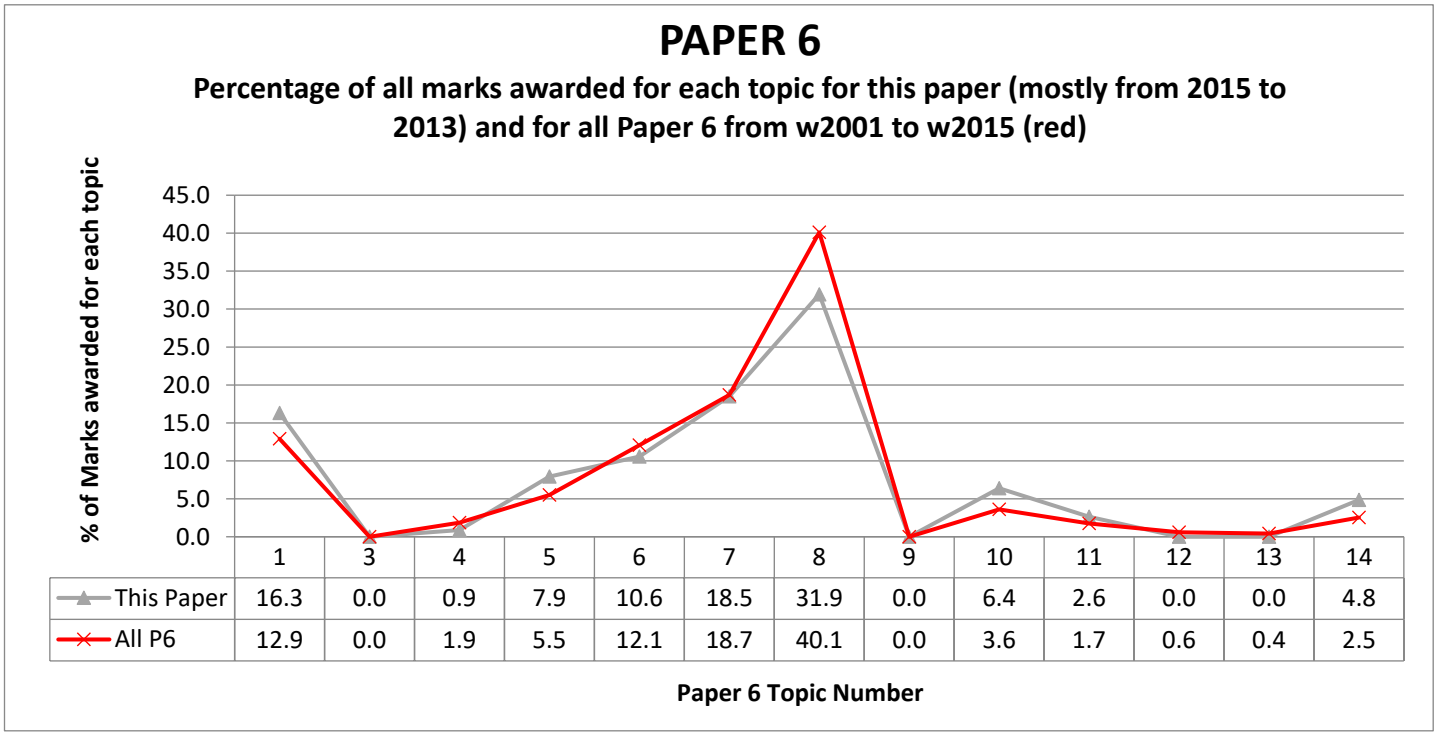
iG Chem EQ P6 2015w to 2013s Balanced

Fewer Topic 8 questions, more marks from other topics

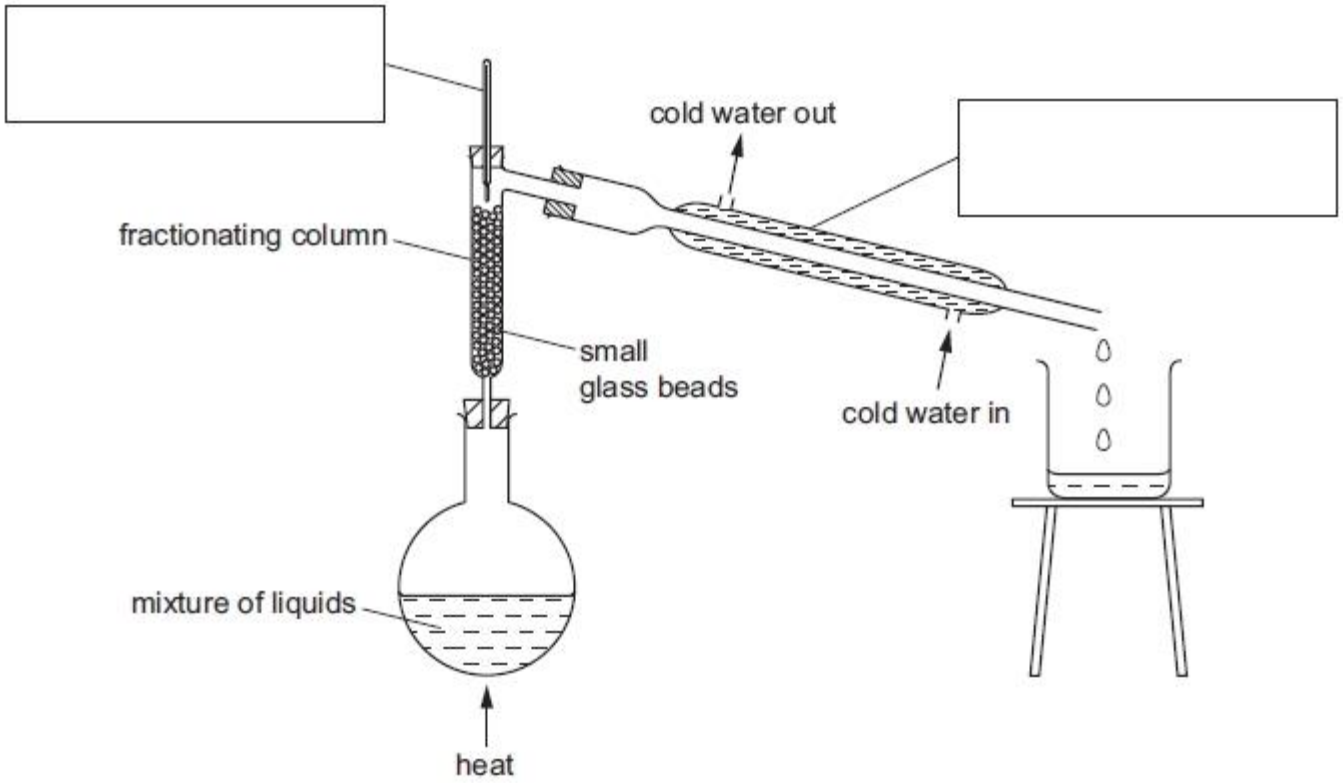
		Chem 1	Chem 3	Chem 4	Chem 5	Chem 6	Chem 7	Chem 8	Chem 9	Chem 10	Chem 11	Chem 12	Chem 13	Chem 14
Total Marks		74	0	4	36	48	84	145	0	29	12	0	0	22
% of Marks	454	16.3	0.0	0.9	7.9	10.6	18.5	31.9	0.0	6.4	2.6	0.0	0.0	4.8
# of Questions		9	0	1	6	3	7	17	0	5	2	0	0	6
Average marks per Q		**8.2**	**0.0**	**4.0**	**6.0**	**16.0**	**12.0**	**8.5**	**0.0**	**5.8**	**6.0**	**#DIV/0!**	**#DIV/0!**	**3.7**



	1	3	4	5	6	7	8	9	10	11	12	13	14
This Paper	16.3	0.0	0.9	7.9	10.6	18.5	31.9	0.0	6.4	2.6	0.0	0.0	4.8
All P6	12.9	0.0	1.9	5.5	12.1	18.7	40.1	0.0	3.6	1.7	0.6	0.4	2.5

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.



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

(b) **(i)** Which liquid would be collected first? Explain why.

.....

..... [2]

(ii) How would the teacher know when all of this liquid had been collected?

..... [1]

(c) Suggest why small glass beads are used in the fractionating column instead of large glass beads.

.....

..... [1]

Topic Chem 1 **Q# 4/** iGCSE Chem/2015march/Paper 6/

6 **Rhubarb Leaves**

Ethanedioic acid dihydrate, $H_2C_2O_4.2H_2O$, is a white crystalline solid. This acid is water-soluble and is found in rhubarb leaves.

Plan an investigation to obtain crystals of ethanedioic acid dihydrate from some rhubarb leaves. You are provided with common laboratory apparatus, water and sand.

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..... [7]

Topic Chem 1 **Q# 5/** iGCSE Chem/2015march/Paper 6/

4 A student investigated the solubility of salt **D** in water at various temperatures.

Four experiments were carried out.

(a) *Experiment 1*

4 g of salt **D** was added to a boiling tube. A burette was filled with distilled water and 10.0 cm^3 of water added to the boiling tube. The mixture of salt **D** and water was heated carefully until all of the solid had dissolved. The boiling tube was removed from the heat and the solution allowed to cool. The solution was stirred gently with a thermometer.

The temperature at which crystals first appeared was noted.

The boiling tube and its contents were kept for the remaining three experiments.

(b) *Experiment 2*

From the burette another 2.0 cm^3 of water was added to the boiling tube and contents from Experiment 1.

The mixture was heated to dissolve the crystals and allowed to cool as in Experiment 1. The temperature at which crystals first appeared was noted.
Record, in the table, the total volume of water in the boiling tube.

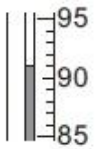
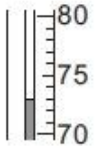
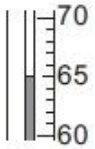
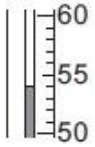
(c) *Experiment 3*

From the burette another 2.0 cm^3 of water was added to the boiling tube and contents from Experiment 2. The experiment was repeated exactly as before.
Record, in the table, the total volume of water in the boiling tube.

(d) *Experiment 4*

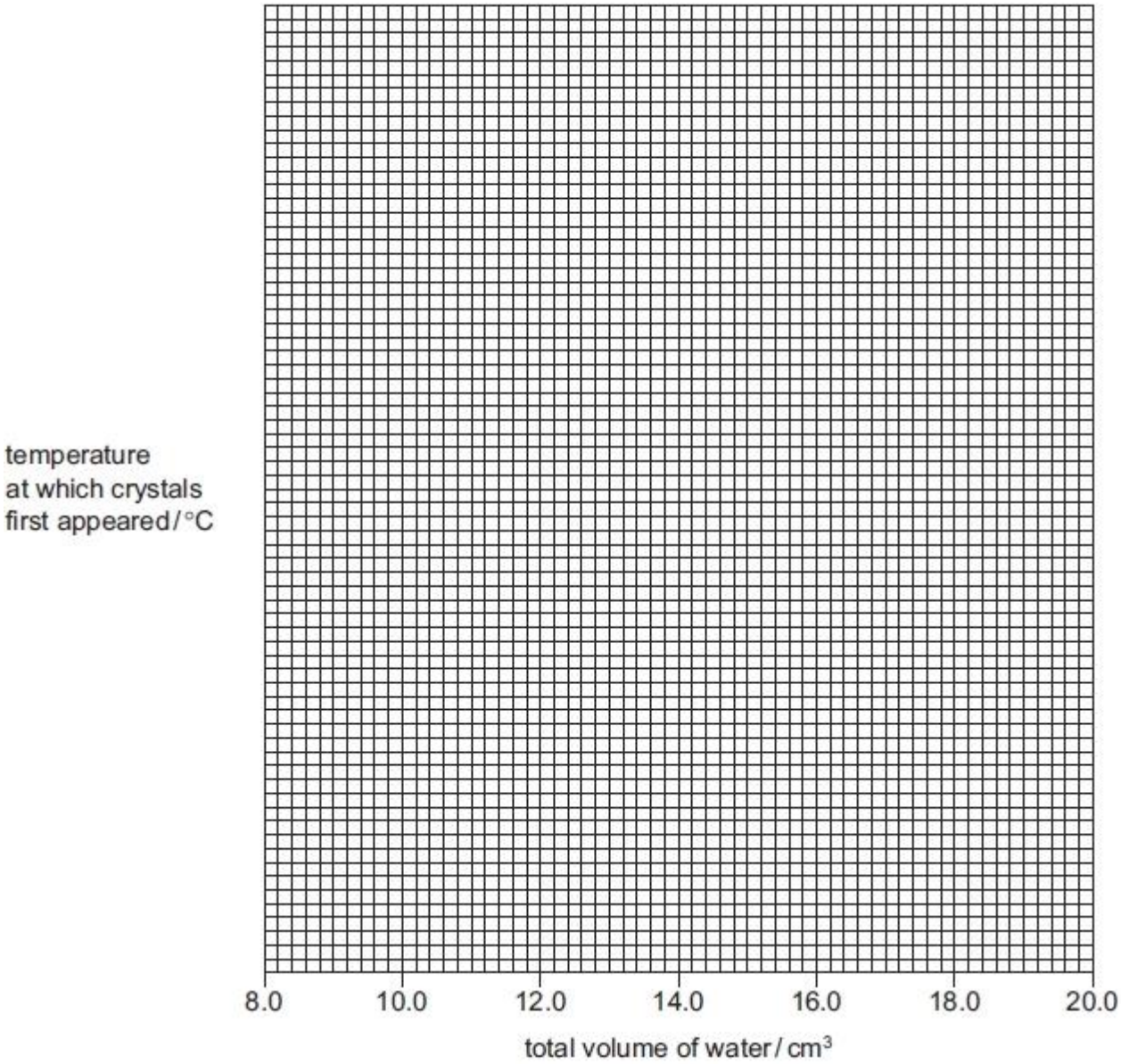
From the burette another 4.0 cm^3 of water was added to the boiling tube and contents from Experiment 3. The experiment was repeated exactly as before.
Record in the table the total volume of water in the boiling tube.

Use the thermometer diagrams in the table to record the temperatures at which crystals first appeared in the four experiments.

Experiment number	total volume of water / cm^3	thermometer diagram	temperature at which crystals first appeared / °C
1	10.0		
2			
3			
4			

[3]

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



[5]

(f) **From your graph**, find the temperature at which crystals of **D** would first appear if the total volume of water in the solution was 20.0 cm^3.
Show clearly **on the grid** how you worked out your answer.

..... [3]

(g) How would the student know when salt **D** was completely dissolved in the water?

..... [1]

(h) The solubility of salt **D** at 100 °C is 57 g in 100 cm^3 of water.
Suggest, with a reason, the effect of using 8 g of salt **D** instead of 4 g in these experiments.

.....

..... [2]

(i) Salt **C** is less soluble in water than salt **D**.

Sketch on the grid the graph you would expect for salt **C**. Label this graph. [2]

(j) Describe and explain **one** improvement that could be made to the experimental method to obtain more reliable results in this investigation.

improvement .....

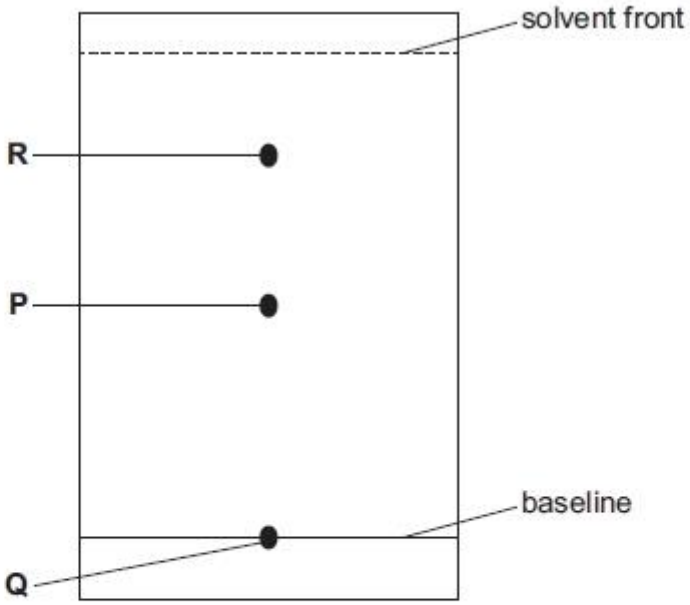
explanation .....

.....

..... [2]

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

2 A mixture of three compounds, **P**, **Q** and **R**, was separated using a piece of paper.



(a) Name this method of separation.

..... [1]

(b) What could have been used to apply the mixture onto the paper?

..... [1]

(c) Suggest a possible solvent that could be used for this separation.

..... [1]

(d) Suggest why compound **Q** remained on the baseline.

.....

..... [1]

(e) R_f values are used to identify compounds.

$$R_f = \frac{\text{distance travelled by compound}}{\text{distance travelled by the solvent}}$$

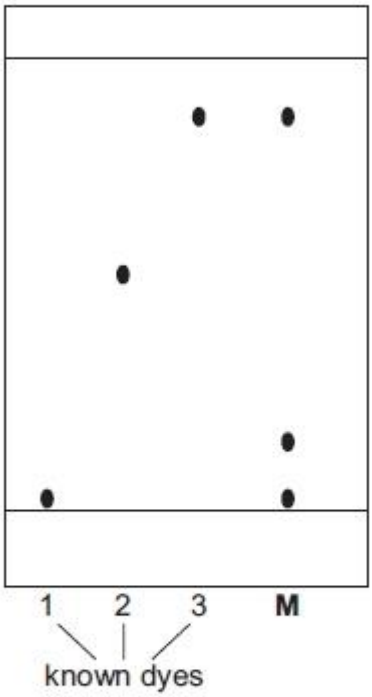
Use the diagram to work out the R_f value of compound **R**.

