

# UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

035099767

#### PHYSICAL SCIENCE

0652/02

Paper 2 (Core)

October/November 2008

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

#### **READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs, tables or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer all questions.

A copy of the Periodic Table is printed on page 16.

At the end of the examination, fasten all your work securely together.

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

For Examiner's Use				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Total				

This document consists of 14 printed pages and 2 blank pages.



**1** A student investigates the current-voltage characteristic for a lamp. She builds the circuit shown in Fig. 1.1.

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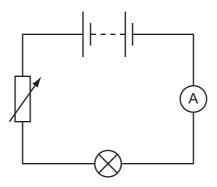


Fig. 1.1

(a) Show where the voltmeter should be connected on Fig. 1.1

[2]

**(b)** From her results the graph in Fig. 1.2 is plotted.

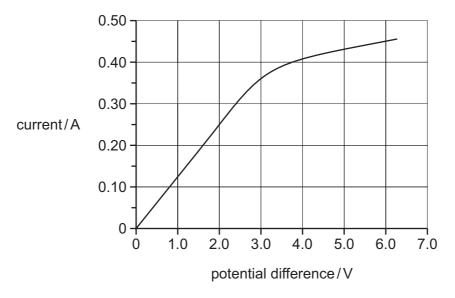


Fig. 1.2

(i) What is the current when there is a potential difference of 2.0 V across the bulb?

[1	Ī	ı
 ι.		į

(	(ii)	Calculate the resistance of the lamp when the potential difference is 2.0 V.							
		Show your working.							
			r	esistance =	[3]				
(	iii)	Use the graph to deduis increased above 0.3	uce what happens to the ro	esistance of the lamp as t	:he current				
		Suggest a reason for	the change.						
					[2]				
(a)	Cor	mplete Table 2.1 by wri	iting in the missing formula  Table 2.1	ae and types of bonding.					
		compound	formula	type of bonding					
		sodium chloride	NaC <i>l</i>	ionic					
		methane							
		potassium bromide							
					[4]				
(b)	Civ	o the names and symb	ols of the ions present in s	sodium chlorido					
(10)	ior	_		Socialii Gillollac.					
		***************************************	symbol		[4]				
		***************************************			т.л				

2

3 Fig. 3.1 shows a 0.20 kg mass hanging on a spring. Fig. 3.1 (a) (i) Calculate the weight of the mass. (g = 10 N/kg)Show your working. weight = (ii) Write down the force acting on the mass due to the spring. force = [3] **(b)** The mass is pulled down a short distance and released.

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(i) Draw an arrow on Fig. 3.1 and label it F, to show the direction of the resultant force

(ii) State what would happen to the mass immediately after it is released.

on the mass immediately after it is released.

4

	mine can be extracted f sodium bromide in sea	rom seawater. water is reacted with chlorine to displace the bromine.	
(a)	What is the name giver	n to all of the elements in Group 7 of the Periodic Table?	
			[1]
(b)	How many electrons ar	re in the outer shell of bromine?	
			[1]
(c)	Write a balanced equ NaBr, and chlorine, $Cl_2$	ation for the displacement reaction between sodium bromi	de,
			[2]
(d)	Explain why iodine can	not be used to displace bromine from sodium bromide.	
			[2]
(e)	Give the name, atomic same period of the Per	c number and relative atomic mass of another element in iodic Table as chlorine.	the
	The Periodic Table is p	rinted on page 16.	
	element		
	atomic number		
	relative atomic mass		[3]

For Examiner's Use **5** Fig. 5.1 shows a liquid-in-glass thermometer.

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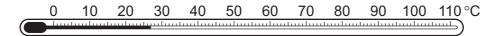


Fig. 5.1

(a)	(i)	Name a suitable liquid to use in the thermometer.	
			[1]
	(ii)	Explain what happens to the liquid when the thermometer is placed in a beaker hot water.	· of
			••••
			[2]
	(iii)	Name the main process by which energy is transferred from the hot water to liquid in the thermometer.	the
			[1]
(b)	The	thermometer is now placed in pure boiling water.	
	(i)	What temperature would the thermometer show?	[1]
	(ii)	Explain what is meant by the term boiling.	
			[2]

**6** Table 6.1 gives the names and formulae of some organic compounds

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### Table 6.1

name of compound	formula
methanol	CH₃OH
ethanol	C₂H₅OH
propanol	
butanol	C₄H <sub>9</sub> OH
pentanol	C₅H₁₁OH

