

(States of matter (particle model, changes of state))

Q1. (2018)

This question is about mixtures.

Substances are separated from a mixture using different methods.

Draw **one** line from each substance and mixture to the best method of separation.

[3 marks]

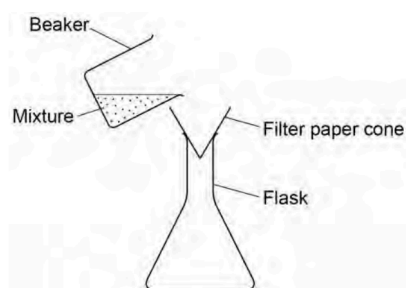
Substance and mixture	Method of separation
Ethanol from ethanol and water	Chromatography
	Crystallisation
Salt from sea water	Electrolysis
	Filtration
The different colours in black ink	Fractional distillation

Q2. (2018)

A student filters a mixture.

Figure 1 shows the apparatus.

Figure 1



Suggest **one** improvement to the apparatus.

[1 mark]

Q3.(2018)

Complete the sentences.

Choose answers from the box.

[2 marks]

condense	evaporate	freeze	melt	solidify
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In simple distillation, the mixture is heated to make the liquid _____.

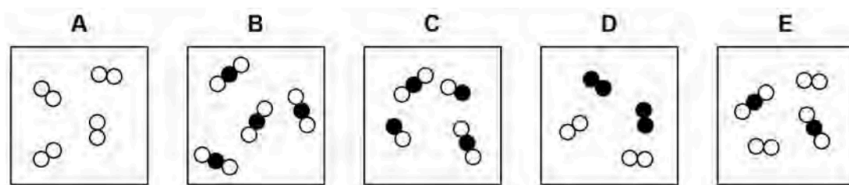
The vapour is then cooled to make it _____.

Q4.a) (2019)

This question is about elements, compounds and mixtures.

Figure 5 shows five different substances, **A**, **B**, **C**, **D** and **E**.

○ and ● represent atoms of different elements.

Figure 5Use **Figure 5** to answer Questions **03.1** to **03.3**

Which substance is only one compound?

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐	E	☐
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Q4.b) (2019)

Which substance is a mixture of elements?

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐	E	☐
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Q4.c) (2019)

Which substance is a mixture of an element and a compound?

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐	E	☐
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Q4.d) (2019)

Substances are separated from a mixture using different methods.

Draw **one** line from each method of separation to the substance and mixture it would separate.

[2 marks]

Method of separation	Substance and mixture
<input type="text" value="chromatography"/>	<input type="text" value="blue food colour from a mixture of food colours"/>
	<input type="text" value="copper from an alloy of copper and zinc"/>
<input type="text" value="crystallisation"/>	<input type="text" value="copper sulfate from copper sulfate solution"/>
	<input type="text" value="ethanol from a mixture of ethanol and water"/>

Q5. (2019)

Sand does not dissolve in water. A student separates a mixture of sand and water by filtration.

Draw a diagram of the apparatus the student could use.

You should label:

- where the sand is collected
- where the water is collected.

[3 marks]

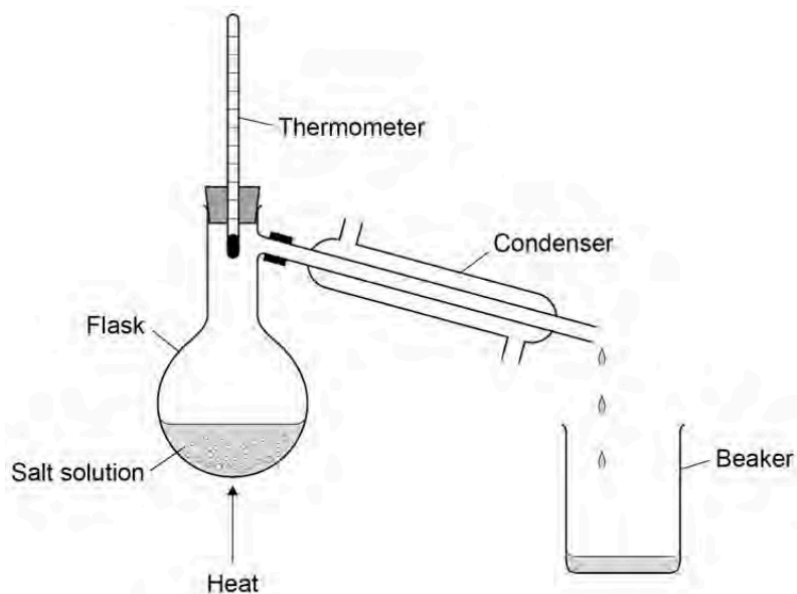
Diagram

Q6.a) (2019)

A student distils a sample of salt solution to produce pure water.

