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Examiners' Report/ Principal Examiner Feedback

January 2015

Pearson Edexcel International GCSE
in Chemistry (4CH0) Paper 1C

Or

Pearson Edexcel Certificate
in Chemistry (4CH0) Paper 1C

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Question 1

This was a straightforward question mostly about atomic structure, and many high scores were seen. In part (b), some identified the particle present only in deuterium as a proton.

Question 2

This question tested some aspects of the separation of mixtures. In part (a)(i), identifying chromatography as the method to use for inks was predictably almost always correct, but simple and fractional distillation were often interchanged. In questions of this type, candidates should be advised to take careful note of how the mixture is described – for example, the separation in S is water from copper(II) sulfate solution, not copper(II) sulfate from copper(II) sulfate solution, for which different methods are required. In (a)(ii), some chose S as the answer, perhaps reading 'undissolved' as 'dissolved'. Part (b) was about crystallisation, a technique that often results in low marks for candidates, so it was pleasing to see so many correct answers here.

Question 3

This question, about tests for elements and compounds, started with the test for hydrogen. It was surprising to see so many scores of zero, given the familiarity of the test. The main problems were the use of a glowing splint and the lack of reference to a flame – just the name 'squeaky pop test' was not accepted. In part (b), sometimes the chemical and physical tests for water were the wrong way round, but the main reason for failing to score full marks was an incomplete answer. Candidates should be guided by the 2-mark allocation and the prompts (test and result) on the answer lines. For the chemical test, 'copper sulfate goes blue' scored only 1 mark – for full marks, a reference to the copper sulfate being anhydrous or white was needed. For the chemical test, 'boiling point = 100 °C' is a correct result, but to score full marks, there had to be a reference to the actual test, such as heating water until it boils. Answers to (b)(iii) were generally poor, with many candidates believing that the cloudiness in the limewater test for carbon dioxide was caused by the formation of calcium hydroxide.

Question 4

This question was about the preparation and collection of oxygen in the laboratory. In part (a), although most candidates identified the mistake as the labelling of the reactants the wrong way round, some believed that a piece of apparatus (often the tubing) should have been labelled. Candidates should be aware that in diagrams, all substances should be labelled, but that there is no need to label common pieces of apparatus. There were many blanks in (a)(ii), although most of those who saw the need for a bung or cork realised why it was necessary. The use of a gas syringe was rarely mentioned in (b), but the equation in (c) was usually correctly balanced. In part (d), a surprising number of candidates correctly referred to activation energy without stating that a catalyst increased the rate of a reaction. Part (e) was poorly answered, with the activation energy shown as a point, rather than a vertical distance, on the profile, while the curve was often drawn higher than for the uncatalysed reaction or started/finished above or below the original horizontal lines.

Question 5

This question about aluminium sulfate contained some unfamiliar parts that were correctly answered only by a minority of candidates. Part (a) was usually correct, although there were some answers of 3 and 5, perhaps through taking H_2O to be one element or counting oxygen twice. In (b)(i), the common errors were to give formulae instead of names, naming the reactants and especially naming the metals instead of the compounds. It was surprising to see so many candidates failing to score marks in (b)(ii) – common mistakes included statements about carbon dioxide being less dense than air and reacting with oxygen. Part (c)(i) was poorly answered by most candidates, with many failing to refer to the state symbols as required by the question.

Question 6

This question was based on ammonium chloride, and began with the familiar experiment about the diffusion of ammonia and hydrogen chloride gases, so it was disappointing to see answers in part (b) that failed to score the mark. In part (c), very few candidates scored full marks for the familiar tests for ammonium and chloride ions, and many gave answers derived from part (b), such as the use of hydrogen chloride as the reagent to convert ammonium ions to ammonia, and the gas formed in the reaction was sometimes given as ammonium chloride or ammonium hydroxide. In (c)(iii), sodium compounds were sometimes given instead of silver compounds. Candidates should be aware that in questions that ask for the identity of a substance, they have the choice of name or formula. Many would be best advised to choose the name, as this is more likely to be correct (eg silver chloride, in preference to $AgCl_2$). Another point is that if both name and formula are given, then both must be correct to score, so silver chloride and $AgCl_2$ would not score.

