Paper Reference (complete below)	I	nitial(s)	)
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Paper Reference(s)	Exami	ner's use	e oi
6241.P01			
Edexcel GCE	Team Le	ader's u	ise (
Chemistry			i
Advanced Subsidiary			
Unit Test 1		Question Number	Le Bl
Wednesday 29 May 2002 - Morning		1	
Time: 1 hour 15 minutes		2	
Materials required for examination	ſ	3	
Nil Nil	Ţ	4	
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Instructions to Candidates	<u> </u>	8	
In the boxes above, write your centre number, candidate number, your surname and initials, the paper reference and your signature. The paper reference is shown above.	_		
Answer ALL questions in the spaces provided in this question paper.  Show all the steps in any calculations and state the units. Calculators may be used.	ļ		
Information for Candidates			
A periodic table is printed on the back cover of this question paper.  The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).  The total mark for this paper is 75.	_		
			<u> </u>
Advice to Candidates			

Turn over

Total





1. (a) Complete the following table:

Leave blank

Element	State at room temperature
Chlorine	Gas
Bromine	
Iodine	

**(2)** 

(b)	Describe how you could use solutions of silver nitrate and ammonia to distinguish a solution of sodium iodide from a solution of sodium bromide.
	(4)

Q1

(Total 6 marks)

<b>2.</b> (a	ı)	Complete and balance the following equations:	<u>I</u>
		(i) $Ca + O_2 \longrightarrow \dots$	l
		(ii) $Na_2O + H_2O \longrightarrow \dots$	
		(iii) $Na_2O + HCl \longrightarrow$	
		(2)	
(b		State and explain the trend in thermal stability of the carbonates of the Group 2 elements as the group is descended.	
		(3)	Q2
		(Total 7 marks)	

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3

3.	(a)		w the shape of each of the following molecules and mark on the diagram a e for the bond angle in each case.
		(i)	CH <sub>4</sub>
		(ii)	$NH_3$
		(iii)	BeCl <sub>2</sub> (2)
			(2)
	(b)		ne the strongest type of intermolecular force present in separate samples of n of the following substances:
		(i)	$\mathrm{CH}_4$
			(1)
		(ii)	HF
			(1)

Leave blank

N11696

Leave blank	State and explain which of the substances CH <sub>4</sub> and HF has the higher boiling temperature.
Q3	(2)
	(Total 10 marks)

**4.** (a) Complete the following table:

Particle	Relative charge	Relative mass
Proton		1
Electron	-1	
Neutron		1

		(3
(b)	State the number of each of the above particles present in one molecule of (showing clearly how you arrive at your answer.	$^{\circ}\mathrm{H}_{4}$
		••••
		•••••
		(3
(c)	Complete the electronic configuration of a chlorine atom.	(*)
	1s <sup>2</sup>	
(d)	Give the <b>formula</b> of the chlorine species composed of 17 protons, 20 neutrons 16 electrons.	(1) and
		(2)
(e)	Write one equation in each case to represent the change occurring when following quantities are measured.	the
	(i) The first electron affinity of sulphur.	
	(ii) The first ionisation energy of sulphur.	(2)
		 (1)

(f)	Explain why the first ionisation energy of chlorine is higher than that of sulphur.	Leave blank
	(2)	Q4
	(Total 14 marks)	

5. (a) (i) Calculate the number of moles of potassium nitrate, KNO<sub>3</sub>, in 10.1 g of KNO<sub>3</sub>.

Leave blank

**(1)** 

(ii) Potassium nitrate, KNO<sub>3</sub>, can be prepared from potassium hydroxide solution as shown in the following equation:

$$KOH(aq) + HNO_3(aq) \longrightarrow KNO_3(aq) + H_2O(1)$$

Calculate the minimum volume, in  $cm^3$ , of 2.00 mol dm<sup>-3</sup> KOH required to produce 10.1 g of KNO<sub>3</sub>.

**(2)** 

(iii) Potassium nitrate decomposes, when heated, to produce oxygen.

$$2KNO_3(s) {\:\longrightarrow\:} 2KNO_2(s) + O_2(g)$$

Calculate the volume of oxygen gas, in dm<sup>3</sup>, produced when 10.1 g of potassium nitrate decomposes in this way.

(1 mole of gas has a volume of 24 dm<sup>3</sup> under the conditions of the experiment.)

**(2)** 

(i)	Calculate the empirical formula of this compound, using the data above and the periodic table.  (3)  0.200 moles of this compound has a mass of 22.0 g. Use this information to help you deduce the molecular formula of this compound.		Leave blank
	(2) (Total 10 marks)	(	)5

5.	(a)	State the structure of, and the type of bonding in, the following substances.  Draw labelled diagrams to illustrate your answers.
		(i) Graphite
		Structure
		Bonding
		Diagram:
		(4)
		(ii) Sodium chloride
		Structure
		Bonding
		Diagram:

(3)

Leave blank

(b)	Ex	plain why both graphite and sodium chloride have high melting temperatures.		eave lank
	*****			
			!	
(c)	(i)	Explain why graphite is able to conduct electricity in the solid state.		
	(ii)	Explain why sodium chloride conducts electricity in the liquid state.		
		(1)	Q	6
		(Total 13 marks)		

