1 This question is about atoms and molecules.

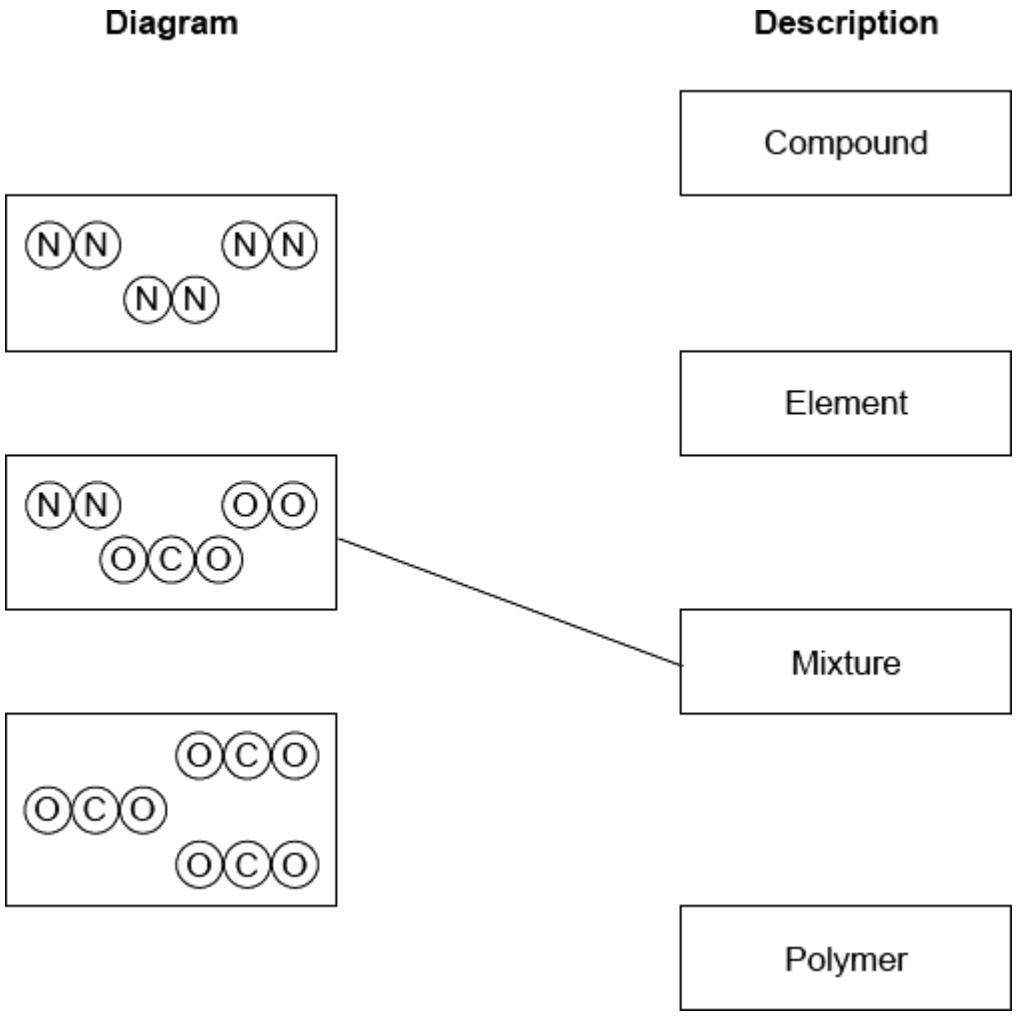
(a) In the diagrams below:

(N) is a nitrogen atom

(O) is an oxygen atom

(C) is a carbon atom.

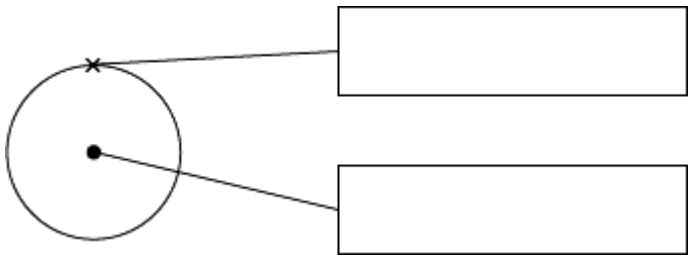
Draw **one** line from each diagram to its correct description.
One line has been done for you.