Question 7

This question was about alkanes obtained from crude oil. Part (a) asked for a description of the separation of crude oil into fractions, but although there were five acceptable ways to score marks (with four achieving full marks), high scores were not seen very often. Although this industrial process has been tested on many previous occasions, candidates continue to find it difficult to score marks. For example, one mark was available for a reference to fractional distillation (or a fractionating column or tower), but many omitted to mention this, or referred to a blast furnace. A few references to fracking were seen, and it is hoped that candidates will be discouraged from using this term. Some answers even failed to mention the heating (or boiling or evaporating) the crude oil, and answers that described cracking (instead of, or as well as, fractional distillation) were limited to 2 marks. Part (b)(ii) was surprisingly poorly answered, with many references to having the same (rather than a gradation in) physical properties. Parts (c) and (d) were well answered, although some candidates were unable to explain why carbon monoxide is poisonous – there were references to 'because it contains carbon' and 'it stops the breathing'. In part (e), most attempts contained the correct numbers of carbon and hydrogen atoms, but some were identical to each other (although drawn differently) and a few repeated the structure given in the question. The calculation in part (f)(i) frequently scored zero or 3 marks – some candidates are able to handle this type of calculation very well, while others did not attempt it.

Question 8

This question was about alkenes and polymers. In part (a), although the formula of the other product of cracking could be easily worked out from the formulae given in the question, many candidates thought that the answer could not be H_2, perhaps because they did not recognise it as a fuel. In (b), although the question referred twice to ethane, some answers mentioned ethene and the presence of a double bond. In (c)(i), many incorrect answers were seen – all the correct atoms but with a double bond between the carbon atoms, a formula that was not displayed, and both bromine atoms attached to the same carbon atom. Very few candidates scored both marks in part (d); common errors included structures with double bonds, CH_3 groups between two carbon atoms, and a repeat unit showing the atoms from one molecule of propene. Part (e) was better answered, although with one or more hydrogen atoms included. Few candidates scored both marks in (f)(i); what was expected was an indication of breaking down or decomposing and a reference to bacteria or microbes. Many omitted the reference to bacteria, and all too often wrote about <u>not</u> breaking down.

Question 9

This question was about elements in Group 1. In part (c), a surprising number of candidates could not give an <u>observation</u> that was similar – many gave answers such as 'forms an alkali', which is a correct statement, but not an observation. For the difference between lithium and potassium, 'potassium reacts more vigorously' was not accepted without a specific observation – but answers like 'potassium melts/catches fire' scored a mark. Many incorrect formulae appeared in part (d), with KO and KCl_2 being common examples. In part (e) all four state symbols had to be correct to score the mark, and it was pleasing to see so few errors. There were fewer uses of aq for water, although quite a number wrote words instead of symbols. Many candidates scored poorly in part (f), mostly through not adding the numbers of protons and neutrons together

Question 10

This question was about lead(II) bromide. Very few high scores were seen in part (a); some candidates did not even begin with mixing the solutions, while others failed to mention a single piece of apparatus. The commonest error in questions of this kind – dealing with the solution, instead of the precipitate, formed in the filtration stage – seemed less prevalent in this paper. There were many blanks seen in (b)(ii), but some candidates went beyond identifying the mistakes and corrected them, which of course scored the marks, while some rewrote the equation correctly, which also scored full marks. It was disappointing in answers to (b)(iii) to see so many references to electrons stopping flowing in the lead(II) bromide.

Question 11

This question was about using a titration to make a soluble salt. Part (a) was usually well answered, but it was disappointing in (b) to see the familiar errors in the burette readings – reading the scale upside down, writing the readings in the wrong order, and the lack of a second decimal place. In part (c), the main problem was failing to identify the two concordant results, even though, as always, candidates were told the meaning of concordance. Although (c)(ii) was marked consequentially on the choice made in (c)(i), this could not be done if no results were ticked. The full range of marks were seen in answers to the mole calculation in part (d); some candidates left the question unanswered, while others scored full marks from three carefully set out steps. Common errors included a failure to divide by 1000 in (i) and not using the 2:1 ratio in (ii); many incorrect final answers scored marks consequentially.

Question 12

This question was about the rate of a very familiar reaction. It was disappointing in part (a) to see references to hydrochloric acid, rather than the specified marble chips. Not many candidates scored the mark in part (b) – there were many references to the formation of carbon dioxide that did not include a mention of escaping from the flask, while other candidates wrote that the marble chips were becoming smaller. Very few marks were scored in part (c) – many thought that the cotton wool was to stop the gas escaping or to keep out impurities. The graph interpretation in part (d) was well done, with the commonest error misreading the scale, giving answers such as 201 and 200.1. Most candidates could calculate the rate correctly in (e), and the graph in (f) was often awarded 2 or 3 marks – the commonest errors were the misplotting of a point or not using a ruler to draw the straight line. The use of particle kinetic theory was variable in part (g) – some very brief answers scoring full marks (eg more particles in a given volume leading to more frequent collisions), but with long rambling answers scoring zero. Quite a few answers were spoiled by references to particles moving more quickly or having more energy.

Grade Boundaries

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