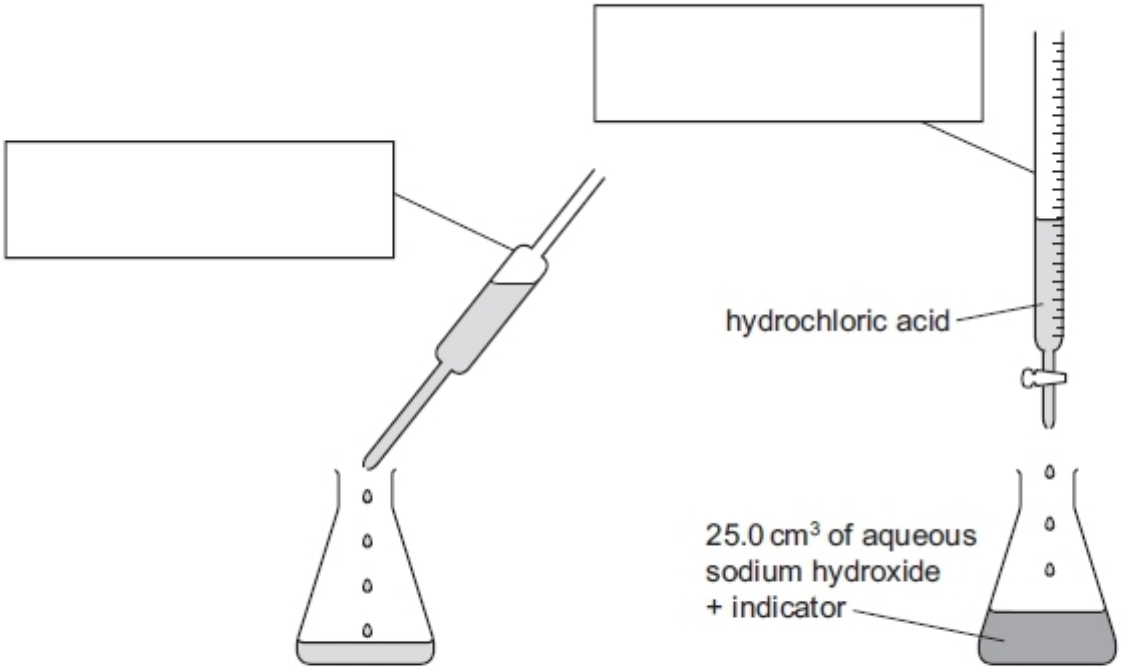
iG Chem 8 Paper 6 Acids, bases and salts 15w to 01w P6 758marks

Q# 1/ iGCSE Chem/2015/w/Paper 62/

1 The volume of hydrochloric acid that reacts with 25.0 cm^3 of aqueous sodium hydroxide can be found using the apparatus below.



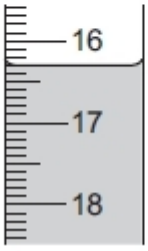
(a) Complete the boxes to identify the pieces of apparatus labelled. [2]

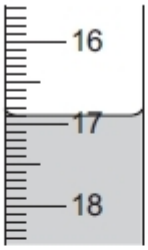
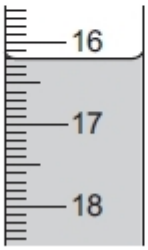
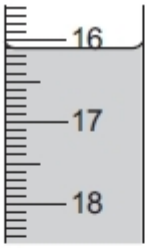
(b) Name a suitable indicator that could be used.

..... [1]

(c) A student did the experiment four times and the volume of hydrochloric acid added each time was measured.

Use the burette diagrams in the table to record the volumes of hydrochloric acid added.

experiment	burette diagram	volume of acid added / cm^3
1		

2		
3		
4		

[2]

(d) (i) What type of chemical reaction occurs when hydrochloric acid reacts with sodium hydroxide?

..... [1]

(ii) How did the student know when all of the sodium hydroxide had reacted?

..... [1]

(e) (i) Which **one** of the results is anomalous?

..... [1]

(ii) Suggest what may have caused this result to be anomalous.

..... [1]

(iii) Use the other results to calculate the average amount of hydrochloric acid that reacted with the sodium hydroxide solution.

.....

..... [2]

(f) Which of the solutions was more concentrated? Explain your answer.

.....

..... [2]

5 Two aqueous solutions, **K** and **L**, were analysed. Solution **L** was aqueous calcium iodide. Tests on the solutions and some of the observations are in the following tables. Complete the observations in the second table.

tests	observations
<u>tests on solution **K**</u> **(a)** Colour of solution **K**.	green / blue
(b) The solution was divided into four equal portions. **(i)** Aqueous sodium hydroxide was added to the first portion drop by drop and shaken. An excess of aqueous sodium hydroxide was then added to the mixture. **(ii)** Aqueous ammonia was added to the second portion drop by drop and shaken. An excess of aqueous ammonia was then added to the mixture. **(iii)** Dilute nitric acid and barium nitrate solution were added to the third portion. **(iv)** Dilute nitric acid and silver nitrate solution were added to the fourth portion.	pale blue precipitate the precipitate was insoluble blue precipitate the precipitate dissolved to form a deep blue solution no visible change white precipitate formed

(c) Identify solution **K**.

..... [2]

tests	observations
<u>tests on solution **L**</u> **(d)** Colour of solution **L**.	..... [1]

(e) The solution was divided into three equal portions.	
(i) Aqueous sodium hydroxide was added to the first portion of the solution drop by drop and shaken.	..... [2]
An excess of aqueous sodium hydroxide was then added to the mixture.	..... [1]
(ii) Aqueous ammonia was added to the second portion of the solution drop by drop and shaken.	..... [1]
An excess of aqueous ammonia was then added to the mixture and shaken.	..... [1]
(iii) Dilute nitric acid and silver nitrate solution were added to the third portion of the solution.	..... [2]

Q# 3/ iGCSE Chem/2015/w/Paper 62/

4 Three jars of gas have lost their labels. The gases are known to be

- ethene,
- ammonia,
- oxygen.

Complete the table to show the chemical tests that could be used to identify each of these gases.

gas	chemical test	result of test
ammonia	....	.... [2]
oxygen	....	.... [2]

Q# 4/ iGCSE Chem/2015s/Paper 6/

5 Solid **C** was analysed. Solid **C** was a mixture of salts containing aluminium ions, sulfate ions and another cation (positive ion).
Tests on solid **C**, and some of the observations, are in the table.

Complete the observations in the table.

tests	observations
<u>tests on solid **C**</u> **(a)** Appearance of solid **C**.	white solid
(b) A little of solid **C** was heated gently and then strongly.	condensation was formed at the top of the test-tube
The gas given off was tested with damp pH indicator paper.	pungent gas, pH = 10
<u>tests on a solution of **C**</u> Water was added to solid **C** to produce an aqueous solution, solution **C**. **(c)** Drops of aqueous sodium hydroxide were added to solution **C** using a teat pipette.	.....
Excess aqueous sodium hydroxide was then added to the mixture.	..... [3]
The mixture was boiled gently and any gases given off were tested.	pungent gas, pH = 10
(d) Excess aqueous ammonia was added to solution **C**.	..... [1]
(e) A few drops of dilute nitric acid and aqueous silver nitrate were added to solution **C**.	..... [1]
(f) A few drops of dilute nitric acid and barium nitrate solution were added to solution **C**.	..... [2]

(g) What does the formation of condensation in test **(b)** tell you about the nature of solid **C**?

..... [1]

(h) What does test **(e)** tell you about the nature of solid **C**?

..... [1]

(i) (i) Name the gas given off in test **(b)**.

..... [1]

(ii) What is your conclusion about the identity of the other cation in solid **C**?

..... [1]

Q# 5/ iGCSE Chem/2015s/Paper 6/

4 A student investigated the reaction of aqueous sodium hydroxide with aqueous solutions of two different acids, **A** and **B**.

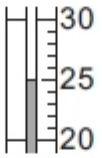
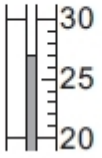
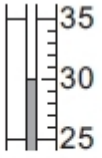
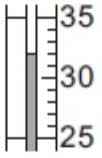
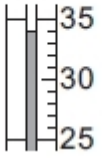
Two experiments were done.

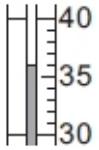
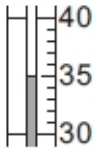
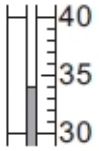
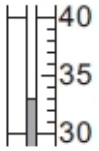
(a) *Experiment 1*

Using a measuring cylinder, 50 cm^3 of aqueous sodium hydroxide solution was poured into a polystyrene cup. The initial temperature of the solution was measured.

A burette was filled with the solution of acid **A** to the 0.0 cm^3 mark.
5.0 cm^3 of acid **A** was added to the aqueous sodium hydroxide in the cup and the mixture stirred.
The temperature of the solution was measured. Another 5.0 cm^3 of acid **A** was added to the cup and the mixture stirred. The temperature of the mixture was measured.
More 5.0 cm^3 portions of acid **A** were added to the cup until a total volume of 40.0 cm^3 of acid had been added. After each addition, the mixture was stirred and the temperature measured.

Use the thermometer diagrams in the table to record the temperatures.

volume of acid **A** added / cm^3	thermometer diagram	temperature of solution in polystyrene cup / °C
0.0		
5.0		
10.0		
15.0		
20.0		

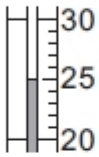
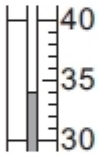
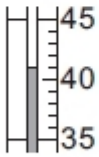
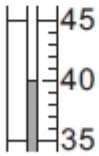
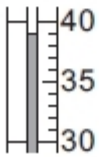
25.0		
30.0		
35.0		
40.0		

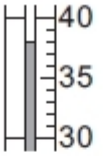
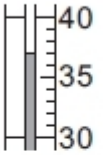
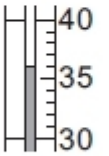
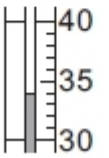
[3]

The burette was emptied and rinsed with distilled water, and then with acid **B**. This acid was discarded. The burette was then filled up to the 0.0 cm^3 mark with acid **B**.

(b) *Experiment 2*

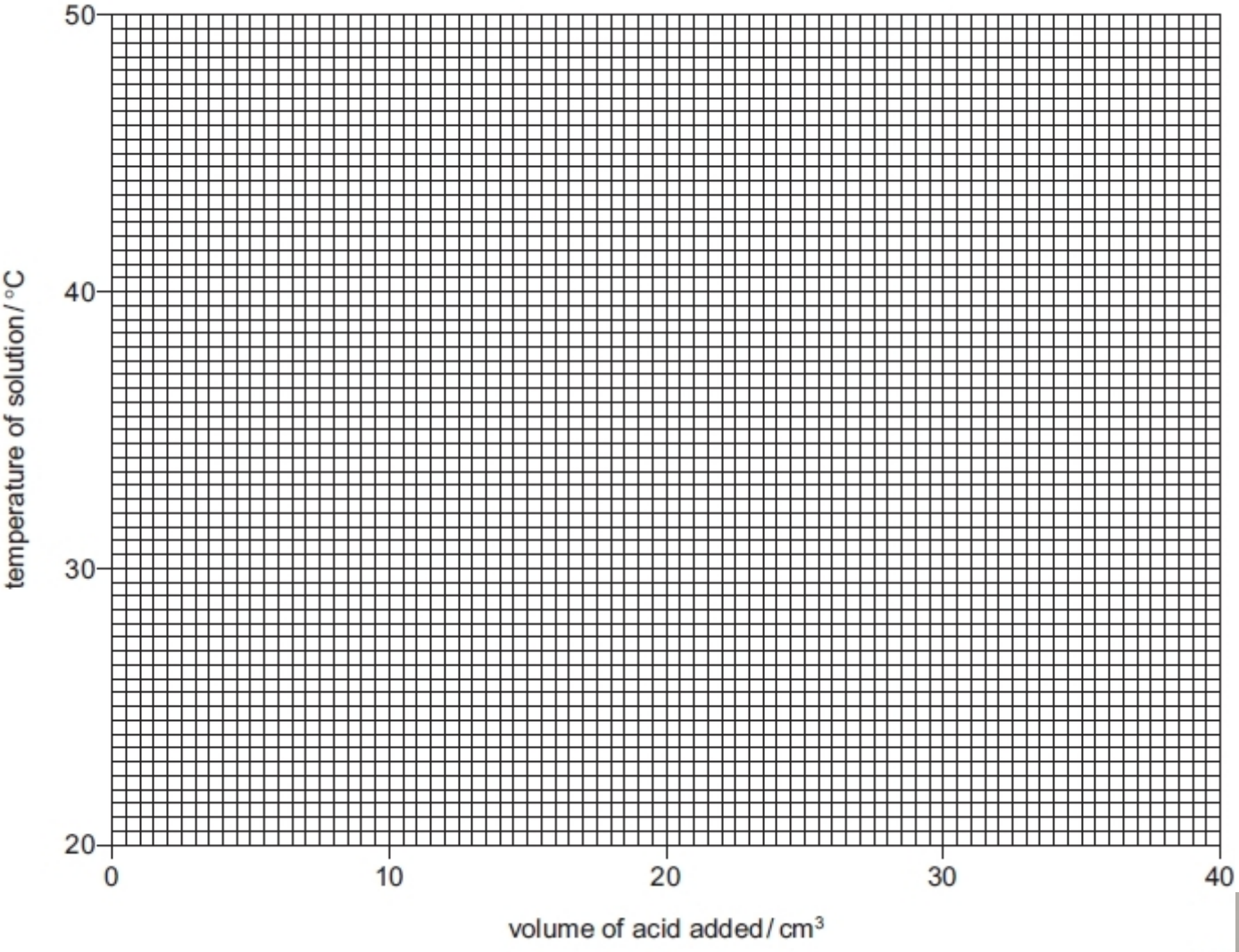
Experiment 1 was repeated using acid **B** instead of acid **A**.
Use the thermometer diagrams in the table to record the temperatures.

volume of acid **B** added / cm^3	thermometer diagram	temperature of solution in polystyrene cup / °C
0.0		
5.0		
10.0		
15.0		
20.0		

25.0		
30.0		
35.0		
40.0		

[3]

(c) Plot the results for Experiments 1 and 2 on the grid and draw a smooth line graph for each experiment.
Clearly label your graphs.



[5]

(d) **Use your graph** to estimate the temperature of the reaction mixture when 8.0 cm^3 of acid **B** were added to 50 cm^3 of aqueous sodium hydroxide.

Show clearly **on the grid** how you worked out your answer.

..... [2]

(e) What type of chemical reaction, other than neutralisation, occurred when acid **A** reacted with sodium hydroxide?

..... [1]

(f) Why was the burette rinsed firstly with distilled water and then with acid **B** before starting Experiment 2?

.....

..... [2]

(g) The solutions of acids **A** and **B** are the same concentration.

(i) In which experiment was the maximum temperature change greater?

..... [1]

(ii) Suggest why the maximum temperature change was greater in this experiment.

.....

..... [1]

(h) Describe one source of error in Experiment 2. Suggest one improvement to reduce this source of error.

source of error .....

improvement .....

[2]

Q# 6/ iGCSE Chem/2015march/Paper 6/

5 Two metal salt solutions, **E** and **F**, were analysed.
E was a mixture of iron(II) sulfate and ammonium sulfate.
The tests on the solutions and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
<u>tests on solution **E**</u> (a) Appearance of solution **E**.	..... [1]

The solution was divided into three equal portions in separate test-tubes. **(b)** Dilute nitric acid and aqueous barium nitrate were added to the first portion of the solution.	..... [1]
(c) **(i)** Excess aqueous sodium hydroxide was added to the second portion of the solution. **(ii)** The mixture was filtered and the filtrate heated. The gas given off was tested with damp litmus paper.	..... [2] .... [2]
(d) Dilute sulfuric acid and aqueous potassium manganate(VII), an oxidising agent, were added to the third portion of the solution. Aqueous sodium hydroxide was then added to the mixture.	..... [1]
<u>tests on solution **F**</u> **(e)** Appearance of solution **F**.	yellow liquid
(f) Zinc powder was added to solution **F**. The solution was observed for five minutes. The gas given off was tested with a splint.	rapid effervescence turned blue, then green and finally light purple lighted splint popped

(g) Identify the gas given off in test **(f)**.

..... [1]

(h) What conclusions can you draw about solution **F**?

.....

..... [2]

[Total: 10]

Q# 7/ iGCSE Chem/2015march/Paper 6/

1 A teacher separated a mixture of two liquids using the apparatus shown. The liquids were:

- ethanoic acid, boiling point 118 °C,
- chloroethanoic acid, boiling point 190 °C.

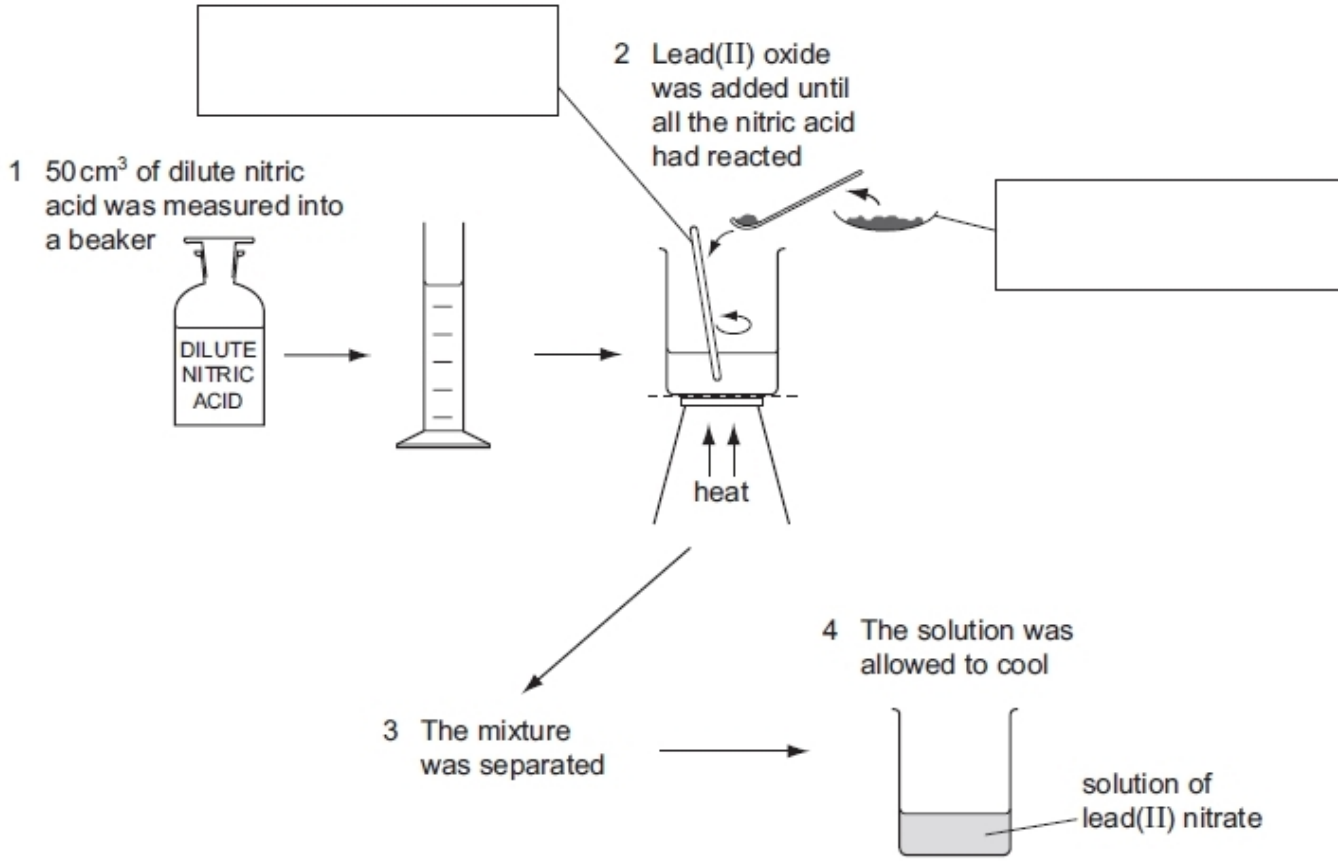
(d) Give a test to show that the liquids are acidic.

test .....

result ..... [2]

Q# 8/ iGCSE Chem/2014/w/Paper 6/

1 A student reacted dilute nitric acid with lead(II) oxide to prepare lead(II) nitrate. The diagram shows the stages in the method used.



(a) Complete the boxes to identify the pieces of apparatus. [2]

(b) Why is the dilute nitric acid heated?

..... [1]

(c) The lead(II) oxide was weighed before and after the additions.

before after

Use the balance diagrams to work out the mass of lead(II) oxide added to the dilute nitric acid.

..... [2]

(d) (i) How would the student know when all of the dilute nitric acid had reacted in stage 2?

..... [1]

(ii) What method is used to separate the mixture in stage 3?

..... [1]

(iii) What term is used to describe the unreacted lead(II) oxide?

..... [1]

(e) Describe the effect of heating the solution of lead(II) nitrate until it boils and then heating for a further ten minutes.

.....

.....

..... [2]

Q# 9/ iGCSE Chem/2014/w/Paper 6/

4 A student investigated the reaction between two different solutions of dilute hydrochloric acid, **A** and **B**, and solution **C** which is alkaline.

Two experiments were carried out.

(a) *Experiment 1*

A burette was filled with solution **A** of dilute hydrochloric acid to the 0.0 cm^3 mark. Using a measuring cylinder, 20 cm^3 of solution **C** was poured into a conical flask. A few drops of methyl orange were added to the flask.

Solution **A** was added to the flask, with shaking, until the mixture just changed colour.

(b) *Experiment 2*

Experiment 1 was repeated using solution **B**.

(h) Describe a method other than titration, using a **different** reactant, that could be used to compare the concentrations of the two solutions of dilute hydrochloric acid, **A** and **B**.

.....

.....

.....

.....

.....

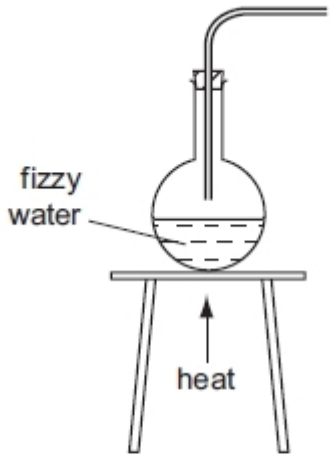
..... [4]

Q# 10/ iGCSE Chem/2014/w/Paper 6/

6 **Fizzy water**

Fizzy water contains carbon dioxide dissolved under pressure. When the water is heated, the gas is given off.

(a) (i) Complete the labelled diagram to show how you could collect and measure the volume of gas given off when fizzy water is heated.



[2]

(ii) State a test for carbon dioxide.

.....

..... [2]

Q# 11/ iGCSE Chem/2014/w/Paper 6/

5 A solid **D**, which is a soluble metal sulfate, was analysed.
The tests on **D**, and some of the observations, are in the following table.
Complete the observations in the table.

tests	observations
<u>tests on solid **D**</u>	
(a) (i) Appearance of solid **D**.	pale green crystals
(ii) Solid **D** was heated in a test-tube gently and then strongly.	condensation formed at the top of the test-tube

tests on the aqueous solution Solid **D** was added to distilled water and shaken to dissolve. The solution was divided into four equal portions in separate test-tubes.	
(b) (i) Several drops of aqueous sodium hydroxide were added to the first portion of the solution.	green precipitate
Excess aqueous sodium hydroxide was added to the mixture.	green precipitate remained
(ii) Excess aqueous ammonia was added to the second portion of the solution.	green precipitate
(c) Aqueous silver nitrate and dilute nitric acid were added to the third portion of the solution.	..... [1]
(d) Aqueous barium nitrate and dilute nitric acid were added to the fourth portion of the solution.	..... [2]

(e) What does test **(a)** tell you about solid **D**?

..... [2]

(f) What conclusions can you draw about the identity of solid **D**?

.....

..... [3]

Q# 12/ iGCSE Chem/2014/w/Paper 6/

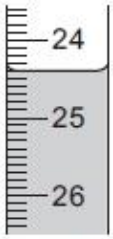
4 A student investigated the reaction between two different solutions of dilute hydrochloric acid, **A** and **B**, and solution **C** which is alkaline.

Two experiments were carried out.

(a) *Experiment 1*

A burette was filled with solution **A** of dilute hydrochloric acid to the 0.0 cm^3 mark. Using a measuring cylinder, 20 cm^3 of solution **C** was poured into a conical flask. A few drops of methyl orange were added to the flask.

Solution **A** was added to the flask, with shaking, until the mixture just changed colour.
Use the burette diagram to record the burette reading in the table and complete the table.



initial reading

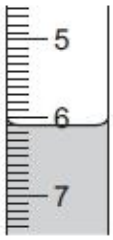
final burette reading / cm^3	
initial burette reading / cm^3	
difference / cm^3	

[2]

(b) *Experiment 2*

The burette was emptied and rinsed, first with distilled water, and then with a little of solution **B**. The burette was filled with solution **B** of dilute hydrochloric acid to the 0.0 cm^3 mark.

Experiment 1 was repeated using solution **B**.
Use the burette diagram to record the burette reading in the table and complete the table.



final reading

final burette reading / cm^3	
initial burette reading / cm^3	
difference / cm^3	

[2]

(c) (i) What type of chemical reaction takes place when hydrochloric acid reacts with alkaline solutions?

..... [1]

(ii) Why is methyl orange added to the flask?

..... [1]

(d) Why was the burette rinsed, first with distilled water and then with solution **B**, before starting Experiment 2?

.....

.....

..... [2]

(c) **(i)** What type of chemical reaction takes place when hydrochloric acid reacts with alkaline solutions?

..... [1]

(ii) Why is methyl orange added to the flask?

..... [1]

(d) Why was the burette rinsed, first with distilled water and then with solution **B**, before starting Experiment 2?

.....

.....

..... [2]

(e) **(i)** In which experiment was the greater volume of dilute hydrochloric acid used?

..... [1]

(ii) Compare the volumes of dilute hydrochloric acid used in Experiments 1 and 2.

..... [1]

(iii) Suggest, in terms of the concentration of solutions **A** and **B**, an explanation for the difference in volumes used.

.....

.....

..... [2]

(f) If Experiment 2 was repeated using 10 cm^3 of solution **C**, what volume of dilute hydrochloric acid would be used? Explain your answer.

.....

