

JUNE 2002

GCE Advanced Subsidiary Level

MARK SCHEME

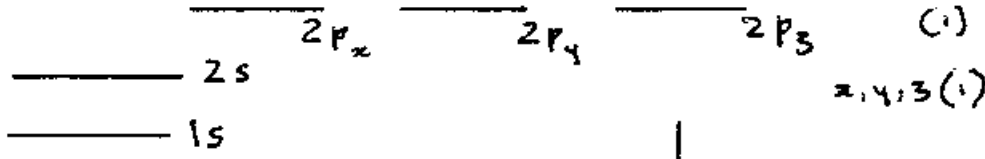
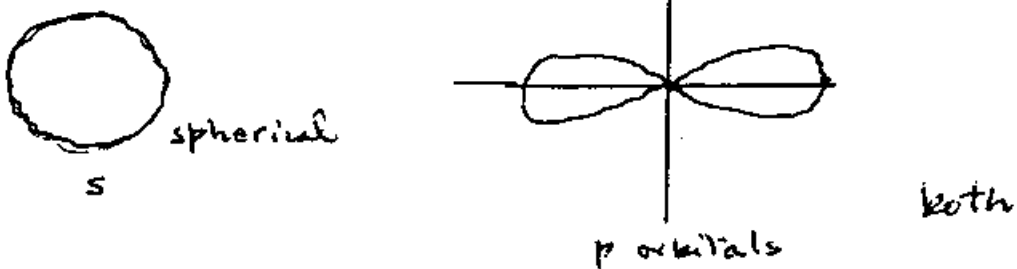
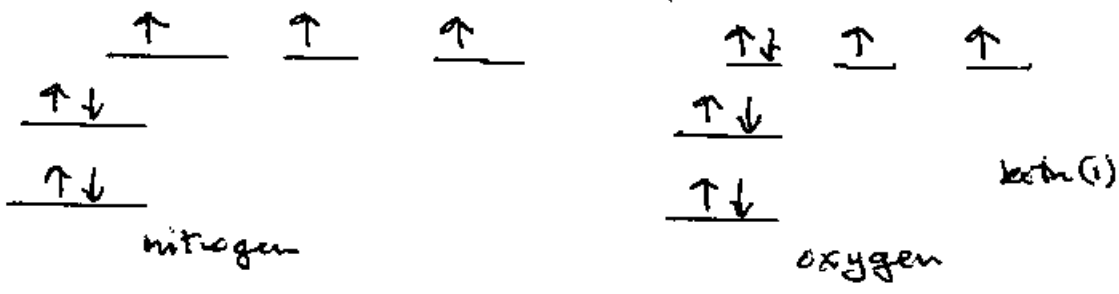
MAXIMUM MARK : 60

SYLLABUS/COMPONENT :9701 /2

**CHEMISTRY
(STRUCTURED QUESTIONS (AS))**



Page 1	Mark Scheme	Syllabus	Paper
	AS Level Examinations – June 2002	9701	2

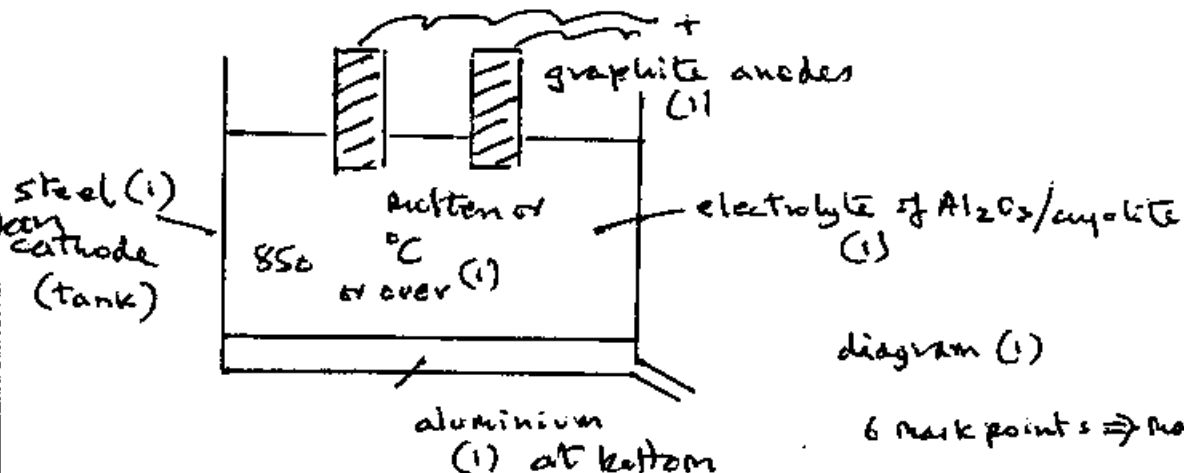
Question Number	Mark Scheme Details	Part Mark
(a)(i)	The six <u>electrons</u> of carbon. / some reference to charge.	
(ii)	The electrostatic attraction from the oppositely charged protons.	[3]
(iii)	The <u>nucleus</u> (give credit if answered in (ii)).	
(b)(i)		[2]
(ii)		[1]
(iii)		[1]
(iv)	1st IE. N is 1410 O is 1310 <u>OR</u> $N > O$ (1)	
	explanation in terms of electron repulsion within doubly occupied p orbital half-filled <u>OR</u> symmetry of ^{three} p orbitals of single occupancy (1) <u>NOT</u> 3 electrons are stable	[2]
(c)(i)	N^{3-} and O^{2-} both (1)	
(ii)	These anions have complete outer / inert gas configuration	[2]
	<u>OR</u> I.E values too large for stability of cations (1)	[1]

NOT electronegative.

