

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

	CANDIDATE NAME		
	CENTRE NUMBER		CANDIDATE NUMBER
* 5 2	COMBINED SC	IENCE	0653/22
50	Paper 2 (Core)		October/November 2013
3 2			1 hour 15 minutes
∞	Candidates ans	wer on the Question Paper.	
4 2	No Additional M	aterials are required.	
* 6			

## 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 pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer all questions.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units. A copy of the Periodic Table is printed on page 20.

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.

This document consists of 19 printed pages and 1 blank page.



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1 (a) Fig. 1.1 shows apparatus that can be used to test the electrical conductivity of the materials contained in the beakers **Q**, **R** and **S**.

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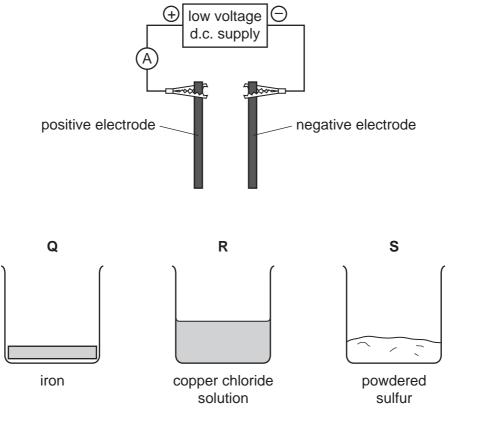


Fig. 1.1

(i) The contents of beakers **Q** and **S** are tested for electrical conductivity by lowering the electrodes into the beakers.

Predict and explain the results.

beaker Q

prediction

explanation

beaker S

prediction

explanation

[3]

- (ii) When the electrodes are lowered into the solution in beaker R, the following observations are made. Examiner's
  - Bubbles of gas form on the surface of the positive electrode.
  - A layer of an orange solid appears on the surface of the negative electrode.

Name the gas that forms and the substance in the orange layer.

gas ..... orange layer

- (iii) State the name of the process described in (ii).
  - [1] .....
- (b) Fig. 1.2 shows names and molecular structure diagrams of some compounds containing carbon.

Draw straight lines to match the structures with names. One line has been drawn as an example.

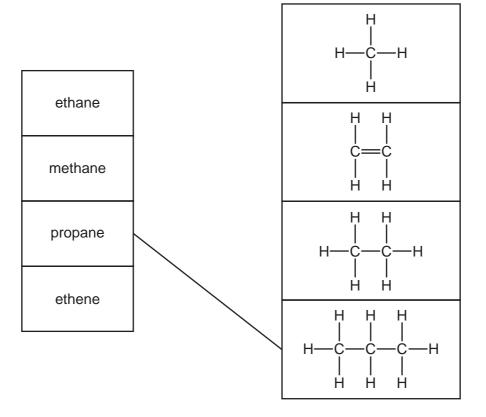


Fig. 1.2

[2]

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[2]

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(ii) Explain whether or not the molecule in Fig. 1.3 is an example of a hydrocarbon.

......[1]

[1]

(c) Fig. 1.3 shows the structure of one molecule of a type of compound called a CFC (chlorofluorocarbon).

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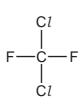


Fig. 1.3

(i) State the chemical formula of the molecule whose structure is shown in Fig. 1.3.

(a) Use the words or phrases below to complete the sentences. For Examiner's Use amplitudes frequencies speeds up slows down speed Each word or phrase can be used once, more than once, or not at all. (i) Light \_\_\_\_\_\_ when it travels from air to glass. (ii) In the electromagnetic spectrum, the waves are arranged in order of · · · · · (iii) 20 Hz to 20 000 Hz is the approximate human range of audible (iv) The \_\_\_\_\_\_ of sound waves determines the loudness of the sounds. [4]

5

(b) Fig. 2.1 shows a demonstration of sound transmission using a bell jar.

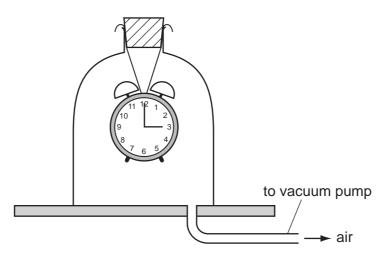


Fig. 2.1

As the air is removed from the bell jar, the ringing sound from inside the bell jar gets quieter. When all the air has been removed, the bell cannot be heard.

Explain these observations.

[3]

2

- 6
- **3** (a) Fig. 3.1 shows cross-sections of a root and a stem.

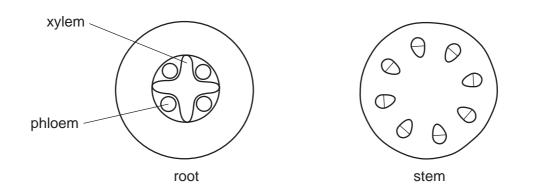


Fig. 3.1

- (i) On Fig. 3.1, use label lines to indicate the positions of the xylem and phloem on the diagram of the stem. [2]
- (ii) Describe the functions of xylem and phloem.

xylem	
,	
phloem	
-	

[4]

(b) The roots of most plants have root hairs near their tips.

