

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

Origin Com



CANDIDATE NAME						
CENTRE NUMBER				CANDIDATE NUMBER		

CHEMISTRY 0620/02

Paper 2 October/November 2008

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may need to use a pencil for any diagrams, graphs 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			
Total			

1 hour 15 minutes

This document consists of 16 printed pages.



	2 ble gives some information about five elements, A, B, C, D ete the table by writing either metal or non-metal in the last	and E.	For iner's
element	properties	metal or non-metal	26.C
Α	shiny solid which conducts electricity		OW
В	reddish brown liquid with a low boiling point		
С	a form of carbon which is black in colour and conducts electricity		
D	white solid which is an insulator and has a high melting point		
E	dull yellow solid which does not conduct heat		

I١	51
L	

(b)	Describe	how	metallic	character	changes	across	a Period
-----	----------	-----	----------	-----------	---------	--------	----------

[1]

(c) Sodium is in Group I of the Periodic Table.

(i) Draw a diagram to show the full electronic structure of sodium.

[1]

(ii) Complete the equation to show what happens when a sodium atom forms a sodium ion.

			3	**ZEV	A STAR CAMP
(d) Comple from th		ences about the p	roperties of the Grou	p I elements usir	19 Tal Canne
acidic	basic	de	ecrease	hard	
incr	ease	lithium	potassium	sof	t
The Group I ele	ments are relat	ively	metals whicl	n	in
reactivity going	down the Grouլ	o. Sodium reacts m	nore violently with wat	er than	·
The Group I me	tals all form		oxides.		[4]
				Т]	otal: 12]

[1]

the right For iner's (a) Match up the atmospheric pollutants on the left with their main source on the right 2 The first one has been done for you. chlorofluorocarbons car exhausts sulphur dioxide aerosol sprays combustion of fossil carbon monoxide fuels containing sulphur incomplete combustion nitrogen oxides of fossil fuels [3] (b) One stage in the manufacture of sulphuric acid involves the oxidation of sulphur dioxide by oxygen in the air to form sulphur trioxide. $2SO_2 + O_2 \longrightarrow 2SO_3$ (i) Explain how this reaction shows that sulphur dioxide is oxidized. [1] (ii) What is the percentage of oxygen in clean air? [1] (iii) Sulphuric acid is used to make the fertiliser ammonium sulphate. ammonia + sulphuric acid → ammonium sulphate What type of reaction is this?

(iv)	Why do farmers need to use fertilisers?	Cambri
(v)	Another fertiliser can be made by the reaction of ammonia with nitric acid. State the chemical name of this fertiliser.	[2]
		[1]
	[Tota	al: 9]

[1]

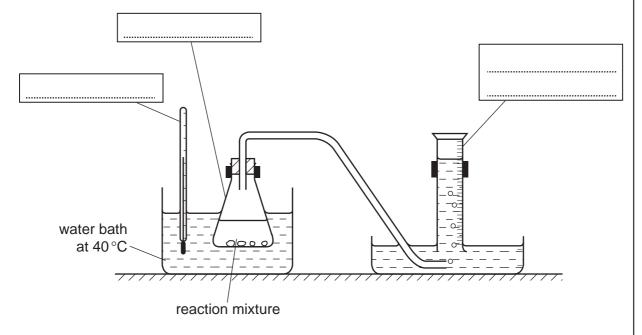
- 3 Calcium carbonate, CaCO₃, is the raw material used in the manufacture of lime, CaC
 - (a) (i) Describe how lime is manufactured from calcium carbonate.

[1	1]
	-

(ii) Write a symbol equation for this reaction.

(iii)	State one large scale use of lime.	
		[1]

- **(b)** A student investigated the speed of reaction of calcium carbonate with hydrochloric acid using the apparatus shown below.
 - (i) Complete the labelling of the apparatus by filling in the three boxes. [3]



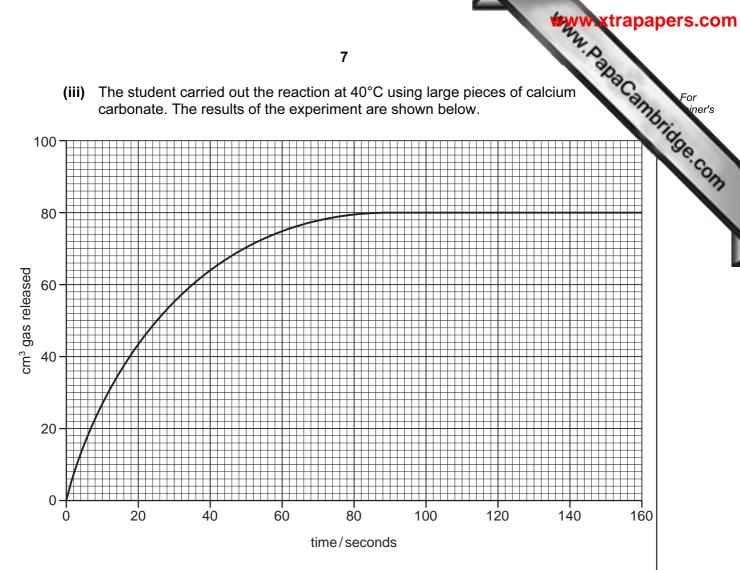
(ii) The equation for the reaction is

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + CO_2 + H_2O$$

Write the word equation for this reaction.

