The Haberdashers' Aske's Boys' School

Elstree, Herts

13+ Entrance Examination 2016

CHEMISTRY

Please follow these instructions

- The Science paper is divided into three sections (Biology, Chemistry and Physics). The time for the Science paper is 1 hour. You should spend no more than 20 minutes on each section.
- Answer the questions in the spaces provided. Long answers are not expected.
- You may use your calculator in any of the numerical questions.
- Rough work should be done on the paper but do not write in the margins.
- Write your name and school in the box below.

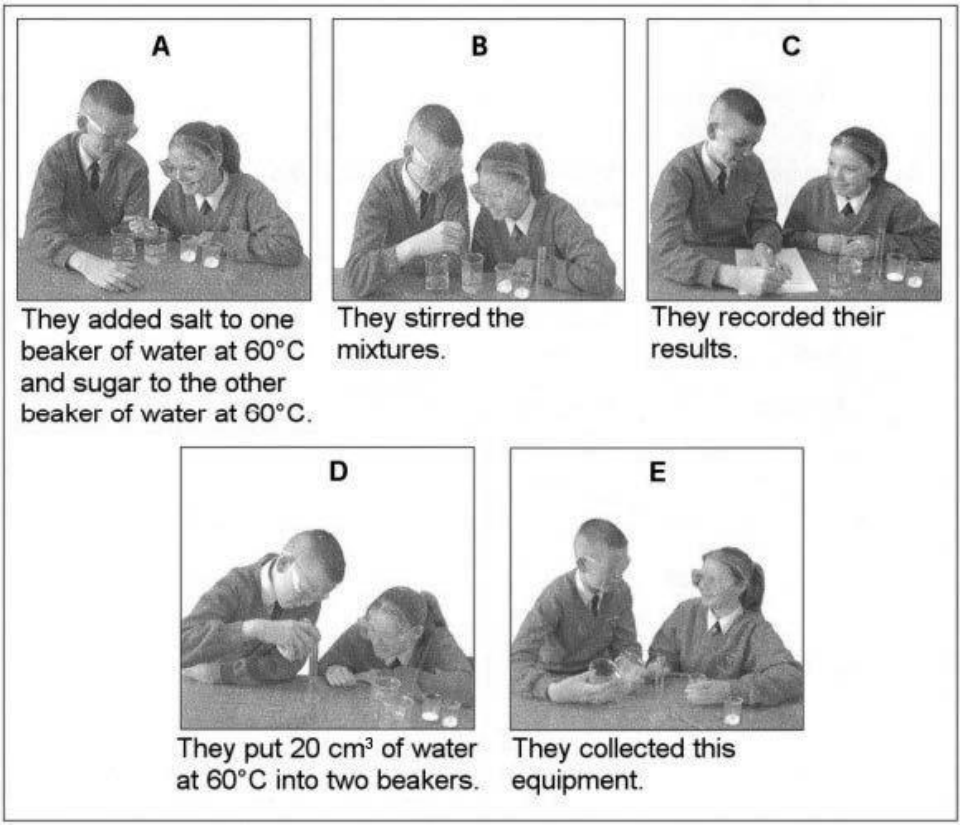
Name	
School	
Exam number	

For the examiner's use only

Question	1	2	3	4	5	6	Total
Max	6	4	6	9	8	33	6
Mark							

Q1. Some pupils carried out an investigation to find out whether more sugar or more salt dissolved in water at 60°C

Here are some of the steps in their investigation. They are **not** in correct order.



(a) Put the letters **A**, **B**, **C**, **D** and **E** in the boxes below to show the correct order of the steps in their investigation.

1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th ☐

1 mark

(b) Why did they use a measuring cylinder?

.....

1 mark

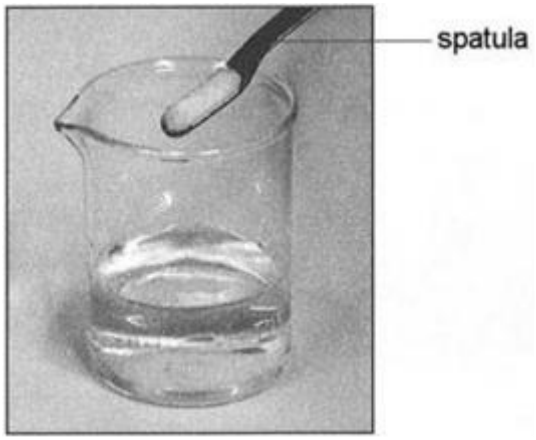
(c) They used water at 60°C in both beakers.