.....

..... [2]

Topic Chem 1 **Q# 2/** iGCSE Chem/2015/s/Paper 6/

3 A mixture of coloured dyes, **M**, was separated by chromatography. The dyes were insoluble in water.
The chromatogram below shows the result of separating the mixture and the chromatography of three known dyes 1, 2 and 3.



(a) On the diagram, label the base line (origin). [1]

(b) Name a solvent that could be used in this separation.

..... [1]

(c) How many dyes were there in the mixture, **M**?

..... [1]

(d) What are your conclusions about the identity of the dyes in the mixture, **M**?

.....

.....

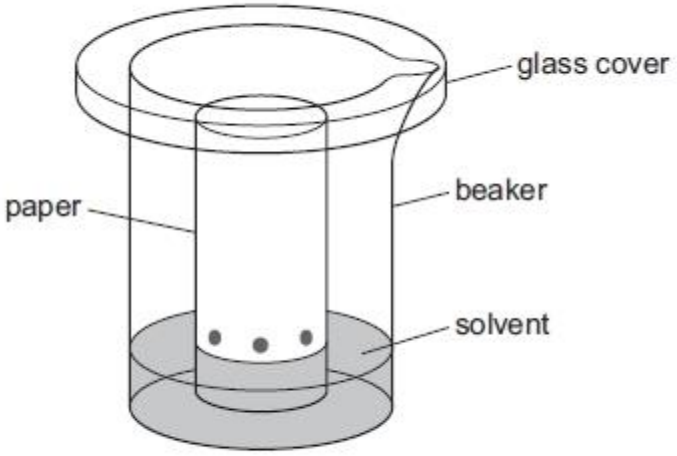
..... [3]

(e) How could the reliability of the results be checked?

..... [1]

Topic Chem 1 **Q# 6/** iGCSE Chem/2014/w/Paper 6/

3 A student investigated the colours present in a fruit drink. The fruit drink was tested to check that no artificial colours had been added. The apparatus below was used.



(a) (i) Name the method used.

..... [1]

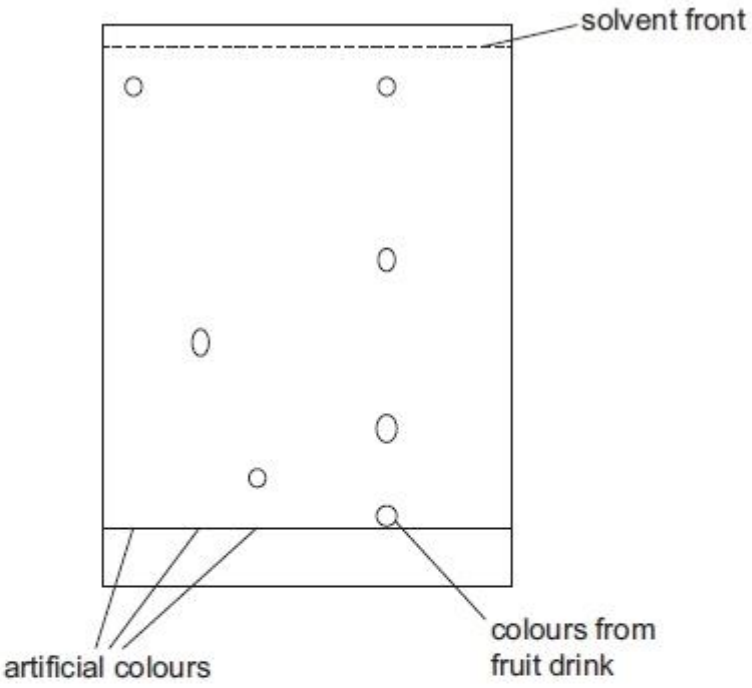
(ii) Why is there a glass cover on the beaker?

..... [1]

(b) When should the paper be removed from the beaker?

..... [1]

(c) The diagram shows the results of the experiment.



(i) How many different coloured compounds were present in the fruit drink?

..... [1]

(ii) Are there any of the artificial colours present in the fruit drink? Explain your answer.

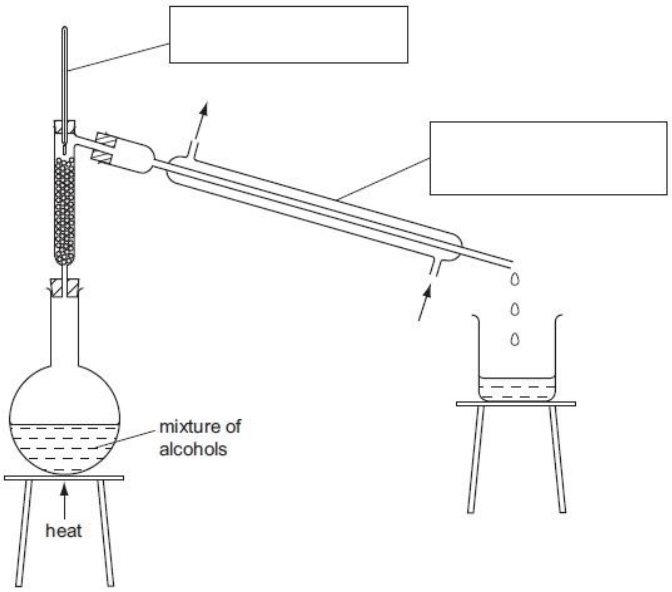
.....

.....

..... [2]

Topic Chem 1 **Q# 7/** iGCSE Chem/2014/s/Paper 6/

1 A student separated a mixture of two alcohols, ethanol (boiling point 78 °C) and butanol (boiling point 118 °C).
The apparatus used is shown below.



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

(b) Label the arrows. [1]

(c) State the name of this separation process.

..... [2]

(d) **(i)** Which liquid is first to collect in the beaker?

..... [1]

(ii) How would the student know when all of this liquid had collected?

.....

..... [1]

(e) Identify and explain a possible hazard in this experiment.

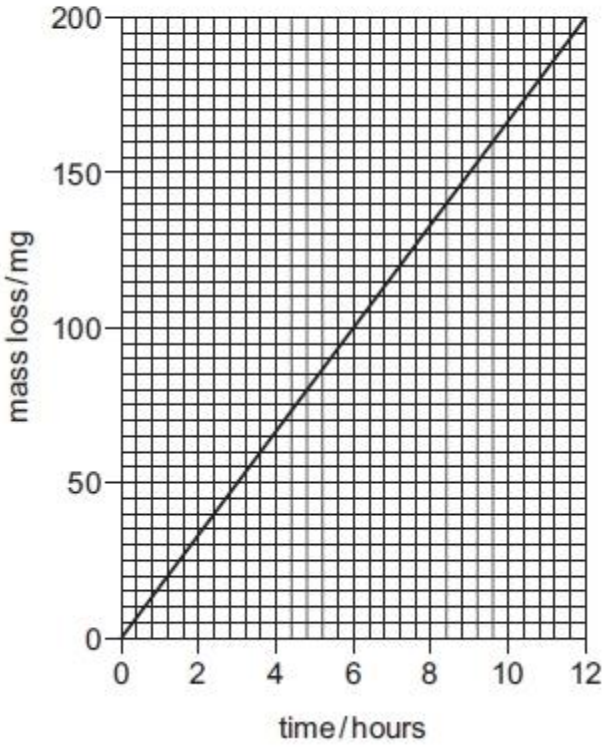
.....

..... [2]

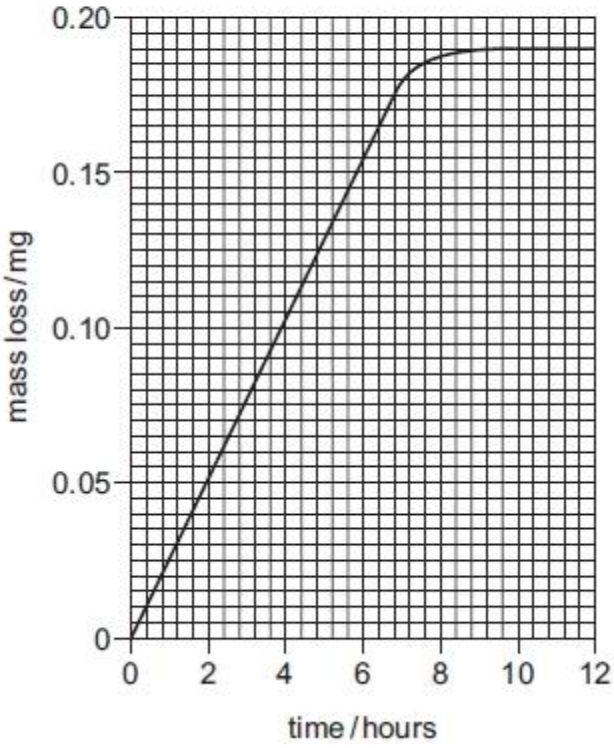
Topic Chem 1 **Q# 8/** iGCSE Chem/2013/s/Paper 6/

5 Identical pieces of steel were placed in two different boiling liquids for 12 hours.
The graphs show how the mass of each piece of steel changed.

graph **A**
steel in boiling acid solution



graph **B**
steel in boiling alkali solution



(a) Give **one** similarity in the change in mass of the steel in both liquids.

..... [1]

(b) Describe **two** ways in which the mass loss shown in graph **A** is different from that shown in graph **B**.

1. .....

.....

2. .....

..... [3]

(c) State **two** different safety precautions that would need to be taken when carrying out this investigation.

1. .....

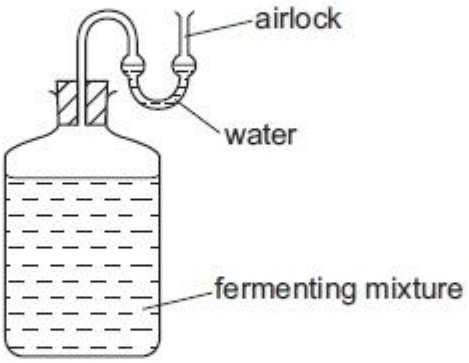
2. ..... [2]

Topic Chem 1 **Q# 9/** iGCSE Chem/2013/s/Paper 6/

2 A student found a recipe for making elderberry wine by fermentation.

1 kg elderberries
0.5 kg sugar
10 g yeast granules
3 dm^3 water

The student decided to make some elderberry wine using the apparatus below.



The student carried out the following method.

Step 1 The elderberries were crushed.

Step 2 The crushed elderberries and sugar were added to the water and the mixture was boiled for ten minutes. The crushed elderberries were then separated from the mixture.

Step 3 Yeast was added to the liquid when it had cooled to room temperature.

(a) Suggest the purpose of the airlock in the apparatus.

..... [1]

(b) What apparatus could be used in Step 1?

..... [1]

(c) Draw a labelled diagram of the apparatus used to separate the crushed elderberries from the mixture in Step 2.

[2]

(d) Why was the yeast in Step 3 not added until the liquid was at room temperature?

..... [1]

(e) **(i)** State **one** observation during the fermentation.

..... [1]

(ii) Suggest how the rate of the fermentation reaction could be measured.

.....

..... [2]

(f) Name the method that could be used to separate ethanol from the fermented mixture.

..... [1]

Topic Chem 4 **Q# 41/** 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.

(b) A label on a bottle of fizzy water stated that 'when evaporated completely the mass of solid residue remaining is 200 mg / dm^3 of water'.
Plan an experiment to check the mass of solid formed when the fizzy water is completely evaporated. You are provided with a 500 cm^3 bottle of fizzy water. You can use the space below to draw a diagram of the apparatus used if you wish.

.....

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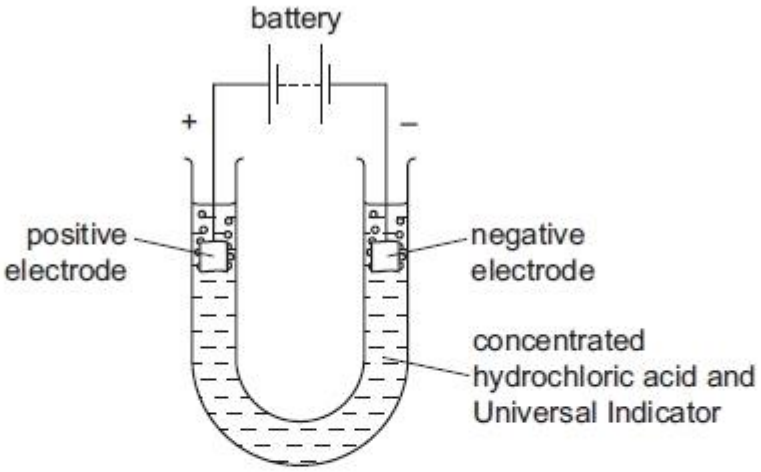
..... [4]

Topic Chem 5 **Q# 46/** iGCSE Chem/2015march/Paper 6/

3 Electricity was passed through concentrated hydrochloric acid using the apparatus shown.



Effervescence was observed at both electrodes.

(a) Name this process used to break down concentrated hydrochloric acid.

..... [1]

(b) Suggest why the electrodes are made of platinum and not aluminium.

..... [1]

(c) (i) Name the gas given off at the positive electrode.

.....

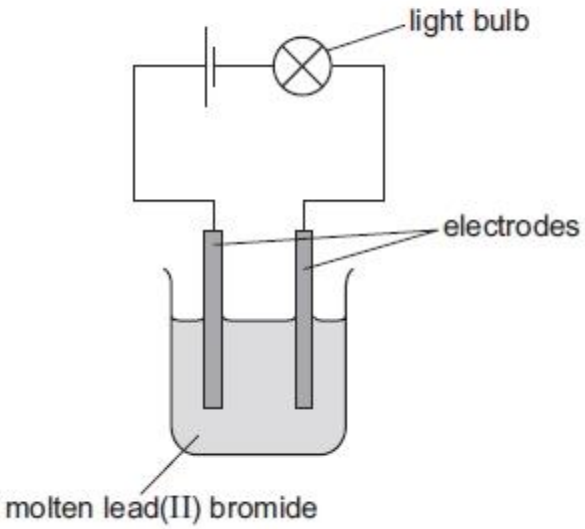
(ii) What would be the colour of the Universal Indicator around the positive electrode at the end of the experiment?

.....

[2]

Topic Chem 5 **Q# 45/** iGCSE Chem/2015/s/Paper 6/

2 Electricity was passed through molten lead(II) bromide using the apparatus shown.



The formation of a brown gas was observed at the positive electrode.

(a) Give **one** other expected observation.

..... [1]

(b) (i) Name a non-metal that could be used for the electrodes.

..... [1]

(ii) Suggest why iron is not used for the electrodes.

..... [1]

(c) (i) Name the brown gas formed.

..... [1]

(ii) Suggest the result of testing this gas with damp blue litmus paper.

..... [1]

(d) Name the product formed at the negative electrode.

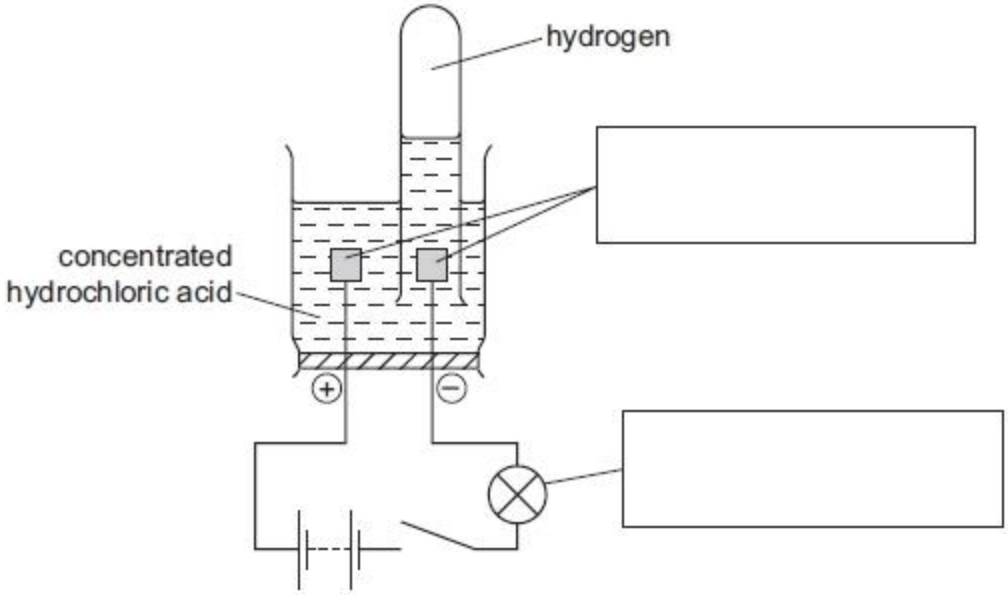
..... [1]

(e) State **one** safety precaution that should be used when doing this experiment.

