

Chemistry (Salters)

Advanced GCE A2 7887

Advanced Subsidiary GCE AS 3887

Report on the Units

January 2008

3887/7887/MS/R/08J

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Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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CONTENTS

Advanced GCE Chemistry (Salters) (7887)

Advanced Subsidiary GCE Chemistry (Salters) (3887)

REPORTS ON THE UNITS

Unit/Content	Page
3887/7887 Chief Examiner's Report	1
2848 Chemistry of Natural Resources	2
2849 Chemistry of Materials	5
2850 Chemistry for Life	9
2854 Chemistry by Design	12
2855 Individual Investigation	14
Grade Thresholds	16

3887/7887 Chief Examiner's Report

It was good to see the numbers taking the first unit rise by over 1000. Many of these candidates did well, too, with improved ability at calculations and writing longer answers. That they can do this within a few months of starting AS Chemistry is most encouraging.

In unit 2848, the predominantly re-take group also performed well in calculations but expressed themselves less well in the longer answers, as did the group taking the third unit, 2849.

As usual, some excellent work was seen. Some candidates found things difficult but very few failed to make the effort to score wherever they could.

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2848 Chemistry of Natural Resources

General Comments

Candidates' marks covered a wide range, although marks above eighty were rare. Candidates did not appear to have a problem with lack of time; all seemed to have had a chance to work through to the end of the paper and answer spaces that were left blank indicated a lack of knowledge and understanding rather than time constraints.

Good attempts were made at most of the calculation questions, with many answers being clearly set out, and showing what was being calculated at each stage. This allowed candidates to gain credit for partially correct answers and through the 'error carried forward' rules. There were also good responses to questions asking for reaction equations, intermolecular forces and for reactions to be classified.

Marks were generally much lower on questions that required candidates to explain: chemicals' properties in terms of bonding and structure, global warming and how CFCs cause ozone depletion. Many candidates lost marks due to a weak grasp of the appropriate technical vocabulary or generally careless wording of written responses.

Comments on Individual Questions

Question 1

The quality of answers to this question was very varied, although in most cases it was found to be one of the harder questions on which to score. Answers involving the link between bonding, structure and properties and global warming were often weak.

- (a) (i) Most answered this correctly.
(ii) Answers here were often poor, with a lack of understanding of the structures and forces that hold the chemicals together. Many failed to distinguish between the two structures, with 'molecular' being attributed to both. Many failed to make a comparison of the forces holding the particles together, or referred incorrectly to intermolecular forces in both chemicals.
- (b) Most candidates gained credit here.
- (c) (i) The majority of candidates scored and there were a few very good answers. Those who failed to gain credit either omitted a reference to equilibrium or made contradictory statements about reactants and products or directions of equilibrium shifts.
(ii) The vast majority of candidates gained this mark.
- (d) Only candidates who scored well on the paper overall gave good answers to this question, with precise use of key technical vocabulary. Weaker responses showed poor use of terminology, with terms like 'traps', 'blocks' and 'bounces' being used instead of 'emits' and 'absorbs'. Many of the weaker answers were at GCSE level, or confused the phenomenon of global warming with ozone depletion.
- (e) (i) Most candidates scored one mark here.
(ii) Most candidates gave answers that were sufficiently specific to gain credit.

Question 2

The quality of answers to this question was variable. Oxidation conditions were generally well known, but the reaction mechanism and question on geometric isomerism were often not well answered.

- (a) (i) Most scored well on this question.
(ii) This proved to be a hard mark to score, highlighting a lack of understanding of skeletal formulae.
- (b) (i) Many candidates failed to score this mark.
(ii) Again, many failed to score here. The overall impression from responses to both (i) and (ii) was that candidates were unsure of what is meant by geometric isomerism, with many answers to being for other types of isomer, such as structural or positional.
- (c) (i) Many scored here, although a few did not read the question carefully enough to spot the instruction for 'full structural formula'.
(ii) The reagents and conditions were generally well known, with many gaining at least two marks here.
(iii) Fewer candidates knew that the reaction was an oxidation process, with many incorrectly classifying the process as substitution.
- (d) (i) Although many gained one mark here, candidates who scored both marks were rare, the 'bonding by accepting a pair of electrons' part of the definition often being omitted.
(ii) Only a small minority of candidates completed the reaction mechanism correctly. Many put partial charges on the alkene group or incorrectly showed a partial negative charge on the bromine nearest to the double bond. Few understood how to draw in the curly arrows or were careless about how and where they were drawn.
(iii) The most able candidates scored here. A commonly seen incorrect response was 'halogenoalkane'.

