Examiners' Report/
Principal Examiner Feedback

January 2015

Pearson Edexcel International GCSE
In Chemistry (4CH0) Paper 2C

Or

Pearson Edexcel Certificate in
Chemistry (4CH0) Paper 2C

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 2015
Publications Code UG040635

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 2015
Publications Code UG040456

Question 1

This question was very well answered. Most candidates knew that the particle represented by the dot and cross diagram is a molecule and that the bonding within the molecule is covalent. Virtually everyone knew the formula of ammonia.

Question 2

This question required candidates to interpret and use a graph of the solubilities of different substances at different temperatures. Most recognised, in part (a)(i), that the solubility of solid A increases as the temperature increases, but some ruined their answer by then going on to state that the relationship was directly proportional. In (a)(ii), the majority of the candidates were able to deduce that solid B was the most soluble at 30 ºC, with solid C being the most common incorrect answer. In part (b), it was very common to give either the observation that solid would appear, or the reason that the solubility of the solid decreases as the solution is cooled, but very few gave both despite the mark allocation of two, which indicated that two points were required to gain full marks.

Question 3

This question, about the manufacture of iron in the blast furnace, produced a number of good answers. In part(a), most were able to state that the raw material missing from the diagram was iron ore. A number referred to it as hematite, which was accepted, but some stated that it is iron(II) oxide, which was not accepted on the grounds that it is not the name of the raw material, but the name of the major compound present in the raw material.

In part (b), the only equation that was not regularly identified was the neutralisation. The two substances required for iron to rust, part (c), has been asked on many occasions and was well known this time. To give a complete answer to part (d) it was necessary to state both that zinc is more reactive than iron **and** that tin is less reactive than iron. Some chose only to mention one of these or just that zinc was more reactive than tin. When explaining why zinc is more effective some candidates did not make a comparison with the relative ease of corrosion of the two metals concerned, e.g. zinc corrodes **in preference** to iron. Some ruined an otherwise good answer by stating that zinc will **rust** before iron. Candidates should be aware that iron is the only metal that rusts.

Question 4

Part (a) was well answered in general with over three quarters of the candidates knowing the name for the process in which glucose is converted into ethanol. More than half also knew that the purpose of the yeast was to provide an enzyme to catalyse the reaction.

Nearly half of the candidates failed to score in part (b), which is surprising since the question demanded direct recall from the specification regarding testing for ions. An incorrect flame colour, usually that of sodium, was often seen in the flame test for calcium ions. Very few managed to obtain all five marks in (b)(ii), with the most common single mistake being the omission of an appropriate acid when testing for sulfate ions.

The direct recall question, part (c), on the conditions required for the direct hydration of ethene was also poorly answered, with nearly half of the candidates scoring zero. There was a lot of confusion with other industrial processes.

There were a number of fully correct answers to the bond energy calculation in (d). Common errors included omitting one or more of the bonds broken/made and doing the final subtraction the wrong way round, giving a final answer of – 45 kJ mol^{-1}. Most decided to calculate the energy involved in breaking all the bonds in the reactants and making all the bonds on the products, rather than using the simpler method of just the bonds actually broken and made.

Question 5

The majority of candidates managed to score all three marks awarded in part (a), but there were some rather bizarre thermometer readings recorded, and some candidates made a subtraction error in calculating the temperature change.

Approximately two thirds of the candidates failed to score in part (b). Those who scored one mark usually did so by mentioning that there would be heat lost during the experiment. Some seemed to think that the data book value was incorrect, whilst others almost scored for mentioning that either the volume of water used or the mass of potassium hydroxide used could have been incorrect, but did not then go on to state that the volume could have been **too large** or that the mass could have been **too small**.

Question 6

Half of the candidates managed to score all three marks in part (a) and very few scored zero. Common errors included 2.8.7 as the electronic configuration of the sulfide ion leading to a charge of 1−; this lost two of the three available marks.

The majority of candidates who answered (b)(i) stated incorrectly that electrons moving, rather than ions moving, is the reason why a molten ionic compound conducts electricity. By contrast, part (b)(ii) was answered rather better, with few failing to score at least one mark. Most scored a mark for recognising that bonds have to be broken and just as many also realised that a lot of energy is required to break all of these bonds. However, some stated that the bonds were covalent or even that intermolecular forces were being overcome. Although it was not penalised, candidates should be aware that it is incorrect to state that forces of attraction are **broken**; the correct terminology is 'forces of attraction are **overcome**'.

Question 7

Surprisingly, fewer than half wrote a correctly balanced equation in part (a). Most who failed to score did so because the equation was not balanced, but some did not make use of the formulae given in the question and invented their own.

The calculation in part (b) was either done well or very badly. Fifty percent of the candidates scored zero, with many not even attempting the calculation. One third scored full marks. As always, the easiest method of solving calculations of this type is to perform a mass-to-mass ratio. Some of those who decided to calculate moles of substance made mistakes in the use of the 10^6 conversion factor between tonnes and grams. There was no need to calculate the mass of the intermediate sulfur dioxide, since the equations gave a direct link to the relative amounts of sulfur and sulfur trioxide.

Over two thirds of the candidates scored zero in the volume calculations in part (c). The most common error for those scoring only was mark was to fail to divide the moles of sulfur dioxide by 2 to obtain the moles of oxygen.

Question 8

This question was poorly answered with over half of the candidates scoring zero, often through choosing inappropriate experiments not involving the reagents stated in the question. For example, descriptions of reactions between the halogens and a metal were seen quite often, as was the use of silver nitrate to form precipitates when added to the halide solutions.

The majority of the rest were able to recognise that only two experiments, as requested, need be carried out, namely adding chlorine to aqueous potassium bromide and adding bromine to aqueous potassium iodide. However, some failed to mention the observations that would be made and some stated incorrectly that bromine and iodine respectively would be evolved. Very few managed to obtain full marks since equations often contained incorrect formulae such as Cl for chlorine and KBr_2 for potassium bromide.

It was possible to score four marks through describing negative reactions such as adding bromine to potassium chloride. However, the equation mark could not be scored if this route was taken, since the question demanded an equation for a reaction that **does** take place.

Question 9

The majority scored at least one mark in parts (a)(i) and (ii). Candidates are advised to limit their answers to one of three alternatives when answering questions involving shift of equilibrium position. The three suggested alternatives are: 'equilibrium position shifts to the left', 'equilibrium position shifts to the right' and 'equilibrium position does not change'. No embellishment beyond these simple statements is required unless the question demands a justification for the prediction made. In particular, stating that one reaction **favoured** is not appropriate since, for example, an increase in temperature favours both the forward and the backward reactions since it increases the rate of both. The subtlety, in part (a)(iii), of recognising that the increase in temperature and the simultaneous increase in pressure have opposing effects, and that it is impossible to know which change has the greater effect was beyond all but the most able.

It was surprising that two-thirds of the candidates were not able to put two-and-two together and recognise that the production of a darker shade of brown must be because there is a greater proportion of the brown gas nitrogen dioxide. Of the remaining one-third, hardly anyone was able to recognise that this shift in equilibrium position must be because the increase in temperature is having a greater effect than the increase in pressure.

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