What else did they do to make their investigation fair?

.....

1 mark

(d) They counted the number of spatulas of sugar or salt added to the water until no more would dissolve.



(i) Why was this **not** an accurate method of measuring how much sugar or salt they added?

……

…….....

1 mark

(ii) Suggest a more accurate method of measuring how much sugar or salt they added.

……

…….....

1 Mark

(e) What name do we give to the mixture present when we have added more solid than will dissolve so that some solid is left floating in the liquid?

……

1 mark
Maximum 6 marks

Q2. The list below shows properties that different elements can have.

- magnetic
- can be compressed
- very high melting point
- very low melting point
- good conductor of heat
- poor conductor of heat
- good conductor of electricity
- poor conductor of electricity

(a) Which **two** properties from the list above make aluminium suitable for saucepans?

1. ……

2. ……

2 marks

(b) Which property in the list above explains why:

(i) copper is used in the cable of a television?

……

1 mark

(ii) a lot of oxygen gas can be pumped into a very small container?

……

1 mark

maximum 4 marks

Q3. (a) Sunil picked yellow, red and purple primula flowers from his garden.

He dipped the different flower petals into water and into two different solutions.
The pH of one solution was 1 and the pH of the other was 10.
This table shows the results.

colour of flower petals	in solutions of pH 1	in water pH 7	in solution of pH 10
yellow	stayed yellow	stayed yellow	stayed yellow
red	stayed red	stayed red	turned green
purple	turned pink	stayed purple	turned blue

Which colour of flower petal would be most useful to make an indicator for **both** acids **and** alkalis?

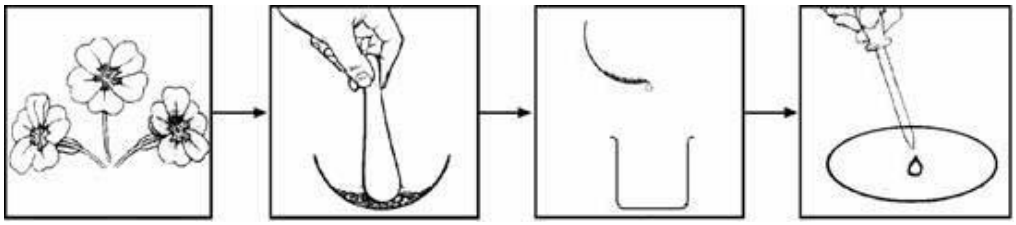
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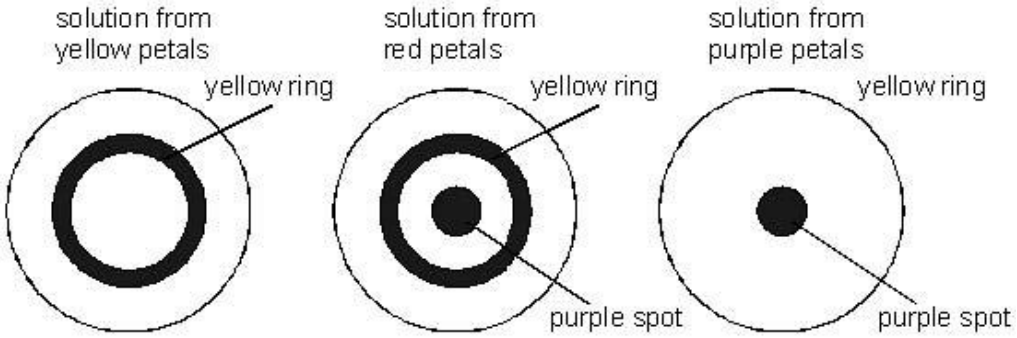
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..... 2 marks

Sunil crushed petals from each flower separately in some liquid and poured off the coloured solutions. Then he put drops of each coloured solution into the middle of different pieces of filter paper.



The solutions spread out on the filter paper. The diagrams show his results.



(b) What is the name of this method of investigating coloured substances?

..... 1 mark

c) Sunil made notes on his experiment. Some words are missing.
Complete the sentences.

When I crushed a flower in a liquid it produced a coloured solution.