(2)

(b) The diagram below shows a hydrogen atom.
Use words from the box to write the correct labels on the diagram.

alloy	**electron**	**group**	**nucleus**



(2)

(c) This chemical equation represents the reaction of hydrogen burning.

$$2H_2 \quad + \quad O_2 \quad \rightarrow \quad 2\ H_2O$$

Complete the sentence to describe what is happening in this chemical reaction.

Hydrogen reacts with .....

.....

.....

.....

(2)
(Total 6 marks)

2 This question is about mixtures and analysis.

(a) Which **two** substances are mixtures?

Tick **two** boxes.

Air	☐
Carbon dioxide	☐
Graphite	☐
Sodium Chloride	☐
Steel	☐

(2)

(b) Draw **one** line from each context to the correct meaning.

Context	Meaning
	A substance that has had nothing added to it
Pure substance in chemistry	A single element or a single compound
	A substance containing only atoms which have different numbers of protons
Pure substance in everyday life	A substance that can be separated by filtration
	A useful product made by mixing substances

(2)

(c) What is the test for chlorine gas?

Tick **one** box.

A glowing splint relights ☐

A lighted splint gives a pop ☐

Damp litmus paper turns white ☐

Limewater turns milky ☐

(1)

(d) A student tested a metal chloride solution with sodium hydroxide solution.

A brown precipitate formed.

What was the metal ion in the metal chloride solution?

Tick **one** box.

Calcium ☐

Copper(II) ☐

Iron(II) ☐

Iron(III) ☐

(1)
(Total 6 marks)

3 Rock salt is a mixture of sand and salt.

Salt dissolves in water. Sand does **not** dissolve in water.

Some students separated rock salt.

This is the method used.

1. Place the rock salt in a beaker.
2. Add 100 cm^3 of cold water.
3. Allow the sand to settle to the bottom of the beaker.
4. Carefully pour the salty water into an evaporating dish.
5. Heat the contents of the evaporating dish with a Bunsen burner until salt crystals start to form.

(a) Suggest **one** improvement to step 2 to make sure all the salt is dissolved in the water.

.....

.....

(1)

(b) The salty water in step 4 still contained very small grains of sand.

Suggest **one** improvement to step 4 to remove all the sand.

.....

.....

(1)

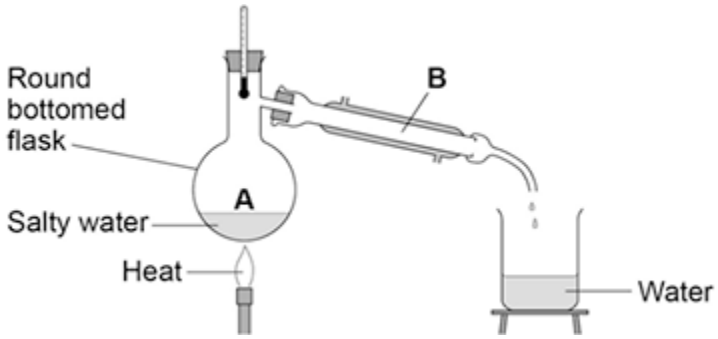
(c) Suggest **one** safety precaution the students should take in step 5.

.....

.....

(1)

(d) Another student removed water from salty water using the apparatus in the figure below.



Describe how this technique works by referring to the processes at **A** and **B**.

.....

.....

.....

.....

