



General Certificate of Education

Chemistry 2421

**CHM6X Externally Marked Practical
Assignment (EMPA)**

Report on the Examination

2010 examination - June series

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General Comments

The paper was generally accessible to the majority of candidates. The Tasks were high scoring with the titration exercise seeing many examples of full marks.

Task 1

In Task 1 there were two main problems. Firstly, a significant number of candidates gave only the final observation in the series of changes or were unspecific regarding the nature of the observation in that the words 'solution' or 'precipitate' were omitted. Secondly, centres need to be advised that they must check their solutions before the Task – it is not acceptable to indicate on the Teacher Results Sheet that hydrogen peroxide solution is a strong acid when it should give a neutral result with Universal Indicator. Some candidates also introduced a chemical error into their answers for Test 3 by mentioning the formation of a 'black solution' following the manganese(IV) oxide addition. Candidates should have recognised that the solid MnO_2 remained undissolved. Generally, candidates were not adept at describing their observations in an acceptable chemical form.

Task 2

In Task 2 the marks were high and often at the maximum but some candidates still lost credit due to inaccurate precision in the recording of each burette value. Candidates should record all burette readings to a precision of zero or five (.00 or .05) in the second decimal place. Concordancy was well understood and results were well presented. A few candidates, however, recorded only the initial and final burette readings leaving the titre value understood. This is not acceptable even if the initial burette readings are all at zero.

EMPA Written Test

Section A

On the written paper in Question 1 the answers were generally good and an allowance was always made for consequential answers from Task 1. In a significant number of cases, however, candidates lost a mark by incorrectly quoting the formula of chromate(VI) ions even though this was not part of the required answer.

Question 2 was not well answered; many candidates were distracted by answers involving chromium and iron(II) species or NaCl. The mark for colour could only be gained if an iron(III) species had been given for the precipitate.

In Question 4, a significant number of answers where the hydrogen ions had not been rationalised were seen and penalised.

The calculations in Questions 5 and 6 were generally well done with the loss of the precision mark (3 significant figures) the main error. This carried over into Question 7(a) where some candidates are still not giving M_r values to one decimal place; however, precision errors in Questions 6 and 7(a) were only penalised once. Questions 7(b) and 7(c) saw many correct answers but some candidates got into mathematical difficulties after a promising start – one error was the appearance of units in the dilution factor.

Section B

In Section B, the graphs seen showed the usual range of mistakes seen in this type of question as mentioned in the marking scheme. The main difficulty was in ensuring that the **plotted** graph covered at least half the printed grid.

In Question 9, most candidates were able to find an appropriate gradient and full marks were common. Allowance was made for consequential errors from the drawing of the graph but in Question 10 the order quoted needed to be based on the final answer to Question 9.

Candidates had some trouble with Question 11, many thinking that a 'white tile' would improve the precision of time measurement.

In Question 12(a) many candidates did not appreciate that '**fractional** distillation' of a mixture of liquids would be needed or confused their answer to 12(b) with this separation. A pleasing number of candidates were able to gain credit in Question 12(b). In 12(c) an inability to express ideas coherently meant some candidates lost this mark. Frequent responses included reference to the spectra 'being the same' or 'the molecules have the same bonds'.

In Question 13(a) the erroneous answer involving temperature rise was often seen and in Question 13(b) candidates often mentioned the formation of water and oxygen but did not then go on to explain their (lack of) effect on the environment. Some candidates misinterpreted the question and quoted the **harmful** effects of these products.

Section C

In Question 14, it was clear that a significant number of candidates misunderstood the question, giving a perfectly good explanation for Figure 2 but quoting the wrong arrangement. The two marks available were therefore awarded independently to allow correct chemistry to be rewarded.

In Questions 15 and 16, it was evident from the quality of the answers when candidates had carried out the procedure themselves. In Question 15, too many answers referred to 'calibrating' the pH meter without explaining what that meant and some candidates used distilled water instead of a buffer solution to guarantee pH 7. In Question 16, there were a variety of acceptable answers including use of the Thiele tube but where more general answers were given the need for slow heating near the melting point was often omitted.