Centre No.						Paper Reference (complete below)							Surname	Initial(s)
Candidate No.										/			Signature	

Paper Reference

4335/03 4437/08

London Examinations IGCSE

Chemistry – 4335

Paper 3

Science (Double Award) – 4437

Paper 8

Foundation and Higher Tiers

Tuesday 9 May 2006 – Afternoon

Time: 1 hour 15 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
Total	

Materials required for examination
Ruler and pencil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s), the paper reference and your signature.
The paper references are shown above. Write the one for which you have been entered. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 50. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
There are 16 pages in this question paper. All blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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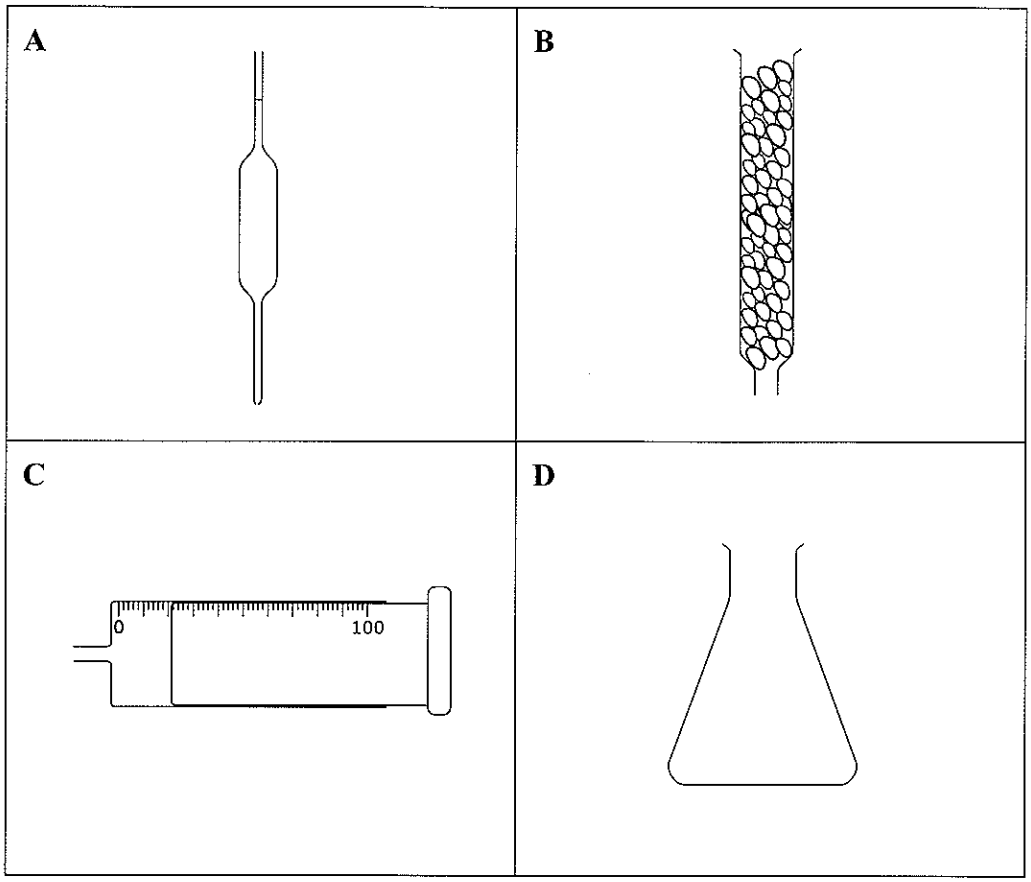
Leave blank

1. (a) These pieces of apparatus are used in the laboratory.



Name each piece of apparatus.

A .....

B .....

C .....

D .....

(4)

(b) Choose **A**, **B**, **C** or **D** to identify the apparatus which is most suitable for

(i) measuring 25.0 cm^3 of a solution .....

(1)

(ii) collecting a gas given off in a reaction .....

(1)

(iii) helping to separate liquids with different boiling points.....

