Q1. 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)

Q2.A bottle of washing soda was found in a school laboratory.
The chemical name of washing soda is sodium carbonate.



A student tested the washing soda to prove that it was sodium carbonate.

(a) The student did a flame test to show that washing soda is a sodium compound.
The student used a clean wire to put the washing soda into the flame.

(i) Why should the wire be clean when used for a flame test?

.....

(1)

(ii) The table shows some properties of metals.

Two of these are properties that the wire must have if it is used for a flame test.

Tick (✓) the **two** correct properties.

Property	Tick (✓)
Good electrical conductor	
High density	
High melting point	
Low boiling point	
Unreactive	

(2)

(iii) Which **one** of the following flame colours shows that washing soda is a sodium compound?

Draw a ring around your answer.

brick-red **lilac** **yellow-orange**

(1)

(b) The student used dilute hydrochloric acid to show that washing soda was a carbonate. Carbon dioxide gas was given off.

(i) Describe what you **see** happening when a gas is given off.

.....

.....

(1)

(ii) The student used limewater to prove that the gas given off was carbon dioxide.

Complete this sentence by choosing the correct word from the box.

clear	**colourless**	**milky**

When carbon dioxide reacts with limewater, the limewater turns .....

(1)

(c) Instrumental methods are used to identify chemicals.

Give **two** advantages of instrumental methods compared with chemical tests by considering:

- the length of time to carry out a test
- the amount of chemical used.

.....

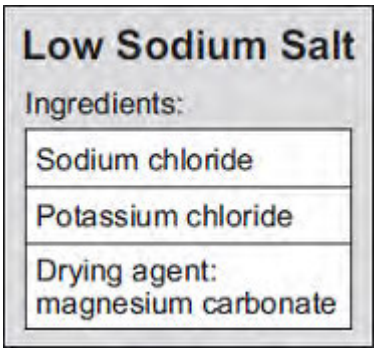
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(2)
(Total 8 marks)

Q3. Low sodium salt is used on food. This label is from a packet of low sodium salt.



A chemist tests the low sodium salt for the substances on the label.

(a) The chemist tests for sodium ions and potassium ions using a flame test.

Draw a ring around the correct answer to complete each sentence.

(i)

In a flame test, sodium ions produce a

lilac	
red	colour.
yellow	

(1)

(ii)

In a flame test, potassium ions produce a

lilac	
red	colour.
yellow	

(1)

(b) The chemist added hydrochloric acid to low sodium salt. Carbon dioxide gas was produced.

Describe the test for carbon dioxide and give the result of the test.

.....

.....

.....

.....

(2)

(c) The chemist made a solution of low sodium salt.

(i) Tick (✓) **one** box to show the chemical used to test for chloride ions.

	Tick (✓)
Barium chloride solution	
Silver nitrate solution	
Sodium sulfate solution	

(1)

(ii) Sodium hydroxide solution is used to test for magnesium ions.

Draw a ring around the colour of precipitate produced by this test.

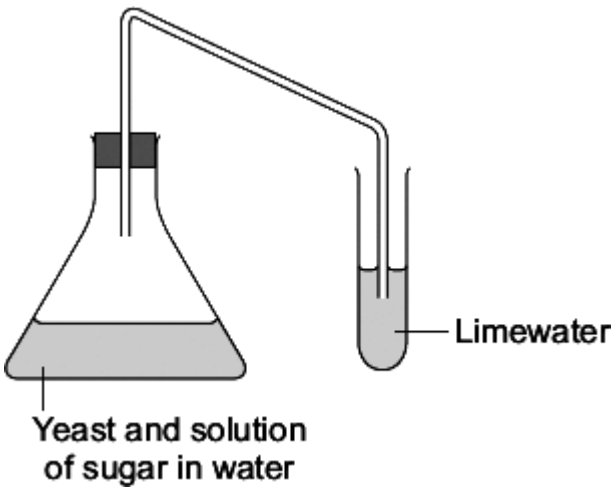
brown **green** **white**

(1)
(Total 6 marks)

Q4. Two fuels that can be used for cars are:

- petrol from crude oil
- ethanol made from sugar in plants.

(a) A student used the apparatus shown to investigate the reaction to make ethanol from sugar.