(iii) The student carried out the reaction at 40°C using large pieces of calcium carbonate. The results of the experiment are shown below.





At what time did the reaction stop?

11	П
	1
 •	-

- (iv) The student repeated the experiment using the same mass of powdered calcium carbonate. All other conditions were kept the same. On the grid above, sketch the graph for the reaction with calcium carbonate powder. [2]
- (v) How does the speed of reaction change when

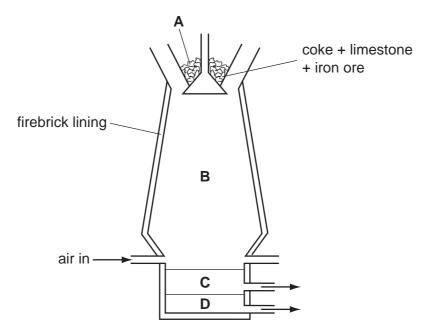
the concentration of hydrochloric acid is decreased,

the temperature is increased? [2]

[Total: 13]



(b) The diagram shows a blast furnace.



(i)	Which one of the raw materials is added to the blast furnace to help remove the
	impurities from the iron ore?

 [1]

- (ii) The impurities are removed as a slag. Which letter on the diagram shows the slag?

 [1]
- (c) Carbon monoxide is formed in the blast furnace by reaction of coke with oxygen.
 - (i) Complete the equation for this reaction.

(ii) State the adverse affect of carbon monoxide on human health.

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111
F . 1

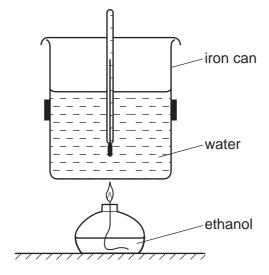
Which two of these sentences correctly describe this reaction? Tick two boxes.

	The	e iron oxide gets reduced.		
	The	e reaction is a thermal decomposition.		
	The	e carbon gets oxidised.		
	The	e carbon gets reduced.		
	Caı	bon neutralises the iron oxide.		[1]
(e)	Alu	minium cannot be extracted from aluminium oxid	de in a blast furnace.	
	Exp	plain why aluminium cannot be extracted in this v	vay.	
				[2]
(f)	(i)	State the name of the method used to extract a	lluminium from its oxide ore.	
				[1]
	(ii)	State one use of aluminium.		
				[1]

[Total: 11]

The apparatus shown below can be used to measure the energy released when a liq is burnt. The amount of energy released is calculated from the increase in temperature 5 known amount of water.





(a)	(1)	explain how this experiment shows that the burning of ethanol is an exother reaction.	mic
			[1]
	(ii)	Complete the word equation for the complete combustion of ethanol.	
		ethanol + oxygen → +	[2]
(b)		anol is a fuel containing carbon. te the names of two other commonly used fuels containing carbon.	
		andand	[2]
(c)	Giv	e the formula of the functional group present in ethanol.	
			[1]
(d)	The	e can contains water. Describe a chemical test for water.	
	tes	t	
	res	ult	[2]

(e)	The	e iron can used in this experiment rusts easily.	S.Cal
	(i)	Describe a method which can be used to prevent iron from rusting.	10
	(ii) (iii)	Rust contains hydrated iron(III) oxide. What do you understand by the term <i>hydrated</i> ? Iron is a transition metal. State two properties which are typical of transition metals.	[1]
		[Total:	 [2]

6 The compound shown below is the first member of the alkane homologous series.

H | H—C—H | H

12

(a) State two characteristics of a homologous series.

 	 	•••••••

(b)	Name and draw the structure of the next member of the alkane homologous series.
-----	---

structure

name

[2]

[2]

(c) Complete the table to show the structure and uses of some organic compounds.

name of compound	molecular formula	structure (showing all atoms and bonds)	use
ethene	C₂H₄		
ethanoic acid	C ₂ H ₄ O ₂		making esters
dibromoethane		Br Br H—C—C—H H H	
	CH₄	H H—C—H H	

(d) Calculate the relative molecular mass of dibromoethane.