..... [1]

Topic Chem 5 **Q# 47/** iGCSE Chem/2013/s/Paper 6/

1 Electricity was passed through a solution of concentrated hydrochloric acid using the apparatus shown.



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

(b) Describe the test for hydrogen.

test .....

result ..... [2]

(c) Describe how a sample of the gas given off at the positive electrode could be collected and its volume measured.

.....

.....

..... [2]

(d) The experiment was repeated using a concentrated aqueous solution of sodium chloride instead of hydrochloric acid.

(i) State the name of the solution formed.

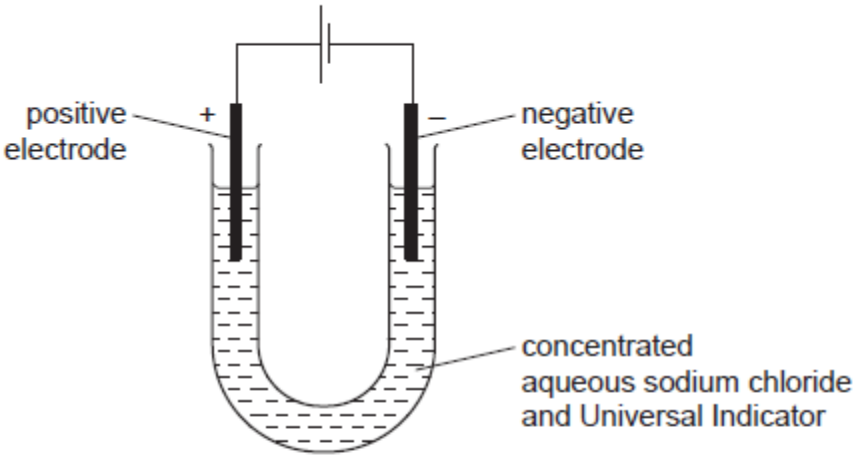
..... [1]

(ii) Give a test to show the presence of this product.

..... [1]

Topic Chem 5 **Q# 49/** iGCSE Chem/2010/w/Paper 6/

6 A concentrated solution of sodium chloride was electrolysed using the apparatus below.



One observation noted was that the Universal Indicator turned purple at the negative electrode.

(a) What observation would be made at **both** electrodes?

..... [1]

(b) Why did the indicator turn purple at the negative electrode?

..... [1]

(c) (i) Name the product formed at the positive electrode.

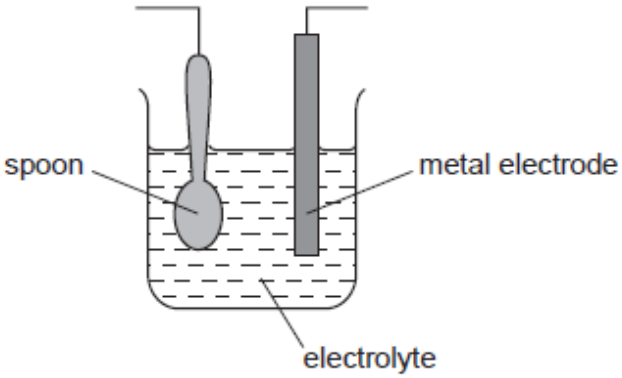
..... [1]

(ii) Suggest the effect of this product on the Universal Indicator.

..... [1]

Topic Chem 5 **Q# 50/** iGCSE Chem/2009/w/Paper 6/

2 A steel spoon can be coated in silver using electrolysis. The spoon must be very clean and free of grease.



(a) Suggest

(i) **one** advantage of putting a thin layer of silver on the spoon,

..... [1]

(ii) **one** disadvantage if the spoon is used frequently,

..... [1]

(iii) why the spoon must be very clean and free of grease?

..... [1]

(b) Which electrode should be the spoon?

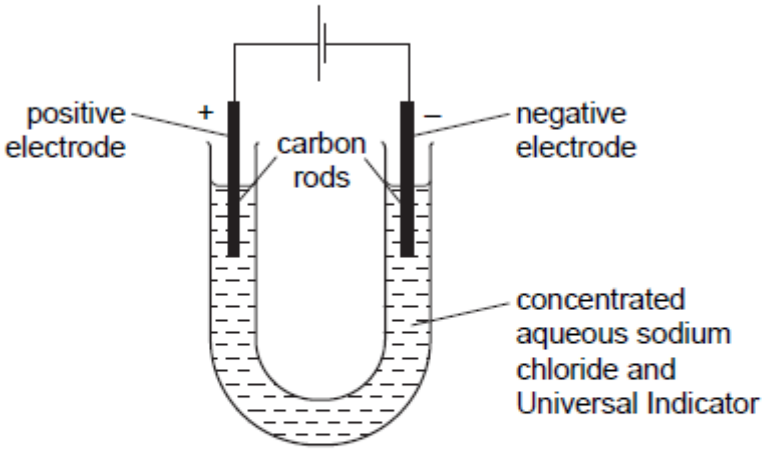
..... [1]

(c) Identify the metal from which the other electrode is made.

..... [1]

Topic Chem 5 **Q# 51/** iGCSE Chem/2008/w/Paper 6/

2 Electricity was passed through a concentrated solution of sodium chloride containing Universal Indicator.



(a) Suggest a suitable material for the electrodes.

..... [1]

Three observations were noted:

1 Bubbles of gas seen immediately at the negative electrode.
2 Bubbles of gas formed after some time at the positive electrode.
3 The solution turned blue around the negative electrode and colourless near the positive electrode.

(b) Give a test to show that the gas observed in 1 is hydrogen.

test .....

result ..... [2]

(c) Suggest why bubbles of gas were not seen immediately in 2.

.....

..... [1]

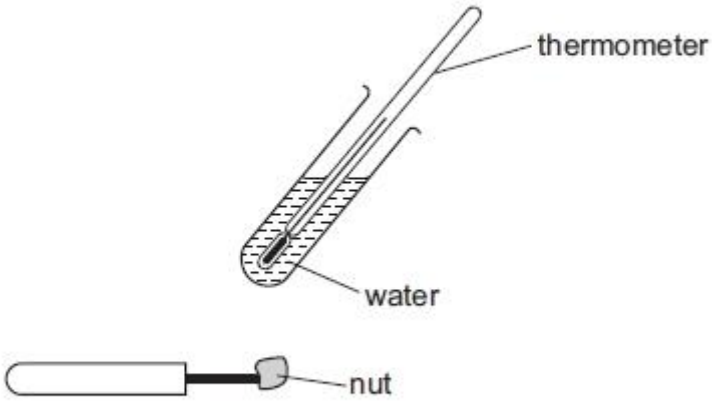
(d) What causes the colour change in 3 at

the negative electrode, ...

the positive electrode? ..... [2]

Topic Chem 6 **Q# 62/** iGCSE Chem/2014/s/Paper 6/

6 Nuts contain oil. Nuts can be burned to produce energy. The apparatus shown can be used to compare the energy produced by burning different nuts.



Plan an investigation to show which of three different types of nut produce the most energy. You are provided with peanuts, brazil nuts and hazelnuts.

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..... [7]

3 A student investigated the reaction between two different solids, **C** and **D**, and excess dilute hydrochloric acid.

Five experiments were carried out.

(a) *Experiment 1*

A measuring cylinder was used to pour 30 cm^3 of dilute hydrochloric acid into a polystyrene cup. The temperature of the dilute hydrochloric acid was measured. 1 g of solid **C** was added to the dilute hydrochloric acid and the mixture stirred with a thermometer.
The maximum temperature reached by the liquid mixture was measured.

(b) *Experiment 2*

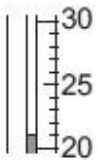
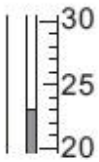
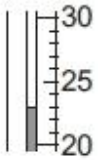
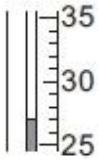
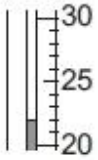
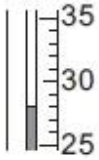
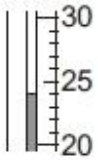
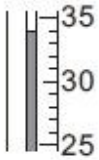
The polystyrene cup was emptied and rinsed with water.
Experiment 1 was repeated using 2 g of solid **C**.

(c) *Experiments 3 and 4*

Experiment 2 was repeated using 3 g and then 5 g of solid **C**.

Use the thermometer diagrams to record the results in the table below.

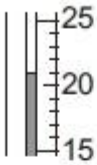
Complete the final column in the table.

experiment	mass of solid **C** / g	thermometer diagram	initial temperature of acid / °C	thermometer diagram	maximum temperature reached / °C	temperature difference / °C
1						
2						
3						
4						

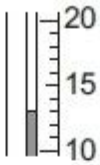
[3]

(d) *Experiment 5*

Experiment 1 was repeated using solid **D**. Use the thermometer diagrams to record the results in the spaces below.



initial temperature of acid



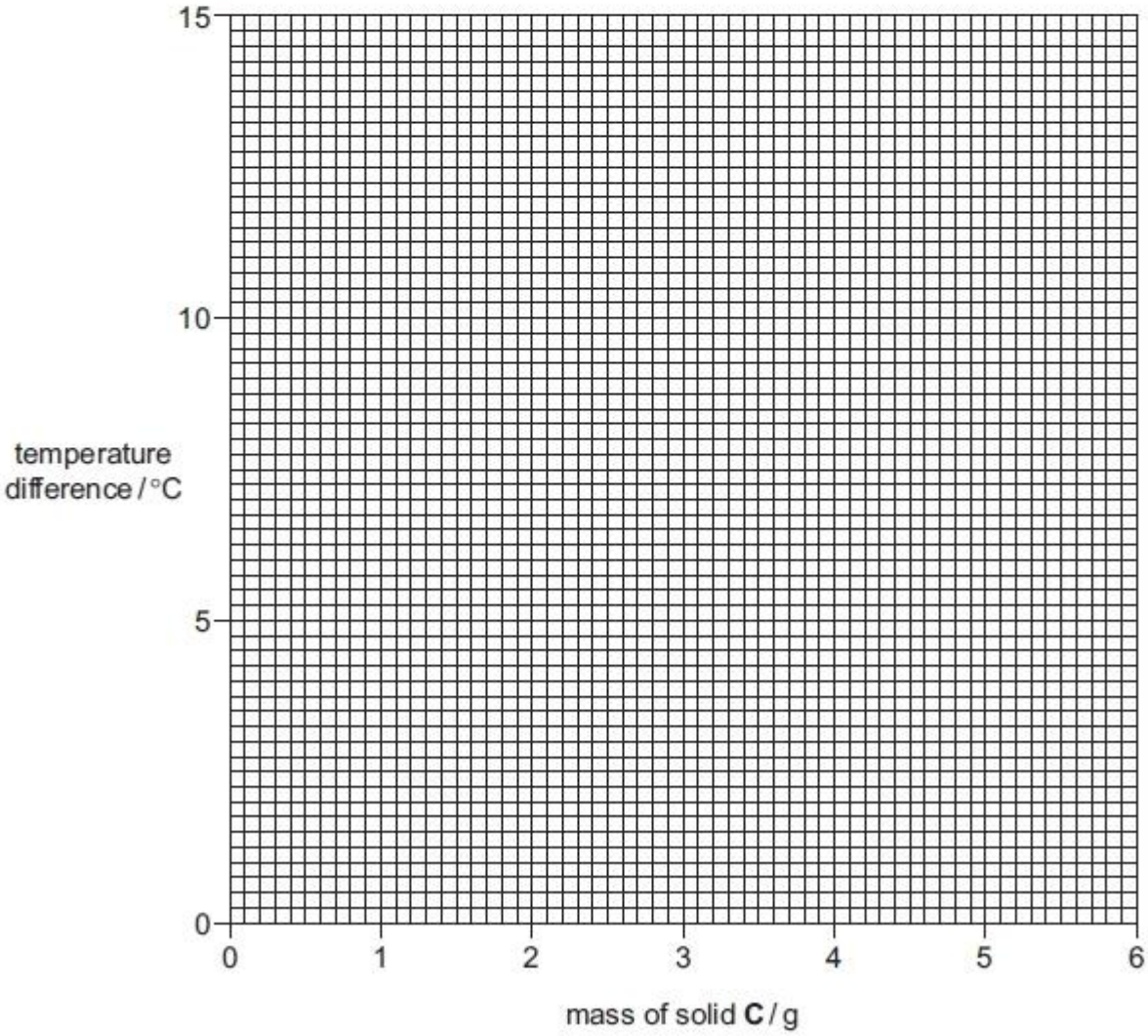
final temperature of liquid mixture

initial temperature of dilute hydrochloric acid = ... °C

final temperature of liquid mixture = ... °C

temperature change = ... °C [2]

(e) Plot the results for Experiments 1, 2, 3 and 4 on the grid and draw a straight line graph.



[4]

(f) **(i)** **From your graph**, deduce the temperature of the solution when 6 g of solid **C** is added to 30 cm^3 of dilute hydrochloric acid.
Show clearly **on the grid** how you worked out your answer.

..... °C [2]

(ii) **From your graph**, deduce the mass of solid **C** that would give a temperature rise of 9 °C when added to 30 cm^3 of dilute hydrochloric acid.

.....

..... [2]

(g) What type of chemical process occurs when solid **D** reacts with dilute hydrochloric acid?

..... [1]

(h) Suggest the effect on the results if Experiment 3 was repeated using 60 cm^3 of dilute hydrochloric acid.

.....

..... [2]

(i) Predict the temperature of the solution in Experiment 4 after 1 hour. Explain your answer.

.....

..... [2]

(j) When carrying out the experiments, what would be **one** advantage and **one** disadvantage of taking the temperature readings after exactly one minute?

advantage .....

.....

disadvantage .....

..... [2]

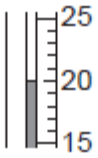
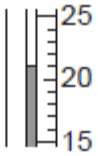
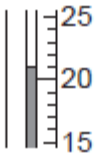
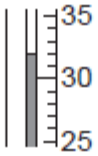
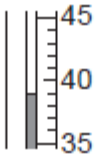
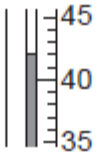
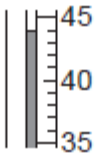
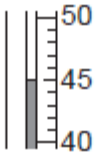
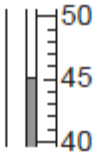
Topic Chem 6 **Q# 65/** iGCSE Chem/2011/w/Paper 6/

4 A student investigated the reaction between aqueous copper(II) sulfate and two different metals, zinc and iron.
Two experiments were carried out.

Experiment 1
Using a measuring cylinder, 25 cm^3 of aqueous copper(II) sulfate was poured into a polystyrene cup. The temperature of the solution was measured. The timer was started and the temperature was measured every half a minute for one minute.

At 1 minute, 5 g of zinc powder was added to the cup and the mixture stirred with the thermometer. The temperature of the mixture was measured every half minute for an additional three minutes.

(a) Use the thermometer diagrams in the table to record the temperatures.

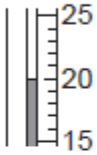
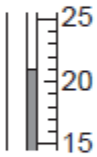
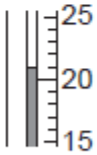
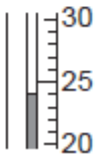
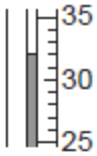
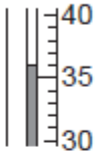
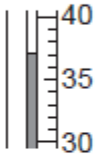
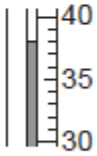
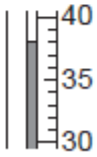
time / min	thermometer diagrams	temperature / °C
0.0		
0.5		
1.0		
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		

[3]

Experiment 2

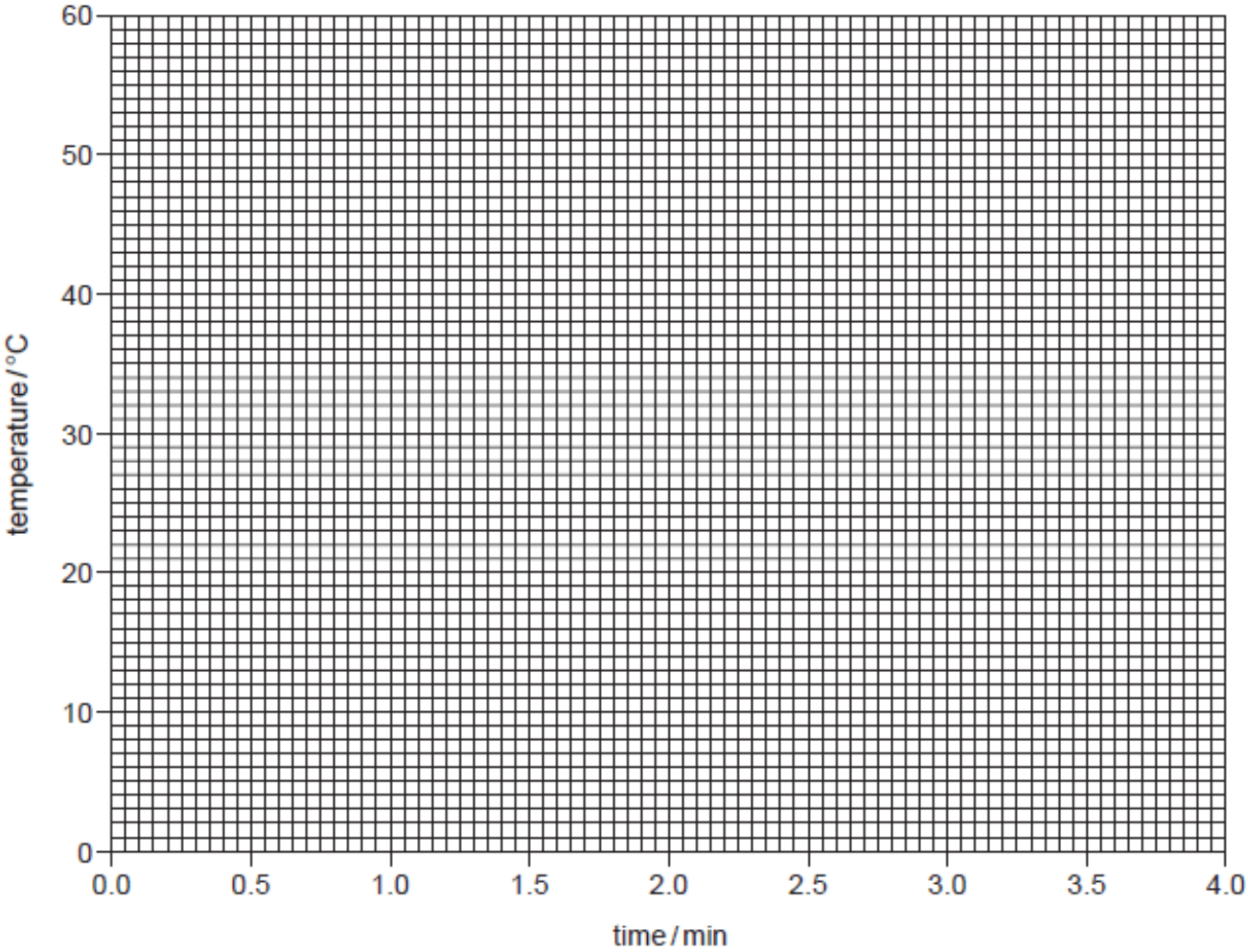
Experiment 1 was repeated using 5 g of iron powder instead of the zinc powder.