(1)

Q1

(Total 7 marks)

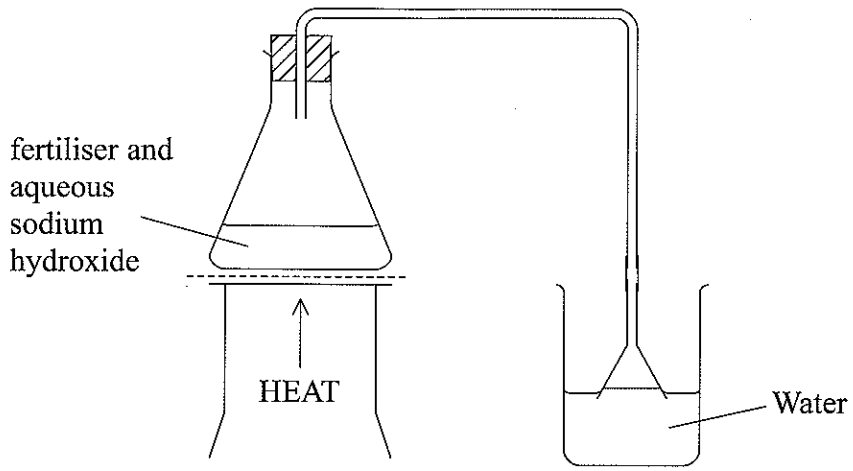
Leave blank

2. When ammonium nitrate is heated with aqueous sodium hydroxide, ammonia gas is given off.

$$NH_4NO_3(s) + NaOH(aq) \rightarrow NaNO_3(aq) + H_2O(l) + NH_3(g)$$

The amount of ammonium nitrate in a fertiliser is found using this reaction.

This apparatus is used.



(a) Aqueous sodium hydroxide is corrosive.
Suggest one safety precaution to take when using it.

.....

(1)

QUESTION 2 CONTINUES ON PAGE 4

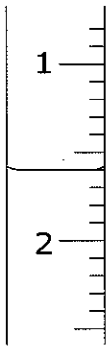
Leave blank

(b) The amount of ammonia dissolved in the water is found by titration.

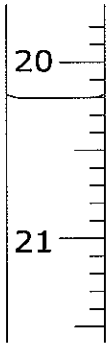
- 25.0 cm^3 of the solution formed is placed in a conical flask.
- An indicator is added.
- Hydrochloric acid is added from a burette until the indicator changes colour.

The diagrams show the readings on the burette before and after adding the hydrochloric acid.

Before



After



Use the diagrams to help you complete the table.

Burette reading after adding acid (cm^3)	
Burette reading before adding acid (cm^3)	
Volume of acid added (cm^3)	

(3)

Leave blank

(c) The experiment was repeated for a different fertiliser sample. The table shows the results.

Burette reading after adding acid (cm^3)	28.95	29.05	29.00	27.75
Burette reading before adding acid (cm^3)	0.80	1.60	1.20	0.50
Volume of acid added (cm^3)	28.15	27.45	27.80	27.25
Titration results to be used (✓)				

(i) Which titration results should be used to calculate the average volume of acid added? Place ticks (✓) in the table.

(1)

(ii) Use these ticked results to calculate the average volume of acid added.

(1)

Q2

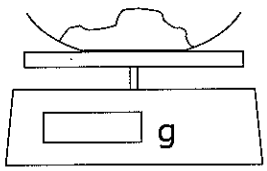
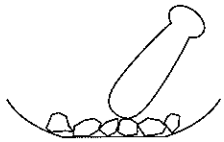
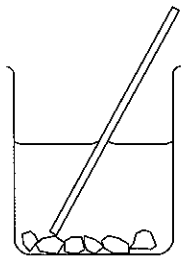
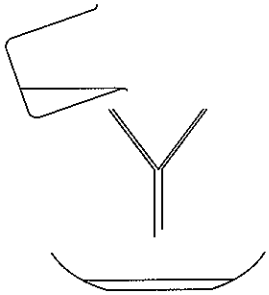
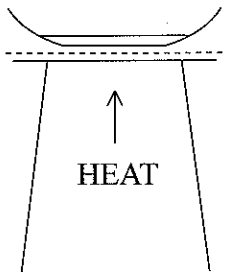
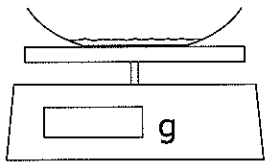
(Total 6 marks)

Leave blank

3. Rock salt is a natural substance. It contains sodium chloride mixed with insoluble substances.

A teacher demonstrates an experiment to find the percentage by mass of sodium chloride in rock salt.

