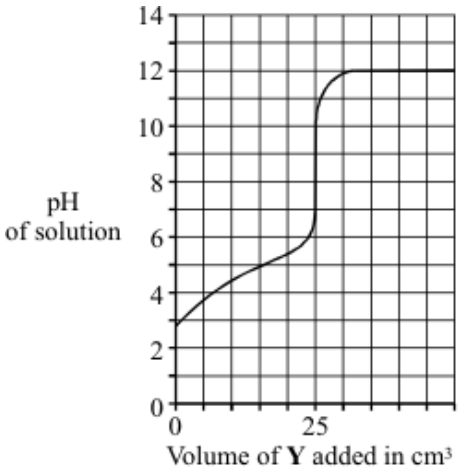
Q1. A solution of **Y** was slowly added to a solution of **X**. The graph shows how the pH of the resulting solution changed.



(a) (i) What was the pH of solution **X** before any of solution **Y** was added?

.....

(1)

(ii) State whether solution **Y** was acidic, alkaline or neutral.

.....

(1)

(iii) What volume of solution **Y** was needed to react with all of the substance in solution **X**?

..... cm^3

(1)

(b) The chemical equation shows the reaction between an acid and an alkali to form a salt and water.

(i) Draw a circle round the formula of the alkali.

$$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$$

(1)

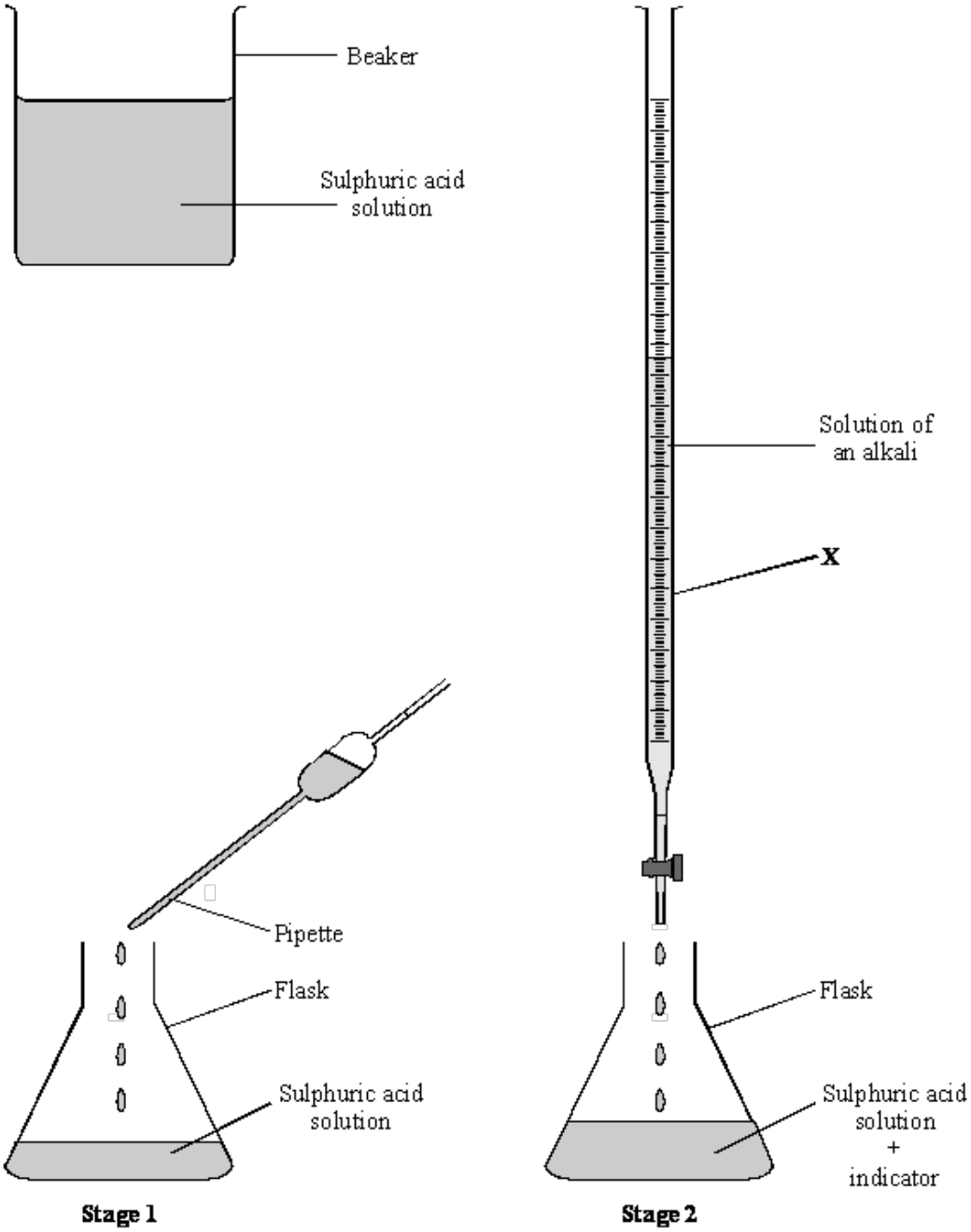
(ii) What is the formula of the salt?

.....

(1)

(Total 5 marks)

Q2. A titration was used to find the concentration of the sulphuric acid solution in the beaker.



Stage 1 25.0 cm^3 of the sulphuric acid solution was added to a flask using a pipette.