Page 2	Mark Scheme	Syllabus	Paper
	AS Level Examinations – June 2002	9701	2

Question Number	Mark Scheme Details	Part Mark
2 (a)	$\begin{array}{ccc} \text{C}_2\text{H}_4 & + \text{H}_2\text{O} & \longrightarrow \text{C}_2\text{H}_5\text{OH} \\ -1418 & & -1367 \\ \Delta H = & (1) & 44 \text{ kJ mol}^{-1} \end{array}$	[2]
(b) (i)	* ΔH when 1 mol of ^{element or compound (1)} a substance is completely combusted (1)	
(ii)	Under standard conditions H_2O & $\text{C}_2\text{H}_5\text{OH}$ are liquids (1)	
(iii)	$\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \longrightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$ (1)	4
(c)	dipole (1) H bond (1) [Total 8] * Some energy reference required.	2

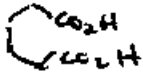
Page 3	Mark Scheme	Syllabus	Paper
	AS Level Examinations – June 2002	9701	2

Question Number	Mark Scheme Details	Part Mark
3 (a)	cryolite (mentioned in syllabus), bauxite	[1]
(b)(i)	 diagram (i) 6 mark points $\Rightarrow$ max	[5]
(ii)	cathode $Al^{3+} + 3e^{-} \rightarrow Al$ anode $2O^{2-} - 4e^{-} \rightarrow O_2$ 1 each	[2]
(iii)	anodes burn / CO_2 or CO formed / F_2 also formed Any one	[1]
(c)	Has low density / lighter therefore saves fuel does not corrode / is protected by oxide film or rust Any two [Total: 11]	[2]

Page 4	Mark Scheme	Syllabus	Paper
	AS Level Examinations – June 2002	9701	2

Question Number	Mark Scheme Details	Part Mark
(a) ⁴ (i)	$S + O_2 \rightarrow SO_2$ (1)	
(ii)	Air (oxygen) required for contact stage (1)	[2]
(b)	vanadium oxide (1) or V_2O_5	[1]
(c) (i)	Le Chatelier: to favour RHS side of eqn (1)	
(ii)	Reaction exothermic is reason why catalyst gets hot (1) or exothermic reaction - Le Chatelier: high temp favours LHS (1)	
(iii)	Catalysts are easily poisoned (1) damage to catalyst.	[3]
(d)	SO_2 damages buildings - marble, limestone etc (1) damages living things - animals, trees etc. (1) acid rain (1) any two effects <u>max</u>	[2]
(e) (i)	hydrogen chloride / HCl gas (1) allow HCl $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$ or $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$ (1)	
(ii)	iodine (1)	[3]
[Total: 11]		

Page 5	Mark Scheme	Syllabus	Paper
	AS Level Examinations – June 2002	9701	2

Question Number	Mark Scheme Details	Part Mark
5 (a) (i)	C_2H_5Br allow any brominated ethane.	
(ii)	$\rightarrow CH_2-CH(CH_3)-$	
(iii)	$CH_2CHCHOHCH_3$	
(iv)		
(v)	 1 each	5
(b) (i)	$C_2H_6 + 3\frac{1}{2} O_2 \rightarrow 2CO_2 + 3H_2O$	
(ii)	$\begin{cases} C_3H_6 \\ CH_2=CHCH_3 \end{cases} + H_2O \rightarrow CH_3CH(OH)CH_3 \quad \text{or} \quad C_3H_7OH$ $\text{or } CH_3CH_2CH_2OH$	
(iii)	 + $H_2 \rightarrow$  or C_6H_{12} 1 each	3
(c) (i)	There is a greater demand for the ^{Petrol} gasoline fraction / about C_8 than for the heavier gasoils/diesel (1) The introduction of the alkene group gives more reactive products (1) <u>OR</u> gives ethane	
(ii)	Balanced equation (1) If products are labelled alkenes give the (i) mark	3
[Total: 11]		

Page 6	Mark Scheme	Syllabus	Paper
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Question Number	Mark Scheme Details	Part Mark												
6 (a)(i)	Two of anaesthetics, refrigerants, flame retardants, plastics - (coolants) (fire extinguishers) solvents chemical inertness aerosols low b.p/volatility	1 1												
(b)(i)	C-Cl (1)	1												
(ii)	U.V light breaks bonds and gives (free) radicals (1) these lead to chain reactions (1) which damages ozone layer (1) Any two points	2												
(c)	<table style="margin-left: auto; margin-right: auto;"> <tr> <td>C</td> <td>H</td> <td>Cl</td> <td>F</td> </tr> <tr> <td>$\frac{17.8}{12}$</td> <td>$\frac{1.5}{1}$</td> <td>$\frac{52.6}{35.5}$</td> <td>$\frac{28.1}{19}$</td> </tr> <tr> <td>= 1.48</td> <td>= 1.5</td> <td>= 1.48</td> <td>= 1.48</td> </tr> </table> $\therefore \text{CHClF}$ (1) mass = 67.5 (1) $\approx$ 62 of 135 $\therefore$ Molecular formula is $\text{C}_2\text{H}_2\text{Cl}_2\text{F}_2$ (1) [Total: 8]	C	H	Cl	F	$\frac{17.8}{12}$	$\frac{1.5}{1}$	$\frac{52.6}{35.5}$	$\frac{28.1}{19}$	= 1.48	= 1.5	= 1.48	= 1.48	3
C	H	Cl	F											
$\frac{17.8}{12}$	$\frac{1.5}{1}$	$\frac{52.6}{35.5}$	$\frac{28.1}{19}$											
= 1.48	= 1.5	= 1.48	= 1.48											