Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2021

Pearson Edexcel International GCSE

In Chemistry (4CH1) Paper 1CR and Science (Double Award) (4SD0) Paper 1CR

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 2021
Publications Code 4SD0_1CR_2101_ER

Question 1

As expected, many correct answers were seen although some candidates incorrectly thought bromine is a gas at room temperature and some could not pick the element that forms a basic oxide.

Question 2

Part (a) produced many two-mark answers, but many others scored just one mark as they gave information which was not about the composition of Ink 1 as was required. In (b) most correctly concluded that Ink 2 was insoluble and rightly suggested a change of solvent. In (c) the measurements and the subsequent calculation of the R_f value were often well done. The most common errors were the inversion of the R_f calculation or failing to give the answer to the required 2 significant figures.

Question 3

In (a)(i) there were a number of candidates who overwrote the letters “a” and “e” so that it was not possible to be sure whether they had written alkane or alkene and so no mark could be given. Candidates should be advised that if they wish to change their mind, they should cross out the whole word out and rewrite it clearly. In (b)(ii) the uses of crude oil fractions were often well known but a surprisingly large number of candidates drew multiple lines from one or more boxes and so lost marks. The least well known was fuel for ships with many suggesting gasoline. In (c) many very good answers correctly naming sulfur as the impurity seen, but others thought that nitrogen was an impurity in fuels or discussed carbon monoxide or carbon dioxide. In (d) the cracking process and the conditions used were well known but fractional distillation and incorrect catalysts such as phosphoric acid and sulphuric acid were not uncommon. Many were able to correctly complete the equation for cracking in (iii) but popular incorrect answers included C_4H_8 and CH_2.

Question 4

In (a)(i) the chemical name for rust should ideally be given as *hydrated* iron(III) oxide but on this occasion iron(III) oxide was accepted but the oxidation state had to be present and correct. In (ii) although the barrier method was often well understood many other candidates incorrectly referred to sacrificial protection or galvanising. Most were able to complete the table in (b)(i) although too many did not follow the instruction to give values to the nearest 0.5 cm^3. In (ii) good candidates made sensible suggestions of reasons for the lower than expected value but others suggested oxygen had escaped. The calculation in (c) was often carried out correctly but some did not subtract the readings and others divided by 35.5

Question 5

In (a) many correctly recognised the reaction as thermal decomposition, but combustion, displacement and oxidation were popular incorrect responses. Many were able to give two variables to be controlled in (b) with amount of carbonate and volume

of limewater common correct suggestions. References to just temperature were ignored as there was not a thermometer in the apparatus. In (c) only better candidates appreciated that the bubbles were caused by air expanding when heated. In (d) most knew that limewater was to test for carbon dioxide, but the majority did not appreciate that carbon dioxide being produced showed the metal carbonate had decomposed. The colour change and more particularly the equation for decomposition of copper carbonate were often well known. Q05(f)(i) proved challenging with many referring to just the reactivity of the metal rather than linking it to the ease of decomposition of the metal carbonate. However, some excellent answers were given by good candidates. In (ii) most just suggested repeating with some also then averaging the results instead of stating that different metal *carbonates* should be tried.

Question 6

In (a)(i) the most common error was to give ZnCl for the formula of zinc chloride. As expected, the test for hydrogen in (ii) was well known with the most common errors being use of a glowing splint or just suggesting the “squeaky pop test”. Most correctly gave the correct volume in (b)(i) and both methods in the Mark Scheme for (ii) were seen. Some others used a correctly drawn line of twice the gradient of the original line to get the answer. In (c) many good explanations were seen although some lost marks through not mentioning “in the same volume” or stated there were more collisions without reference to time or frequency. Many candidates gave good arguments involving surface area in (d) but it was surprising to see many trying to argue that increasing the pressure could affect the rate of reaction between an acid and a metal.

Question 7

In (a) most gave very good answers in terms of the transfer of electrons in the formation of lithium chloride but then quite often did not refer to a shared *pair* of electrons in hydrogen chloride. Some were able to gain credit from dot-and-cross diagrams. In (b) it was disappointing that many poor-quality answers were seen where the candidates discussed intermolecular forces in the ionic compound and implied covalent bonds were being broken in melting the simple molecular structure. Candidates should be very careful not to contradict themselves with incorrect statements having started along the right lines.

Question 8

(a)(i) The meaning of the term *isomers* was well known. Common incorrect statements included *same structural formula* and *same general formula.* There were a few who clearly confused *isomers* with *isotopes*. In (ii) some candidates had not carefully read the question which asked for isomers of compound Q and instead tried to draw isomers of $C_4H_8Br_2$. In (b)(i) good candidates realised the statement was only partially correct and gave full explanations. Others just discussed one part of the statement, usually the correct reference to the compound being unsaturated. Most correctly stated that it was addition polymerisation occurring in (ii). A common issue in completing the

polymerisation equation in (iii) was the careless and consequently incorrect connectivity of the bond to the CH_3 or the $COOCH_3$. A few candidates still showed a double bond in the polymer. The calculation in (c)(i) proved to be challenging for many but strong candidates answered it well using either a reacting mass or a mole type method. Amongst those who made good attempts, a common error was multiplying by 8 twice, eg multiplying by 8 for the mole ratio of octane to carbon dioxide in the equation, and then again multiplying the relative formula mass of carbon dioxide by 8 later on. In (ii) most gave global warming as an environmental problem caused by carbon dioxide.

Question 9

In (a) the reason for storing lithium, sodium and potassium in paraffin oil was well known but some candidates were a bit vague and just stated that they are very reactive and did not gain a mark. In (b)(i) most could give a similarity in the reactions of potassium and caesium with water and knew that caesium would react more quickly or violently. In the equation in (ii) a common error was to give caesium oxide as the product. In (c)(i) most correctly suggested the use of a lid as a suitable addition to the apparatus but in (ii) although many good answers were seen, candidates often suggested another change in the apparatus when the question asked for a change to the method. In the energy change calculation in (d)(i) common errors were the use of 1 or 50 instead of 100 for the mass. In (ii) many scored the first mark for dividing by 0.05 but often candidates did not use the given temperatures to appreciate the reaction was exothermic and so did not give the negative sign for the molar enthalpy change.

Question 10

In (a)(i) most recognised the reaction as being neutralisation but some suggested displacement or redox. In (ii) only strong candidates knew the role of acids as proton donors. In (b)(i) many decent attempts at a method for producing a saturated solution of copper(II) sulfate from sulfuric acid and copper(II) carbonate were seen. Some candidates, perhaps not having read the question carefully, continued unnecessarily to produce pure dry crystals of copper(II) sulfate. It also seemed apparent from those that either did not attempt the question, or gave very poor responses, that some candidates, for whatever reason, had unfortunately not experienced a similar experiment in the laboratory. The percentage yield calculation in (ii) was often well done. The most common mistake was not subtracting to get the correct actual mass of crystals obtained (4.6 g), and rounding errors were also sometimes seen in giving answers to the required one decimal place. In (c)(i) many correct answers were seen using the expected method in the Mark Scheme. However, some very good answers involving an alternative method were also credited. Some candidates did not realise they could subtract to get the percentage of water so struggled to access the question. In (ii) many knew that using a flame test was required to identify calcium ions, but the correct flame colour was less well known, with suggestions of a range of different colours including orange, blue and green being common.

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