

**Subject: CHEMISTRY (SALTERS) Code: 2850**  
**Chemistry for Life**

**Session: Jan Year: 2006**

**Mark Scheme - FINAL**

paper set date: 11/01/06

MAXIMUM MARK	<b>75</b>
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Subject officer: Steven Evans
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**Abbreviations,  
 annotations and  
 conventions used in the  
 Mark Scheme**

/ = alternative and acceptable answers for the same marking point  
 ; = separates marking points  
 NOT = answers which are not worthy of credit  
 ( ) = words which are not essential to gain credit  
 \_\_\_\_\_ = (underlining) key words which **must** be used to gain credit  
 ecf = error carried forward  
 AW = alternative wording  
 ora = or reverse argument t

CHECKED BY	APPROVED (Tick or initials or signature)	DATE

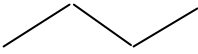
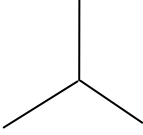
## ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.  
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ( $\frac{1}{2}$ ) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.  
  
x = incorrect response (errors may also be underlined)  
^ = omission mark  
bod = benefit of the doubt (where professional judgement has been used)  
ecf = error carried forward (in consequential marking)  
con = contradiction (in cases where candidates contradict themselves in the same response)  
sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

<b>Mark Scheme</b> Page 1 of 4	<b>Unit Code</b> 2850	<b>Session</b> Jan	<b>Year</b> 2006	<b>Version</b> final
1 a i	Similarity: Same no./amount/of protons/electrons/atomic number/ (NOT $A_r$ or same atomic charge)  Difference; Different no./amount/ of neutrons/different mass no/masses/atomic mass/one (more) neutron(1);  (use of 'it' or 'they' is fine)  (or specific numbers e.g. both have one proton- zero and one neutrons)			2
1 a ii	$2\text{}^2_1\text{H} \rightarrow \text{}^4_2\text{He}$ correct/consistent symbol(1); top and bottom add up(1);  NB other possibilities, see example below, but must show fusion  eg $\text{}^3_2\text{He} + \text{}^1_0\text{n}$ scores 2 must be <u>correct symbols</u> e.g. not HE			2
1 a iii	(Light) nuclei (1) (fuse/join/come together)(1); NOT atoms  to form a <u>heavier</u> nucleus/atom/element or larger <u>nucleus</u> (1)  any reference to bonding is a CON			2
1 b i	Like/positive charges/protons(1)  (ignore references to ions unless neg -CON); repel(1)			2
1 b ii	<u>High/extreme</u> pressure/gravity/density(1); Not - lots of pressure  <u>high/extreme</u> temp/extreme heat/energy/KE(1) allow high temp and pressure(2 marks) NOT intense temperature			2
1 c i	$\text{H}_2$ (with or without proton or mass number)(1); D/ $\text{}^2_1\text{H}$ (1); <u>or in words</u>  eg hydrogen with an extra neutron symbols to right OK  NB a cation shown(1); - give this mark if cation shown in c i or cii(1);			3
1 c ii	For peak at 3- HD/T (1); for peak at 4 - D <sub>2</sub> /HT (1)  Allow <u>one mark max.</u> for reference to possible existence of an  (heavier) isotope of (hydrogen) NB $\text{}^4_1\text{H}$ is a CON  NOT contamination			2
1 c iii	(relative) abundance/amount(of that isotope)/proportion AW NOT concentration NOT intensity			1
				16

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2 a	s aq(1) both correct			1
2 b	<u>Any</u> of: Reactivity/ease of ion formation/thermal stability of carbonates base strength of oxides/hydroxides			1
2 c i	$[\text{Mg}]^{2+} 2[\text{Cl}]^{-}$ charges both correct(1); no electrons around Mg (allow 8) (1); (NB covalent structure - zero) eight, with <u>one different</u> around Cl(1); 2Clions(1); either separate or x2			4
2 c ii	Acid-base/alkali/neutralization/exothermic(1)			1
2 d	Delocalized/'sea'/free electrons(1); can move/mobile(1);			2
2e	Mark the <u>process</u> (in any order) i.e. divide by 100(1); multiply by 1000(1); (x10 gets both these marks) divide by 24(1); sig figs(mark separately)(1); <u>0.054 scores all four</u> NB CON wrong figure at start - looking for digits 13 (some using 1.0)			4
2f	3000 - 3200 (1)			1
2g	Graph A(1); Any two from the following three: successive IE's get bigger/higher/harder to remove electrons/ AW(1); big jump in/so much energy needed on electron 3 removed/Group 2 elements have two outer shell electrons (easier to remove)(1); Hard(er) to remove electron from inner shell/(energy) level /nearer nucleus(1) Answer D could get first of above points only i.e. MAX 1 mark Answers B or C - zero			3
				17

