edexcel

Examiners' Report/
Principal Examiner Feedback

Summer 2014

Pearson Edexcel GCE
Chemistry Unit 6CH04 Paper 01R
General Principles of Chemistry I

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

Summer 2014
Publications Code UA038320

General:

The paper seemed to be fully accessible with no dead marks. In candidates eyes it seemed demanding as they were often placed in less familiar situations in calculations and explanations. However, their performance was still good giving the paper quite a high mean mark, with a reasonable standard deviation.

There was no evidence of any candidate being short of time to finish the paper.

Q8(a)-(c) This was a fairly straightforward section of entropy calculations and questions. As usual care was needed in looking up data and execution of the calculations.

In part (i) common errors were the wrong data for the entropy of calcium chloride or calcium, choosing the wrong column or the wrong row. A ruler is helpful to avoid this.

In part (ii) there was the usual confusion between moles and molecules. For example 'Two molecules go to one molecule'.

In (b) many answers were given to four or five significant figures.

In (c) the sign was often lost. More serious were the candidates who confused total entropy with entropy of surroundings.

(d)(i) Though the first part was made particularly straightforward by making it clear to use the volume of solution, this was often not read. The volume of solvent was used. Some candidates incorrectly converted the volume to dm^3.

In (ii) there were many candidates who attempted to set up new, incorrect Hess cycles. The sign was often omitted.

Part (iii) seemed an unfamiliar calculation to most candidates, but they were not put off, and those with the confidence to apply their skills were successful. It was a good idea to label the cycle with appropriate symbols and apply Hess from there.

Many candidates either left this part blank or gave an unintelligible jumble of numbers.

In part (iv), though quite simple, this diagram seemed unknown to most candidates. Common errors were to omit the charge on the chloride ion, to include full charges on oxygen and hydrogen in water, or to bond chloride ions to the oxygen of water.

(v) Many seemed unaware of these change. However, some were able to work out the correct reasons. There were many incorrect statements about energy changes in bond making and bond breaking. There was confusion between water molecules and ions, like ‘the ions are closer in solution’.

Q9(a)(i) Common errors were the omission of any reference to sulfuric acid or omission of the conditions of reflux or distillation. A few gave incorrect oxidation states or formulae for dichromate.

(ii) A few weaker candidates gave the state of the product in either part as a solution.

The detail of the second test was often lacking. ‘Iodoform gives a yellow precipitate’ was typical and gained the fourth mark but not the third.

In part (b)(i) common errors were the omission of the charge on the attacking cyanide ion or the negative charge on oxygen in the intermediate. Some arrows went in the wrong direction, particularly from hydrogen to the oxygen in the final step.

In part (ii) many forgot that low pH means acidic so gave their answers the wrong way round. There were additional problems in that few realised that that in acid the attacking nucleophile would not exist as the cyanide ion is protonated.

(c)(i) As usual there were many candidates who confused reaction types giving answers like nucleophilic substitution.

In part (ii) there was confusion between hydration and hydrolysis. Hydration only involves bond making. Hydrolysis, as the ending implies, is bonds breaking and making.

In (iii) incorrect values between 10 and 13 were quite common.

Most gave the correct number of peaks in part (iv), though some gave four five or six.

In (v) the answer should say that there are no hydrogen atoms attached to the adjacent carbon atom. Sometimes the carbon was referred to as a molecule.

In (vi) some failed to use the correct language. Stronger answers said that there was no chiral carbon as there are no non-superimposable mirror images.

(d)(i) There were problems with the ester connection and connection at the ends of the two units.

Within each unit incorrect carbon frameworks were common.

(ii)Very few did not recognise the ester group.

Q10(a) Some errors occurred in balancing the equation. Some added or removed electrons.

(b)(i) This with the other parts of (b) were very discriminating. Colourless was the most common (incorrect) response.

In part (ii) the key was to mention the immediate change of colour.

In part (iii) a reasoned chemical answer was needed: ideally something about “the thiosulfate reducing iodine to iodide as soon as it formed”. Reference to iodine rather an iodide ions was not uncommon.

In part (c)(i) the axes were usually the correct way round but labels or units were missing. Scales were often too small or running in the wrong direction. The points were sometimes incorrectly plotted or a straight line not drawn.

In part (ii) weaker candidates gave ‘zero order as the graph is a straight line’ which gained no credit.

In part (iii) the rate constant was often missed. The unit had to be consistent. A transferred error was allowed from part (ii).

Though part (d)(i) was set slightly differently to the usual as only two values were given, the majority of candidates knew to find the gradient of the line between them.

Some correctly solved two simultaneous equations.

Both methods were acceptable.

Both required care with signs, powers of ten, and units.

A common error was to ignore the constant in the relationship, and attempt a simple substitution which showed a total lack of understanding and gained no credit. Of course, if the constant had been included, the second equation written and the simultaneous equation solved full marks were possible.

(d)(ii) This was well done, with most suggesting more readings were needed at different temperatures.

11(a)(i) There was little knowledge of the appearance of the element iodine as a solid or a vapour. Some thought the liquid would form.

(ii) The constancy of intensive properties like concentration, at equilibrium was not well known.

(iii) This calculation was done very well. Most worked back from the equilibrium concentration of hydrogen or iodine and hydrogen iodide to the equilibrium amounts. These were used to calculate the initial number of moles and hence the initial mass of hydrogen iodide.

Parts (ii), (iii) and (iv) were always answered correctly.

There were very few errors in section (c).

Part (d) was another matter. Most thought that the equilibrium constant changed with pressure. The best candidates said how the equilibrium ratio changed with increased total pressure and explained how the reaction responded to return it to the original value for the equilibrium constant.

Advice to candidates

To improve their performance candidates should draw on both theory and their practical work to:

- Practise calculations of entropy changes, hydration energies, activation energies and equilibrium constants.
- Practise plotting rate graphs.
- Always consider the reasons and explanations for result of practical work or calculations.
- Learn the organic reactions, with names and formulae of reactants and products, conditions, and tests for and uses of products.

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 Edinburgh Gate, Harlow, Essex CM20 2JE