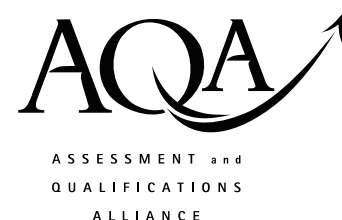


|                     |  |  |  |  |  |                  |  |  |  |  |  |
|---------------------|--|--|--|--|--|------------------|--|--|--|--|--|
| Surname             |  |  |  |  |  | Other Names      |  |  |  |  |  |
| Centre Number       |  |  |  |  |  | Candidate Number |  |  |  |  |  |
| Candidate Signature |  |  |  |  |  | Date             |  |  |  |  |  |

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General Certificate of Secondary Education  
June 2008 / June 2009



**CHEMISTRY**  
**ISA C3.1 Substances Dissolved in Water**

**CHYC/C3.1**

To be conducted before 4 May 2009  
For submission in May 2008 or May 2009 or May 2010

**For this paper you must have:**

- results tables and charts or graphs from your own investigation
- a ruler.

You may use a calculator.

| For Teacher's Use |      |
|-------------------|------|
| Section           | Mark |
| 1                 |      |
| 2                 |      |
| Total<br>(max 34) |      |

Time allowed: 45 minutes

**Instructions**

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** and **Section 2**.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The maximum mark for this paper is 34.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

|   |                 |
|---|-----------------|
| Did this candidate take part in the practical activity? | <b>YES / NO</b> |
|---|-----------------|

Signature of teacher marking this ISA ..... Date .....

**SECTION 1**

These questions are about the investigation that **you** did.

Answer **all** questions in the spaces provided.

**1** What were you trying to find out in your investigation?

.....  
.....  
.....  
.....

*(2 marks)*

**2** In your investigation, it was important to keep some variables the same to make it a fair test.

(a) What name is given to this type of variable?

Draw a ring around your answer.

**categoric      continuous      control      discrete**

*(1 mark)*

(b) State **one** variable that it was important to keep the same to make it a fair test.

.....  
*(1 mark)*

(c) Say how you kept this variable the same.

.....  
.....  
*(1 mark)*

(d) Explain why this variable had to be kept the same to make it a fair test.

.....  
.....  
*(1 mark)*

3 (a) Apart from human error, state **one** possible error in your investigation.

.....  
.....  
(1 mark)

(b) What caused this error?

.....  
.....  
(1 mark)

4 Repeating the measurements may make the calculated mean more **reliable**.

Explain why.

.....  
.....  
.....  
.....  
(2 marks)

5 What did you find out from your investigation?

I found out that .....

.....  
.....  
.....  
(2 marks)

6 Make sure that **your** results tables and charts or graphs are handed in with this paper.  
You will be awarded up to 6 marks for these.

(6 marks)

**SECTION 2**

These questions are about an investigation that may be similar to the one that you did.

Answer **all** questions in the spaces provided.

A company fitted water treatment equipment to houses that had a private water supply from a well or borehole. The company wanted to know how the hardness of water varied around the area. To do this, samples of untreated water were taken from six private water supplies and tested.

The company used  $25 \text{ cm}^3$  measuring cylinders for all volume measurements.

The  $25 \text{ cm}^3$  water sample was poured into a  $250 \text{ cm}^3$  conical flask.

Soap solution was then added  $1 \text{ cm}^3$  at a time and the flask shaken to make a lather.

Soap solution was added until a permanent lather was formed.

Look at the results in **Table 1** and then answer the questions that follow.

**Table 1**

| Location of water sample | Volume of soap solution needed to make a permanent lather in $\text{cm}^3$ |        |        |      |
|--------------------------|--|--------|--------|------|
|                          | Test 1   | Test 2 | Test 3 | Mean |
| <b>A</b>                 | 41   | 43     | 42     | 42   |
| <b>B</b>                 | 31   | 32     | 33     | 32   |
| <b>C</b>                 | 45   | 47     | 49     | 47   |
| <b>D</b>                 | 62   | 66     | 64     | 64   |
| <b>E</b>                 | 41   | 45     | 58     | 43   |
| <b>F</b>                 | 72   | 68     | 70     | 70   |
| <b>Distilled water</b>   | 1  | 1      | 1      | 1    |

7 Choose **one** result in **Table 1** that should have been checked.

Result: Sample ..... Test .....

Explain why.

.....

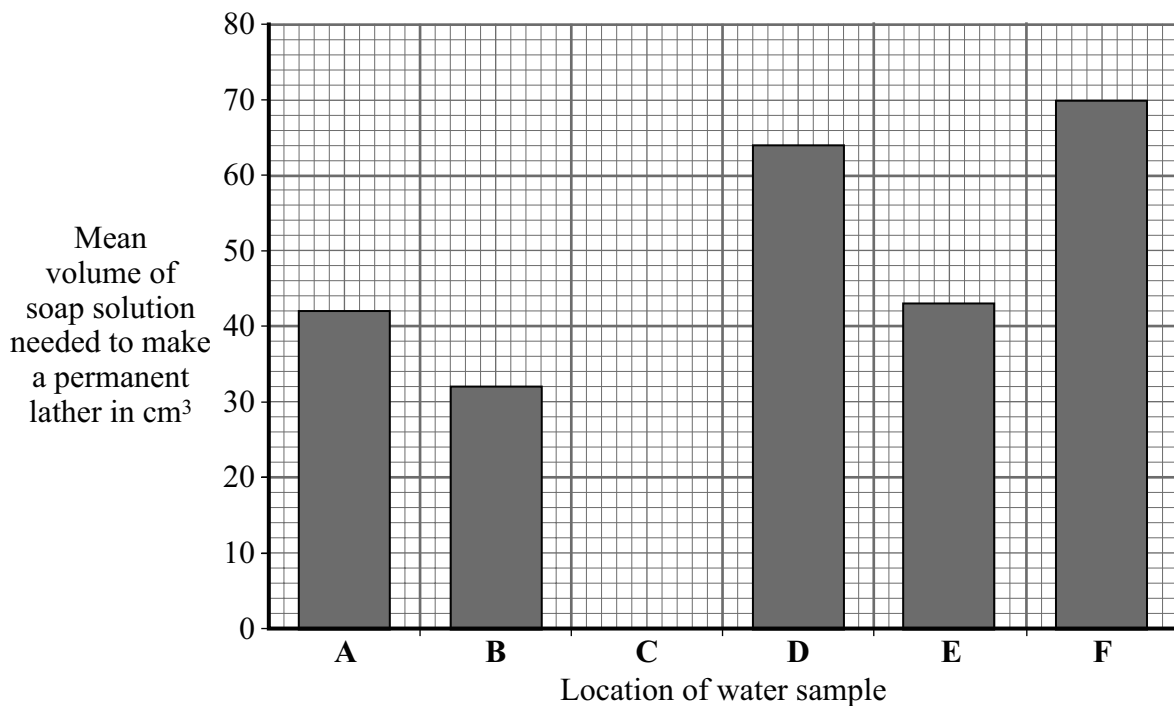
.....