Stage 2 A solution of an alkali was added to the acid until the solution was neutral. The volume of the alkali was noted.

(a) What would be the pH of the sulphuric acid solution?

.....

(1)

(b) Why was a pipette used instead of a measuring cylinder in **Stage 1**?

.....

(1)

(c) Name the apparatus labelled **X** which is used to add the alkali in **Stage 2**.

.....

(1)

(d) Name an alkali that could be used in **Stage 2**.

.....

(1)

(e) (i) Name an indicator that you could use to find out when the solution was neutral.

.....

(1)

(ii) How would you know that the solution was neutral?

.....

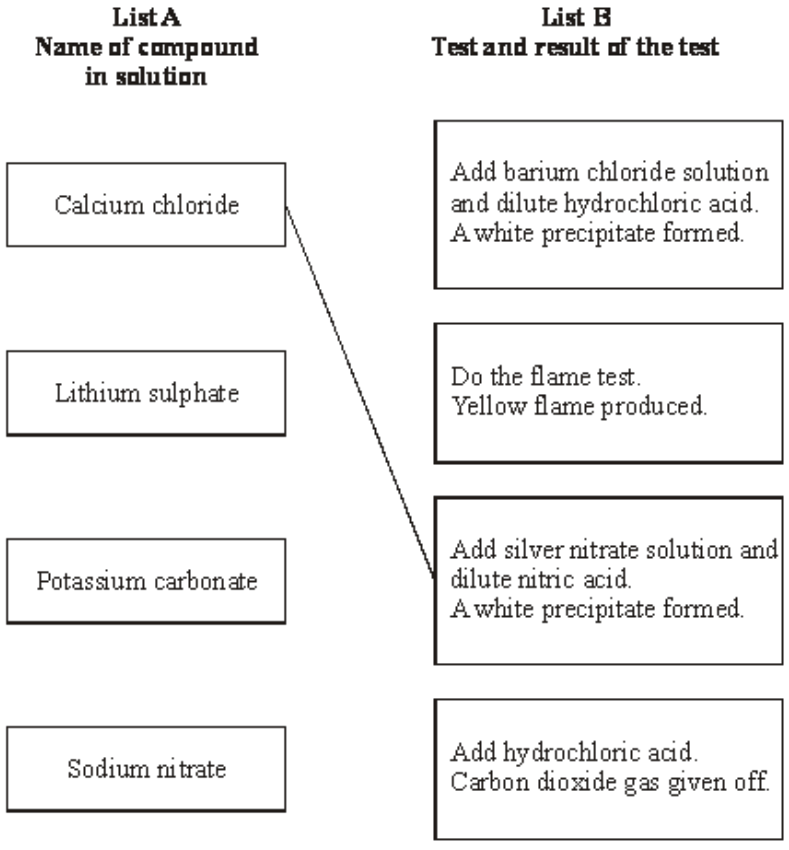
(1)

(Total 6 marks)

Q3. Chemical tests can be used to identify compounds.

(a) List **A** gives the names of four compounds in solution. List **B** gives tests and the result of the tests.

Draw a straight line from each compound in List **A** to its test and test result in List **B**. The first one has been done for you.



(2)

(b) State what you would **see** when sodium hydroxide solution reacts with copper sulphate solution.

.....

.....

(2)

(Total 4 marks)

Q4. Chemical tests are used to identify compounds.

(a) What colour is produced by sodium compounds in flame tests?

.....

(1)

(b) Chemical tests are carried out on these substances.

ammonium	**copper bromide**	**magnesium sulphate**
potassium nitrate	**copper nitrate**	**zinc carbonate**

Complete each sentence by choosing the correct substance from the box. You may use each substance once or not at all.

The substance which

(i) reacts with dilute hydrochloric acid to produce carbon dioxide gas is

.....

(1)

(ii) in solution reacts with sodium hydroxide solution to form a blue precipitate is

.....

(1)

(iii) in solution reacts with barium chloride solution, in the presence of dilute hydrochloric acid, to form a white precipitate is

.....

(1)

(c) State what you **see** when sodium chloride solution reacts with silver nitrate solution in the presence of dilute nitric acid.

.....

(1)

(Total 5 marks)

Q5. Tennis players sometimes use *smelling salts* to help revive them.

The active chemical in *smelling salts* is ammonium carbonate, $(NH_4)_2CO_3$.

A student tested some *smelling salts* to prove that they contained ammonium ions and carbonate ions.

(a) Complete these sentences by choosing the correct substances from the box.

(i) Test for carbonate ions.

ammonia	**carbon dioxide**	**hydrochloric acid**
limewater	**water**	

The student added ..... to the smelling salts.

A gas called ..... was given off.

This gas turned ..... milky.

(3)

(ii) Test for ammonium ions.

ammonia	**carbon dioxide**	**hydrochloric acid**
litmus	**sodium hydroxide**	

The student added ..... to the smelling salts.

A gas called ..... was given off.

This gas turned ..... paper blue.

(3)

(b) Suggest why ammonium ions **cannot** be identified using a flame test.

.....

