

GCE

Chemistry

CHM6T – Investigative and Practical Skills in A2 Chemistry
Report on the Examination

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General Comments

The internal assessment of practical skills at A2 ran smoothly and successfully. The points made in the report for CHM3T apply to this module too. They are repeated here for the benefit of schools and colleges with A2 students only.

Administration

Moderators are very grateful that the majority of schools and colleges submitted a complete, well presented sample for moderation by the 15 May deadline. Moderators would once again ask that schools and colleges who failed to meet the deadline this year make every effort to comply with it next year.

A few schools and colleges failed to understand that if they have unit entries of twenty or below they do not require sampling but should instead send the work of all students directly to the moderator by 15 May. Most schools and colleges with more than one student group clearly indicated which teacher result applied to each individual student.

Schools and colleges are reminded that full completion of the front page of the ISA Written Test means that there is no need for students to complete an individual Candidate Record Form. A number of schools and colleges unnecessarily continued to have their students complete both.

There seemed to be a definite increase in the number of errors in Centre Mark Forms. Some moderators sent a steady stream of Mod/Cen/Adm forms to schools and colleges advising them of addition errors and transcription errors. Schools and colleges are strongly advised to ensure the students' marks are correctly entered as not all errors can be rectified by the moderator's marking of the sample.

Preparation

Schools and colleges are reminded that only the highlighted information contained within the Teachers' Notes (under 'Information to be given to candidates') can be given to students and this should be done no more than a week before students attempt the Task. Schools and colleges must not provide their students with any further information or resources.

AQA also publishes the **Instructions for the Administration of the ISA** in order to make clear to all schools and colleges the requirements for security of the ISA material. It is expected that all schools and colleges follow these instructions. Schools and colleges who fail to follow these instructions can expect to be investigated.

PSA

The PSA exercises remain popular with schools and colleges and covering the full range gives students a good basic grounding in practical techniques. In virtually every school or college, this section does not discriminate between students. Scores of 11 or 12 for this section are almost universal, even for students at the E grade boundary.

Marking

The majority of schools and colleges were able to apply the published Marking Guidelines successfully and accurately, at least as far as the more routine questions were concerned. The standard of marking sometimes dropped alarmingly in *How Science Works* questions, especially when a similar question had not appeared before in an ISA. In some cases, answers which were vague, contradictory or plain wrong were given credit. This undue generosity continues to be the main reason for a mark adjustment.

I trust regular readers will excuse the repeated following advice. Accurate marking requires that:

- (a) when the answer in the Marking Guidelines includes specific chemical terms or phrases or underlined words, these words, or their very close equivalents, **must** be present if an answer is to be credited. As a simple example, if the answer is 'white precipitate', a mark cannot be allowed for 'precipitate', 'the mixture turns white' or 'the solution turns cloudy'.

Similarly, if two elements of an answer are linked together by an underlined 'and', **both** elements must be present for the answer to be credited. For example, if the answer is 'temperature and pressure' the student must mention both temperature and pressure to earn the mark. One or the other only is insufficient and must not gain the mark.

These types of mistake **cannot** be given the benefit of doubt.

- (b) a mark **cannot** be awarded when a student's response contains chemical errors alongside the correct answer. To continue with the example in part (a), the answer 'a white precipitate of magnesium nitrate' is not worth a mark. Answers which contain a contradiction, such as 'sodium sulfate, NaSO_4 ' are not worth a mark. Teachers can ignore additional material if it is a true statement, but irrelevant to the question. However, chemical errors must be penalised **every** time.

Some schools and colleges had difficulty with marking when answers differed from the published scheme. Marking was often inconsistent; correct chemistry that did not precisely follow the Marking Guidelines was penalised while answers of very little merit were credited. The marking can be massively out of tolerance, with double figure discrepancies sometimes seen.

The Marking Guidelines cannot cover all possible answers and it is inevitable that teachers will be faced with a range of additional responses. Each school or college has an Assessment Adviser allocated to them, part of whose role is to give help in applying the Marking Guidelines.

