Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2020

Pearson Edexcel International GCSE In Chemistry (4CH1) Paper 2CR

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November 2020
Publications Code 4CH1_2CR_2011_ER

Question 1
In (a) the majority of candidates were able to name at least three pieces of apparatus correctly, with evaporating basin being the least well known with vague answers such as dish or bowl.

Question 2
In (c)(ii) many candidates knew how to calculate the relative atomic mass and gained all three marks. A few ignored the instruction to give their answer to one decimal place and therefore lost the third marking point.

Question 3
In (a)(i) most candidates gained the first marking point for knowing that bitumen was involved in the construction of roads. The second marking point was sometimes missed by candidates just writing cars or cooking, with no reference to gasoline being a fuel. Some thought gasoline was used as aircraft fuel.

In (ii) the majority of candidates scored the second marking point for stating something along the lines that bitumen has a higher boiling point than gasoline. Surprisingly very few referred to the temperature gradient in the column and so did not score the first marking point. Some candidates failed to score by referring to density or melting point rather than boiling point.

Many candidates stated the correct conditions in (b)(i). Common incorrect answers included giving the conditions for other industrial processes such as the conditions for the reaction of ethene with steam to produce ethanol. Some candidates just gave vague answers such as high temperature and a catalyst, which was insufficient to score the marks. Part (ii) was well answered with most candidates gaining both marks. One-mark answers were rarely seen as if they knew one correct alkene they could usually work out the other alkene.

Question 4
In (a) many candidates were able to give two correct observations. Fizzing was quite often seen but as gas bubbles were mentioned in the stem of the question this answer was not creditworthy. Other answers which were not accepted included the idea of heat being released or a flame being seen. Some just mentioned the sodium moving which was insufficient for the first marking point.

The equation in (b)(i) prove difficult for the majority of candidates. Common incorrect answers included writing F or 2F not realising that fluorine is diatomic and giving the formula of lithium fluoride as LiF_2 or Li_2F. Some thought lithium was diatomic. The flame test in (ii) was generally well known and most candidates gave a correct flame colour. Part (iii) was a good discriminator. Most candidates gained at least one mark, usually for the correct charges, although many of these drew the electron configurations for the atoms instead of the ions. Others gained two marks, most often losing one mark for missing out the inner shell of the fluoride ion. Unless otherwise specified, when asked

to show the arrangement of electrons in an ion inner shells need to be included. A small number of fully correct answers were seen.

Part (c) was fairly well answered with most candidates gaining two of the three marks. The majority gained the first marking point for mentioning at least one of the alternative answers. Only a small minority mentioned shielding, and some referred to less attraction of the outer electron in potassium but without referring to the nucleus, thus missing out on the third marking point. A fair number stated that the electron would be more easily lost gaining the fourth marking point.

Question 5

Many candidates gained both marks for the diagram in (a)(i). Some lost a mark by not labelling the diagram or by drawing only two rows of atoms/cations. As aluminium was mentioned in the stem of the question a few seemed to misunderstand the question and drew a diagram showing the electron configuration of an aluminium atom. Drawings representing ionic lattices were also seen occasionally. There were some good concise answers for (ii). Those who lost one mark often did so by either not stating that the electrons were delocalised or by writing about electrons carrying current or charge with no mention of them being mobile. It was pleasing to see that very few candidates thought the atoms/cations moved to conduct electricity.

Surprisingly, part (b) was not particularly well answered. Many candidates managed to score at least one mark but there were a large number giving irrelevant answers such as high melting point and good conductor of electricity. Several candidates referred to aluminium being light as opposed to low density. Low cost or the idea of recycling aluminium were also mentioned, but these were not creditworthy answers.

The majority of candidates scored the mark for (c)(i) but a fair number lost the mark in (ii) by stating that aluminium gains electrons. The equation in (iii) proved difficult for many candidates. Those who gained the first mark for the correct species often lost the second mark for incorrect balancing. A common error was to write $2e^-$ instead of $4e^-$.

Question 6

A variety of colours appeared in (b)(i) however a fair number scored both marks. A few had the colours reversed, allowing them one mark. There was some confusion with litmus and methyl orange as blue and red or yellow and red were sometimes seen. Part (ii) proved difficult for many with some saying that universal indicator gave no colour or it somehow affected the reaction. Those who did score the mark usually stated that universal indicator has a range of colours, however some very good clear answers referring to the difficulty in determining the end point were seen.

A fair number of candidates had the right idea for (c)(i) and gained both marks. Some mentioned repeating without indicator which gained one mark and others described adding the acid to the alkali but with no indication of the quantities required. A small number of candidates completely misunderstood the question and went on to describe the salt preparation that was asked for in (ii). Some candidates gave good descriptions

of the salt preparation in (ii) gaining all four marks, although they often washed the crystals before drying which was not necessary here as the solution of sodium chloride was a pure solution. Most gained at least two marks, usually for the partial evaporation and the drying of the crystals. Some lost the second marking point as there was no mention of leaving the solution to cool and others went straight to the drying stage without filtering. There were a few who evaporated the solution to dryness limiting them to one mark. Others gave some confused answers where they filtered the solution before heating it or they referred to a precipitate being formed, presumably assuming sodium chloride was an insoluble salt.

Many candidates scored all three marks for the calculation in (d), often by using the moles method shown on the mark scheme or sometimes using the $c_1v_1=c_2v_2$ method. Some confused answers involved multiplying 0.800 by 0.0215 instead of 0.0250. Others found the moles of sodium hydroxide correctly but then went on to divide 0.0215 by 0.02. In cases of this nature all was not lost as they could be awarded an error carried forward mark for a correct evaluation, giving them a total of two marks. A small number lost the evaluation mark for giving their answer to only one significant figure.

Question 7

Part (a)(i) saw a variety of answers although a fair number did give the correct answer. Incorrect answers included water, phosphoric acid and oxygen, presumably as this was an oxidation reaction.

In (b) quite a few fully correct answers for the full five marks were seen, with a few losing the mark in (iii) for omission of the minus sign. Candidates often lost a mark in (i) for omitting the value for one bond, usually the C-O, the C-C or sometimes the O-H but they often went on to give the correct calculation for (ii). It was surprising that some candidates attempted to answer the whole question in (i). I wonder what they thought the other spaces were for.

A few candidates appeared to have no clue as to how to attempt this type of calculation and sometimes just added together all the numbers given in the table.

A fair number were able to name the ester in (c)(i) although some lost the mark due to incorrect spelling of methanoate. Drawing a correct structure in (ii) proved difficult for most candidates. Those who did draw the ester linkage correctly usually went on to draw a fully correct structure and so gained both marks. A common error was to draw the displayed formula of propanoic acid which was not creditworthy. Some good mark scheme answers were seen in (iii). Common errors included not referring to rate in the first marking point or saying that the concentrations of reactants and products are the same. Some just stated that the reaction just keeps on going or is reversible, which were not creditworthy responses. Others stated that it takes place in a closed system which did not score as this was in the stem of the question.

Part (d) was a good discriminator. There were a fair number of fully correct answers.

Common errors included not converting to cm^3 which lost them one mark or finding the moles of methanoic acid correctly but then failing to divide by 2 also losing them one mark. Some just multiplied the mass or the M_r by 24 which was not creditworthy, and others used the M_r of carbon dioxide and divided 2.3 by 44, although in this case error carried forward marks could be awarded.