Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
January 2011

Chemistry

CHY3F

Unit Chemistry C3

F

Written Paper

Monday 17 January 2011 9.00 am to 9.45 am

For this paper you must have:
- a ruler
- the Data Sheet (enclosed).

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

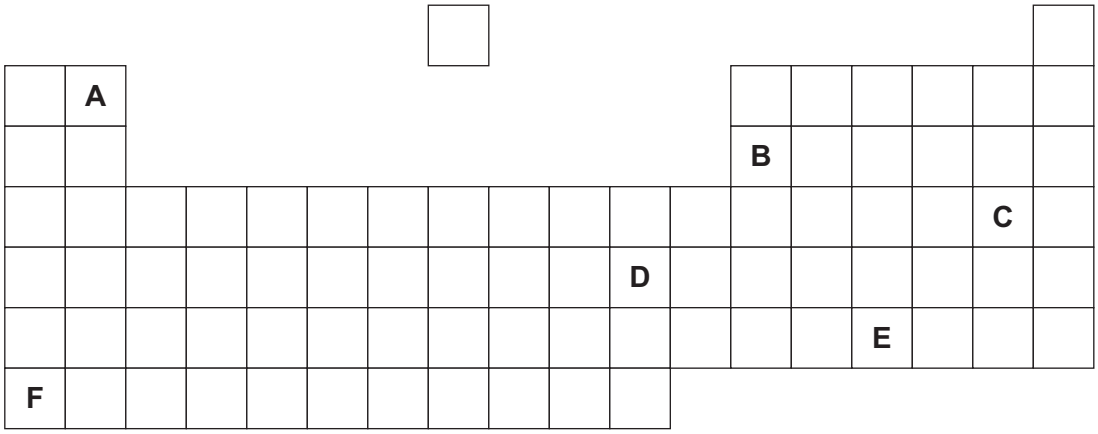
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

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

1 The periodic table on the Data Sheet may help you to answer these questions.

1 (a) Part of the periodic table is shown below.



The letters are **not** the symbols of the elements.

Choose your answers **only** from the letters shown in the periodic table above.

Which letter, **A**, **B**, **C**, **D**, **E** or **F**, represents

1 (a) (i) aluminium ☐ *(1 mark)*

1 (a) (ii) a Group 5 element ☐ *(1 mark)*

1 (a) (iii) an alkali metal ☐ *(1 mark)*

1 (a) (iv) the element with atomic (proton) number of 47 ☐ *(1 mark)*

1 (a) (v) an element with seven electrons in its outer shell? ☐ *(1 mark)*

1 (b) The table shows the boiling points of the Group 7 elements.

The elements are arranged **in alphabetical order**.

Group 7 element		
Name	**Symbol**	**Boiling point in °C**
Astatine	At	337
Bromine		58
Chlorine	Cl	–34
Fluorine	F	–188
Iodine	I	184

1 (b) (i) The symbol for bromine is missing from the table.

What is the symbol for bromine? Symbol = ...

(1 mark)

1 (b) (ii) Arrange these elements in order of **decreasing** boiling point. The first one and the last one have been done for you.

At .... F

Highest boiling point ⟶ Lowest boiling point

(1 mark)

1 (c) The table shows some statements about Group 7 elements.

Tick (✓) the **two** correct statements.

	Tick (✓)
They are halogens.	
They are metals.	
They become less reactive down Group 7.	
They are compounds.	

(2 marks)

9

Turn over ▶

2 Read the information in the box and then answer the questions.

> Seidlitz Powder is a medicine.
>
> Seidlitz Powder comes as two powders. One powder is wrapped in white paper and contains tartaric acid. The other powder is wrapped in blue paper and contains sodium hydrogencarbonate.
>
> The contents of the blue paper are dissolved in water and the contents of the white paper are added. This causes a reaction that produces carbon dioxide gas. The mixture is safe to drink when the reaction stops.

2 (a) Suggest why Seidlitz Powder comes as two separate powders.

.....

(1 mark)

2 (b) The reaction produces carbon dioxide gas.

