



Examiners' Report

Principal Examiner Feedback

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Pearson Edexcel International Advanced
Subsidiary Level

Chemistry (WCH06)

Unit 6: Chemistry Laboratory Skill II



Introduction

This paper contained opportunity for learners across the whole-ability range to show the depth of their knowledge and understanding of practical activities. There was no evidence that learners did not have sufficient time to complete the paper. The learners as a whole were able to apply their knowledge and understanding of practical work in all areas, with no questions proving to be totally inaccessible. It was clear, however, that some learners were extremely fluent in some areas of practical work and so scored high marks on these questions but were not so familiar with activities in other areas of the specification.

Question 1

The focus is on observation and inference type questions, with chromium ions as the primary focus. Some learners found identifying the metal difficult, opting instead for iron, copper or nickel ions. These learners were able to score some marks for identifying, for example, the role of zinc as a reducing agent in 1(f) or the fact that ethanol was oxidised in 1(d). There were a number of scripts with good responses to the items in this question, but learners had some difficulty with some of the items. Notably was (a), where many used their answer to (b), and then suggested that sodium ions were present rather than recognising that the colour of the compound was due to the presence of a transition metal. The yellow flame test in (b) was familiar to many, but only a few knew that the orange solution in (c) was due to dichromate(VI) ions. Recognising the presence of chromate(VI) and dichromate(VI) ions in (a) and (c) made the remaining items much more straightforward. Those that did this were able to score some good marks on the rest of the question.

Question 2

In this question, it was important to use the answers to the individual items to gradually build towards identification of the compound Y and Z. Consequently, it was not possible to deduce from (a)(i) that an alcohol was present as PCl_5 is a test for an -OH group which might be present in an alcohol or a carboxylic acid. (a)(ii), however, ruled out the possibility of a carboxylic acid so that only an alcohol was possible. Some learners did not seem aware that an alcohol with a methyl group and a hydrogen attached to the carbon with the -OH group on it would give a positive triiodomethane test in (a)(iii). It is important to be very clear about what each chemical test is actually testing for, and what will give a positive result. The final item in (a) concerned mass spectrometry. Many learners were able to identify an appropriate species responsible for the fragment at $m/e = 45$. Unfortunately, some forgot that this species was positively charged so were not able to score a mark. Fragmentation was recognised as the source of this ion, but a recognition of the fragmentation of methyl radical or group was necessary to score the second mark. Learners found (b) much more straightforward and were able to score good marks identifying propanoic acid through the two tests described.

Question 3

This question began with graph drawing. The graph was a very well answered item, with full marks being the most common score. Some learners forgot the need for units on the axis and some plotted incorrect points, usually the first few being the hardest to get right. In general, however, this was very well answered. A number of learners were clearly not familiar with this practical and so the rest of the question proved a little more challenging. (a)(ii) proved much difficult, with few recognising the link between the concentration of iodine and the volume of sodium thiosulfate. Those that were able to answer the other two items in (a) did so very effectively with few learners scoring only one mark for either of these two mark questions, with zero or two being the common scores. The colour change of starch as an indicator was very well understood, with full marks being the most common score, but the idea of an insoluble complex being formed if the iodine was added too early was not so commonly recognised. It is important to note that, in an examination focused on practical work, ideas about how this work is carried out are very important. The fact that the starch was added near the end-point was commonly recognised, but how a learner would know when this point had been reached as the solution becomes straw coloured, was not so well known. 3(c), 3(d) and 3(e) were all quite accessible to many learners. Again, the responses tended to either score full marks for the item or nothing.

Question 4

This question, on the synthesis of 2-ethanoylaminobenzoic acid, began by considering reflux, a question on which most learners were able to score some marks. Section (b) proved much more challenging, however, with few learners identifying the need to react water with the excess ethanoyl chloride, though a few more were able to suggest that an exothermic or vigorous reaction would occur if the mixture was still hot. The final sections of the paper proved more accessible, with many knowing the advantages of suction filtration and scoring at least one of the marks for how a melting point test might be used to establish the purity of a sample of the product. The final calculation proved to be one which the learners were able to answer very well, with high marks being scored.

Summary

Overall, this paper proved to be accessible to majority of the learners, however there are a number of areas which are worthy of consideration. Questions on practical work will often, though not necessarily always, ask about the processes and outcomes of the practical work rather than the theory which accompanies it. Consequently, learners should read the questions in this way. The ability to answer these questions improves significantly with exposure to practical activities, many of which are suggested within the specification. Practical challenges not only enhance understanding of the processes of practical chemistry but improve understanding of the theory that underpins it and provides significant interest and enjoyment for the learners and should be a significant part of a course at this level.