Question 3

Marks on this question were generally quite good. Marks were usually gained for the repeat unit of the polymer and for the parts dealing with intermolecular forces.

- (a) (i) Candidates scored well on this question, with few failing to gain both marks.
(ii) Many gained this mark.
- (b) Many candidates gained at least two marks here. Those who did not were generally candidates who failed to complete the $-\text{COOH}$ group on the right hand polymer chain and tried to draw a hydrogen bond to the carbon that is shown.
- (c) This was generally well answered, often better than similar questions in the past. Many candidates clearly described the limitation of relative movement of the polymer chains and indicated the reason for this in terms of strength of the hydrogen bonds.
- (d) This was generally well answered.
- (e) The majority of candidate scored here.
 - (i) Very few candidates scored here, with the most commonly seen answer being methylethene.
 - (ii) Most scored at least one mark here, either for a correct formula mass or by ecf for the second mark.
 - (iii) The majority of candidates gained this mark.
 - (iv) Again, most scored here.

Question 4

Marks on this question were generally good and this was often candidates' best scoring question. Marks on (a) were usually high and most candidates scored well on the calculations.

- (a) (i) Most scored at least one mark here.
(ii) Many candidates gained full marks here. Responses gaining only two marks had usually failed to score the third because the wording of the explanation was unclear.
- (b) (i) Most scored at least one mark here for referring to the formation of acid rain. Fewer gained the second mark for explaining the environmental problems that acid rain can cause.
(ii) Many scored this mark.
- (c) (i) The majority of candidates scored marks here. A small minority of candidates confused the ionic equation with a half equation.
(ii) Most scored at least one mark here.
- (d) (i) Many scored full marks for this question. The remaining candidates often scored one mark, provided that some working was shown to indicate understanding of the concept of moles process or to allow ecf to be applied.
(ii) Many scored two marks here. The mark for significant figures was the one least likely to be scored, either because candidates failed to notice the instruction or because they did not understand what two significant figures means – and gave answers to two decimal places.

Question 5

Most candidates scored reasonable marks on this question, with the equations and calculations being generally well answered, but much weaker responses being given to the explanation of ozone depletion.

- (a) Most gained credit here.
- (b) The majority of candidates gained this mark.
- (c) (i) Many scored at least one mark here, although there was the same confusion with this question as was seen in **4(c)(i)**, where some responses were half equations.
(ii) Many scored two or three marks here. The most common reason for not gaining full credit was the poor wording of the explanation.
(iii) Marks on this part were generally high.
(iv) Many scored here.
(v) Many correct responses were seen, with orange the most common incorrect answer.
- (d) (i) A large majority of candidates gained both marks here.
(ii) Marks were generally high here. A few lost credit by indicating more than two responses.
- (e) The most able candidates gave very good responses here, with good use of key technical terms. Weaker candidates often scored one for the idea of the catalyst providing an alternative reaction pathway with a lower activation enthalpy. They then, however, often went on to discuss the effect of heating the catalyst and how that changes the reaction rate, rather than explaining the impact of the catalyst itself in detail.
- (f) The most able candidates gave very good answers to this question, but many of the weaker answers lacked detail and showed poor understanding of the basic chemical ideas and terminology. Many used terms like 'upper' and 'lower' atmosphere, 'rays' and 'light'. Chain reactions were often mentioned instead of making it clear that chlorine radicals are regenerated. Many failed to address the second part of the question, or incorrectly compared the reactivity of the bromine and chlorine radicals.