(b) Use the thermometer diagrams in the table to record the temperatures.

time / min	thermometer diagrams	temperature / °C
0.0		
0.5		
1.0		
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		

[3]

(c) Plot the results of both experiments on the grid below. Draw two smooth line graphs. Clearly label your graphs.



[5]

(d) **From your graph**, work out the temperature of the reaction mixture in Experiment 1 after 1 minute 15 seconds. Show clearly **on the graph** how you worked out your answer.

..... [3]

(e) What type of chemical process occurs when zinc and iron react with aqueous copper(II) sulfate?

..... [1]

(f) **(i)** Compare the temperature changes in Experiments 1 and 2.

..... [1]

(ii) Suggest an explanation for the difference in temperature changes.

.....

..... [1]

(g) Explain how the temperature changes would differ in the experiments if 12.5 cm^3 of copper(II) sulfate solution were used.

.....

.....

..... [2]

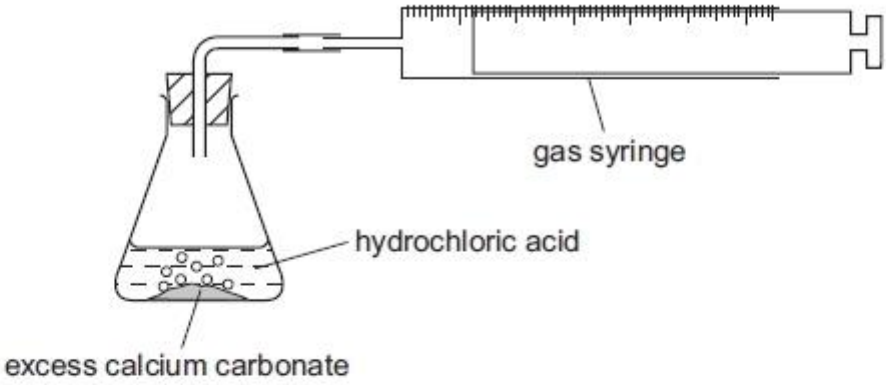
(h) Predict the effect of using lumps of zinc in Experiment 1. Explain your answer.

.....

..... [2]

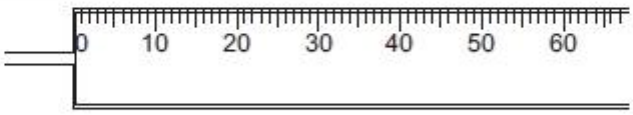
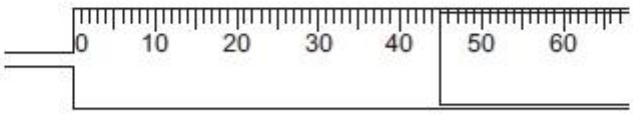
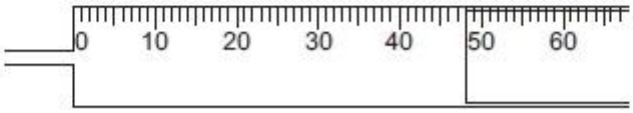
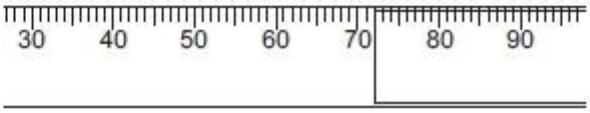
Topic Chem 7 **Q# 81/** iGCSE Chem/2015march/Paper 6/

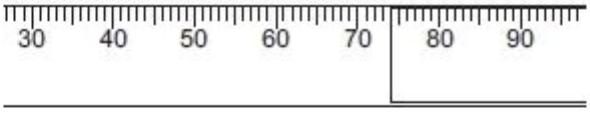
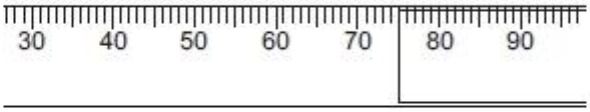
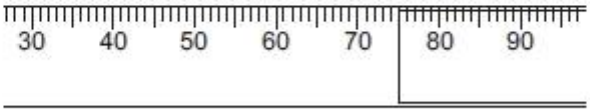
2 The rate of reaction between excess calcium carbonate and dilute hydrochloric acid was investigated using the apparatus shown below. The temperature of the hydrochloric acid was 25 °C.



The volume of carbon dioxide evolved was measured every minute for six minutes.

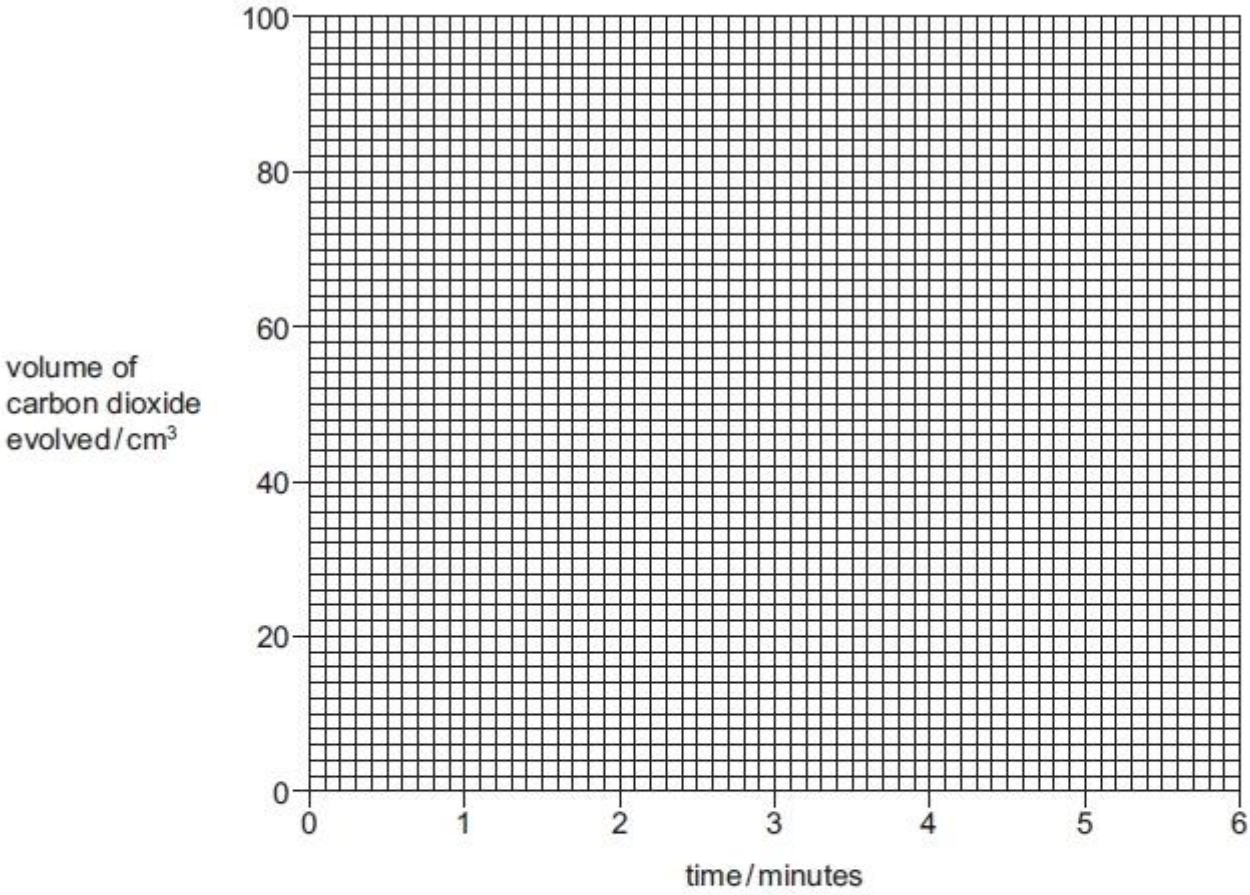
(a) Use the gas syringe diagrams to complete the table of results.

time / minutes	gas syringe diagram	total volume of carbon dioxide evolved / cm^3
0		
1		
2		
3		

4		
5		
6		

[3]

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



[4]

(c) **(i)** Which point appears to be inaccurate? Explain why.

.....

..... [2]

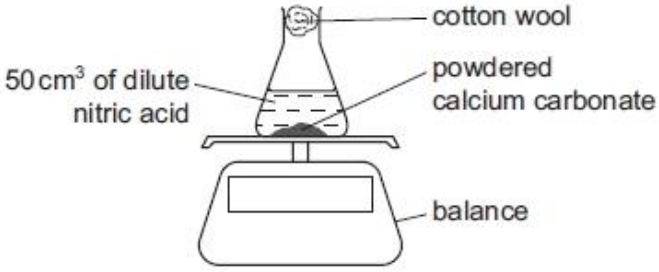
(ii) **Use your graph** to work out the volume of gas expected at that time. Show clearly **on the grid** how you worked out your answer.

..... [2]

(d) Sketch, **on the grid**, the graph you would expect if the experiment was repeated using hydrochloric acid at a temperature of 50 °C. [2]

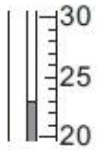
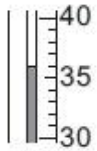
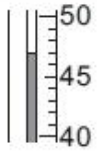
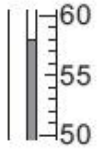
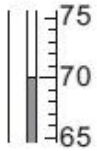
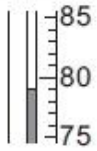
Topic Chem 7 **Q# 79/** iGCSE Chem/2015/w/Paper 62/

3 A teacher demonstrated the rate of reaction of dilute nitric acid with powdered calcium carbonate at different temperatures.
50 cm^3 of dilute nitric acid was heated to a known temperature and placed on a balance.



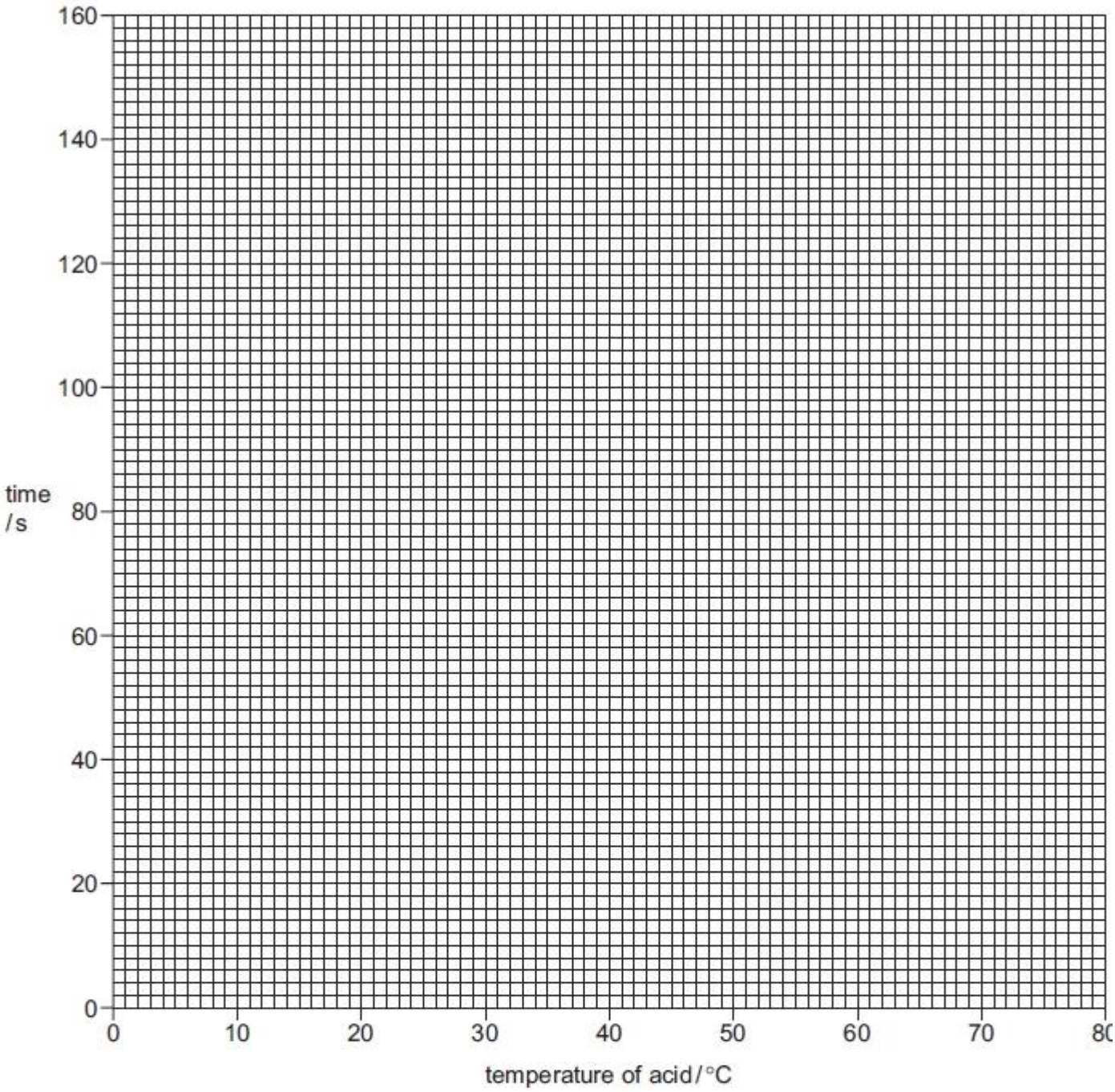
Excess powdered calcium carbonate was added to the nitric acid and the mass of the beaker and contents recorded. The time taken for the mass to decrease by 1 g was measured. The experiment was repeated at different temperatures.

(a) Using the thermometer diagrams, record the temperatures in the table.

thermometer diagram	temperature of nitric acid / °C	time for mass to decrease by 1 g in seconds
		139
		102
		99
		60
		45
		38

[3]

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



[3]

(c) Which point is inaccurate? Explain why you chose this point.

.....

..... [2]

(d) **Use your graph** to find out the time of reaction at a temperature of 30 °C. Show clearly on the grid how you obtained your answer.

..... [3]

(e) **(i)** How does the rate of this reaction vary with the change in temperature?

..... [1]

(ii) Explain why.

.....

.....

..... [2]

(f) **(i)** What would be the effect of repeating the experiments using lumps of calcium carbonate instead of powdered calcium carbonate? Explain your answer.

.....

..... [2]

(ii) Sketch on the grid the curve you would expect. [1]

(g) Explain why cotton wool was used in the neck of the conical flask.

.....

..... [2]

Topic Chem 7 **Q# 80/** iGCSE Chem/2015/s/Paper 6/

6 A catalyst is a substance that speeds up the rate of a chemical reaction and remains unchanged at the end of the reaction.
Hydrogen peroxide solution, H_2O_2, breaks down to form oxygen. This decomposition is very slow if a catalyst is not used.
Plan an investigation to show that copper(II) oxide is a suitable catalyst for this reaction.
You can use aqueous hydrogen peroxide and common laboratory apparatus.

Step 1 Show that copper(II) oxide catalyses the decomposition of hydrogen peroxide and measure the rate of the reaction.

.....

.....

.....

.....

.....

.....

.....

.....

Step 2 Show that the copper(II) oxide is unchanged at the end of the decomposition.

