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Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International Advanced Subsidiary / Advanced Level
In Chemistry (WCH13)
Paper 1 Practical Skills in Chemistry

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Introduction

The paper emphasises practical techniques, including a number of core practicals and organic preparations. There were opportunities for all candidates to demonstrate their chemical knowledge and understanding. The more demanding questions were those which either required an evaluation of experimental methods and results or an understanding of why certain procedures are employed in a chemistry practical, particularly the core practicals.
The standard of mathematical calculations was generally very good, though not always easy to follow and unfortunately marks were regularly lost because the students did not read the question carefully enough. There was no evidence of students running out of time.

Question 1

This was a straightforward question and showed a widespread knowledge of the tests for ions. The ionic equation required in (a)(iii) eluded many students.
The majority of students were able to follow the logic of the sequence of tests given. However, some students after correctly identifying a solution, instead of stating the name which had already been given in the question, wrote an incorrect formula. Colours produced in flame tests were very often correctly stated but marks were lost for incorrect charges on cations or the use of the name of the cation when the formula was clearly required.

Question 2

2(a)(i)

This question was generally answered well, with many students showing a clear understanding of why the beaker is washed. Some comments on the concentration were not awarded the mark since the change in concentration was not referred to as being lowered or diluted if all not transferred. Some students made general comments about improving accuracy and reducing error which did not score.

2(a)(ii)

Giving the correct number of significant figures appeared to be a common problem, with many responses not scoring marking point 2 for not giving answers to 2/3 SF.
Many arrived at the answer of 0.27mol/dm^3, with the assumption that the volume was 100cm^3 which was the original volume of water used to dissolve the acid and not 250cm^3 which was the volume of the volumetric flask. Units were generally correct.

2(b)(i)

Many students seemed not to have grasped that a burette made up of both water and the acid, would lead to a lower concentration. There was also a lack of recognition that the burette had already been rinsed with deionised water to remove impurities and offered this as a response.

2(b)(ii)

Marking point 1 was poorly worded such as saying 'the meniscus is not on the pipette mark' with the missing key word being the bottom of the meniscus in order to gain the first mark. Very few decided to redraw the correct position of the meniscus but those who did were mostly able to show clearly that they knew exactly what the mistakes were and how to correct them, with minimal use of language.

Marking point 2 was awarded for the majority saying that the pipette level was not read at eyelevel or correctly saying the reading should be taken horizontally/ perpendicular or level with the mark.

2(b)(iii)

Many students incorrectly thought that the pipette should be emptied to deliver $25cm^3$ solution.

2(c)(i)

All answers provided the correct subtraction of all three results to get the correct titres. Some used all three titres to calculate the mean which was not awarded here but allowed transfer of error (TE) on the next part of the question.

Calculating the moles of ethanedioic acid was generally correct with most students realising the need to multiply by 2 before calculating the concentration of sodium hydroxide. A few students mixed up the mean titre volume and the volume of NaOH used in the final calculation so did not score marking point 3. Some students lost marks when they failed to convert the volume titre and/or pipette volume to dm^3. In many of these cases, the final concentration answers were very high, and a simple 'reality check' would have indicated the problem.

Question 3

3(a)

Many students wrote about gas being sucked back rather than water.

3(b)(i)

Very well answered, with many responses being awarded all 3 marks.

A common error was seeing sodium as the metal when students failed to remember that a Group 2 carbonate was being decomposed.

3(b)(ii)

Marks were lost for a wide range of reasons. These included students ignoring the information from the question that the equipment was not changed. Students were able to make reference to a reduction in the percentage uncertainty with an increase in mass and also understood that more gas would be produced, however most failed to identify that the volume of the gas given off would exceed that of the measuring cylinder, thus securing the second mark.

3(c)

This was a poorly answered question. Many students did not use the correct mass of solution, common errors being 100g (using the beaker volume of 100cm^3) or 160g (using the beaker volume + HCl volume) instead of 60g in the heat energy equation and so the heat energy was wrong. However, TE as given on the correct enthalpy when divided by 0.05. However, a few forgot to add the negative sign for an exothermic reaction and did not get this mark, even though the correct kJ/mol or J/mol value was given. In carrying the value from the enthalpy change forward to the second part of the question it was clear that some students did not appreciate that the units should be compatible.

Question 4

4(a)(i)

This was a straightforward question with nearly all responses gaining 2 marks. Some students suggested doing the experiment in a cupboard rather than a fume cupboard.

4(a)(ii)

Many students just compared the density of one substance to the other and scored no marks. Only a minority of answers used ideas about intermolecular forces, and these ideas were sometimes not stated clearly enough.

4(a)(iii)

This was well answered but marks were sometimes lost for vague references to pressure changes or gas being lost.

4(a)(iv)

This was also well answered but some students stated that sodium sulfate reacts with water, without stating that this causes the removal of water from the organic layer.

4(a)(v)

The quality of diagrams was very varied. Some could not draw the condenser and a number of fractionating columns were seen. A significant number still did not score marking point 4, mainly for being closed on the receiving side.

4(b)

Many answers scored full marks, with the first method described in the mark scheme being the most widely used. Some candidates successfully calculated moles of alcohol and (theoretical) mass of product, but did not then apply the percentage yield calculation correctly. Others used Mr values for the alcohol and the product that included both the HCl and the water ie, more like an atom economy calculation.

4(c)

A challenging question with only the most able students scoring full marks. Many responses referred only to the times taken for the different halogenoalkanes with no reference to the rate of hydrolysis. Some students stated that the halogen and the structure affected the time

but did not provide an explanation. There were references to strength of bonds and iodine even though there is was no mention of iodoalkanes in the question. Students who failed to identify haloalkanes as tertiary/ secondary/ primary but referred to branched/ unbranched did not score well.

Summary

In order to improve their performance, students should:

- read the question carefully, paying particular attention to bold text and make sure that they are answering the question that has been asked
- write concisely and avoid making the same point multiple times
- ensure that diagrams of experimental apparatus show a workable arrangement
- make sure that procedures in the core practicals are carefully learned
- write formulae and numbers carefully, checking their legibility
- show all working for calculations and give final answers to an appropriate number of significant figures
- consider suitable precautions when working with hazardous substances

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