2849 Chemistry of Materials

General Comments

There was a good spread of marks across the whole range with fewer candidates in single figures or in the teens. There was no evidence that time was a constraint or in excess. In January the candidates' level of examination awareness and past paper practice is largely centre based. It is clear that some have the time to practise past questions and enhance their examination skills. Many others do not and suffer accordingly but will undoubtedly improve by the summer. General points to note include:

- The space allocated for answers should be sufficient for even those with the larger styles of hand-writing; hence the need for extra sheets should be rare. The main problem here is the failure of the candidates, in general, to plan the extended writing answers so that they address the question set and not write indiscriminately about anything to do with the topic under discussion;
- Many fail to address the question because they do not focus on the command words used *e.g. 'Explain' and 'Describe', or 'Name' and 'Give the formula of'*;
- Writing acceptable English so as to convey the correct meaning remains weak for many and costs such candidates a significant number of marks. Reading to check what has been written is not widely carried out.

Generally students were effective in using the *Data Sheet*, though a few did confuse bonds having similar structures in n.m.r.

The calculation proved very difficult for the vast majority, probably because of a poor understanding of chemical equilibria. The 'appropriate number of significant figures' was very much better understood, with the stronger candidates often stating the number of figures used.

Comments on Individual Questions

- 1
- (a) A minority explained why the polymer was soluble in terms of hydrogen bonding and then discussed the advantages of such a material. Thus indicating they had not read the information properly.
 - (b) Weak candidates often did not recognise the ester, just circling the single-bonded oxygen atom.
 - (c) In (i) the need for heating under refluxing was well known, the concentration of the acid much less so.

There was a definite improvement in drawing structures, the commonest error in (ii) being the omission of the $-\text{CH}_2-$ unit in the diol. Many centres performed admirably in describing recrystallisation and usually well within the space allocation too. However, it was clear that some centres had not covered the experimental work, candidates of all abilities failing to score significantly and some even leaving the space empty thus failing to gain the QWC mark. However, for the majority it was pleasing to see the logic followed in describing the process.

- (d) Although the use of scientific language in describing and explaining polymer properties was often quite weak, *e.g. intermolecular forces was often reduced to just 'bonds'*, many obtained 3 out of the 4 marks. The commonest error was in failing to relate crystallinity to the regularity of structure. Some confused matters by trying to write far too much; describing both the properties of the *trans* and mixed polymers and discussing other properties such as T_g .
- (e) Although the peak at 3300 cm^{-1} was usually correctly identified as due to an O–H group, many failed to relate this to PCT; thus not recognising that the carbon structure was based on cyclohexane rather than benzene they described the functional group as a phenol.
- (f) Often co-polymerisation but many suggested condensation as a reaction used.
- 2 (a) Mostly correct, only a few candidates suggested alcohol, carbonyl or amide.
- (b) In (i) many failed to address the question asked by stating that the colour seen with phenylalanine was 'no change'; some gave purple for both. Responses were good in many cases with more candidates recognising the acidic phenol group. Writing the structures of the ions was good, though some protonated the NH_2 group and others omitted the C=O group or the negative charge on the oxygens. Again addressing the question was a problem in (iii) where zwitterions were defined instead of explanation of their formation; here transfer of a 'hydrogen atom' was the usual error.
- (c) Most candidates were able to cope successfully with the detail required; occasionally the circling of the amide group was omitted.
- (d) Most recognised the need for a chiral centre but far fewer that the 'mirror images' should be non-superimposable.
- Generally the role of the active site in enzyme catalysis was well understood and candidates gave lucid accounts of pH control and enzyme inhibition. Weaker candidates still tried to answer in purely biological language rather than in chemical terms.
- (e) There was an improvement in the ability to construct a correct rate equation from given data but most failed to use it to deduce the correct units for the rate constant, many answers either omitted s^{-1} or gave any reference to mol dm^{-3} .
- 3 (a) There were few problems in calculating E°_{cell} .
- (b) Many were able to 'suggest' standard conditions but not 'explain' that this would affect the values of electrode potentials. Others thought that the values were actually measured at that time with inferior instruments.
- (c) Surprisingly a lottery for many with most believing that 'electrons move through solutions'.
- (d) On the whole the diagrams were well drawn but even then some candidates lost marks because of poor labelling. The hydrogen electrode was the weak link; what appeared to be solid hydrogen electrodes were drawn and labelled as such. The salt bridge did not touch the copper(II) solution. Some failed to read the question properly and drew the Fe/Fe^{2+} cell.
- (e) This was answered well but equations were sometimes reversed and Fe/Fe^{2+} containing equations were seen.