Researchers grew two types of plants, A and B, in soil with different concentrations of phosphate ions. They measured the mean number of root hairs in a small area of the roots, and also the mean length of the root hairs.

Table 3.1 shows their results.

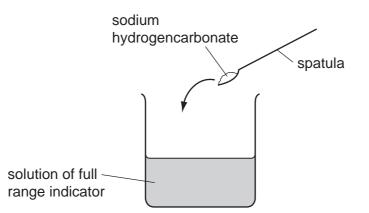
#### Table 3.1

type of plant	phosphate concentration	mean number of root hairs per unit area	mean length of root hairs/micrometres
•	low	1.26	175
A	high	1.70	149
В	low	1.41	225
D	high	1.85	52

(i) Describe **two** ways in which the addition of phosphate ions to the soil affects the root hairs in type **A** plants.

	1
	2
	[2]
(ii)	Compare the effect of adding phosphate ions to the soil for type <b>A</b> plants and for type <b>B</b> plants.
	[2]
	[4]
(iii)	Explain why a reduction in the length of its root hairs could reduce the rate of growth of a plant.
	[3]
	[0]

- **4** Sodium hydrogencarbonate, NaHCO<sub>3</sub>, is a white solid compound which is soluble in water.
  - (a) A student adds some sodium hydrogencarbonate to a beaker which containes an aqueous solution of full range indicator (Universal Indicator).



When the sodium hydrogencarbonate dissolves, the solution changes colour from green to blue.

(i) State and explain briefly how the pH of the mixture changes when the sodium hydrogencarbonate dissolves.

[2]

(ii) The student then adds excess dilute hydrochloric acid to the blue solution.

Apart from an increase in volume, state **two** observations that are made when the acid is added.

1	 
2	 
	[2]

(b) Fig. 4.1 shows apparatus a teacher uses to demonstrate the heating of sodium hydrogencarbonate.

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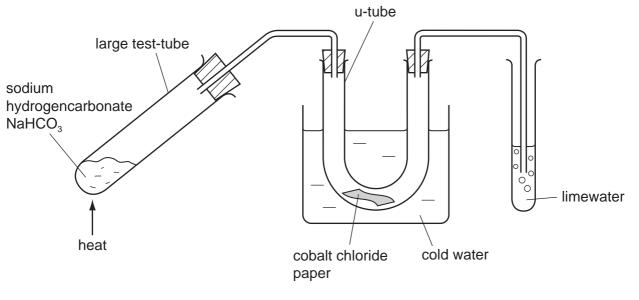


Fig. 4.1

The solid is heated strongly for a few minutes.

- The cobalt chloride paper changes colour from blue to pink.
- A gas bubbles out through the limewater, turning it cloudy.

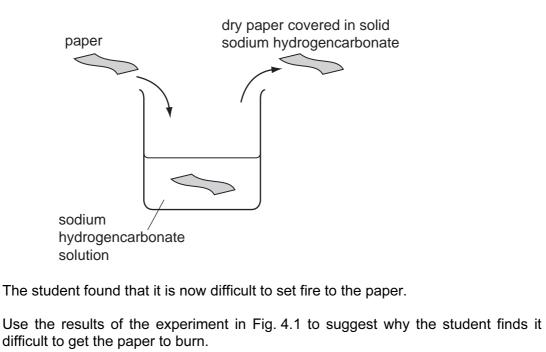
After the reaction, a white solid, sodium carbonate, remains in the large test-tube.

(i) Explain how the observations show that both water and carbon dioxide are produced.

[2]

(ii) A student places a piece of paper into a solution of sodium hydrogencarbonate.

She removes the paper and allows it to dry. She notices that crystals of solid sodium hydrogencarbonate are left on the paper.



•••••
•••••
 [2]

5 (a) Fig. 5.1 shows a bicycle with two lights **A** and **B** at the front.

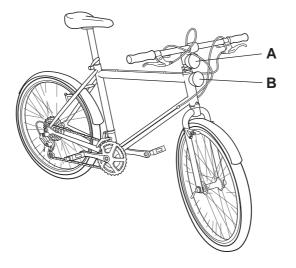
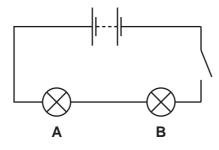


Fig. 5.1

Fig. 5.2 shows the circuit used to power the two lights.





(i) State the name given to this type of circuit arrangement.

(ii) To calculate the resistance of light **A**, the current flowing through it and the voltage across it must be measured.

