Examiners' Report

Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE

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

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Question 1

The separation methods in part a were well understood with most candidates understanding the difference between simple distillation and fractional distillation. In part b, the most candidates could explain why the molecule was a compound. Some candidates lost marks for stating that the bond was between two different molecules as opposed to two different atoms.

Question 2

Most candidates knew the conditions for rusting but few gave the full name for rust as hydrated iron(III) oxide. A number of candidates lost a mark for giving the name iron(II) oxide.

Most candidates scored a mark in 2bi for galvanising. Part (ii) was less well understood. Most knew that zinc is more reactive than iron; some thought it formed an oxide layer like aluminium whereas others thought the iron reacted with the zinc.

Question 3

Most candidates were familiar with the experiment in part b and correctly stated that the ammonia molecules had moved further at the same time than the hydrogen chloride molecules. b(iii) was less well understood with few candidates appreciating that the ring of ammonium chloride took several minutes to form because of collisions with air particles or with the molecules of ammonia and hydrogen chloride moving in random directions. Many answers were linked to rates of reaction.

Question 4

4bi was poorly understood with very few candidates scoring full marks. Many candidates worked out that $20cm^3$ of oxygen had reacted but most failed to add the volume of gas in the tubes to the gas in the syringe. A lot of answers were incorrectly rounded. Many candidates were clearly more familiar with experiments to determine the percentage of oxygen in the air and tried manipulating the figures to get an answer of around 20%.

There were many correct answers for 4bii showing a good appreciation for likely errors in the experiment. Common incorrect answers included: reaction not complete; not enough copper; too much oxygen or the teacher not measuring the volume correctly.

Question 5

Isotopes were well understood and the A_r value in b(iii) was particularly well answered. Many candidates found b(iv) difficult. A lot of answers were not to 4 sig figs or the minus sign was missing from the powers in the answer. Some multiplied instead of dividing by Avogadro's number.

5c was poorly answered showing that few candidates understood how mole ratios work in equations. Most candidates gave an answer of 0.70 moles as they had not understood that only 0.40 moles of magnesium could react producing 0.40 moles of magnesium oxide.

Question 6

6a was well answered by most. Some candidates only had oxygen gaining electrons or gaining one electron. A small number were confused with sharing electrons.

In c, few candidates could explain why solid sodium oxide did not conduct electricity. Some knew that the structure was giant ionic, but few could link this to an absence of mobile charged particles.

Most candidates could describe the test for sodium ions in d whereas the equation in e was often poorly balanced with a number of Na_2 molecules as products.

Question 7

A pleasing number of candidates knew the solubility rules in 7a and got the correct answer to this challenging multiple-choice question.

In bii, few candidates appreciated that they were being asked to produce sodium nitrate crystals from the mixture produced by the reaction of silver nitrate and sodium chloride. Methods to produce a solution of sodium nitrate were ignored. Filtering at the beginning was therefore often missing. Some of the methods of drying were not specific enough: drying along was insufficient; a method of drying such as using filter paper was needed. Some heated to dryness and others heated the crystals instead of the solution. Leaving to cool after saturation and filtration after cooling were common omissions.

Question 8

In a ii, few candidates were able to apply their knowledge and identify c as a saturated compound with the general formula C_nH_{2n} whereas most could explain why A and D were isomers. Most candidates knew how to calculate an empirical formula in c but a few didn't show division by the smallest number of moles. Very few candidates were able to join two molecules of propene together with many candidates drawing a molecule of butane. Marks were awarded for two carbons joined to two hydrogens and another two carbons joined to one hydrogen and a methyl group. In d few candidates stated lack of space in landfill sites as a problem with disposal of addition polymers.

Question 9

In 9a, many candidates thought the cotton wool kept gases in the conical flask rather than drops of acid leaving the flask. Very few linked this to the loss in mass being therefore due to gas only therefore making the experiment more accurate.

In c i, the reason for the reaction stopping was well understood with most candidates stating that the acid had run out. In ciii, many candidates misread the graph. Again, rounding errors were common in the answer. Most candidates calculated the average rate of reaction over the first 60 seconds in part (iv); few candidates drew a tangent on the graph, despite this being one of the mathematical skills (4E).

In d, the relationship between concentration and initial rate of reaction was well described by most candidates. In ii, candidates need to be reminded to mention particles per unit volume and collisions per unit time.

Question 10

Many candidates scored one mark in aii for failing to mention shared pair(s) of electrons; most mentioned nuclei and scored M2. 10bii was poorly answered with lots of confusing and contradictory answers. Many candidates mentioned intermolecular forces in graphite or breaking covalent bonds in fullerene. A lot of candidates thought the difference in melting point was due to weaker covalent bonds in C_{60}

Question 11

The tests in part a were well understood by most.

In b, many candidates scored two marks for working out the mass and number of moles of hydrated zinc sulfate. A lot of candidates lost a mark for an incorrect answer due to rounding too early. Candidates should only round in the final step. A pleasing number had read the question carefully and gave the answer to one decimal place.

A lot of candidates were confused by ci and few were able to calculate the volume of water collected having been given the maximum volume and the percentage yield. Many candidates couldn't link this experiment to distillation and didn't consider cooling the delivery tube as a way of increasing the yield of water.

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