- (f) Although there were many excellent answers, there was some tendency to write about 'electronegativity', higher' and 'lower' and confusion about the role of electron transfer in redox reactions.
- (g) In (i) OH rather than O–H was frequent. The commonest error was to lose the comparative mark but the concept of electron delocalisation stabilising the carboxylate ion and not the alkoxide ion was well known if not well explained. The usual problem with candidates referring to the stability of the undissociated molecule rather than the anion was frequently encountered. Confused explanations of proton loss showed that the definition of an acid is poorly understood.

- 4 (a) Many ester, ether and ketone names were seen and all too often the 'ethanoate' became 'methanoate' or 'pentanoate', whilst 'pentyl' was switched to 'ethyl'.
- (b) The calculation was very poor; some salvaged 2 marks for 4.66 based on an incorrect equilibrium expression. Those that wrote the proper equation for K_c frequently only managed 1 mark because everything went wrong after that including dividing by 2 instead of taking the square root.

The initial problem of missing water out of the K_c equation was often explained as 'being in excess', equal to 1, or more mathematically worrying as equal to 0! A few centres had clearly taught this topic well and their candidates knew that the concentrations of **P** and water were equal.

Explanations in (ii) were often confused and contradictory:

- condenser water was confused with product water;
- many did not recognise the ester smell;
- the equilibrium constant was thought to be the same as equilibrium position;
- effect of concentration on K_c poorly understood.

A large number of candidates used acyl chlorides or even anti-bumping granules as catalyst or quoted *moderately* concentrated acid as the catalyst.

- (c) Many candidates thought that $\text{CH}_3\text{-C=O}$ gave the same chemical shift as $\text{-CH}_2\text{-CH}_3$ and therefore thought that the six protons with a 'shift of 0.9' belonged to compound **P**.
- (d) The diagram was poorly annotated with many students not reading the question properly and following the instructions *i.e.* putting the shifts on the two diagrams with the correct Hs. Many failed to distinguish -CH_2 from $\text{-CH}_2\text{O}$ and also $\text{CH}_3\text{C=O}$ from $\text{CH}_3\text{-O}$.

- 5 (a) Most candidates referred to resistance to rusting, though not always in the clearest way.
- (b) Most identified **X** as being magnesium sulphide/MgS but a significant number gave sulphur or one of its oxides. Although the answers here were often centre dependent, the prevention of heat shock was the most common answer to **(ii)**. Some candidates referred to the use of recycled steel in adjusting the composition of the steel, which comes later in the process.

Correct answers were common in **(iii)** but many included calcium or sulphur in their response.

A feature often seen is that candidates do not follow the logic from part question to the next; they approach each bit in total isolation from what has been asked a line or two before.

- (c) The first part was generally well answered but all too often the $4s^2$ electrons were left in the arrangement for Ni(II). Equation writing was much improved; the commonest error was to collect all the ions together as reactants.
- (d) Again failure to address the question asked caused many to lose both marks here, including some able candidates. Many launched into a general discussion of how colour arises with many gaining the first mark for the splitting of the d orbitals but then going on to write about adsorption and transmission rather than the difference in energy terms between the two levels being dependent upon the ligand.

The usual answer in **(ii)** and **(iii)** was 6/2 for the coordination numbers followed by octahedral and linear. However, many scored all the marks here for quoting 6/4 and octahedral/tetrahedral. This was centre dependent. Most candidates who wrote tetrahedral also wrote square planar.

2850 Chemistry for Life

General Comments

This paper proved very accessible for candidates across the whole ability range. This was reflected in a higher mean score than in recent sessions.

The paper also achieved good discrimination with marks in single figures, to marks of over 70.