This is because a coloured substance had ..... in

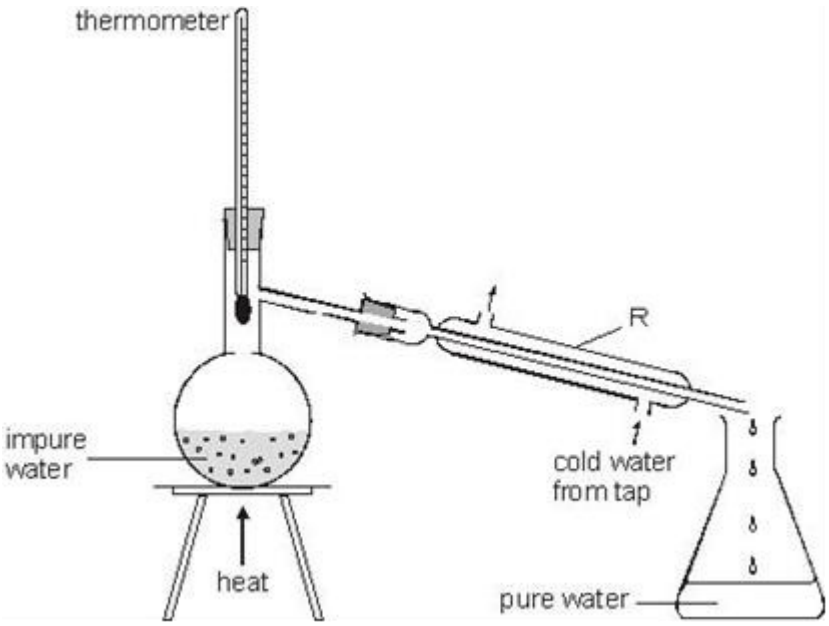
the liquid. This shows that the liquid is
..... for these coloured substances.

My experiment shows that one of the flowers probably contained two

coloured substances. This was the ..... flower.

3 marks
maximum 6 marks

Q4. (a) The apparatus in the diagram below is used to obtain pure water from impure water.



(i) What temperature would the thermometer show?

…….°C

1 mark

(ii) What is the function of the piece of apparatus labelled R?

……

…….....

1 mark

(iii) Give the name of the process which purifies water in this way.

…….

1 mark

(b) Look back to the apparatus in part (a).
Give the letter, A, B, C or D, from the diagram above, for the change of state which occurs:

in the round-bottomed flask

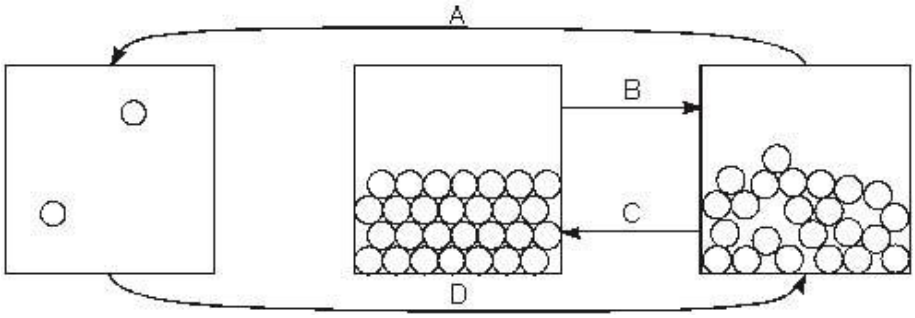
…….

in the piece of apparatus labelled R

…….

2 marks

(b) The diagram below shows particles in a gas, a solid and a liquid.
Each arrow, A, B, C and D, represents a change of state.



(i) Choose from the following words to complete the sentences below.

boiling **condensing** **distilling** **evaporating**

filtering **freezing** **melting**

Change of state A is called

.....

Change of state B is called

.....

Change of state C is called

.....

Change of state D is called

.....

4 marks

maximum 9 marks

Q5. Solder is a mixture of lead and tin.
The melting point of solder depends on the amount of tin in the mixture.

(a) Look at the table below.

amount of tin in solder (%)	melting point of solder (°C)
0	327
30	255
40	235
50	212
60	188
70	192
80	205
90	220
100	232