The stages are:

1. Weighing rock salt	2. Crushing into small lumps	3. Stirring in water
		
4. Filtering	**5. Heating to remove water**	**6. Weighing salt**
		

The table shows the results of experiments using two different samples.

Experiment	**Mass of rock salt (g)**	**Mass of evaporating dish (g)**	**Mass of evaporating dish after heating (g)**	**Mass of salt obtained (g)**	**Percentage by mass of salt in rock salt (%)**
1	8.0	97.2	100.4	3.2	40
2	6.0	98.4	101.1		

Leave blank

(a) Calculate the missing values for Experiment 2 and write them in the table on page 6.

(2)

(b) The teacher asks the students in the class to suggest possible errors in the experiments.

Student **A** says the results will be different if the rock salt is crushed to make a powder.

Student **B** says the wet filter paper still has some salt soaked into it.

(i) The rock salt is crushed to a powder before adding it to the water.
What effect does this have on how the salt dissolves?

.....

.....

(1)

(ii) Is the mass of salt obtained less than or greater than it should be because of the error suggested by student **B**?

.....

(1)

(c) One student suggests that a good way to check the answer in an experiment is to find the mass of the insoluble substances.

Suggest what further steps are needed to do this.

.....

.....

.....

.....

.....

.....

(3)

Q3

(Total 7 marks)

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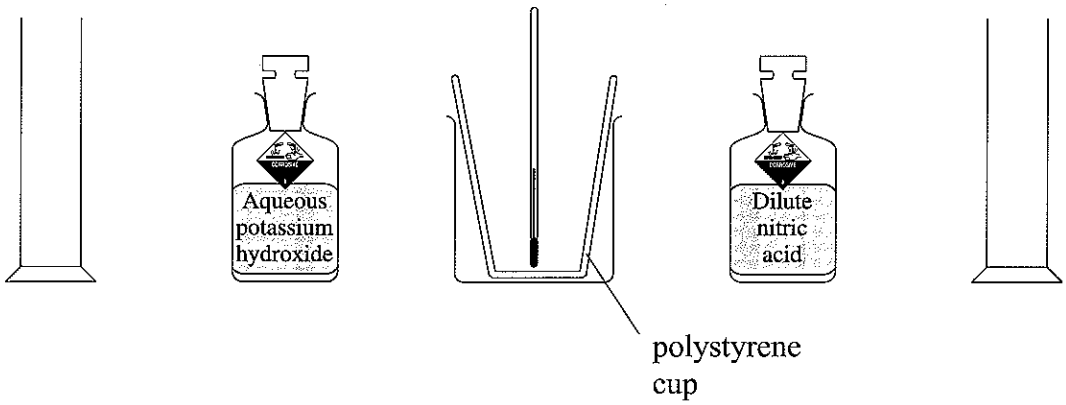
4. When aqueous potassium hydroxide reacts with dilute nitric acid the temperature of the mixture rises.

This apparatus is used to measure the temperature rise.



This is the method.

- Add some aqueous potassium hydroxide to the polystyrene cup and record the temperature.
- Add some dilute nitric acid and stir the mixture.
- Record the temperature of the mixture.
- Repeat the experiment using different volumes of the two solutions.

(a) Why is it better to mix the solutions in a polystyrene cup instead of in a glass beaker?

.....

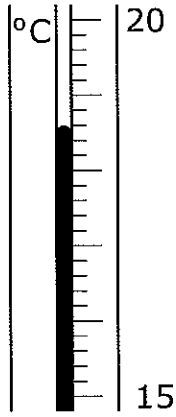
(1)

QUESTION 4 CONTINUES ON PAGE 10

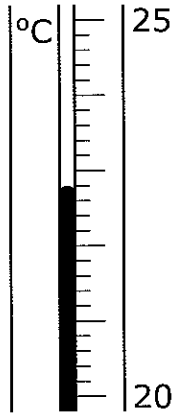
Leave blank

(b) These are the thermometer readings in one experiment.

Temperature before adding acid



Temperature after adding acid



Write down the temperatures shown and work out the temperature change.

