

GCSE Combined Science: Trilogy

Worksheet: Mixtures

TIME 30 min	TOTAL 28 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Mixtures

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Apparatus used to separate mixtures includes filter paper, evaporating basins, condensers and fractionating columns.

0 1 . 1 Which piece of apparatus cools a vapour so that it condenses back into a liquid?

Tick (✓) **one** box.

Condenser

☐

Evaporating basin

☐

Filter funnel

☐

Fractionating column

☐

[1 mark]

0 1 . 2 Which piece of apparatus holds the residue during filtration?

Tick (✓) **one** box.

Condenser

☐

Filter paper in a funnel

☐

Measuring cylinder

☐

Test tube

☐

[1 mark]

0 1 . 3

Suggest a mixture from which a solid could be obtained by heating the mixture in an evaporating basin.

.....

.....

[1 mark]

0 1 . 4

Name the separation method that uses a condenser but not a fractionating column.

.....

.....

.....

[1 mark]

0 2

This question is about mixtures and how they are separated.

0 2 . 1

Which method would separate sand from a mixture of sand and water?

Tick (✓) **one** box.

Chromatography

☐

Crystallisation

☐

Filtration

☐

Fractional distillation

☐

[1 mark]

0 2 . 2

Which method would separate the different coloured dyes in a sample of ink?

Tick (✓) **one** box.

Chromatography

☐

Crystallisation

☐

Filtration

☐

Fractional distillation

☐

[1 mark]

0 2 . 3

What is a mixture?

.....

.....

.....

.....

[2 marks]

0 2 . 4

Separating a mixture does not make any new substances.
What type of process is used to separate a mixture?

.....

.....

.....

.....

[1 mark]

.....

0 3

Table 1 gives information about four mixtures, **W**, **X**, **Y** and **Z**.

Table 1

Mixture	Information
W	Sodium chloride dissolved in water. Only the water is needed.
X	Hexane (boiling point 69 °C) and heptane (boiling point 98 °C). The two liquids mix completely.
Y	Insoluble zinc carbonate powder in zinc sulfate solution. Only the solution is needed.
Z	Hydrated copper(II) sulfate dissolved in water. Crystals are needed. The crystals lose water if they are heated strongly.

0 3 . 1

Name the best method to obtain the water from mixture **W**.

.....

.....

.....

.....
[1 mark]

0 3 . 2

Name the best method to separate mixture **X**.
Explain why this method is needed.

.....

.....

.....

.....

[2 marks]

0 3 . 3

Explain how filtration separates the zinc carbonate from the solution in mixture **Y**.

[2 marks]

0 3 . 4

Explain why the solution in mixture **Z** should be crystallised rather than heated until all of the water has evaporated.

[1 mark]

0 4

A student used fractional distillation to separate a mixture of three liquids. The liquids mix together completely.

Table 2 shows the boiling points of the three liquids.

Table 2

Liquid	Boiling point in °C
Methanol	65
Propan-1-ol	97
Butan-1-ol	118

0 4 . 1

Explain why the liquids can be separated by fractional distillation.

[1 mark]

0 4 . 2

Which liquid is collected first?
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 4 . 3

Suggest the reading on the thermometer at the top of the fractionating column while the second liquid is being collected.

.....

.....

.....

Temperature = °C

[1 mark]

0 4 . 4

Explain why fractional distillation separates these liquids better than simple distillation.

.....

.....

.....

.....

[2 marks]

0 4 . 5

The student heated the flask with an electric heater, not a Bunsen burner. Suggest why.

.....

.....

[1 mark]

.....

0 5

A student heated blue copper(II) sulfate solution in a flask. The flask was connected to a water-cooled condenser. A thermometer was placed at the top of the flask, level with the side arm that led to the condenser. A liquid was collected in a beaker at the end of the condenser.

0 5 . 1

Name this separation technique.

.....

.....

.....

.....

[1 mark]

0 5 . 2

Describe what happens to the water in the flask and in the condenser.

.....

.....

.....

.....

[2 marks]

0 5 . 3

The thermometer read 100 °C while the liquid was being collected.
What does this show about the liquid collected?