On Fig. 5.2, using the correct symbols, draw an ammeter and a voltmeter correctly connected to make these measurements. [4]

	(iii)	The resistance of light <b>A</b> in the circuit is $5\Omega$ and the resistance of light <b>B</b> is $10\Omega$ .	For
		Calculate the combined resistance of the two lights.	Examiner's Use
		State the formula that you use and show your working.	
		formula	
		working	
		Ω [2]	
(b)	The 300	e bicycle was made from a block of aluminium alloy of mass 9000g and volume $10{\rm cm}^3$ .	
	Cal	culate the density of aluminium in $g/cm^3$ .	
	Sta	te the formula that you use and show your working.	
		formula	
		working	
		g/cm <sup>3</sup> [2]	
(c)	The	e bicycle is ridden by a cyclist. The cyclist is cooled by sweating.	
	Exp	plain, in terms of particles, how sweating cools his body.	
		[1]	

**6** Fig. 6.1 shows the male reproductive system.

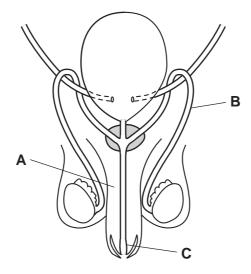


		Fig. 6.1
(a)	Na	me the parts labelled <b>A</b> , <b>B</b> and <b>C</b> .
	Α.	
	в.	
	с.	[3]
(b)		infection may block the tube labelled <b>B</b> . If the tube on the other side is also blocked, man may be unable to have children.
	Exp	plain why.
		[2]
(c)		//AIDS is a disease that can be passed on by sexual intercourse.
	(i)	What does HIV stand for?
	(ii)	State <b>one</b> way in which a man with HIV/AIDS can avoid passing it to another person.

- 7 (a) The elements chlorine, bromine and iodine are found in Group 7 of the Periodic Table.
  - (i) Complete Table 7.1 by writing the physical state (solid, liquid or gas) at room temperature (20 °C) of the elements.

		Table 7	.1	
		element	physical state	
		bromine		
		iodine		
				[1]
(ii)	Explain why an iodin	e atom is larger a	ind heavier than a	bromine atom.
				[2]
(iii)	An aqueous solutic potassium iodide.	on containing chl	orine is added t	o a colourless solution of
	chlorine so	lution	– colourless soluti potassium iodid	
	Describe and explain	n briefly what is ol	oserved in this rea	action.
	observation			
	explanation			
				[2]

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(b) Explain why a dilute solution of chlorine is usually added to drinking water before it is supplied to homes.
 [2]
 (c) Helium is a gas found in Group 0 of the Periodic Table.
 Some helium is added to a flask containing chlorine and left for a few days.
 Predict and explain whether the flask now contains a mixture of the two elements or a compound.

[2]

- 8 (a) Fig. 8.1 shows a car moving along a road.
  - (i) Draw and label arrows on Fig. 8.1 to show the directions of the driving and friction forces acting on the car. [1]

16



- (ii) State **one** source of friction on the moving car.
- [1]
- (iii) The driving and friction forces are balanced.

Explain what is meant by the phrase forces are balanced.

(iv) Describe the movement of the car when these forces are balanced.
 [1]
 (v) Apart from the driving and friction forces there are other forces acting on the car.

Name one of these forces.

......[1]

(b) (i) The car travels a distance of 400 m down a hill in 25 seconds.

Calculate the average speed of the car.

State the formula that you use and show your working.

formula

working

\_\_\_\_\_m/s [2]

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(ii)	The car is going faster at the bottom of the hill than it was at the top.		For Examiner's
	State the type of energy which the car has gained.	[1]	Use
(iii)	State the type of energy which the car will have lost as it travels down the hill.		
		[1]	

(a) Fig. 9.1 shows a food web in the Antarctic Ocean. 9 For Examiner's Use blue whale fish dolphin microscopic krill squid · sperm whale green plants e.g. algae Fig. 9.1 (i) State the term used for organisms such as the microscopic green plants that make their own organic nutrients. [1] (ii) Name one organic nutrient that is made by the green plants. [1] ..... (iii) State what is shown by the arrows in the food web. [1] (b) Fishing boats catch large quantities of krill in the Antarctic Ocean. Suggest how this could affect the numbers of the organisms in the food web in Fig. 9.1. [2] (c) There is concern that global warming will damage the environment in the Antarctic Ocean. Name two gases that contribute to global warming. 1 ..... 2 [2] .....

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	١١			0	<u></u>	Fluorine 9	35.5	C1	Chlorine 17	80	Ŗ	Bromine 35	127	-	lodine 53		At	Astatine 85				173	Ytterbium	0/	QN	Nobelium 102
	N			16	2 0	Oxygen 8		S	Sulfur 16	62	Se	Selenium 34	128	Te	Tellurium 52		Ро	Polonium 84				169	Thulium <b>B</b>	69	ΡM	Ę
	>			14	± Z	Nitrogen 7	31	٩	Phosphorus 15	75	As	Arsenic 33	122	Sb	Antimony 51	209	Bi	Bismuth 83				167 <b>T</b>	Erbium	68	ШЦ	Fermium 100
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										48	Ħ	Titanium 22	91	Zr	Zirconium 40	178	Ħ	Hafnium 72						ic mass		nic) number
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	1				Be "	Beryllium	24	Mg	Magnesium 12	40	Ca	Calcium	88	Sr	Strontium 38	137	Ba	Barium 56	226		88	*58-71 Lanthanoid series	†90-103 Actinoid series		; ×	ھ <b>؛</b>
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