(2)

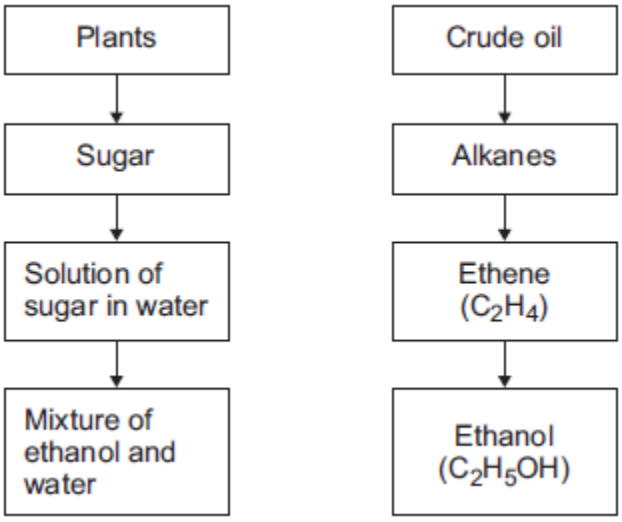
(e) What is the reading on the thermometer during this process?

..... °C

(1)

(Total 6 marks)

4 Ethanol can be made from plants and from crude oil as shown in the diagram below.



(a) Describe how the solution of sugar in water is used to produce the mixture of ethanol and water.

.....

.....

.....

.....

(2)

(b) Ethanol has a boiling point of 78 °C.
Water has a boiling point of 100 °C.

Describe how distillation is used to separate a mixture of ethanol and water.

.....

.....

.....

.....

.....

(3)
(Total 5 marks)

Mark schemes

1

(a) NN linked to element

1

OCO linked to compound

1

(b) electron

1

nucleus

must be correct order

1

(c) (reacts with) oxygen

1

to produce water

must be names

accept hydrogen oxide

allow steam

1

[6]

2

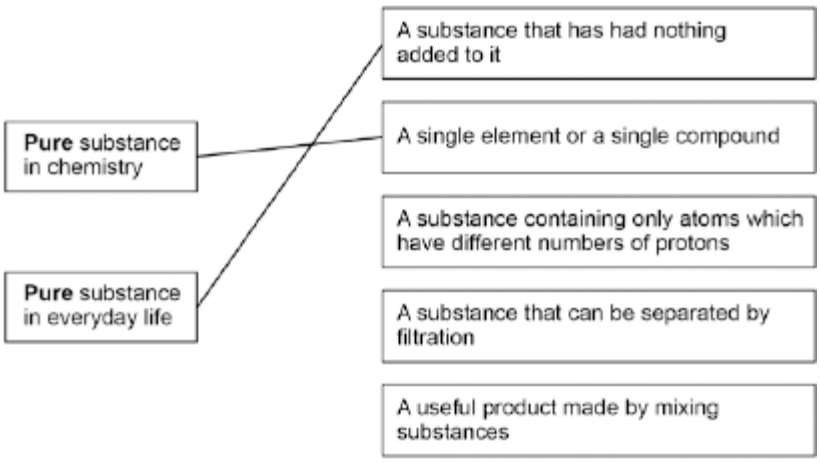
(a) Air

2

Steel

1

(b)



Allow **1** mark for the correct meanings linked to context but incorrect way around

1

(c) Damp litmus paper turns white

1

(d) Iron(III)

1

[6]

3

(a) any **one** from:

- heat
- stir

1

(b) filter

accept use a centrifuge

accept leave longer (to settle)

1

(c) any **one** from:

- wear safety spectacles
- wear an apron

1

(d) evaporation at **A**

1

condensation at **B**

1

(e) 100

1

[6]

4

(a) add yeast

1

and ferment **or** by fermentation

*allow in a warm place **or** temperatures within the range 20-45^{o}C **or** with an airlock / absence of air*

1

(b) heat (the mixture)

1

ethanol has a lower boiling point than water **or** more ethanol than water vaporises **or** ethanol evaporates first or when the temperature reaches 78^{o}C

allow ethanol and water boil at different temperatures

1

condense (the vapour)

allow condense at different temperatures for the last two marking points

if no other mark is awarded, allow repeat distillation or use fractional distillation apparatus for 1 mark

1

[5]