(1)	name the type of organic compounds listed in the table.	
		[1]
(ii)	What is the name given to a series of compounds like these?	
		[1]
	Complete the table by writing in the formula for propanol.	[1]
	Draw the structure of ethanol.	
		[1]
G		
(i)		
(ii)		[2]
	(ii)	(ii) What is the name given to a series of compounds like these?  Complete the table by writing in the formula for propanol.  Draw the structure of ethanol.  Give two uses of ethanol.  (i)

**7 (a)** Fig. 7.1 shows a ripple tank with three wavefronts approaching an area of shallow water.

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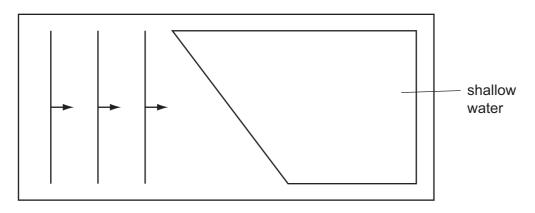


Fig. 7.1

- (i) On Fig 7.1, draw **four** more wavefronts to complete the diagram. [3]
- (ii) Name the process being demonstrated. [1]
- **(b)** Fig. 7.2 shows a similar ripple tank, with waves approaching a barrier that reflects water waves.

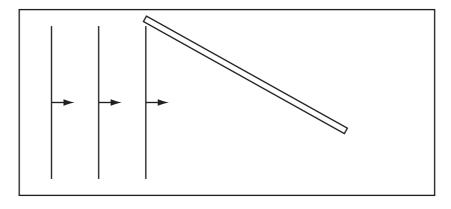


Fig. 7.2

On Fig. 7.2, draw in four more wavefronts to complete the diagram. [3]

8 Small pieces of metallic gold can be found in the gravel at the bottom of streams. Sodium is obtained by the electrolysis of one of its compounds. Iron is extracted by reduction of its ore with carbon in a blast furnace. (a) (i) Put these three metals in order of reactivity. most reactive ..... least reactive [2] (ii) Suggest where you would place carbon in this list? Explain your answer. (b) Name an ore of iron. [1] (c) Stainless steel is a mixture of iron and chromium. (i) What name do we give to mixtures of metals like stainless steel? [1] (ii) Give a use of stainless steel. [1]

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9 (a) A student arranges two magnets so that magnet **B** balances as in Fig. 9.1. magnet **B** magnet A S Ν Fig. 9.1 (i) Label the poles of magnet B [1] (ii) Explain why magnet **B** can be balanced in this way. (b) The student brings a magnet near to an iron bar. X S Ν iron bar Fig. 9.2 What happens when: The magnet is brought up to end Y? The magnet is brought up to end X? (c) He wraps a length of wire around the iron bar. He connects the wire to a battery so that there is a current in the wire. He repeats the experiment in **(b)**. Explain how you would expect the results to change

10 Fig. 10.1 shows an experiment to measure the volume of oxygen in 100 cm<sup>3</sup> of air.Oxygen reacts with iron to form a solid compound.

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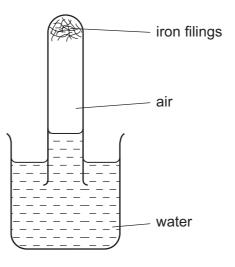


Fig. 10.1

(a)	Wh	at do we call reactions which involve the addition of oxygen?	
			[1]
(b)	Wh	at type of compound is formed when an element reacts with oxygen?	[1]
	•••••		۲٠,
(c)	(i)	What volume of gas remains in the tube when all the oxygen has reacted?	
			[1]
	(ii)	Name the main gas in the tube after the oxygen has reacted.	
			[1]

11	The iod	line isotope, $^{131}_{53}$ I, decays by emitting a $\beta$ –particle.
	(a) Ex	plain what is meant by a β–particle.
	••••	[2]
	(b) (i)	Complete the equation which describes the decay.
		$^{131}_{53}I = ^{131}_{111111111111111111111111111111111$
	(ii)	Use the Periodic Table, on page 16, to identify the element X and comment on its reactivity.
		1/11