The most able candidates scored heavily over all the questions.

Encouragingly candidates seemed better able to structure their responses this session, particularly in longer answers and in calculations, the latter allowing examiners to more easily award 'error carried forward' (ecf) marks.

Question 1, was generally well answered by candidates with many more able candidates scoring full marks. Mark distribution across the remaining questions was fairly even.

Calculations were also, in general, well attempted and better set out than latterly.

Likewise, longer answers seem to be gradually showing an improvement in structure with a commensurate increase in marks awarded. Some of the chemistry however was often centre dependent.

Again, there was no evidence reported by the examining team of problems with time.

Comments on Individual Questions

1 Candidates often scored highly on this question.

- (a) Some candidates suggested the carbon particles were the result of the formation of CO_2 or CO.
- (c) (ii) This question was a fairly straightforward 'electron pair repulsion' question but unfortunately the context of the ether seemed to throw some candidates, however there were many excellent answers, often from whole centres.
- (iii) Common errors included linear ethers and the alcohol functional group.
- (iv) The calculation was correctly answered by many candidates, however marks are still being lost carelessly by the failure to include signs. Some candidates answered their own question involving bond making and breaking.

Tip for candidates

Calculations involving energy changes must **always** be accompanied by a sign.

- (d) A very common mistake was for candidates to talk in terms of more molecules present on mixing, rather than more possible arrangements of molecules when mixed.

Numerical answer c (iv) –3403

2 This question produced a wide range of marks.

- (a) (ii) Candidates rarely scored on this part question, often commenting in terms of the relative reactivity of lithium compared to sodium rather than in terms of formula masses/moles.
- (b) (i) A significant number of candidates failed to score the state symbol mark through simply not reading the information in the stem carefully enough. This problem repeated itself in question 3(a)(i).
- (ii) Many candidates got the dot-cross structure perfectly correct but a worrying proportion hedged their bets between a covalent structure and an ionic.

Tip for teachers

Ensure that students put brackets around dot-cross representations for individual ions. This avoids any confusion with covalent structures.

- (iv) Some candidates lost marks for putting a state symbol by the electron or representing it as a beta particle *i.e.* with 0 and -1 .
- (v) This part question was variably answered with the biggest loss of marks being caused by candidates failing to answer in comparative terms.

Tip for candidates

Longer answer questions, particularly those involving group trends, usually require a clear **comparison** of reactivity/properties.

- (c) (i) Diagrams of metallic structure were too often very poor, and either not labelled at all or incorrectly labelled, for instance referring to lithium 'nuclei' or 'protons'.
- (ii) A common error here was to suggest that the electrons carried the electricity through the structure.

- 3
- (a) (i) Many candidates failed to balance this equation.
 - (ii) The formulae of magnesium oxide was often wrong with Mg_2O_3 the most common incorrect version.
 - (b) (i) A large number of candidates unfortunately calculated the number of moles of H atoms in 5 kg of hydrogen gas despite the stem clearly stating H_2 .
 - (ii) There seemed, overall, to be a greater number of candidates setting out their calculations more clearly than in recent sessions, and this allowed examiners to allow ecf marks, for instance on a unbalanced equation from (a)(i) or the wrong answer from (b)(i). Some candidates failed to convert their answers to kg.
 - (c) (i) An alarming number of candidates used 'N' as their symbol for nitrogen gas.
 - (ii) This produced many excellent (though centre dependent) answers. The commonest error was to describe the breaking of bonds **between** adsorbed (still a few using absorbed) reactant molecules.

Parts (d) and (e) were reasonably well answered.

Numerical answers b (i) 2500; (b) (ii) 18.3; (b) (iii) 715000

Report on the Units taken in January 2008

- 4 (a) (i) Most candidates correctly answered alkanes but a small number quoted branched or unbranched alkanes as their answer.
- (ii) Candidates scored heavily on the heptane mark but only a relatively small number correctly put the ethyl and methyl branches in that order.
- (iii) This straightforward question, although yielding full marks for many candidates, gave a significant number of weaker candidates' problems with the clarity of their explanation. Again, Examiners reported considerable centre bias. The remainder of part (a) and parts (b) and (c) were usually well answered.
- (d) (i) Marks were variable on this calculation and some candidates clearly did not pay any attention to, or did not understand, the request for two significant figures emboldened in the question. This mark was frequently scored. The ecf on the previous answer being allowed on the mark scheme.
- (iii) A small but significant number of more able candidates gave a thoughtful answer, in terms of complete combustion, to this final part.