Some schools and colleges take a real pride in providing a clear indication of the marks awarded, with supporting annotation where needed. Some confusion is inevitable when the marker does not always use ticks and underlining consistently or indicate the marks for each question or part question in the margin. This inconsistency does lead to incorrect additions and transposition errors.

CHM6T/P13: Task

Some schools and colleges had difficulty in obtaining the expected observations in some of the tests in this task. In the majority of cases, the discrepancies were minor and did not affect the demand level of the task. In a few schools and colleges, the outcome was less satisfactory. A number of positive results were replaced by 'no visible change' in the teacher and student results.

All schools and colleges are reminded to trial the task before the students complete it and to consult with their Assessment Adviser if it doesn't work as expected.

A number of schools and colleges do not seem to realise that the teacher results for an observation exercise provide a check that the correct solutions have been given to the students. Teacher results are not an opportunity to increase the number of creditworthy answers. The moderator will accept a teacher alternative as long as it is reasonable. If the great majority of students in the group obtain the expected result, the teacher result will be ignored. The Marking Guidelines allow for reasonable variations but moderators will not use teacher results that are completely out of line with the expected observations.

Many students continue to struggle with recording their results in an observation exercise. The Additional Guidance in the Marking Guidelines covers many of the non-standard answers. This guidance is periodically updated and expanded, and teachers must be aware of the changes when marking scripts. A significant number of schools and colleges were very generous when marking the Task, accepting loose descriptions instead of the correct chemical terms. If the student records an additional, incorrect observation then this will cancel a correct observation and lose the scoring point for that test.

While virtually all students are familiar with the term 'precipitate', a significant number of students still use unacceptable imprecise terms such as 'cloudy solution', 'goes cloudy' or 'milky solution'. Teachers should not consider these as mark-worthy alternatives at this level. This type of mistake must be penalised every time it occurs.

The appropriate use of the word 'solution' continues to elude many students and some teachers. As a concession to the students, the Additional Guidance instructed schools and colleges to penalise the omission of the word 'solution' once only. Many ignored this instruction and allowed full marks to be given to students who omitted the word 'solution' every time. It was not uncommon to see a Teacher Results grid that also had the word 'solution' omitted every time. When an adjective – a colour - is quoted it must be alongside a noun – a solution or a liquid or a solid (or precipitate) or a gas.

CHM6T/P13: Written Test

This paper proved accessible to students and a good number of scripts with very high marks were seen. The main problem areas are given below.

Section A

Most students were able to identify the two functional groups in Question 1. The common mistake was to include a disqualifier, such as 'aldehyde, RCOH'. This type of error cannot be overlooked.

In Questions 2 and 3, some teachers did not mark consequentially on the student's answer to Question 1 although many were unduly lenient when marking these questions. In Question 2, students often struggled to express themselves clearly and were allowed a mark for answers that made little sense. In Question 3, the answer needed to contain a definite reference to a carboxylic acid and an oxidisable group. In some cases, a mark was routinely given for answers that contained a reference to only one or neither of these groups.

In Question 5, a number of students spoiled their answer by including sodium hydroxide in the test reagent. The use of water was occasionally allowed even though it was specifically disallowed in the Marking Guidelines. In Question 6, many students stated that Tollens' Reagent is specific to aldehydes and were allowed the mark. This answer did little more than reword the question. A specific reference to potassium dichromate(VI) was needed to earn the mark.

In Question 7(a), many students gave the answer 'primary alcohols are oxidised to aldehydes'. Since ethanol is the only primary alcohol which will give a positive triiodomethane test this answer missed the point, and teachers were told to ignore that answer in the Marking Guidelines. However, sometimes teachers wrongly allowed a mark for this answer. This was another question where answers that included a disqualifier, such as 'ethanol is oxidised to ethanal, CH₃CO', were often incorrectly allowed a mark despite the absence of 'Yes' and use of an incorrect formula for ethanal.

The calculation in Question 7(b) was answered well. Many teachers did not penalise students who did not give their final answer to 3 significant figures. Some did not always give credit for alternative methods, such as employing the scaling to 100% yield at the start of the calculation. The omission of the word 'soluble' in Question 7(c) often went unpunished while Question 7(d) was answered well.

