

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4782/02

SCIENCE B

UNIT 2: Science and Life in the Modern World

HIGHER TIER

P.M. MONDAY, 10 June 2013

1 hour

For Examiner's use only		
Question	Maximum mark	Mark Awarded
1.	8	
2.	11	
3.	12	
4.	6	
5.	8	
6.	6	
7.	9	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answer to question 3(c) and 6.

A periodic table is printed on page 16.

Answer **all** questions.

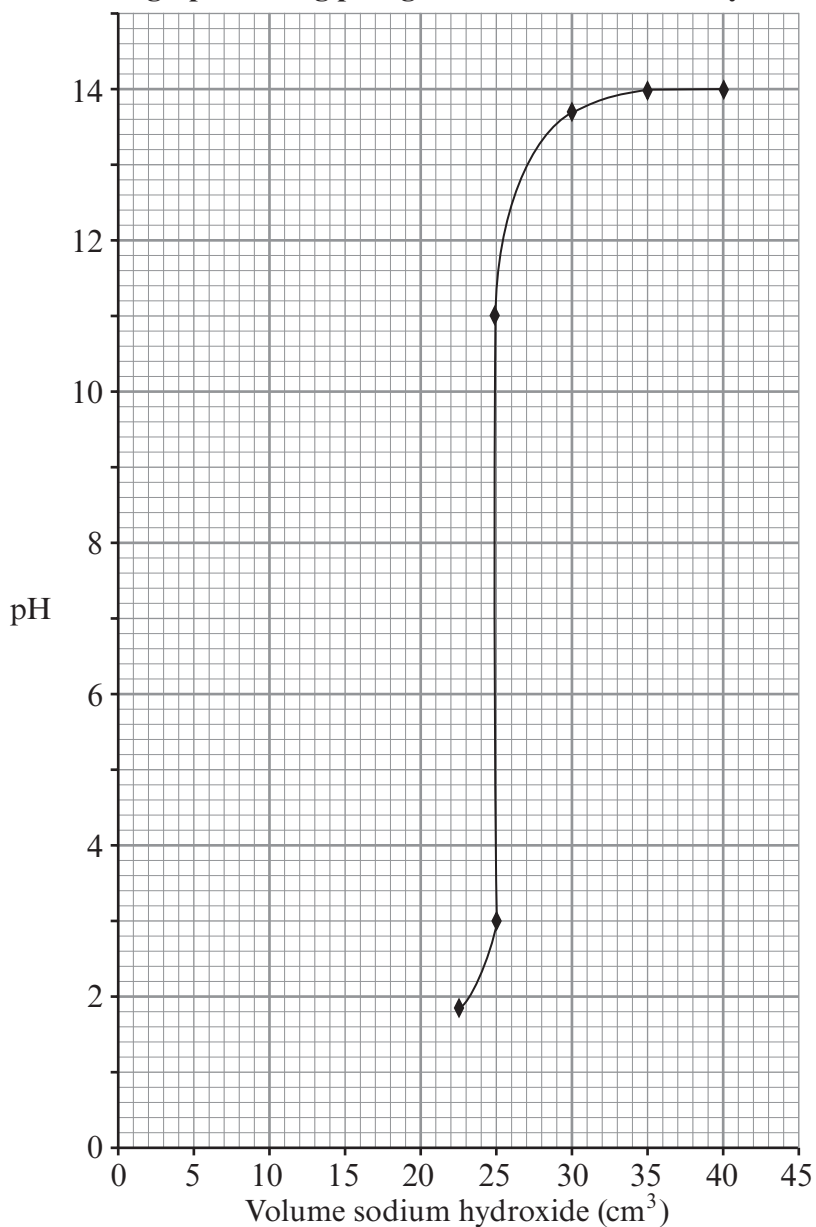
Examiner
only

1. David is investigating the neutralisation reaction between hydrochloric acid and sodium hydroxide. He measured the pH as he added sodium hydroxide solution to dilute hydrochloric acid from a burette. He has started to plot his results in a graph.

- (a) (i) The table below shows results that David has not yet plotted in the graph. Use these results to complete his graph. Join the points. [3]

Volume of sodium hydroxide (cm ³)	pH reading
0	1.0
5	1.0
10	1.1
15	1.2
20	1.5

David's graph showing pH against volume of sodium hydroxide



(ii) Use the graph to find the volume of sodium hydroxide solution required to neutralise the dilute hydrochloric acid. [1]

..... cm³

(b) Give the chemical formula of the salt formed when David reacted hydrochloric acid with sodium hydroxide. [1]

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(c) Acids and alkalis react to form a salt and water. In this experiment David followed the method below.