Numerical answers (d) (i) 47000; (d) (ii) 2.3

2854 Chemistry by Design

General Comments

There were only 70 scripts, almost all from re-take candidates. One or two were excellent, showing a really good understanding of the subject. Others showed rather patchy knowledge, probably the result of a term's separation from the subject. Almost all were trying hard to improve their grades. There were very few gaps and no evidence that the paper was too long.

Comments on Individual Questions

Question 1

This provided an easy start, although the commonest mark lost was for part **(a)(i)**, but part **(a)(ii)** was usually fine. There were often good answers to part **(b)**, though some tried to answer it in terms of kinetics. Part **(c)** was often correct, as was part **(d)**. Most scored highly in part **(e)**, with even the sometimes elusive positive sign often being given.

Numerical answers: Part (c) (i) 6.4×10^{-3}

Question 2

Candidates found this question harder. The calculation in part **(b)** was frequently incorrect, with relatively few realising that one significant figure was in line with the data supplied. Part **(c)** was well done, including part **(iii)** on intermolecular forces. Part **(d)** varied in difficulty with part **(ii)** seldom scoring more than one or two marks. Part **(d)(iii)** was not particularly well done, but part **(d)(iv)** showed a good understanding. In part **(e)**, a few candidates thought they were just deciding between **C** and **D**. The most difficult concept was interpreting the *lack* of an O–H absorption in the infrared which indicated that **C** was not the correct choice.

Numerical answer Part (b) 1×10^7

Question 3

This question had easy and hard parts. No-one scored three marks on part **(a)(i)**, though all correct answers featured for different candidates. 'Iron' was a common incorrect response. Part **(a)(ii)** and **(iii)** were often well done, while in part **(b)(i)** everything was usually there except the positive charge. Part **(b)(ii)** was often completely correct. Part **(a)(iii)** was poorly done. Many did not notice that the compound decomposed before it melted, so comments on the melting point were not valid. Dissolving and conducting when molten were sometimes mentioned but the reasons were often wrong, for example '*the molecule forms hydrogen bonds*' or '*the free electrons carry the current*'. Spelling, punctuation and grammar were seldom wrong. Part **(c)** was usually right, though few realised that it was a hint for a possible answer to part **(d)**. Candidates clearly understand weak acid chemistry and pH calculations and did well in part **(e)**. Part **(f)** was harder. An actual solution containing ammonium ions was seldom mentioned in part **(f)(i)**, and relatively few realised that $\text{pH} = \text{p}K_a$ in part **(f)(ii)**.

Numerical answers Part (c) 35%; Part (e)(iii) 2.4×10^{-6} ; Part (e)(iv) 5.6; Part (f)(ii) 9.3

Question 4

This question, too, had mixed responses. Most of part **(a)** was high-scoring, except part **(iv)** where the formula of hexane was often given as C_6H_{12} . Part **(b)** was again well done, though many came unstuck on part **(iii)**, with quite a few candidates getting the M_r values wrong. The cold conditions needed for the coupling reaction in part **(c)(i)** were usually known, but the alkali was rarely mentioned. Mistakes in part **(c)(ii)** included a triple bond between the nitrogen atoms and an $-NH_2$ instead of $-OH$. Part **(d)** was often correct and a good standard was set in part **(e)**. There was still a proportion of candidates who thought the complementary colour was emitted when the electron fell back down and others who felt that benzene was colourless because it absorbed *all* frequencies of visible light. Almost all answered using correct technical terms and scored the quality of written communication marks.