..... [2]

(g) Give **one** advantage and **one** disadvantage of using a measuring cylinder for solution **C**.

advantage .....

disadvantage ..... [2]

Q# 13/ iGCSE Chem/2014s/Paper 6/

2 The following paragraph was taken from a student's notebook.

> *Preparation of lead chloride*
>
> *10 cm^3 of aqueous lead nitrate was placed in a beaker and 10 cm^3 of aqueous potassium chloride added. Lead chloride, a white solid, was formed. The solid was separated from the mixture.*
> *Water was then added to the solid and the mixture boiled. A clear liquid was formed. On cooling, white crystals were deposited.*

(a) What type of chemical reaction resulted in the formation of the lead chloride?

..... [1]

(b) What is the solubility of lead chloride in

(i) cold water, ...

(ii) hot water? ..... [2]

(c) What method should be used to separate the crystals from the mixture?

..... [1]

Q# 14/ iGCSE Chem/2014s/Paper 6/

5 A solid **U** was analysed. **U** was a soluble metal sulfate.
The tests on **U**, and some of the observations are in the following table.
Complete the observations.

tests	observations
tests on solid **U** **(a)** Appearance of solid **U**.	pink crystals
(b) Solid **U** was heated gently and then strongly in a test-tube.	condensation droplets formed on the sides of the test-tube
(c) Solid **U** was added to distilled water in a test-tube and shaken until dissolved. The solution was divided into three equal portions in separate test-tubes and the following tests carried out. Several drops of aqueous sodium hydroxide were added to the first portion of the solution and the test-tube shaken. Then hydrogen peroxide solution was added to the mixture and the gas given off tested.	 pale brown precipitate effervescence glowing splint relit

(d) Dilute nitric acid was added to the second portion of the solution followed by barium nitrate solution.	.... [2]
(e) Dilute nitric acid was added to the third portion of the solution followed by silver nitrate solution.	..... [1]

(f) What does test **(e)** tell you about solid **U**?

..... [1]

(g) Name the gas given off in test **(c)**.

..... [1]

(h) What conclusions can you draw about solid **U**?

.....

..... [2]

Q# 15/ iGCSE Chem/2014s/Paper 6/

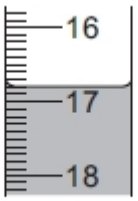
4 A student investigated the reaction between dilute hydrochloric acid and an aqueous alkaline solution **R**, containing two different substances, **S** and **T**.

Three experiments were carried out.

Experiment 1

Using a measuring cylinder, 25 cm^3 of solution **R** was poured into a conical flask and five drops of phenolphthalein were added to the flask.
A burette was filled with hydrochloric acid up to the 0.0 cm^3 mark. Hydrochloric acid was added to the solution **R** and the flask shaken. Addition of hydrochloric acid was continued until the colour just disappeared.
The mixture in the flask was kept for Experiment 2.

(a) Use the burette diagram to record the final volume in the table of results and complete the table.



final burette reading

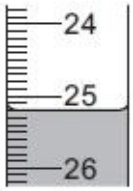
	burette readings
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[3]

Experiment 2

Five drops of methyl orange indicator were added to the mixture in the flask from Experiment 1. The mixture turned yellow. The initial volume reading of the burette was the same as the final reading in Experiment 1. Hydrochloric acid was added from the burette to the mixture in the flask and the mixture shaken.
The volume of hydrochloric acid added was recorded when the indicator just changed colour.

(b) Use the burette diagram to record the final volume in the table of results and complete the table.



final burette reading

	burette readings
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[3]

(c) *Experiment 3*

Hydrochloric acid was added to about 5 cm^3 of solution **R** in a test-tube.

Rapid effervescence was observed.

(d) When phenolphthalein indicator was used in Experiment 1 the colour changed

from pink to ..... [1]

(e) In a similar experiment, methyl orange indicator was used in Experiment 1 followed by phenolphthalein in Experiment 2.
Suggest why this experiment would not work.

.....

..... [1]

(f) What conclusion can you draw from Experiment 3?

..... [1]

(g) The volume of hydrochloric acid added in Experiment 1 reacted with all of substance **S** and half of substance **T**.
The volume of hydrochloric acid in Experiment 2 reacted with half of substance **T**.

(i) Work out the volume of hydrochloric acid which reacted with substance **S**.

..... [2]

(ii) Work out the volume of hydrochloric acid which reacted with substance **T**.

..... [1]

(iii) Compare the volumes of hydrochloric acid which reacted with substances **S** and **T**.

..... [1]

(h) (i) The experiments were repeated using 100 cm^3 of solution **R**.
Predict the volume of hydrochloric acid which would be added in Experiments 1 and 2.
Explain your answer.

Experiment 1 .....

Experiment 2 .....

Explanation ..... [3]

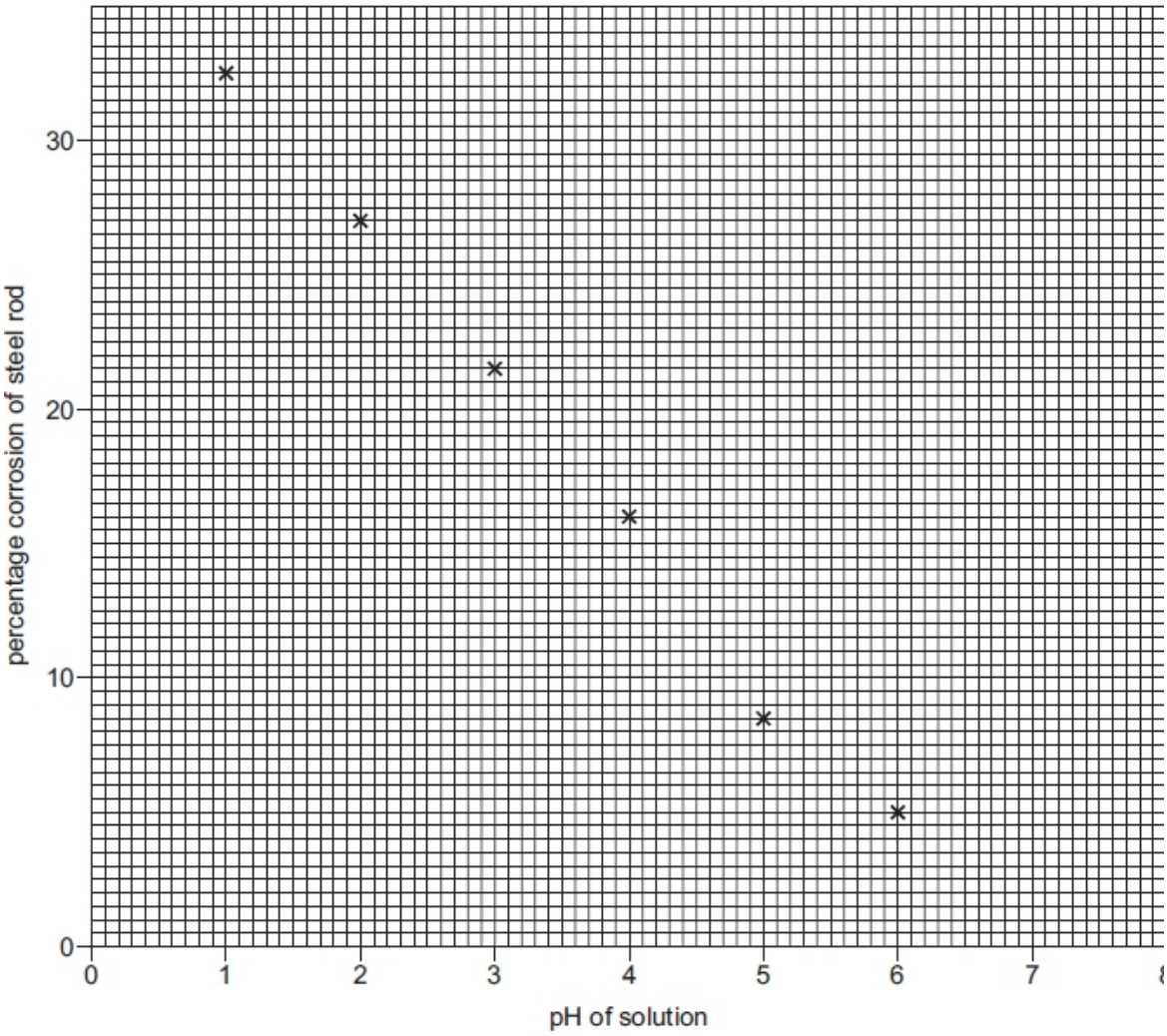
(ii) Suggest a practical problem that would occur when carrying out these repeat experiments and how you could solve this problem.

.....

..... [2]

Q# 16/ iGCSE Chem/2013/w/Paper 6/

2 Eight steel rods of the same size were placed in solutions of different pH for one week.
The percentage corrosion of the rods was measured and the results plotted on the grid below.



(a) Draw a best fit straight line through the points. [1]

(b) Why were the steel rods the same size?

..... [1]

(c) State **one** other variable which should have been kept constant.

..... [1]

(d) State one conclusion that could be drawn from the results.

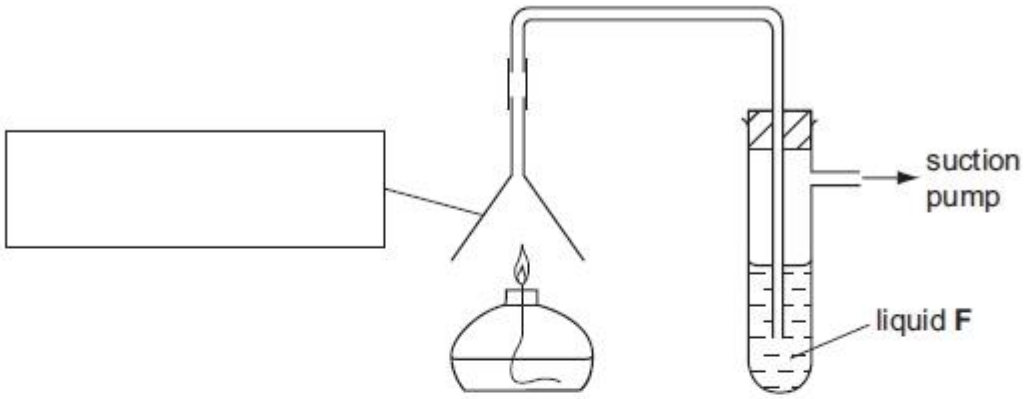
..... [1]

(e) Determine the percentage corrosion of a steel rod in a solution of pH 6.5.

..... [1]

Q# 17/ iGCSE Chem/2013/w/Paper 6/

1 A student investigated the products formed when ethanol was burned using the apparatus shown.



(a) Complete the box to identify the piece of apparatus. [1]

(b) Why is a suction pump used?

..... [1]

(c) **(i)** Suggest the purpose and identity of liquid **F**.

identity .....

purpose ..... [2]

(ii) Why is the end of the delivery tube below the surface of liquid **F**?

.....

..... [1]

(d) Give **one** expected observation in the horizontal part of the delivery tube.
Explain your answer.

.....

..... [2]

Q# 18/ iGCSE Chem/2013/w/Paper 6/

4 Two liquids, **L** and **M**, were analysed. **L** was aqueous potassium iodide. **M** was a colourless liquid.
The tests on the liquids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
tests on liquid **L** **(a)** Appearance of liquid **L**.	..... [1]
Liquid **L** was divided into three equal portions in separate test-tubes. **(b) (i)** An iodine crystal was added to the first portion of liquid **L**. The test-tube was stoppered and the contents shaken. **(ii)** An equal volume of liquid **M** was added to the test-tube, the contents shaken and left to stand for five minutes.	liquid turned orange two layers were formed, pink top layer and orange lower layer
(c) To the second portion of liquid **L**, dilute nitric acid and barium nitrate solution were added.	..... [1]
(d) To the third portion of liquid **L**, dilute nitric acid and silver nitrate solution were added.	..... [2]

(e) Why does the colour of liquid **L** change in test **(b)(i)**?

.....

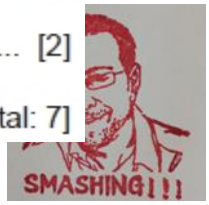
..... [1]

(f) What conclusions can you draw about liquid **M** from test **(b)(ii)**?

.....

..... [2]

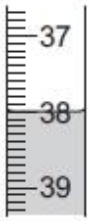
[Total: 7]



3 A student investigated the reaction between aqueous sodium hydroxide and acid **K**.
Two experiments were carried out.

(a) *Experiment 1*

Using a measuring cylinder, 25 cm^3 of acid **K** was poured into a conical flask. Phenolphthalein indicator was added to the flask. A burette was filled with aqueous sodium hydroxide to the 0.0 cm^3 mark. Aqueous sodium hydroxide was added from the burette to the flask and the mixture shaken until the solution showed a permanent colour change.
The final volume was measured. Use the burette diagram to record the final volume in the table and complete the table.



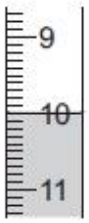
final volume

	burette reading
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

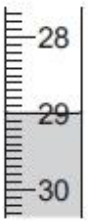
[2]

(b) *Experiment 2*

The solution was poured away and the conical flask rinsed.
Using a measuring cylinder, 50 cm^3 of acid **K** was poured into the conical flask. 0.3 g of powdered calcium carbonate was added to the flask and the flask shaken until no further reaction was observed.
Phenolphthalein was added to the mixture in the flask.
A burette was filled with the same aqueous sodium hydroxide and the initial volume measured. Aqueous sodium hydroxide was added from the burette to the flask and the mixture shaken until the solution showed a permanent colour change.
Use the burette diagrams to record the initial and final volumes in the table and complete the table.



initial volume



final volume

	burette reading
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[2]

(c) What colour change was observed after the sodium hydroxide solution was added to the flask?

from ..... to ..... [2]

(d) What type of chemical reaction occurred when acid **K** reacted with sodium hydroxide?

..... [1]

(e) If Experiment 1 were repeated using 50 cm^3 of acid **K**, what volume of sodium hydroxide would be required to change the colour of the indicator?

..... [2]

(f) **(i)** What were the effects of adding 0.3 g of powdered calcium carbonate to acid **K**?

.....

..... [2]

(ii) Use your answer in **(e)** to work out the difference between the volume of sodium hydroxide needed to completely react with 50 cm^3 of acid **K** and the volume of sodium hydroxide used in Experiment 2.

.....

..... [2]

(iii) Estimate the mass of calcium carbonate that would be needed to be added to 50 cm^3 of acid **K** to require 0.0 cm^3 of sodium hydroxide.

..... [1]

(g) What would be the effect on the results if the solutions of acid **K** were warmed before adding the sodium hydroxide? Give a reason for your answer.

effect on results .....

reason ..... [2]

(h) Suggest the advantage, if any, of

(i) using a pipette to measure the volume of acid **K**.

.....

..... [2]

(ii) using a polystyrene cup instead of a flask.

.....

..... [2]

4 A mixture of two solids, **E** and **F**, was analysed.
Solid **E** was the water-soluble salt aluminium chloride, $AlCl_3$, and solid **F** was an insoluble salt.
The tests on the mixture and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
Distilled water was added to the mixture in a boiling tube. The contents of the boiling tube were shaken and filtered, keeping the filtrate and residue for the following tests.	
<u>tests on the filtrate</u> The filtrate was divided into five portions in five test-tubes. **(a)** The first portion was used to describe the appearance of the filtrate.	appearance ..... [1]
(b) Several drops of aqueous sodium hydroxide were added to the second portion of the solution. Excess aqueous sodium hydroxide was then added to the test-tube.	.... [3]
(c) Aqueous ammonia was added to the third portion, dropwise and then in excess.	.... [2]
(d) To the fourth portion of the solution, dilute nitric acid and aqueous silver nitrate were added.	..... [2]
(e) To the fifth portion of the solution, about 1 cm^3 of dilute nitric acid and barium nitrate solution were added.	..... [1]

tests	observations
<u>tests on the residue</u> **(f) (i)** To a little of the residue, dilute hydrochloric acid was added. The gas given off was tested.	rapid effervescence gas turned limewater milky
(ii) The residue was heated, gently then strongly.	solid changed colour from green to black

(g) What conclusions can you draw about solid **F**?

.....

..... [2]

Q# 21/ iGCSE Chem/2013s/Paper 6/

6 Copper(II) oxide and carbon are both black solids. Copper(II) oxide reacts with dilute sulfuric acid to form aqueous copper(II) sulfate. Carbon does not react with dilute sulfuric acid.
You are given a mixture of copper(II) oxide and carbon and access to dilute sulfuric acid.
Plan an experiment to investigate the percentage of copper(II) oxide in the mixture.

.....

.....

.....

.....

.....

.....

..... [6]

Q# 22/ iGCSE Chem/2012/w/Paper 6/

5 A mixture of two solids, **M** and **N**, was analysed.
Solid **M** was zinc sulfate which is water-soluble and solid **N** was insoluble.
The tests on the mixture, and some of the observations, are in the table.
Complete the observations in the table.

tests	observations
Distilled water was added to the mixture in a boiling tube and shaken. The contents of the tube were filtered and the filtrate and residue kept for the following tests.	

<u>tests on the filtrate</u> The filtrate was divided into four portions.	
(a) (i) Drops of aqueous sodium hydroxide were added to the first portion of the filtrate. Excess aqueous sodium hydroxide was then added. **(ii)** Drops of aqueous ammonia were added to the second portion of the filtrate. Excess aqueous ammonia was then added.	.... [3] .... [2]
(b) About 1 cm^3 of dilute nitric acid followed by silver nitrate solution was added to the third portion of the filtrate.	..... [1]
(c) About 1 cm^3 of dilute nitric acid followed by barium nitrate solution was added to the fourth portion of the filtrate.	..... [2]

tests	observations
<u>tests on the residue</u> **(d)** Appearance of the residue.	black solid
(e) Dilute hydrochloric acid was added to a little of the residue. The mixture was heated and the gas given off was tested with damp blue litmus paper.	effervescence pungent gas, bleached litmus paper
(f) Aqueous hydrogen peroxide was added to a little of the residue. The gas given off was tested.	effervescence glowing splint relit

(g) Identify the gas given off in test **(e)**.

..... [1]

(h) Identify the gas given off in test **(f)**.

..... [1]

(i) What conclusions can you draw about solid **N**?

.....

..... [2]

Q# 23/ iGCSE Chem/2012s/Paper 6/

5 Solid **W** was analysed. **W** was a carbonate salt.
The tests on solid **W**, and some of the observations, are in the following table. Complete the observations in the table.
Do not write any conclusions in the table.

tests	observations
tests on solid **W** **(a)** Appearance of solid **W**.	white solid
(b) Solid **W** was heated. The gas given off was tested with damp red litmus paper.	gas evolved formed a white solid at the top of the test-tube litmus paper turned blue
(c) Dilute hydrochloric acid was added to solid **W**. The gas given off was tested.	.... [3]
(d) Dilute sodium hydroxide was added to solid **W** and the mixture heated. The gas given off was tested with damp pH indicator paper.	pungent gas given off pH of gas = 10

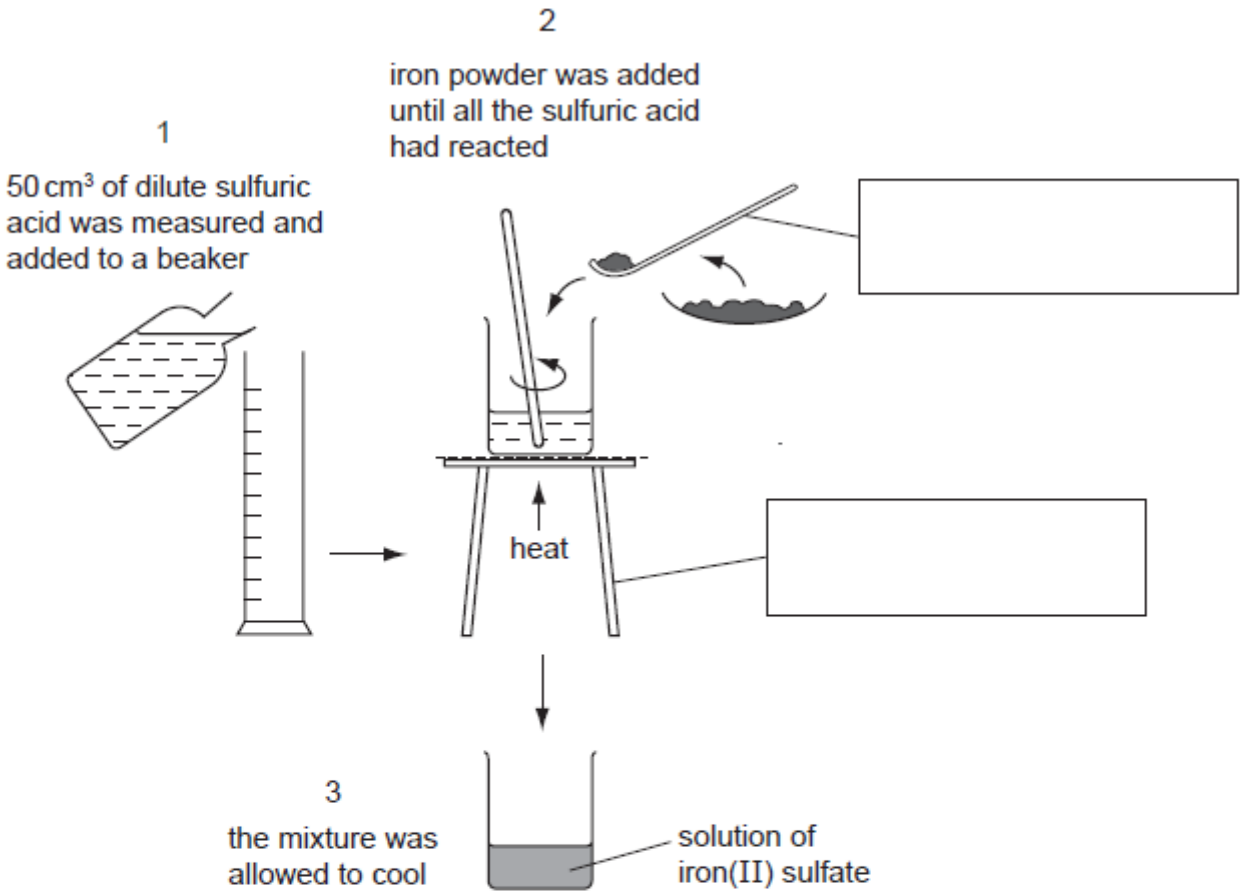
(e) Identify the gas given off in test **(d)**.

..... [1]

(f) What conclusions can you draw about solid **W**?

..... [2]

1 A student reacted excess iron powder with sulfuric acid to prepare a solution of iron(II) sulfate.
The diagram shows the procedure followed in three stages.



(a) Complete the boxes to identify the pieces of apparatus labelled. [2]

(b) How would the student know when all of the sulfuric acid had reacted? Give **two** reasons.

1 .....

2 ..... [2]

(c) Describe the effect of boiling the solution of iron(II) sulfate for several minutes.

.....

.....

..... [3]

4 A student investigated the reaction between aqueous lead nitrate and aqueous potassium chloride.

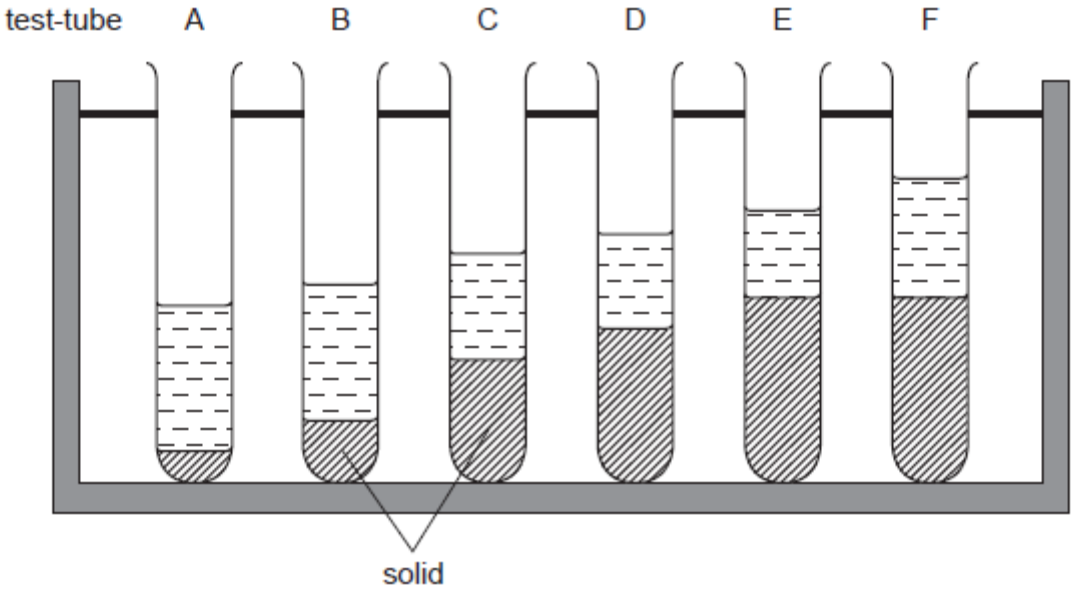
(a) One experiment was carried out.

Using a measuring cylinder, 3 cm^3 of aqueous lead nitrate was poured into each of six test-tubes in a test-tube rack. The test-tubes were labelled A, B, C, D, E and F respectively.

A burette was filled with aqueous potassium chloride. A 1.0 cm^3 sample of the aqueous potassium chloride was added to test-tube A.
A 2.0 cm^3 sample of aqueous potassium chloride was added to test-tube B.
A 4.0 cm^3, 5.0 cm^3, 6.0 cm^3 and 7.0 cm^3 sample of aqueous potassium chloride was added to test-tubes C, D, E and F respectively.

Using a glass rod, the contents of the test-tubes were stirred. The contents of the test-tubes were left to stand for 10 minutes.