2 (b) (i) What would you see during the reaction?

.....

(1 mark)

2 (b) (ii) Which state symbol in a chemical equation shows that carbon dioxide is a gas?

Draw a ring around **one** answer.

(s) **(l)** **(aq)** **(g)**

(1 mark)

2 (b) (iii) Draw a ring around the correct answer to complete the sentence.

Carbon dioxide can be identified because it turns [limescale / limestone / limewater] milky.

(1 mark)

2 (c) Sodium hydrogencarbonate contains sodium ions. Sodium ions can be identified by flame tests.

Draw a ring around the correct answer to complete the sentence.

Sodium ions give a | blue | red | yellow | flame.

(1 mark)

2 (d) Some Seidlitz Powder was bought on the Internet for £5. However, when tested, it was found to be only magnesium sulfate, worth a few pence.

Draw a ring around the correct answer to complete each sentence.

2 (d) (i) The test for sulfate ions uses | barium chloride | silver nitrate | sodium hydroxide | solution.

(1 mark)

2 (d) (ii) A positive test for sulfate ions produces a | blue | red | white | precipitate.

(1 mark)

2 (d) (iii) Suggest **one** disadvantage of buying medicines on the Internet.

.....

.....

(1 mark)

8

Turn over for the next question

3 This label was on a bottle of vinegar.

Vinegar contains ethanoic acid, which is a *weak* acid.

3 (a) Draw a ring around the correct answer to complete the sentences.

3 (a) (i) Ethanoic acid is an acid because it contains

hydrogen
hydroxide
oxide

ions.

(1 mark)

3 (a) (ii) Ethanoic acid is a *weak* acid because it is

completely
not
partially

ionised in water.

(1 mark)

3 (b) Magnesium ribbon can be used in a test to show that ethanoic acid is a weaker acid than hydrochloric acid.

3 (b) (i) State **one** way of making this test fair.

.....

.....

(1 mark)

3 (b) (ii) Give the results of this test.

.....

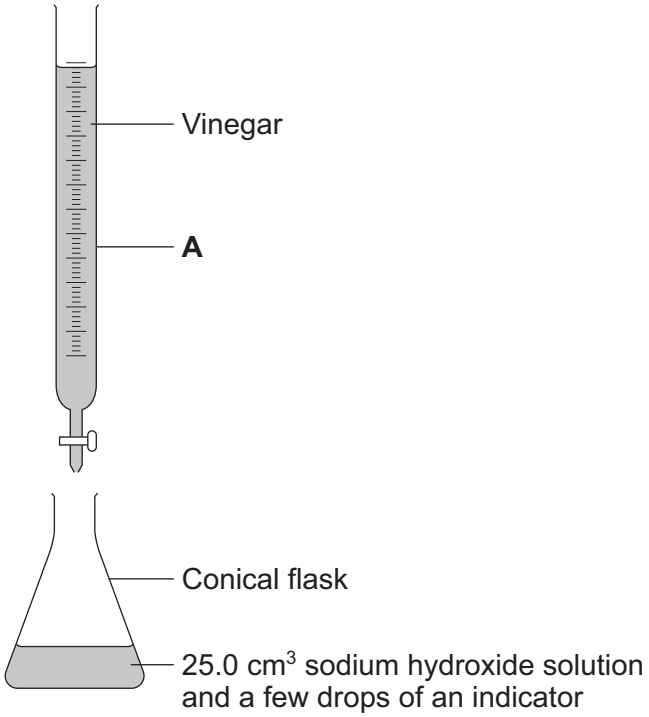
.....

.....

.....

(2 marks)

3 (c) The diagram shows the apparatus a student used to find the volume of vinegar that reacts with 25.0 cm^3 of sodium hydroxide solution.



3 (c) (i) Choose the correct word from the box to complete the sentence.

filtration	**polymerisation**	**titration**

The name of this method is ..... .

(1 mark)

3 (c) (ii) Which **one** of the following is the correct name for apparatus **A**?

Draw a ring around **one** answer.

burette **measuring cylinder** **pipette**

(1 mark)

3 (c) (iii) State how the student knew when enough vinegar had been added.