Figure 6 shows the apparatus.

Figure 6



What temperature would you expect the thermometer to show?

[1 mark]

Tick (✓) **one** box.

0 °C

☐

10 °C

☐

50 °C

☐

100 °C

☐

Q6.b) (2019)

Describe how the process of distillation shown in **Figure 6** produces pure water from salt solution.

[4 marks]

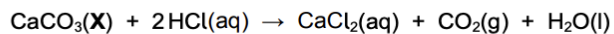
Q7. a)(2019)

A student investigated the reaction between lumps of calcium carbonate and dilute hydrochloric acid.

This is the method used.

1. Pour 100 cm³ of dilute hydrochloric acid into a conical flask.
2. Place the conical flask on a balance.
3. Add 2 g of calcium carbonate lumps to the conical flask.
4. Wait until the calcium carbonate stops reacting.
5. Record the decrease in mass of the conical flask and contents.
6. Repeat steps 1 to 5 three more times.

The equation for the reaction is:



What is the state symbol **X** in the equation?

[1 mark]

Tick (✓) **one** box.

aq ☐ g ☐ l ☐ s ☐

Q7. b)(2019)

Table 2 shows the student's results.

Table 2

	Result 1	Result 2	Result 3	Result 4
Decrease in mass of the conical flask and contents in g	0.84	0.79	0.86	0.47

Why does the mass of the conical flask and contents decrease during the reaction?

[1 mark]

Tick (✓) **one** box.

A gas escapes.

☐

A new solution is made.

☐

The dilute hydrochloric acid is used up.

☐

The calcium carbonate lumps decrease in size.

☐

Q7. c)(2019)

What is the range of the four results in **Table 2**?

[1 mark]

From _____ g to _____ g

Q7. d)(2019)

Calculate the mean decrease in mass of the conical flask and contents.

Do **not** include the anomalous result.

Use **Table 2**.

[2 marks]

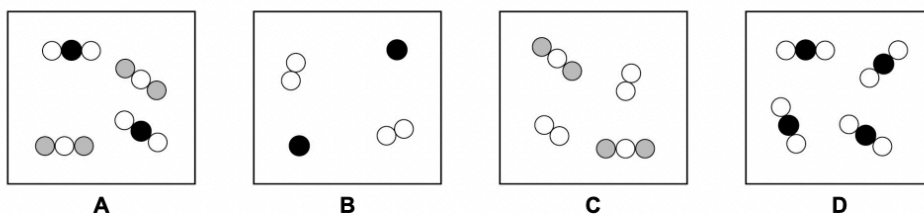
Mean decrease in mass = _____ g

Q8.a) (2022)

The diagrams in **Figure 2** represent different substances.

● ● and ○ represent atoms of three different elements.

Figure 2



Which diagram represents a mixture of compounds?

[1 mark]

A ☐

B ☐

C ☐

D ☐

Q8.b) (2022)

Which diagram represents a mixture of elements?

[1 mark]

A ☐

B ☐

C ☐

D ☐

Q9.(2022)

Substances can be separated from mixtures by using different methods.

Complete the sentence.

[1 mark]

Sand can be separated from a mixture of sand and water by

_____.

Q10.a) (2022)

A mixture of four liquids was fractionally distilled.

Figure 3 shows the apparatus used.