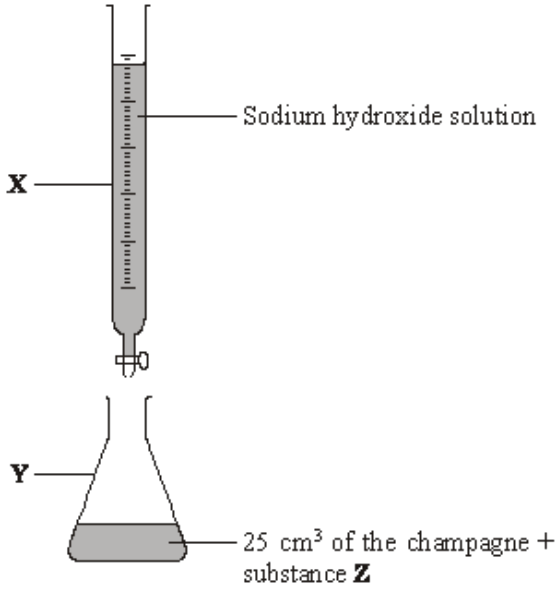
.....

(1)

(Total 7 marks)

Q6. In 1916 a ship was sunk by a German submarine. The ship was carrying bottles of champagne. The wreck was discovered in 1997 and the champagne was brought to the surface and analysed.

The diagram shows the apparatus used to find the amount of acid in 25 cm^3 of the champagne.



(a) Choose the correct words from the box to name apparatus **X** and **Y**.

beaker	**burette**	**conical flask**	**measuring cylinder**

(i) Apparatus **X** is a .....

(1)

(ii) Apparatus **Y** is a .....

(1)

(b) Sodium hydroxide solution was added to this champagne until substance **Z** showed that the reaction was complete. The volume of sodium hydroxide used was recorded. The result was used to calculate the amount of acid present.

Complete these sentences by drawing a ring around the correct answer.

(i) Substance **Z** is

a catalyst
a conductor
an indicator

(1)

(ii) The reaction was complete when substance **Z**

changed colour
formed a gas
gave a precipitate

(1)

(iii) The name of this method of analysis is

distillation
filtration
titration

(1)

(c) 250 cm^3 of this champagne were found to contain 1 g of acid.

Calculate the mass of acid in 750 cm^3 of this champagne.

.....

.....

.....

Mass = ... g

(2)

(d) (i) Which **one** of the following ions makes champagne acidic?

Draw a ring around your answer.

chloride **hydrogen** **sodium**

(1)

(ii) The acid in champagne is a *weak* acid.

Complete this sentence by drawing a ring around the correct answer.

The word *weak* means that the acid

has a low boiling point
is dilute
is partially ionised

(1)

(Total 9 marks)

Q7. 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.

.....

.....

.....

.....

.....

(2)

(Total 8 marks)

Q8.

Supreme is used to clean and degrease tiles, work surfaces and windows. The active ingredient is ammonia solution, which is an alkali.

(a) Draw a ring around the correct answer to complete these sentences.

(i) Ammonia solution is alkaline because of

hydroxide
magnesium
sulfate

ions.

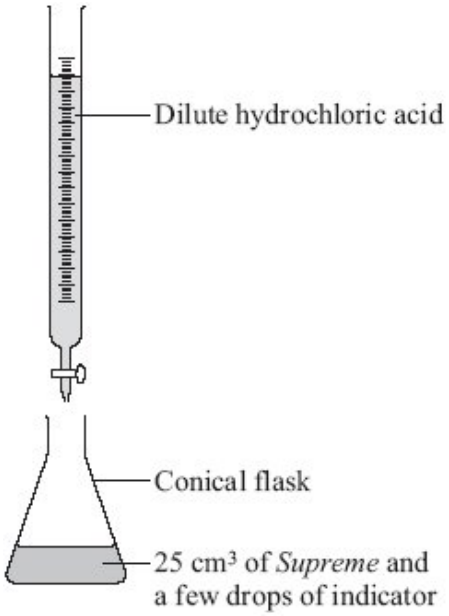
(1)

(ii) Ammonia solution turns litmus paper

blue.
green.
red.

(1)

(b) The diagram shows the apparatus a student could use for a titration.



Draw a ring around the correct answer to complete each sentence about how the student could do this titration.

(i) Measure 25 cm^3 of *Supreme* into a conical flask using a

pipette.
test tube.
thermometer.

(1)

(ii) Add a few drops of an indicator to the *Supreme* in the conical flask.

Then put hydrochloric acid into a

beaker.
burette.
measuring cylinder.

(1)

(iii) Add the acid to the *Supreme* until the indicator

changes colour.
dissolves.
forms a gas.

(1)

(c) The student recorded the volume of hydrochloric acid used.

Suggest how the student could check the reliability of this result.

.....

.....

(1)

(Total 6 marks)

Q9. Chemical tests can be used to identify ions in solutions.

(a) List **A** gives the names of two sulfates in solution.
List **B** gives the results of adding sodium hydroxide solution.

Draw a straight line from each sulfate in List **A** to its correct test result in List **B**.

List A **Name of sulfate in solution**	**List B** **Result of adding sodium hydroxide solution**
	A blue precipitate formed
Copper sulfate	
	A white precipitate formed
Iron(II) sulfate	
	A green precipitate formed

(2)

(b) Suggest why clean test tubes were used for each test.

.....

.....

(1)

(c) Draw a ring around the correct colour to complete this sentence.