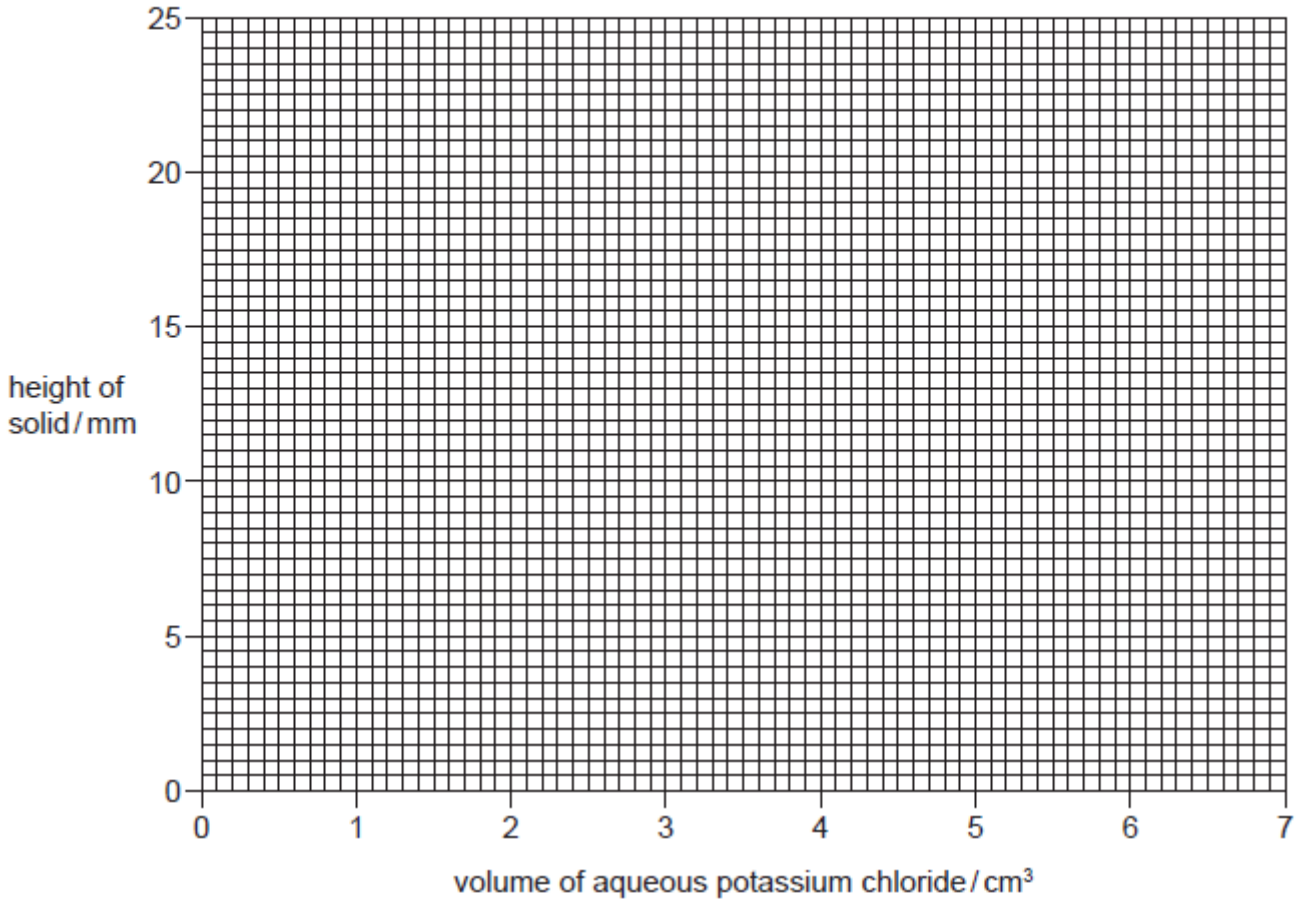
After 10 minutes, a ruler was used to measure the height of the solid in each test-tube. The diagrams show the six test-tubes in a rack. Use a ruler to measure the height of the solid in each test-tube in the diagram. Record the heights of the solid in the table.



test-tube number	volume of aqueous potassium chloride / cm^3	height of solid / mm
A		
B		
C		
D		
E		
F		

[4]

(b) Plot your results on the grid below. Draw two intersecting straight line graphs.



[4]

(c) **From your graph**, find the height of the solid formed when 3.5 cm^3 of aqueous potassium chloride was added to 3 cm^3 of aqueous lead nitrate.
Show clearly **on the graph** how you obtained your answer.

..... [3]

(d) What type of chemical reaction occurs when aqueous potassium chloride reacts with aqueous lead nitrate?

..... [1]

(e) **(i)** Compare the heights of the solids in test-tubes E and F.

..... [1]

(ii) Suggest an explanation for the heights of the solids in **(e)(i)**.

.....

..... [1]

(f) Predict what would happen if the experiment were continued using three further test-tubes with 8 cm^3, 9 cm^3 and 10 cm^3 of aqueous potassium chloride. Explain your answer.

.....

.....

..... [2]

(g) What difference would be observed if the experiment was repeated using aqueous silver nitrate and aqueous potassium iodide?

.....

..... [1]

(h) Explain **one** improvement the student could make to the experiment to obtain more accurate results.

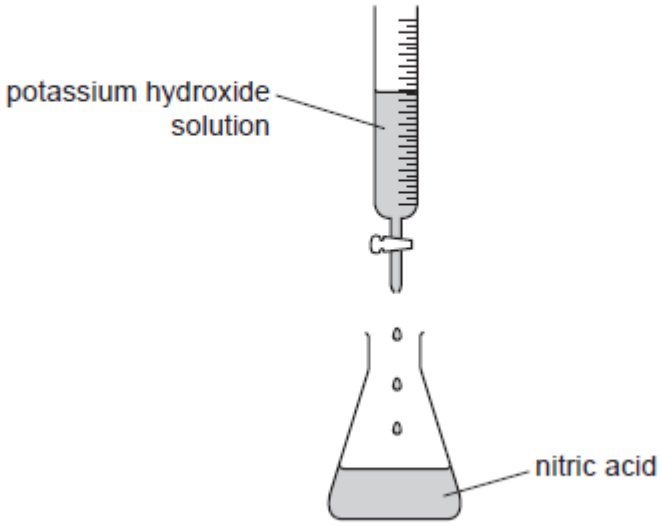
improvement .....

explanation .....

..... [2]

Q# 26/ iGCSE Chem/2011/w/Paper 6/

2 A student prepared a sample of potassium nitrate by neutralising nitric acid using potassium hydroxide solution.
25.0 cm^3 of nitric acid was poured into a conical flask. Potassium hydroxide was added a little at a time from a burette as shown below.

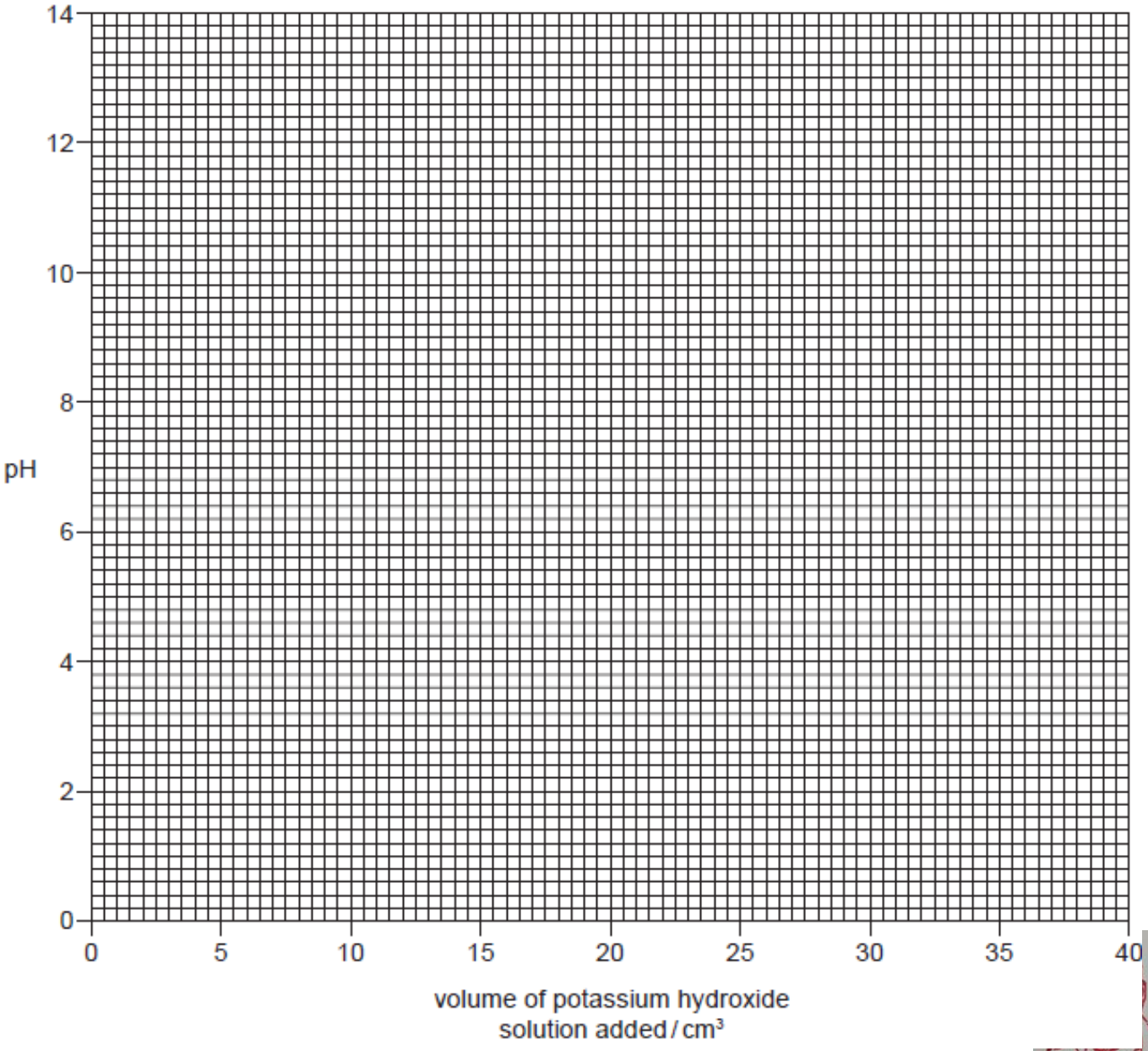


After each addition of potassium hydroxide solution the pH was measured with a pH meter and the values recorded in the table of results.

volume of potassium hydroxide solution added / cm^3	pH value
5.0	1.2
10.0	1.4
15.0	2.6
20.0	2.0
24.0	2.7
24.5	3.0
25.5	11.0
26.0	11.3
30.0	12.0
40.0	13.2

You are going to draw a graph to find the volume of potassium hydroxide solution required to neutralise the 25.0 cm^3 of nitric acid.

(a) Plot the results on the grid below and draw a smooth line graph.



(b) Which point appears to be inaccurate?

..... [1]

(c) (i) **Use your graph** to find the pH of the solution when 35.0 cm^3 of potassium hydroxide was added.

..... [1]

(ii) **Use your graph** to find the pH of 25.0 cm^3 of nitric acid.

Show clearly **on the grid** how you obtained your answer.

..... [2]

(d) (i) What is the pH of the solution when all of the nitric acid has just been neutralised?

..... [1]

(ii) What volume of potassium hydroxide was required to neutralise 25.0 cm^3 of nitric acid?

..... [1]

(e) Describe how the student should modify the experiment to obtain pure crystals of potassium nitrate.

.....

.....

.....

.....

..... [3]

Q# 28/ iGCSE Chem/2011/w/Paper 6/

5 Three different liquids **P**, **Q** and **R** were analysed.
P was an aqueous solution of sulfuric acid.
The tests on the liquids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) (i) Appearance of the liquids.	**P** ..... [1] **Q** colourless, smell of vinegar **R** colourless, no smell

(ii) The pH of the liquids was tested using Universal Indicator paper.	**P** ..... [1] **Q** pH 5 **R** pH 7
(b) A piece of magnesium ribbon was added to a little of each liquid. The gas given off by liquid **P** was tested.	**P** .... [2] **Q** slow effervescence **R** no reaction
(c) To a little of liquid **P**, hydrochloric acid and aqueous barium chloride were added.	..... [2]
(d) Liquid **R** was heated to boiling in a test-tube. A thermometer was used to record the constant temperature of the vapour produced.	temperature = 100 °C

(e) What conclusions can you draw about liquid **Q**?

..... [2]

(f) Identify liquid **R**.

..... [1]

Q# 29/ iGCSE Chem/2011s/Paper 6/

5 Two different liquids, **M** and **N**, were analysed. **N** was aqueous potassium iodide. The tests on the liquids and some of the observations are in the following table. Complete the observations in the table.

tests	observations
(a) (i) Appearance of liquid **M**.	colourless liquid with an antiseptic smell
(ii) Appearance of liquid **N**.	..... [2]
(b) (i) A few drops of **M** were transferred to a dry watch glass. The liquid was touched with a lighted splint.	burns with a yellow flame
(ii) Test **(b)(i)** was repeated using liquid **N**.	..... [1]
(c) A little of liquid **M** was added to a crystal of iodine in a test-tube. The test-tube was shaken.	orange-brown solution

(d) To a little of liquid **N**, a few drops of dilute nitric acid was added, followed by silver nitrate solution.	..... [2]

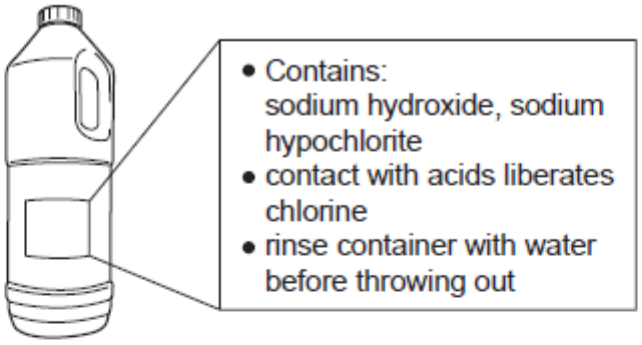
(e) What type of substance is liquid **M**?

.....

..... [2]

Q# 30/ iGCSE Chem/2011s/Paper 6/

7 The label shows some information on a bottle of liquid sink and drain cleaner.



(a) Give a chemical test for the presence of sodium hydroxide.

test .....

result ..... [2]

(b) Suggest why it could be dangerous to pour fizzy drinks into a sink containing this liquid cleaner.

.....

..... [2]

(c) Why should the container be rinsed with water before throwing out?

..... [1]

(d) Give a chemical test for chlorine.

test .....

result ..... [2]

6 The reaction between aqueous barium chloride and aqueous sodium sulfate produces a white precipitate.
Six experiments were carried out to find the mass of precipitate produced using solution **P** and solution **Q**.

Solution **P** was aqueous barium chloride.
Solution **Q** was aqueous sodium sulfate.
Both solutions were of the same concentration.

5 cm^3 of solution **P** was put into each of six test-tubes. Increasing volumes of solution **Q** were added to each test-tube. The mixtures were filtered to obtain the precipitates, which were washed, dried and then weighed in a suitable container.

(a) Draw a labelled diagram to show how the mixture was filtered.

[2]

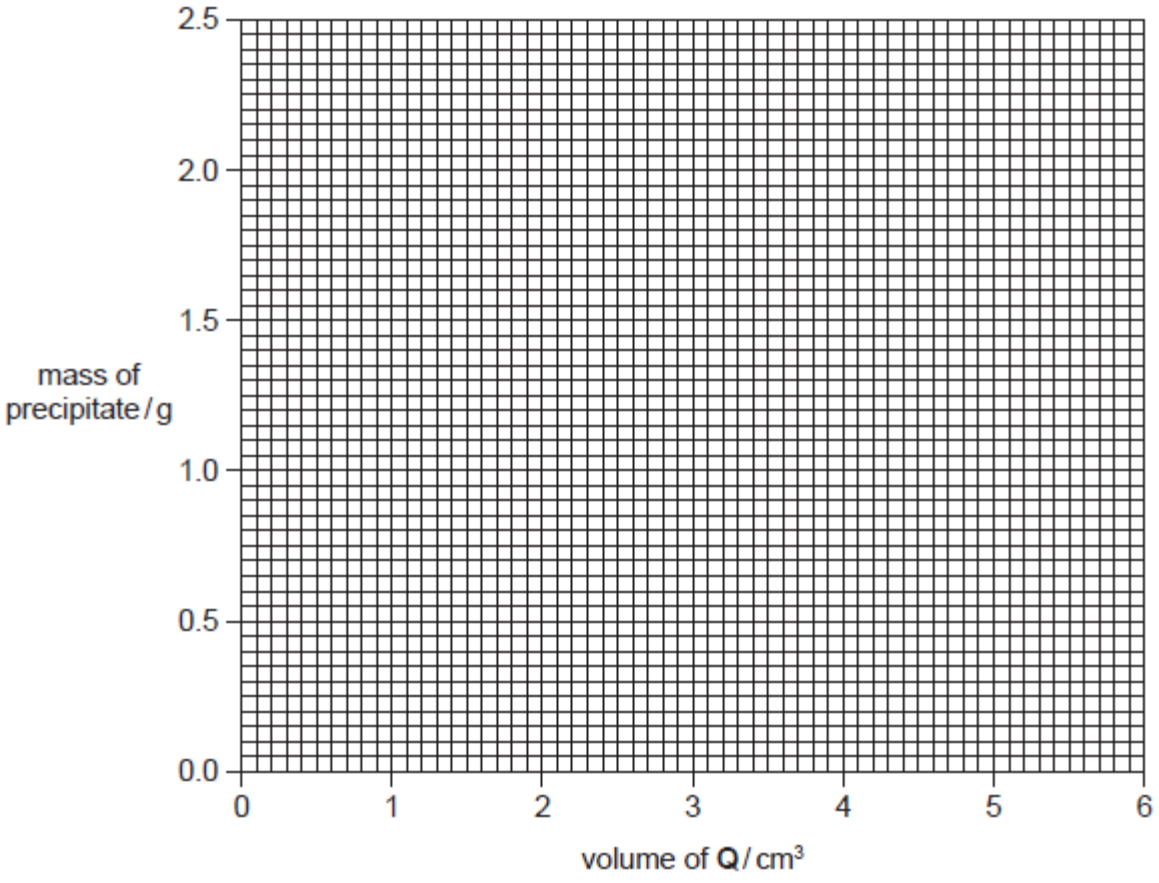
The results are shown in the table below.

(b) Complete the table.

volume of **P** / cm^3	volume of **Q** / cm^3	mass of container / g	mass of container and precipitate / g	mass of precipitate / g
5	1	4.50	4.95	
5	2	4.50	5.45	
5	3	4.50	5.90	
5	4	4.50	6.40	
5	5	4.50	6.85	
5	6	4.50	6.85	

[2]

(c) Plot the points on the grid below. Join the points with two intersecting straight lines.



[3]

(d) What is the minimum volume of **Q** required to completely react with 5 cm^3 of **P**?

..... [1]

Q# 32/ iGCSE Chem/2011s/Paper 6/

4 A student investigated the reaction between two different solutions of deep purple potassium manganate(VII), **A** and **B**, and an acidic solution of hydrogen peroxide.

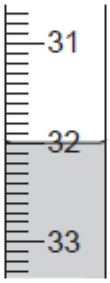
Three experiments were carried out.

Experiment 1

A burette was filled with the solution **A** of potassium manganate(VII) up to the 0.0 cm^3 mark. Using a measuring cylinder, 25 cm^3 of colourless hydrogen peroxide solution was poured into the conical flask.

The potassium manganate(VII) solution **A** was added slowly to the flask, and shaken to mix thoroughly. Addition of potassium manganate(VII) solution was continued until there was a permanent pink colour in the contents of the flask.

(a) Use the burette diagram to record the volume in the table of results and complete the column. [2]

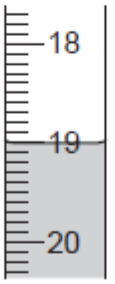


final reading

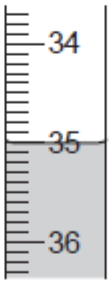
Experiment 2

Experiment 1 was repeated using the solution **B** of potassium manganate(VII) instead of solution **A**.

(b) Use the burette diagrams to record the volumes in the table of results and complete the table. [2]



initial reading



final reading

	experiment 1	experiment 2
final reading / cm^3		
initial reading / cm^3		
difference / cm^3		

To a little of the hydrogen peroxide solution in a test-tube, manganese(IV) oxide was added.

Rapid effervescence was observed and a glowing splint relit.

(c) Identify the gas given off in Experiment 3.

..... [1]

(d) **(i)** What colour change was observed when potassium manganate(VII) solution was added to the flask?

from ..... to ..... [1]

(ii) Why was an indicator **not** added to the flask?

..... [1]

(e) **(i)** In which experiment was the greatest volume of potassium manganate(VII) solution used?

..... [1]

(ii) Compare the volumes of potassium manganate(VII) used in Experiments 1 and 2.

..... [1]

(iii) Suggest an explanation for the difference in volumes.

.....

.....

..... [2]

(f) If Experiment 2 was repeated using 12.5 cm^3 of the hydrogen peroxide solution, what volume of potassium manganate(VII) solution would be needed to react completely? Explain your answer.

.....

..... [3]

(g) Give **one** advantage and **one** disadvantage of using a measuring cylinder for the hydrogen peroxide solution.

advantage .....

disadvantage ..... [2]

Q# 33/ iGCSE Chem/2010/w/Paper 6/

7 E numbers identify chemicals which are added to foods.

(a) E210 is benzoic acid. How could you show that a solution of benzoic acid is a weak acid?

test .....

result ..... [2]

(b) E211 is sodium benzoate. Name a suitable substance that would react with a solution of benzoic acid to form sodium benzoate.

..... [1]

Q# 34/ iGCSE Chem/2010/w/Paper 6/

2 The following instructions were used to prepare magnesium sulfate crystals, $MgSO_4.7H_2O$.

Step 1 Measure 50 cm^3 of dilute sulfuric acid into a beaker and warm the solution.

Step 2 Using a spatula, add some magnesium oxide and stir the mixture. Continue adding the magnesium oxide until excess is present.

Step 3 Separate the excess magnesium oxide from the solution of magnesium sulfate.

Step 4 Heat the solution until crystals form. Obtain the crystals and dry them.

(a) Why is the sulfuric acid warmed?

..... [1]

(b) How would you know when excess magnesium oxide is present in **Step 2**?

..... [1]

(c) What method is used in **Step 3**?

..... [1]

(d) Why must care be taken when drying the crystals in **Step 4**?

..... [1]

(e) Explain how the method would differ if magnesium carbonate was used instead of magnesium oxide.

.....

..... [2]

Q# 35/ iGCSE Chem/2010/w/Paper 6/

5 Two different solutions, **X** and **Y**, were analysed. **X** was copper sulfate solution.
The tests on the solutions, and some of the observations, are in the following table.

Complete the observations in the table.

tests	observations
tests on solution **X**	
(a) (i) Appearance of solution **X**.	..... [1]
(ii) To a little of solution **X**, aqueous sodium hydroxide was added.	..... [2]
(iii) To a little of solution **X**, aqueous ammonia was added drop by drop and shaken.	..... [1]
Excess aqueous ammonia solution was then added to the test-tube.	..... [2]
tests on solution **Y**	
(b) (i) A little of solution **Y** was tested with Universal Indicator paper. The pH was recorded.	pH1

(ii)	To about 3 cm^3 of solution Y a few drops of dilute hydrochloric acid and then aqueous barium chloride was added.	white precipitate

(c) Identify solution Y.

..... [2]

Q# 36/ iGCSE Chem/2010s/Paper 6/

2 Three bottles of liquids have lost their labels.

The liquids are known to be:

aqueous sodium iodide,

hexene,

dilute nitric acid.

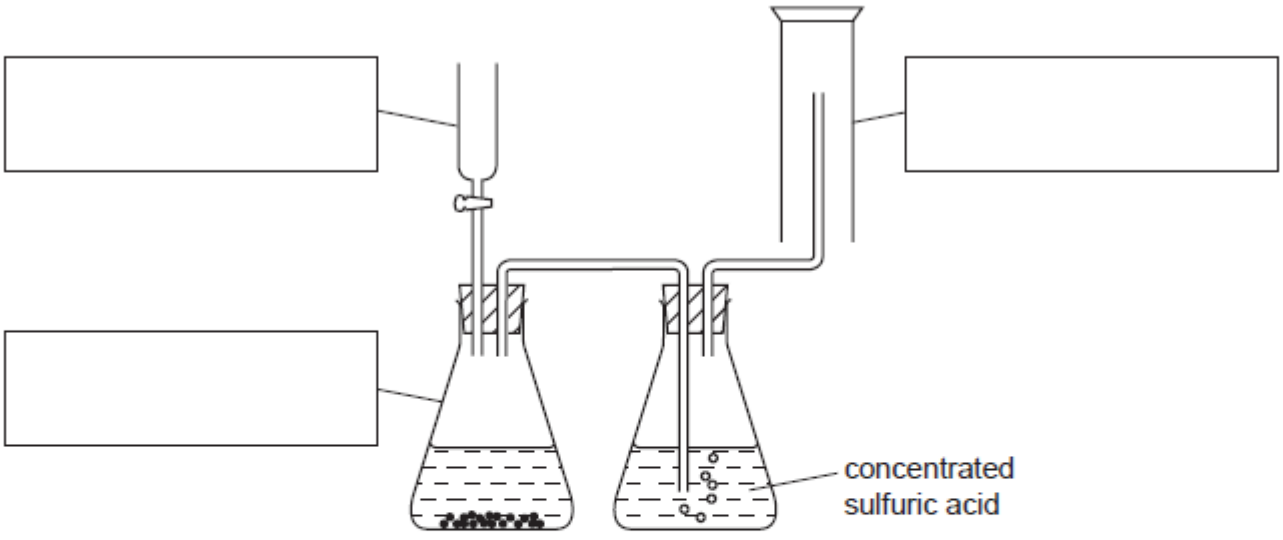
Outline chemical tests you could use to distinguish between the liquids in the three bottles.

liquid	test	result
aqueous sodium iodide	....	....
dilute nitric acid	....	....

[4]

Q# 37/ iGCSE Chem/2010s/Paper 6/

1 The diagram shows the apparatus used to prepare a gas. The gas is more dense than air.



(a) Complete the boxes to name the apparatus. [3]

(b) Identify **one** mistake in the diagram.

..... [1]

(c) Suggest a reason why the gas is passed through concentrated sulfuric acid.