<b>Mark Scheme</b>	<b>Unit Code</b>	<b>Session</b>	<b>Year</b>	<b>Version</b>
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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>		
3 a i	Reactants label to left of products(1); Reactants label below products(1); <u>single</u> headed 'vertical' arrow going up, labelled in words or using $\Delta H$ (1) ecf for products below reactants	3		
3 a ii	Endothermic(1);	1		
3 b i	$\sum \Delta H_f$ products(1); $\sum \Delta H_f$ reactants(1); correct combination of values i.e. $-980 - (-1014)$ (1); ecf on above answer <u>with</u> sign (+34 scores all 4) ecf on above	4		
3 b ii	Any <u>four</u> of the following five: Mass/weight of ammonium bicarbonate(1); Ignore references to mass after reaction Vol./mass of HCl (1) NOT volume of reactants; Concentration of HCl(1); Starting temperature(1); finishing temps(1); NB(temp change/ $\Delta T$ scores two mass of reactants on its own = 1 mark; temp increase - 1 mark only	4		
3 b iii	Entropies increase from solids to gases(1) ; ORA disorder/no. of ways of arranging/randomness increase in same way(1)AW ignore nature of particle, except electron (0) More moles/molecules/ of product (1); more products OK gases/liquids from solids(1)	4		
3 c i	$4\text{Fe(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{Fe}_2\text{O}_3\text{(s)}$ <u>correct</u> balanced equation allow multiples etc(1); states(1)	2		
3 c ii	Catalyst/increases conductivity/absorb energy/moderates, AW/inc surface area/ reduces rate!(1)	1		
		19		

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4 a i	$C_nH_{2n+2}$ or 'x'			1
4 a ii	Easier to store/transport/space needed reduced/handle/denser AW(1)			1
4 b i	Any skeletal formula(more than three C) (1);Dots or blobs CON this mark  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">               butane           </div> <div style="text-align: center;">               methylpropane (1);allow 2-methylpropane              (allow slight mis-spellings e.g. methyl)           </div> <div style="text-align: center;">             both correct (1)           </div> </div>			3
4 b ii	(structural) isomers(1) NOT isomerism			1
4 c i	5(dm <sup>3</sup> ) oxygen(1); ecf 5 x 100/20 (or 5 x 5) = 25(dm <sup>3</sup> ) (1) 25 = 2 marks			2
4 c ii	Volume of a gas depends on temp/pressure; AW (1)			1
4 c iii	CO - toxic/poisonous/photochemical smog(1); NOT harmful/health hazard/acid rain/greenhouse			1
4 c iv	Inefficient/waste of petrol/(photochemical)smog(unless in previous answer)/irritant/asthma/greenhouse gas/global warming/produces ozone/any specific hydrocarbon e.g. benzene carcinogenic(1);			1
4 c v	Bonds broken, energy in/endermichic(1); formed, energy out/exo(1); more out than in/more exo than endothermic(1) AW (independent)			3
4 d	Small(er) molecules/chains (ignore references to branched)autogas/ petrol has C <sub>5</sub> - C <sub>7</sub> hydrocarbons(1); less/reduces/ tendency to autoignite/knock/pre-ignite(1);NOT stops avoids damage to engine(1); higher compression ratio/power/efficiency possible (1)			4
4 e i	1000/44 (1); 1000/44 x 2220 (1) ; ecf for correct answer (between 50,390 and 51,160 depending on rounding)(1) ;			3
4 e ii	Low(er) M <sub>r</sub> /small(er) molecules(1)more moles/molecules(per kg) (1)ORA			2
	Total			23