

GCE

Chemistry

CHM3X – Investigative and Practical Skills in AS Chemistry
Report on the Examination

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General comments

This year's paper compared well with those for previous years and seemed to indicate that students were well prepared for the practical examination by the majority of schools and colleges. All parts of the paper were accessible but, again, there are some indications, in the responses to Section C of the Written Test, that the breadth of practical experience in some schools and colleges is weak. A thorough coverage of the experimental activities recommended in the PSAs, published by AQA, would help to alleviate this apparent lack of practical awareness.

Task 1

High marks were recorded by many students in the two Tasks. Task 1, the thermal decomposition of sodium hydrogencarbonate, was well executed and recorded by most students. The results for the percentage by mass of solid, remaining after heating, were normally quite close to the expected 63.1%, allowing students to score good accuracy marks. However, it was noted that the teacher results for a few schools and colleges were significantly distant from this value. Again, the importance of using a fresh sample of the reagent for an assessed task was highlighted. In a small number of cases, students failed to record the initial mass of the crucible and thus, no assessment of accuracy was possible.

Task 2

In Task 2, the calorimetric determination of an enthalpy change, good results were frequently seen and well recorded. Imprecision in temperature recording was rarely seen and only a few schools and colleges appeared to be using thermometers other than those that measured to 0.1 or 0.2 °C. Despite the advice to in the Teachers' Notes to check the recording of a temperature, there were a few instances where misreading had probably occurred with the loss of all the accuracy marks. A few students did not stir sufficiently well and the temperature was seen to continue to decline at the sixth and, sometimes, the seventh minute. As in Task 1, very few failed to record the mass of the weighing container and could not access Accuracy marks. Most resultant enthalpies were quite close to the teacher values.

The Written Test

Section A

In the Written Test, high marks were seen in Section A where the students' task results were processed. Generally, students were familiar with the calculation steps involved and were able to explain answers fully. Questions 1 and 2 were answered well with some students failing in Question 1(a) to calculate the solid masses and just recording their raw results. Occasionally, the precision mark was lost in Question 1(b) but atom economy was well understood. In Question 3, some students over-complicated the question, divided by the percentage from Question 1(b) or simply left the difference as the final answer. In Question 4, occasional doubling of the tolerance was penalised. Question 5 required some thought and common errors were references to impurity, to higher masses without further qualification and to the temperature of the Bunsen flame. Most students, however, gave good answers. In Questions 6 and 7, good graphical work was seen with a few still using poor scales or, where temperatures were scattered, poor lines of best fit. In Question 7, some students' answers displayed poor precision and some misinterpreted the question by giving the lowest temperature reading. Questions 8 and 9 were answered well with many clear calculations and correct substitution of values – the main errors were giving

inconsistent units, using the mass value from Task 1 in the calculation of moles and using a negative sign for the final enthalpy.

Section B

Section B questions proved to be more demanding. There were many correct formulae in Question 10 but often a mark was lost due to incorrect connectivity between OH and C. The equation in Question 11 was very challenging with many failing to get the tartrate product correct. Question 12 proved surprisingly difficult with a significant proportion of answers using inappropriate reagents, imprecise reagents (eg a reactive metal) or mis-reading the question and suggesting a carbonate or hydrogencarbonate reagent. In Question 13, there were many good answers with occasional deduction of a mark if the 'acid' conditions were not mentioned, the wrong oxidation state was quoted, the full colour change was not given or 'no reaction' was written as an observation. Where the wrong reagent was given (frequently Fehling's or Tollens' solutions) all the marks were lost. Questions 14, 15 and 16 required some thought by the student and were often poorly done. The main error in Question 14 was to suggest that the water would react with the baking powder and this was common. Vague answers were the problem in Question 15; it was necessary to quote both the reaction of the acid with the sodium carbonate or hydrogencarbonate and to state the release of CO₂ gas. An acceptable answer in Question 16 was thermal decomposition of the tartaric acid since students would not know that this is unlikely. Vague answers about 'changes' on reacting were not accepted and the frequent mention of neutralisation (producing toxic salts) was penalised. The expected answer of small quantities was, however, frequently seen.

Section C

As usual, Section C was poorly answered with few students getting high marks. The suggested improvements to the preparation of a standard solution in Question 17(a) were weak and incomplete for many, although most gained at least one mark. Changes not referring to technique were often quoted, for example the use of distilled water throughout. There was also much encouragement to clean apparatus and to zero balances. In Question 17(b), many just ignored the 'Rough' and averaged all three results. Students did have to make it clear that at least one further titration was needed and just an explanation of concordancy did not score both marks. The final question, Question 18, proved too difficult for most students. It is clear that many did not understand the term 'filtrate' and quoted the ions in barium sulfate. A considerable number of students gave a selection from a variety of correct and incorrect species to answer this deceptively simple question.

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

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