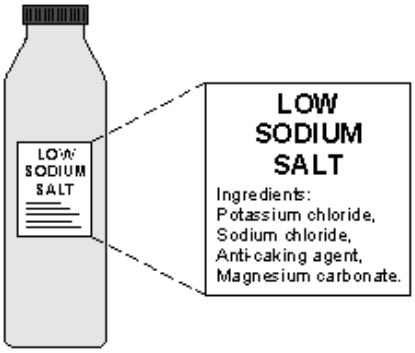
Sulfate solutions react with barium chloride solution to give a

blue
green
white

precipitate.

(1)
(Total 4 marks)

Q10. The use of too much common salt (sodium chloride) in our diet increases the risk of heart problems. One way to reduce sodium chloride in our diet is to use Low Sodium Salt instead of common salt.



A student tested Low Sodium Salt to find out if it contained all of the compounds on the list of ingredients.

(a) The student added dilute hydrochloric acid to Low Sodium Salt to show that it contains carbonate ions. Carbon dioxide gas was given off.

(i) What would the student **see** that shows a gas is given off?

.....

.....

(1)

(ii) The student tested the gas given off to show that the gas was carbon dioxide.

Complete the sentence.

When carbon dioxide gas is mixed with limewater

the solution turns ..... .

(1)

(b) The student tested for magnesium ions. The student added sodium hydroxide solution to a solution of Low Sodium Salt.

What is the colour of the precipitate that the student would see?

.....

(1)

(c) The student did a flame test using Low Sodium Salt.

(i) The flame colour the student saw was yellow. Which compound in Low Sodium Salt produces this flame colour?

.....

(1)

(ii) The student did **not** observe the colour in the flame which would show that there were potassium ions in the Low Sodium Salt.

Suggest why.

(You will need to state the flame colour of the potassium ions in your answer.)

.....

.....

.....

.....

(2)
(Total 6 marks)

Q11. Chemical tests can be used to detect and identify elements and compounds.

A jar of a chemical from 1870 is shown.

Copperas was a name used for iron(II) sulfate, $FeSO_4$. It does not contain any copper!

(a) A student tested solutions of copperas to show which ions it contained.

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

(i) The student tested for iron(II) ions, Fe^{2+}

The student added a solution of

- barium chloride.
- silver nitrate.
- sodium hydroxide.

The colour of the precipitate formed was

- green
- red.
- white

The precipitate was a

- liquid.
- gas.
- solid

(3)

(ii) The student tested for sulfate ions, SO_4^{2-}

The student added dilute hydrochloric acid and

- barium chloride
- silver nitrate
- sodium hydroxide

solution.

The colour of the precipitate formed was

- green
- red.
- white

Sulfuric acid (H_2SO_4) should **not** be used instead of hydrochloric acid (HCl) when testing for sulfate ions. This is because sulfuric acid contains

- chloride ions, Cl^-
- nitrate ions, NO_3^-
- sulfate ions, SO_4^{2-}

(3)

(b) A flame test can be used to identify the metal ions in a compound.

How do you carry out a flame test?

.....

.....

(1)

(c) The elements in a compound can also be detected and identified using instrumental methods of analysis.

State **one** advantage of using instrumental methods compared with chemical tests.

.....

.....

(1)

(Total 8 marks)

Q12. The table shows some information about acids and alkalis.

Name of acid or alkali	Type	Ions produced in solution		pH	Effect on Universal Indicator
Hydrochloric acid	Strong acid	H^+	Cl^-	1	Goes red
Sodium hydroxide	Strong alkali	Na^+	OH^-	13	Goes purple

Use the information in the table to help you answer parts **(a)** and **(b)**.

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

(i) Hydrochloric acid is acidic.

This is because it contains [Cl^- / H^+ / OH^-] ions

(1)

(ii) Sodium hydroxide solution is alkaline.

This is because it contains [H^+ / Na^+ / OH^-] ions

(1)

(iii) The pH of acids is [higher than / lower than / the same as] the pH of alkalis.

(1)

(b) Ethanoic acid is a weak acid.

Universal Indicator can be used to show that hydrochloric acid is a stronger acid than ethanoic acid of the same concentration.

Explain how.

.....

.....

.....

.....

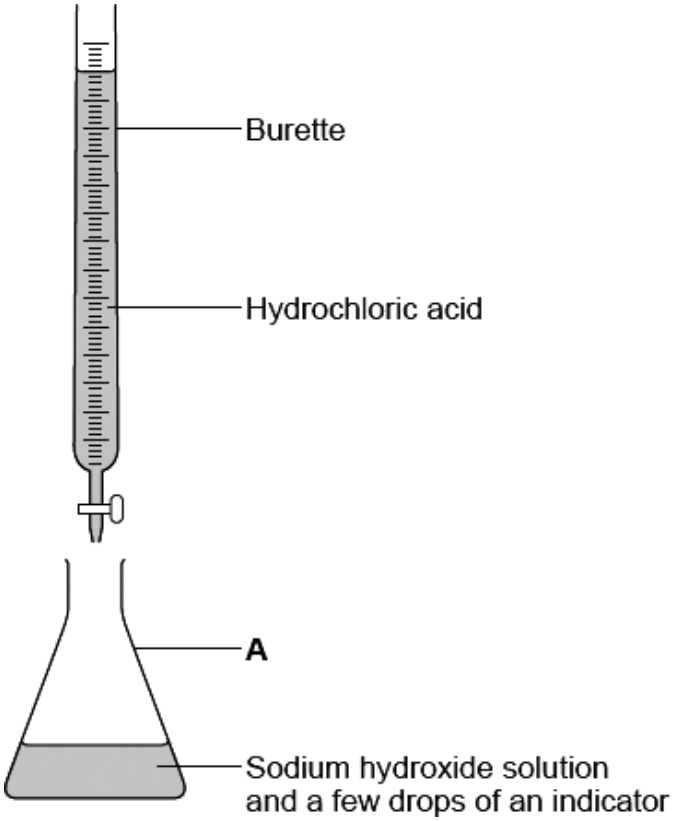
(2)

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

Strong acids and strong alkalis are | completely | not | partially | ionised in water.