Section B

The various parts of Question 8 tested students on a relatively unfamiliar practical technique. The questions discriminated well where the Marking Guidelines were followed closely. Unfortunately, the marking in some schools and colleges was generous and marks were awarded for any answer that was vaguely connected to the question. In Question 8(a), marks were sometimes awarded, incorrectly, for 'to prevent a vigorous reaction'. In Question 8(c), marks were incorrectly awarded for 'must have a high boiling point', 'must have a high melting point' and 'must be transparent'. Many students and teachers thought inflammable meant the opposite to flammable. In contrast, questions 8(d) and 8(e) were usually answered and marked well.

Question 9 also discriminated well. Most students had a good idea of what to do but answers often lacked detail. Some students did not always specify what they were comparing. The occasional answer made no reference at all to either aldehyde. The need for the two spectra to match exactly meant that the second mark should not have been awarded to many students.

Question 10(a) was unfamiliar to most students, and marking was occasionally lenient. Question 10(b) was much more familiar and most students gave good answers. Some teachers awarded marks for statements such as 'plot a pH curve'. Some centres wrongly gave credit for alkali portions outside the ranges given in mark guidelines.

CHM6T/Q13: Task

This task also involved an observation exercise and the outcomes were very similar to those for the task in CHM6T/P13. The variety of colours shown by the chromium(III) precipitates occasionally caused some difficulties in the marking.

A number of students continue to have difficulties deciding on the colour of a settled precipitate formed in a coloured solution. Simple techniques such as decanting most of the liquid, then adding water to reduce the intensity of the colour of the remaining liquid, might help in future.

CHM6T/Q13: Written Test

This paper proved demanding and a wide range of marks were seen. Students usually coped confidently with the early questions in Section A but struggled at times with the detail needed in the later questions. Answers in Section B were often disappointing.

Section A

In Question 1, students often lost a mark because they did not refer to their own results from the task. Question 2 was found difficult by many students and teachers. The majority of students forgot to include an appropriate acid in the test, or used an inappropriate barium compound. Many were wrongly allowed the first mark. Some persist in awarding a mark for the observation when the reagent would not work. It was quite common to see an incomplete colour change given and duly credited in Question 4.

Questions 5(b) and 5(c) gave rise to the most disagreement during moderation. A large number of students omitted the key words in their answers to these questions but were still awarded the mark. In Question 5(d), 'lead is toxic' was often credited whereas students needed to refer to the toxicity of the compound.

Section B

Most students were successful in calculating the empirical formula in Question 6(a). Teachers need to beware of awarding full marks for flawed calculations which arrive at the expected answer, even though it is an impossible answer from the method used. In Question 6(b), many students forgot to include the charge on the ion.

The calculations in Question 7 were well-handled by students. In many cases, the only mark lost was the final mark in 7(d) for not recording to 3 significant figures. There were some vague answers given to 7(e). To score the mark, the student needed to mention a specific part of the process which would be responsible for the loss of some of the product.

In Question 7(f), some students struggled to explain a redox titration, even though they did not have to use data from a table of E^\ominus values. Very few answers worth both marks were seen. Many students could not express themselves clearly while many others confused the two salts. This was one question where students frequently ruined a promising answer by including some incorrect chemistry. The marking of this question was often very lenient.

Question 8(a) tested students on a relatively unfamiliar piece of apparatus. Unfortunately, this was one of the less well-marked questions in the Written Test. The specific phrases underlined in the Marking Guidelines were often ignored. A mark was often awarded for an answer that did little more than restate the question.

The diagram in Question 9(a) was well drawn by the majority of students. Most students were able to describe the graph needed in Question 9(b) but many were unable to suggest an appropriate method for measuring the initial rate. In Question 9(c), some students were allowed the first mark even though they did not describe the conditions to be kept constant.

Despite the long catalogue of points listed above, this was, overall, another very positive session in many schools and colleges. The teachers in these schools and colleges have successfully and securely delivered the practical assessment and have impressed with the accurate and consistent

standard of their marking. In my last report as a Principal Moderator, I am grateful for the opportunity to salute these superb professionals and wish them well in the future.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator <http://www.aqa.org.uk/exams-administration/about-results/uniform-mark-scale/convert-marks-to-ums>