



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 0 3 5 0 9 9 7 6 7 1 *

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	
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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.

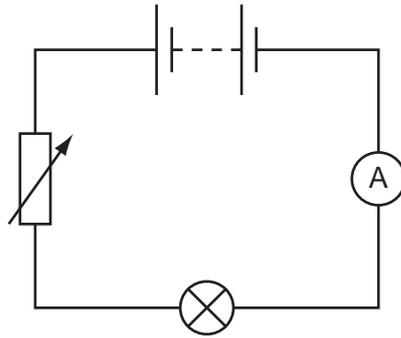


Fig. 1.1

- (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.

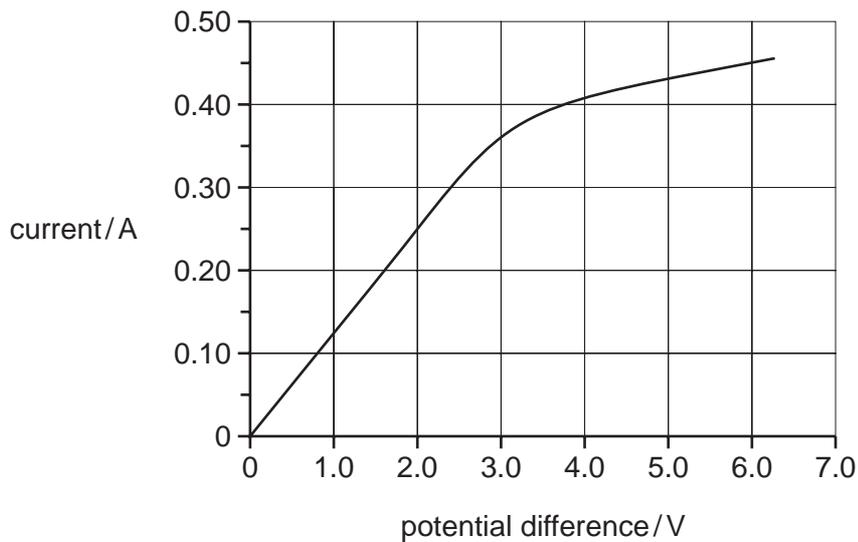


Fig. 1.2

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

..... [1]

- (ii) Calculate the resistance of the lamp when the potential difference is 2.0 V.

Show your working.

resistance = [3]

- (iii) Use the graph to deduce what happens to the resistance of the lamp as the current is increased above 0.30 A.

Suggest a reason for the change.

.....

 [2]

- 2 (a) Complete Table 2.1 by writing in the missing formulae and types of bonding.

Table 2.1

compound	formula	type of bonding
sodium chloride	NaCl	ionic
methane		
potassium bromide		

[4]

- (b) Give the names and symbols of the ions present in sodium chloride.

ion 1 symbol

ion 2 symbol [4]

- 3 Fig. 3.1 shows a 0.20 kg mass hanging on a spring.

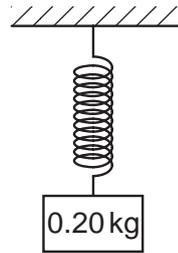


Fig. 3.1

- (a) (i) Calculate the weight of the mass.
($g = 10 \text{ N/kg}$)

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.

- (i) Draw an arrow on Fig. 3.1 and label it F , to show the direction of the resultant force on the mass immediately after it is released. [1]

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

.....
..... [2]

- 4 Bromine can be extracted from seawater.
The sodium bromide in seawater is reacted with chlorine to displace the bromine.

(a) What is the name given to all of the elements in Group 7 of the Periodic Table?

..... [1]

(b) How many electrons are in the outer shell of bromine?

..... [1]

(c) Write a balanced equation for the displacement reaction between sodium bromide, NaBr, and chlorine, Cl₂.

..... [2]

(d) Explain why iodine cannot be used to displace bromine from sodium bromide.

.....
.....

..... [2]

(e) Give the name, atomic number and relative atomic mass of another element in the same period of the Periodic Table as chlorine.

The Periodic Table is printed on page 16.

element

atomic number

relative atomic mass [3]

5 Fig. 5.1 shows a liquid-in-glass thermometer.

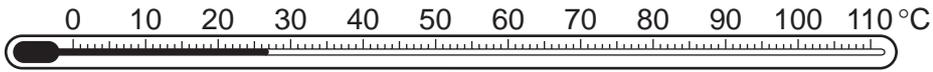


Fig. 5.1

(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 of hot water.

.....
.....
..... [2]

(iii) Name the main process by which energy is transferred from the hot water to the liquid in the thermometer.

..... [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

Table 6.1

name of compound	formula
methanol	CH ₃ OH
ethanol	C ₂ H ₅ OH
propanol	
butanol	C ₄ H ₉ OH
pentanol	C ₅ H ₁₁ OH

(a) (i) 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]

(b) Complete the table by writing in the formula for propanol.

[1]

(c) Draw the structure of ethanol.

[1]

(d) Give **two** uses of ethanol.