(i) Draw a ring around the correct answer to complete the sentence

This reaction to make ethanol from sugar is

combustion.
decomposition.
fermentation.

(1)

(ii) Complete the sentences.

The limewater turns ..... .

This happens because ..... .

(2)

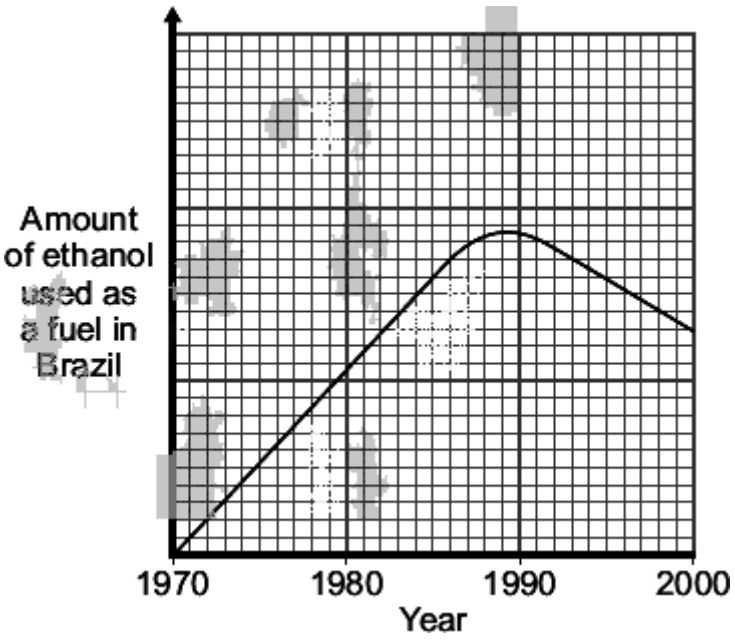
(b) In 1970, the Brazilian Government stated that all petrol must contain more than 25% ethanol.

The reasons for this statement in 1970 were:

- Brazil did not have many oilfields

- Brazil has a climate suitable for growing sugar cane.

The graph shows the amount of ethanol used as a fuel in Brazil from 1970 to 2000.



(i) Use the graph to describe the changes in the amount of ethanol used as a fuel in Brazil from 1970 to 2000.

.....

.....

.....

.....

(2)

(ii) In 2011, the Brazilian Government decided to reduce the amount of ethanol in petrol to 18%.

Suggest **one** reason for their decision.

.....

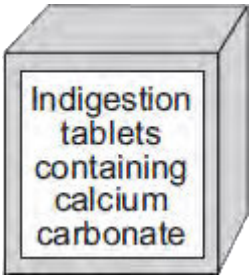
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(1)
(Total 6 marks)

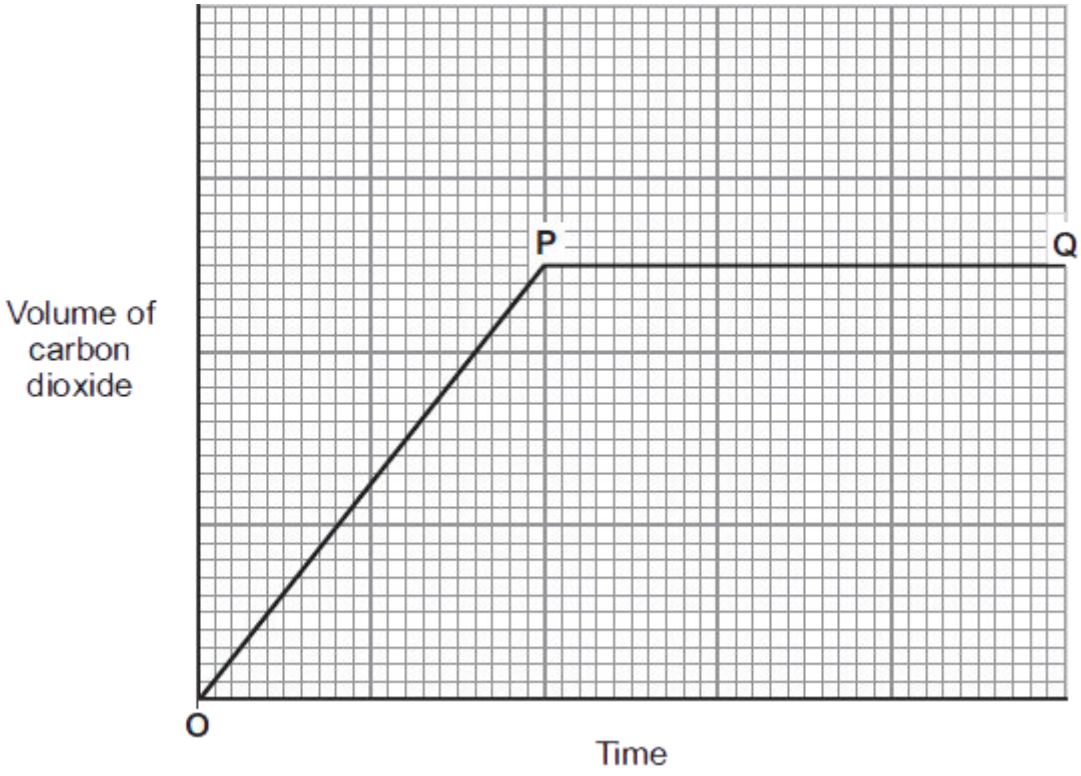
Q5. Human stomachs contain hydrochloric acid.