Temperature before adding acid ..... °C

Temperature after adding acid ..... °C

Temperature change ..... °C

(3)

(c) The table shows the results of a series of experiments.

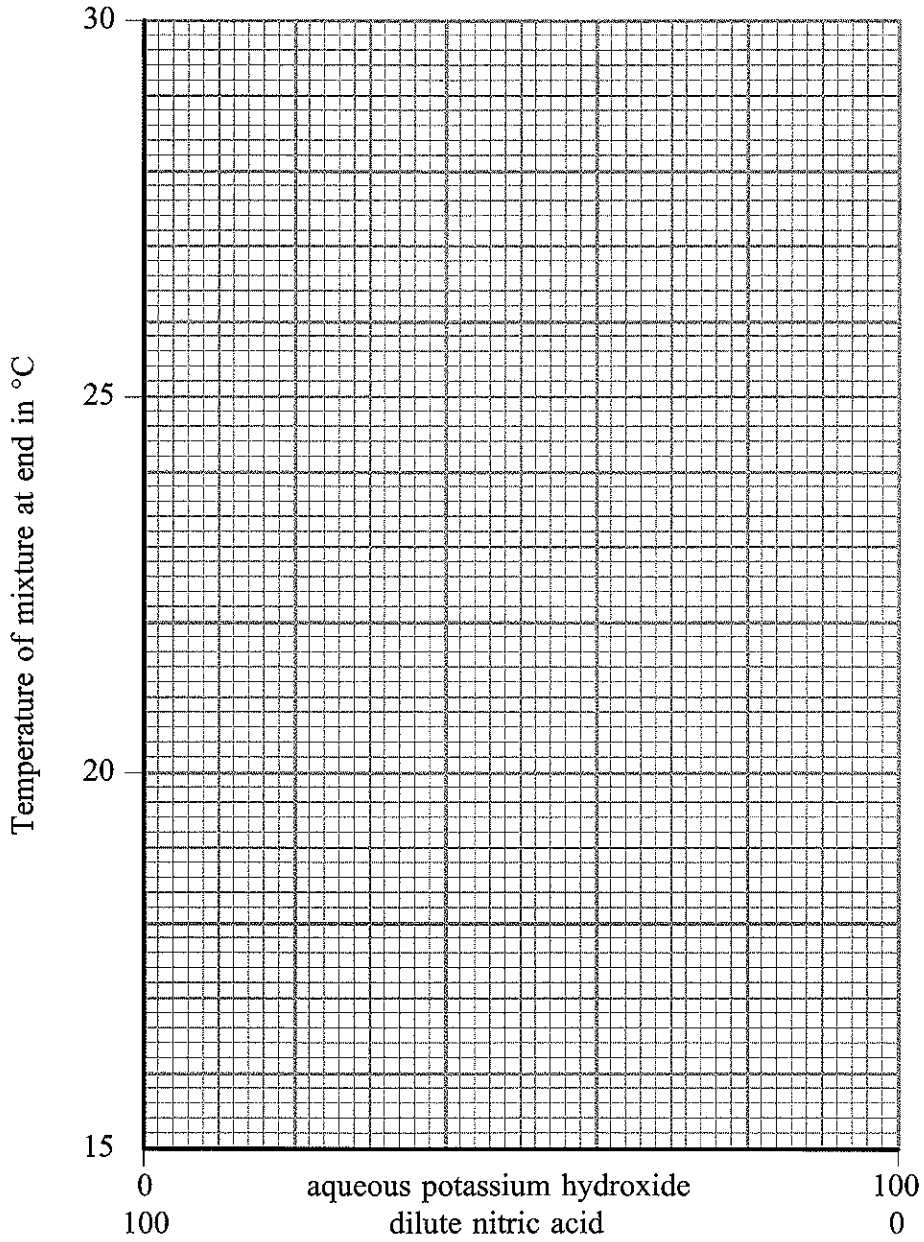
Experiment	Volume of aqueous potassium hydroxide (cm^3)	Volume of dilute nitric acid (cm^3)	Temperature of mixture at end (°C)
1	10	90	21.0
2	20	80	22.8
3	30	70	24.7
4	70	30	23.6
5	80	20	22.2
6	90	10	20.7

The initial temperatures of the aqueous potassium hydroxide and dilute nitric acid were both 19.2 °C.