(1)

(d) The diagram shows the apparatus used to find the volume of hydrochloric acid that reacts with 25.0 cm^3 of sodium hydroxide solution.



(i) Which **one** of the following is the correct name for **A**?

Draw a ring around your answer.

beaker **conical flask** **pipette**

(1)

(ii) Use the correct word from the box to complete the sentence.

distillation	**filtration**	**titration**

The method used to find the volume of acid that reacts with a known volume of alkali is ..... .

(1)

(iii) Suggest **one** way to make the results more reliable.

.....

(1)

(Total 9 marks)

Q13. Alums are salts. They have been used since ancient times in dyeing and medicine and still have many uses today.

Three alums are shown in the table:

Name	Ions present
Ammonium alum	NH_4^+ Al^{3+} SO_4^{2-}
Potassium alum	K^+ Al^{3+} SO_4^{2-}
Sodium alum	Na^+ Al^{3+} SO_4^{2-}

A student tested these alums to show which ions were present.

(a) The student did a flame test on these alums. A sample of each alum was held on a wire in a colourless flame.

In (a)(i) and (a)(ii) use the correct word from the box to complete each sentence.

blue	**lilac**	**yellow**	**green**

(i) Sodium ions give a ..... flame.

(1)

(ii) Potassium ions give a ..... flame.

(1)

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

The wire used in a flame test should have a high

- density.
- electrical conductivity.
- melting point.

(1)

(b) Draw a ring around the correct word to complete the sentences.

(i) The student tested a solution of each salt for sulfate ions (SO_4^{2-}).

The student added dilute hydrochloric acid and

barium chloride
nitric acid
silver nitrate

solution and

a white

gas
liquid
solid

was formed.

(2)

(ii) The student tested a solution of each salt for aluminium ions (Al^{3+}).

The student added sodium hydroxide solution and a

green
red
white

precipitate was formed. When excess sodium hydroxide solution was added, the

precipitate

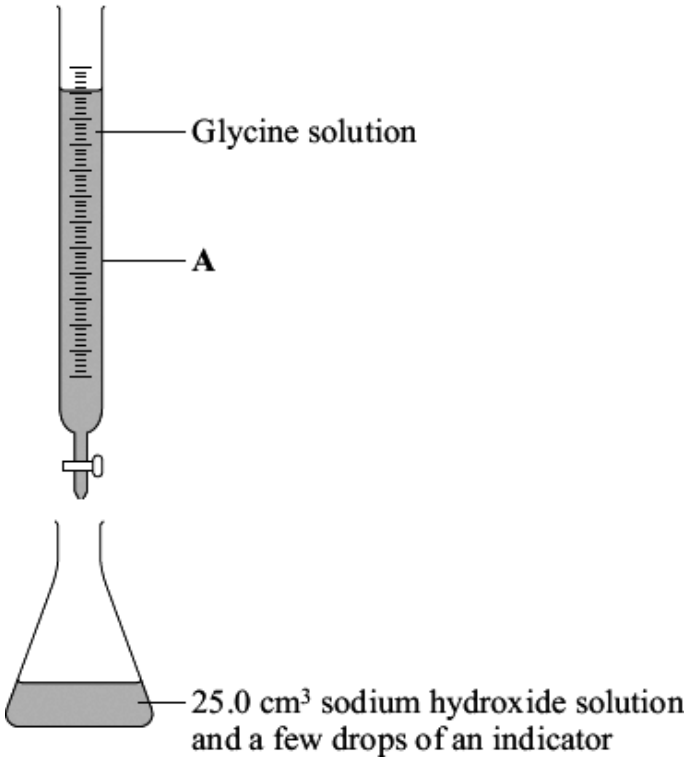
boiled.
condensed.
dissolved.

(2)
(Total 7 marks)

Q14. Glycine is an amino acid. It is found in fish, meat, beans and dairy produce.

A student carried out a titration to find the amount of glycine solution that reacts with 25.0 cm^3 of sodium hydroxide solution.

The diagram shows the apparatus that the student used.



(a) Which **one** of the following words is the correct name for apparatus **A**?

Draw a ring around your answer.

burette **cylinder** **pipette**

(1)

(b) How would the student know when enough glycine solution had been added to react with all of the sodium hydroxide solution?

.....

.....

(1)

(c) The student's results are given in the table.

Titration	Volume of glycine solution added in cm^3
1	18.5
2	18.3
3	18.4

(i) What is the range?

.....

(1)

(ii) Calculate the mean.

.....

(1)

(iii) Suggest why the student repeated the titration.