Numerical answer Part (b)(iii) 87%

Question 5

Many parts of this question were found hard, including part **(a)**. In part **(b)(i)** relatively few candidates realised that most of the triglyceride structure was non-polar and hence that the main type of intermolecular bonds were instantaneous dipole–induced dipole. Part **(b)(ii)** was well done. In part **(c)(i)** there were not a lot of correct answers. In part **(c)(ii)**, many scored one or two marks, making various of the marking points but not being able to manage three.

Part **(d)(i)** was surprisingly poorly answered, with a large variety of wrong answers indicating that many candidates were confused by the question. Part **(d)(ii)** was better, with just the straight $O-H-O$ eluding some. In part **(d)(iii)** there were some correct answers and others that just showed *one* of water's hydrogen atoms attracted to the ion. Part **(e)** was answered reasonably, the mark most usually lost being not mentioning that the hydration enthalpy was for both anion and cation.

Numerical answer Part (e)(ii) +3

2855 Individual Investigation

General Comments

The entry for this component was very small, consisting of only 15 candidates from eight centres. Other centres had made entries but candidates were withdrawn after the entry had been made.

In most centres the marks awarded were felt to be appropriate, often to work of a high standard. In a few cases, the marks awarded by centres were inappropriate, as the marking descriptors at the levels selected had not been sufficiently met.

Extent of the Investigation

A key issue which can contribute to the award of inappropriate marks is the limited extent of the Investigation undertaken. This can affect all skill areas.

In the Planning section, a limited Investigation will reduce both the experimental detail that is included and the theory that is provided to support the procedures.

In the Implementing skill area a limited Investigation will generate less experimental data that is normally expected for between 15 and 20 hours of practical work.

In the Analysing skill area a limited Investigation will provide fewer opportunities for candidates to manipulate data and to draw conclusions from it.

In the Evaluating section a limited Investigation provides less opportunity for candidates to calculate uncertainties associated with a range of measurements and to comment on a range of experimental procedures.

Where a limited Investigation is undertaken the marks awarded by the centre must reflect these points.

In examples of good practice, centres explained why specific marks had been awarded in each skill area by matching candidate performance against specific coursework descriptors. In less good practice, explanations were given in much more general terms and did not make clear why higher marks had not been given.

Comments on Individual Skill Areas

Planning

Many plans were comprehensive and detailed. In some cases not all the expected theory to support experimental procedures was included. Risk assessments and references were generally good.

Implementing

Where a titration is used during an investigation, all burette reading should be recorded and not just the titres. Where titres are very low, it is expected that candidates will dilute one of the solutions and carry out further titrations to generate higher titre values. If this is not done, then the data will not be of sufficient quality to meet the descriptor for the recording strand of implementing at level 8.

Where concentrations of reactants or temperatures are changed, there should be a sufficient range of measurements to allow a suitable graph to be drawn.

Analysing

In examples of good practice, candidates clearly linked their conclusions with underlying chemical knowledge and ideas. In other cases, conclusions were superficial and tended to describe rather than evaluate the collected data.

Evaluating

The calculation of uncertainties associated with measurements has improved over the past few sessions, but some candidates do not consider all types of measurements that they have made. In kinetics Investigations it is important that the uncertainty associated with time data is estimated.

The identification of limitations of experimental procedures is often less well done and prevents candidates from accessing the highest mark levels. It is quite common for candidates to comment on only some of the experimental procedures that they have used during their Investigation.

Grade Thresholds

Advanced GCE Chemistry (Salters) (3887/7887)
January 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
2848	Raw	90	70	62	54	46	39	0
	UMS	120	96	84	72	60	48	0
2849	Raw	90	68	60	53	46	39	0
	UMS	90	72	63	54	45	36	0
2850	Raw	75	57	50	43	37	31	0
	UMS	90	72	63	54	45	36	0
2854	Raw	120	84	75	66	58	50	0
	UMS	120	96	84	72	60	48	0
2855	Raw	90	76	68	60	52	44	0
	UMS	90	72	63	54	45	36	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3887	300	240	210	180	150	120	0
7887	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3887	12.2	35.3	61.1	82.3	96.4	100	569
7887	15.0	48.8	75.0	92.5	98.8	100	84

653 candidates aggregated this series

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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