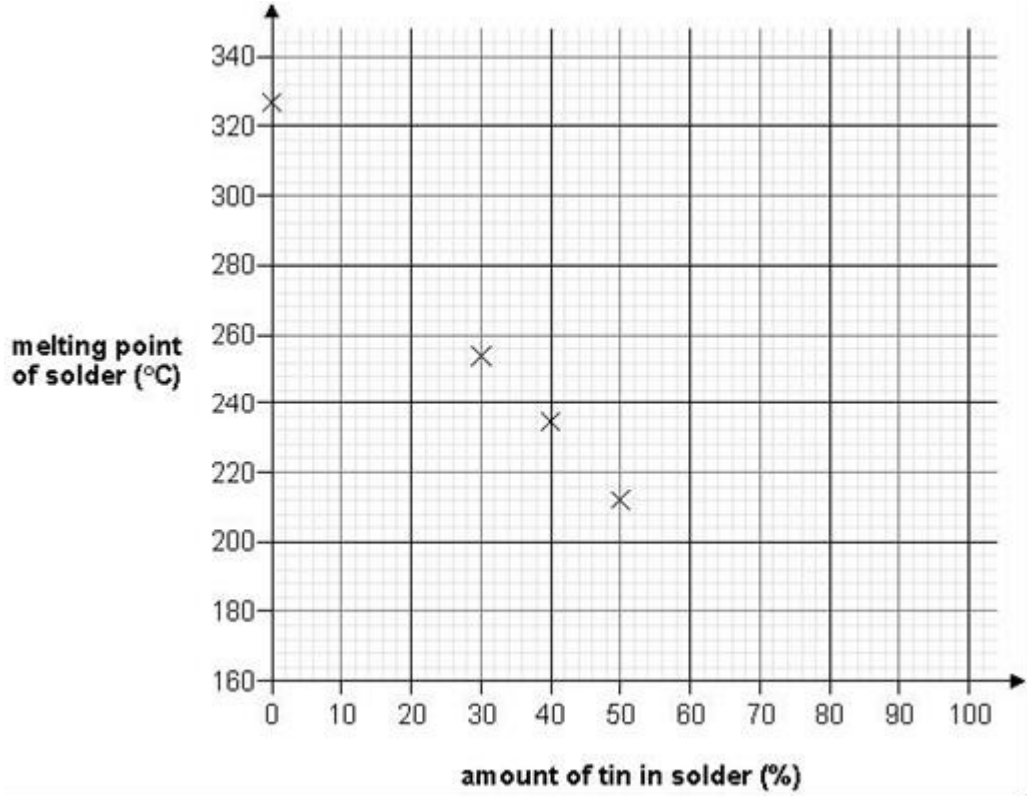
(i) The melting point of pure tin is 232°C.
What is the melting point of pure lead?

……°C

1 mark

(ii) Use the data in the table to plot the points on the grid below.
Four of the points are plotted for you.

Draw an appropriate line of best fit.



3 marks

(b) Use your graph to estimate the amount of tin needed to make solder with the **lowest** melting point.

……%

1 mark

(c) Describe how the melting point of solder changes with the amount of tin in the solder.

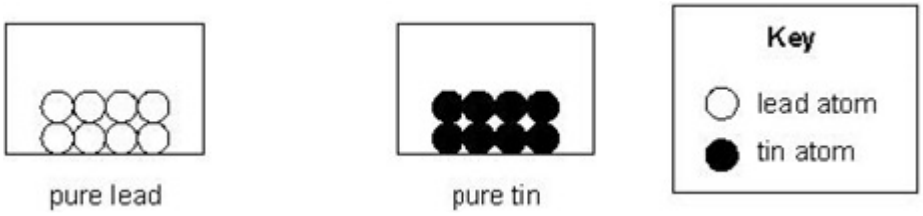
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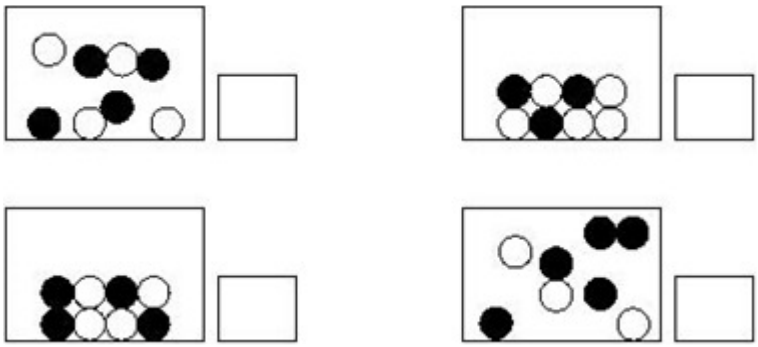
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…… 2 marks

(d) The diagrams below show the arrangement of atoms in solid samples of pure lead and pure tin.



Which box shows the correct arrangement of the lead atoms and tin atoms at room temperature in a sample of solder that has a melting point of 212°C?
Use the table above.
Tick the correct box.



1 mark

maximum 8 marks