For iner's

[1]

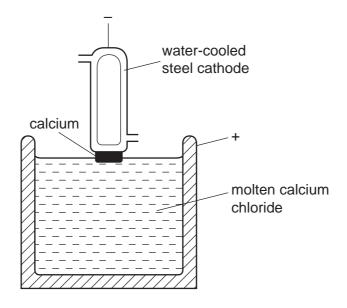
[Total: 11]

7

[2]

WWW. Papa Cambridge Com The diagram shows the structures of calcium chloride, calcium and chlorine. C1-Cl-Cl-Cl-(Ca²⁺ (Ca²⁺ Cl-Cl-Clcalcium chloride calcium chlorine (a) Use ideas about structure and bonding to explain the following: (i) Calcium chloride conducts electricity when molten but not when solid. [2] (ii) At room temperature, calcium is a solid but chlorine is a gas.

(b) Calcium is manufactured by the electrolysis of molten calcium chloride.



	(i)	State the products formed	
		at the anode,	
		at the cathode.	[2]
	(ii)	Suggest a non-metal that can be used as an anode in this electrolysis.	
			[1]
	(iii)	A stream of inert gas is blown over the calcium as it is removed from the mol calcium chloride.	ten
		Suggest why a stream of inert gas is blown over the hot calcium.	
			[1]
	(iv)	State the name of a gas which is inert.	
			[1]
(c)	solu	ueous sodium hydroxide or aqueous ammonia can be used to test for calcium ions ution. scribe the results of these tests	s in
	wit	h aqueous sodium hydroxide,	
			[2]
	wit	h aqueous ammonia.	
			[1]

[Total: 12]

	Elements
DATA SHEET	Table of the
Ď	The Periodic
	È

									1	*****	AdhaCambridge.Co.
					1	6					aba
	0	4 Heium	20 Ne Neon 10	40 Ar Argon	84 Krypton 36	131 Xe Xenon 54	Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103	Candy
			19 Fluorine	35.5 C1 Chlorine	80 Br Bromine 35	127 I lodine 53	At Astatine 85		173 Yb Ytterbium 70	No Nobelium 102	Be.C.
	I		16 Oxygen 8	32 S Sulphur 16	Selenium	128 Te Tellurium	Po Polonium 84		169 Tm Thullum 69	Md Mendelevium 101	
	>		14 N itrogen 7	31 P Phosphorus 15	75 AS Arsenic 33	122 Sb Antimony 51	209 Bis Bismuth		167 Er Erbium 68	Fm Fermium 100	
	2		12 Carbon 6	28 Si Silicon 14	73 Ge Germanium 32	Sn Tin 50	207 Pb Lead		165 Ho Holmium 67	ES Einsteinium 99	(r.t.p.).
	≡		11 Boron 5	27 A1 Aluminium 13	70 Ga Gallium 31	115 In Indium	204 T (Thallium		162 Dy Dysprosium 66	Cf Californium 98	The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
					65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury		159 Tb Terbium 65	BK Berkelium 97	ature and
					64 Copper Copper	108 Ag Silver 47	197 Au Gold		157 Gd Gadolinium 64	Cm Curium	n tempera
Group					59 Nickel	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63	Am Americium 95	n³ at roon
Gr					59 Cobalt	103 Rh Rhodium 45	192 Ir Iridium		150 Sm Samarium 62	Pu Plutonium 94	s is 24 dr
		T Hydrogen			56 Fe Iron 26	101 Ru Ruthenium 44	190 Os Osmium 76		Pm Promethium 61	Np Neptunium 93	of any ga
					Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75		144 Nd Neodymium 60	238 U Uranium 92	one mole
					Cr Chromium 24	96 Mo Molybdenum 42	184 W Tungsten 74		141 Pr Praseodymium 59	Pa Protactinium 91	olume of c
					51 V Vanadium 23	93 Nb Niobium 41	181 Ta Tantalum		140 Ce Cerium	232 Th Thorium	The ×c
					48 T Itanium	2r Zirconium 40	178 Hf Hafnium			iic mass ool iic) number	
					Sc Scandium 21	89 ≺	139 La Lanthanum 57 *	227 Ac Actinium 89	series eries	 a = relative atomic mass X = atomic symbol b = proton (atomic) number 	
	=		9 Be Beryllium	24 Mg Magnesium	40 Ca Calcium 20	Sr Strontium 38	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series	a X a B D D D D D D D D D D D D D D D D D D	
	_		7 Li thium	23 Na Sodium	39 Potassium	85 R b Rubidium	133 CS Caesium 55	Fr Francium 87	58-71 La 90-103 A	Key	

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