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**General Certificate of Education**

# Chemistry 1421

## CHM3X Externally Marked Practical Assignment (EMPA)

# Report on the Examination

*2010 examination - June series*

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## General Comments

Centres are once again to be congratulated on their excellent and much appreciated efforts in this second externally marked practical assignment for the new specification. This EMPA discriminated effectively between able and less able candidates. Candidates found this year's assignment accessible and many good scripts were seen. The great majority of candidates scored at least half marks.

### *Administration*

Most centres submitted scripts and the associated paperwork well within the May 15 deadline. Fewer centres did not complete the paperwork properly. The main deficiencies continue to be:

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

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

(c) Centres forgetting to include a signed Centre Declaration Sheet.

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

### *Task 1*

Candidates seemed familiar with the thermochemistry exercise, which proved to be more demanding than a titration. High marks were not quite so common. In a number of centres candidates appeared to be using 0.5°C thermometers. Centres are reminded that candidates rarely obtain good results with these thermometers and consequently cannot access the highest marks in the task.

In a couple of centres the solutions were presumably prepared too close to the event and had not had time to cool to room temperature. This guaranteed no marks for accuracy for all of the candidates.

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

### *Task 2*

The observation exercise in this task gave candidates another opportunity to demonstrate a routine practical skill but high marks were again quite rare. The majority of candidates failed to record the initial observation when the alkali was added in Test 1. Candidates also need to take more care when describing the colour change of the indicator paper in this test. Stating that universal indicator paper 'turns green' implies that ammonia is virtually neutral. Many candidates did not use the term 'precipitate' unless distinct particles could be seen in the reaction mixture.

The marker will accept the teacher's results as long as 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 do not successfully

complete the tests. If a number of candidates obtain the expected results, the marker will usually assume that the solutions used were the correct ones.

**EMPA Written Test**

This paper proved demanding and a wide range of marks was seen. The main problem areas are given below.

***Section A***

In Question 1, the candidate was required to draw a graph using results from the task. Most candidates were familiar with the profile of the graph and most candidates obtained good marks. However, many candidates continue to lose a mark for plotted points which did not cover half the paper, or for graphs containing incorrectly plotted points. It is usually unrealistic to start the temperature axis at zero.

The majority of candidates were able to complete the calculations in Questions 2 to 4 but lost the mark in Question 5 by not quoting the temperature rise to one decimal place.

In Question 6, many candidates did not use the correct mass in the equation, so lost a mark. In Question 8, many better candidates forgot to convert their answer to kJ $mol^{-1}$ and also lost a mark.

Candidates had a good appreciation of the calculation of apparatus errors and a majority scored the mark in Question 9.

In Question 10, many candidates lost a mark because they did not comment on the quality of their line of best fit. Answers such as 'the graph shows a positive correlation' need to be expanded to be worth a mark.

The candidate's failure to differentiate between the meaning of accuracy and reliability often resulted in the loss of the mark in Question 11.

Question 12 defeated most candidates. The majority of candidates automatically turn to a flaw in the experimental set-up in this type of question. They find it very difficult to look at the nature of the experiment itself.

A surprising number of candidates did not identify ammonium sulfate in Question 13. A good number lost the mark for a correct identification because they wrote an incorrect formula. Question 14 was well done but only the best candidates were able to make any progress in Question 15. Many candidates have difficulty in appreciating the value of a negative test result.

Surprisingly the toxicity hazard seemed to confound candidates in Question 16. Many gave a list of precautions, most of which were inappropriate and consequently lost the mark.

***Section B***

In Question 17, many candidates lost the mark because they thought that ammonia would react with sodium hydroxide. In Question 18 many candidates repeated their answer from Question 11 and didn't receive any credit. Very few candidates could write a balanced equation producing water and one other product in Question 19.

Candidates provided a wide range of answers to Question 20(a), with a surprising number completing the calculations correctly but then drawing an illogical conclusion. Question 20(b) was well answered, although some candidates did not appreciate that the fertiliser has to have some solubility to function. The calculation in Question 21 was beyond many candidates. The number of candidates who stated incorrectly that the $M_r$ of ammonia is 18 was disappointingly large.

### *Section C*

This section tested the understanding of the skills and techniques acquired during the AS course. It again proved very challenging and full marks for this section were very rare.

Question 22 (a) was answered well. The usual mistake was to misread the question and suggest a suitable titre volume. A few candidates had no concept of volume, thinking one drop equals one $cm^3$. In contrast, Question 22 (b) was poorly answered. Most candidates did not see the significance of a burette measuring a volume difference, and talked about the accuracy of a single volume reading being affected.

Many candidates seemingly forgot the details of an experiment they will surely have met several times before. Concise answers scoring both points were surprisingly rare. A significant number of candidates measured the time taken for a given volume of gas to be produced. Candidates should not use the term 'amount' when they mean 'volume'. Many candidates adopted a scattergun approach, listing every variable they could think of.

Questions requiring a test and reagent defeat many candidates and Question 24 was no exception. Many candidates could remember the results of the silver mirror test, but not the name of the test reagent. Centres are reminded that if the candidate chooses an incorrect test reagent the mark for the observation cannot be awarded.

Overall the scheme seems to have worked well once again. Given the pressures on centres to deliver the teaching programme, this was a very positive and encouraging outcome. Centres are warmly commended on their efforts.