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General Certificate of Education

Chemistry 2421

CHM6T Investigative Skills Assignment (ISA)

Report on the Examination

2010 examination - June series

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General Comments

The first series for the new specification has seen centres maintain their excellent and much appreciated efforts. The moderation scheme ran smoothly and successfully. The very great majority of centres have come to terms with the new format for assessment at AS and the standard of marking of the A2 work was equally as good.

Administration

As at AS, most centres submitted a complete and well presented sample for moderation, well within the May 15 deadline. This was greatly appreciated by the moderation team.

A smaller number of centres made the familiar mistakes with paperwork. The main deficiencies are repeated below for the benefit of centres with A2 candidates only:

(a) Forgetting to include target values for the task, although happily there were fewer instances this year.

(b) Centres with more than one student group forgetting to indicate which target value applied to each individual candidate.

(c) Forgetting to include a signed Centre Declaration Sheet.

(d) Candidates forgetting to sign their Candidate Record Form.

(e) A surprisingly large number of candidates with incorrect marks entered on the Centre Mark Sheet.

PSA

Candidates scored even better in this section, with the same lack of discrimination between candidates. Scores of 11 or 12 were almost universal.

Marking

The great majority of centres were able to apply the published Marking Guidelines successfully and with commendable accuracy. The greater detail in the Marking Guidelines seems to have been welcomed by teachers and the additional guidance given during the Standardising Meetings also seems to have been helpful to centres. The most frequent reasons for the recommendation of a mark adjustment continue to be that the centre used an incorrect target value in assessing accuracy in the task and/or the centre's interpretation of the Marking Guidelines was unduly generous.

The Marking Guidelines cannot cover all possible answers and it is inevitable that teachers will be faced with a range of additional responses. Centres are reminded that their Assessment Adviser can provide guidance on the application of the Marking Guidelines.

Centres must avoid an understandable tendency to give the candidate the benefit of the doubt whenever an answer is on the right lines, but doesn't really match the required response. Some markers remorselessly allow answers that are very vague indeed, or are simply wrong. The result is serious over-marking and the candidate's script is outside tolerance.

ISA CHM6T/P10

Task

The observation exercise in the task proved straightforward for the great majority of candidates, and high marks were common. Many centres allowed marks when the candidate's results matched the teacher's results for the reactions with potassium manganate(VII) and methyl orange. Centres are reminded that the teacher's results can be accepted when they are reasonable. The acceptance of alternative observations is mainly intended to allow for errors in the practical exercise itself, such as the candidates being given a solution of the wrong concentration or the wrong reagent. They are not intended to allow marks to be given to candidates who make confused observations. While there can be a number of acceptable observations when potassium manganate(VII) is being reduced, an answer such as 'yellow orange' is contradictory for reactions of methyl orange, and must not be credited.

Centres are reminded that if something goes drastically wrong with a task the centre must contact the Chemistry Subject Office at AQA for guidance.

ISA Written Test

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

Section A

In Question 1, most candidates could identify the unknown from their task results but a surprising number could not give a satisfactory test in Question 2. Centres are reminded that if the candidate chooses an incorrect test reagent the mark for the observation cannot be awarded.

In Question 3, many candidates failed to write a correct equation with a satisfactory representation of the ester product.

In Question 4, most candidates could provide a covalent bond and/or appropriate frequency range in Questions 4(a) and 4(b). However, few were able to score both marks in Question 4(c). The candidate must compare the spectrum with that of the known compound and look for an exact match to score the marks. Many centres were very generous when marking vague answers. It was not uncommon to see two marks being awarded for a long answer that completely missed both of the scoring points.

Section B

Virtually all candidates were able to produce a suitable graph in Question 5. There were fewer examples of generous marking of this graph, as the nature of the graph makes it more likely that the plotted points will cover half the paper. Occasionally graphs containing incorrectly plotted points were not penalised. Some markers forgot that the line of best fit mark cannot be awarded when the line itself is poorly drawn or doubled in places. Given the shape of the graph, some minor doubling can be ignored but sometimes graphs with several doubled regions escaped the appropriate penalty.

Many candidates could not determine the volume of sodium hydroxide at the end-point of the titration in Question 6(a), quoting an amazing range of values. Most candidates could, however,

obtain appropriate values for Questions 6(b) and 6(c). In Question 6(c), some centres did not allow a consequential mark from an incorrect answer to Question 6(b).

Candidates either scored both marks in Question 7 or made no useful progress. In Question 8, a number of candidates became confused when comparing two very small numbers and chose the wrong acid.