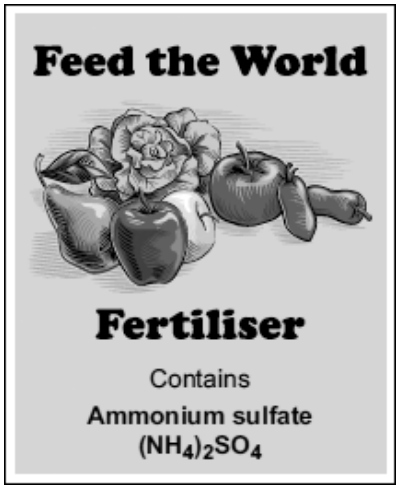
.....

.....

(1)

(Total 5 marks)

Q15. Ammonium sulfate is an artificial fertiliser.



(a) A student tested this fertiliser to prove that it contained ammonium ions and sulfate ions.

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

(i) Test for ammonium ions (NH_4^+).

The student added | sodium chloride solution / sodium hydroxide solution / dilute sulfuric acid | to the fertiliser.

A gas called ammonia was produced.

Ammonia turns damp litmus paper | blue. / green. / red. |

(2)

(ii) Test for sulfate ions (SO_4^{2-}).

The student added | barium chloride / silver nitrate / sodium chloride | solution to a solution of the fertiliser.

A | blue / red / white | precipitate was formed.

(2)

(b) Ammonium sulfate is made by reacting sulfuric acid with ammonia solution.

Sulfuric acid is a *strong* acid.

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

The word *strong* means that the acid is

- difficult to break.
- very concentrated.
- fully ionised in water.

(1)

(c) Use the information about acids in the table to help you answer these questions.

Name of chemical	**Ions produced in aqueous solution**		**pH**	**Universal Indicator added**
Ethanoic acid	H^+	CH_3COO^-	5	Goes orange
Sulfuric acid	H^+	SO_4^{2-}	1	Goes red

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

(i) Sulfuric acid and ethanoic acid are both acids because they contain

- CH_3COO^- ions.
- H^+ ions.
- SO_4^{2-} ions.

(1)

(ii) Sulfuric acid is a stronger acid than ethanoic acid.

The pH of stronger acids is

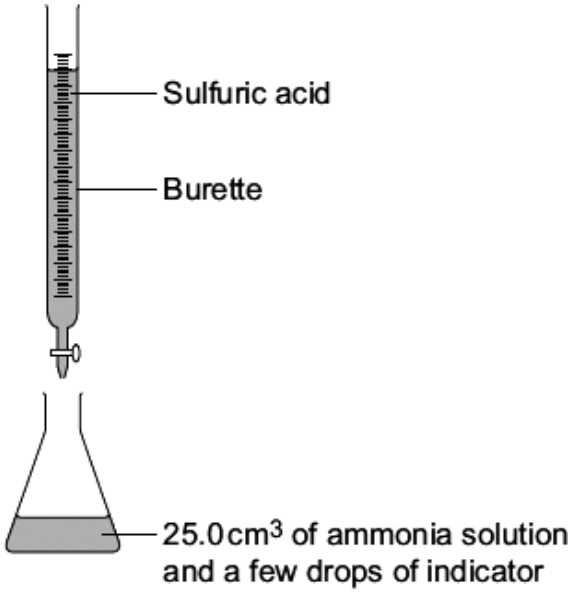
- higher than
- lower than
- the same as

the pH of weaker acids.

(1)

(d) The volume of sulfuric acid that reacts with 25.0 cm^3 of ammonia solution can be found by titration.

The diagram shows the apparatus used for the titration.



A student did the titration five times and recorded the following results.

Titration	1	2	3	4	5
Volume of acid added in cm^3	13.3	13.9	13.2	13.1	13.2

(i) How did the student know when enough sulfuric acid had been added to neutralise the ammonia solution?

.....

.....

(1)

(ii) The student did **not** use one of the results because it was anomalous.

Which result was anomalous? .....

(1)

(iii) Use the **other** four results to calculate the mean volume of sulfuric acid that reacted with the ammonia.

.....

.....

Mean volume = ... cm^3

(1)

(Total 10 marks)

Q16. 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)

Q17. 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)

Q18. Vinegar can be added to food.

Vinegar is a solution of ethanoic acid in water.

(a) Ethanoic acid is a *weak* acid.

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

(i) When dissolved in water, an acid forms a solution containing

carbonate ions.
hydrogen ions.
hydroxide ions.

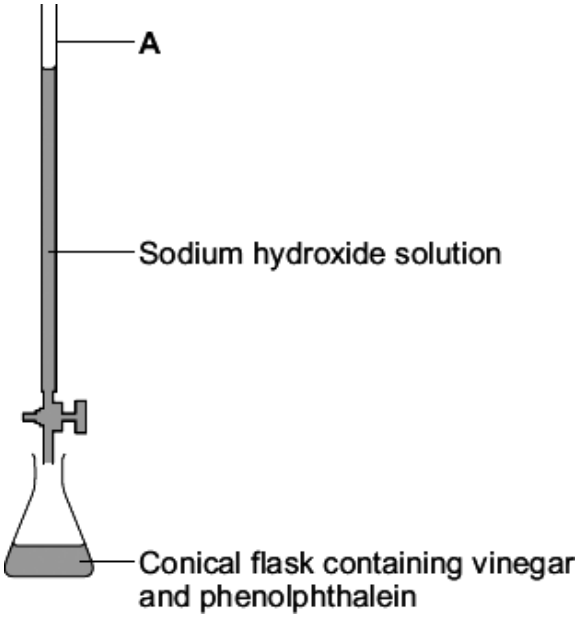
(1)

(ii) Ethanoic acid is a *weak* acid because in water it is

completely ionised.
not ionised.
partially ionised.