.....

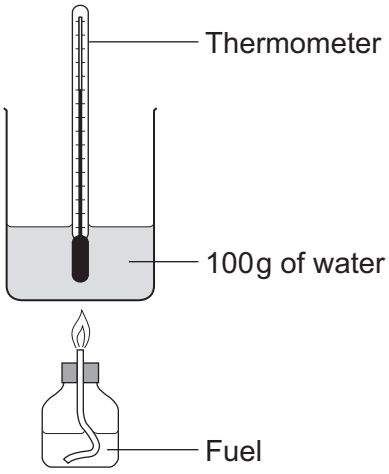
.....

(1 mark)

8

4 (a) A student burned three liquid fuels and compared the amounts of energy they produced.

The diagram shows the apparatus the student used.



The heat produced when each fuel was burned increased the temperature of 100g of water.

The table shows the student's results.

Fuel	Mass of fuel burned in g	Temperature increase in °C	Type of flame
A	1	5	smoky
B	1	4	not smoky
C	1	5	not smoky

4 (a) (i) The student suggested that fuel **C** was the best fuel.

Give **two** reasons why.

1 .....

.....

2 .....

.....

(2 marks)

4 (a) (ii) Use the following equation to calculate the energy change for burning 1 g of fuel **A**.

energy change in joules = 100 × 4.2 × temperature increase for 1 g of fuel

.....

.....

Answer = ... J

(1 mark)

4 (b) (i) Draw a ring around the correct answer to complete the sentence.

Energy is usually measured in joules.

Some food labels give energy measured in

calories.

degrees.

minutes.

(1 mark)

4 (b) (ii) Suggest why knowing about the energy in food can help towards a healthier lifestyle.

.....

.....

.....

(1 mark)