Candidates have a good appreciation of the calculation of apparatus errors and a majority scored the mark in Question 9. Again the need to work with very small numbers meant that many candidates did not complete Question 10 correctly.

Candidates either answered Question 11 confidently, or misread the question and suggested changes to the experimental technique. Only the better candidates were able to answer Question 12 correctly.

The equation in Question 13(a) was well done, but many candidates lost the mark in Question 13(b) because their answers were vague.

In Question 14(a), most candidates appreciated that the reaction was carbon neutral but could not express themselves clearly. The problems associated with a finite resource were not appreciated by many candidates in Question 14(b).

ISA CHM6T/Q10

Task

As in Unit CHM3T few centres had difficulty with the titration exercise in the task. Candidates took the opportunity to demonstrate their skills in this most traditional of practical exercises and high marks were the norm. In one or two centres the average titres recorded were much lower than usual. Centres are reminded that when this happens they must not increase the tolerance boundaries for the accuracy marks. A few centres recorded very high titres perhaps because of a mistake in making up a solution to the required concentration. Teachers are reminded that if the teacher value is obtained before the candidates undertake the task then such mistakes are unlikely to occur.

Candidates must be told that a complete table will require columns for *Initial volume*, *Final volume* and *Titre*. The teacher must check that the candidate has calculated an average titre correctly and has only used concordant results in the calculation. Accuracy marks are based on the correct average titre. Some centres were unduly lenient when awarding the mark for precision of recording. Centres are reminded that candidates must record all non-zero volumes to 0.05 cm^3.

Centres are reminded that if something goes drastically wrong with a task the centre must contact the Chemistry Subject Office at AQA for guidance.

ISA Written Test

This paper proved quite demanding and a wide range of marks was seen. It must be stressed that the great majority of teachers were able to apply the guidelines and mark accurately. The long list of problem areas given below are mainly intended to help the inexperienced teacher, or those new to the AQA scheme.

Section A

In Question 1, candidates were often incorrectly given the mark even though they included a non-concordant titre in the average.

In Question 2, many candidates were wrongly allowed the mark when they had forgotten to cancel the hydrogen ions from both sides of the equation.

In Question 3, most candidates could calculate the number of moles of manganate(VII) but a fair number could not apply the correct mole ratio for the second mark.

In Question 5, a surprising number of candidates could not calculate a M_r given a mass and a concentration.

In Question 6, a number of centres continue to overlook the requirement to give the M_r value to one decimal place. When a numerical answer is required to a specified precision, a mark cannot be awarded unless the candidate's answer is given to the same specified precision.

In Question 7, many candidates could not explain the relevance of their calculated M_r value and relied on guess work.

Candidates have a good appreciation of the calculation of apparatus errors and the great majority scored both marks in Question 8.

In Question 9, the toxicity hazard seems to confound candidates. Many gave a list of precautions, most of which were inappropriate and consequently lost the mark.

Many candidates continue to struggle with questions such as Question 10, seemingly unable to tie a general concept to experimental results. Many candidates focussed on errors in the experiment or the calculations.

Section B

Many candidates failed to score the mark in Question 11(a), an incorrect charge for the complex being the usual error.

Answers to Question 11(b) were disappointing. Most candidates had some idea of the answer but could not explain themselves clearly. Many centres awarded marks for answers that made little sense.

In Question 12(a), credit cannot be given to candidates who repeat the information from the question stem, rather than apply this information.

A surprising number could not give a satisfactory test in Question 12(b). Centres are reminded that if the candidate chooses an incorrect test reagent the mark for the observation cannot be awarded. Centres are also reminded that 'OH^-' or 'hydroxide' is not acceptable as a test reagent, but a correct observation can score the second mark. When required to identify a test reagent, a candidate must give the full name or formula.

Candidates tended to overlook the practical process in search of an answer to Question 12(c), 'incomplete reaction' being a popular choice.

As at AS, the yield calculation in Question 12(d) proved to be beyond a large number of candidates. Many did not attempt the question.

While most candidates were able to write a correct equation in Question 12(e)(i), only a handful could deduce the mole ratio in Question 12(e)(ii).

Many candidates continue to struggle with questions such as Question 14, once again unable to see beyond the observations in a familiar practical activity. Similarly, the application of logic to everyday chemistry in Question 15 defeated many candidates.

The above notes are intended for that small minority of centres experiencing difficulty in meeting the marking criteria. They must not be allowed to unduly detract from the very healthy overall picture. Given the pressures on centres to deliver the teaching programme, this was a very positive first session. Centres are again warmly commended for the trouble taken to assemble a sample which proved to be easy to moderate. Their efforts continue to be much appreciated by the moderator team.