Pearson

Examiners' Report
Principal Examiner Feedback

October 2017

Pearson Edexcel International Advanced Level In Chemistry (WCH03) Paper 1 Chemistry Laboratory Skills I

edexcel

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

October 2017
Publications Code WCH03_01_1710_ER

Introduction

The paper included questions for students across the whole-ability range and so there were opportunities for all students to demonstrate their chemical knowledge and understanding. There were a number of questions which had marks being awarded across the whole range available and so these were effective discriminators. It was also pleasing to note that there was no evidence of any time shortage. The more demanding questions were those which either required an explanation of key chemical concept and principles or an understanding of what actually occurs in a chemical practical.

Question 1

The Q1(a) part was well-answered with the majority of students knowing the test for hydrogen chloride. These questions and part Q1(b)(i) gave the students the option to identify by name or formula and it is worth reminding centres to highlight to their students that if both name and formulae are given then **both** must be correct to score the mark. Occasionally an error was seen which negated the other correct answer of the response.

The formula of the solid formed in part Q1(c) was only correctly given by students of higher ability. Amongst common errors for the formula of ammonium sulfate were $(NH_3)_2SO_4$, NH_4SO_4 and $NH_4(SO_4)_2$. Clearly more practice at writing such formulae would be beneficial for students.

In part Q1(d) the question stem stated that the student "should have been unsure about the identity of the cation" and so it was disappointing to see a significant number of students ruin their answer by stating categorically that the cation responsible was a specific metal ion. This suggests that many students need to read the stem more carefully.

Many students answered part Q1(e) very well, following the logic of the analytical steps and suggesting a possible formula for solid **Y**. However a small minority of students gave the answer as AgCl which is likely further evidence of not reading the stem correctly.

Question 2

In part Q2(a) it was evident from the responses seen that the wording of an answer to this question proved very problematic to students. The correct answer of 'decreased concentration' was not explained well and an assortment of spurious reasons were given. It was very difficult at times to decipher exactly what was meant by the student and so benefit of doubt was given, unless the volume of the solution was clearly stated as being increased which would mean that the solution and not the solid was absorbing the moisture.

In previous exam series, students have shown realisation that a balance reading has two measurement uncertainties but this novel way of asking the same thing was beyond all but the most able of students with only about 12% scoring the mark.

The first part of the calculation in part Q2(b)(i) was usually answered correctly but a significant number of students did not multiply by 0.025 correctly in Q2(b)(ii), with some omitting a zero. The calculation continued in Q2(c)(iii) and a wide range of answers was seen. Perhaps the most common error was in determining the average titre incorrectly through the inclusion of the initial 'rough' titre. Other errors were to omit the doubling of the number of moles from part Q2(b)(iii) and the use of the molar mass of NaOH rather than that of HCl. Marking was often hampered by the random scattering of working seen and it would be appreciated if centres could stress the benefits to their students of working from left to right and from top to bottom in the space provided.

The colour change of the methyl orange indicator in part Q2(c)(i) was given by less than 20% of students which was very disappointing. It was not unusual to see the phenolphthalein indicator change stated.

Question 3

Over 80% of students could correctly give a precaution that would reduce the risk of the hazard in part Q3(a)(i) but further evidence of not reading the question was seen in some responses stating goggles should be worn when this was requested not to be given in the question.

A significant number of students attempted to explain why the second hazard label was used in part Q3(a)(ii) by referring to the reactions in the question but this was not acceptable because the label is used independently of whatever reaction is then undertaken.

The majority of responses to part Q3(a)(iii) correctly gave "steamy/misty fumes" but the reverse was the case with the following part Q3(iv). Only the more able students were able to suggest a suitable reagent such as sodium for a test to confirm the presence of a hydroxy group.

It was rather surprising that only about half of the students could use the information provided in the infrared spectrum and table of data to name the alcohol functional group. The interpretation of data in this way is a crucial skill in chemistry and indeed in most other subjects so it is well worth centres emphasizing this skill with more practice.

Only about a third of students could correctly give the name or formula of the tertiary alcohol for part Q3(c) and so proved to be a good discriminator of higher ability. This question is another example where if both name and formula are given then **both** must be correct.