Stomach ache can be caused by too much acid in the stomach.

Indigestion tablets can be used to reduce the amount of acid in the stomach.



(a) The graph shows how the volume of carbon dioxide produced changes with time, after some calcium carbonate is added to hydrochloric acid.



(i) Complete the sentence to explain what happens between **O**and **P**.

Between **O**and **P**the calcium carbonate and hydrochloric acid .....

(1)

(ii) Complete the sentence to explain what happens at **P**.

At **P**the calcium carbonate and hydrochloric acid .....

because .....

(2)

(iii) Describe the test for carbon dioxide gas.

Test .....

Result of the test .....

(2)

(b) Calcium carbonate is found in limestone.
Limestone is removed from the ground by quarrying.



Photograph supplied by Stockbyte/Thinkstock

Tick (✓) **one**advantage and tick (✓) **one**disadvantage of quarrying limestone.

Statement	**Advantage Tick (✓)**	**Disadvantage Tick (✓)**
Quarrying limestone destroys the shells and skeletons of marine organisms that formed the limestone.		
Quarrying limestone releases dust, and lorries release		

carbon dioxide from burning diesel fuel.		
Quarrying limestone provides building materials, employment and new road links.		
Quarrying limestone removes ores from the ground.		

(2)
(Total 7 marks)

Q6. A student investigated an egg shell.



Trish Steel [CC-BY-SA-2.0], via Wikimedia Commons

(a) Draw a ring around the correct answer to complete each sentence.

(i) **Test 1**

Dilute hydrochloric acid was added to the egg shell.

Carbon dioxide gas was produced which turned limewater

- milky.
- blue.
- red.

This test shows that the egg shell must contain

- carbonate ions.
- chloride ions.
- sulfate ions.

(2)

(ii) **Test 2**

The student then did a flame test.
He used the solution remaining after dilute hydrochloric acid was added to the egg shell.

The flame test showed that the egg shell contained calcium ions because

the flame was

red.
blue.
lilac.

(1)

(b) Some scientists investigated the amount of lead found in egg shells.
They used a modern instrumental method which was more *sensitive* and more *accurate* than older methods.

(i) Draw a ring around the correct answer to complete the sentence.

The modern instrumental method is more *sensitive*, which means that

it can measure

larger
much larger
smaller

amounts of lead than older methods.

(1)

(ii) Tick (✓) the meaning of more *accurate*.

	Tick (✓)
The measurement is given to more decimal places.	
The answer obtained is closer to the true value.	
The equipment used is more expensive.	

(1)
(Total 5 marks)

Q7. Read the information in the box and then answer the questions.

Seidlitz Powder is a medicine.

Seidlitz Powder comes as two powders. One powder is wrapped in white paper and contains tartaric acid. The other powder is wrapped in blue paper and contains sodium hydrogencarbonate.

The contents of the blue paper are dissolved in water and the contents of the white paper are added. This causes a reaction that produces carbon dioxide gas. The mixture is safe to drink when the reaction stops.

(a) Suggest why Seidlitz Powder comes as two separate powders.

.....

(1)

(b) The reaction produces carbon dioxide gas.

