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Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International Advanced Level
In Chemistry (WCH16)
Paper 1 Practical Skills in Chemistry II

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Introduction

This paper appeared accessible to students at all levels, with very few blank responses seen. Students again proved their ability to answer calculation questions with many fully correct answers. Where answers were not fully correct, very good presentation made allocating marks straightforward for many students. While many students were clearly familiar with the practical techniques used in these experiments a few were not able to apply their knowledge to the specific context or gave answers which lacked precision.

Question 1

This question required students to recognise tests and observations of unknown solutions and a solution of barium chloride. Parts of this question requiring interpretation of observations and the writing of formulae were attempted with confidence, though equations and practical techniques were more challenging. The majority of students were able to recognise the corrosive hazard symbol in 1(a)(i), and were able to apply this later to identify hydrochloric acid, many recognising that for this hazard, the acid would be concentrated. The equipment used, and practical technique required, to add small amounts of solutions and observe changes on addition was well understood. Questions on the other tests were generally well answered and formulae given were often correct. One solution was a blue solution of copper(II) sulfate. Formulae of the copper compounds resulting from tests on this solution, particularly the pale blue precipitate, were well known and many recognised the yellow solution as $[CuCl_4]^{2-}$. There were a number of students who gave the formula of the dark blue solution as $[Cu(NH_3)_6]^{2+}$ rather than the correct tetraammine $[Cu(NH_3)_4]^{2+}$. Quite a number of students, however, thought that the coloured solutions contained chromium ions. These, and those giving the wrong formula for the dark blue solution, were able to score marks for the equation and EDTA complex. This final part of this question, 1(b)(vii), saw some students recognising the correct formula of the complex as $[Cu(EDTA)]^{2-}$. Of those that did, many were then able to complete a balanced equation.

Question 2

In part 2(a) students were able to recognise the most significant hazard and a suitable safety precaution. Quite a significant number state incorrectly that a mask was a suitable precaution for a toxic gas. Where other hazards were identified many were able to suggest suitable precaution for this hazard and so were able to score one mark.

The calculations in 2(b) and 2(f) were generally very well answered as mentioned above. In (2f) which was worth 6 marks, a range of scores were seen, but most students were able to score at least 2 marks, with 6 marks being reasonably common. Calculations were generally well laid out with each step clearly labelled.

The parts of the question that focussed on experimental error and the effect of possible side-reactions, 2(c) and 2(g) were less well understood. Some students used generalisations rather than applying their knowledge to the context of the questions and so limited the marks available to them.

In 2(e), five marks were available for a description of carrying out a titration. Some students, who presumably misinterpreted the question, spent some time talking about preparing a standard solution, which was not required, and so perhaps limited their chances of scoring full marks. Others did not read the question with sufficient care and used samples of the reaction mixture rather than the whole solution as required in the question. There were some excellent responses, however, with many students identifying the three key points and able to offer many suggestions as to how the titration could be made as accurate as possible.

Question 3

This question tested the students' understanding of the practical techniques involved in the synthesis of an azo-dye, Organol Brown. Many students had clearly carried out a practical similar to this one, or were able to apply their knowledge of the steps involved.

As in question 2, there were some generalisations associated with the practical steps in 3(a)(i), 3(a)(iii) and in 3(e), which limited access to the highest marks, but many students thoughtfully applied their knowledge to the context of this question.

The drying agent in 3(b), and the recrystallisation steps in 3(d) were particularly well understood and answered.

The diagrams 3(a)(ii), however, suggested that students would benefit from further time working on this aspect of their study. Clear labelled diagrams which are cross-sections of the apparatus are what is required, and while most students recognised in general the type of apparatus needed for a reflux, the detail in the diagrams saw marks being lost for sealed systems and for the incorrect direction of water flow in the condenser.

In part (e) many students were able to identify that the observation to show purity in the melting point test was a sharp temperature range. Matching this temperature to the melting point of a compound in a data book identifies the compound, not its purity.

Summary

Based on the performance in this paper students should:

- read questions with care to ensure that they understand what is required from the question rather than assumming the question is similar to one they have seen previously
- ensure they are familiar with the sixteen core practicals from the specification and as many of the further recommended practicals as possible
- practice applying the knowledge learned in these practicals to unfamiliar situations where similar techniques are used
- avoid generalisations to questions asking about techniques in a particular practical setting identifying any particular relevance of the reagents being used in that particular experiment
- practice drawing the practical equipment and set-ups for the techniques which they encounter, using cross-sectional diagrams rather than 3-dimensional ones

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