5

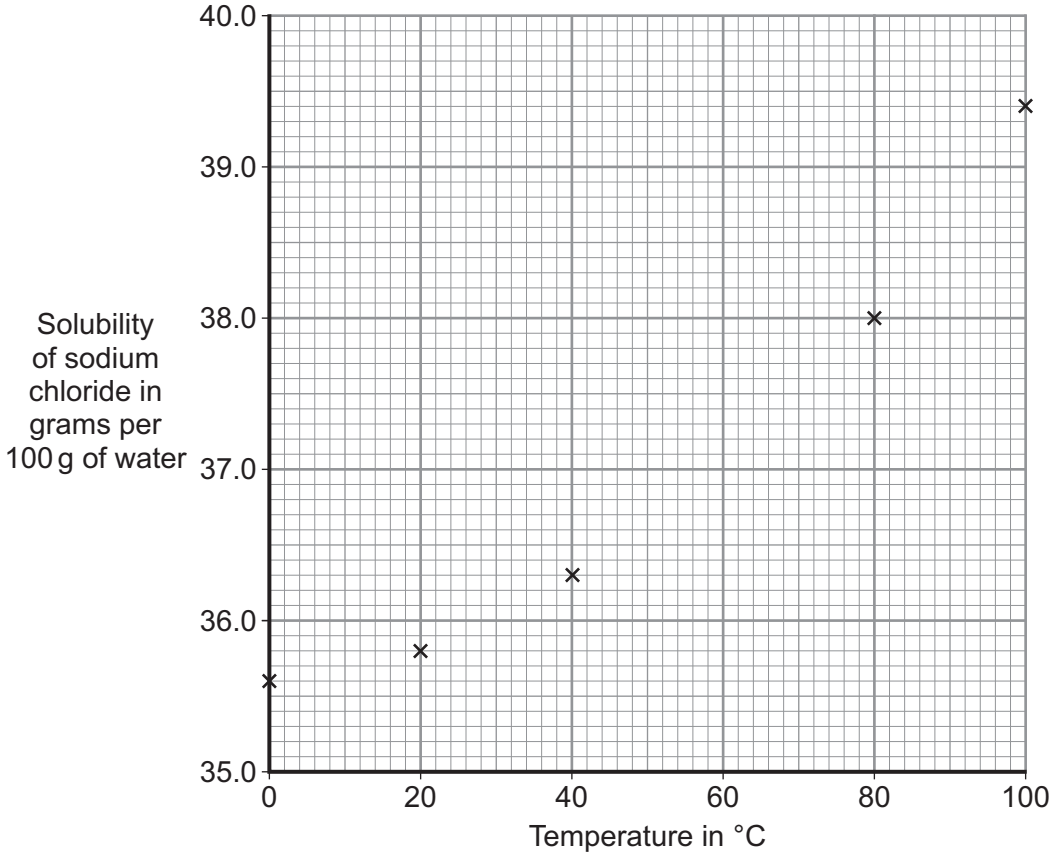
Turn over for the next question

5 The table gives the solubility of sodium chloride in water at different temperatures.

Temperature in °C	**0**	**20**	**40**	**80**	**100**
Solubility in g per 100 g of water	35.6	35.8	36.3	38.0	39.4

5 (a) A student plotted Graph **A** using the data in the table.

Graph A



5 (a) (i) Draw a smooth curve through all the points on Graph **A**. *(1 mark)*

5 (a) (ii) Use this graph to find the mass of sodium chloride that dissolves in 100 g of water at 60 °C.

Mass = ... g

(1 mark)

5 (a) (iii) A saturated solution of sodium chloride in 100 g of water is made at 60 °C. It is then cooled to 20 °C.

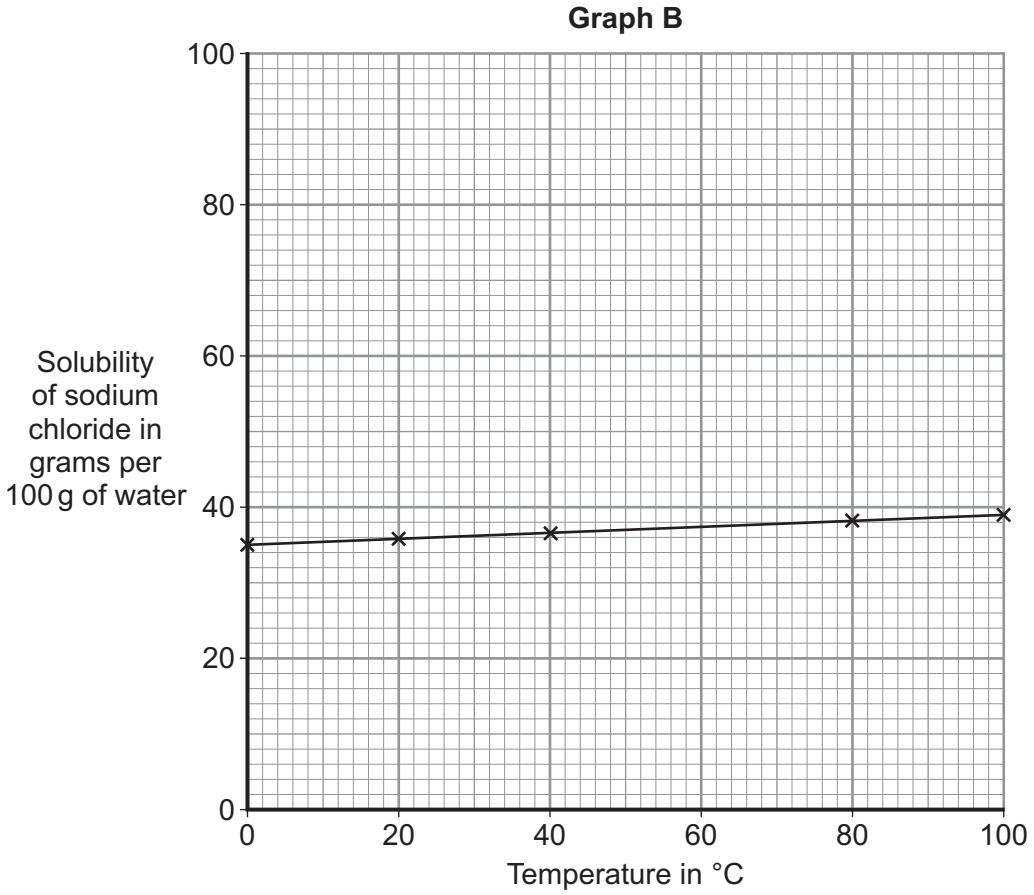
What mass of sodium chloride crystallises from the solution?