.....

.....

[1 mark]

0 5 . 4

What colour is the liquid collected in the beaker?
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Mixtures · 28 marks

Question 1 (4 marks)

01.1 [1 mark]

Correct: Condenser

01.2 [1 mark]

Correct: Filter paper in a funnel

01.3 [1 mark]

Answer: e.g. salt solution (salt dissolved in water)

- a solution of a soluble solid, e.g. salt / sodium chloride solution, copper sulfate solution (1)
-

01.4 [1 mark]

Answer: simple distillation

- (simple) distillation (1)
-

Question 2 (5 marks)

02.1 [1 mark]

Correct: Filtration

02.2 [1 mark]

Correct: Chromatography

02.3 [2 marks]

Answer: Two or more elements or compounds that are not chemically combined.

- two or more elements or compounds / substances (1)
- not chemically combined (together) (1)

Notes: Allow 'not chemically bonded'.

02.4 [1 mark]

Answer: a physical process

- physical (process) (1)
-

Question 3 (6 marks)

03.1 [1 mark]

Answer: simple distillation

- (simple) distillation (1)

03.2 [2 marks]

Answer: Fractional distillation; the boiling points are quite close, so without a fractionating column both liquids would evaporate and be collected together.

- fractional distillation (1)
- the boiling points are close together, so both liquids would evaporate and be collected together without a fractionating column (1)

Notes: The explanation mark depends on fractional distillation.

03.3 [2 marks]

Answer: The zinc carbonate particles are too large to pass through the filter paper and stay as the residue; the solution passes through as the filtrate.

- zinc carbonate particles are too large to pass through the filter paper / are trapped as the residue (1)
- the solution / water and dissolved particles pass through (as the filtrate) (1)

03.4 [1 mark]

Answer: Heating to dryness would make the crystals lose their water, so hydrated crystals would not form.

- heating strongly / to dryness would make the crystals lose water (so hydrated crystals would not be obtained) (1)

Notes: Allow 'the crystals would become anhydrous / turn to powder'.

Question 4 (7 marks)

04.1 [1 mark]

Answer: They have different boiling points.

- (the liquids have) different boiling points (1)

04.2 [2 marks]

Answer: Methanol, because it has the lowest boiling point.

- methanol (1)
- lowest boiling point (1)

Notes: The reason mark depends on methanol being chosen.

04.3 [1 mark]

Answer: 97 °C

- 97 (°C) (1)

04.4 [2 marks]

Answer: The column is hottest at the bottom and coolest at the top, so liquids with higher boiling points condense and run back, and only the liquid with the lowest boiling point reaches the top.

- the column is hotter at the bottom and cooler at the top / there is a temperature gradient up the column (1)
- (vapours of) liquids with higher boiling points condense (and return to the flask) so only the liquid with the lowest boiling point reaches the top / the condenser (1)

Notes: Allow 'in simple distillation vapours of more than one liquid would be collected together' for 1 mark.

04.5 [1 mark]

Answer: The liquids are flammable.

- the liquids / vapours are flammable (1)

Notes: Allow 'could catch fire'.

Question 5 (6 marks)

05.1 [1 mark]

Answer: simple distillation

- (simple) distillation (1)

Notes: Do not accept fractional distillation.

05.2 [2 marks]

Answer: The water boils/evaporates in the flask; the water vapour is cooled and condenses in the condenser.

- water evaporates / boils (in the flask) (1)
 - (water vapour / steam) is cooled and condenses (in the condenser) (1)
-

05.3 [1 mark]

Answer: It is (pure) water, because water boils at 100 °C.

- it is (pure) water / 100 °C is the boiling point of water (1)
-

05.4 [2 marks]

Answer: Colourless; the copper(II) sulfate does not evaporate, so it stays in the flask.

- colourless (1)
- copper(II) sulfate does not evaporate / boil (at 100 °C) so it stays in the flask (1)

Notes: Do not accept 'clear' for colourless. The reason mark can be awarded if the colour is wrong only if the reason refers to the copper(II) sulfate staying in the flask.