.....

.....

.....

.....

.....

.....

.....

[Total: 8]

Topic Chem 7 **Q# 82/** iGCSE Chem/2014/w/Paper 6/

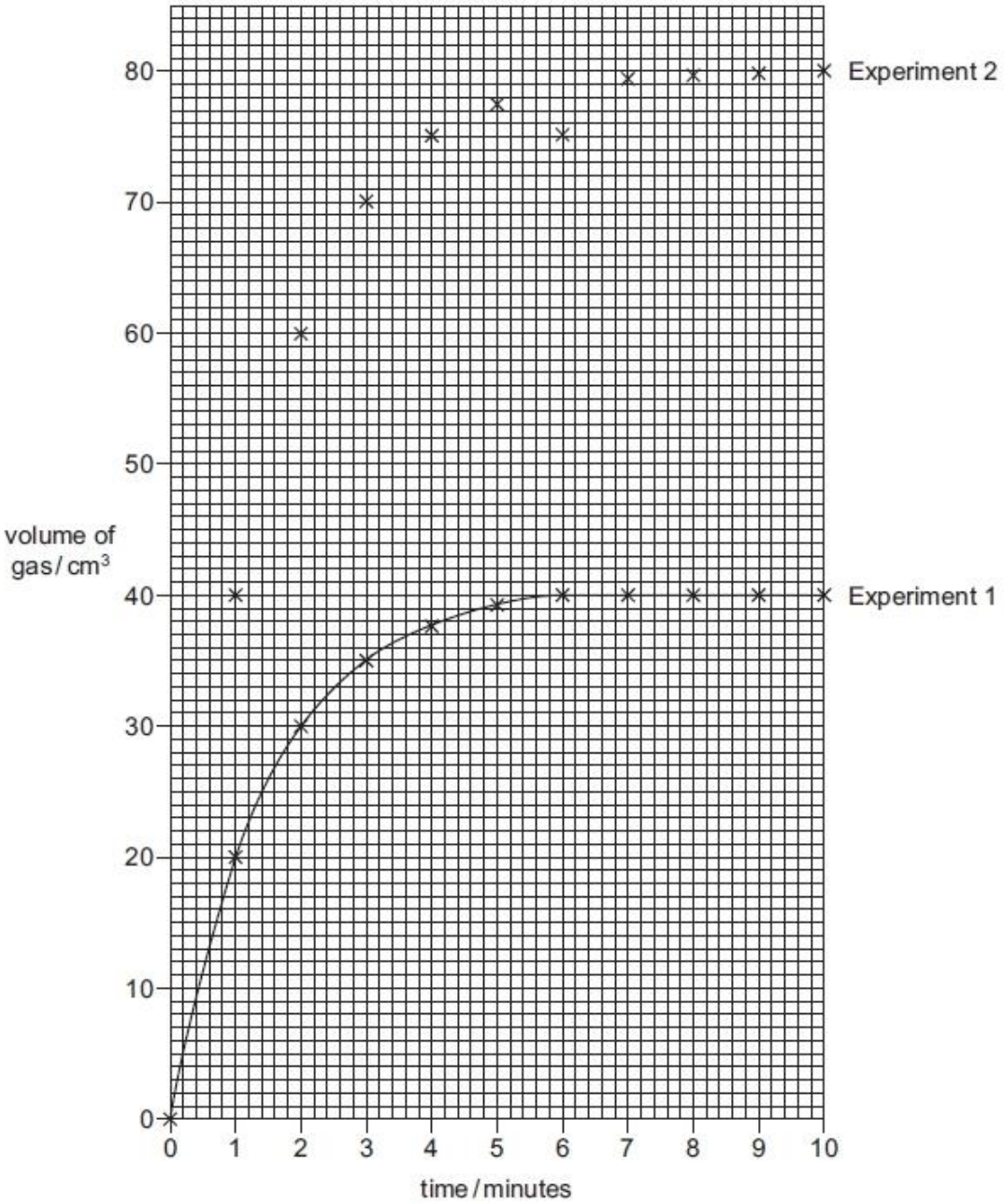
2 Two experiments were carried out to show what factors affect the rate of decomposition of hydrogen peroxide, H_2O_2.
In each experiment the volume of gas produced was measured every minute for ten minutes.

Experiment 1

The student used a mixture of 50 cm^3 of hydrogen peroxide, 50 cm^3 of water and 1 g of manganese(IV) oxide at a room temperature of 20 °C.
The results were plotted to obtain the graph shown.

Experiment 2

The student repeated Experiment 1 but did not record how much of each substance was used. The points were plotted on the grid.



(a) Complete the graph for Experiment 2. [1]

(b) Suggest the composition of the mixture used in Experiment 2. Explain your suggestion.

composition .....

.....

explanation .....

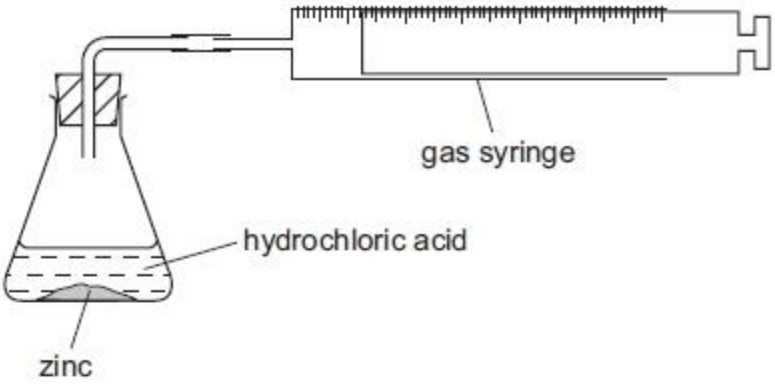
..... [4]

(c) What is the function of the manganese(IV) oxide?

..... [1]

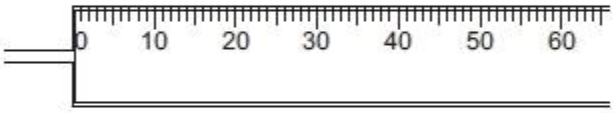
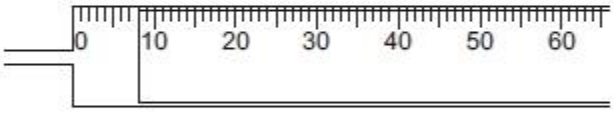
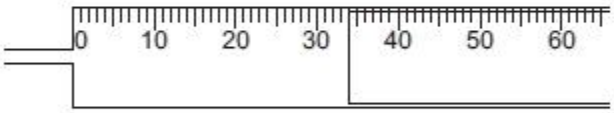
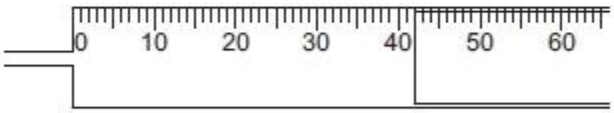
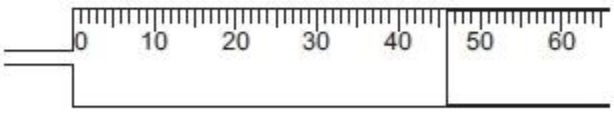
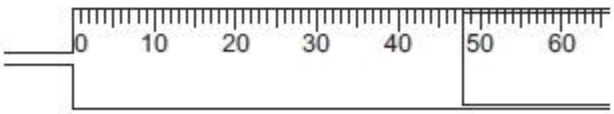
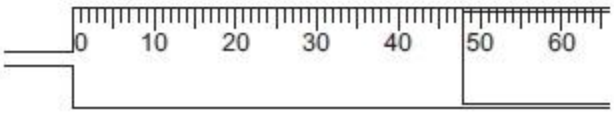
(d) Sketch on the grid the curve that you would expect if Experiment 1 was repeated at 10 °C. [2]

3 A student investigated the reaction of zinc powder with dilute hydrochloric acid using the apparatus below.



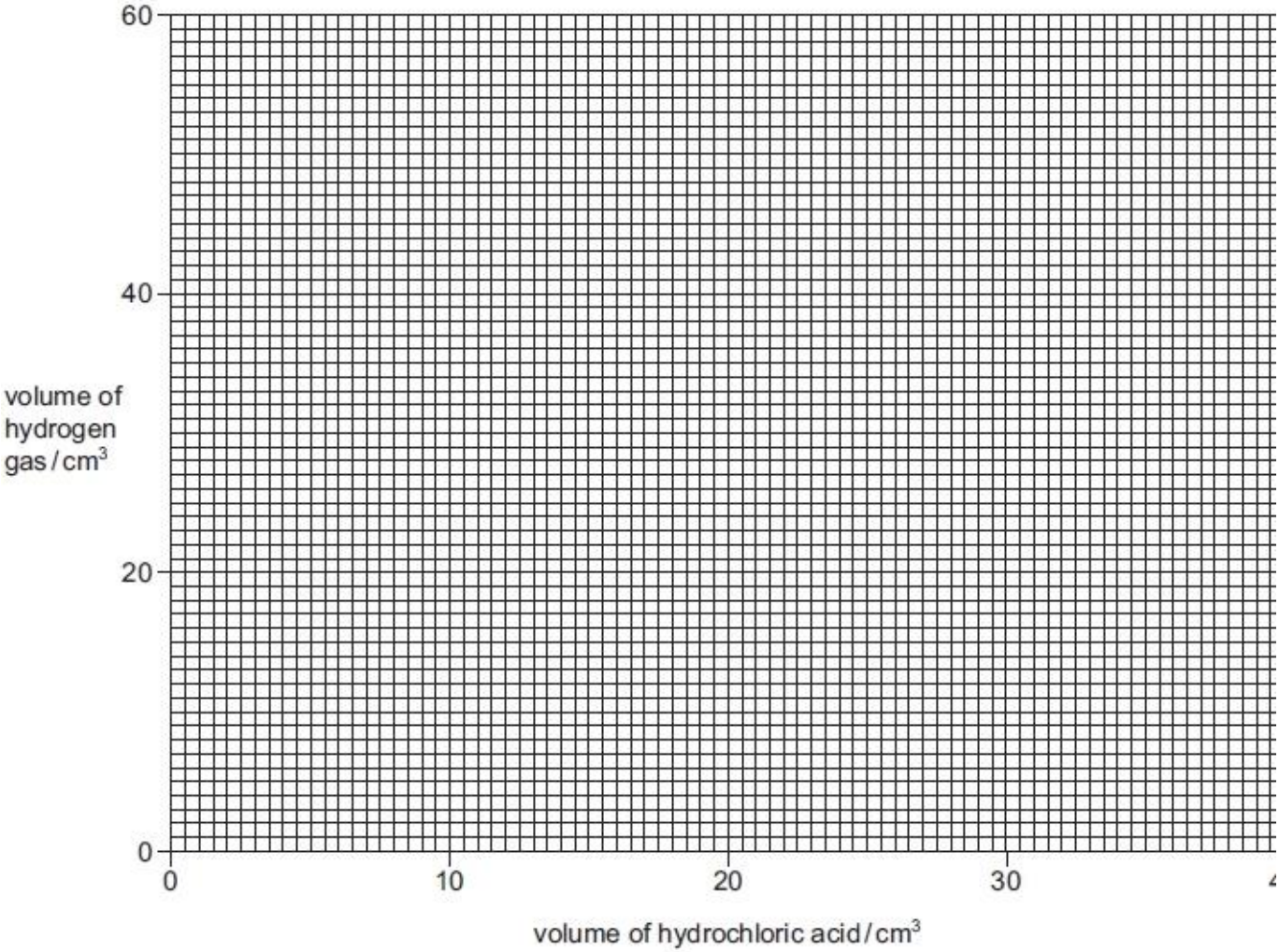
The same mass of zinc was added to different volumes of hydrochloric acid at room temperature, 20 °C. The total volume of hydrogen gas given off in each experiment was measured.

(a) Use the gas syringe diagrams to record the volumes of hydrogen gas in the table.

volume of hydrochloric acid / cm^3	gas syringe diagram	volume of hydrogen gas / cm^3
0		
5		
10		
15		
20		
30		
40		

[3]

(b) On the grid, plot the points and draw a smooth line graph.



[4]

(c) **(i)** Which point is inaccurate?

..... [1]

(ii) Suggest a possible reason for this inaccurate measurement.

..... [1]

(iii) **Use your graph** to work out the volume that would be expected to be formed. Show clearly **on the grid** how you got your answer.

..... [2]

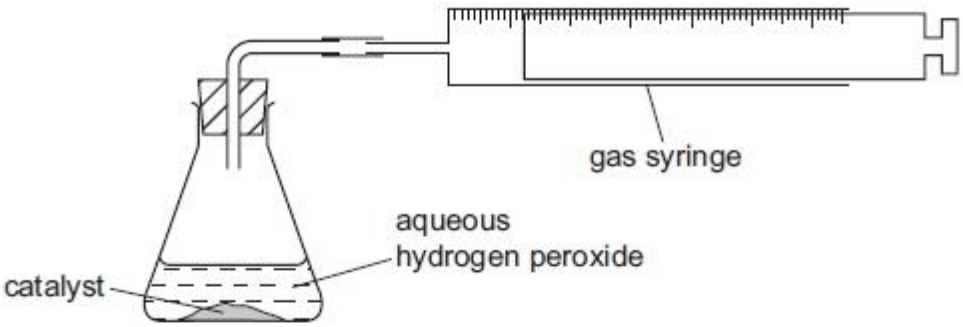
(d) Explain why the volume of hydrogen gas does not increase after 30 cm^3 of hydrochloric acid.

.....

..... [2]

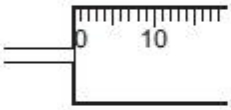
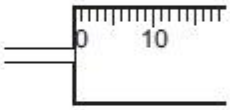
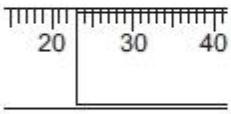
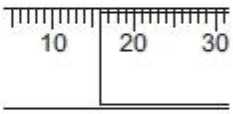
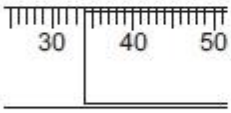
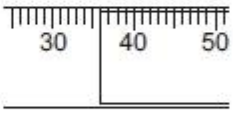
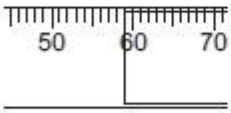
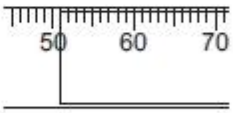
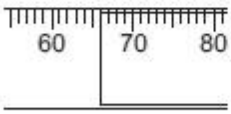
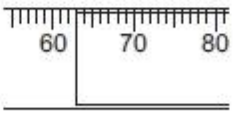
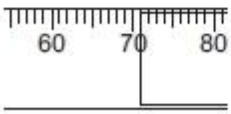
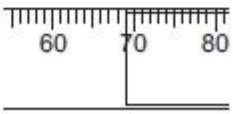
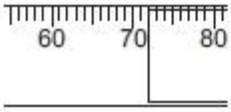
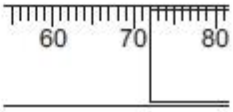
(e) Sketch on the grid the graph you would expect if the experiments were repeated using the same mass of zinc granules. [2]

5 Two experiments using catalysts were carried out. Catalysts **R** and **S** were used to break down 50 cm^3 of aqueous hydrogen peroxide at a temperature of 20 °C. The volume of oxygen given off was measured using the apparatus shown.



