



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

1 hour 15 minutes

CANDIDATE NAME		
CENTRE NUMBER	CANDIDATE NUMBER	
CHEMISTRY		0620/02
Paper 2	Oct	tober/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		

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		For iner's
element	properties	metal or non-metal	De.C
А	shiny solid which conducts electricity		3
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		

[5]

(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.

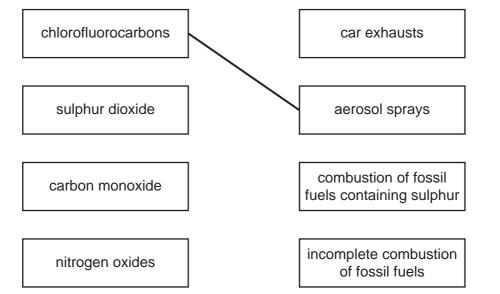
[1]

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

			3		s using Part ann
(d) Comple from the		nces about the p	properties of the	Group I elements	s using Conn
acidic	basic	d	lecrease	hard	
incre	ease	lithium	potass	sium	soft
The Group I eler	nents are relati	vely	metals ·	which	in
reactivity going o	down the Group	o. Sodium reacts r	more violently with	n water than	·
The Group I met	als all form		oxides.		[4]
					[Total: 12]

[3]

2 (a) Match up the atmospheric pollutants on the left with their main source on the righ. The first one has been done for you.



(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?

[1]

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

iner's

- ne, CaO. For iner's
- 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
 -	

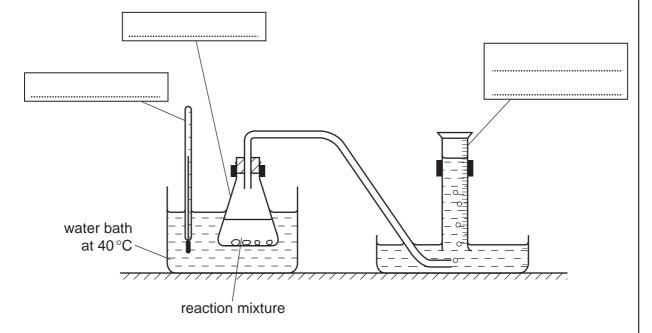
(ii) Write a symbol equation for this reaction.

П	1	ı	
•		-	

(iii) State one large scale use of lime.

. 1	I
 ٠,	J

- **(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]

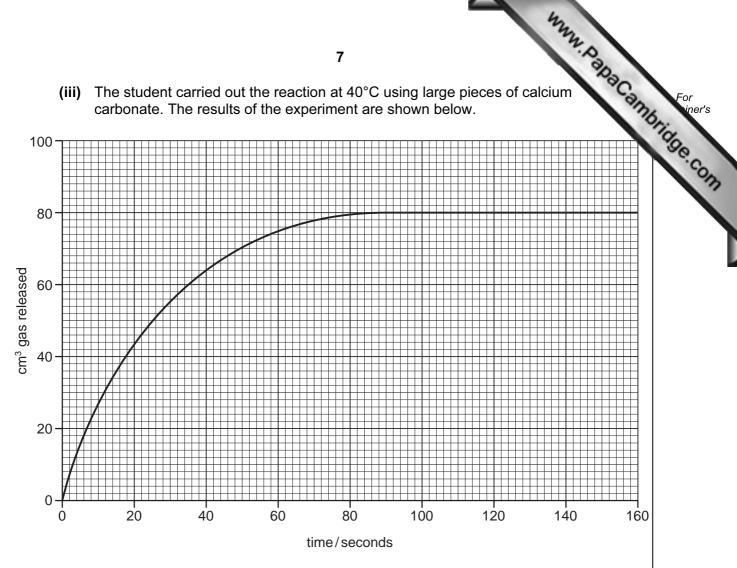


(ii) The equation for the reaction is

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

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 reacti	on stop?	ton?
-----------------------------	----------	------

11	1
1 '	ı
-	-

- (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,

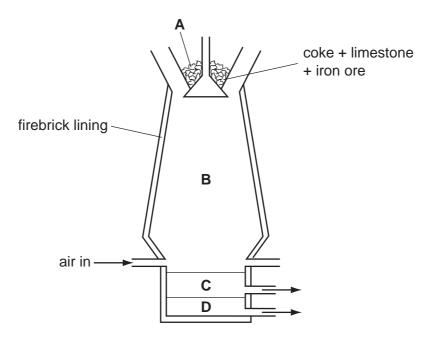
the temperature is increased? [2]

[Total: 13]

- Iron is extracted from its ore in a blast furnace.
 - (a) State the name of the ore from which iron is extracted.

www.PapaCambridge.com

(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.