..... [1]

Q# 38/ iGCSE Chem/2010s/Paper 6/

5 Solid **E** was analysed. **E** was an aluminium salt.
The tests on the solid and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
tests on solid **E** **(a)** Appearance of solid **E**.	white crystalline solid
(b) A little of solid **E** was heated in a test-tube.	colourless drops of liquid formed at the top of the tube
(c) A little of solid **E** was dissolved in distilled water. The solution was divided into four test-tubes and the following tests were carried out. **(i)** To the first test-tube of solution, drops of aqueous sodium hydroxide were added. Excess sodium hydroxide was then added to the test-tube. **(ii)** Test **(i)** was repeated using aqueous ammonia solution instead of aqueous sodium hydroxide. **(iii)** To the third test-tube of solution, dilute hydrochloric acid was added, followed by barium chloride solution. **(iv)** To the fourth test-tube of solution, aqueous sodium hydroxide and aluminium powder were added. The mixture was heated.	.... [3] .... [2] no reaction effervescence pungent gas given off turned damp litmus paper blue

(d) What does test **(b)** tell you about solid **E**.

.....

..... [1]

(e) Identify the gas given off in test **(c)(iv)**.

..... [1]

(f) What conclusions can you draw about solid **E**?

.....

..... [2]

Q# 39/ iGCSE Chem/2009/w/Paper 6/

3 Three unlabelled bottles of chemicals each contained one of the following liquids:

- sodium nitrate dissolved in water;
- pure water;
- hexene.

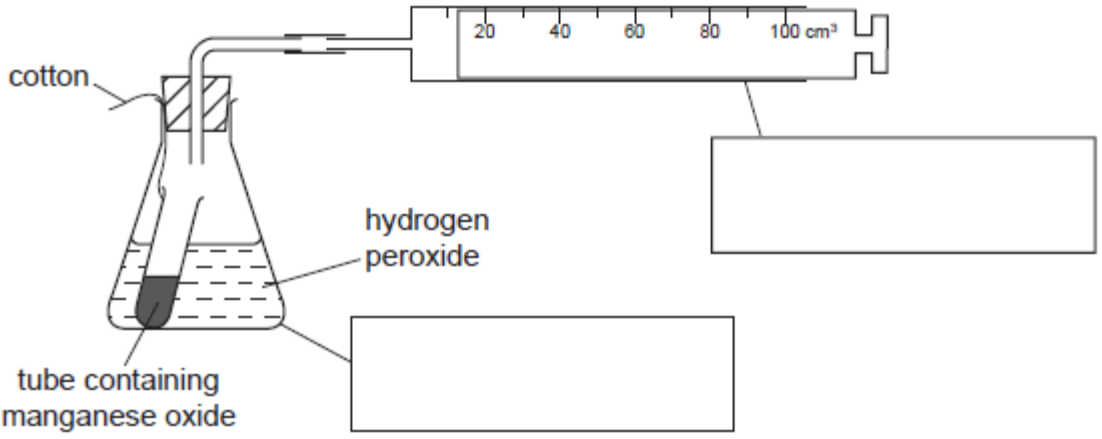
(a) Give a test by which you could identify sodium nitrate solution.

test .....

result ..... [2]

Q# 40/ iGCSE Chem/2009/w/Paper 6/

1 The apparatus below was used to make oxygen. The tube of manganese oxide was added to the hydrogen peroxide solution by releasing the cotton.



(a) Complete the boxes to identify the pieces of apparatus. [2]

(b) Why was the tube of manganese oxide suspended in the flask?

..... [1]

(c) Give a test for oxygen.

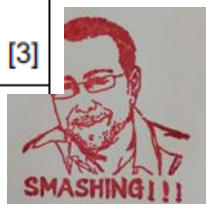
test .....

result ..... [2]

Q# 41/ iGCSE Chem/2009/w/Paper 6/

5 Three aqueous solutions **K**, **L** and **M**, were analysed. **L** was a solution of sodium hydroxide. The tests on the solutions and some of the observations are in the table. Complete the observations in the table. Do not write any conclusions in the table.

tests	observations
(a) Appearance of the solutions.	
solution **K**	colourless liquid
solution **L**	colourless liquid
solution **M**	colourless liquid
(b) Universal Indicator paper was used to test the pH of each solution.	
solution **K**	pH 10
solution **L**	pH ..... [1]
solution **M**	pH 2
(c) <u>tests on solution **K**</u>	
(i) Drops of solution **K** were added to copper sulfate solution in a test-tube.	pale blue precipitate formed
Excess of solution **K** was then added to the test-tube.	deep blue solution formed
(ii) Experiment **(c)(i)** was repeated using aqueous aluminium sulfate instead of aqueous copper sulfate.	white precipitate formed insoluble in excess
(iii) A few drops of nitric acid and silver nitrate solution were added to solution **K**.	no visible reaction
(d) <u>tests on solution **L**</u>	
(i) Experiment **(c)(i)** was repeated using solution **L**.	..... [1]
(ii) Experiment **(c)(ii)** was repeated using solution **L**.	.... [3]



(e)	<u>test on solution **M**</u> Experiment **(c)(iii)** was repeated using solution **M**.	white precipitate formed

(f) What conclusions can you make about solution **K**?

.....

..... [2]

(g) What conclusions can you make about solution **M**?

.....

..... [2]

Q# 42/ iGCSE Chem/2009s/Paper 6/

5 Two solids, **S** and **V**, were analysed. **S** was copper(II) oxide.
The tests on the solids, and some of the observations are in the following table.
Complete the observations in the table. Do not write any conclusions in the table.

test	observation
<u>tests on solid **S**</u> **(a)** Appearance of solid **S**	black solid
(b) Hydrogen peroxide was added to solid **S** in a test-tube.	slow effervescence
A glowing splint was inserted into the tube.	splint relit
(c) Dilute sulfuric acid was added to solid **S** in a test-tube. The mixture was heated to boiling point.	blue solution formed
The solution was divided into three equal portions into test-tubes.	
(i) To the first portion of the solution, excess sodium hydroxide was added.	..... [1]
(ii) To the second portion of the solution, about 1 cm^3 of aqueous ammonia solution was added.	..... [2]
Excess ammonia solution was then added.	..... [2]

(iii) To the third portion of the solution, dilute hydrochloric acid was added followed by barium chloride solution.	..... [2]

test	observation
tests on solid **V**	
(d) Appearance of solid **V**	black solid
(e) Hydrogen peroxide was added to solid **V** in a test-tube.	rapid effervescence
A glowing splint was inserted into the tube.	splint relit

(f) **(i)** Compare the reactivity of solid **S** and solid **V** with hydrogen peroxide.

..... [1]

(ii) Identify the gas given off in test **(e)**.

..... [1]

(g) What conclusions can you draw about solid **V**?

.....

.....

..... [2]

Q# 43/ iGCSE Chem/2009s/Paper 6/

6 Acid base indicators

Indicators are used to identify acids and bases.
Indicators can be obtained from berries and other fruits.

(a) Plan an experiment to obtain an aqueous solution of an indicator from some berries.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Plan an experiment to use the indicator solution to show that it is an effective indicator.

.....

.....

.....

.....

.....

.....

..... [3]

Q# 44/ iGCSE Chem/2009s/Paper 6/

3 Describe a chemical test to distinguish between each of the following pairs of substances. An example is given.

Example: hydrogen and carbon dioxide

test lighted splint

result with hydrogen ..... gives a pop .....

result with carbon dioxide ..... splint is extinguished .....

(a) zinc carbonate and zinc chloride

test .....

result with zinc carbonate .....

result with zinc chloride ..... [2]

(b) ammonia and chlorine

test .....

result with ammonia .....

result with chlorine ..... [3]

(c) aqueous iron(II) sulfate and aqueous iron(III) sulfate

test .....

result with aqueous iron(II) sulfate .....

result with aqueous iron(III) sulfate ..... [3]

5 Two salt solutions **K** and **L** were analysed. Each contained the same chloride anion but different metal cations. **K** was a copper(II) salt.
The tests on the solutions and some of the observations are in the following table. Complete the observations in the table.

tests	observations
(a) Appearance of the solutions. solution **K**	.....[1]
solution **L**	yellow
(b) The pH of each solution was tested. solution **K**	pH 3
solution **L**	pH 2
<u>tests on solution **K**</u> **(c)** **(i)** Drops of aqueous sodium hydroxide were added to solution **K**. Excess aqueous sodium hydroxide was then added to the test-tube.	....[2]
(ii) Experiment **(c)(i)** was repeated using aqueous ammonia instead of aqueous sodium hydroxide.	drops .....[1] excess ....[2]
(iii) A few drops of hydrochloric acid and about 1 cm^3 of barium chloride solution were added to a little of solution **K**.	.....[1]

tests	observations
(iv) A few drops of nitric acid and about 1 cm^3 of silver nitrate solution were added to a little of solution **K**.	.....[1]
<u>tests on solution **L**</u> **(d)** **(i)** Experiment **(c)(i)** was repeated using solution **L**. **(ii)** Experiment **(c)(ii)** was repeated using solution **L**. **(iii)** Experiment **(c)(iii)** was repeated using solution **L**. **(iv)** Experiment **(c)(iv)** was repeated using solution **L**.	red - brown precipitate red – brown precipitate .....[1] .....[1]

(e) What does test **(b)** indicate?

..... [1]

(f) Identify the metal cation present in solution **L**.

..... [2]

Q# 46/ iGCSE Chem/2008/w/Paper 6/

7 A solution of magnesium sulphate can be made by reacting magnesium oxide with warm sulphuric acid.

(a) Describe how you could make a solution of magnesium sulphate starting with magnesium oxide powder and dilute sulphuric acid.

.....

.....

.....

.....

.....

..... [3]

(b) Describe how you would obtain pure dry crystals of hydrated magnesium sulphate, $MgSO_4.7H_2O$, from the solution of magnesium sulphate in **(a)**.

.....

.....

.....

.....

.....

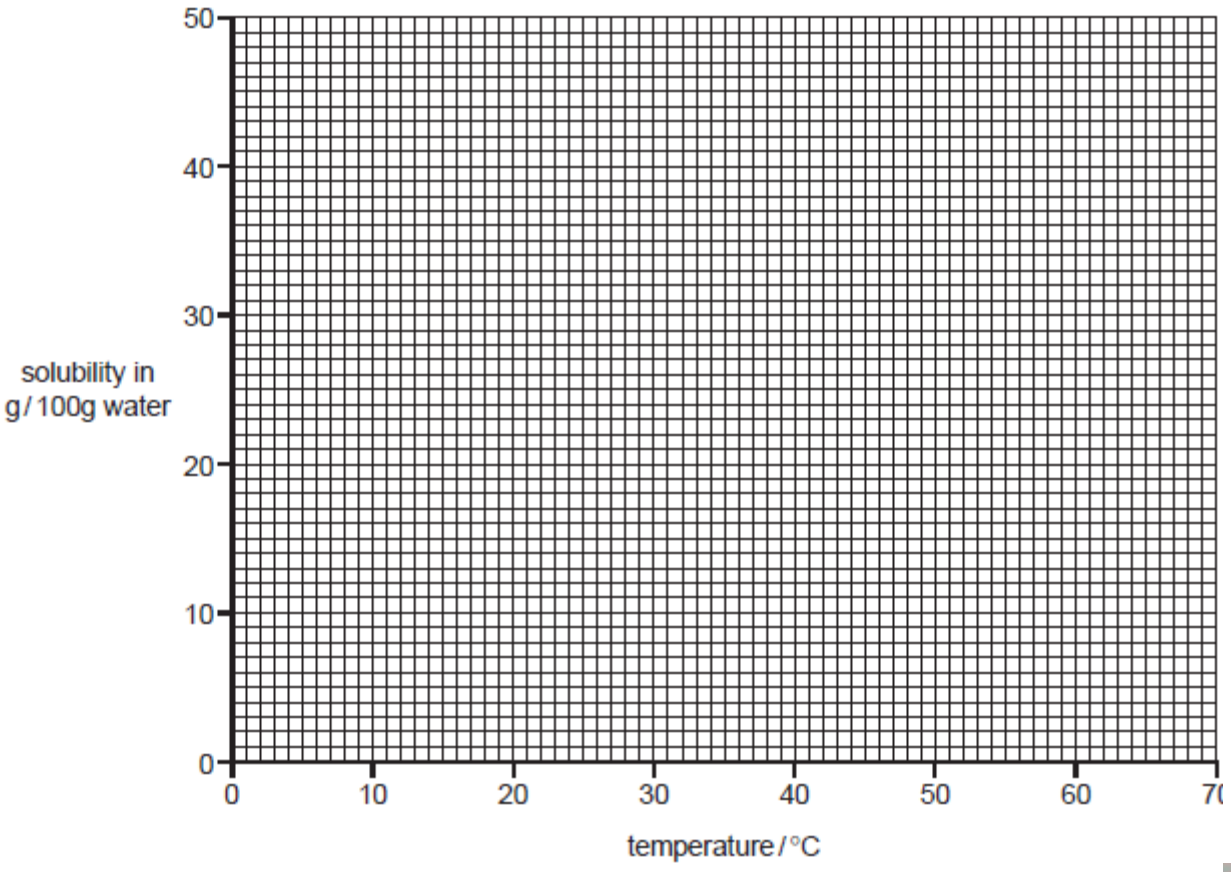
..... [3]

Q# 47/ iGCSE Chem/2008/w/Paper 6/

6 An experiment was carried out to determine the solubility of potassium chlorate at different temperatures. The solubility is the mass of potassium chlorate that dissolves in 100 g of water.
The results obtained are shown in the table below.

temperature / °C	0	10	20	30	40	50	60
solubility in g / 100 g water	14	17	20	24	29	34	40

(a) On the grid, draw a smooth line graph to show the solubility of potassium chlorate at different temperatures.



[4]

(b) Use your graph to determine the solubility of potassium chlorate at 70 °C. Show clearly on the graph how you obtained your answer.

..... [2]

(c) What would be the effect of cooling a saturated solution of potassium chlorate from 60 °C to 20 °C?

.....

.....

..... [2]

Q# 48/ iGCSE Chem/2008s/Paper 6/ Q7

(b) What practical method could be used to separate the mixture of alcohol (bp 78°C) and water (bp 100°C)?

..... [2]

(c) Give a chemical test to show the presence of water.

test .....

result ..... [2]

(d) What would be the effect of touching the alcohol with a lighted splint?

..... [1]

Q# 49/ iGCSE Chem/2008s/Paper 6/

4 A student investigated the reaction between potassium manganate(VII) and a metallic salt solution.

Two experiments were carried out.

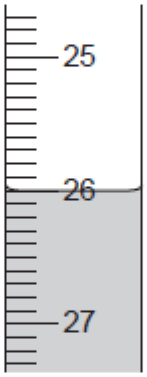
Experiment 1

(a) About 1 cm^3 of aqueous sodium hydroxide was added to a little of the salt solution **A** and the observation noted.

observation *green precipitate formed*

(b) A burette was filled with potassium manganate(VII) solution up to the 0.0 cm^3 mark.
By using a measuring cylinder, 25 cm^3 of solution **A** of the salt was placed into a conical flask. The flask was shaken to mix the contents.
The potassium manganate(VII) solution was added to the flask, and shaken to mix thoroughly. Addition of potassium manganate(VII) solution was continued until there was a pale pink colour in the contents of the flask.

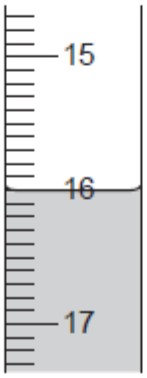
Use the burette diagram to record the volume in the table and complete the column.



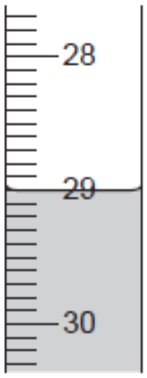
final reading

Experiment 2

(c) Experiment **1(b)** was repeated using a different solution **B** of the salt, instead of solution **A**. Use the burette diagrams to record the volumes in the table and complete the table.



initial reading



final reading

(d) About 1 cm^3 of aqueous sodium hydroxide was added to a little of the solution in the flask and the observation noted.

observation *red-brown precipitate*

Table of results

Burette readings/cm^3

	Experiment 1	**Experiment 2**
final reading		
initial reading		
difference		

[4]

(e) **(i)** In which Experiment was the greatest volume of potassium manganate(VII) solution used?

..... [1]

(ii) Compare the volumes of potassium manganate(VII) solution used in Experiments 1 and 2.

.....

..... [2]

(iii) Suggest an explanation for the difference in the volumes.

.....

..... [2]

(f) Predict the volume of potassium manganate(VII) solution which would be needed to react completely with 50 cm^3 of solution **B**.

.....

..... [2]

(g) Explain one change that could be made to the experimental method to obtain more accurate results.

change .....

explanation ..... [2]

(h) What conclusion can you draw about the salt solution from

(i) experiment **1(a)**,

..... [1]

(ii) experiment **2(d)**?

..... [1]

Q# 50/ iGCSE Chem/2008s/Paper 6/

7 This label is from a container of 'Bite Relief' solution.

BITE RELIEF

FOR FAST RELIEF FROM INSECT BITES AND STINGS

Active ingredient: Ammonia
Also contains water and alcohol

DIRECTIONS FOR USE: Use cotton wool to dab the solution on the affected area of the skin

(a) Give a chemical test to show the presence of ammonia in Bite Relief solution.

test .....

result ..... [2]

Q# 51/ iGCSE Chem/2008s/Paper 6/

5 Two different solids, **T** and **V**, were analysed. **T** was a calcium salt.
The tests on the solids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
tests on solid **T** **(a)** Appearance of solid **T.**	white solid
(b) A little of solid **T** was dissolved in distilled water. The solution was divided into three test-tubes. **(i)** The pH of the first portion of the solution was tested.	colour orange pH 5
(ii) To the second portion of solution was added excess aqueous sodium hydroxide.	..... [2]
(iii) To the third portion of solution was added excess ammonia solution.	..... [2]

tests	observations
<u>tests on solid **V**</u> **(c)** Appearance of solid **V**.	green crystals
(d) A little of solid **V** was dissolved in distilled water. The solution was divided into three test-tubes. The smell of the solution was noted.	smells of vinegar
(i) Test **(b)(i)** was repeated using the first portion of solution.	colour orange pH 6
(ii) Test **(b)(ii)** was repeated using the second portion of the solution.	pale blue precipitate
(iii) Test **(b)(iii)** was repeated using the third portion of solution.	pale blue precipitate soluble in excess to form a dark blue solution.

(e) What do **tests (b)(i)** and **(d)(i)** tell you about solutions **T** and **V**?

.....

[2]

(f) What additional conclusions can you draw about solid **V**?

.....

.....

[2]

5 Three different liquids **P**, **Q** and **R** were analysed. **Q** was an aqueous solution of sodium hydroxide.
The tests on the liquids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) Test the pH of the liquids using indicator paper. Note the colour of the paper.	**P** colour red pH 1 **Q** colour ..... pH .....[2] **R** colour orange pH 5
(b) (i) Add a 5 cm piece of magnesium to about 3 cm^3 of liquid **P** in a test–tube. Test the gas given off.	bubbles of gas lighted splint pops
(ii) Repeat **(b)(i)** using liquids **Q**, and **R**. Do not test for any gases.	**Q** ..... **R** .....[2]

tests	observations
(c) To about 2 cm^3 of liquid **P** add 1 spatula measure of sodium carbonate. Test the gas given off.	.... [3]
(d) By using a teat pipette add aqueous silver nitrate to about 1 cm^3 of liquid **P**.	white precipitate
(e) By using a teat pipette add liquid **Q** to about 1 cm^3 of aqueous iron(II) sulphate.	..... [2]

(f) Name the gas given off in test **(b)(i)**.

..... [1]

(g) Name the gas given off in test **(c)**.

..... [1]

(h) Identify liquid **P**.

..... [1]

(i) What conclusions can you draw about liquid **R**?

.....

..... [2]

3 The information in the box is about the preparation of zinc nitrate crystals.

Step 1: Add a small amount of zinc oxide to some hot dilute nitric acid, and stir.
Step 2: Keep adding zinc oxide until it is in *excess*.
Step 3: Remove the excess zinc oxide to leave colourless zinc nitrate solution.
Step 4: Evaporate the zinc nitrate solution until it is *saturated*.
Step 5: Leave the *saturated solution* to cool. White crystals form on cooling.
Step 6: Remove the crystals from the remaining solution.
Step 7: Dry the crystals on a piece of filter paper.

(a) Suggest a reason for using *excess* zinc oxide in Step 2.

.....

..... [1]

(b) Suggest how the *excess* zinc oxide can be removed from the solution in Step 3.

..... [1]

(c) **(i)** What is meant by the term *saturated solution*?

.....

..... [2]

(ii) What practical method could show the solution to be saturated?

.....

..... [1]

(d) Why are the crystals dried in Step 7 using filter paper instead of by heating?

.....

..... [1]

Q# 54/ iGCSE Chem/2007s/Paper 6/ Q7

(b) How could you show that the solution contains calcium ions?

.....

..... [2]

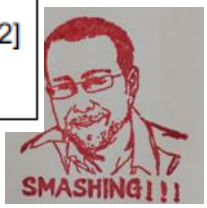
Q# 55/ iGCSE Chem/2007s/Paper 6/

5 A sample of solid **C** was analysed. **C** is a mixture of two salts, **D** and **E**. Solid **D** is insoluble lead carbonate and solid **E** is water-soluble.
The tests on **C**, and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) Describe the appearance of **C.**	pale green solid
(b) Using a spatula, place a little of **C** in a hard glass test-tube. Inside the top of the tube suspend a piece of damp indicator paper. Heat **C** gently until gas comes out of the tube.	paper turns blue pH 8 to 11
(c) Using a spatula, place a little of **C** in a test-tube. Add about 2 cm^3 of dilute nitric acid and test the gas.	....[3]

Solid **C** was added to a boiling tube containing distilled water. The tube was shaken to mix the contents. The contents of the boiling tube were filtered.

tests on the residue in the filter paper	observations
(d) Place the funnel in a test-tube. Pour dilute nitric acid onto the residue contained in the funnel. Add 2 cm^3 of potassium iodide to the solution collected in the tube.	.....[2]



tests on the filtrate	observations
(e) Divide the filtrate into three test-tubes.	
(i) To the first portion add dilute hydrochloric acid and about 1 cm^3 of aqueous barium nitrate.	white precipitate
(ii) To the second portion of solution add excess aqueous ammonia.	green precipitate
(iii) To the third portion of solution, add an equal volume of aqueous sodium hydroxide.	green precipitate
Warm the mixture gently. Test the gas with indicator paper.	paper turned blue pH 8 to 11

(f) Name the gas given off in **(c)**.

..... [1]

(g) Name the gas given off in **(e)(iii)**.

..... [1]

(h) What conclusions can you draw about salt **E**?

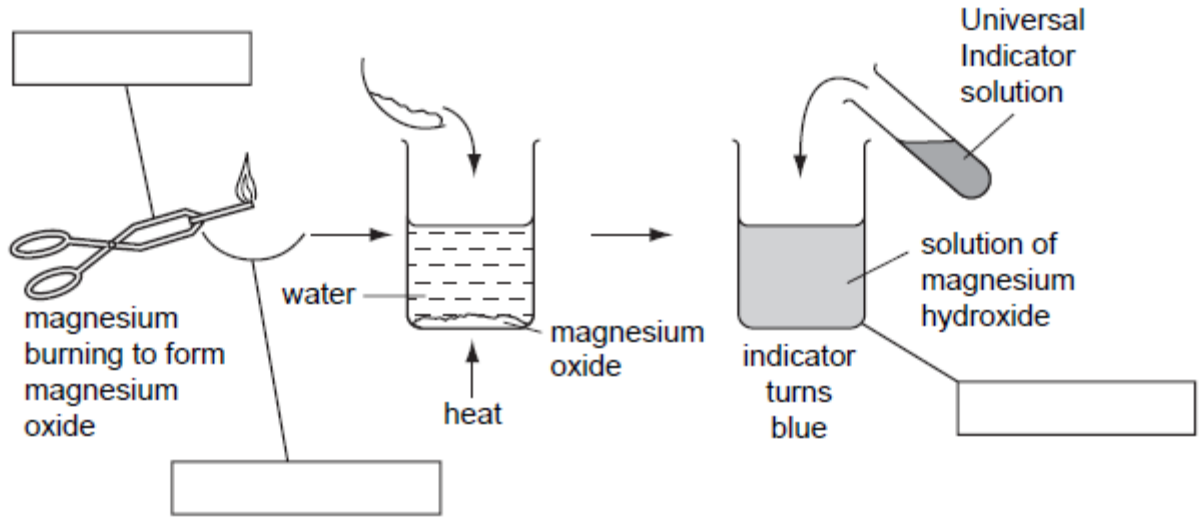
.....

.....

..... [4]

Q# 56/ iGCSE Chem/2006/w/Paper 6/

1 The diagram shows the formation of a solution of magnesium hydroxide from magnesium.



(a) Complete the empty boxes to name the pieces of apparatus. [3]

(b) What type of chemical reaction is the burning of magnesium?

..... [1]

(c) Suggest a pH for the solution of magnesium hydroxide.

..... [1]

Q# 57/ iGCSE Chem/2006/w/Paper 6/

5 Two solids, **F** and **G**, were analysed. Solid **F** was an ammonium salt and solid **G** was a potassium salt.

The tests on **F** and **G** and some of the observations are in the following table.

Complete the observations in the table.

tests	observations
Solid **F** was added to distilled water and shaken to dissolve. The solution was divided into 4 equal portions in test-tubes.	
(a) (i) The pH of the first portion of the solution was tested using Universal Indicator solution.	colour orange pH 5
(ii) Aqueous sodium hydroxide was added to the second portion and heated gently. The gas given off was tested with damp litmus paper.	....[2]

	(iii) To the third portion of solution, was added dilute nitric acid and then aqueous lead(II) nitrate.	white precipitate
	(iv) To the fourth portion of solution, was added dilute nitric acid followed by aqueous silver nitrate.	white precipitate
(b)	**(i)** Solid **G** was dissolved in distilled water. The solution was divided into two test-tubes.	
	(ii) **(a)(iii)** was repeated using the first portion of the solution.	bright yellow precipitate
	(iii) **(a)(iv)** was repeated using the second portion of the solution.	pale yellow precipitate

(c) What conclusion can be drawn from test **(a)(i)**?

..... [2]

(d) Name the gas given off in **(a)(ii)**.

..... [1]

(e) Identify solid **F**.

..... [1]

(f) Identify solid **G**.