(i)

(ii) [2]

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

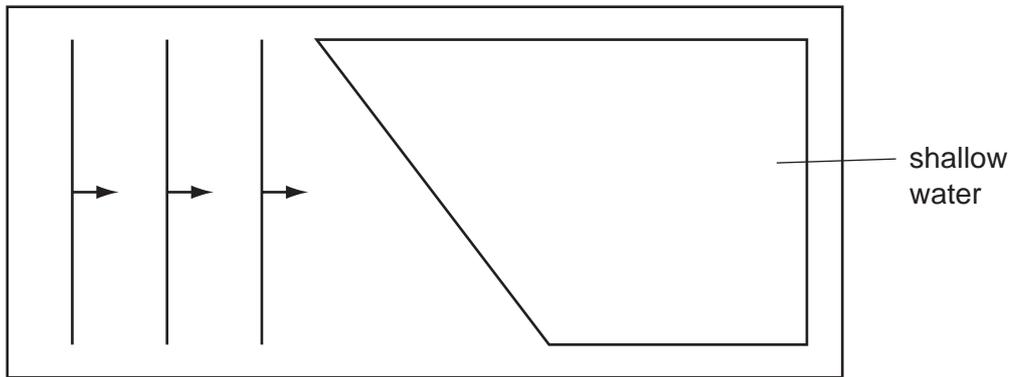


Fig. 7.1

- (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.

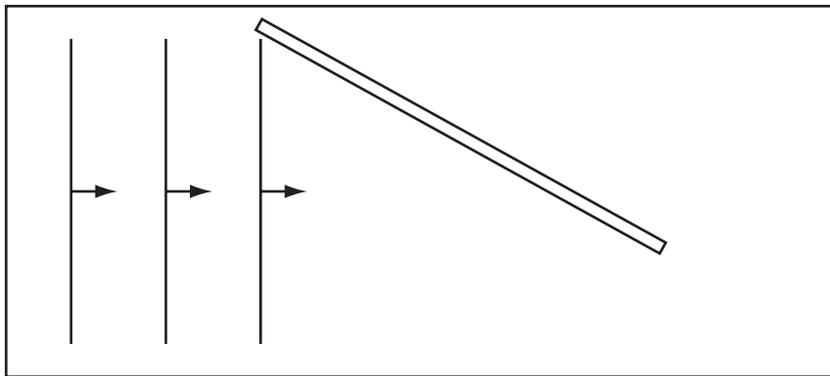


Fig. 7.2

- 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.

.....

.....

..... [2]

(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]

9 (a) A student arranges two magnets so that magnet B balances as in Fig. 9.1.

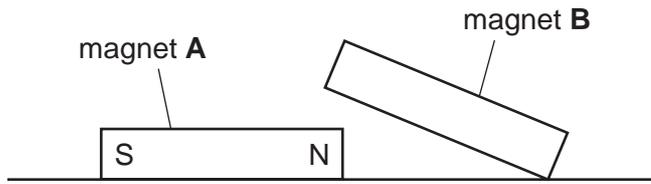


Fig. 9.1

(i) Label the poles of magnet B [1]

(ii) Explain why magnet B can be balanced in this way.

.....

.....

..... [2]

(b) The student brings a magnet near to an iron bar.



Fig. 9.2

What happens when:

The magnet is brought up to end Y?

The magnet is brought up to end X? [1]

(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

.....

.....

..... [2]

10 Fig. 10.1 shows an experiment to measure the volume of oxygen in 100 cm³ of air.

Oxygen reacts with iron to form a solid compound.

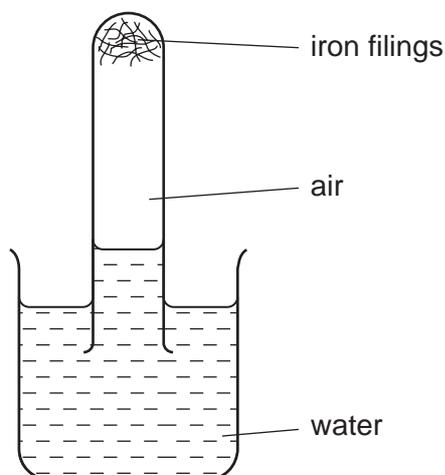


Fig. 10.1

(a) What do we call reactions which involve the addition of oxygen?

..... [1]

(b) What type of compound is formed when an element reacts with oxygen?

..... [1]

(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.

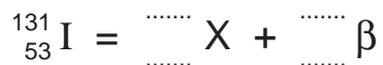
..... [1]

11 The iodine isotope, ${}_{53}^{131}\text{I}$, decays by emitting a β -particle.

(a) Explain what is meant by a β -particle.

.....
..... [2]

(b) (i) Complete the equation which describes the decay.

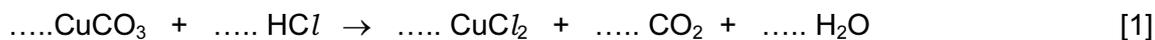


(ii) Use the Periodic Table, on page 16, to identify the element X and comment on its reactivity.

.....
..... [4]

12 A sample of copper chloride is made by reacting excess copper carbonate with hydrochloric acid.

(a) Balance the equation for this reaction.



(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]

DATA SHEET
The Periodic Table of the Elements

		Group																																																																		
I	II	III	IV	V	VI	VII	0																																																													
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	106 Pd Palladium 46	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	127 I Iodine 53	131 Xe Xenon 54	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86	226 Ra Radium 88	227 Ac Actinium 89
												140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	232 Th Thorium 90	238 U Uranium 92	238 Pa Protactinium 91	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103																														

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a	X
b	

 a = relative atomic mass
 X = atomic symbol
 b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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