Leave blank

Plot these results on the grid.

Draw two lines of best fit, one for Experiments 1–3 and one for Experiments 4–6. Make sure that the two lines cross each other.



(4)

QUESTION 4 CONTINUES ON PAGE 12

Leave blank

(d) The point where the lines cross indicates the mixing of equal amounts, **in moles**, of nitric acid and potassium hydroxide. For the point where the lines cross, write down

the temperature reached ..... °C

the volume of aqueous potassium hydroxide used .....cm^3

the volume of dilute nitric acid used ..... cm^3

(3)

(e) The temperature recorded in (d) may not be a reliable value. Suggest how you could check the reliability of this temperature.

.....

.....

(1)

(f) Which solution has the greater concentration, the dilute nitric acid or the aqueous potassium hydroxide? Give a reason for your choice.

.....

.....

(1)

Q4

(Total 13 marks)

Leave blank

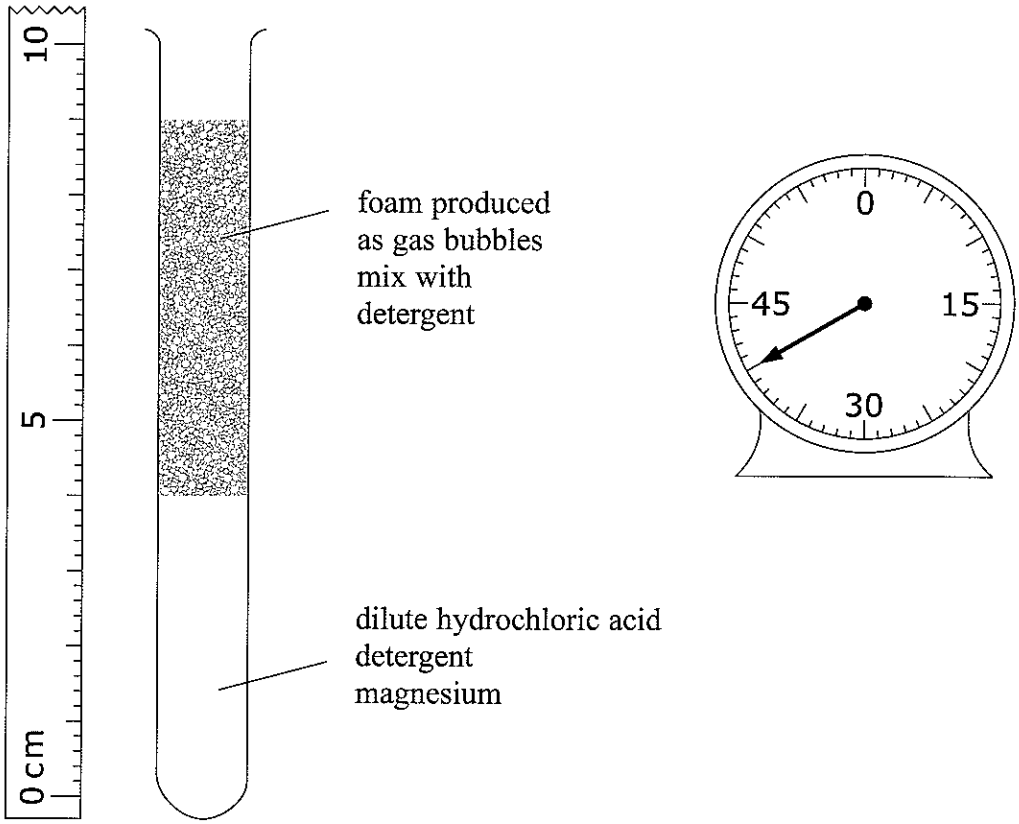
5. The equation for the reaction between magnesium and dilute hydrochloric acid is

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

To measure the rate of this reaction a student

- puts a small amount of powdered magnesium in a test tube
- adds a mixture of dilute hydrochloric acid and detergent
- measures the depth of the foam produced over a period of time.

Here is the apparatus he uses.



(a) (i) What is the depth of the foam in the tube?

..... cm

(1)

(ii) What is the time shown on the clock?