..... [1]

Q# 58/ iGCSE Chem/2006s/Paper 6/ Q1

(c) Give a test for chlorine.

test .....

result ..... [2]

5 A mixture of two compounds, **B** and **C**, was tested.
Compound **B** was a water-soluble zinc salt and compound **C** was insoluble.
The tests and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) One measure of the mixture was heated gently then strongly.	condensation at the top of the tube
The gas released was tested with cobalt chloride paper.	paper turned pink
The rest of the mixture was added to about 25 cm^3 of distilled water in a boiling tube. The contents of the tube were shaken and filtered. The following tests were carried out.	
Tests on the filtrate The solution was divided into 2 cm^3 portions in four test-tubes.	
(b) (i) Drops of aqueous sodium hydroxide were added to the first portion of the solution.	.....
Excess aqueous sodium hydroxide was added.	.....
	.....[3]
(ii) Using the second portion test **(b)(i)** was repeated using aqueous ammonia instead of aqueous sodium hydroxide.	.....
	.....
	.....[3]
(iii) To the third portion of solution was added hydrochloric acid and barium nitrate solution.	white precipitate

tests	observations
(iv) To the fourth portion of solution was added nitric acid and silver nitrate solution.	no visible reaction
Tests on the residue	
(c) Some of the residue was placed into a test-tube. Dilute hydrochloric acid was added and the gas given off was tested with limewater.	rapid effervescence limewater turned milky

(d) What does test **(a)** indicate?

.....

[1]

(e) What conclusions can you draw about compound **B**?

.....

.....

[2]

(f) What does test **(c)** indicate?

.....

.....

[2]

Q# 60/ iGCSE Chem/2006s/Paper 6/

6 The diagram shows two bottles of liquid oven cleaner.

The oven cleaners contain sodium hydroxide solution. Plan an investigation to show which oven cleaner contains the highest concentration of sodium hydroxide.

.....

.....

.....

.....

.....

.....

.....

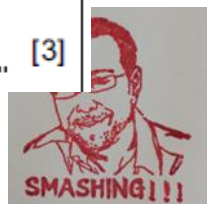
..... [6]

Q# 61/ iGCSE Chem/2005/w/Paper 6/

5 A solid compound **X** was analysed. Solid **X** was an aluminium salt. The tests on **X** and some of the observations are in the following table.

Complete the observations in the table.

tests	observations
(a) One spatula measure of **X** was placed into a hard-glass test-tube. The solid was heated gently then strongly. The gas was tested with pH indicator paper.	condensation at top of tube paper went red
Distilled water was added to **X** and shaken to dissolve. The solution was divided into five portions in test-tubes. **(b) (i)** To the first portion, drops of aqueous sodium hydroxide were added. Excess aqueous sodium hydroxide was then added. **(ii)** To the second portion, drops of aqueous ammonia were added. Excess ammonia was then added.	.... [3] .... [3]



(iii) To the third portion of solution, hydrochloric acid and barium chloride solution were added.	no visible change
(iv) To the fourth portion of solution, nitric acid and lead nitrate solution were added.	no visible change
(v) To the fifth portion, aqueous sodium hydroxide and a spatula measure of aluminium granules were added. The mixture was warmed and the gas tested with indicator paper.	pungent gas paper went blue, pH 10

(c) What does test **(a)** tell you about the gas given off?

..... [1]

(d) What conclusions can you draw about **X** from tests **(b)(iii)** and **(iv)**?

(b)(iii) .....

(b)(iv) ..... [2]

(e) Identify the gas in **(b)(v)**.

..... [1]

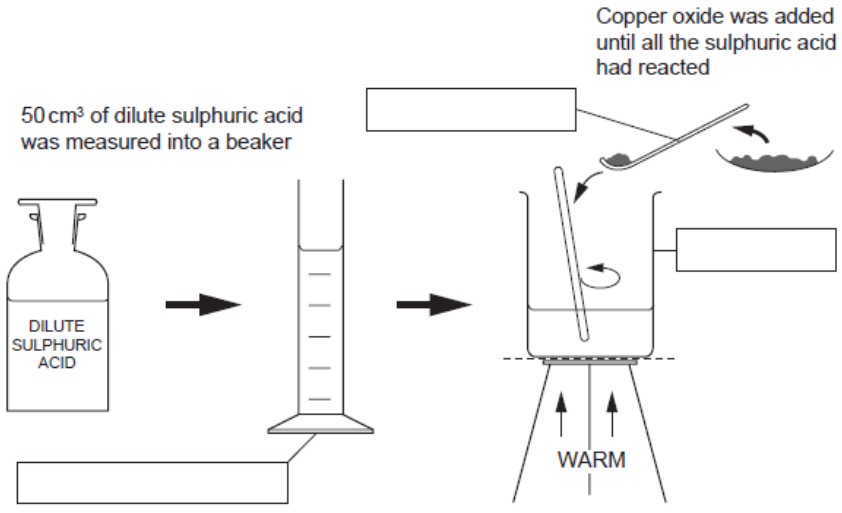
(f) What conclusions can you draw about substance **X**?

.....

..... [2]

Q# 62/ iGCSE Chem/2005/w/Paper 6/

1 A student reacted sulphuric acid with copper(II) oxide. The diagram shows the procedure followed.



(a) Complete the boxes to identify the pieces of apparatus labelled. [3]

(b) What is the colour of the solution formed?

..... [1]

(c) Describe how crystals could be quickly obtained from the solution.

.....

..... [2]

Q# 63/ iGCSE Chem/2005/w/Paper 6/

7 Some plants do not grow well in acidic soil.
A farmer gives you a small sample of soil from a corner of one of his fields.

(a) Plan an investigation to find out the pH of the soil sample.

You are provided with Universal Indicator solution and common laboratory apparatus.

.....

.....

.....

.....

.....

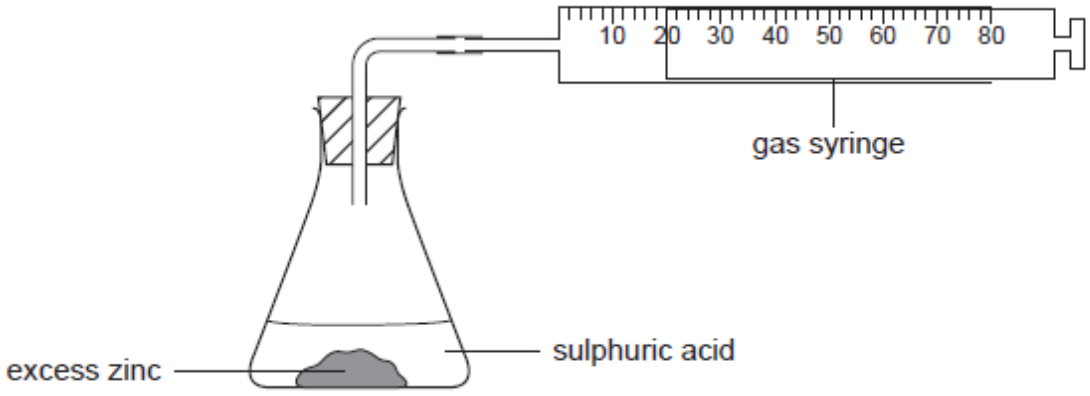
..... [5]

(b) Why would further experiments be necessary to inform the farmer which plants should be grown in each of his fields?

.....

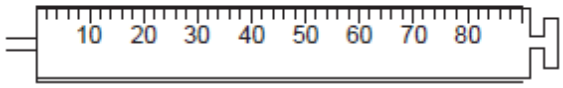
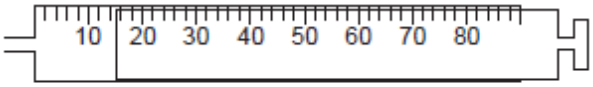
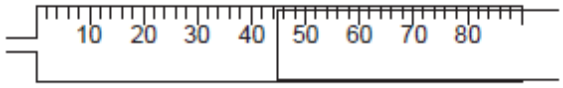
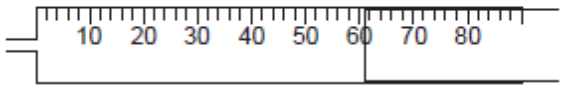
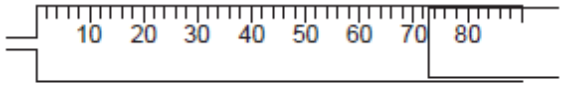
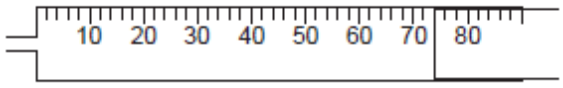
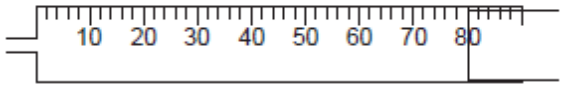
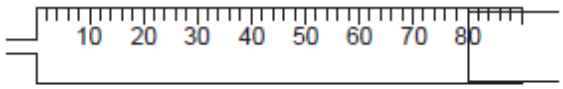
..... [2]

3 In a set of experiments zinc was reacted with sulphuric acid to form hydrogen. The apparatus below was used.



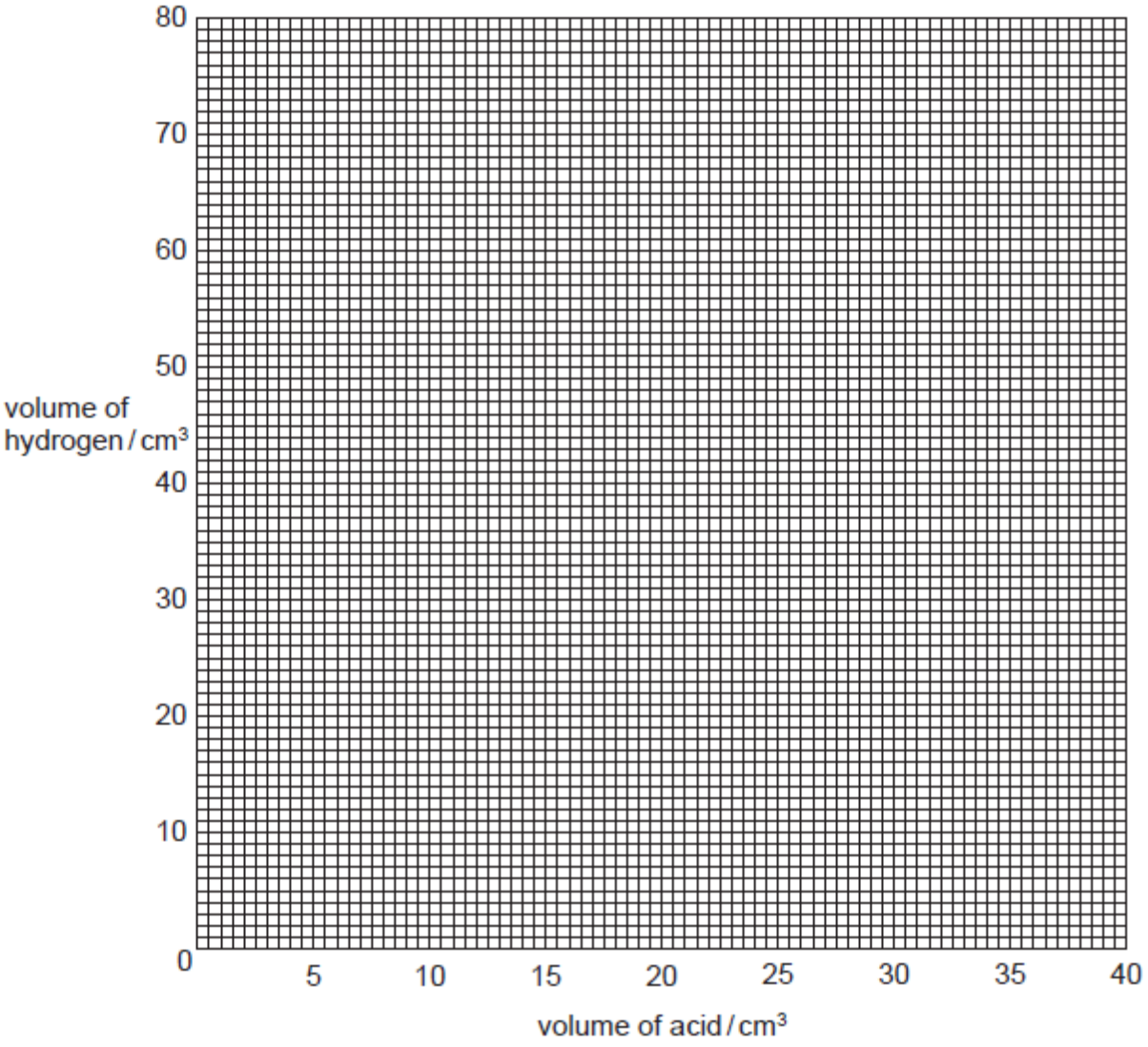
The same mass of zinc was used each time. The volume of acid used was different each time. Use the syringe diagrams to record the volume of hydrogen produced each time in the table.

Table of results

volume of sulphuric acid/cm^3	syringe diagram	volume of hydrogen/cm^3
0		
5		
15		
20		
25		
30		
35		
40		

[4]

(a) Plot the results on the grid below. Draw a smooth line graph.



[4]

(b) Use the graph to find the volume of sulphuric acid that will produce 33 cm^3 of gas.

..... [1]

(c) What volume of gas is produced if 10 cm^3 of sulphuric acid is used?

..... [1]

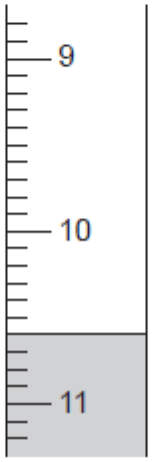
4 A student investigated an aqueous solution of calcium hydroxide and water.

Two experiments were carried out.

Experiment 1

By using a measuring cylinder 25 cm^3 of the aqueous solution of calcium hydroxide was placed in a flask. Phenolphthalein indicator was added to the flask. A burette was filled to the 0.0 cm^3 mark with solution **M** of hydrochloric acid.

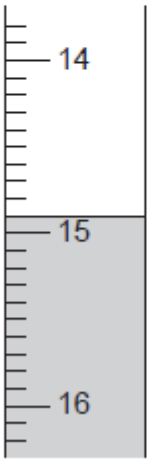
Solution **M** was added slowly to the flask until the colour just disappeared. Use the burette diagram to record the volume in the table and complete the column.



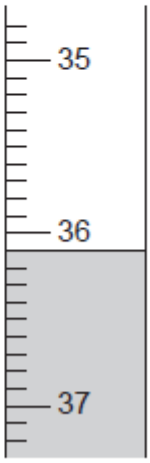
Experiment 2

Experiment 1 was repeated using a different solution, **N**, of hydrochloric acid.

Use the burette diagrams to record the volumes in the table and complete the table.



initial



final

Table of results

burette readings/cm^3	Experiment 1	Experiment 2
final reading		
initial reading	0.0	
difference		

[4]

(a) What type of chemical reaction occurs when hydrochloric acid reacts with calcium hydroxide?

.....

[1]

(b) **(i)** In which experiment was the greater volume of hydrochloric acid used?

.....

[1]

(ii) Compare the volumes of acid used in Experiments 1 and 2.

.....

.....

[2]

(iii) Suggest an explanation for the difference in volumes.

.....

.....

[2]

(c) Predict the volume of hydrochloric acid **M** that would be needed to react completely if Experiment 1 was repeated with 50 cm^3 of calcium hydroxide solution?

volume of solution .....

explanation .....

.....

[3]

(d) Suggest **one** change you could make to the **apparatus** used in the experiments to obtain more accurate results.

.....

.....

[1]

Q# 66/ iGCSE Chem/2005s/Paper 6/

6 The label below is from a bottle of concentrated lemon drink.

Concentrated lemon drink
Ingredients: Water, sugar, citric acid, preservatives, potassium sorbate (artificial sweetener). Yellow colourings E102 and E104.

(a) What is meant by the term *concentrated*?

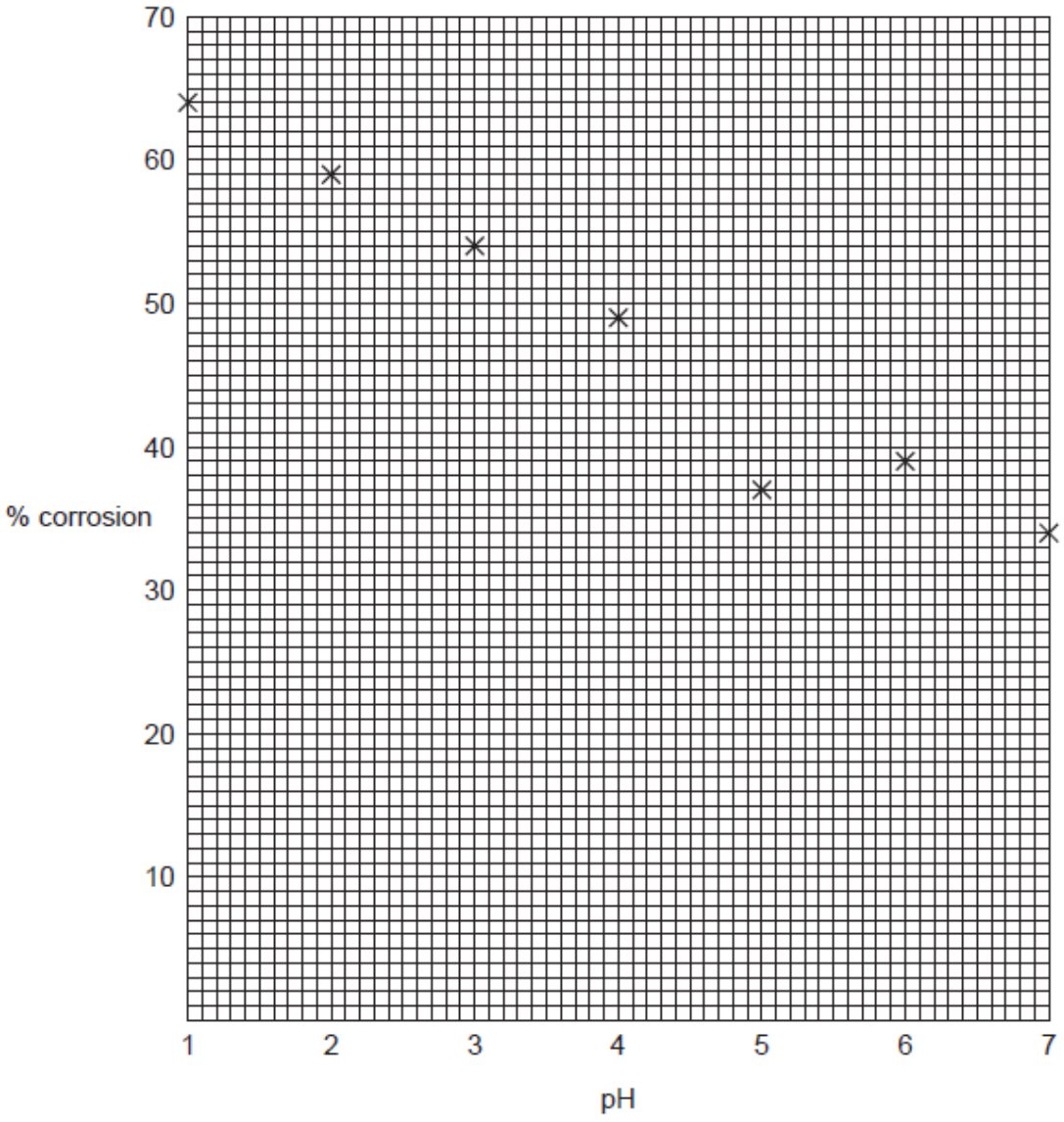
..... [1]

(b) Predict the pH of the lemon drink.

..... [1]

Q# 67/ iGCSE Chem/2005s/Paper 6/

7 Samples of concrete were placed in solutions of different pH. The graph shows the percentage corrosion of the samples.



(a) Draw a smooth line graph on the grid [1]

(b) Which point on the grid appears to be inaccurate? Explain your reason for identifying this point.

.....

..... [2]

(c) What happens to the percentage corrosion as the pH changes from 1 to 7?

..... [1]

Q# 68/ iGCSE Chem/2005s/Paper 6/

6 The label below is from a bottle of concentrated lemon drink.

Concentrated lemon drink
Ingredients: Water, sugar, citric acid, preservatives, potassium sorbate (artificial sweetener). Yellow colourings E102 and E104.

(c) Describe an experiment to show that two different yellow colourings are present in the drink.

[4]

5 A sample of a solution of acid **A** was analysed.

The tests on **A**, and some of the observations are in the following table.

Complete the observations in the table.

tests	observations
(a) The pH of the solution was tested using indicator paper	colour orange pH 4
(b) The solution was divided into three test-tubes **(i)** To the first portion was added a piece of magnesium ribbon. The gas was tested with a lighted splint.	..... [2]
(ii) To the second portion of **A** was added sodium carbonate. The gas was tested with limewater.	..... [2]
(iii) To the third portion of liquid **A** was added a spatula measure of solid **B**. The mixture was boiled gently. By using a teat pipette the solution was transferred to another test tube. Excess aqueous ammonia was added.	green solution formed dark blue solution formed

(c) What does test **(a)** tell you about the type of acid in solution **A**?

..... [1]

(d) **(i)** Name the gas given off in test **(b)(i)**.

..... [1]

(ii) Name the gas given off in test **(b)(ii)**.

..... [1]

(e) Explain the observations in test **(b)(iii)**.

.....

..... [2]

Q# 71/ iGCSE Chem/2004/w/Paper 6/

5 Salt **E**, which is ammonium chloride was tested.

Record all observations in the table.

tests	observations
(a) Describe the appearance of **E**	..... [2]
(b) Using a spatula salt **E** was placed in a hard glass test-tube. Inside the top of the tube was suspended a piece of damp blue litmus paper next to a piece of damp red litmus paper. **E** was heated gently until gas came out of the tube.	red litmus went blue then blue litmus went red
(c) **E** was dissolved in water to make an aqueous solution. The solution was divided into three test-tubes **(i)** To the first portion, was added a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate.	.... [2]
(ii) To the second portion of solution **E**, was added about 1 cm^3 of lead nitrate solution.	..... [2]
(iii) To the third portion of solution **E**, was added about 1 cm^3 of aqueous sodium hydroxide. The mixture was boiled gently and the gas given off was tested with indicator paper	.... [2]

(d) Name the gas given off in test **(c)(iii)**.

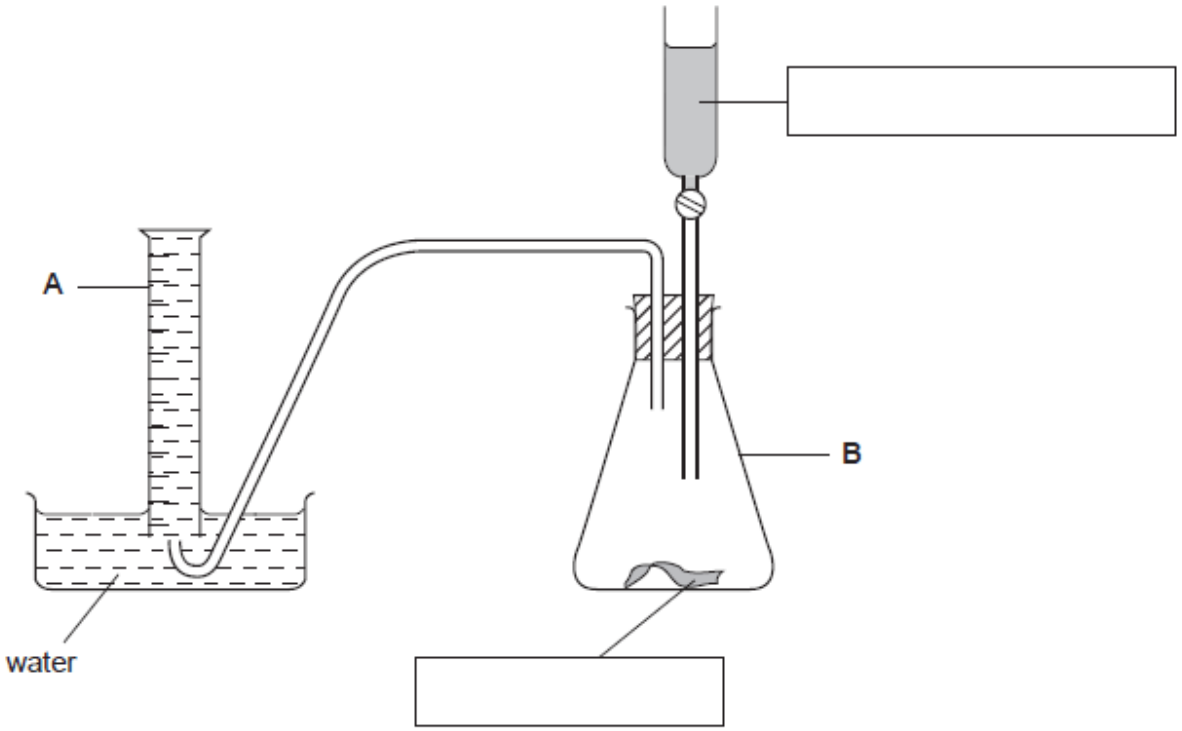
..... [1]

(e) Explain the observations in test **(b)**.

.....

..... [2]

1 The apparatus below was used to make hydrogen. Dilute hydrochloric acid was added to zinc.



(a) Identify the pieces of apparatus labelled

A, ...

B. ..... [2]

(b) Complete the boxes [1]

(c) Give a test for hydrogen.

test .....

result ..... [2]

Q# 73/ iGCSE Chem/2004/w/Paper 6/

6 Describe a chemical test to distinguish between each of the following pairs of substances. An example is given.

oxygen and carbon dioxide

test: glowing splint

result: re-lights in oxygen, no effect with carbon dioxide

(a) aqueous chlorine and aqueous sodium chloride

test .....

result with chlorine .....

result with sodium chloride ..... [2]

(b) aqueous iron(II) chloride and aqueous iron(III) chloride

test .....

result with iron(II) chloride .....

result with iron(III) chloride ..... [2]

(c) copper sulphate and copper carbonate

test .....

result with copper sulphate .....

result with copper carbonate ..... [2]

Q# 74/ iGCSE Chem/2004s/Paper 6/

7 Describe a chemical test to **distinguish** between each of the following pairs of substances. An example is given.

potassium chloride and potassium iodide

test: add aqueous lead(II) nitrate

result: potassium chloride gives a white precipitate, potassium iodide gives a yellow precipitate

(b) sulphuric acid and aqueous sodium sulphate

test .....

result with sulphuric acid .....

result with aqueous sodium sulphate ..... [2]

(c) hydrochloric acid and nitric acid

test .....

result with hydrochloric acid .....

result with nitric acid ..... [2]

5 A mixture of two calcium compounds **C** and **D** was tested.

C is partially soluble in water and **D** is soluble in water.