(i) What would you see during the reaction?

.....

(1)

(ii) Which state symbol in a chemical equation shows that carbon dioxide is a gas?

Draw a ring around **one** answer.

(s) **(l)** **(aq)** **(g)**

(1)

(iii) Draw a ring around the correct answer to complete the sentence.

Carbon dioxide can be identified because it turns

limescale

limestone

limewater

milky.

(1)

(c) Sodium hydrogencarbonate contains sodium ions. Sodium ions can be identified by flame tests.

Draw a ring around the correct answer to complete the sentence.

Sodium ions give a [blue / red / yellow] flame.

(1)

(d) Some Seidlitz Powder was bought on the Internet for £5. However, when tested, it was found to be only magnesium sulfate, worth a few pence.

Draw a ring around the correct answer to complete each sentence.

(i) The test for sulfate ions uses [barium chloride / silver nitrate / sodium hydroxide] solution.

(1)

(ii) A positive test for sulfate ions produces a [blue / red / white] precipitate..



(1)

(iii) Suggest **one** disadvantage of buying medicines on the Internet.

.....

.....

(1)
(Total 8 marks)

Q8. A bottle of washing soda was found in a school laboratory. The modern name of washing soda is sodium carbonate.



A student tested the washing soda to prove that it was sodium carbonate.

(a) The student did a flame test to show that washing soda is a sodium compound.

The student used a clean wire to put the washing soda into the flame.

(i) Why should the wire be clean when used for a flame test?

.....

(1)

(ii) The table shows some properties of metals.

Two of these are properties that the wire must have if it is used for a flame test.

Put a tick (✓) next to the **two** correct properties.

Property	(✓)
Good electrical conductor	
High density	
High melting point	
Low boiling point	
Unreactive	

(2)

(iii) Which **one** of the following flame colours shows that washing soda is a sodium compound?

Draw a ring around your answer.

brick-red **lilac** **yellow-orange**

(1)

(b) The student used dilute hydrochloric acid to show that washing soda was a carbonate. Carbon dioxide gas was given off.

(i) Describe what you **see** happening when a gas is given off.

.....

.....

(1)

(ii) The student used limewater to prove that the gas given off was carbon dioxide.

Complete this sentence by choosing the correct word from the box.

clear	**colourless**	**milky**

When carbon dioxide reacts with limewater, the limewater turns

.....

(1)

(c) Instrumental methods are used to identify chemicals.

Describe some advantages of instrumental methods compared with chemical tests by considering:

- the length of time needed to carry out a test
- the amount of chemical used.

.....

.....

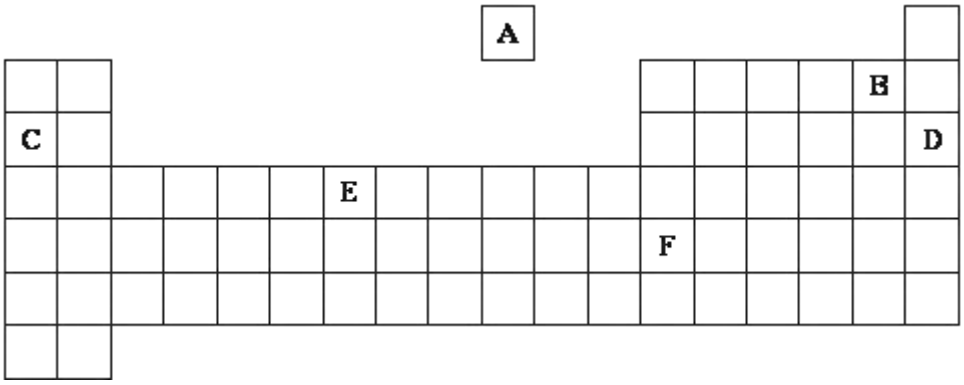
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(2)
(Total 8 marks)

Q9. The diagram shows an outline of the periodic table.



Choose your answers **only** from the letters shown on the table above.

The periodic table on the Data Sheet may help you to answer this question.

Which element, **A** to **F**:

(a) is in Group 3;

.....

(1)

(b) is a metal which floats on water and reacts violently to make an alkaline solution and hydrogen gas;

.....

(1)

(c) is a gas which burns with a squeaky pop?

.....

(1)
(Total 3 marks)