.....

.....

(2 marks)

8 The company decides to present the data in the form of a bar chart.



(a) Explain why the company chose to use a bar chart to present the data.

.....

.....

.....

.....

(2 marks)

(b) Using **Table 1**, draw the bar for location **C** on the graph.

(1 mark)

To help you with these questions, **Table 1** is reprinted here.

**Table 1**

| Location of water sample | Volume of soap solution needed to make a permanent lather in cm <sup>3</sup> |        |        |      |
|--------------------------|--|--------|--------|------|
|                          | Test 1   | Test 2 | Test 3 | Mean |
| <b>A</b>                 | 41   | 43     | 42     | 42   |
| <b>B</b>                 | 31   | 32     | 33     | 32   |
| <b>C</b>                 | 45   | 47     | 49     | 47   |
| <b>D</b>                 | 62   | 66     | 64     | 64   |
| <b>E</b>                 | 41   | 45     | 58     | 43   |
| <b>F</b>                 | 72   | 68     | 70     | 70   |
| <b>Distilled water</b>   | 1  | 1      | 1      | 1    |

If the volume of soap solution needed to form a permanent lather was **greater** than 60 cm<sup>3</sup>, the water needed treatment for hardness.

- 9** Some of the samples of water in **Table 1** gave test results that showed the need for treatment to remove hardness.

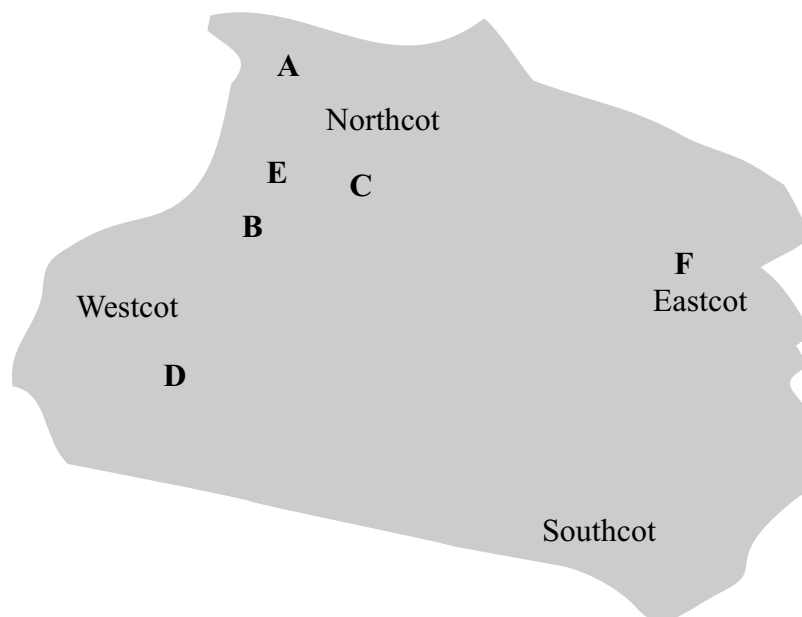
Write down the letters of these samples. ....  
(1 mark)

- 10** The company decided that its measurements were not precise enough and wanted to make them more precise.

Suggest **two** ways in which this could be done.

.....  
.....  
.....  
.....  
(2 marks)

The company had a map of the area that showed the villages of Northcot, Southcot, Eastcot and Westcot. The map was marked with letters to show the locations of the water samples.



- 11 The company has taken one sample of water to test from each of the locations **A** to **F**.

Look at the map. Do you think that enough samples of water have been taken to find out how the hardness of water varies across the area?

Draw a ring around your answer.      **Yes / No**

Explain your answer.

.....

.....

.....

.....

*(2 marks)*

- 12 What conclusions could the water company make about the hardness of the water in the area? Use the data in **Table 1** and the map to help you to answer this question.

.....

.....

*(1 mark)*

**13** A family has just moved into the Southcot area and has a private water supply from a well. They think that they may need to have their water supply treated to remove water hardness. They get in touch with the water treatment company and are told about the water hardness survey.

The company tells them that the survey shows that there is no need to test the water and recommends that a treatment plant is installed to remove the hardness from their water.

This is not the best advice for the family on how to treat their water.

Explain why.

*To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

.....  
.....  
.....  
.....  
.....  
.....

(3 marks)

**14** The company used distilled water as one of the water samples.

Explain why it did this.

.....  
.....  
.....  
.....

(2 marks)

**END OF QUESTIONS**