Complete the observations in the table.

tests	observations
The mixture of **C** and **D** was added to distilled water in a boiling tube. The tube was shaken. The mixture was filtered.	
(a) The filtrate was divided into five equal portions.	
(i) To the first portion was added drops of aqueous sodium hydroxide, a little at a time, with shaking.	.... [2]
Excess aqueous sodium hydroxide was added.	..... [1]
(ii) To the second portion was added excess aqueous ammonia, a little at a time.	..... [1]
(iii) To the third portion was added dilute sodium hydroxide and aluminium powder. The mixture was boiled and the gas tested with damp litmus paper.	red litmus went blue
(iv) The pH of the fourth portion was tested with Indicator paper.	pH about 10
(v) Carbon dioxide was bubbled through the fifth portion.	solution turned milky/cloudy

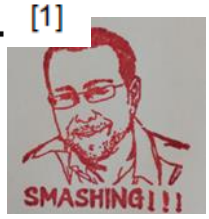
(b) Name the gas given off in **(a)(iii)**.

..... [1]

(c) Suggest an explanation for the observation in **(a)(v)**.

.....

..... [1]



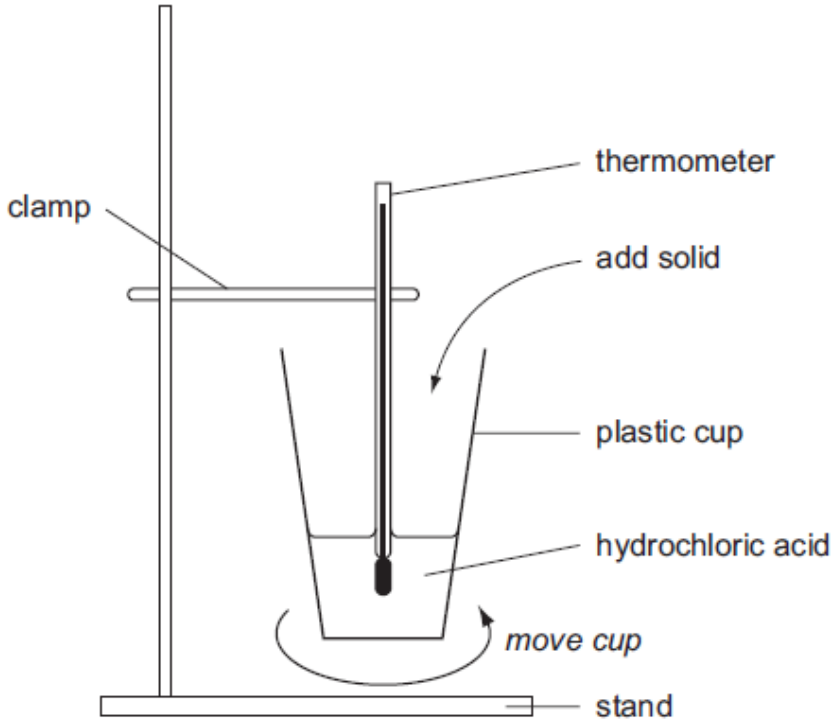
(d) What conclusions can you draw about the identity of the anions in solid **C** and **D**?

.....

..... [2]

Q# 77/ iGCSE Chem/2004s/Paper 6/

4 A student investigated the temperature changes that occur when two compounds **A** and **B**, react with hydrochloric acid. The apparatus below was used.



Experiment 1

By using a measuring cylinder, 30 cm^3 of hydrochloric acid was added to the plastic cup.

Use the thermometer diagram to record the initial temperature of the acid in the table. The timer was started, and some of the solid **A** was added to the cup. Immediate effervescence occurred. The mixture was stirred by moving the cup until the fizzing stopped.

More of **A** was then added and the student continued adding **A** in this way until all of solid **A** had been added.

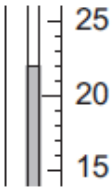
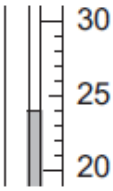
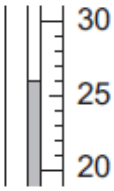
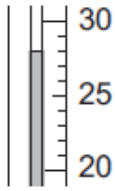
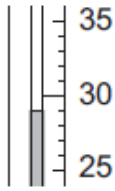
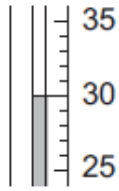
Use the thermometer diagrams to record the temperature of the mixture every half minute.

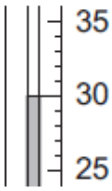
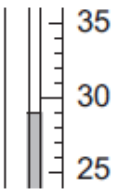
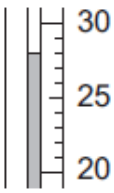
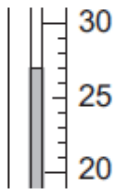
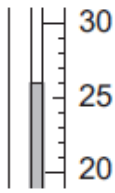
Experiment 2

Experiment 1 was repeated using solid **B**. Use the thermometer diagrams to record the temperatures in the table.

Table of results

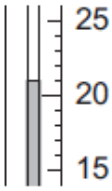
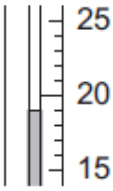
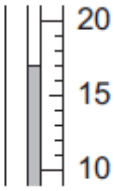
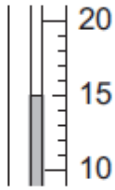
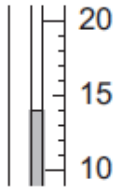
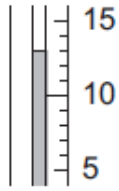
Experiment 1

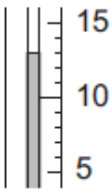
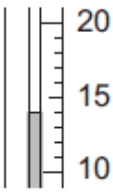
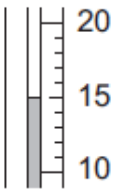
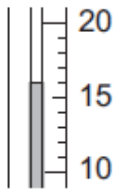
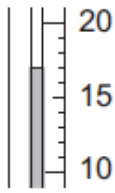
time/min	0.0	0.5	1.0	1.5	2.0	2.5
thermometer diagram						
temperature / °C						

3.0	3.5	4.0	4.5	5.0
				

[2]

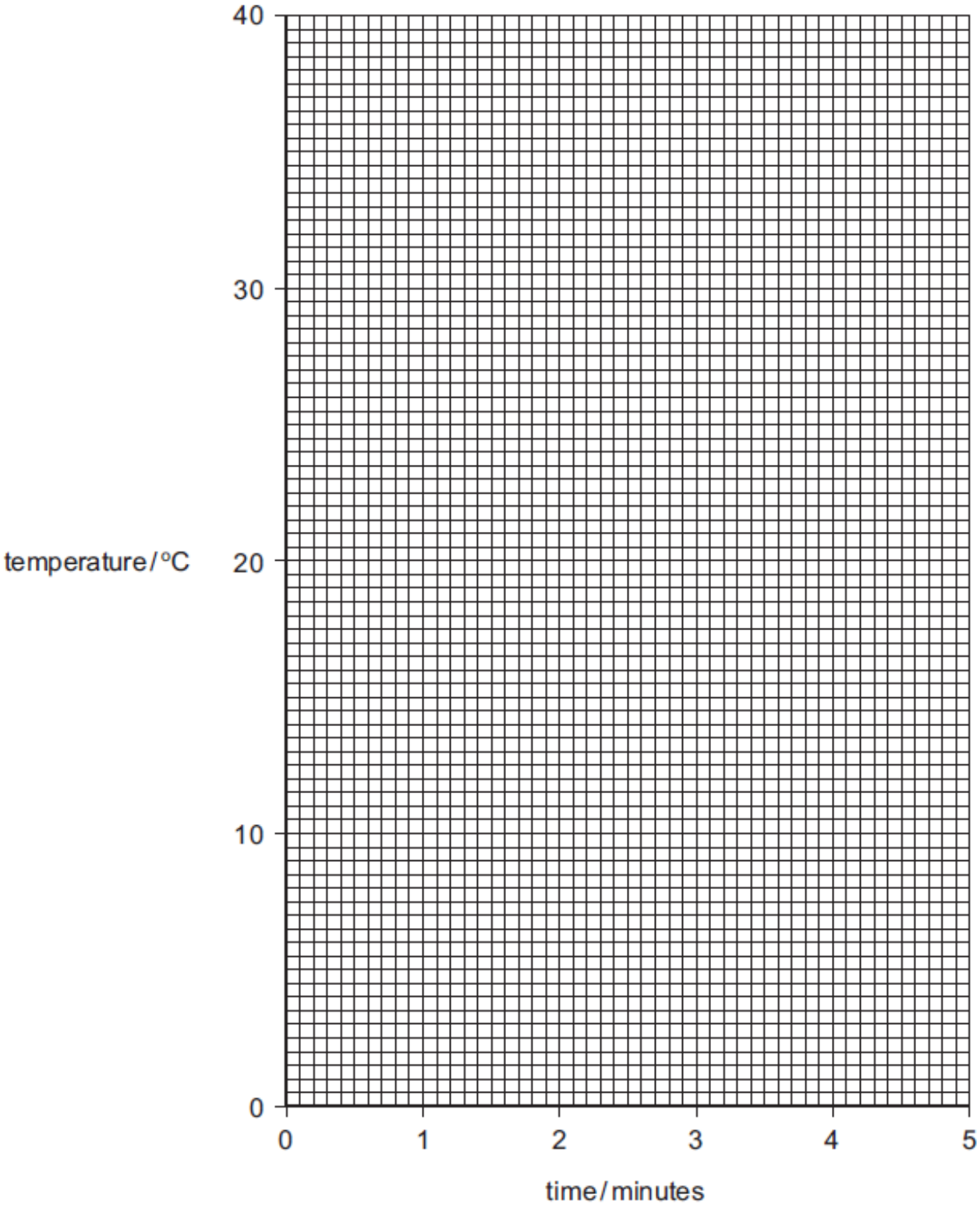
Experiment 2

time/min	0.0	0.5	1.0	1.5	2.0	2.5
thermometer diagram						
temperature / °C						

3.0	3.5	4.0	4.5	5.0
				

[2]

(a) Plot the results from both experiments on the grid below. For each set of results draw a smooth line graph. Indicate clearly which line represents Experiment 1 and which line Experiment 2 [6]



(b) **From your graphs;**

(i) Find the temperature of the reaction mixture after the hydrochloric acid had reacted for 2 minutes 15 seconds with

solid **A**, ...

solid **B**. ..... [2]

(ii) What type of chemical reaction occurs when

solid **A**, ...

solid **B** .....

reacts with hydrochloric acid? [2]

(c) Suggest what type of compound solids **A** and **B** are. Explain your answer

.....

.....

..... [2]

(d) If the plastic cup and final reaction mixture are left for one hour, predict the temperature at this time for

(i) solid **A** and hydrochloric acid, ...

(ii) solid **B** and hydrochloric acid. .....

Explain your answers.

.....

..... [3]

4 An aqueous solution of substance **X** was analysed. Substance **X** was an iron(III) salt containing one other cation. The tests on **X** and some of the observations are in the following table. Complete the observations in the table.

Tests	*Observations*
(a) Colour of solution **X**	dark yellow
(b) **(i)** Drops of aqueous sodium hydroxide were added to about 2 cm^3 of the solution. Excess aqueous sodium hydroxide was added to the test-tube. **(ii)** The mixture was heated. The gas given off was tested with damp indicator paper.	....[3] pungent smell indicator turned blue, pH 10
(c) Experiment **(b)(i)** was repeated using aqueous ammonia instead of aqueous sodium hydroxide.	....[2]
(d) To about 2 cm^3 of solution **X** was added dilute sulphuric acid. Two pieces of zinc were added. The mixture was heated and the gas given off tested. After 10 minutes the mixture was filtered and test **(b)(i)** was repeated.	lighted splint popped green precipitate insoluble in excess
(e) A few drops of hydrochloric acid were added to about 2 cm^3 of solution **X**. About 1 cm^3 of barium chloride solution was added to the mixture.	white precipitate

(f) **(i)** Name the gas given off in **(d)**.

.....

(ii) What type of chemical reaction occurs in **(d)**. Explain your answer.

.....

.....[3]

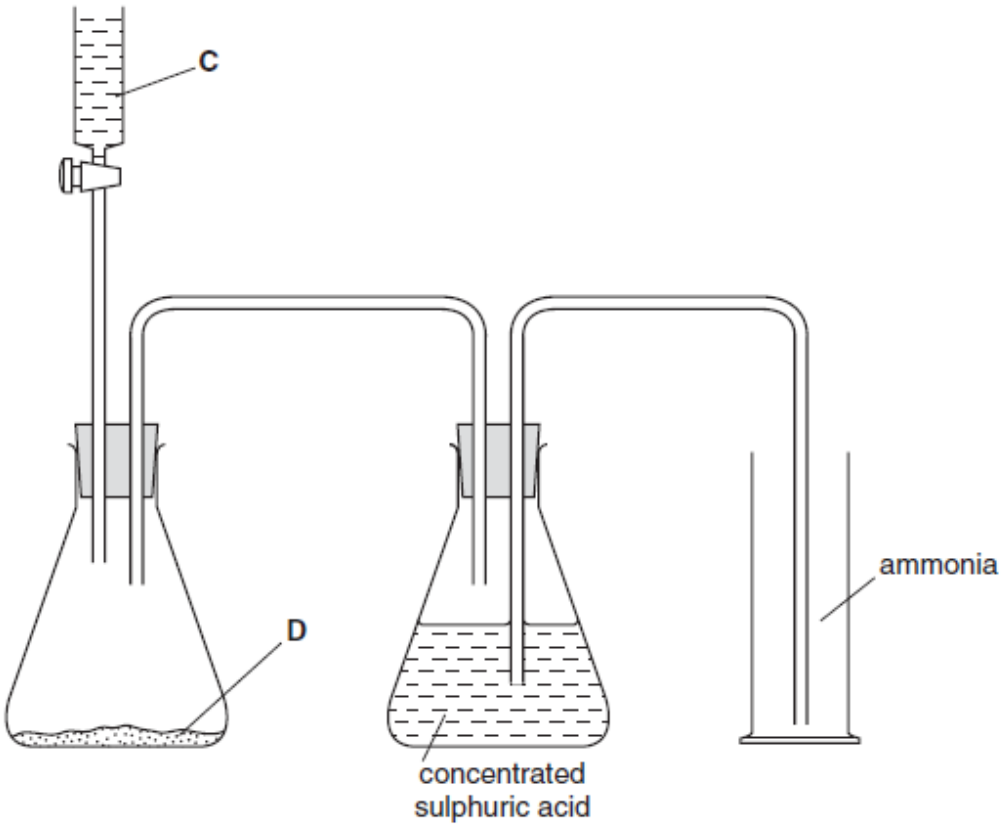
(g) What conclusions can you draw about the anion and the other cation in substance **X**?

anion .....

cation .....[2]

Q# 79/ iGCSE Chem/2003/w/Paper 6/

5 Ammonia is produced when aqueous sodium hydroxide is warmed with ammonium sulphate. Ammonia is less dense than air and very soluble in water. The apparatus below was used to prepare a sample of dry ammonia gas.



(a) Name substance **C**. .....[1]

(b) Name substance **D**. .....[1]

(c) What necessary piece of equipment is missing in the diagram?

.....[1]

(d) Suggest why concentrated sulphuric acid should **not** be used to dry ammonia.

.....[1]

(e) There are two other mistakes in the apparatus shown in the diagram. Identify and explain these mistakes.

mistake 1 .....

explanation .....

mistake 2 .....

explanation .....[4]

Q# 80/ iGCSE Chem/2003s/Paper 6/

6 Beach sand is a mixture of sand and broken shells (calcium carbonate). Calcium carbonate reacts with dilute hydrochloric acid to form a solution of calcium chloride.

Plan an investigation to find out the percentage of shell material in a given sample of beach sand.

.....

.....

.....

.....

.....

.....

.....

.....[6]

Q# 81/ iGCSE Chem/2003s/Paper 6/

4 A mixture of two solid compounds **D** and **E** was analysed. Solid **D** was a zinc salt which is soluble in water. Solid **E** was an insoluble metal carbonate. The tests on the mixture and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) About half of the mixture of **D** and **E** was placed in a test-tube. The mixture was heated	green to black condensation formed
(b) The rest of the mixture of **D** and **E** was added to distilled water in a boiling tube. The contents of the tube were filtered. The filtrate and the residue were kept for the following tests.	
test on residue **(c)** The residue was transferred from the filter paper in to a test-tube. About 3 cm^3 of dilute sulphuric acid was added. The gas was tested with limewater.	....[2]

The solution obtained in **(c)** was divided into two equal portions. **(d)** **(i)** To the first portion was added excess aqueous sodium hydroxide, a little at a time.	pale blue precipitate
(ii) To the second portion was added excess aqueous ammonia, a little at a time.	....[4]

tests	observations
test on filtrate **(e)** The filtrate from **(b)** was divided into three approximately equal portions.	
(i) To the first portion were added drops of aqueous sodium hydroxide, a little at a time with shaking.	....[2]
Excess aqueous sodium hydroxide was added.	.....[1]
(ii) To the second portion was added excess aqueous ammonia a little at a time.	....[3]
(iii) To the third portion were added drops of dilute hydrochloric acid and aqueous barium chloride.	white precipitate

(f) What conclusions can you draw about the identity of solid **D**?

.....

.....[2]

\

(g) What conclusions can you draw about the identity of the cation in solid **E**?

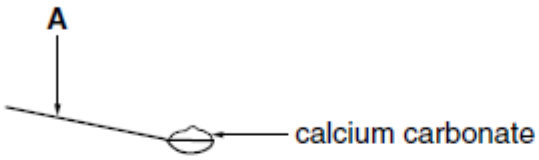
.....

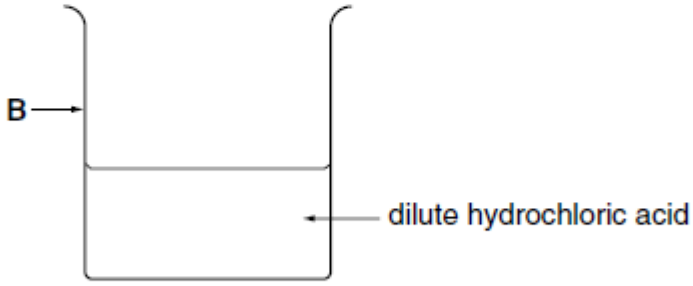
.....[2]

Q# 82/ iGCSE Chem/2002/w/Paper 6/

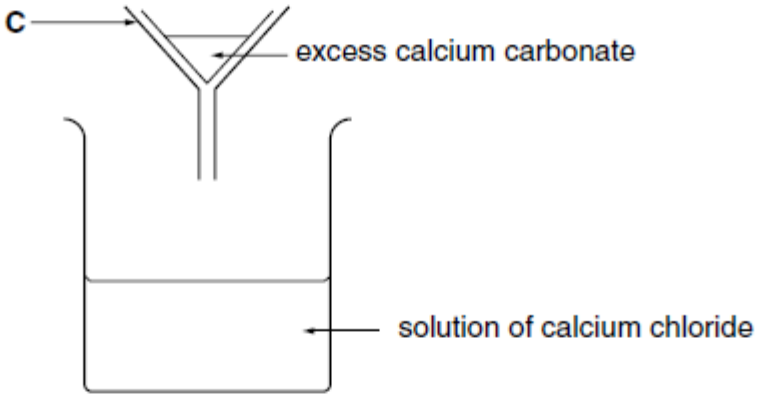
1 A student investigated the neutralisation of dilute hydrochloric acid, using an excess of calcium carbonate.

Step 1 Excess calcium carbonate was added to hydrochloric acid.





Step 2. Excess calcium carbonate was removed from the solution.



Step 3. The solution of calcium chloride was tested with indicator paper.

(a) Identify the pieces of apparatus labelled:

A.....

B.....

C.....[3]

(b) What does the term *excess* mean?

.....

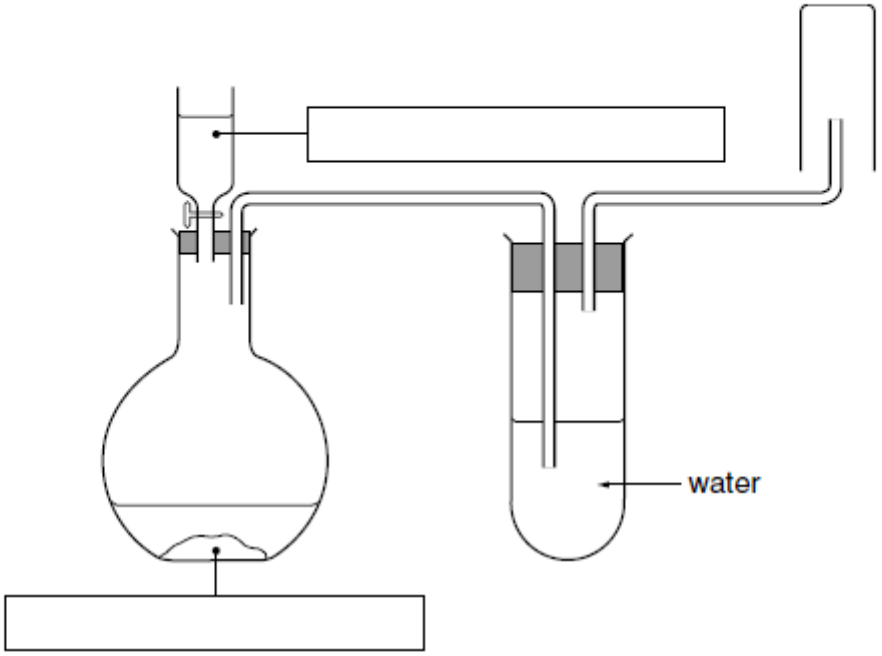
.....[1]

(c) Suggest the pH value of the solution of calcium chloride.

.....[1]

Q# 83/ iGCSE Chem/2002/w/Paper 6/

2 Hydrogen chloride gas is strong-smelling, denser than air and soluble in water. A sample of hydrogen chloride gas can be prepared by adding concentrated sulphuric acid to sodium chloride. Study the diagram of the apparatus used.



(a) Fill in the boxes to show the chemicals used. [2]

(b) Identify and explain **two** mistakes in the diagram.

Mistake 1 .....

.....[2]

Mistake 2 .....

.....[2]

(c) State **one** precaution that should be taken when carrying out this experiment.

.....

.....[1]

5 Two liquids, **F** and **G**, were tested. The tests and some of the observations are in the following table. **G** was an aqueous solution of a metal iodide.

Complete the observations in the table.

tests	*observations*
(a) **(i)** Appearance of liquid **F**.	colourless smells like petrol
(ii) Appearance of liquid **G**.	colourless no smell
(b) **(i)** About 1 cm^3 of liquid **F** was added to a crystal of iodine. The test-tube was shaken.	purple solution
(ii) About 1 cm^3 of liquid **G** was added to a crystal of iodine. The test-tube was shaken.	red/brown solution
The mixture from **(b)(i)** was added to the mixture in **(b)(ii)**.	two layers formed
(c) A few drops of **F** were placed on a dry watch glass. The liquid was touched with a lighted splint.	....[2]
(d) To about 1 cm^3 of liquid **G** was added a few drops of dilute nitric acid followed by aqueous lead(II) nitrate.	....[2]
(e) To about 1 cm^3 of liquid **G** was added a few drops of dilute nitric acid followed by aqueous silver nitrate.	....[2]

(f) What type of substance is liquid **F**?

.....

.....[2]

Q# 85/ iGCSE Chem/2002/w/Paper 6/

6 The following paragraph was taken from a student's notebook.

To make potassium chloride

25.0 cm^3 of aqueous potassium hydroxide were placed in a flask and a few drops of indicator were added. Dilute hydrochloric acid was added to the flask until the indicator changed colour. The volume of acid used was 19.0 cm^3.

(a) What piece of apparatus should be used to measure the aqueous potassium hydroxide?

.....[1]

(b) **(i)** Name a suitable indicator that could be used.

.....[1]

(ii) The indicator colour would change

from.....

to..... [2]

(c) Which solution was more concentrated? Explain your answer.

.....

.....[2]

(d) How could **pure** crystals of potassium chloride be obtained from this experiment?

.....

.....

.....

.....[3]

Q# 86/ iGCSE Chem/2002s/Paper 6/

2 The label shows the substances present in a bottle of lemon drink.

(a) A piece of litmus paper was dipped in the drink.

(i) What colour will the paper turn?

.....[1]

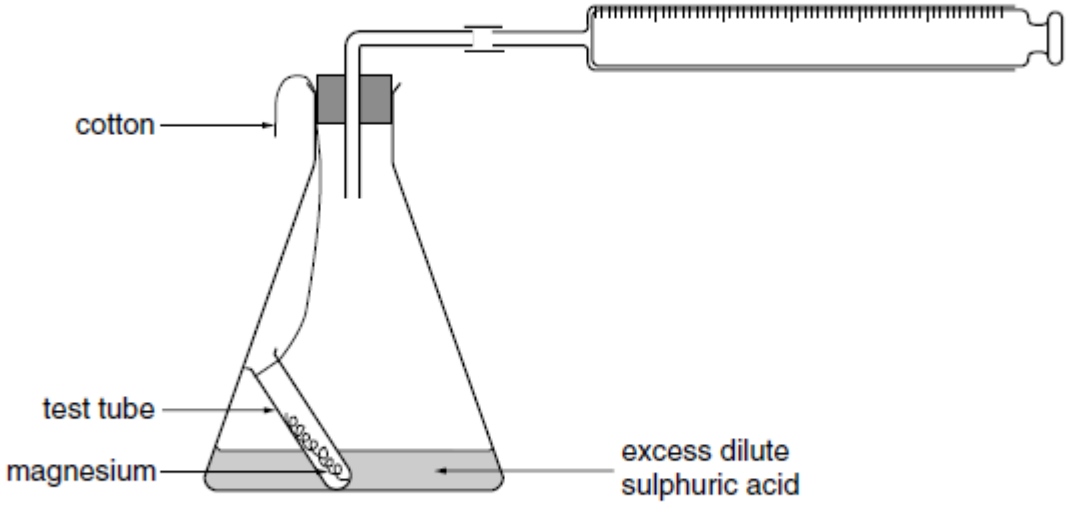
(ii) Why does using litmus paper give a better result than adding Universal Indicator solution to the drink?

.....

.....[1]

Q# 87/ iGCSE Chem/2002s/Paper 6/

3 The apparatus below was used to investigate the speed of the reaction between an **excess** of dilute sulphuric acid and 4 cm of magnesium ribbon.



