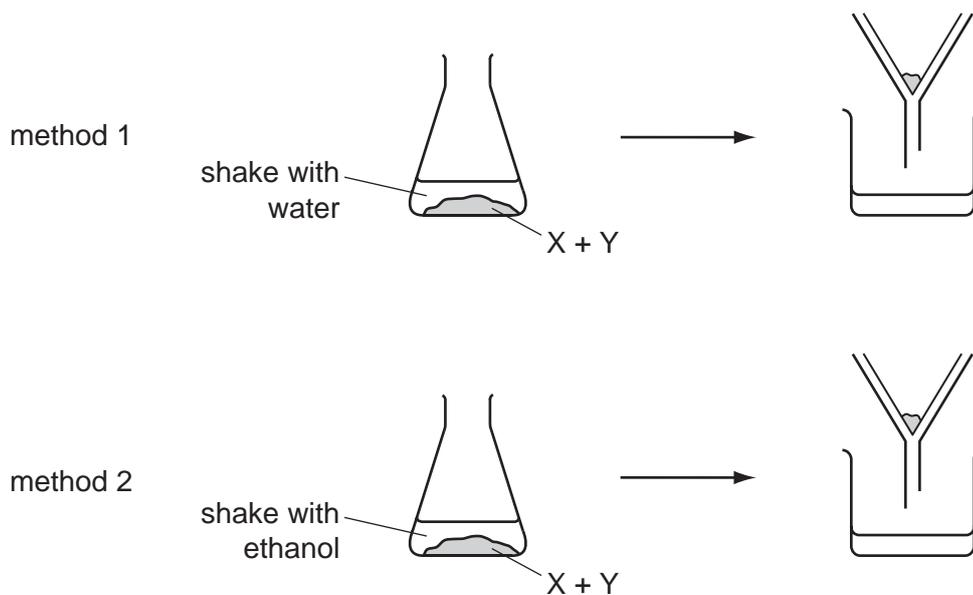
	using water	using carbon disulfide	using a magnet
A	✓	✓	x
B	x	✓	✓
C	✓	x	✓
D	x	✓	x

8 Which method is most suitable to obtain zinc carbonate from a suspension of zinc carbonate in water?

- A crystallisation
- B distillation
- C evaporation
- D filtration

9 A solid mixture contains an ionic salt, X, and a covalent organic compound, Y.

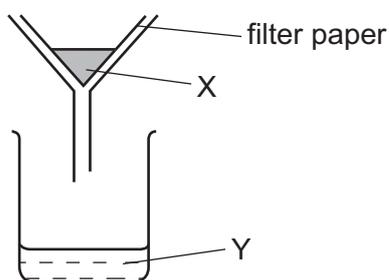
Two students suggest methods of separating the mixture as shown.



Which methods of separation are likely to work?