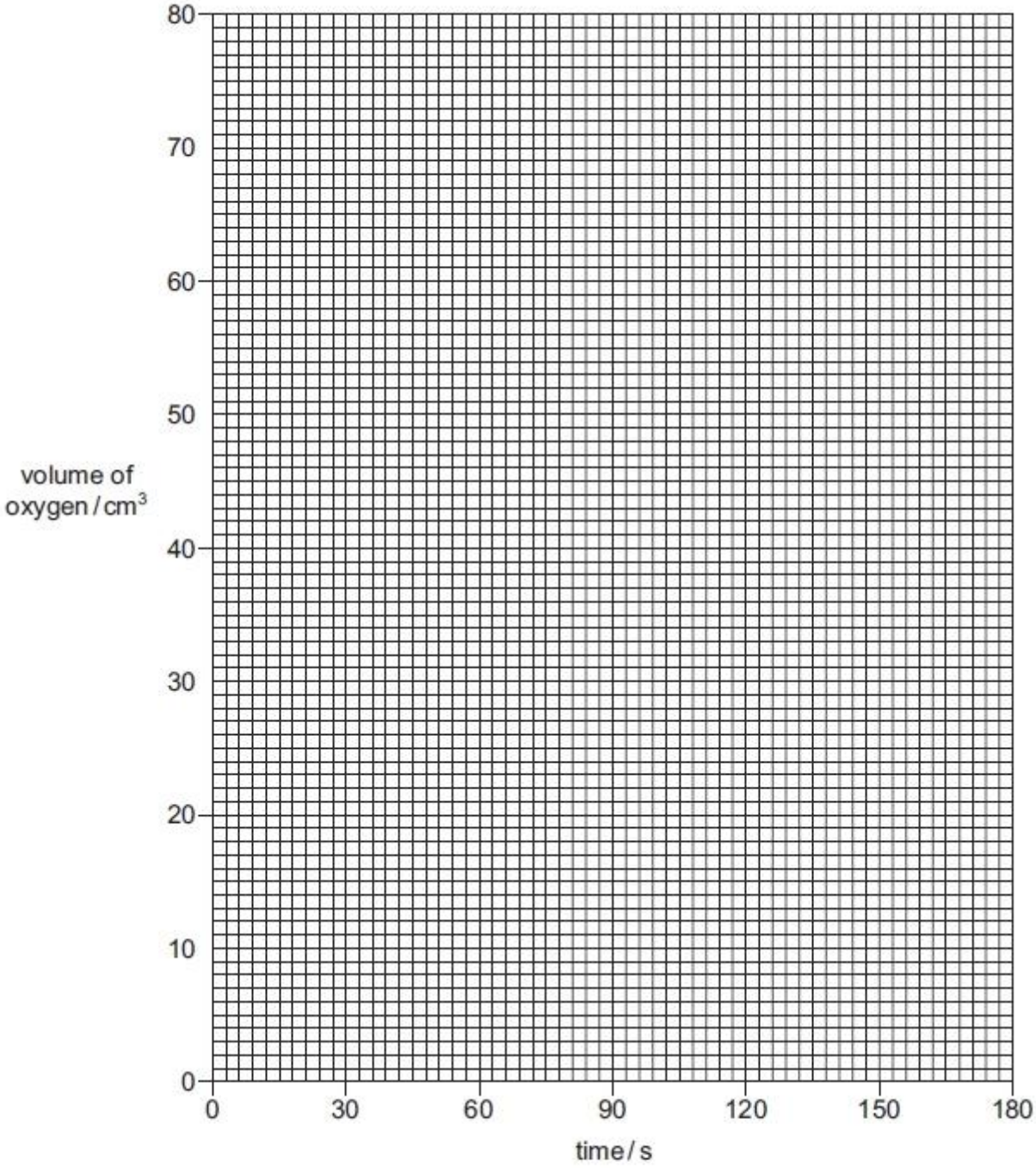
The gas syringe diagrams show the volume of oxygen formed every 30 seconds in each experiment.

(a) Use the syringe diagrams to complete the volumes in the table.

time / s	using catalyst **R**		using catalyst **S**	
	syringe diagram	volume / cm^3	syringe diagram	volume / cm^3
0				
30				
60				
90				
120				
150				
180				

[4]

(b) Plot a graph to show each set of results. Clearly label the graphs **R** and **S**.



[6]

(c) Which result using catalyst **R** was inaccurate?

..... [1]

(d) Which is the better catalyst in this reaction? Explain your answer.

.....

..... [2]

(e) Sketch a line on the grid to show the graph you would expect if the reaction with catalyst **R** was repeated at 50 °C. [2]

Topic Chem 7 **Q# 85/** iGCSE Chem/2013/w/Paper 6/

6

Old documents

Some documents are stored in containers with packets of silica gel crystals. These crystals absorb water from air that enters the container. Water could damage the documents.
Anhydrous cobalt(II) chloride is added to the silica gel. As the crystals absorb water they change colour from blue to pink. Heating the silica gel in an oven removes the water from the crystals so that the crystals can be reused.

Plan an experiment to find the mass of water absorbed by a packet of silica gel crystals.

.....

.....

.....

.....

.....

.....

..... [6]

Topic Chem 8 **Q# 116/** 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
tests on solution **E** **(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.	..... [2]
(ii) The mixture was filtered and the filtrate heated.	.....
The gas given off was tested with damp litmus paper.	..... [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]
tests on solution **F**	
(e) Appearance of solution **F**.	yellow liquid
(f) Zinc powder was added to solution **F**.	rapid effervescence
The solution was observed for five minutes.	turned blue, then green and finally light purple
The gas given off was tested with a splint.	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]

Topic Chem 8 **Q# 117/** iGCSE Chem/2015march/Paper 6/

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

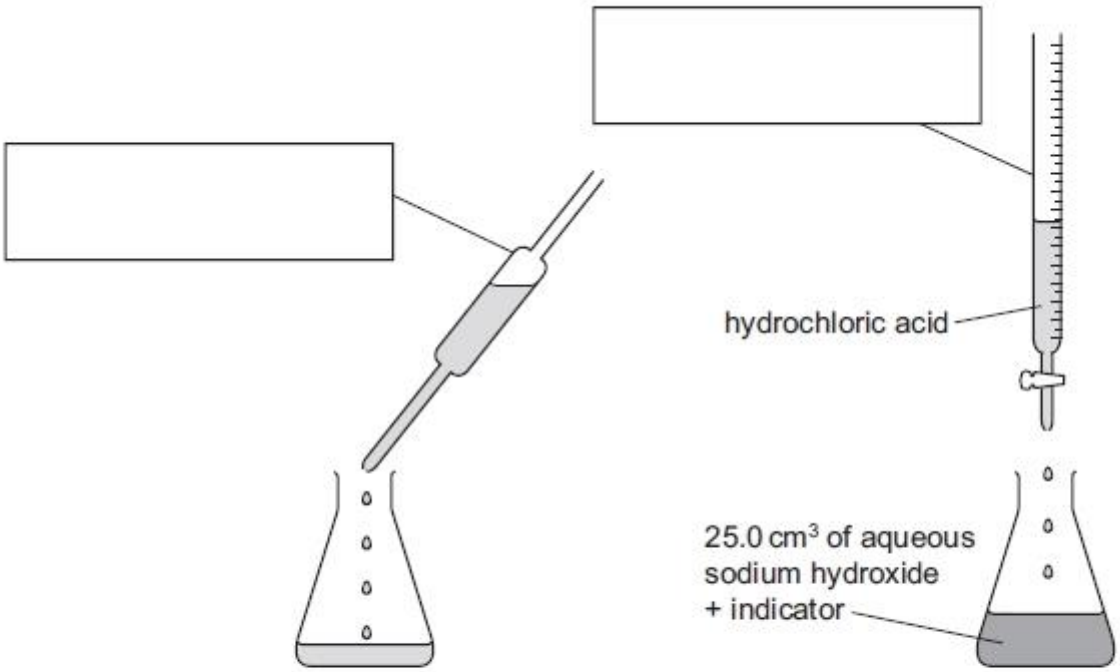
- ethanoic acid, boiling point 118 °C,
- chloroethanoic acid, boiling point 190 °C.

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

test .....

result ..... [2]

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



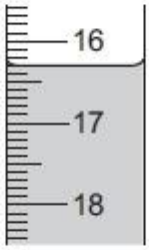
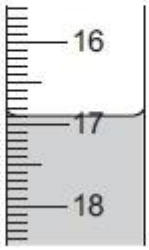
(a) Complete the boxes to identify the pieces of apparatus labelled. [2]

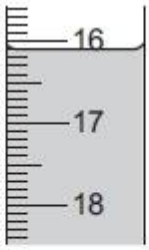
(b) Name a suitable indicator that could be used.

..... [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
tests on solution **K** **(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.	pale blue precipitate
An excess of aqueous sodium hydroxide was then added to the mixture.	the precipitate was insoluble
(ii) Aqueous ammonia was added to the second portion drop by drop and shaken.	blue precipitate
An excess of aqueous ammonia was then added to the mixture.	the precipitate dissolved to form a deep blue solution
(iii) Dilute nitric acid and barium nitrate solution were added to the third portion.	no visible change
(iv) Dilute nitric acid and silver nitrate solution were added to the fourth portion.	white precipitate formed

(c) Identify solution **K**.

..... [2]

tests	observations
tests on solution **L** **(d)** Colour of solution **L**.	..... [1]

tests	observations
(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]

Topic Chem 8 **Q# 113/** 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]

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
tests on solid **C** **(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
tests on a solution of **C** 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)**.

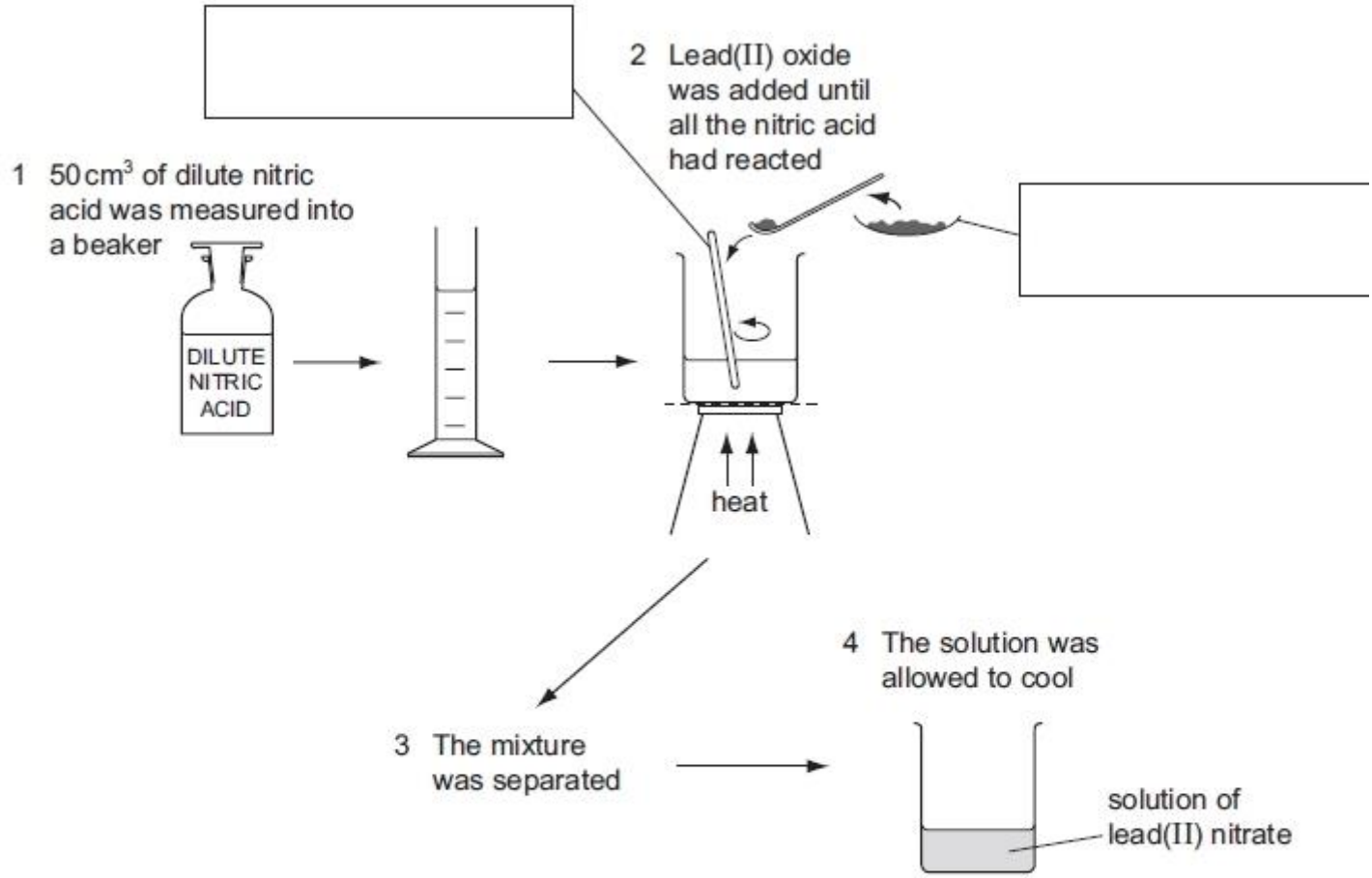
..... [1]

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

..... [1]

Topic Chem 8 **Q# 118/** 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]

Topic Chem 8 **Q# 119/** 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**.

.....

.....

.....

.....

.....

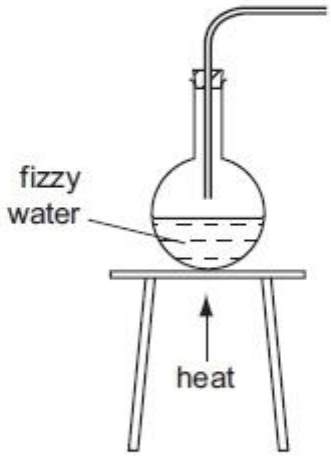
..... [4]

Topic 6 Chem 8 **Q# 120/** iGCSE Chem/2014/w/Paper 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]

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
tests on solid **D**	
(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]

Topic Chem 8 **Q# 123/** iGCSE Chem/2014/s/Paper 6/

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

> *Preparation of lead chloride*
>
> *10 cm³ of aqueous lead nitrate was placed in a beaker and 10 cm³ 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]

Topic Chem 8 **Q# 124/** iGCSE Chem/2014/s/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
<u>tests on solid **U**</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.	pale brown precipitate
Then hydrogen peroxide solution was added to the mixture and the gas given off tested.	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]

Topic Chem 8 **Q# 125/** iGCSE Chem/2014/s/Paper 6/

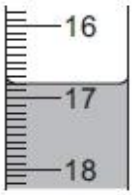
4 A student investigated the reaction between dilute hydrochloric acid and an aqueous alkaline solution **R**, containing two different substances, **S** and **T**.

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

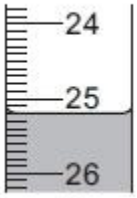
	burette readings
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[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]

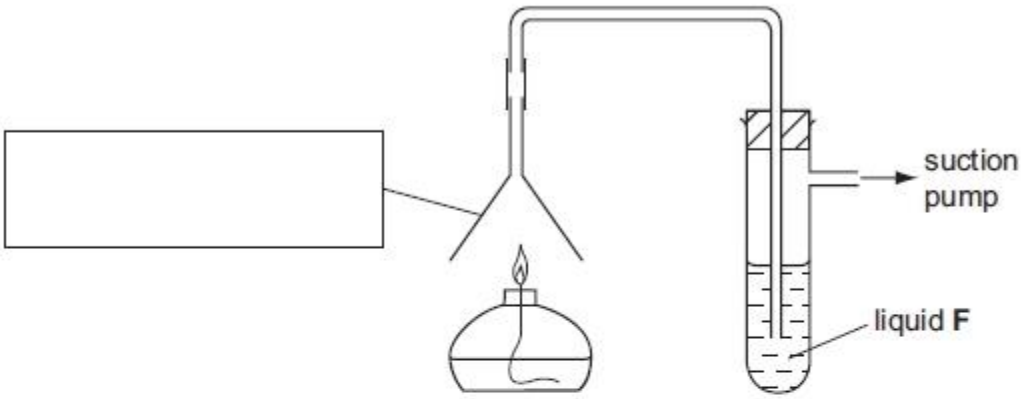
(ii) Suggest a practical problem that would occur when carrying out these repeat experiments and how you could solve this problem.

.....

..... [2]

Topic Chem 8 **Q# 127/** 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]

Topic Chem 8 **Q# 128/** 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]

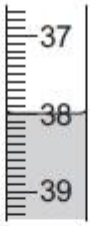
[Total: 7]

Topic Chem 8 **Q# 129/** iGCSE Chem/2013/w/Paper 6/

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]

Topic Chem 8 **Q# 131/** iGCSE Chem/2013/s/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]

Topic Chem 10 **Q# 204/** iGCSE Chem/2015/w/Paper 62/

6 You are provided with samples of three metals, tin, zinc and silver.

Plan an investigation to show the order of reactivity of these three metals.
You are provided with common laboratory apparatus and dilute acids.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

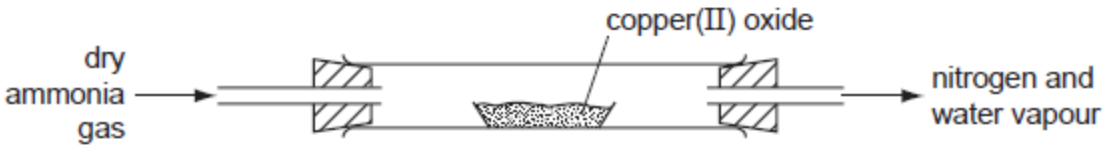
.....

..... [6]

Topic Chem 10 **Q# 205/** iGCSE Chem/2012/w/Paper 6/

1 A student reacted dry ammonia gas with hot copper(II) oxide.
The apparatus used is shown below.
The equation for the reaction is

$$2NH_3 + 3CuO \rightarrow 3Cu + N_2 + 3H_2O$$



(a) Indicate with an arrow where the heat is applied. [1]

(b) The colour of the copper(II) oxide would change

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

(c) Draw a labelled diagram to show how liquid water could be obtained from the water vapour produced.

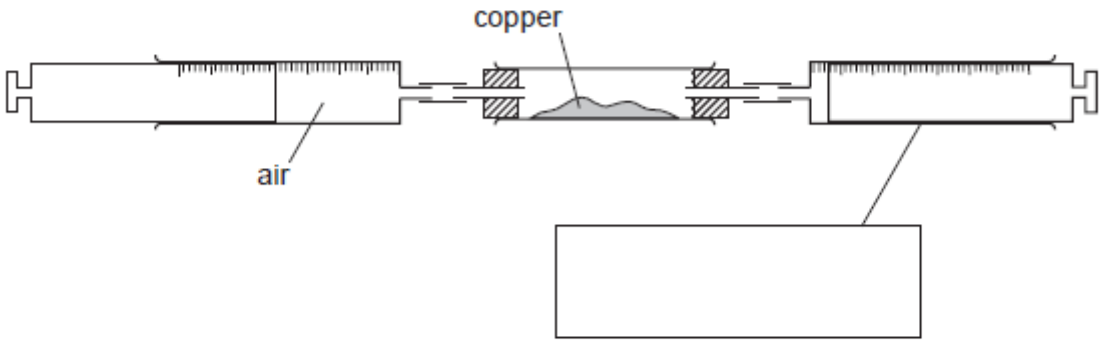
[2]

(d) Suggest the effect of nitrogen on a lighted splint.

