Surname

Other Names

Centre Number



GCSE

4782/02

# SCIENCE B UNIT 2: Science and Life in the Modern World HIGHER TIER

P.M. MONDAY, 10 June 2013

l 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.

2

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.

these results to complete his graph. Join the points.

(a)

(i)

The table below shows results that David has not yet plotted in the graph. Use

 
 Volume of sodium hydroxide (cm<sup>3</sup>)
 pH reading

 0
 1.0

 5
 1.0

 10
 1.1

 15
 1.2

 20
 1.5





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[3]

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

- (b) Give the chemical formula of the salt formed when David reacted hydrochloric acid with sodium hydroxide. [1]
- (c) Acids and alkalis react to form a salt and water. In this experiment David followed the method below.

#### Method:

- 1. Pipette  $25 \text{ cm}^3$  of dilute acid into a conical flask.
- 2. Add a few drops of universal indicator.
- 3. Add  $40 \,\mathrm{cm}^3$  of sodium hydroxide solution to a burette.
- 4. Add  $2 \text{ cm}^3$  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]

8

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Turn over.

Examiner A gamma camera is used in diagnosing cancer. Describe the steps involved in forming 2. (a)this diagnostic image. [3] \_\_\_\_\_ *(b)* The information in the table describes some of the properties of radio-isotopes. Radio-isotope Half-life Symbol  $^{14}C$ carbon-14 5730 years <sup>57</sup>Co cobalt-57 271 years <sup>99</sup>Tc technetium-99 6 hours <sup>15</sup>O oxygen-15 2 minutes State what is meant by the term half-life. [2] (i) Explain which of these radio-isotopes would be most suitable for use in producing (ii) gamma camera images. [2]

4

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

5

Fraction =

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- Typical Nutritional Values Ready Salted Crisps **Ready Salted Crisps** Original 'Better Living' Brand per 25 g per 100 g per 25 g per 100 g pack pack Energy (kJ) 552 2200 1680 420 1.6 6.5 1.7 6.8 Protein (g) Carbohydrate (g) 12.3 49.0 14.6 58.4 of which sugars (g) 0.1 0.4 0.1 0.4 8.5 5.0 20.0 Fat (g) 0.7 of which saturates 2.8 0.4 1.6 6.8 27.2 4.3 17.2 monounsaturated polyunsaturated 1.0 4.0 1.2 Fibre (g) 1.0 4.0 4.8 1.2 0.5 Salt (g) 2.0 0.3 1.0
- 3. The table below shows information from two packets of crisps.

## (a) (i) Explain why all values on food labels are quoted **per 100 g**.

[2]

(ii) Complete the table by inserting the **two** missing values.

[2]

(b) The information below shows the guideline daily amounts (GDA) of salt for children and adults.

7

	Guideline daily amounts of salt (g)
Men	6.0
Women	6.0
Children (5-10)	4.0

Mandy, a ten year old girl, eats **one** packet of **'Original'** ready salted crisps for her school lunch. What percentage of her daily amount of salt do these crisps provide? [2]

Percentage of daily allowance of salt =

(c) The manufacturer of the **'Better Living'** brand claims they are healthier for you. Use the information in the table, and your understanding of lifestyle choices, to assess this claim. [6 QWC]

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12

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Examiner only Sickle-cell anaemia is an inherited disease. It is caused by a recessive allele which controls the 4. production of haemoglobin. Haemoglobin is found in red blood cells. Give the genotype of a **homozygous** sufferer. [1] (a)(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 = ..... Explain what advice a genetic counsellor may offer this family. (c)[2] 6

The	metal lead can be obtained from the compound lead bromide by electrolysis.	Examiner only
	Anode Cathode $Pb^{2+}$ $Pb^{2+}$ $Pb^{2+}$ $Pb^{2+}$ $Pb^{2+}$ $Pb^{2+}$ $Pb^{2+}$ Lead ion $Pb^{2+}$ Lead ion	
<i>(a)</i>	Explain which element is formed at the cathode. [3]	
( <i>b</i> )	Write the balanced chemical symbol equation for the extraction of lead by electrolysis. [3]	
(c)	Identify the main chemical risk associated with this experiment and <b>one</b> safety precaution that would be needed to reduce this risk. [2]	
		8

5.

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Explain how this image has been produced and describe its advantages over other imaging techniques that use electromagnetic radiation. [6 QWC]


6. Charlotte is pregnant and has just had her 20 week scan. The image of her baby is shown below.

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 (predicted for 2014)
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]

A	
Answer	

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

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

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	0	helium 2 He	neon 10 Ne	argon 18 Ar	krypton 36 Kr	xenon 54 Xe	radon 86 <b>Rn</b>	
	Г		fluorine 9 F	chlorine 17 Cl	bromine 35 <b>Br</b>	iodine 53 I	astatine 85 At	
	9		oxygen 8 O	sulfur 16 S	selenium 34 Se	tellurium 52 <b>Te</b>	polonium 84 Po	
	S		nitrogen 7 N	phosphorus 15 P	arsenic 33 AS	antimony 51 Sb	bismuth 83 <b>Bi</b>	
	4		carbon 6 C	silicon 14 Si	germanium 32 Ge	tin 50 Sn	lead 82 Pb	
	С		boron 5 <b>B</b>	aluminium 13 <b>Al</b>	gallium 31 Ga	Indium 49 In	thallium 81 <b>TI</b>	
					zinc 30 Zn	Cadmium 48 Cd	mercury 80 Hg	
					copper 29 Cu	silver 47 <b>Ag</b>	gold 79 Au	
					nickel 28 <b>Ni</b>	palladium 46 Pd	platinum 78 Pt	
		hydrogen 1 <b>H</b>			cobalt 27 C0	rhodium 45 <b>Rh</b>	iridium 77 <b>Ir</b>	
					iron 26 Fe	ruthenium 44 <b>Ru</b>	osmium 76 <b>OS</b>	
name umber <b>ool</b>					manganese 25 Mn	technetium 43 <b>Tc</b>	rhenium 75 <b>Re</b>	
element atomic n Syml					chromium 24 <b>Cr</b>	molybdenum 42 MO	tungsten 74 W	
					vanadium 23 V	niobium 41 Nb	tantalum 73 <b>Ta</b>	
					titanium 22 <b>Ti</b>	zirconium 40 Zr	hafnium 72 Hf	
					scandium 21 Sc	yttrium 39 Y	lutetium 71 Lu	
	0		beryllium 4 Be	magnesium 12 Mg	calcium 20 Ca	strontium 38 Sr	barium 56 <b>Ba</b>	radium 88 <b>Ra</b>
	1		lithium 3 Li	11 Na	potassium 19 K	rubidium 37 <b>Rb</b>	caesium 55 CS	francium 87 Fr
			2	ŝ	4	2	9	2

**Periodic Table of the Elements** 

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