(1)

(b) The diagram shows the apparatus used to investigate the amount of ethanoic acid in vinegar.



(i) Draw a ring around the name of the piece of apparatus labelled **A** on the diagram.

burette **measuring cylinder** **pipette**

(1)

(ii) Phenolphthalein is added to the vinegar in the conical flask so that the end point of the titration can be seen.

What type of substance is phenolphthalein?

Draw a ring around the correct answer.

alkali **catalyst** **indicator**

(1)

(iii) How would you know that the end point of the titration has been reached?

.....

.....

(1)

(c) The results of the titration are shown in the table.

	Rough titration	Accurate titrations		
		1	**2**	**3**
Final reading in cm^3	22	21.30	22.50	24.40
Initial reading in cm^3	0	1.00	2.00	4.00
Volume used in cm^3	22	20.30	20.50	20.40

Calculate the best value of the mean volume from these titrations.

.....

.....

.....

Mean volume used = ... cm^3

(2)

(d) 25.0 cm^3 of this vinegar contained 1.25 g of ethanoic acid.

Calculate the mass of ethanoic acid in 1 litre (1000 cm^3) of this vinegar.

.....

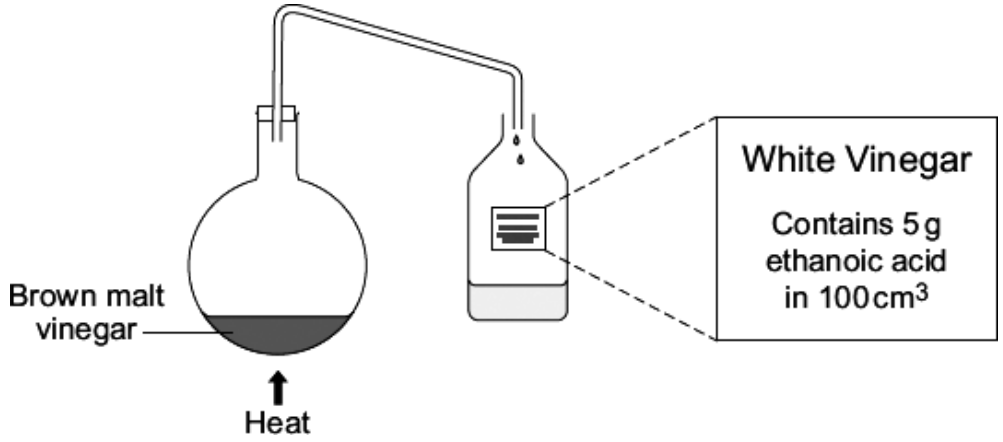
.....

.....

Mass = ... g

(2)
(Total 9 marks)

Q19. White vinegar can be made by distillation of brown malt vinegar.



(a) White vinegar contains only water (boiling point 100 °C) and ethanoic acid (boiling point 118 °C).

Suggest why the brown colour remains in the flask during the distillation.

.....

.....

(1)

(b) Ethanoic acid is a weak acid.

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

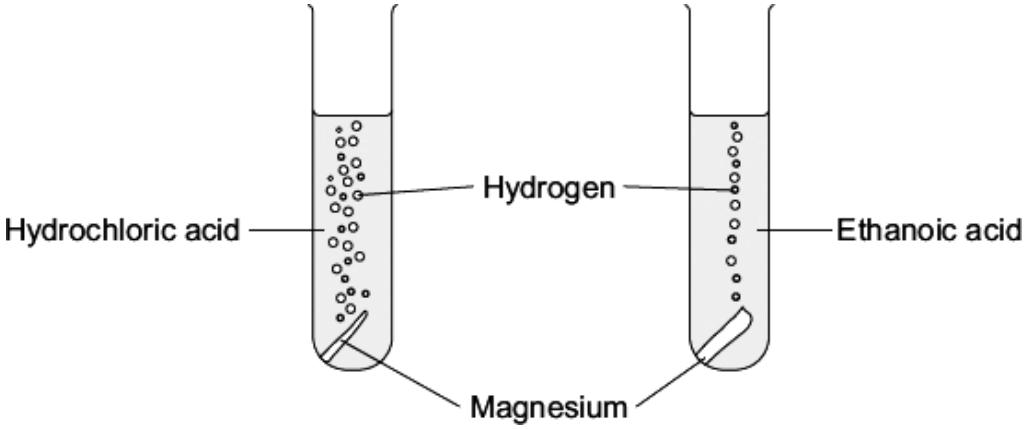
Weak acids are | completely | not | partially | ionised in water.

(1)

(ii) Hydrochloric acid and ethanoic acid were reacted with magnesium metal to produce hydrogen gas.

At the start:

- both acids were the same concentration
- both pieces of magnesium were the same size.



Give **two** observations which show that ethanoic acid is a weaker acid than hydrochloric acid.

1 .....