Figure 3

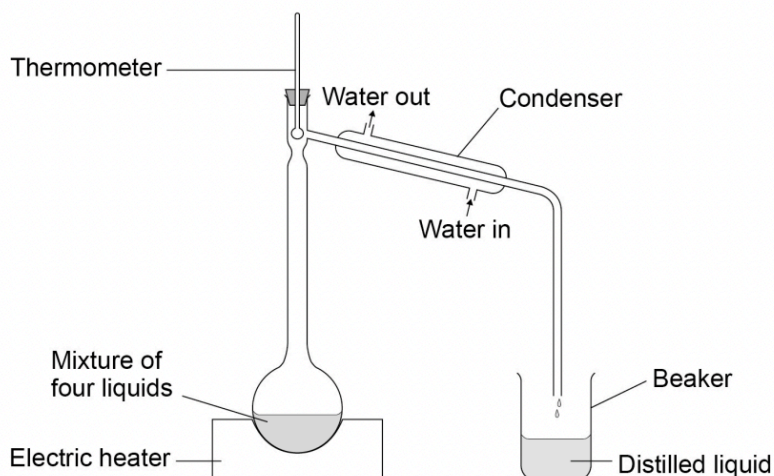


Table 2 shows the boiling points of the four liquids in the mixture.

Table 2

Liquid	Boiling point in °C
A	97
B	138
C	78
D	118

Which liquid in **Table 2** would distil and be collected in the beaker first?

[1 mark]

Liquid _____

Q10.b) (2022)

Suggest what would happen to the temperature of the water as the water flows through the condenser.

[1 mark]

Q10.c) (2022)

Describe how to obtain sodium chloride crystals from sodium chloride solution by crystallisation.

[2 marks]

Q11.(2023)

What happens to the atoms in pure tin as the tin melts?

[1 mark]

Tick (✓) **one** box.

The atoms gain energy and their arrangement becomes less ordered.

☐

The atoms gain energy and their arrangement becomes more ordered.

☐

The atoms lose energy and their arrangement becomes less ordered.

☐

The atoms lose energy and their arrangement becomes more ordered.

☐

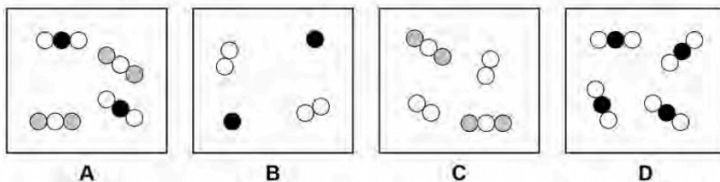
Q12.a) (2024)

This question is about elements, compounds and mixtures.

Figure 1 shows diagrams which represent the atoms and molecules in different substances.

Figure 1

● and ○ represent different types of atom.



Which diagram in **Figure 1** represents a pure compound?

[1 mark]

Tick (✓) **one** box.

A ☐

B ☐

C ☐

D ☐

Q12.b) (2024)

Which diagram in **Figure 1** represents a mixture of an element and a compound?

[1 mark]

Tick (✓) **one** box.

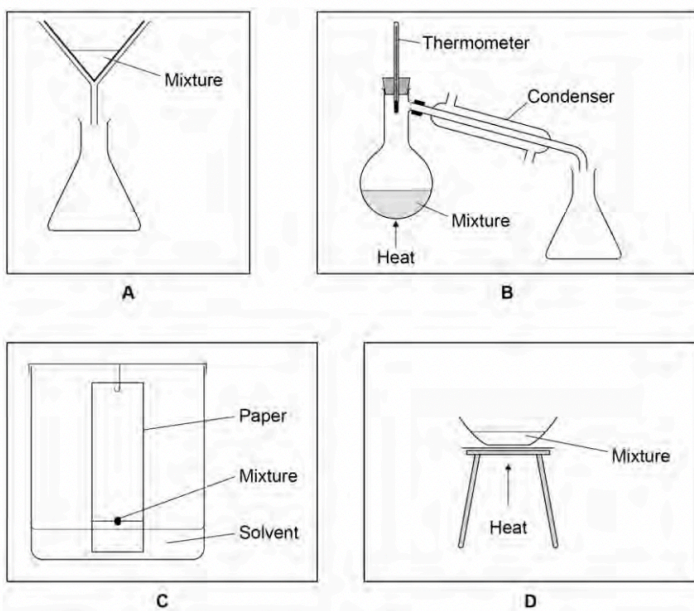
A	☐	B	☐	C	☐	D	☐
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Q13.a)(2024)

Mixtures are separated by different methods.

Figure 3 shows the apparatus for separating four different types of mixture.

Figure 3



Which apparatus could be used to collect water from sodium chloride solution?

Use **Figure 3**.

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐
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Q13.b)(2024)

Which apparatus shows filtration?

Use **Figure 3**.

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐
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