..... seconds

(1)

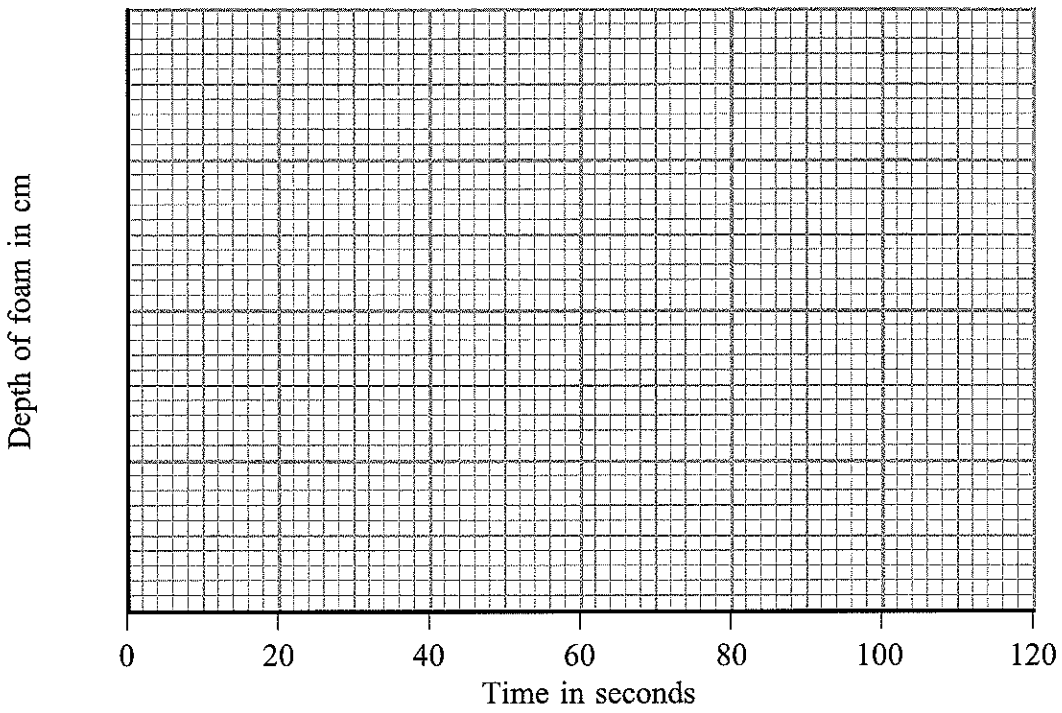
QUESTION 5 CONTINUES ON PAGE 14

Leave blank

(b) The table shows the student's results.

Depth of foam (cm)	0.0	2.7	4.3	5.3	6.0	6.5	6.8	6.8
Time (seconds)	0	15	30	45	60	75	90	105

(i) Choose a suitable scale for the depth of the foam.
Draw a graph of the results.



(4)

(ii) How long did the reaction take to finish?

..... seconds

(1)

Leave blank

(c) Other students used the same method to compare the reactivities of different metals.

(i) Which **two** features of the other metals should be the same for the results to be valid?

.....

.....

.....

.....

(2)

(ii) Which **two** features of the mixture of acid and detergent should be the same for the results to be valid?

.....

.....

.....

.....

(2)

(iii) Identify **one** other feature of the reaction that must be kept constant for a fair test.

.....

.....

(1)

QUESTION 5 CONTINUES ON PAGE 16

Leave blank

(d) Five students compared the reactivities of different metals. They measured the time for the foam to reach its maximum depth.
The table shows the results.

Student	Time taken for foam to reach depth (seconds)				
	Metal 1	**Metal 2**	**Metal 3**	**Metal 4**	**Metal 5**
P	76	26	68	30	38
Q	not done	28	63	33	42
R	not done	27	not done	not done	40
S	80	29	105	27	47
T	79	not done	66	28	45

(i) For which metal are the results **most** reliable?

.....

(1)

(ii) Identify **one** anomalous result.

.....

(1)

(iii) Suggest a reason for this anomalous result.

.....

.....

(1)

(iv) Which **two** metals appear to be the most reactive?

.....

(1)

(v) Why is it not possible to conclude with certainty which one of these two metals is the most reactive?

.....

.....

(1)

Q5

(Total 17 marks)

TOTAL FOR PAPER: 50 MARKS

END