[2]

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

[1]

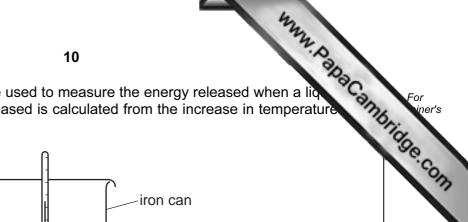
$$Fe_2O_3 + 3C \longrightarrow 2Fe + 3CO$$

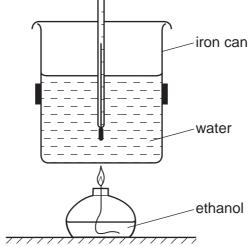
Which two of these sentences correctly describe this reaction? Tick **two** boxes.

	The	e iron oxide gets reduced.		
	The	e reaction is a thermal decomposition.		
	The	e carbon gets oxidised.		
	The	e carbon gets reduced.		
	Cai	bon neutralises the iron oxide.		[1]
(e)		minium cannot be extracted from aluminium oxicolations of the contracted in this with the cannot be extracted in the cannot be extracted in this with the cannot be extracted in the		
				 [2]
	•••••			[-]
(f)	(i)	State the name of the method used to extract a	luminium 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 liquis burnt. The amount of energy released is calculated from the increase in temperature 5 known amount of water.





(a)	(1)	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.	
		and	[2]
(c)	Giv	e the formula of the functional group present in ethanol.	[1]
	•••••		ניו
(d)	The	e can contains water. Describe a chemical test for water.	
	tes	rt	
	res	sult	[2]

(e)	The	e iron can used in this experiment rusts easily.	Cal
	(i)	Describe a method which can be used to prevent iron from rusting.	/
			[1]
	(ii)	Rust contains hydrated iron(III) oxide. What do you understand by the term hydrated?	
		Timat as you anasistana by the term hydrateur	[1]
ı	(iii)	Iron is a transition metal. State two properties which are typical of transition metals.	
			[2]
		[Total:	12]

For iner's 6 The compound shown below is the first member of the alkane homologous series.

(a) State two characteristics of a homologous series.

	[2]

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

name	

structure

[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.

www.PapaCambridge.com

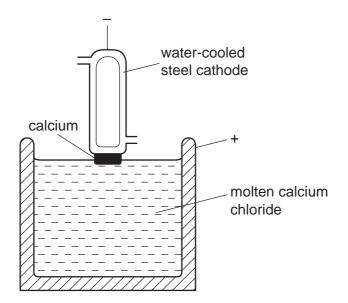
[1]

[Total: 11]

7

www.papaCambridge.com The diagram shows the structures of calcium chloride, calcium and chlorine. C1-Cl-Cl-Cl-Ca²⁺ (Ca²⁺ 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. [2]

(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]
		h aqueous ammonia.	
			[1]

[Total: 12]

www.PapaCambridge.com

	0	Helium	20 Neon	40 Ar Argon	84 Kr	131 Xe Xenon	Rn Radon 86		Lu Lutetium
	_		10	8	36	5			
			19 Fluorine	35.5 C1 Chlorine	80 Br Bromine 35	127 I lodine	At Astatine 85		Yb Ytterbium
	N		16 Oxygen	32 S Sulphur 16	Se Selenium 34	128 Te Tellurium 52	Po Polonium 84		169 Tm Thulium
	>		14 N Nitrogen 7	31 Phosphorus 15	75 AS Arsenic	122 Sb Antimony 51	209 Bis Bismuth		167 Er Erbium
	>		12 Carbon 6	28 Silicon	73 Ge Germanium	119 Sn Tin	207 Pb Lead 82		165 Ho Holmium
	≡		11 Boron 5	27 A1 Aluminium	70 Ga Gallium 31	115 In Indium 49	204 T t Thallium		162 Dy Dysprosium
					65 Zn Znc 30	112 Cd Cadmium 48	201 Hg Mercuny 80		159 Tb
					64 Cu Copper 29	108 Ag Silver	197 Au Gold		157 Gd Gadolinium
dn					59 Nickel Nickel	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium
Group					59 Co Cobalt	103 Rh Rhodium	192 Ir Iridium		Samarium
		T Hydrogen			56 Te Iron	101 Ru Ruthenium 44	190 Os Osmium 76		Pm Promethium
			,		Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75		Neodymium
					52 Cr Chromium 24	96 Mo Malybdenum 42	184 W Tungsten 74		Praseodymium
					51 V Vanadium 23	93 No Niobium	181 Ta Tantalum		Cerium
					48 二 Trtanium	91 Zr Zirconium 40	178 Hf Hafnium 72		
					Scandium 21	89 ≺ Yttrium 39	139 La Lanthanum 57 *	227 Ac Actinium †	series eries
	=		Be Beryllium	24 Mg Magnesium	40 Ca Calcium	Strontium 38	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series
	_		7 Li Lithium	23 Na Sodium	39 K Potassium 19	Rb Rubidium	133 CS Caesium 55	Fr Francium 87	*58-71 La

www.papaCambridge.com Erbium Fm Es Dy Dysprosium 66 Californium 98 ರ **BK**Berkelium
97 **P C**urium Am Pu Plutonium Neptunium 93 Ра 232 **Th** Thorium Serium Cerium 28 90

b = proton (atomic) number

a = relative atomic mass X = atomic symbol

Key

Mo

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.