..... [1]

Topic Chem 10 **Q# 206/** iGCSE Chem/2011/w/Paper 6/

1 A student investigated the reaction of air with copper. 100 cm^3 of air was passed continuously over heated copper using the apparatus below. When the volume remained constant, the apparatus was left to cool and the volume of gas was measured.



(a) **(i)** Complete the box to show the apparatus labelled. [1]

(ii) Indicate on the diagram, with an arrow, where heat is applied. [1]

(b) What should be used to transfer the copper from a bottle to the apparatus?

..... [1]

(c) The copper changed colour from brown to ..... [1]

(d) Why was the apparatus left to cool before measuring the final volume of gas?

.....

..... [2]

Topic Chem 10 **Q# 207/** iGCSE Chem/2010s/Paper 6/

7 Malachite is a naturally occurring form of copper carbonate. Outline how a sample of copper metal could be obtained from large lumps of malachite in the laboratory.
Copper is one of the least reactive metals.
Your answer should include any chemicals used and conditions.

.....

.....

.....

.....

.....

.....

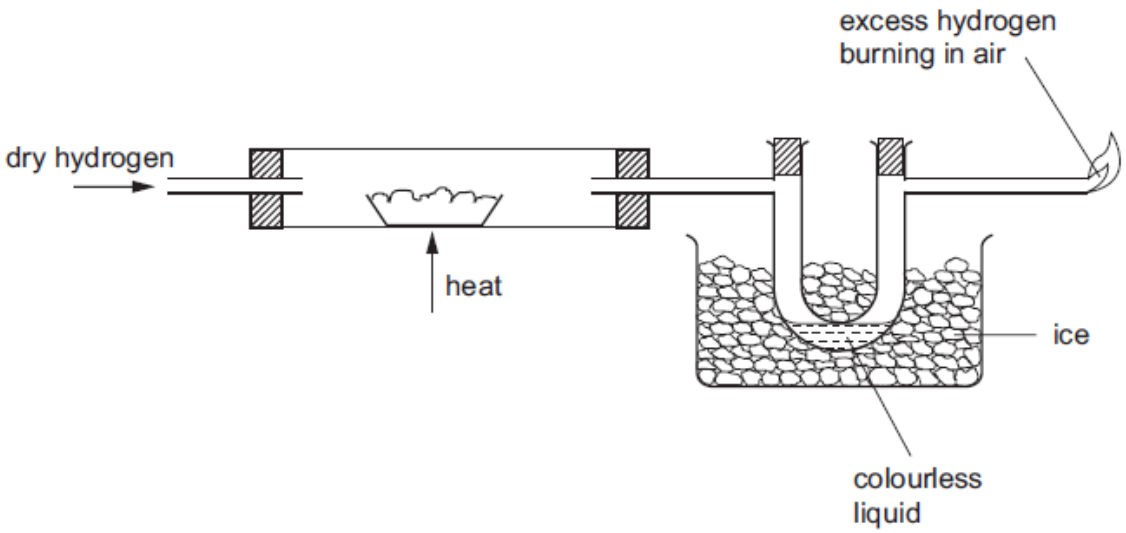
.....

.....

..... [6]

Topic Chem 10 **Q# 209/** iGCSE Chem/2004s/Paper 6/

6 Copper oxide was reacted with hydrogen using the apparatus shown below.



(a) Indicate on the diagram with an arrow where the copper oxide is placed. [1]

(b) The colour of the copper oxide would change from ..... to ..... [2]

(c) What is the purpose of the ice?

.....

..... [2]

Topic Chem 11 **Q# 211/** iGCSE Chem/2012s/Paper 6/

STOP RUST!

Solutions of chemicals known as corrosion inhibitors are added to the water in steel radiators to reduce rust.
You are provided with three different bottles of liquid corrosion inhibitors, **R**, **S** and **T**, and some steel nails.
Plan an experiment to test if these inhibitors prevent the corrosion of steel and which of these inhibitors is the most effective.

.....

.....

.....

.....

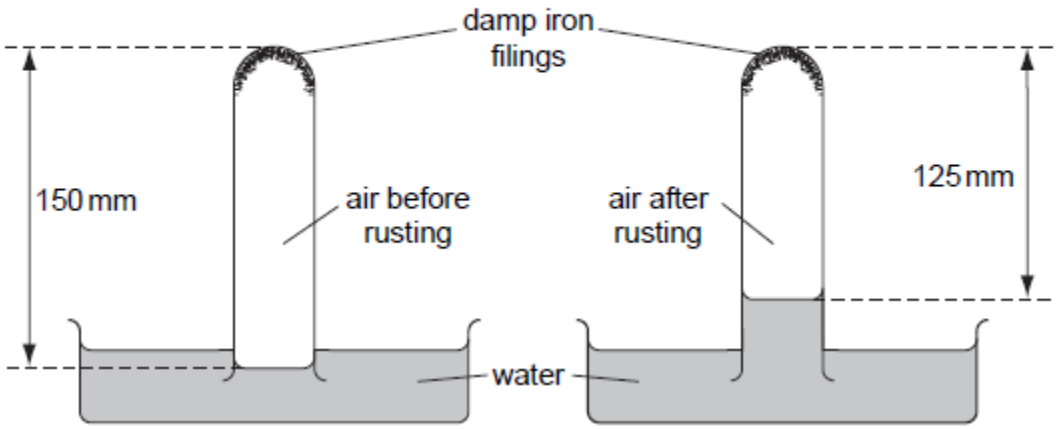
.....

.....

..... [7]

Topic Chem 11 **Q# 212/** iGCSE Chem/2007/w/Paper 6/

2 An experiment was set up to investigate the rusting of iron.



(a) Describe the appearance of the iron after rusting.

..... [1]

(b) **(i)** Why does the water rise up the tube?

..... [1]

(ii) Calculate the percentage change in the volume of air in the tube.

..... [1]

(c) What difference would be observed if

(i) an iron nail was suspended in the tube instead of using iron filings,

..... [1]

(ii) the water contained salt?

..... [1]

Topic Chem 14 **Q# 221/** iGCSE Chem/2015/w/Paper 62/

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

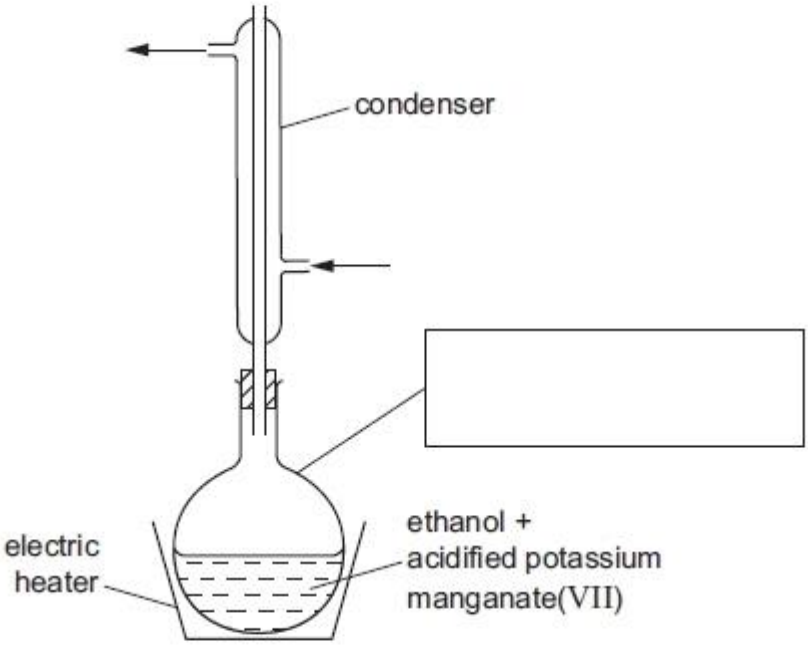
- ethene,
- ammonia,
- oxygen.

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

gas	chemical test	result of test
ethene	.....	.....
	.....	..... [2]

Topic Chem 14 **Q# 222/** iGCSE Chem/2015/s/Paper 6/

1 Ethanol was reacted with hot acidified potassium manganate(VII) solution using the apparatus below. Ethanoic acid was formed.



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

(ii) Label the arrows. [1]

(b) **(i)** Suggest and explain why an electric heater is used to heat this reaction and not a Bunsen burner.

.....

..... [2]

(ii) Suggest why a condenser is necessary.

..... [1]

(c) Complete the table to show the difference in smell between ethanol and ethanoic acid.

	smell
ethanol	
ethanoic acid	

[2]

Topic Chem 14 **Q# 224/** iGCSE Chem/2010s/Paper 6/

2 Three bottles of liquids have lost their labels.

The liquids are known to be:

aqueous sodium iodide,

hexene,

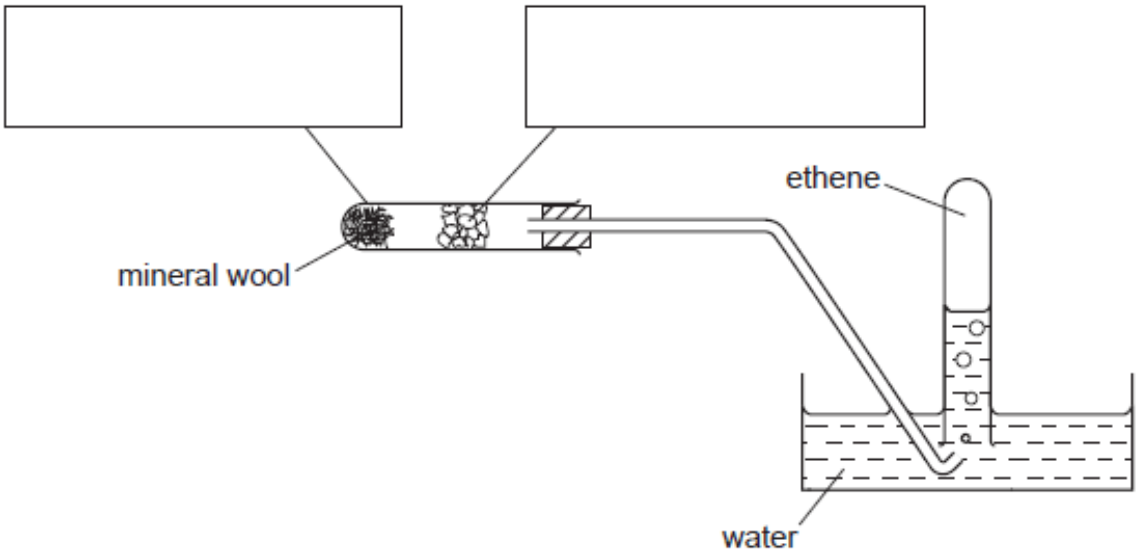
dilute nitric acid.

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

liquid	**test**	**result**
hexene	....	....

Topic Chem 14 **Q# 223/** iGCSE Chem/2010/w/Paper 6/

1 Ethene can be prepared by passing ethanol vapour over hot aluminium oxide.



(a) Complete the boxes to show the chemicals used. [1]

(b) Show on the diagram with two arrows where the heat is applied. [2]

(c) Why must the delivery tube be removed from the water before the heating is stopped?

.....

.....

..... [2]

Topic Chem 14 **Q# 225/** iGCSE Chem/2009/w/Paper 6/

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

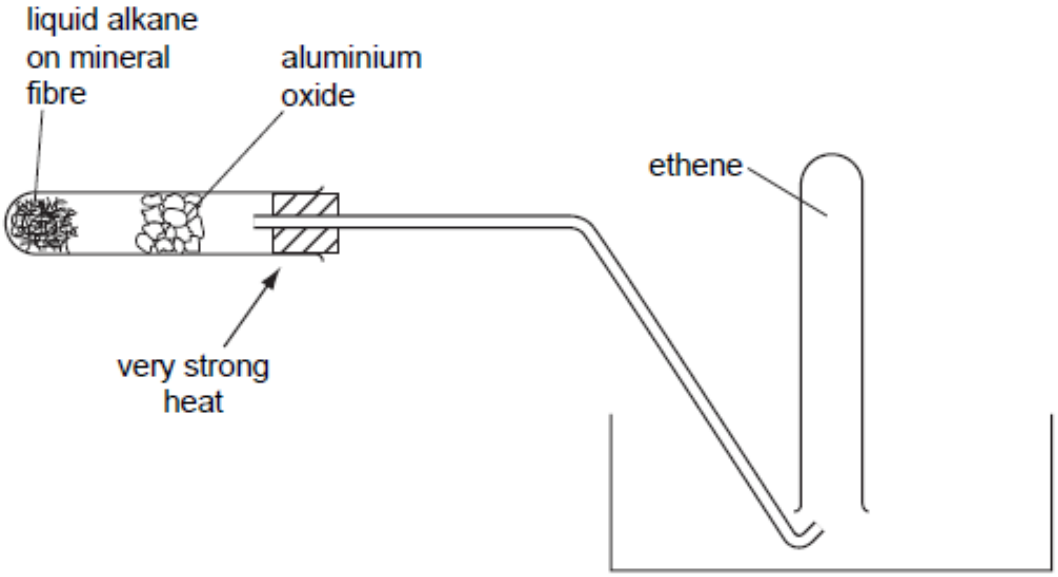
- sodium nitrate dissolved in water;
- pure water;
- hexene.

(c) Give a test by which you could identify hexene.

test .....

result ..... [2]

3 Ethene gas was formed by the cracking of a liquid alkane. The diagram shows the apparatus used.



(a) Identify two mistakes in the diagram.

1 .....

..... [1]

2 .....

..... [1]

(b) Describe a test to show the presence of ethene.

test .....

result ..... [2]

Mark Scheme

Q# 3/ iGCSE Chem/2015march/Paper 6/

1 **(a)** thermometer (1)

condenser (1) [2]

(b) **(i)** ethanoic acid (1)

lower boiling point/evaporates first (1) [2]

(ii) temperature reading will rise/gap in liquid coming over/no more collected at 118°C (1) [1]

(c) larger surface area (1) [1]

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

6 any **seven** from:

extraction

cut leaves up / small pieces / grind / crush (1)

use of pestle / mortar (1)

add water (1)

sand (1)

boil / heat / stir / mix / shake (1)

separation

decant / filter (1)

obtaining crystals

evaporate / heat solution (1)

to crystallising point / until crystals start to form (1)

leave to cool (1) [7]

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

4 (d) Table of results

total volume of water boxes completed correctly (1),

10, 12, 14, 18

temperature boxes completed (2)
all 4 correct (2)
3 correct (1)
2 or fewer correct (0)

91, 73, 65, 54 [3]

(e) appropriate scale for y axis (1)
note: must use at least 4 large squares vertically to plot points

all points correctly plotted (3),
all 4 correct (3)
3 correct (2)
2 correct (1)
1 or fewer correct (0)
note: origin should not be included

smooth line graph (1) [5]

(f) value from graph for 20 cm^3 water, 50–53 (1) ± half a small square

shown clearly by extrapolation (1)

unit, °C (1) [3]

(g) clear / colourless liquid forms / no solid / crystals / salt visible (1) [1]

(h) salt would not all dissolve (1)

use of figures (1) [2]
e.g. only 5.7 g would dissolve in 10 cm^3 water at 100 °C

(i) sketch graph always above line (1)

label (1) [2]

(j) any **one** improvement from: (1)

do not remove thermometer from solution
use IT method / second person to note formation of crystals
repeat
do separate experiments
use smaller volumes of water
evaporation

linked explanation (1)

loss of solid on thermometer
observing formation of first crystals may vary
average
more results to plot on graph
method of avoiding evaporation e.g. separate experiments, lid [2]

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

Question	Answer	Marks	Guidance
2(a)	chromatography;	1	
2(b)	(teat) pipette / capillary tube;	1	**A:** dropper / glass rod
2(c)	water / organic solvent;	1	
2(d)	compound Q is insoluble;	1	**R:** it reacts with the solvent
2(e)	between (4.7 and 5.1) divided by (6.2 or 6.3); answer: between 0.74 and 0.82;	1 1	correct answer with no working scores 2

Q# 2/ iGCSE Chem/2015/s/Paper 6/

Question	Answer	Marks	Guidance
3(a)	base line / origin clearly labelled on diagram;	1	
3(b)	any organic solvent / ethanol / alcohol / acetone;	1	**R** water / acids
3(c)	3;	1	
3(d)	1 and 3 present; 2 not present; unknown dye present;	3	**I** reference to properties of dyes 1, 2 and 3
3(e)	repeat the experiment / use a different solvent / measure R_f values;	1	

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

3 (a) (i) chromatography (1) [1]

(ii) to prevent loss / evaporation of solvent (1) [1]

(b) when the solvent is near the top of the paper / before the solvent reaches the top of the paper (1) [1]

(c) (i) 4 (1) [1]

(ii) yes, one artificial dye (1)
at same height / matches (1) [2]