	1	2
A	✓	✓
B	✓	x
C	x	✓
D	x	x

10 The diagram shows a method for separating a substance that contains X and Y.

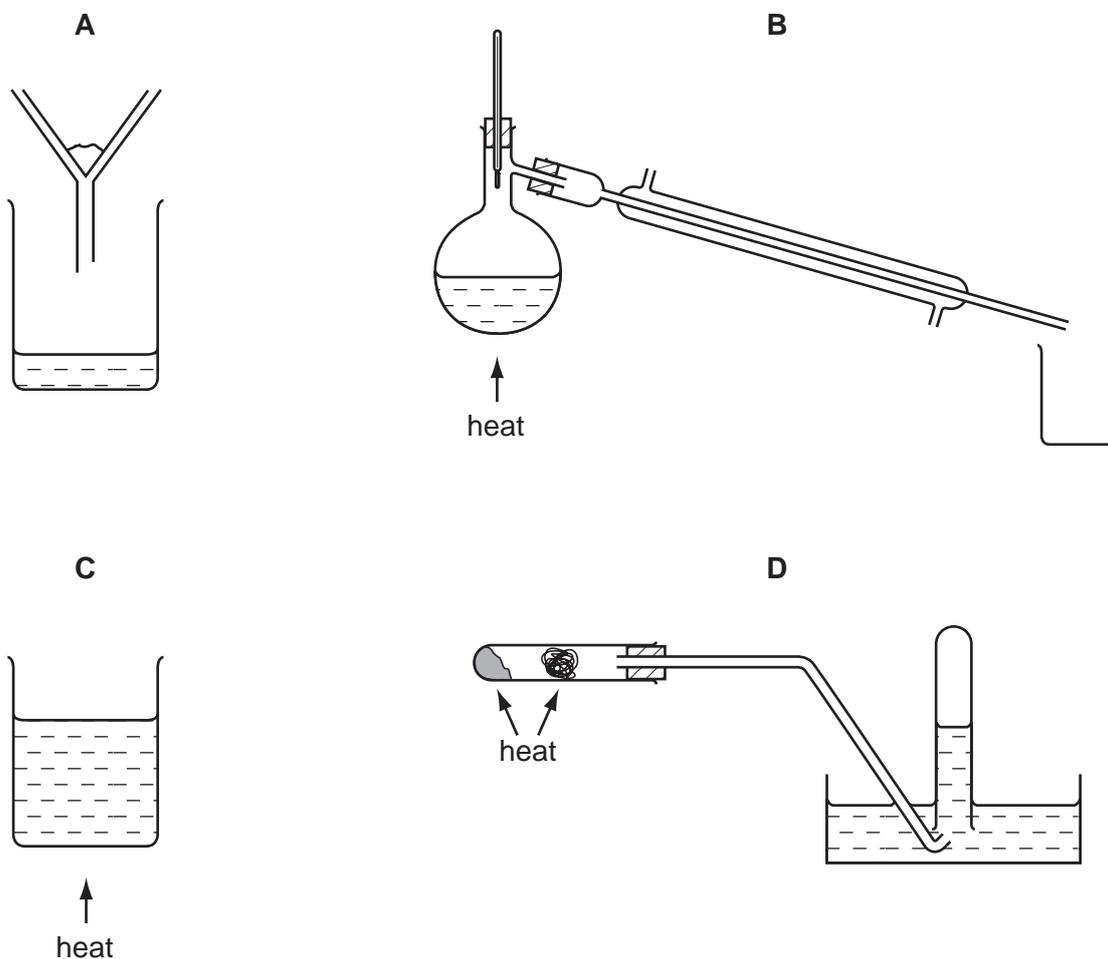


Which types of substance can be separated as shown?

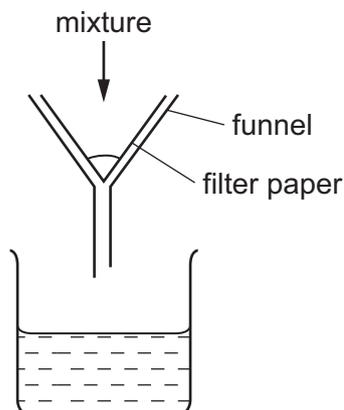
- A compounds
- B elements
- C mixtures
- D molecules

11 Methanol, CH_3OH , and ethanol, $\text{C}_2\text{H}_5\text{OH}$, are miscible liquids.

Which diagram shows apparatus that is used to obtain methanol from a mixture of ethanol and methanol?



- 12 A mixture is separated using the apparatus shown.



What is the mixture?

- A aqueous copper chloride and copper
 - B aqueous copper chloride and sodium chloride
 - C ethane and methane
 - D ethanol and water
- 13 Ethanol is made by fermentation.
- How is ethanol obtained from the fermentation mixture?
- A chromatography
 - B crystallisation
 - C electrolysis
 - D fractional distillation
- 14 Alcohol and water are completely miscible. This means when mixed together they form only one liquid layer.
- Which method is used to separate alcohol from water?
- A crystallisation
 - B filtration
 - C fractional distillation
 - D precipitation

15 Which two methods can be used to separate a salt from its solution in water?

- 1 crystallisation
- 2 decanting
- 3 distillation
- 4 filtration

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

16 The results of some tests on a colourless liquid X are shown.

- Boiling point = 102 °C
- Universal Indicator turns green

What is X?