Most students could add a label to the appropriate peak on the mass spectrum but the skeletal formula for part Q3(d)(ii) proved much more challenging and so was an effective indicator of higher ability.

Question 4

The processing of the experimental results to determine the enthalpy change in parts Q4(a) to Q4(d) produced the full range of marks but the majority of students scoring 3 or more marks. Occasionally errors such as 0.60g and 50.2 or 51°C were seen when completing the table but these were rare. The main point to highlight from this question comes from part Q4(d) where either the negative sign was omitted, or the answer was not given to the nearest whole number as requested in the question. Further, there was some evidence of students misreading their own work because —663 was sometimes seen even though the working stated the answer was —633. The final answer in the space provided is the value which is marked and thus serves as another reminder to double-check work.

Unfortunately, the answers to part Q4(e) were normally unsuitable. Just under two-thirds of responses scored zero. Despite the question instructing students not to include repeats nor more accurate measuring equipment, both of these were frequently seen in such answers as 'use a digital thermometer' or 'use a pipette'. Students do need to focus on the experiment being considered because it was very common to see responses suggesting that polystyrene cups should be used, but these would not be suitable for use above a flame in a combustion experiment.

Only the very best of students was able to both state that the enthalpy change would be more negative and that this would arise because the temperature of the water at the bottom of the beaker would be higher. The statement that the temperature was not uniform is similar to stating that there will be a 'change' without stating in which direction or in which way/how it changes.

Part Q4(g) was mostly answered correctly with the presence of a black solid or soot being given. Very occasionally the error was made of identifying the solid as CO or carbon monoxide which negated the correct observation.

Question 5

The question about anti-bumping granules in part Q5(a) was similar to one from the previous October WCH03 paper and students that had reviewed that mark scheme answered very well. It was pleasing to see that many students now understand the reason for the use of these granules.

However, it was surprising that only just over half of students appreciated that concentrated sulfuric acid is added dropwise because of the exothermic reaction in part Q5(b) since this is a common question and use of this acid.

Part Q5(c) addressed a more novel practical situation but many students could appreciate the issue concerned. Nonetheless it was challenging at times to mark some responses which were somewhat vague in their descriptions. The loss of the organic compounds through the open tap funnel was the issue that needed to be identified.

The use of sodium hydrogencarbonate solution in organic preparations is not new but less than half of students appreciated the neutralisation purpose required in part Q5(d). It was common to see vague answers about the 'removal of impurities' being given which did not score.

It was pleasing to see that the majority of students knew that a separating funnel was the piece of apparatus required for part Q5(e) but the second mark was not always obtained. It was not enough to simply state that the two liquids have different densities because this is not the same as stating that they are immiscible. Common incorrect answers which were seen were filtration and fractional distillation.

The use of anhydrous calcium chloride as a drying agent is generally well-known but in part Q5(f) the change in appearance was required and this proved to be less well-known. A variety of incorrect descriptions were given, even colour changes which suggests that the use of this compound needs to be revisited by centres.

The final question was correctly answered by the majority of students which suggests that they kept applying themselves to the question paper until the end. The use of redistillation to produce a pure sample is familiar and an important practical technique so it was pleasing to see that many knew of it.

Paper Summary

There still continues to be a significant number of questions where it was very clear that the students had not read the question carefully enough. It is always strongly encouraged that students should make sure that they have sufficient time to re-read their answers and then to double-check that they have answered the question as it is written. In addition if two answers are given then both must be correct if the response is to gain credit.

Chemistry is a practical subject and clearly this paper is designed to assess this particular aspect of the subject in detail. Students are encouraged to try to gain more practice at experiments and to focus on why certain parts of the procedure are carried out. Furthermore the interpretation of data such as infrared spectra is important to practice.

In addition the clear lay-out of working in any calculations is to be strongly encouraged and to check that the final value stated matches that required by the question.

Advice to students

Based on their performance on this paper, student should:

- make sure you know and understand the procedures used in the core practicals.
- always read the question carefully. There were at least five parts of questions in this paper where it was obvious that they had not been read carefully.
- show your method in calculations. If you just write down numbers without saying what they refer to you may not get the marks.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html