12	A sample of copper chloride is made by reacting excess copper carbonate with hydrochloric acid.						
	(a) Balance the equation for this reaction.						
	CuCO <sub>3</sub> + HC $l$ $\rightarrow$ CuC $l_2$ + CO <sub>2</sub> + H <sub>2</sub> O [1	]					
	(b) (i) Name the gas evolved.						
	[1	]					
	(ii) Describe a test for this gas.						
		•					
	[2	]					
	(c) How could you obtain pure copper chloride crystals from the resulting mixture?						
	[2	]					

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DATA SHEET
The Periodic Table of the Elements

	0	4 He Helium	20 Neon 10 40 Ar Argan	84 <b>Kr</b> Krypton 36	131 <b>Xe</b> Xenon 54	Rn Radon 86		175 <b>Lu</b> Lutetium 71	<b>Lr</b> Lawrencium 103
			19 Fluorine 9 35.5 <b>C 1</b> Chlorine	80 <b>Br</b> Bromine 35	127 <b>I</b> lodine 53	At Astatine 85		<b>Yb</b> Ytterbium 70	Nobelium 102
	>		16 Oxygen 8 32 Sulphur	79 <b>Se</b> Selenium 34	128 <b>Te</b> Tellurium 52	Po Polonium 84		169 <b>Tm</b> Thullum	Md Mendelevium 101
	^		14 Nitrogen 7 31 Phosphorus 15	75 <b>AS</b> Arsenic 33	122 <b>Sb</b> Antimony 51	209 <b>Bi</b> Bismuth 83		167 <b>Er</b> Erbium 68	Fm Fermium 100
	N		12 Carbon 6 Silicon 14	73 <b>Ge</b> Germanium 32	<b>Sn</b> Tin	207 <b>Pb</b> Lead 82		165 <b>Ho</b> Holmium 67	<b>Es</b> Einsteinium 99
	≡		11 B Boron 5 27 A <b>A 1</b> Abuminium	70 <b>Ga</b> Gallium 31	115 <b>In</b> Indium 49	204 <b>T t</b> Thallium 81		162 <b>Dy</b> Dysprosium 66	Californium 98
				65 <b>Zn</b> 2inc 30	Cd Cadmium 48	201 <b>Hg</b> Mercury 80		159 <b>Tb</b> Terbium 65	<b>BK</b> Berkelium 97
				64 <b>Copper</b> 29	108 <b>Ag</b> Silver 47	197 <b>Au</b> Gold		157 <b>Gd</b> Gadolinium 64	Cm Curium 96
Group				59 Nickel	106 Pd Palladium 46	195 <b>Pt</b> Platinum 78		152 <b>Eu</b> Europium 63	Am Americium
Ď				59 <b>Cob</b> Cobalt 27	103 Rh Rhodium 45	192 <b>Ir</b> Irdium 77		Sm Samarium 62	Pu Plutonium 94
		1 Hydrogen		56 <b>Fe</b> Iron 26	Ru Ruthenium 44	190 <b>Os</b> Osmium 76		Pm Promettium 61	Neptunium
				Manganese	Tc Technetium 43	186 <b>Re</b> Rhenium 75		Neodymium 60	238 <b>U</b> Uranium
				52 <b>Cr</b> Chromium 24	96 <b>Mo</b> Molybdenum 42	184 <b>W</b> Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91
				51 V Vanadium 23	93 <b>Nb</b> Niobium 41	181 <b>Ta</b> Tantalum		140 <b>Ce</b> Cerium	232 <b>Th</b> Thorium 90
				48 <b>Ti</b> Titanium 22	91 <b>Zr</b> Ziroonium 40	178 <b>Hf</b> Hafnium 72			nic mass Ibol nic) number
		ı		Scandium 21	89 <b>Y</b> Yttrium 39	139 <b>La</b> Lanthanum 57 *	227 <b>Ac</b> Actinium 89	l series series	a = relative atomic mass  X = atomic symbol b = proton (atomic) number
	=		Be Beryllium 4  24  Magnesium 12	40 <b>Ca</b> Calcium	Strontium	137 <b>Ba</b> Barium 56	226 <b>Ra</b> Radium 88	*58-71 Lanthanoid series	л <b>х</b> в
	_		7   Lithium 3   23   Na   Sodium 11	39 K Potassium	Rb Rubidium 37	133 Cs Caesium 55	<b>Fr</b> Francium 87	*58-71 L 190-103	Key

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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