edexcel

Examiners' Report/ Principal Examiner Feedback

January 2016

Pearson Edexcel International A Level in Chemistry (WCH03) Paper 01

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

January 2016
Publications Code IA043126*

Introduction

The paper included questions that enabled the whole ability range to gain credit while at the same time allowing for differentiation. The topics covered by this paper are not heavily mathematical but where such exist, the general performance by students was good. This is a paper with clear emphasis on practical techniques which continue to prove problematic for many students, likely reflecting the need for more practical experience.

Question 1

The opening diagram on the flame test for 1(a) was very well done with very few students giving the wrong metal for the wire and almost all giving the correct acid. A notable exception was one student stating Rubidium as the metal for the wire and water for the solution used. Certainly, this would have given a dramatic result.
1(b) was also generally well done but one mark was lost by a significant minority of students due to omission of the charges on the ions. The question clearly states 'cation' and is a useful reminder for students to read and answer the question carefully.
1(c)(i) was likewise answered correctly by the majority but again the question required an 'observation' which meant that answers relating to "carbon dioxide given off" did not score unless accompanied by the suitable reference to bubbles, fizzing or effervescence. In addition, a sizeable number of students went further and started to write their own question by describing a further test with limewater but this was not credited.
The most challenging question in this section was part (c)(ii) which was aimed at the more able students and was an effective discriminator for this grade boundary. Furthermore part (c)(iii) produced the full range of scores and also proved a good discriminator. It was somewhat surprising that the use of barium chloride solution to determine the presence of sulfate ions was not better known. The test of formulae writing for Group 1 salts proved too difficult for some with the incorrect formula of $LiSO_4$ being given.

Question 2

There were few correct answers to part (a)(i), with a significant number of students misunderstanding the issue as a similarity of result rather than a lack of result altogether because of the solid physical state of the compounds. Part (a)(ii) proved to be a challenging question with only the most able student scoring 2 marks. Reference to the carbonate/hydrogencarbonate solution was required for the first mark but the second mark was awarded for a correct observation from a given carbonate.
It was pleasing to see so many correct answers for the structure of the product in part (b). The occasional lack of care resulted in some weaker students failing to gain the mark.
Skeletal diagrams are always effective discriminators for higher ability students and this was evident in part (c). Students do need reminding that the bond should clearly go from the carbon atom to the oxygen atom of the OH group and not to the hydrogen atom.
Part (c) (ii) proved to be taxing for even the more able students since only about half of these were awarded the mark. A significant number did not score the mark because of the failure to mention the peak/trough that would be observed in the spectrum and instead simply mentioned the C=O bond. Some students confused mass spectrometry with infrared spectroscopy and incorrectly referred to fragment peaks.

Question 3

The lack of familiarity of students with standard practical techniques was clearly evident in part (a) with less than fifty students realising the need for initial gentle heating to avoid “spitting” and loss of solid when removing the water of crystallisation.
Likewise it was very disappointing to see such few correct responses to the need for ‘heating to constant mass’ in part (b). These suggest a lack of practical experience.
In addition part (e) was often answered with some apparent confusion over whether additional deionized water was added to the washing soda solution still in the beaker or added to the beaker after the solution had been poured out. The students needed to make it clear that the ‘washings’ were transferred to the volumetric flask because it has been known for these to be discarded down the sink rather than used properly.
The molar calculations in parts (d) and (g) were generally well done but did result in a good spread of mark and so provided an effective means of discrimination between students.
Part (h) proved another effective discriminator with only the more able students being able to describe clearly how an overshoot of the titration would result in a calculation of more moles of sodium carbonate and consequentially a lower value of x, the water of crystallisation. No credit was given simply for an assertion that x would be lower unless a suitable explanation was given.

Question 4

The calculations in parts(a)(i)-(iii) were also generally well done, although a sizeable number of students lost the mark for (ii) by the use of only one significant figure with 0.02 or incorrect rounding of 0.0205668 to 0.0205 instead of 0.0206.
The correct answer to part (iv) concerning the use of excess sulfuric acid is to ensure that the enthalpy change is per mole of copper(II) carbonate or that the limiting factor is the copper(II) carbonate. However the vast majority of students gave their answer concerning the need to allow all the copper(II) carbonate to react. This was awarded the mark as an ‘ALLOW’ but it would be good for centres to help their students appreciate the best answer.
Usual reminders to students to read and answer the question were undoubtedly in evidence in part (b) because the question clearly asks for a sign in the answer and a significant number of students lost one mark due to omitting a sign. Hence this question gave further opportunity for discrimination between students.
In part (c) the issue of familiarity of practical techniques and the need to visualise the experiment came to the fore. Very few students appreciated the impossibility of measuring the heat absorbed when heating a substance. Credit was given to those student who referred to the difficulty of measuring the temperature change of a solid as this does reflect some practical understanding.

Question 5

Part (a) was generally well-answered but reference to violence of reaction and explosions were all too common.
Answers to the errors in the apparatus diagram for parts (b) had a tendency to be too vague. It would likely be beneficial to students if, on unheated apparatus, they could actually see the effect of the water inlet and outlet being incorrectly attached to a condenser because then the effect of an incompletely-filled condenser may be imprinted on their minds more effectively. In (b)(ii) many students referred to the lack of a thermometer and so an inability to measure the temperature of the distillate but without the stopper in the stillhead there wouldn’t be much distillate as the majority would escape. This was the reason for the question requesting details of the most significant error. Furthermore some students did focus on the lack of stopper and the escape of gasses but failed to identify them which also did not score. Clear reference to the iodoethane product was required and any mention

of ethanol escaping was not credited since step 5 referred to the distilling of the crude iodoethane and not of the reactant.
Step 6 was referred to in part (c) and the use of sodium carbonate to remove any remaining acid was generally well-known, with a minority incorrectly thinking that ethanol would be removed.
The drawing of a separating funnel for part (d) has been asked on many past papers but still proves problematic although a good spread of marks was seen. There must be a narrowing of the top of the flask or a 'neck' at the top of the flask which could accommodate a stopper. A sizeable number of students drew something like a burette and so this did not gain the second mark for the apparatus shape. Only the weaker students drew the two layers the wrong way round for the third marking point.
Likewise the use of a drying agent such as anhydrous calcium chloride in part (e) has been commonly seen before but still students seem unfamiliar with its effect. The question clearly required the change in appearance but many vague answers such as 'drier' were seen. Only the more able students correctly referred to the iodoethane becoming less cloudy or clearer.
In part (f) many students thought that 'filtration' was a suitable means of separating the iodoethane from the drying agent but this would be most impractical and result in the majority of the iodoethane being lost. Hence reference to 'decanting' was required and gave another opportunity for the more able to gain credit.
Many students scored well in part (g) correctly referring to 're-distillation' which should be known as a key step in the preparation of a pure organic substance.
The final question of part (h) was very well answered with the just over half of the students appreciating that the iodide ions would be oxidised to iodine.

Summary

Advice to students

- Make sure you experience practical techniques and understand the reason for them.
- Read the question very carefully! This advice is given for every exam but careless reading is one of the most common reasons for losing marks.
- Finally double-check and even triple-check your answers because oftentimes simple errors can be quickly identified and fixed and thus improve the overall score.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL