Centre Number Candidate Number Name WANN, PAPAC AMBRIDGE, COM

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

PHYSICAL SCIENCE

0652/02

Paper 2

October/November 2005

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 in the spaces provided on the Question Paper. 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.

Answer all questions.

The number of marks is given in brackets [] at the end of each question or part question. A copy of the Periodic Table is printed on page 16.

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1

2

13

Total

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

(a) A glider is an aeroplane without an engine. Glider pilots use columns of rising w to lift their gliders to a greater height, as shown in Fig. 1.1. 1

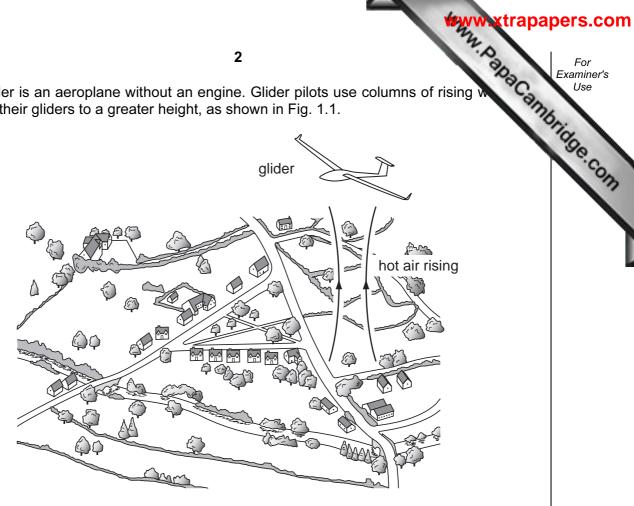


Fig. 1.1

	(i)	Name the process which causes the warm air to rise.	
	(ii)	Explain why the warm air rises.	
			[3]
(b)		e warm air sometimes carries water vapour higher into the atmosphere where inges to small water drops to form clouds.	e it
	Nar	me the process when water vapour turns to liquid.	
			[1]

(c) As the water drops get larger they begin to fall. Fig. 1.2 shows a speed – time g. the fall of one of the water drops.

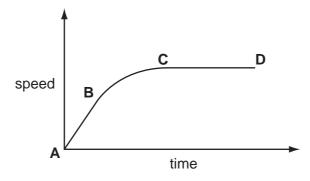


Fig. 1.2

(i)	Describe the motion of the water drop between points A and B .

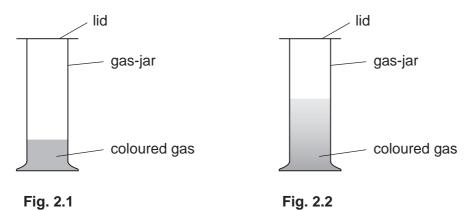
(ii)	Describe the motion of the water drop between points C and D .	
		[3]

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[1]

2 A coloured gas is put into the bottom of a gas-jar of air. The lid is quickly replaced on This is shown in Fig. 2.1.

After several minutes the coloured gas can be seen halfway up the jar. This is shown in Fig. 2.2.



(a)	Name this	process	of one	gas	mixing	slowly	with	anothe	r
-----	-----------	---------	--------	-----	--------	--------	------	--------	---

(b) The molecules of the coloured gas move about quickly yet the process of mixing with the air is very slow.

- 3 The properties of iron can be changed by the controlled use of additives to form steel alloys.
 - (a) State one use of mild steel.

State one use of stainless steel.

Explain why the mixing is slow.

[2]

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(b) A piece of mild steel in everyday use is protected with paint. Stainless steel does not need this protection. Explain this difference. In a coal-fired power station coal is burnt in a furnace. This heats water to provide steam to drive a generator. (a) Complete the sentences below to explain the energy changes. In the furnace _____ energy of the coal is converted to energy in the steam. This is then converted into [3] energy at the generator. Another method of obtaining steam to drive a generator is to pump water deep into the ground. The water is heated by hot rocks. **(b) (i)** What name is given to this type of power station? (ii) State **one** advantage of this method over the coal-fired power station. (c) Explain how the generator is driven in a hydroelectric power station. In your answer refer to relevant energy changes. [2]

WWW. Papa Cambridge.com (a) A method to separate and analyse mixtures uses a vertical strip of paper dippin 5 solvent. (i) Name this method of separating mixtures. (ii) Some experiments using this method require a locating agent to show the positions of the components. Explain why a locating agent may be required. (b) Bitumen is used to make roads. Describe how bitumen is obtained from the mixture of hydrocarbons in crude oil (petroleum).

Fig. 6.1 shows the electromagnetic spectrum.

. 6.1 shows the	electromaç	gnetic spect	7 rum.			Apa,	For Examiner's Use
radio waves	micro waves	infra red	visible	Р	X-rays	gamma rays	annoridge con

increasing frequency

Fig. 6.1

(a)	Name the type of radiation found in the section labelled P .
(b)	State what happens to the speed of electromagnetic radiation, in a vacuum, as the frequency of the radiation increases.

(c) The photograph in Fig. 6.2 shows a replacement joint in a person's arm.



Fig. 6.2

	Name the part of the electromagnetic spectrum used to take this photograph.		
			[1]
(d)	Another method of obtaining images of internal organs is to use sound frequency above the human threshold of hearing.	waves	of
	State the maximum frequency sound that a human can hear.		
		Hz	[1]

(a)	Wh	en ethene, C ₂ H ₄ , reacts with hydrogen in an addition reaction, an alkane is followed	Use
	(i)	Name this alkane.	Military
			Cannonidae Com
	(ii)	Draw a diagram to show the structure of this alkane.	
			[1]
(b)	Wh	en ethene, C ₂ H ₄ , reacts with steam in an addition reaction, an alcohol is formed.	
	(i)	Name this alcohol.	
			[1]
	(ii)	Draw a diagram to show the structure of this alcohol.	
			[1]
(c)	Wh	en ethene, C ₂ H ₄ , reacts with itself in an addition reaction, a polymer is formed.	
	(i)	Name this polymer.	
			[1]
	(ii)	Draw a diagram to show the structure of this polymer.	
			[1]

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(a)	Describe how you would carry out an experiment to find the magnetic field around a bar magnet.	Ca
		[4]
(b)	On Fig. 8.1 draw the magnetic field pattern of the bar magnet.	
	S N	

Fig. 8.1

[3]

[2]

(a) Chlorine has two isotopes, $^{35}_{17}$ Cl and $^{37}_{17}$ Cl.

			www.xtra
		10	A. Day
1)	Chlorine has two isotopes, $^{35}_{17}$ C	l and $^{37}_{17}$ C l .	18
	Complete Fig. 9.1 for these isoto	pes.	WWW.xtra
		35 C <i>l</i>	37 C <i>l</i>
_		17 🖰 1	17 01
	number of protons in nucleus	17	
	number of neutrons in nucleus		20
	arrangement of electrons in shells in the atom		

Fig. 9.1 [3]

(b) Draw a diagram to show the covalent bonding in a molecule of hydrogen chloride, HCl

(c) (i) Describe the formation of each of the ions in sodium chloride, NaCl, from the elements. (ii) Explain how these ions are held together in the compound.

r solid.

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[2] (d) Explain why sodium chloride conducts electricity when liquid but not when solid. (e) Describe a chemical test for the chloride ion in solution. test result

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10	The	e nob	ole gas, radon, is radioactive. Radon nuclei decay by emitting alpha-particles.
	(a)	(i)	elle gas, radon, is radioactive. Radon nuclei decay by emitting alpha-particles. Explain what is meant by the term <i>noble gas</i> .
		(ii)	Explain what is meant by the term alpha-particle.
			[3]
	(b)	Cor	nplete the equation which shows the decay of a nucleus of radon-220.
			²²⁰ ₈₆ Rn → Po + ······ α (alpha)
			[2]
	(c)		ample consists of 36.0 μg of radon-220. After a period of 3 minutes only 4.5 μg of on-220 remained.
		Cal	culate the half-life of radon-220. Show your working.
			half-life =mminute(s) [3]
11			monoxide and oxides of nitrogen are common pollutants of air.
	Des		e how each pollutant is formed.
		carl	oon monoxide
		•••••	
		oxio	des of nitrogen
			ΓΔ1

For Examiner's Use

12	(a)	(i)	State the main method to obtain calcium oxide (lime) from calcium calcium stone).	Cannibridge Com
				[1] Se.co.
		(ii)	Complete the equation for this process.	133
			CaCO ₃ +	[2]
				ا ا
	((iii)	The energy required to break the bonds in calcium carbonate is greater than energy released when the products are formed.	the
			What does this show about the total energy change in the reaction?	
				[1]
	((iv)	Describe a test to identify the gas produced in this process.	
			test	
			test	
			result	[2]
	(b)	Cal	cium hydroxide (slaked lime) is used to treat acidic industrial waste products.	
		Nar	ne the main chemical process involved in this treatment.	
				F43
				[1]

13 Fig. 13.1 shows two types of switch that can be used to control an electric light.

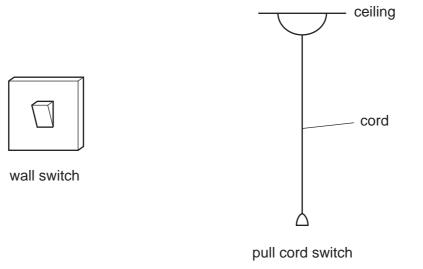


Fig. 13.1

Explain why a pull-cord switch, not a wall switch, should always be used in a bathro or shower-room.	om
	••••
	[3]

(b) Fig. 13.2 shows part of a circuit that could be used to operate lights in a room.

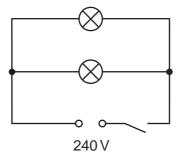


Fig. 13.2

The two lamps are identical and each takes a current of 0.25 A.

(i) Calculate the resistance of each lamp. Show your working and include the unit.

resistance = [3]

(ii) What is the total current taken from the supply when both lamps are switch

current ____ A [1]

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The Periodic Table of the Elements **DATA SHEET**

								Gre	Group								
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							-										4
							I										He
							Hydrogen 1										Helium 2
7	o							_				11	12	14	16	19	20
=	Be											Ф	ပ	z	0	ш	Se
2 Lithium	Beryllium 4											Boron 5	Carbon 6	Nitrogen 7	Oxygen 8	Fluorine 9	Neon 10
23	24											27	28	31	32	35.5	40
Na	Mg											ΝI	Si			CI	Ā
Sodium 11	Magnesium 12											Aluminium 13		Phosphorus 15	Sulphur 16	Chlorine 17	Argon 18
39	40	45	48	51	52	55	56	59	29	64	65		73	75	62	80	84
¥	င္မ	လွ	F	>	ပ်	Mn	Fe	රි	Z	చె	Zn	Ga	Ge	As	Se	Ā	궃
Potassium 19	Calcium 20	Scandium 21	Titanium 22	Vanadium 23	Chromium 24	Manganese 25	Iron 26	Cobalt 27	Nickel 28	Copper 29	Zinc 30		Germanium 32	Arsenic 33	Selenium 34	Bromine 35	Krypton 36
85	88	88	91	93	96			103		108	112	115	119	122	128	127	131
Sp.	S	>	Zr	S S	Mo			Rh	Pd	Ag	ၓ		Sn	Sb	<u>P</u>	Ι	Xe
Rubidium 37	Strontium 38	Yttrium 39	Zirconium 40	Niobium 41	Molybdenum 42	Technetium 43	Ruthenium 44	Rhodium 45	Palladium 46	Silver 47	Cadmium 48	Indium 49	50 Tin	Antimony 51	Tellurium 52	lodine 53	Xenon 54
133	137	139	178	181	184	186		192		197	201	204	207	209			
S	Ba	Ľ	Ξ	Та	>		Os	ĭ	£	Αn	£	11	Pb	Ξ	Ъо	Αt	Rn
Caesium 55	Barium 56	Lanthanum 57 *	Hafnium 72	Tantalum 73	Tungsten 74	Rhenium 75	Osmium 76	Iridium 77	Platinum 78	Gold 79	Mercury 80	Thallium 81	Lead 82	Bismuth 83	Polonium 84	Astatine 85	86
	226	227															
ŗ	Ra	Ac															
Francium 87	Radium 88	Actinium 89															
*58-711	*58-71 Lanthanoid series	Sprips		140	141	144		150	152		159	162	165		169	173	
00-103	90 / 1 Editinging Scries	pripe		පී	ሗ	P N					q	۵	운	ш	Ħ	Υb	2
200-200	יף איניין ווויסר	200		Cerium	Praseodymium	Neodymium	Promethium 64	Samarium	Europium	Ε	Terbium	Dysprosium	Holmium	Erbium 68	Thulium	Ytterbium	Lutetium 71

WANN, PAPAC CAMBridge, COM **Yb**Ytterbium
70 Md Mendelevium 101 169 **Tan** Thulium Fm Fermium 100 167 **Er** Erbium Einsteinium 165 **Holmium** Californium 162 **Dy**Dysprosium
66 **BK**Berkelium
97 159 **Ter**bium Curium 96 Gadolinium 64 157 **Gd Am**Americium
95 152 **Eu**Europium
63 Pu Plutonium Samarium 62 150 **Sm** Neptunium 93 Promethium Pm Neodymium 144 **N** Pa Protactinium Praseodymium 59 ¹ 4 140 **Ge**rium 232 **7** Thorium 28 90

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

b = proton (atomic) number

Key

a = relative atomic mass X = atomic symbol