Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE

In Chemistry (4CH1) Paper 2CR

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 2022
Publications Code 4CH1_2CR_2201_ER

Question 1

As expected in (a) most candidates could identify the two substances required for iron to rust although carbon dioxide was sometimes suggested. In (b) the most common error was to give copper as the metal lowest in the reactivity series.

Question 2

In questions such as (a) where candidates are required to add missing words they should be aware that the correct words will not only be scientifically correct but will also fit in with the grammar of the sentence. Most correctly gave heated or boiled in the first space and fractionating in the second. The majority gave boiling points in the third sentence although some gave two answers in the two word spaces, (with the second most often being melting points, which was ignored), rather than the two words required. In (b) almost all suggested road making as a use of bitumen. In (c) most could name pentane and calculate its relative molecular mass with 42 being the most common incorrect answer. In (d) many gave the correct catalyst and temperature for cracking although some evidently confused this process with another one and suggested a catalyst of phosphoric acid and a temperature of 300^{o}C. In the equation for cracking in (e) most gave at least one of the required alkenes and often both.

Question 3

Part (a) of this question probably gave evidence of the practical experience of candidates. Those who were familiar with doing a titration gave very good descriptions and scored well, whilst those who had probably not had the relevant practical experience struggled. Many did not help themselves by not using the information given in the question and used a beaker instead of the conical flask, or an indicator other than the stipulated methyl orange. Many candidates lost marks for not employing good practice e.g. not adding a *few drops* of methyl orange or not swirling the conical flask. The best candidates were able to include a reference to repeating to get concordant results. Although significant numbers had no idea how to do the calculations in (b), many others did well with fully correct answers not uncommon. Those that made an error in part (i) often carried their error forward and were able to score marks in later parts of the question.

Question 4

Ethanoic acid was often correctly given as the first answer in (a) with some suggesting methanoic acid and a few ethanol. The second part of the question was less well done with molecular formula being a very common incorrect answer. Good candidates gave a fully correct displayed formula but occasionally there was no bond shown between the oxygen and hydrogen atoms. In (b) many candidates gave potassium dichromate. The oxidation state was not essential but when given it must be correct. A correct formula was allowed on this occasion. When asked for reagents candidates should be aware that they have to give specific reagents so *acidified potassium dichromate* without identifying the acid only scored one mark. In (c)(i) the majority correctly referred to flammability.

Question 5

The vast majority knew in (a)(i) that dioxide would cause acid rain although some suggested global warming. In (ii) many did not know how to do the calculation, failing to appreciate that the first step was to calculate the number of moles of sulfur. Of those candidates that did make correct attempts, a sizable number did not give their final answer in standard form as required for the third mark. In (b)(i) although some good answers in terms of alternative reaction pathways with a lower activation energy were seen, many just stated a catalyst is not used up in the reaction or is unchanged at the end rather than explaining how it increases the rate of a reaction. In (ii) many responses were in terms of rate and so were not answering the question which concerned the increase in yield. Most were able to give a correct reason in (iii). In (c) the most common mistakes were to place a 2 in front of the SO_3 in the first equation and to omit a 2 in front of the H_2SO_4 in the second equation. Most candidates made good efforts at the percentage mass calculation in part (d) with many fully correct. The most common error was to take the mass of nitrogen as 14 rather than 28.

Question 6

Although good answers were seen to part (a), far too many candidates did not read the question carefully enough which stated the salt was insoluble. These candidates incorrectly gave descriptions of a crystallisation process, but on this occasion, they were given access to the final mark. In (b) a common misconception was that the lamp did not light because electrons could not move in the solid lead (II) bromide. In (c)(i) the candidates had been told that bromine was formed during the electrolysis of the molten lead (II) bromide, so the most common correct observation was a brown gas. In (c)(ii) the common reasons for a loss of marks in written descriptions were failing to state the bromide ions being attracted to the positive electrode and not explaining how the bromine molecules were formed. Candidates should be aware of the importance of using the endings -ine and -ide correctly. Correct ionic half-equations helped some candidates to gain marks. In (d) the answers were disappointing. Many ionic half-equations were incorrectly balanced and very few correct state symbols were seen. Many gave the ion as (aq) although the majority who failed to gain this mark did so because they omitted to give any state symbols at all.

Question 7

Most gave the correct meaning of exothermic in part (a). In (b) the calculation to find the bond energy of the Cl-Cl bond instead of the more common enthalpy change (ΔH) calculation proved challenging to many and only good candidates managed to deal well with it. Weaker candidates were not able to set up a suitable equation although some were able to gain occasional marks usually for involving the value of 862. Many did not use the given ΔH value of -184. In (c) although some very good answers were seen, too many candidates contradicted themselves or made incorrect statements such as *more energy is needed to break bonds than make bonds*. In the reaction profile question in (d) many candidates lost marks by producing inaccurate diagrams. Lines or arrows often did not quite start or end in the right positions, and the position of some labels was sometimes vague or careless. Several candidates failed to show the activation energy hump in their diagram.

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