(a) (i) What is the purpose of the test-tube?

.....[1]

(ii) What is the purpose of the gas syringe?

.....[1]

(b) How was the reaction started?

.....[1]

Q# 88/ iGCSE Chem/2002s/Paper 6/

7 Describe a chemical test to distinguish between each of the following pairs of substances. An example is given.

potassium chloride and potassium iodide

test: add aqueous lead(II) nitrate

result: potassium chloride gives a white precipitate, potassium iodide gives a yellow precipitate

(a) hydrochloric acid and aqueous sodium chloride

test .....

result .....

.....[2]

(c) sulphuric acid and nitric acid

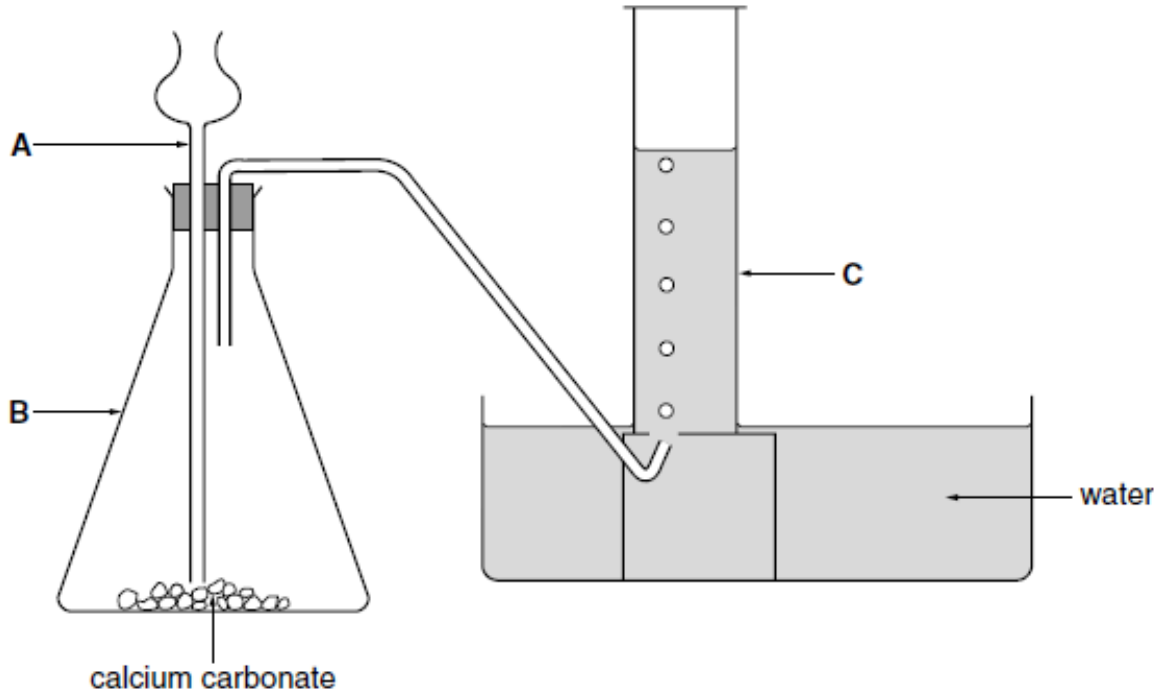
test .....

result .....

.....[2]

Q# 89/ iGCSE Chem/2002s/Paper 6/

1 The apparatus below was used to make carbon dioxide. Dilute hydrochloric acid was added to calcium carbonate.



(a) Identify the pieces of apparatus labelled:

A .....

B .....

C .....

[3]

(b) Indicate on the diagram with an arrow where the acid was added. [1]

(c) State a test for carbon dioxide.

test .....

result .....[2]

6 Two solid compounds **S** and **T** were tested. The tests on **S** and **T** and some of the observations are in the following table. **S** was copper(II) oxide. Complete the observations in the table.

Tests	*Observations*
(a) Appearance of **S** and **T**.	**S** black solid **T** black solid
(b) **(i)** Solid **S** was added to aqueous hydrogen peroxide.	no reaction
The mixture was boiled. The gas given off was tested with a glowing splint.	splint extinguished
(ii) Solid **T** was added to aqueous hydrogen peroxide.	rapid effervescence
The gas given off was tested with a glowing splint.	splint relit
(c) **(i)** Solid **T** was added to hydrochloric acid and heated.	
The gas given off was tested with damp blue litmus paper.	litmus paper bleached
(ii) Test **(c)(i)** was repeated using solid **S**.	
The colour of the solution was noted.	green solution
(d) The solution from **(c)(ii)** was divided into two equal portions of 1 cm^3.	
(i) To the first portion was added excess aqueous sodium hydroxide.	....[2]
(ii) To the second portion was added excess aqueous ammonia.	....[3]

(e) Name the gas given off in test **(b)(ii)**.

.....[1]

(f) Name the gas given off in test **(c)(i)**.

.....[1]

(g) What conclusions can you draw about solid **T**?

.....

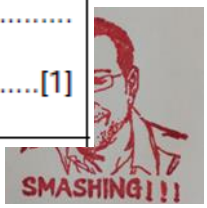
.....

.....[2]

Q# 91/ iGCSE Chem/2001/w/Paper 6/

5 The solid **P** contained the iron(II) cation, another cation and one anion.
The tests on an aqueous solution of **P** and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) **(i)** To about 1cm^3 of solution **P** was added excess aqueous sodium hydroxide and shaken	....[2]
(ii) The mixture was heated gently until boiling. The gas given off was tested with pH indicator paper.	Indicator paper turned blue pH 11
(b) To about 1 cm^3 of solution **P**, was added a few drops of dilute sulphuric acid and potassium manganate(VII) solution. The colour change was noted. The iron(II) ions were oxidised to iron(III) ions. Aqueous sodium hydroxide was added with shaking until no further change.	.....[2]
(c) To 1 cm^3 of solution **P**, was added aqueous ammonia with shaking until excess ammonia was present.	....[2]
After 5 minutes, describe the surface of the mixture.	....[1]



(d) To 1 cm^3 of solution **P** was added drops of dilute hydrochloric acid and then aqueous barium chloride.	white precipitate

(e) What gas is given off in test **(a)**?

.....[1]

(f) Identify the other cation present in solid **P**.

.....[1]

(g) Identify the anion present in solid **P**.

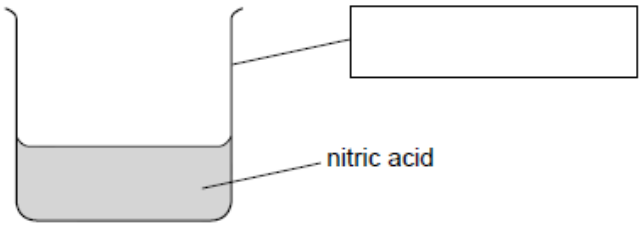
.....[1]

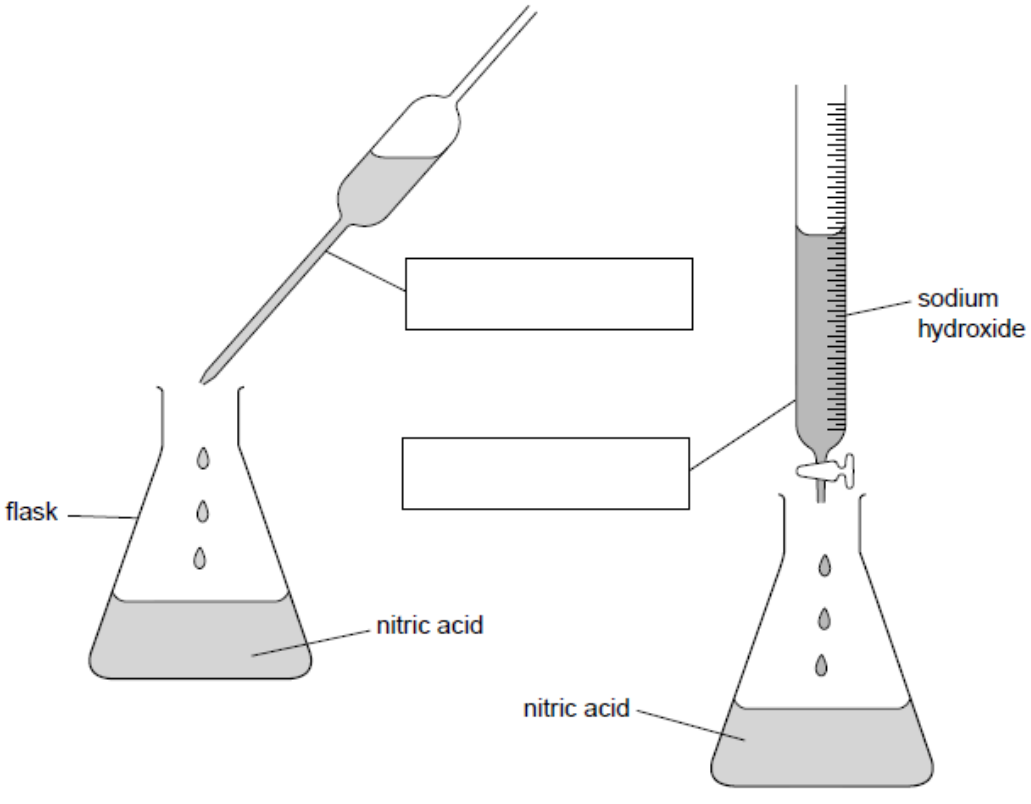
Q# 92/ iGCSE Chem/2001/w/Paper 6/

1 The diagrams show the apparatus used to find the concentration of a nitric acid solution.

25.0 cm^3 of nitric acid was added to a flask.

Sodium hydroxide was added to the acid until the solution was neutral. The volume of the sodium hydroxide was noted.





(a) Complete the boxes to name the apparatus used. [3]

(b) How could you tell when the solution was neutral?

.....

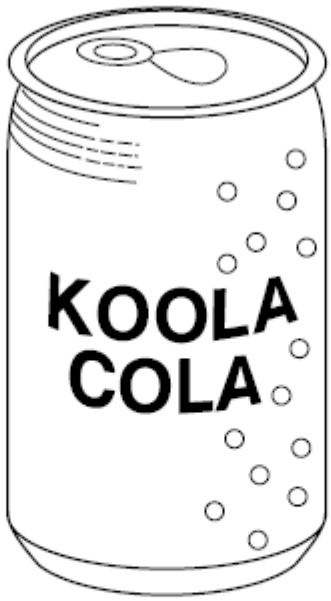
.....[2]

(c) How could the accuracy of the results be checked?

.....[1]

Q# 93/ iGCSE Chem/2001/w/Paper 6/

6 You are provided with cans of a fizzy drink – Koola cola.



Plan tests to investigate the cola so that you can answer the following four questions.

(a) What is the pH of the cola?

.....

.....[2]

(b) How many coloured pigments does the cola contain?

.....

.....

.....

.....

.....[3]

(c) What volume of gas is released when a can of cola is opened? [Note: The can will have to be opened under water.]

.....

.....

.....[2]

(d) Is the gas released carbon dioxide?

.....

.....[2]

Mark Scheme iG Chem 8 15w to 01w P6 758marks

Q# 1/ iGCSE Chem/2015/w/Paper 62/

1(a)	pipette; burette;	1 1	**I:** dropper **R:** teat pipette
1(b)	named indicator;	1	**I:** references to indicator paper **R:** Universal Indicator
1(c)	all volumes correct: 16.3, 16.9, 16.2, 16.1 4 correct = 2 3 correct = 1 2 or fewer correct = 0	2	
1(d)(i)	neutralisation / acid-base reaction / exothermic;	1	
1(d)(ii)	(indicator) changed colour;	1	**A:** incorrect colour changes
1(e)(i)	Experiment 2 / the second one / 16.9;	1	ecf on **(c)**
1(e)(ii)	measuring or recording error / overshot end-point / manual error with burette;	1	**A:** incorrect volume of sodium hydroxide used **I:** human error
1(e)(iii)	16.2; cm^3;	1 1	ecf on **(c)**
1(f)	hydrochloric acid; less volume used than sodium hydroxide;	1 1	

Q# 2/ iGCSE Chem/2015/w/Paper 62/

5(c)	copper; chloride;	1 1	**I:** any reference to copper's oxidation state
5(d)	colourless;	1	**R:** white / pale yellow
5(e)(i)	white; precipitate ; insoluble / no change / no reaction ;	1 1 1	**R:** colourless
5(e)(ii)	no precipitate / slight white precipitate; no change / no reaction;	1 1	
5(e)(iii)	yellow; precipitate;	1 1	

Q# 3/ iGCSE Chem/2015/w/Paper 62/

4	*tests on ethene*		**A:** Allow any test which gives only a **unique detectable result** for that substance, e.g. lighted splint / ethene burns.
	ammonia red litmus / pH paper; turns blue / pH > 7;	 1 1	
	oxygen glowing splint; relights;	 1 1	 **R:** relights a lighted splint **A:** lighted splint glows brighter

Q# 4/ iGCSE Chem/2015s/Paper 6/

5(c)	white; precipitate; dissolves/clears;	3	
5(d)	white precipitate;	1	
5(e)	no reaction/no change/no precipitate/colourless solution;	1	
5(f)	white; precipitate;	2	
5(g)	hydrated/water;	1	
5(h)	not a halide/not a named halide;	1	
5(i)(i)	ammonia/NH_3;	1	
5(i)(ii)	ammonium/NH_4^+;	1	

Q# 5/ iGCSE Chem/2015s/Paper 6/

4(a)	25, 27, 30, 32, 34, 36, 35, 34, 33 all 9 = 3 marks 8 = 2 marks 7 = 1 mark	3	please put an 'x' by any incorrectly plotted points
4(b)	25, 34, 41, 40, 39, 38, 37, 36, 34 all 9 = 3 marks 8 = 2 marks 7 = 1 mark	3	
4(c)	all 18 points plotted within half a small square = 3 marks 17 points plotted within half a small square = 2 marks 16 points plotted within half a small square = 1 mark; smooth line graph; labels;	5	
4(d)	value read from graph, 38.5 °C; indication clearly shown;	2	
4(e)	exothermic;	1	
4(f)	to remove traces of acid A/clean; to remove water;	2	
4(g)(i)	experiment 2/acid B;	1	
4(g)(ii)	acid B is stronger/dibasic/has a lower pH/more acidic;	1	I more reactive/more concentrated
4(h)	heat losses/using a measuring cylinder/thermometer/cup not washed; insulate/use burette/digital thermom./new cup;	2	I repeat and average

Q# 6/ iGCSE Chem/2015march/Paper 6/

5 tests on solution **E**

(a) yellow/green/any combination of yellow/green [1]

(b) white precipitate (1) [1]

(c) **(i)** green (1) precipitate (1) [2]

(ii) indicator paper turns blue (1)

pungent/sharp smell(1) [2]

(d) brown precipitate (1) [1]

(g) hydrogen (1) [1]

(h) any **two** from:
transition metal (1)

different valencies/colours (1)

acidic solution (1) [2]

Q# 7/ iGCSE Chem/2015march/Paper 6/ Q1

(d) test: named indicator / pH meter / pH paper (1)

result: correct colour change / pH < 7 (1) [2]

Q# 8/ iGCSE Chem/2014/w/Paper 6/

1 **(a)** boxes completed to show stirrer / glass rod (1)
watchglass / evaporating dish (1) [2]

(b) to speed up the reaction (1) [1]

(c) correct answer 4.2g (2)
if incorrect, evidence of 17.8 – 13.6 (1) [2]

(d) **(i)** solid / lead oxide visible / remaining (1) [1]
do not allow: mention of precipitate

(ii) filtration (1) [1]

(iii) excess (1) [1]
allow: residue

(e) Any **two** from:
evaporation / steam (1)
solid / crystals formed (1)
breakdown / decomposition of solid (1) [2]

Q# 9/ iGCSE Chem/2014/w/Paper 6/ Q4

(h) same volume of each solution (1)
add suitable reactant (1)
expected observation (1)
comparison (1) [4]
note: e.g. 10 cm^3 of each acid (1), add strip of magnesium / named carbonate (1)
effervescence (1), more rapid bubbles means stronger acid (1)

Q# 10/ iGCSE Chem/2014/w/Paper 6/

6 **(a)** **(i)** gas syringe / inverted measuring cylinder in trough of water (1)
labelled (1) [2]

(ii) limewater (1)
milky (1) [2]

Q# 11/ iGCSE Chem/2014/w/Paper 6/

5 **(c)** no reaction / no change / no precipitate (1) [1]

(d) white (1)
precipitate (1) [2]

(e) transition metal present (1)
allow: iron
water / hydrated (1) [2]

(f) hydrated (1) iron (1) (II) (1) (sulfate) [3]

Q# 12/ iGCSE Chem/2014/w/Paper 6/

4 **(a)** table of results for Experiment 1
initial volume completed correctly (1)
0 or 24.4
all readings to 1 decimal place (1) [2]

(b) table of results for Experiment 2
final volume completed correctly (1)
6.1
difference correct (1) [2]

(c) **(i)** neutralisation (1) [1]
allow: acid-base

(ii) as an indicator / to show end point (1) [1]

(d) water to remove the solution A of acid (1)
acid B to remove traces of water (1) [2]

(e) **(i)** Experiment 1
ecf from readings (1) [1]

(ii) any correct comparison (1) [1]

(iii) solution B more concentrated / stronger (1) or converse
less volume was needed (1) [2]

(f) half value from table result for experiment 2 (1)
cm^3 (1) [2]

(g) advantage: easy to use / quick / convenient (1)
disadvantage: not accurate owtte (1) [2]

(h) same volume of each solution (1)
add suitable reactant (1)
expected observation (1)
comparison (1) [4]
note: e.g. 10 cm^3 of each acid (1), add strip of magnesium / named carbonate (1)
effervescence (1), more rapid bubbles means stronger acid (1)

Q# 13/ iGCSE Chem/2014s/Paper 6/

2 **(a)** precipitation / double decomposition (1) [1]
allow: ppt

(b) **(i)** low / insoluble / does not dissolve (1) [1]

(ii) high / soluble / dissolves (1) [1]

(c) filtration (1) [1]

Q# 14/ iGCSE Chem/2014s/Paper 6/

5 **(d)** white (1)

precipitate (1) [2]

(e) no reaction / no change / no precipitate (1) [1]
allow: colourless solution

(f) not a chloride / halide (1) [1]

(g) oxygen / O_2 (1) [1]
not O

(h) transition metal / manganese (1)

hydrated salt (1)
ignore: sulfate

allow: catalyst (1) max [2]

Q# 15/ iGCSE Chem/2014s/Paper 6/

4 **(a)** table of results for Experiment 1

initial and final volume boxes completed correctly (1) 0.0 and 16.8

difference box correctly completed (1) 16.8

all readings to one decimal place (1) [3]

(b) table of results for Experiment 2

initial (1) and final volume (1) boxes completed correctly 16.8 (1) and 25.2 (1)

difference box correctly completed (1) 8.4 [3]

(d) to colourless (1) [1]
not: clear

(e) coloured reacting mixture masks colour of phenolphthalein / reaction is finished / solution is acidic (1) [1]

(f) carbonate / carbon dioxide present (1) [1]
allow: hydrogencarbonate

(g) (i) 8.4 (1)
ecf: titre 1 – titre 2

cm^3 (1) [2]

(ii) 16.8 (1) [1]
ecf: 2 × titre 2

(iii) twice volume of acid needed to react with T (1) [1]
ecf: if **(g)(i)** or / and **(g)(ii)** wrong need quantitative link.
not: more (unqualified)

(h) (i) 67.2 cm^3 (1)

33.6 cm^3 (1)

4 × volume of solution R (1) [3]

(ii) volume of acid used > 50 cm^3 / more than burette can hold (1)

set up more than two burettes / 100.8 won't fit into 2 (1) [2]
allow: impurities / contamination (1)

Q# 16/ iGCSE Chem/2013/w/Paper 6/

2 (a) straight line drawn with a ruler through all points missing point at pH 5 (1) [1]

(b) idea of fair test / comparability (1) [1]

(c) temperature (1) [1]

(d) the lower the pH the greater the % corrosion / or converse / pH 1 is most corrosive (1) [1]

(e) 2.5% (1) [1]

Q# 17/ iGCSE Chem/2013/w/Paper 6/

1 (a) funnel (1) [1]

(b) to move products through the apparatus / owtte e.g. let the gases go out (1) [1]

(c) (i) limewater (1)
to detect carbon dioxide (1) [2]

(ii) so gas bubbles through liquid (1) [1]

(d) condensation / drops (1) water (1) [2]
allow: black deposit (1) soot / carbon (1)

Q# 18/ iGCSE Chem/2013/w/Paper 6/

4 tests on liquid L

(a) colourless (liquid) [1]
allow: (pale) yellow

(c) no reaction / change (1) [1]

(d) yellow (1) precipitate (1) [2]

(e) iodine dissolves / owtte (1) [1]

(f) organic (1) solvent (1) liquids do not mix (1) max [2]

Q# 19/ iGCSE Chem/2013/w/Paper 6/

3 **(a)** table of results for Experiment 1
initial, final and difference volume boxes completed correctly (1)
0.0, 38.0 difference 38.0
readings to 1dp (1) [2]

(b) table of results for Experiment 2
initial and final boxes completed correctly (1) 10.0, 29.0
difference (1) [2]

(c) colourless (1) pink (1) [2]

(d) neutralisation / exothermic (1) [1]

(e) 2 × volume for Experiment 1 from table / 76 (1) cm^3 (1) [2]

(f) **(i)** reacts with the acid / neutralised (1) less sodium hydroxide needed (1) [2]

(ii) volume in **(e)** – volume added in Experiment 2 (1) e.g. 76–19
correct value (2) e.g. 57 cm^3 [2]

(iii) estimate based on **(ii)** answer to **(ii)** / 3 divided into 19 × 0.1 + 0.3 = 0.4 g [1]

(g) no effect (1)
reason – reaction not affected by temperature (1) [2]

(h) **(i)** more accurate (1) than a measuring cylinder (1) [2]

(ii) no effect / advantage (1) not measuring temperature changes (1) [2]

Q# 20/ iGCSE Chem/2013s/Paper 6/

4 tests on filtrate

(a) colourless (1) [1]
ignore: clear, **not:** white

(b) white (1) precipitate (1)

soluble in excess / dissolves (1) [3]

(c) white precipitate (1)
Insoluble / does not dissolve (1) [2]

(d) white (1) precipitate (1) [2]

(e) no reaction / no change / no precipitate (1) [1]

(g) transition metal / copper (1) carbonate (1) [2]

Q# 21/ iGCSE Chem/2013s/Paper 6/

6 weigh mixture (1)

add excess (1) sulfuric acid (1)

heat / stir (1)

filter (1) wash (1) dry (1) the carbon / residue

reweigh(1) calculate percentage (1) max 6 [6]

will not work = 0
ignore: details of evaporation of copper sulfate solution
note: must have at least one weighing for 6 marks

Q# 22/ iGCSE Chem/2012/w/Paper 6/

5 **(a)** **(i)** white (1) precipitate (1) dissolves (1) [3]

(ii) white precipitate (1) dissolves (1) [2]

(b) no reaction/change (1) [1]

(c) white (1) precipitate (1) [2]

(g) chlorine (1) **not:** chloride [1]

(h) oxygen (1) [1]

(i) transition metal present (1) catalyst (1) **allow:** copper oxide for one mark [2]

manganese (1) oxide (1) max 2

Q# 23/ iGCSE Chem/2012s/Paper 6/

5 **(c)** fizz/bubbles/effervescence (1) limewater (1)
milky/cloudy/white ppt (1) **cond**: on limewater [3]

(e) ammonia (1) [1]

(f) non-transition metal (1)
ammonium (salt or carbonate) (2) **not**: ammonia max [2]

Q# 24/ iGCSE Chem/2012s/Paper 6/

1 **(a)** tripod (1) **accept**: stand spatula (1) not: spoon [2]

(b) fizz/bubbles/effervescence stops (1)
solid/iron/powder visible / no more iron dissolves/reacts (1) [2]

(c) evaporation of water/steam (1) solid/residue/crystals formed (1)
colour change turns brown/darker green (1)
effect of heat on solid solid breaks down (1) max 3 [3]

Q# 25/ iGCSE Chem/2012s/Paper 6/

4 **(a)** Table of results **ignore**: units in table
volume of aqueous potassium chloride boxes completed correctly (1) 1, 2, 4. 5, 6, 7
heights of solid boxes completed ±1mm (2) 4, 8, 16, 20, 24, 24
in mm (1) [4]

(b) all points correctly plotted (2), –1 for any incorrect
straight line graphs (2) **note**: one for each line, doesn't have to go through origin [4]

(c) value from graph 14 (1) unit (1) shown clearly (1) [3]

(d) precipitation (1) **allow**: double decomposition ignore: exo/endothermic [1]

(e) **(i)** same (1) no ecf **not**: almost the same
all lead nitrate reacted/reaction finished/lead nitrate is limiting factor (1) [2]

(ii) same heights/owtte (1)
lead nitrate is limiting factor/same amount of lead nitrate/excess potassium chloride (1) [2]

(g) yellow (precipitate) (1) [1]

(h) improvement (1) e.g. use burette/pipette/leave solid to settle longer/repeat
explanation (1) e.g. instead of a measuring cylinder/heights more accurate/take average [2]

Q# 26/ iGCSE Chem/2011/w/Paper 6/

2 **(a)** points plotted correctly (2)
smooth line graph missing anomalous point (1) [3]

(b) point at 15 cm^3/pH 2.6/third point (1) [1]

(c) **(i)** 12.6 (1) [1]

(ii) pH 1 (1) extrapolation shown (1) [2]

(d) **(i)** 7 (1) [1]

(ii) 25 (1) [1]

(e) repeat experiment (1) stop when 25 cm^3 added/when pH7 (1)
evaporate/heat (1) use same volumes (1)
to crystallising point/until saturated (1) max [3]

Q# 27/ iGCSE Chem/2011/w/Paper 6/

2 **(a)** points plotted correctly (2)
smooth line graph missing anomalous point (1) [3]

(b) point at 15 cm^3/pH 2.6/third point (1) [1]

(c) **(i)** 12.6 (1) [1]

(ii) pH 1 (1) extrapolation shown (1) [2]

Q# 28/ iGCSE Chem/2011/w/Paper 6/

5 **(a)** **(i)** **P** colourless, no smell (1) [1]

(ii) **P** pH 1–3 (1) [1]