- A** ethanol
- B** hydrochloric acid
- C** pure water
- D** sodium chloride (salt) solution

17 A blue solid, X, is soluble in water.

Which method is used to obtain pure solid X from an aqueous solution?

- A** chromatography
- B** crystallisation
- C** filtration
- D** neutralisation

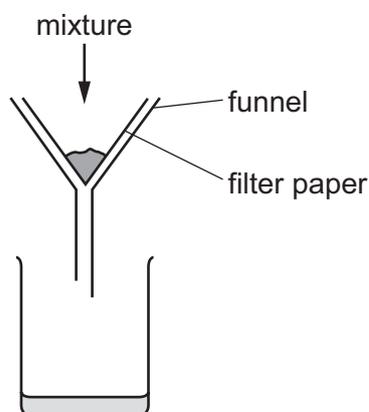
18 Which method separates a mixture of sugar and glass?

- A** dissolve, filter and evaporate
- B** distil and filter
- C** fractionally distil
- D** use chromatography

19 Which method can be used to separate a mixture of salt and water to obtain **both** parts of the mixture?

- A crystallisation
- B distillation
- C evaporation
- D filtration

20 The apparatus used to separate a mixture is shown.



What is the mixture?

- A aqueous calcium chloride and aqueous calcium nitrate
 - B calcium carbonate and aqueous calcium chloride
 - C ethanol and water
 - D sand and calcium carbonate
- 21 Which method is used to obtain copper(II) sulfate crystals from an aqueous solution of copper(II) sulfate?
- A chromatography
 - B condensation
 - C evaporation
 - D filtration

22 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 it1..... .

The solution is2..... and then3..... to obtain the pure crystals.

Which words complete gaps 1, 2 and 3?

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

23 The table shows the solubility of four substances, W, X, Y and Z, in ethanol and in water.

substance	solubility in ethanol	solubility in water
W	insolubl	insoluble
X	insolubl	soluble
Y	solubl	insoluble
Z	solubl	soluble

Two methods of separation are given.

- method 1: add the substance to ethanol and then filter
- method 2: add the substance to water and then filter

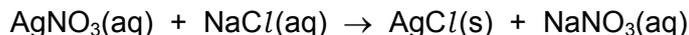
Which substances can be separated from each other by both method 1 and method 2?

A W and X **B** X and Y **C** X and Z **D** Y and Z

24 Which method is used to obtain a concentrated solution of ethanol from a dilute solution of ethanol dissolved in water?

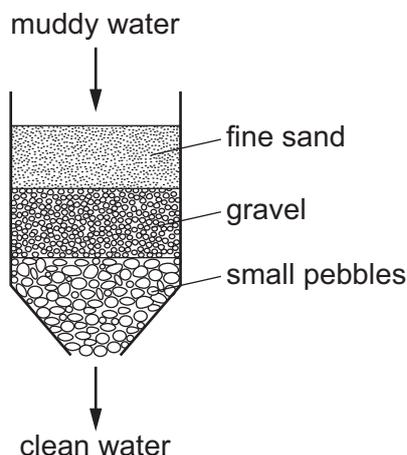
- A** crystallisation
- B** distillation
- C** filtration
- D** paper chromatography

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



How is silver chloride separated from the reaction mixture?

- A crystallisation
 - B distillation
 - C evaporation
 - D filtration
- 26 The diagram shows how muddy water can be purified.



Which process for purifying the muddy water is shown?

- A crystallisation
 - B distillation
 - C filtration
 - D solvent extraction
- 27 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