(a) Hydrogen sulphide is produced when concentrated sulphuric acid is added to solid 7. sodium iodide, but sulphur dioxide is produced when concentrated sulphuric acid is added to solid sodium bromide. Complete the following table: Oxidation number of sulphur Compound Formula in compound Sulphuric acid  $H_2SO_4$ Hydrogen sulphide  $H_2S$ Sulphur dioxide  $SO_2$ (ii) Use your answers to part (a)(i) to suggest which of the ions, iodide or bromide, has the greater reducing power. Write an ionic half-equation to show the oxidation of chloride ions, Cl-, to (b) (i) chlorine, Cl<sub>2</sub>. (ii) Write an ionic half-equation to show the reduction of chlorate(I) ions, OCl<sup>-</sup>, to chloride ions, in acidic conditions. ..... (iii) Bleach is a solution of chlorate(I) ions and chloride ions. Combine the two ionic half-equations above to produce an equation which shows the effect of adding acid to bleach.

**Q7** 

(1)

Leave

blank

(Total 9 marks)

(a) T	The hydrated metal ion $[Mg(H_2O)_6]^{2+}$ contains covalent bonds and dative covalence bonds.				
(1	i) Name two elements in $[Mg(H_2O)_6]^{2+}$ which are joined by a covalent bo	nd.			
		(1)			
(1	ii) Name two elements in $[Mg(H_2O)_6]^{2+}$ which are joined by a dative covarbond.	lent			
		(1)			
(b) (i	On the following diagram of a water molecule draw partial charges on eatom to show the bond polarities:	ach			
	Н				
(ii		(1)			
(ii	ii) Explain whether or not a water molecule is polar overall.	(2)			
		Q8			
	(Total 6 mark				
	TOTAL FOR DADED, 75 MADE	<del></del>			

**END** 

## THE PERIODIC TABLE

	-	7					Ü	Group					m	4	S.	9	7	0
Period																		
								Key										7
-	Hydrogen						Molar n	Molar mass g mol	- "									Helium
	_							Symbol									4	,
	7							Name				_	=	22	14	91	19	20
7	Ľ						Atom	Atomic number	$\neg$				m,	<u>၂</u>	Z,	0	щ	Se
	Lithium												Boron 5	Lamon 6	Nidrogen 7	OXygen 8	- 6 - 6	10
	23	_										I	1.7	28	31	32	35.5	40
جر:	Z												F	Si	പ	S	ひ	Ar
ì	Sodium												Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon
	=	_	 								, «,		2	4 6	2 ;	٤	- 6	8 2
•	33		÷ 5	\$ F	15 >	2 ر	S	× 1	» c	? <u>;</u>	5.50	8 V	ع ج	ع و	C V	÷ 2	À	: <del>\</del>
<del>1</del>	Potassium		Scandium	Titanium	Vanadium		Manganese	) <u>E</u>	Cobalt	Nickei	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
	61		21	22	23	24	23	56	27	28	29	30	31	32	33	34	35	36
	\$8	_	68	<u>-</u> 5	63	96	66	101	103	901	801	112	115	119	122	82.	127	13
vo	Въ		7	Zr	g	Mo	ည	Ru	뫈	Pd	Ag	P C	In	Sn	Sp	Le		×e
	Rubidium		Yttrium	Zirconium	Niobium	Motybdenum	Technetium 41	Ruthenium 44	Rhodium 45	Palladium 46	Silver 47	Cadmium 48	Indium 49	£ 8	Antimony	Tellumum 52	Lodine 53	Xenon 54
	133		139	87.1	181	184	98!	061	192	361	197	201	204	202	500	210	210	222
9	CS		La	Hf	Та	3	Re	SO	Ir	Z	Au	Hg	E	Pb	Bi	Po	At	Rn
	Caesium 55	Barium 56	Lanthanum 57	Hafnium 72	Tantalum 73	Tungsten 74	Tungsten Rhenium	Osmium 76	Iridium 77	Platinum 78	Sold 33	Mercury 80	Thallium 81	Lead 82	Bismuth 83	Polonium 84	Astatine 85	Radon 86
	223	+	227															
7	Fr		Ac															
	Francium 87		Actinium 89															
	ò	-																

Ľ	Lutetium 71		(257)	Ľ	Lawrencium 103	
Ϋ́β	Ytterbium 70		(254)	°N	Nobelium 102	
Tm	Thulium 69		(256)	Md	Mendelevium 101	
Ë	Erbium 68		(253)	Fm	<b>Fermium</b> 100	
H.	Holmium 67		(254)	Es	Einsteinium 99	
Ē Ā	Dysprosium 66		(251)	Cť	Californium 98	
ξ. L	Terbium 65		(245)	Bk	Berkelium 97	
B	Gadolinium 64		(247)	Cm	Curium 96	
En En	Europium 63		(243)	Am	Americium 95	
Sm	Samarium 62		(242)	Pu	Plutonium 94	
Pm	Promethium 61		(237)	αN	Neptunium 93	
4 Z	Neodymium 60		238	Ω	Uranium 92	
Pr	Praseodymium 59		(1831)	Pa	Protactínium 93	
္ ပ	Cerium 58		232	Th	Thorium 90	,
		•				