.....

.....

(2 marks)

5 (b) Another student plotted Graph **B** using the same data.



The table shows the conclusion that each student made.

	How solubility changes as temperature increases
1st student (Graph A)	Very large increase
2nd student (Graph B)	Very small increase

Suggest why the students came to such different conclusions even though they had used the same data to plot their graphs.

.....

.....

.....

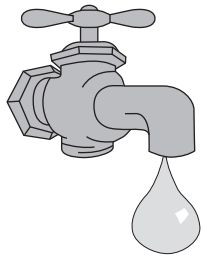
(1 mark)

5

Turn over ▶

6 Good quality water is essential for life.

6 (a) In the United Kingdom, water is filtered and treated with chlorine to make it safe to drink.



Explain why the water is:

filtered .....

.....

treated with chlorine. .....

.....

(2 marks)

6 (b) Millions of people in Bangladesh drink water from wells that contain high levels of arsenic. Arsenic is poisonous.

The World Health Organisation recommends that there should be no more than 0.01 mg of arsenic per litre in drinking water.

The table gives some information about two instrumental methods of testing for arsenic.

Factor to consider	**Laboratory Instrumental Method**	**Portable Instrumental Method**
Cost of equipment	£10 000	£50
Skill level of technician	Highly skilled	Little training needed
Where test is done	Laboratory only	Anywhere
Time to prepare the instrument for the test	5 minutes	10 seconds
Sensitivity of the instrument	0.000001 mg of arsenic per litre of water	0.1 mg of arsenic per litre of water

6 (b) (i) Use the information in the table to give **two** advantages and **one** disadvantage of using the Portable Instrumental Method compared with the Laboratory Instrumental Method.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

6 (b) (ii) The information about these two instrumental methods was provided by the Professional Institute of Water Engineers (PIWE). The Institute has no connection with the companies that make these instruments.

Suggest why many people would accept the views of PIWE rather than the views of the companies that make the instruments.

.....

.....

(1 mark)

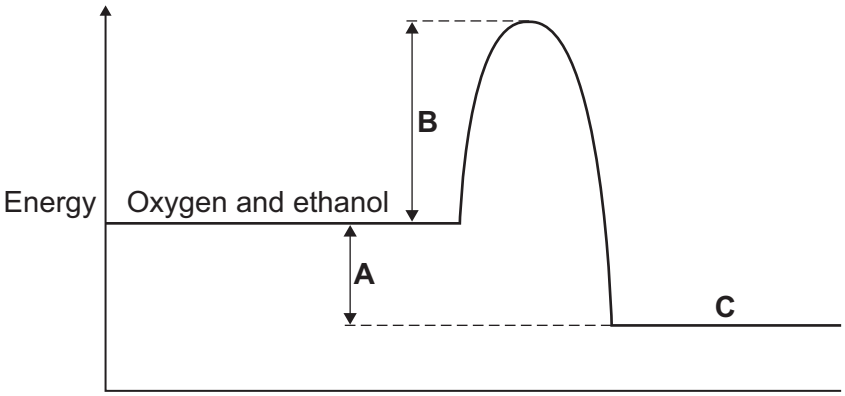
6

Turn over for the next question

7 V2 rockets were used during the Second World War.

V2 rockets were powered by liquid oxygen and ethanol. Oxygen and ethanol react to produce carbon dioxide and water.

The energy level diagram represents the energy changes during this reaction.



7 (a) On the energy level diagram what is represented by the letter:

A .....

B .....

C .....

(3 marks)

7 (b) What type of reaction is represented by this energy level diagram?

.....

.....

(1 mark)

4

END OF QUESTIONS

There are no questions printed on this page

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