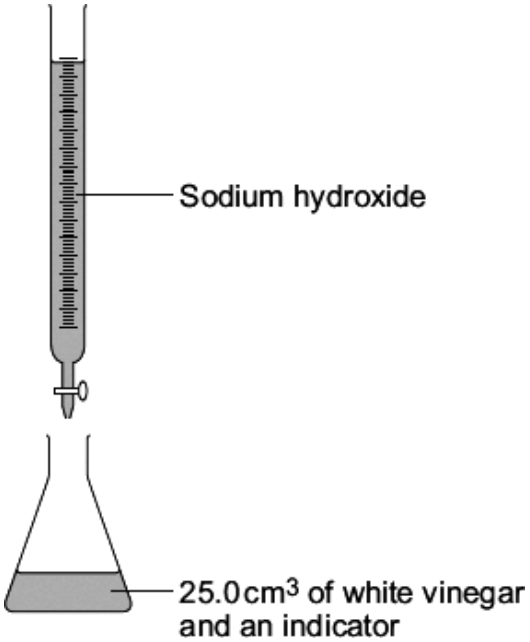
.....

2 .....

.....

(2)

(c) A student did a titration to find out if the white vinegar contains 5 g of ethanoic acid in 100 cm^3.



(i) Choose the correct words from the box to complete the sentences.
Use each word once or not at all.

burette	**conical flask**	**pipette**	**thermometer**

To do this titration 25.0 cm^3 of the white vinegar is measured

using a ..... .

The 25.0 cm^3 of white vinegar is then run into a ..... .

An indicator is added to the white vinegar.

Sodium hydroxide solution is added to the white vinegar

from a ..... .

(3)

(ii) How does the student know when to stop adding the sodium hydroxide solution?

.....

.....

.....

.....

(2)

(d) The titration is repeated three more times. The results are shown in the table.

Titration	**1**	**2**	**3**	**4**
Volume of sodium hydroxide in cm^3	23.5	20.1	19.9	20.0

(i) The student decided that the mean of these results was 20.0 cm^3.

Explain why.
Use the figures from the table in your explanation.

.....

.....

.....

.....

(2)

(ii) From the results, the student calculated that the concentration of the ethanoic acid was 48 g per cubic decimetre.

Did the white vinegar contain 5 g of ethanoic acid in 100 cm^3 ?
Explain your answer.

.....

.....

(1)
(Total 12 marks)

Q20. 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.

.....

.....

.....

.....

(2)
(Total 8 marks)

Q21. The table shows some information about acids and alkalis.

Name of acid or alkali	Type	Ions produced in solution		pH	Effect on Universal Indicator
Hydrochloric acid	Strong acid	H^+	Cl^-	1	Goes red
Sodium hydroxide	Strong alkali	Na^+	OH^-	13	Goes purple

Use the information in the table to help you answer parts (a) and (b).

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

(i) Hydrochloric acid is acidic.

This is because it contains [Cl^- / H^+ / OH^-] ions.

(1)

(ii) Sodium hydroxide solution is alkaline.

This is because it contains [H^+ / Na^+ / OH^-] ions.

(1)

(b) Hydrochloric acid is a stronger acid than ethanoic acid.

When Universal Indicator is added to solutions of these acids at the same concentration the results are different.

Describe how the results would show that ethanoic acid is a weaker acid than hydrochloric acid.

.....

.....

.....

.....

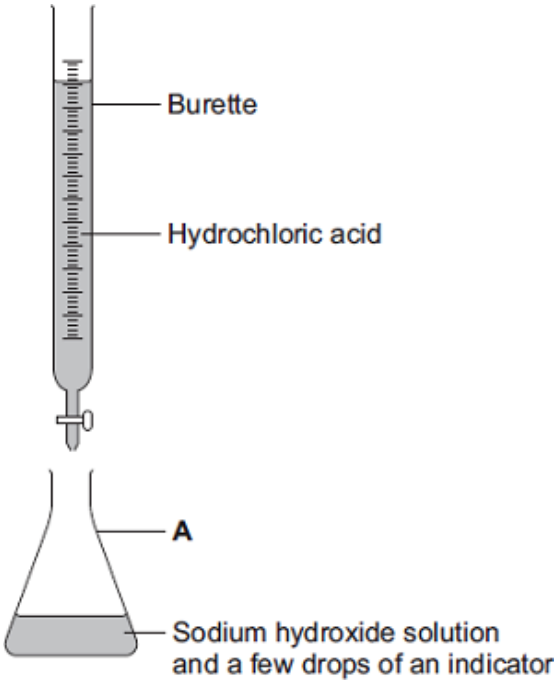
(2)

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

Strong acids and strong alkalis are | completely | not | partially | ionised in water.

(1)

(d) The diagram shows the apparatus used to find the volume of hydrochloric acid that reacts with 25.0 cm^3 of sodium hydroxide solution.



(i) Which **one** of the following is the correct name for **A**?

Draw a ring around your answer.

beaker **conical flask** **pipette**

(1)

(ii) Use the correct word from the box to complete the sentence.

distillation **filtration** **titration**

(1)

The method used to find the volume of acid that reacts with a known volume of alkali is called.....

(1)

(iii) Suggest **one** way to make the results more reliable.

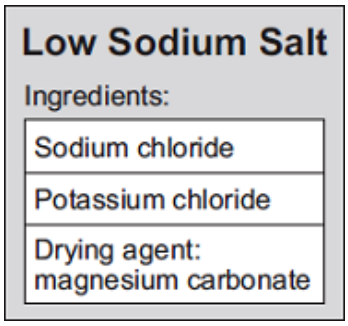
.....

.....

(1)

(Total 8 marks)

Q22. 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 / yellow] colour.

(1)

(ii) In a flame test, potassium ions produce a [lilac / red / yellow] colour.

(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)