(b) **P** fizzes/effervescence/bubbles (1)
lighted splint pops (1) **not** hydrogen [2]

(c) white (1) precipitate (1) [2]

(e) weak acid (1) ethanoic acid (2) [2]

(f) water (1) [1]

Q# 29/ iGCSE Chem/2011s/Paper 6/

5 **(a)** **(ii)** colourless (1) **allow** yellow no smell (1) [2]

(b) **(ii)** extinguished/owtte (1) [1]

(d) yellow (1) precipitate (1) [2]

(e) organic (1) **allow** hydrocarbon
fuel/alcohol/named alcohol (1) **allow** flammable [2]

Q# 30/ iGCSE Chem/2011s/Paper 6/

7 **(a)** appropriate test (1) result (1) [2]
e.g.

pH paper or named indicator	11–14 **or** correct colour
named metal salt solution/ion	correct colour precipitate
ammonium salt/heat	ammonia/owtte

(b) fizzy drinks may be acidic/contain carbon dioxide (1)
chlorine formed (1) toxic (1) max [2]

(c) answer connected to health and safety (1) [1]
allow to affect the environment/to clean it

(d) litmus/pH/UI paper (1) bleached owtte (1) [2]

Q# 31/ iGCSE Chem/2011s/Paper 6/

6 **(a)** diagram of a filter paper in a funnel (1) label funnel/filter paper (1) [2]

(b) 0.45, 0.95, 1.40, 1.90, 2.35 and 2.35 (2), –1 for each incorrect up to 2 [2]

(c) all points plotted correctly (2), –1 for each incorrect point up to 2
two intersecting straight lines (1) **ignore** origin [3]

(d) 5 cm^3 (1) **ignore** unit [1]

Q# 32/ iGCSE Chem/2011s/Paper 6/

4 Experiment 1

(a) and (b) initial and final volumes completed correctly (1) 0.0, 32.0

Experiment 2

initial and final volumes completed correctly (1) 19.0, 35.0

all readings in both experiments to 1 decimal place (1)
both differences correctly calculated (1) [4]

(c) oxygen(1) [1]

(d) **(i)** colourless **not** clear to purple/pink (1) **or** reverse [1]

(ii) potassium manganate is coloured/owtte (1) [1]
accept is not an acid/alkali reaction

(e) **(i)** experiment 1(1) **allow** ecf [1]

(ii) experiment 1 2× volume of experiment 2 [1]

(iii) solution B more concentrated/stronger (1) **or** converse
2× as concentrated (2) [2]

(f) half value from table result for experiment 2 / 8 (1) cm^3 (1)
half volume of peroxide used (1) [3]

(g) advantage easy to use/quick/convenient/fairly accurate (1)
disadvantage not accurate owtte (1) [2]

Q# 33/ iGCSE Chem/2010/w/Paper 6/

7 **(a)** universal indicator / pH paper (1) **not** litmus
pH of 4–6 / yellow / orange (1) **not** red [2]

(b) sodium hydroxide / carbonate / oxide [1]

Q# 34/ iGCSE Chem/2010/w/Paper 6/

2 **(a)** to speed up the reaction [1]

(b) solid visible owtte e.g. no more solid will dissolve [1]

(c) filtration / centrifuge **not** decant [1]

(d) to make sure water (of crystallisation) is not lost / stop dehydration /
so crystals do not turn into powder / does not decompose **not** crystals break [1]

(e) no heat needed / not necessary to warm acid (1)
carbonates react with acid at room temperature (1)
no bubbles would indicate that carbonate is in excess (1) [max 2]

Q# 35/ iGCSE Chem/2010/w/Paper 6/

5 **(a)** **(i)** blue (1) [1]

(ii) blue (1) precipitate (1) [2]

(iii) blue precipitate (1)
deep / royal blue (1) solution (1) **or** precipitate dissolves [3]

(c) sulfuric acid (2) acid or sulfate only (1) [2]

Q# 36/ iGCSE Chem/2010s/Paper 6/

2 wrong reagent, correct result = 0

aqueous sodium iodide
(nitric acid)/silver/lead nitrate (1) yellow precipitate (1)

nitric acid
named indicator (1) correct colour change/pH (1)
or
magnesium forms hydrogen/fizzes
or
(named) carbonate forms carbon dioxide/fizzes

[4]

Q# 37/ iGCSE Chem/2010s/Paper 6/

1 **(a)** flask (1)
tap/separating/dropping funnel (1) not burette
gas jar (1) accept measuring cylinder [3]

(b) gas should be collected downwards owtte (1) [1]

(c) to remove impurities/water (1) [1]

Q# 38/ iGCSE Chem/2010s/Paper 6/

5 tests on solid **E**

(c) **(i)** white (1)
precipitate (1)
with excess dissolves/clears/colourless (1) [3]

(ii) white precipitate (1)
insoluble/no change (in excess) (1) [2]

(d) contains water/hydrated (1) [1]

(e) ammonia (1) not ammonium [1]

(f) nitrate (1)
hydrated salt (1)
not a sulfate (1) max [2] [2]

Q# 39/ iGCSE Chem/2009/w/Paper 6/

3 **(a)** add aluminium/Devarda's alloy and sodium hydroxide (warm) (1)

ammonia/alkaline gas formed/turns red litmus blue (1)
for a 'near miss' in reagents allow a mark for ammonia [2]

Q# 40/ iGCSE Chem/2009/w/Paper 6/

1 **(a)** (conical) flask (1) (gas) syringe (1) [2]

(b) to stop loss of gas owtte/stop mixing/so that they don't react [1]

(c) glowing splint (1) relights (1)
lighted splint = 0 ignore 'pops' [2]

Q# 41/ iGCSE Chem/2009/w/Paper 6/

5 **(b)** pH of solution L 11-14 [1]

(d) **(i)** blue precipitate (1) both for one mark (soluble in excess = 0) [1]

(ii) white (1) precipitate (1)
dissolves/clears/soluble in excess (1) [3]

(c) weak (1) alkali/base (1) or ammonia (2) [2]

(d) hydrochloric acid (2)
or acid (1) chloride ion (1) **not** chlorine ion [2]

Q# 42/ iGCSE Chem/2009s/Paper 6/

5 tests on solid **S**

(c) **(i)** blue precipitate (1) [1]

(ii) blue (1) precipitate (1) [2]

dissolves/clears (1) deep/royal blue (1) [2]

(iii) white (1) precipitate (1) [2]

(f) **(i)** **V** is more reactive or converse (1) [1]

(ii) oxygen (1) [1]

(g) catalyst/transition metal/manganese oxide any two points (2)
V is a better catalyst = 2 [2]

Q# 43/ iGCSE Chem/2009s/Paper 6/

6 **(a)** add water (1)
crush/mix/warm (1)
filter/decant or pipette off liquid/sieve (1) [3]

(b) add indicator solution to acid (and note colour) (1)
add indicator solution to alkali or named alkali (and note colour) (1) not base
conclusion e.g. colours should be different owtte (1) [3]

Q# 44/ iGCSE Chem/2009s/Paper 6/

3 **(a)** add dilute acid (1) fizz, no fizz (1) or correct chloride test [2]

(b) litmus paper/named indicator (1) turns blue (1) bleached (1) [3]

(c) sodium hydroxide/ammonia (solution) (1) green (precipitate) (1)
brown (precipitate) (1) [3]

Q# 45/ iGCSE Chem/2008/w/Paper 6/

5 **(a)** solution **K** blue/green not precipitate [1]

(c) tests on solution **K**

(i) blue (1) precipitate (1) [2]

(ii) blue precipitate [1]
deep/royal (1) blue solution or precipitate dissolves (1) [2]

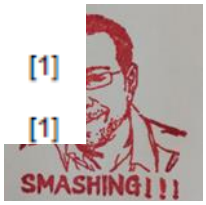
(iii) no reaction/change/nothing [1]

(iv) white precipitate [1]

(d) tests on solution **L**

(iii) no reaction/change/nothing [1]

(iv) white precipitate [1]



5 **(a)** solution **K** blue/green not precipitate [1]

(c) tests on solution **K**

(i) blue (1) precipitate (1) [2]

(ii) blue precipitate [1]
deep/royal (1) blue solution or precipitate dissolves (1) [2]

(iii) no reaction/change/nothing [1]

(iv) white precipitate [1]

(d) tests on solution **L**

(iii) no reaction/change/nothing [1]

(iv) white precipitate [1]

(e) acids [1]

(f) iron (1) (III) (1) or Fe^{3+} (2) ignore anions [2]

Q# 46/ iGCSE Chem/2008/w/Paper 6/

7 **(a)** heat/warm the acid (1)
add excess oxide or description of no more solid reacting (1)
filter/decant (1) [3]

(b) heat qualified e.g. to crystallising point or description of e.g. using glass rod/leave it to evaporate (1)
cool to form crystals (1)
filter off crystals (1)
method of drying crystals e.g. pressed filter papers/oven at low temperature (1) [max 3]

Q# 47/ iGCSE Chem/2008/w/Paper 6/

6 **(a)** Points plotted correctly (3), –1 for each incorrect
smooth curve (1) not a straight line [4]

(b) 47±1 or reading from graph (1) curve extrapolated on grid (1) [2]

(c) solid/crystals form owtte (1) 20g (1) [2]
not solubility decreases

Q# 48/ iGCSE Chem/2008s/Paper 6/ Q7

(b) fractional (1) distillation (1) fractionation (1) [2]

(c) blue cobalt chloride paper (1) turns pink (1)

OR anhydrous/white copper sulphate (1) turns blue (1) [2]

(d) catches fire owtte (1) [1]

Q# 49/ iGCSE Chem/2008s/Paper 6/

4 Table of results

Experiment 1
initial and final volume boxes correctly completed (1), 0.0 and 26.0

Experiment 2
initial and final volume boxes correctly completed (2), 16.0 and 29.0

differences completed correctly (1), 26.0 and 13.0 [4]

(e) (i) Experiment 1 (1) [1]

(ii) more in Experiment 1/greater volume (1) ×2 (1) [2]

(iii) solution **A** more concentrated/stronger than **B** (1) X2 (1) [2]

(f) twice the volume value for Experiment 2/26 (1) cm^3 (1) [2]

(g) change e.g. repeat titrations (1) or use a burette/pipette

explanation e.g. average reading more accurate (1) instead of m/cylinder [2]

(h) (i) iron(II) ions present (1) [1]

(ii) iron(III) ions (1) [1]

Q# 50/ iGCSE Chem/2008s/Paper 6/

7 (a) test red litmus (1) or other named indicator

result blue (1) [2]

Q# 51/ iGCSE Chem/2008s/Paper 6/

5 Tests on solid **T**

(b) (ii) white (1) precipitate (1) insoluble in excess (1) [2]

(iii) no/slight (1) precipitate (1) max 4 for **(ii)** and **(iii)** [2]
no reaction (1) only

(e) weak (1) acids (1) [2]

(f) copper present(1) ethanoic acid/organic salt (1) [2]

Q# 52/ iGCSE Chem/2007/w/Paper 6/

5 (a) (i) Q blue/purple (1) 11–14 (1) [2]

(ii) Q no reaction/change (1)
R bubbles/fizz (1) [2]

(c) bubbles/fizz (1)
limewater (1) milky (1) [3]

(e) green (1) precipitate (1) [2]

(f) hydrogen (1) [1]

(g) carbon dioxide (1) [1]

(h) hydrochloric acid/HC*l* (1) [1]

(i) weak (1) acid (1) [2]

Q# 53/ iGCSE Chem/2007/w/Paper 6/

3 (a) So that all acid is used up/neutralised (1) [1]

(b) filter (1) [1]

(c) (i) no more solid/solute can dissolve (1) at that temperature (1) [2]

(ii) use a glass rod to show crystals forming/observe crystals forming on edge of solution (1) [1]

(d) to prevent breakdown of the crystals/not form powder/not lose water (1) [1]

Q# 54/ iGCSE Chem/2007s/Paper 6/ Q7

(b) sodium hydroxide (1) white precipitate (1)
or flame test (1) red (1) [2]

Q# 55/ iGCSE Chem/2007s/Paper 6/

5 (c) bubbles / fizz (1) limewater (1) milky (1) [3]

(d) yellow (1) precipitate (1) [2]

(f) carbon dioxide (1) [1]

(g) ammonia (1) [1]

(h) iron (1) (II) (1) ammonium (1) sulphate (1) [4]

Q# 56/ iGCSE Chem/2006/w/Paper 6/

1 (a) Boxes filled in correctly to show
tongs(1)
watch glass/evaporating basin/dish(1)
beaker(1) [3]

(b) oxidation/combustion/exothermic/redox(1) [1]

(c) > 7(1) [1]

Q# 57/ iGCSE Chem/2006/w/Paper 6/

5 (a) (ii) red(1) litmus turns blue(1) reference to smell(1) max 2 [2]

(c) weak(1) acid(1) [2]

(d) ammonia(1) [1]

(e) ammonium chloride(1) [1]

(f) potassium iodide(1) [1]

Q# 58/ iGCSE Chem/2006s/Paper 6/ Q1

(c) Litmus paper (1), bleaches/white (1) **[2]**

Q# 59/ iGCSE Chem/2006s/Paper 6/

5 (b) (i) white (1), precipitate (1), dissolves/soluble (1) **[3]**

(ii) white (1), precipitate (1), dissolves/soluble (1) **[3]**

(d) reference to water (1) e.g. hydrated salt **[1]**

(e) sulphate (1), not a chloride (1) **[2]**

(f) carbon dioxide (1), from a carbonate (1) **[2]**

Q# 60/ iGCSE Chem/2006s/Paper 6/

6 Measured volume of oven cleaner (1)
Add indicator/named indicator (1)
Add named acid (1), from a burette/pipette (1)
Until colour change/end point (1), measure/record volume of acid (1)
Repeat with other cleaner (1), compare (1)

Max 6 **[6]**

Q# 61/ iGCSE Chem/2005/w/Paper 6/

5 (b) (i) white (1)
precipitate (1)
dissolves (1) **[3]**

(ii) white (1)
precipitate (1)
insoluble (1) **[3]**

(c) acid gas/named/hydrated salt **[1]**

(d) not a sulphate (1)
not a halide (1) **[2]**

(e) ammonia [1]

(f) nitrate (1)

hydrated/water (1) [2]

Q# 62/ iGCSE Chem/2005/w/Paper 6/

1 (a) boxes filled in correctly to show:

measuring cylinder (1)

spatula (1)

beaker (1) [3]

(b) blue [1]

(c) heat (1)

to crystallising point (1) [2]

Q# 63/ iGCSE Chem/2005/w/Paper 6/

7 (a) soil sample + water (1)

stir/heat (1)

filter (1)

add Universal Indicator (1)

chart (1) [5]

(b) more samples (1)

different parts of field (1) [2]

Q# 64/ iGCSE Chem/2005s/Paper 6/

3 volumes from syringe diagrams;

15, 45, 61, 73, 74, 80 and 80 all correct (4) (-1 for each incorrect) [4]

(a) graph:
all points plotted correctly (3) (-1 for each incorrect)
smooth curve (1) [4]

(b) volume of acid from graph, 10.5 → 11.5 (1) [1]

(c) volume of hydrogen from graph, 29.5 → 30.5 (1) [1]

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4 table of results:

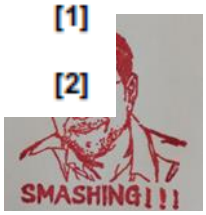
all initial and final volume boxes correctly completed 0.0, 10.6, 14.9 36.1 (3)

difference boxes correctly completed, 10.6, 21.2 (1) [4]

(a) neutralisation (1) [1]

(b) (i) experiment 2 (1) [1]

(ii) experiment 2 more/greater volume (1) x 2 (1) [2]



(iii) **M** more concentrated/stronger than N (1) x 2 (1) **[2]**

(c) 21.2 (1) cm^3 (1)

twice as much calcium hydroxide (1) **[3]**

(d) e.g. use a pipette/burette instead of a measuring cylinder (1) **[1]**

Q# 66/ iGCSE Chem/2005s/Paper 6/

6 **(a)** no/little water present/little water implied (1) **[1]**

(b) any value less than 7 (1) **[1]**

Q# 67/ iGCSE Chem/2005s/Paper 6/

7 **(a)** straight line (1) DRAWN WITH A RULER **[1]**

(b) inaccurate point is at pH 5 (1) not on line (1) **[2]**

(c) % corrosion decreases as pH increases (1) **[1]**

Q# 68/ iGCSE Chem/2005s/Paper 6/ Q6

(c) chromatography (1) apply to paper (1) use of solvent (1)

description of two yellow spots (1) **[4]**

paper in drink = max 2

Q# 69/ iGCSE Chem/2005s/Paper 6/

4 table of results:

all initial and final volume boxes correctly completed 0.0, 10.6, 14.9 36.1 (3)

difference boxes correctly completed, 10.6, 21.2 (1) **[4]**

(b) **(i)** experiment 2 (1) **[1]**

(ii) experiment 2 more/greater volume (1) x 2 (1) **[2]**

Q# 70/ iGCSE Chem/2005s/Paper 6/

5 **(b)** **(i)** fizz/bubbles (1) pops (1) **[2]**

(ii) fizz/bubbles (1) limewater milky (1) **[2]**

(c) weak (1) **[1]**

(d) **(i)** hydrogen (1) **[1]**

(ii) carbon dioxide (1) **[1]**

(e) copper (1) 2+ (1) **[2]**

Q# 71/ iGCSE Chem/2004/w/Paper 6/

5 **(a)** white (1) crystals/solid (1) **(2)**

(c) **(i)** white (1) precipitate (1) **(2)**

(ii) white (1) precipitate (1) **(2)**

(iii) reference to smell (1) alkaline/blue (1) pH 9 → 12 (1) **2 max** **(2)**

(d) ammonia (1) **(1)**

(e) alkaline gas/ammonia given off (1)

acid gas/hydrogen chloride given off (1) **(2)**

Q# 72/ iGCSE Chem/2004/w/Paper 6/

1 **(a)** **A** measuring cylinder (1)

B flask (1) **(2)**

(b) boxes completed correctly, zinc and hydrochloric acid (1) **(1)**

(c) lighted splint (1) pops (1)

second mark consequential i.e. glowing splint = 0 **(2)**

Q# 73/ iGCSE Chem/2004/w/Paper 6/

6 **(a)** litmus/indicator (1)

bleached in chlorine, no effect with sodium chloride (1) **(2)**

(b) sodium hydroxide (1)

green (precipitate) with iron(II), brown (precipitate) with iron(III) (1) **(2)**

(c) add hydrochloric acid (1)

fizz/bubbles with carbonate, no reaction with sulphate (1) **(2)**

alternative with HC*l* and barium chloride (1)

white precipitate with sulphate, not carbonate (1)

Q# 74/ iGCSE Chem/2004s/Paper 6/ Q4

(b)	Add indicator/named indicator or CO_3^{2-}/Mg	1	
	Turns red/correct colour in acid, no change for sodium sulphate	1	[2]
(c)	Add silver nitrate	1	
	White precipitate with hydrochloric acid, no change with nitric acid	1	[2]

Q# 75/ iGCSE Chem/2004s/Paper 6/

5	**(a)**	**(i)**	White	1	
			Precipitate	1	[2]
			No change/white precipitate/insoluble in excess	1	[1]
		(ii)	No/thin precipitate/no reaction	1	[1]
	(b)		Ammonia	1	[1]
	(c)		Reference to limewater/test for carbon dioxide	1	[1]
	(d)		Nitrate	1	
			Alkali/hydroxide/oxide	1	[2]

Q# 76/ iGCSE Chem/2004s/Paper 6/

5	(a)	(i)	White	1	
			Precipitate	1	[2]
			No change/white precipitate/insoluble in excess	1	[1]
		(ii)	No/thin precipitate/no reaction	1	[1]
	(b)		Ammonia	1	[1]
	(c)		Reference to limewater/test for carbon dioxide	1	[1]
	(d)		Nitrate	1	
			Alkali/hydroxide/oxide	1	[2]

Q# 77/ iGCSE Chem/2004s/Paper 6/

4			Experiment 1 Temperatures correct (-1 any incorrect)	2	[2]

Time/Min	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Temp/°C	22	24	26	28	29	30	30	29	28	27	26

			Experiment 2 Temperatures correct (-1 any incorrect)	2	[2]

Time/Min	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Temp/°C	21	19	17	15	14	13	13	14	15	16	17

	(a)		Graph. Points plotted correctly (-1 each incorrect)	3	
			Smooth lines/curves	2	
			Labelled	1	[6]
	(b)	(i)	Temperature from graph 29.5°C ± 0.25°C	1	
			Temperature from graph 13.5°C	1	[2]
		(ii)	1. Exothermic	1	
			2. Endothermic	1	[2]
	(c)		Carbonate	1	
			Fizz/gas with acid	1	[2]
	(d)	(i)	22°C	1	
			21°C } No units only (1)	1	
		(ii)	Reference to room temperature/reaction finished	1	[3]

Q# 78/ iGCSE Chem/2003/w/Paper 6/

4	(b) (i)	Orange/brown (1) Precipitate (1) No change in excess (1)	3
	(c)	Orange/brown precipitate (1) No change in excess (1)	2
	(f) (i)	Hydrogen (1)	1

	(ii)	Reduction/redox/displacement (1) iron (II) formed (1)	2
	(g)	Cation – ammonium (1) Anion – sulphate (1)	2

Q# 79/ iGCSE Chem/2003/w/Paper 6/

5	(a)	Sodium hydroxide (1)	1
	(b)	Ammonium sulphate (1)	1
	(c)	Bunsen burner (1)	1
	(d)	Reference to reaction (1)	1
	(e)	Gas jar wrong way up (1) Gas is less dense than air (1)	2
		Tubes in flask should be evened (1) Liquid would be transferred to gas jar (1)	2
		Also credit in (c)	

Q# 80/ iGCSE Chem/2003s/Paper 6/

6 Known mass of beach sand (1)
add excess (1) dilute hydrochloric acid (1)
filter (1) wash (1) dry (1) residue
and weigh sand (1) working out result (1)
max 6 of 8 [6]

Q# 81/ iGCSE Chem/2003s/Paper 6/

4 (c) effervescence/fizz/bubbles (1)
limewater milky (1)/blue solution [2]

(d) (ii) blue (1) precipitate (1)
royal/dark blue (1) solution (1) [4]

(e) (i) white (1) precipitate (1)
dissolves (1) [3]

(ii) white (1) precipitate (1)
dissolves (1) [3]

(f) Solid **D** is a sulphate (1) hydrated (1) [2]

(g) copper (1)/Cu^{2+} (2) [2]

Q# 82/ iGCSE Chem/2002/w/Paper 6/

1 (a) A – spatula only (1)
B – beaker only (1)
C – funnel (1) not filter 3

(b)	more than enough to react (1) / residue		1
(c)	6-7 (1)		1

Q# 83/ iGCSE Chem/2002/w/Paper 6/

2	(a)	top box – sulphuric acid (1) bottom box – sodium chloride (1)	2
	(b)	gas passed through water (1) gas is soluble in water (1)	2
		gas collected by upward delivery (1) gas is denser than air (1) marks independently	2
	(c)	fume cupboard / goggles (1) or well-ventilated room / gloves	1

Q# 84/ iGCSE Chem/2002/w/Paper 6/

5	(c)	catches fire / ignites (1) yellow / blue flame / smoky (1)	2
	(d)	yellow (1) precipitate (1)	2
	(e)	cream / white (1) precipitate (1) / yellow	2
	(f)	organic (1) hydrocarbon (1) / alkane / alkene (1)	2
		2 marks.	

Q# 85/ iGCSE Chem/2002/w/Paper 6/

6 (a) pipette / burette (1) — 1

(b) name (1) eg methyl orange / phenolphthalein. (not Universal Indicator, litmus) — 1

colour change (2) eg yellow (1) to orange / pink (1) — 2

for litmus blue (1) → purple / red (1) pink (1) to colourless (1)

(c) The acid (1) less needed to neutralise the KOH (1) — 2

(d) repeat experiment (1)
without indicator (1) / charcoal
evaporate solution (1)
to crystallising point (1) max 3 — 3

max indicator = max 2

Q# 86/ iGCSE Chem/2002s/Paper 6/

2 (a) (i) red / pink (1) — 1

(ii) colour of drink interferes or similar (1) — 1

Q# 87/ iGCSE Chem/2002s/Paper 6/

3 (a) (i) to keep the magnesium out of contact with acid or similar (1) — 1

(ii) to measure volume of gas (1) not collect — 1

(b) shake the flask / let go colton (1) — 1

Q# 88/ iGCSE Chem/2002s/Paper 6/

7 (a) reagent (1) eg indicator
result (1) red in acid, no change in NaCl eq! — 2

(c) barium chloride (1) white precipitate in H_2SO_4 (1) no change in HNO_3 2

Q# 89/ iGCSE Chem/2002s/Paper 6/

1 (a) A – (thistle) funnel (1)

B – (conical) flask (1)

C – gas jar (1) 3

(b) → into thistle funnel (1) 1

(c) limewater (1) milky (1) /cloudy not splint test 2

Q# 90/ iGCSE Chem/2002s/Paper 6/

6 (d) (i) blue (1) precipitate (1) 2

(ii) blue precipitate (1) dissolves /soluble (1) /solution

deep /royal blue (1) 3

(e) oxygen (1) / O_2 1

(f) chlorine (1) / Cl_2 1

(g) catalyst /oxidising agent (1)

transition metal / manganese (1) or its ox. max 2 2

MnO_2 = (2)

Q# 91/ iGCSE Chem/2001/w/Paper 6/

5 (a) (i)	green (1) precipitate (1)	[max 2]
(b)	red / brown (1) precipitate (1)	[2]
(c)	green (1) precipitate (1)	[2]
	brown (1)	[1]
(e)	ammonia	[1]
(f)	ammonium	[1]
(g)	sulphate	[1]

Q# 92/ iGCSE Chem/2001/w/Paper 6/

1 (a) Boxes completed to show
beaker (1), pipette (1), burette (1) [3]

(b) indicator (1), colour change (1) [2]

(c) repeat the experiment / pH meter [1]

Q# 93/ iGCSE Chem/2001/w/Paper 6/

6 (a) Universal Indicator solution / pH paper (1), read pH from chart (1) / use a pH meter (2)[max 2]

(b) chromatography (1) paper (1)
apply cola (1) separation with solvent (1) [max 3]

(c) can open under water to collect gas in graduated tube / m. cylinder (1)
filled with water (1), syringe = 0 (would not work) [2]

(d) limewater [1]
milky [1]