Q# 7/ iGCSE Chem/2014/s/Paper 6/

1 (a) thermometer (1)

condenser (1)
allow condensing tube, condensating tube, etc. [2]

(b) arrows labelled – water (in) and water (out) (1) [1]

(c) fractional (1)

distillation (1) [2]

(d) (i) ethanol (1) [1]

(ii) temperature would rise (above 78°C) (1) [1]

(e) alcohols are (in)flammable / catch fire / burn (1)
ignore: explode

Bunsen burner / flame / heat (1) [2]

Q# 8/ iGCSE Chem/2013/s/Paper 6/

5 (a) both lose mass (1) [1]
not: change mass

(b) mass loss increases constantly in graph **A** (1)

becomes constant in graph **B** (after about 7–9 hours) (1)

mass loss or change is greater in acid/less in alkali (1) [3]

(c) goggles / lab coat / tongs / fume cupboard / well ventilated area any two [2]
ignore: reference to hair

Q# 9/ iGCSE Chem/2013/s/Paper 6/

2 (a) to prevent air / oxygen / bacteria entering jar (1) [1]

(b) pestle and / or mortar (1) [1]

(c) diagram of funnel and filter paper (1) labelled (1) [2]

(d) yeast would not work at high temperatures / kills yeast / denatures enzymes / owtte (1) [1]
allow: kills enzyme

(e) (i) bubbles / froth (1) [1]
not: gas / CO_2 given off / turns cloudy

(ii) (collect gas) and measure volume / count bubbles (1)

over certain time interval (1) [2]
allow: one mark for timing until bubbles / reaction stopped

(f) fractional distillation (1) [1]

Q# 41/ iGCSE Chem/2014/w/Paper 6/ Q6

(b) measured volume of water (1)
in named weighed container (1)
evaporate to dryness (1)
reweigh / measure mass of solid (1)
conclusion: e.g. double the mass of residue if 500 cm^3 water used to check mass in 1000 cm^3 (1) max [4]

Q# 46/ iGCSE Chem/2015march/Paper 6/

3 (a) electrolysis (1) [1]

(b) aluminium would react / platinum is inert / less reactive (1) [1]

(c) (i) chlorine (1)

(ii) colourless / bleached / pale yellow (1) [2]

Q# 45/ iGCSE Chem/2015/s/Paper 6/

Question	Answer	Marks	Guidance
2(a)	bulb lights / silver-grey liquid or solid forms / bubbles;	1	
2(b)(i)	carbon / graphite;	1	
2(b)(ii)	it reacts / is reactive;	1	**A** corrodes / rusts **I** dissolves
2(c)(i)	bromine / Br_2;	1	**R** bromide
2(c)(ii)	bleaches / turns white;	1	
2(d)	lead;	1	**R** lead(II) / lead ions
2(e)	fume cupboard / well-ventilated area;	1	**I** references to goggles / safety clothing

Q# 47/ iGCSE Chem/2013/s/Paper 6/

1 (a) electrode(s) / anode / cathode(either) (1)
allow: electrodes labelled wrong way round **not**: carbon/platinum

bulb / lamp / light (1) [2]

(b) lighted splint (1) pops (1) glowing splint = 0 [2]

(c) graduated test-tube / measuring cylinder (1) **not**: gas syringe as will not work

filled with electrolyte / acid / water inverted over electrode / owtte (1) [2]

(d) (i) sodium hydroxide (1) [1]

(ii) universal indicator with pH>7 / litmus turns blue (1) [1]
note: mark not awarded if **(d)(i)** is incorrect

Q# 49/ iGCSE Chem/2010/w/Paper 6/

6 (a) bubbles / fizzing / effervescence [1]

(b) alkali formed [1]

(c) (i) chlorine [1]

(ii) indicator bleached / decolourised **allow** yellow [1]

Q# 50/ iGCSE Chem/2009/w/Paper 6/

2 (a) (i) prevent rusting or corrosion/more attractive or shiny/so it doesn't oxidise
not less reactive or answers about value [1]

(ii) silver wears off/will need re-coating
ignore references to rusting [1]

(iii) so that silver can coat the spoon/stick to the spoon owtte [1]

(b) negative/cathode [1]

; (c) silver [1]

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

2 (a) carbon/graphite/any unreactive metal e.g. platinum/nickel [1]

(b) lighted splint (1) pops (1) [2]

(c) gas dissolves (in the solution) o.w.t.t.e [1]

(d) alkali/(sodium) hydroxide (1)
chlorine/bleach (1) not chloride or chlorine ions [2]

Q# 62/ iGCSE Chem/2014/s/Paper 6/

6 same / measured volume of water (1)

initial temperature (1)

mass of nut(s) (1)

ignite / burn (1)
not: heat

for suitable time < 10 minutes / to completion (1)

final temperature of water (1)

repeat with other nut(s) (1)

compare / conclusion (1) max [7]

Q# 63/ iGCSE Chem/2013/s/Paper 6/

3 **(c)** Table of results for Experiments 1–4

mass of solids correctly recorded (1) 1, 2, 3, 5 g

initial and maximum temperature boxes correctly completed (1)

initial 21, 23, 22, 24

maximum 23, 27, 28, 34

temperature differences correct (1) 2, 4, 6, 10 [3]

(d) results for Experiment 5

initial and final temperatures completed 21 and 13 (1)

temperature change completed correctly and shown as negative –8 (1) [2]

(e) all points correctly plotted 3–1 for any incorrect

straight line graph drawn with a ruler (1) [4]

(f) **(i)** value from graph 12 °C ± half small square (1)

extrapolation shown clearly (1) **allow:** ecf [2]

(ii) value from graph 4.5 g ± half small square (1)

indication shown clearly (1) **allow:** ecf [2]

(g) endothermic (1) [1]

(h) lower temperature change (1)

3 °C (1)

greater volume/more acid (1) any 2 for [2]

(i) room temperature or initial temperature from table 24 °C (1)

reaction finished / owtte (1) [2]

(j) advantage, e.g. comparability of results / fair test (1)
ignore: reference to reliability / accuracy

disadvantage, e.g. reaction not finished / temperature still changing / may not reach maximum temperature (1) [2]

Q# 65/ iGCSE Chem/2011/w/Paper 6/

4 (a) Table of results for Experiment 1
temperature boxes completed correctly (3)
20, 21, 21, 32, 39, 42, 44, 45, 45 [3]

(b) Table of results for Experiment 2
temperature boxes completed correctly (3)
20, 21, 21, 24, 32, 36, 37, 38, 38 [3]

(c) all points correctly plotted (3) -1 for each incorrect
best fit smooth line graphs (1)
labels (1) [5]

(d) value from graph ≈28°C ± half small square (1) unit (1) shown clearly (1) [3]

(e) exothermic/redox/displacement (1) [1]

(f) (i) temperature rises greater/faster in Experiment 1 (1) **allow** converse [1]

(ii) zinc is more reactive (1) [1]

(g) temperature changes would be same/faster/owtte (1) metal in excess (1)/
temperature changes would be greater (1) lower volume (1) [2]

(h) solid would react slower/temperature rises would be slower (1)
smaller surface area (1) [2]

Q# 81/ iGCSE Chem/2015march/Paper 6/

2 (a) Table of results

volume boxes completed correctly (3),
all 7 correct (3)
6 correct (2)
5 correct (1)
4 or fewer correct (0)

0, 45, 48, 72, 74, 75, 75 [3]

(b) points plotted correctly, including origin (3),
all 7 correct (3)
6 correct (2)
5 correct (1)
4 or fewer correct (0)

Smooth line graph(1) [4]

(c) (i) point at 2 min/3rd point/48 cm^3 (1)

off curve (1) [2]

(ii) reading from graph, 62–64 (cm^3) (1)

indication (1) [2]

(d) curve to left of original (1)

to same level (1) [2]

Q# 79/ iGCSE Chem/2015/w/Paper 62/

Question	Answer	Marks	Guidance
3(a)	all temperatures correctly recorded: 23, 36, 47, 58, 70, 79 6 correct = 3 5 correct = 2 4 correct = 1 3 or fewer correct = 0	3	
3(b)	all points correctly plotted: 23, 36, 47, 58, 70, 79 6 correct = 2 5 correct = 1 4 correct = 0 smooth curve;	2 1	
3(c)	third point/at 47 °C or 99 s; not on smooth line/curve;	1 1	
3(d)	118; seconds/sec/s; indication on the graph;	1 1 1	
3(e)(i)	(it) increases/higher the temperature faster reaction;	1	I: references to time (rather than rate)

Question	Answer	Marks	Guidance
3(e)(ii)	particles have more energy/ move faster; more (chance of/successful) collisions;	1 1	
3(f)(i)	slower reaction /longer time; smaller surface area;	1 1	
3(f)(ii)	sketch above the curve not touching the original at any point;	1	**A:** curve above but touching the anomalous point
3(g)	to prevent escape of /splash of acid; to allow carbon dioxide/ gas to escape;	1 1	**R:** prevent spillages

Q# 80/ iGCSE Chem/2015/s/Paper 6/

Question	Answer	Marks	Guidance

6	***step 1***
	add copper oxide or catalyst to hydrogen peroxide;
	measure volume of gas/mass loss/collect gas/count bubbles;
	over time;
	known volume of hydrogen peroxide;
	compare to hydrogen peroxide on its own;
	test gas with glowing splint;
	splint relights;
	
	step 2
	filter copper(II) oxide;
	dry;
	weigh;
	compare to original mass;
	OR
	filter (copper(II) oxide)/ evaporate to dryness;
	add to hydrogen peroxide;
	measure rate of reaction;
	compare to first experiment;
		max 8	

Q# 82/ iGCSE Chem/2014/w/Paper 6/

2 **(a)** smooth curve missing anomalous point (1) [1]

(b) **composition of mixture**
double volume / 100 cm^3 of hydrogen peroxide (1)
more than 1 g of manganese(IV) oxide / powdered (1) [2]
ignore: references to water
note: double the concentration is valid for (2)

explanation
double volume of gas (1)
faster reaction (1) [2]

(c) catalyst / increase the rate of the reaction (1) [1]

(d) sketch graph less steep than original for Experiment 1 (1)
to same level (1) [2]

Q# 83/ iGCSE Chem/2014/s/Paper 6/

3 **(a)** volumes of hydrogen completed correctly (3)
0, 8, 34, 42, 46, 48, 48 [3]
guidance: 7 correct (3); 6 correct (2); 5 correct (1); 4 or fewer correct (0)

(b) points plotted correctly including origin (3)
guidance: 7 correct (3); 6 correct (2); 5 correct (1); 4 or fewer correct (0)

smooth curve missing anomalous point (1) [4]

(c) (i) point at 5 cm^3 / 8 cm^3 H_2 / second point (1) [1]

(ii) leak / loss / escape of gas or wrong amount / too little HC / or zinc (1) [1]
allow: syringe sticking

(iii) reading from graph (1) ± half small square

indication on graph (1) [2]

(d) excess acid (1)

all zinc reacted (1) [2]
allow: used up

(e) sketch curve identical (2)

different curve levelling out at 48 cm^3 (1) [2]
note: must be some indication of a second curve

Q# 84/ iGCSE Chem/2013/w/Paper 6/

5 (a) volumes completed correctly (4), –1 each incorrect [4]

time / s	catalyst R	catalyst S
0	0	0
30	23	16
60	34	36
90	59	51
120	66	63
150	71	69
180	72	72

(b) points plotted correctly (3) smooth curves (2) labels (1) [6]

(c) result at 60s / volume 34 / third result (1) [1]

(d) R (1) rate faster (1) [2]

(e) sketch to left of R graph / steeper (1) to same level (1) [2]

Q# 85/ iGCSE Chem/2013/w/Paper 6/

6 mass of silica gel (1)
heat in oven > 100 °C (1)
for specified realistic time / until turns blue (1)
reweigh (1) record (1)
heat in oven again to check constant mass / indication of colour change (1)
calculation (1) max [6]

Q# 116/ 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# 117/ iGCSE Chem/2015march/Paper 6/ Q1

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

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

Q# 111/ iGCSE Chem/2015/w/Paper 62/

Question	Answer	Marks	Guidance
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# 112/ iGCSE Chem/2015/w/Paper 62/

Question	Answer	Marks	Guidance
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# 113/ iGCSE Chem/2015/w/Paper 62/

Question	Answer	Marks	Guidance
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# 114/ iGCSE Chem/2015/s/Paper 6/

Question	Answer	Marks	Guidance
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# 118/ 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 4.2 g (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# 119/ 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# 120/ 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# 121/ 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# 123/ iGCSE Chem/2014/s/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# 124/ iGCSE Chem/2014/s/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# 125/ iGCSE Chem/2014/s/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# 127/ 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# 128/ 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# 129/ 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# 131/ iGCSE Chem/2013/s/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# 204/ iGCSE Chem/2015/w/Paper 62/

Question	Answer	Marks	Guidance
6	**Method 1: Monitoring the reaction of the metal with acid** 6 from: • named acid; • same or stated volume of (same concentration of) acid; • fair test idea, i.e. same surface area/size/mass/amount metal; • measure volume of gas/count bubbles/temperature change/observe complete reaction; • suitable reference to time; • conclusion/comparison, e.g. most effervescence = most reactive; **Method 2: Displacement reaction** 6 from: • react each metal; • with named acid; • to prepare salt solution of each; • react each metal with each solution of salt; • observe if displacement occurs; • conclusion/comparison;	6	**I:** use of heat unless this is identified as the output variable for the experiment

Q# 205/ iGCSE Chem/2012/w/Paper 6/

1 **(a)** arrow under copper oxide (1) [1]

(b) black (1) to brown/red (1) [2]

(c) diagram of tube entering test-tube or similar in beaker of cold water/ice/Liebig condenser (1) [2]

labelled water/ice/condenser (1)

(d) extinguished/goes out (1) **not:** no effect/no reaction [1]

Q# 206/ iGCSE Chem/2011/w/Paper 6/

1 **(a)** **(i)** (gas) syringe (1) [1]

(ii) arrow indication under copper (1) [1]

(b) spatula (1) [1]

(c) black (1) [1]

(d) to return to room/initial temperature (1)
correct volume of gas (1) [2]

Q# 207/ iGCSE Chem/2010s/Paper 6/

7 crush malachite (1) using pestle/mortar (1) add named acid (1)
solution formed (1) add magnesium/zinc/iron (1) displacement (1)
obtain copper/filter (1) max [6] [6]

or first two steps (2) add carbon/reactive metal/hydrogen (1) heat (1)
displace/redox (1) until goes pink (1) obtain copper (1)
or first four steps (4) electrolyse solution (1) copper deposited at cathode (1)
obtain copper (1) NB If malachite anode used allow max 3 even if it would not work.

Q# 209/ iGCSE Chem/2004s/Paper 6/

6	(a)	Indication of copper oxide	1	[1]
	(b)	Black	1	
		to		
		red/pink/brown	1	[2]
	(c)	To cool/condense	1	
		Steam/water	1	[2]

Q# 211/ iGCSE Chem/2012s/Paper 6/

6 steel nail(s) in test-tube/suitable glass container (1)
x cm^3 (1)
water (1) no water = max 3
known volume of inhibitor added (1)
observe effect after suitable time (1) note: minimum time = 1 day
repeat using other inhibitors (1)
observe/comparison of results (1) [7]

Q# 212/ iGCSE Chem/2007/w/Paper 6/

2	(a)	brown/orange/red-brown (1)	[1]
	(b) (i)	takes the place of oxygen owtte (1) not air	[1]
	(ii)	16.6–17% (1)	[1]
	(c) (i)	formation of rust slower (1)	[1]
	(ii)	no effect (1)	[1]

Q# 221/ iGCSE Chem/2015/w/Paper 62/ Q4

4	*tests on ethene* bromine (water); turns colourless;	 1 1	**A:** Allow any test which gives only a **unique detectable result** for that substance, e.g. lighted splint / ethene burns.

Q# 222/ iGCSE Chem/2015/s/Paper 6/

Question	Answer	Marks	Guidance
1(a)(i)	flask;	1	
1(a)(ii)	top arrow water **and** bottom arrow water;	1	
1(b)(i)	to prevent fire / ref. to safety / controlled heating; ethanol is flammable;	 2	I dangerous
1(b)(ii)	to prevent evaporation / loss of reactants or ethanol;	1	
1(c)	*ethanol:* sweet / nail varnish remover / alcohol / spirit; *ethanoic acid:* vinegar / sour / acid / sharp / pungent;	 2	I strong / pleasant

Q# 224/ iGCSE Chem/2010s/Paper 6/ Q2

hexene
bromine (water) (1) goes colourless (1) not clear
accept lit splint burns

Q# 223/ iGCSE Chem/2010/w/Paper 6/

1 **(a)** ethanol and aluminium oxide boxes correctly labelled [1]

(b) arrow towards wool (1) arrow towards solid (1) [2]

(c) to prevent suck back or description of suck back owtte (1)
effect of suck back e.g. crack tube (1) [2]

Q# 225/ iGCSE Chem/2009/w/Paper 6/ Q3

(c) bromine (water) (1)
goes colourless (1)
not clear [2]

Q# 226/ iGCSE Chem/2008/w/Paper 6/

3 **(a)** heat indicated in wrong position (1)
no water in the trough (and collection tube) (1) [2]

(b) bromine/iodine (water) (1) turns colourless (1) not clear [2]