Examiners' Report
Principal Examiner Feedback

January 2019

Pearson Edexcel International Advanced Level
In Physics (WCH03) Paper 01
Chemistry Laboratory Skills I

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January 2019
Publications Code WCH03_01_1901_ER

General comment

The paper had a significant focus on the core practicals contained within the specification. All students had good opportunities to demonstrate their chemical understanding and the questions on flame tests and titration calcualtions were particulary well answered. Many students found parts of question 3 and 4 the most demanding where they had to:

- describe how to make a standard solution
- suggest ways of adapting chemical apparatus
- suggest ways of developing an experiment

These areas can be improved by carrying out practical tasks in the laboratory.

There was no evidence of students running out of time.

Question 1

The majority of students answered parts (a) and (b)(i) correctly. Although a number failed to read the question properly and just gave the Br^- ion instead of AgBr. A very small number gave the incorrect halide.

The ionic equation in (b)(ii) was usually correct, but a significant minority did not score the state symbols mark, either because they were incorrect or simply left out. The equation forming $AgBr_2$ was also occasionally seen.

In part (b)(iii) many knew how ammonia solution could be used to confirm the presence of the bromide ion, but a number just wrote about the solubility of silver bromide in concentrated ammonia, and omitted the separate test using dilute ammonia. Some students appreciated both concentrated and dilute ammonia were required, but got them the wrong way round stating that the silver bromide was soluble in dilute ammonia and insoluble in concentrated. A few students suggested using chlorine water to displace the bromide.

Question 2

The start to this question (a) invloved a novel approach to simple qualitatative tests. Many students found this quite challenging and it proved to be a good discriminator. Students who scored full marks often wrote word or symbol equations as rough work to help in them identify the compounds. This is a good practice, but students must make it clear what their final answer is. A number of students confused the acids and gave them the wrong way round and some students only identified E correctly. A small minority did not read the question correctly and gave options for B-E which were not provided in the question. These included ions, elements and a mixture of different compounds.

The ability to carry out a flame test is a technique that is clearly understood by the majority of students and (b)(i) was particularly well answered. A few students missed marks by not specifying the material of the wire or not mentioning that the sample should be placed in the flame of the Bunsen burner. Very occasionally sulfuric acid was also seen. In(b)(ii) almost all students correctly identified the flame colour for both compounds.

Question 3

In (a), students who had carried out a thiosulfate titration tended to score both marks. However, it was apparent that a significant minority had little or no understanding of using starch as an indicator for this titration. The most common incorrect answer given was phenolphthalein with the associated colours of pink and colourless.

In (b) (i) almost all students accurately completed the table and the majority correctly chose titrations 2 and 4 to calculate the mean in (b) (ii). However, a number just ignored titre 1, saying that it was not included as it was a rough titration. They then took the average of titres 2, 3 and 4 which were not concordant so did not score the mark. The calculations were well answered with almost all students scoring the first mark and there were many completely correct answers. Not dividing by 2 in part (v) or not multiplying by 10 in (vi) were common errors. However, the availability of TE marks meant that (b) was a high scoring section for the majority of students.

Making a standard solution in (c) was clearly the most demanding question for lots of students and it was apparent that many had no practical experience of this technique. Students who had a reasonable understanding often missed key details such as using **distilled** water and **dissolving** the solid. Giving scoring points in the wrong order also cost marks such as making up to the mark with distilled water before the solid was dissolved. There were also a large number of titration descriptions which did not score any marks.

Question 4

This question on the decomposition of hydrogen peroxide is a practical in the specification and it was pleasing that answers to parts (a) and (b) were generally very well done. Students were usually able to identify that the same amount of the metal oxide should be used, but some lost marks by duplication of this scoring point, eg, 'same mass of solid' and 'same moles of metal oxide'. A small minority referred to having the same concentration of the solid so did not score this mark and a number erroneously stated that there needed to be the same volume of H_2O_2 solution rather than specifying the same concentration. The majority of

students understood the measurements that needed to be made for this reaction and there were many accurate answers, but a number did not make it clear that the **volume** of gas needed to be measured. Some otherwise correct responses were also spoilt by referring to the time for the reaction to finish.

Unfortunately parts (c) and (d) were generally poorly answered. In (c) students who had seen or carried out this improvement to a reaction where a gas is collected probably scored the mark. However, this was rarely seen and students gave a range of incorrect answers including, adding the hydrogen peroxide to the solid, swapping the bung for cotton wool, using a lower concentration of the peroxide or cooling the solution down. Part (d) was answered slighter better than (c) with almost all the correct responses scoring marks via the weighing the oxides before and after route. However, the majority of students did not score marks. Most incorrect answers suggested that the metal oxide could simply be heated and a test for O_2 carried out.

Question 5

The answers to this organic question were generally very pleasing. Part (a) scored well, although a number achieved the reagent mark but made a mistake with the conditions with aqueous or acidic being common wrong responses.

A good proportion of fully correct answers were seen in (b)(i).
However, areas where marks were lost included the absence of the initial colour of bromine or bromine water and forgetting to mention acidic conditions with $KMnO_4$. Part (b)(ii) was also well done but some students drew structures where a bromine and hydrogen had been added instead of a bromine and a hydroxyl or two bromines. Surprisingly, some answers had the displayed formula for propene itself, showing that the question had not been read carefully enough.

Although there was a slight confusion between substances that act as irritants or are corrosive, most students seemed to have a good appreciation of hazards and the majority scored 2 marks for (b)(ii). However, the appropriate safety precautions associated with the hazards were not quite as well understood and there were a surprising array of answers, many of which did not score. These included: not eating poisonous chemicals, wearing shoes when dealing with corrosive substances and using a gas mask when dealing with toxic gases. Occasionally a sensible safety precaution did not match the hazard.

The diagrams in (d)(ii) varied in quality. A good proportion had the right basic idea but were poorly executed. A failure to provide heat was a common omission and some answers either drew a completely closed system or had the distillation flask open at the top. Water flow in the condenser was not always drawn the correct way round or was omitted completely and some condensers were horizontal or tilting upwards. There were also several reflux diagrams.

A large number of students found (d)(iii) quite challenging. Many had the right idea but omitted the word **peak** or **trough** which was essential in the answer. A number lost marks by not referring clearly to the absence of a peak or trough relating to the O-H bond, others confused IR with mass spectrometry and quite a few mentioned the presence of C=O peak but said nothing about the absence of the O-H peak.

Paper summary

Based on the performance in this paper, students are offered the following advice.

Always read the question carefully and follow the instructions which are given.

This is a practical paper so make sure you learn and understand the procedures in the core practicals.

Make sure you know the hazards associated with the chemicals contained in the specification and understand the appropriate safety precautions you would take when handling them in the laboratory.

When asked to give an observation think carefully about colour changes and give both the before and after colour.

When asked to draw apparatus for organic reactions you should pay particular attention to the joints and seals as well as the angle of the condenser and don't forget labels, including heat.

Learn the charges of anions and cations in the specification. Do not forget you have a periodic table at the back of the question paper and this can be used to help you when working out the formula of compounds or writing equations.

Practise writing ionic equations.

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