Method:

1. Pipette 25 cm³ of dilute acid into a conical flask.
2. Add a few drops of universal indicator.
3. Add 40 cm³ of sodium hydroxide solution to a burette.
4. Add 2 cm³ of sodium hydroxide solution to the dilute acid from the burette.
5. Record the pH using a colour chart.
6. Repeat steps 4 and 5 until all the sodium hydroxide solution is added.

Suggest **three** changes to this method which will allow David to make a **pure** salt. [3]

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2. (a) A gamma camera is used in diagnosing cancer. Describe the steps involved in forming this diagnostic image. [3]

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- (b) The information in the table describes some of the properties of radio-isotopes.

Radio-isotope	Symbol	Half-life
carbon-14	^{14}C	5730 years
cobalt-57	^{57}Co	271 years
technetium-99	^{99}Tc	6 hours
oxygen-15	^{15}O	2 minutes

- (i) State what is meant by the term *half-life*. [2]

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- (ii) Explain which of these radio-isotopes would be most suitable for use in producing gamma camera images. [2]

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- (c) (i) Iodine-131 is used in internal radiotherapy. What is meant by the term *internal radiotherapy*? [2]

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- (ii) Iodine-131 has a half-life of 8 days. Calculate the **fraction** of the original amount of iodine-131 that would be left in the body after 24 days. [2]

Fraction =

11

3. The table below shows information from two packets of crisps.

	Typical Nutritional Values			
	Ready Salted Crisps Original		Ready Salted Crisps 'Better Living' Brand	
	per 25 g pack	per 100 g	per 25 g pack	per 100 g
Energy (kJ)	552	2200	420	1680
Protein (g)	1.6	6.5	1.7	6.8
Carbohydrate (g)	12.3	49.0	14.6	58.4
<i>of which</i> sugars (g)	0.1	0.4	0.1	0.4
Fat (g)	8.5	5.0	20.0
<i>of which</i> saturates	0.7	2.8	0.4	1.6
monounsaturated	6.8	27.2	4.3	17.2
polyunsaturated	1.0	4.0	1.2
Fibre (g)	1.0	4.0	1.2	4.8
Salt (g)	0.5	2.0	0.3	1.0

- (a) (i) Explain why all values on food labels are quoted **per 100 g**. [2]

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- (ii) Complete the table by inserting the **two** missing values. [2]

4. Sickle-cell anaemia is an inherited disease. It is caused by a recessive allele which controls the production of haemoglobin. Haemoglobin is found in red blood cells.

(a) Give the genotype of a **homozygous** sufferer. [1]

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(b) Bill and Alison show 'sickle-cell trait'. They are both heterozygous for the sickle-cell allele.

Use an appropriate diagram to calculate the chance of Bill and Alison producing a healthy baby. [3]

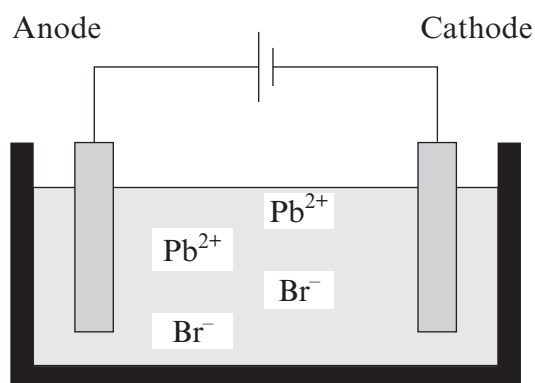
Chance of a healthy baby =

(c) Explain what advice a genetic counsellor may offer this family. [2]

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5. The metal lead can be obtained from the compound lead bromide by electrolysis.

**Key** Br^- Bromide ion Pb^{2+} Lead ion

- (a) Explain which element is formed at the cathode. [3]

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- (b) Write the balanced chemical symbol equation for the extraction of lead by electrolysis. [3]

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- (c) Identify the main chemical risk associated with this experiment and **one** safety precaution that would be needed to reduce this risk. [2]

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7. The **total** use of bioplastics in the European Union was **333 000** tonnes in 2008.

The European Union has predicted the potential use of bioplastics in different sectors of the European economy for 2014. This is shown in the table below.

Use of bioplastic	Tonnes per year (<i>predicted for 2014</i>)
catering products	450 000
organic waste bags	100 000
bioplastic foils	530 000
nappies	320 000
vegetable packaging	400 000
all other uses	200 000

(a) Calculate the percentage **increase** in the use of bioplastics in the European Union from 2008 to 2014. [3]

Answer

(b) Many environmental institutions promote the use of bioplastics. Explain why the use of bioplastics is being promoted. [3]

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(c) The worldwide demand for bioplastics is expected to continue to grow. Outline disadvantages of using bioplastics. [3]

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