



Examiners' Report

Principal Examiner Feedback

November 2021

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

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There were well answered questions in this paper. Some candidates had clearly started post 16 study of chemistry and this was reflected in the quality of many responses.

Question 1

These questions were well answered by most candidates but there was some confusion with the numbering of periods with many candidates having forgotten that period 1 only contains hydrogen and helium. In 1b many candidates were unfamiliar with the dividing line on the periodic table between metals and non-metals.

Question 2

In 2a many candidates scored 2 marks whereas some confused the definitions of solute, solvent, and solution. In 2bi, candidates are reminded that to measure a precise volume of solution such as 10.0cm^3 , they need a volumetric pipette, or a burette as opposed to a measuring cylinder. In 2bii, many candidates were looking for more complicated answers than the correct one. They had the solute melting, exploding, or catching fire rather than simply being heated too quickly or boiling. In 2biii, the idea of improving the reliability of the recorded temperature by repeating and calculating a mean was well described by most.

In 2ciii a number of candidates misread the question and read the solubility of A from the graph rather than B. They scored M2 for multiplying the solubility of B by 2.5. In 2ciii, many candidates thought that 95°C being close to the boiling point of water was a reason for an inaccurate result, the mark scheme was simply looking for water being lost by evaporation.

Question 3

In 3ai, a number of candidates had not read the stem of the question and gave (s) as the state symbol for either hydrogen sulfide or sulfur dioxide. Many candidates found this equation tricky to balance, probably because atoms of sulfur appeared in both of the reactants. In 3aii, most candidates scored a mark for recognising that sulfur dioxide is reduced because it loses oxygen. Some candidates also made reference to gain of electrons which was ignored. In 3bi, the first marking point was scored by most candidates who appreciated that hydrogen sulfide diffuses more quickly than sulfur dioxide as the ring of solid forms closer to the sulfur dioxide end of the tube. The second marking point was more challenging, and a number of candidates did not recognise that this meant that the hydrogen sulfide molecules had therefore moved further than the sulfur dioxide molecules in the same period of time. Many just repeated what they had been asked to show. In 3bii, many candidates correctly calculated the M_r values of hydrogen sulfide and sulfur dioxide and correctly linked this to the speed of diffusion. Some candidates thought that the balancing number in front of hydrogen sulfide was part of the formula and therefore could not access the first or the third marking points.

Question 4

In 4a, many scored 2 marks for Mg^{2+} and SO_4^{2-} . Some lost a mark for getting the ions the wrong way around as they did not know a cation is a positive ion. There was a lot of confusion with the sulfate ion and the sulfide ion. In 4b, many candidates scored 3 marks. Most got the electron configurations of the ions correct but got the charges on the ions incorrect. Candidates are reminded of the need to show the electrons in each shell if an electron configuration is asked for. In 4ci, surprisingly few candidates could link the production of hydroxide ions with the colour change in the phenolphthalein. Many candidates thought K^+ ions changed the colour of the indicator presumably showing some confusion with the flame test. In 4cii, there was confusion here with the reaction of potassium with water as hydrogen was often given as one of the products. In 4d, many candidates failed to score by referring to mobile electrons in an aqueous solution of an ionic compound.

There were some very clearly written, concise answers to 4e where gases X and Y were clearly identified, and the correct half equations given. Some candidates lost marks by giving the gases the wrong way around or with electrons being added to the wrong side of the half equation.

Question 5

Most candidates got the methods of extraction the right way round in 5b. Some lost marks for not correctly comparing the reactivity of the metals with carbon which was shown in the reactivity series.

Many candidates failed to score 3 marks in 5c, as the particles in their diagrams were too far apart or they had failed to label the particles as either positive ions or atoms. Most understood that metals are malleable because the layers were able to slide over one another.

The reacting mass calculation in 5d was well answered by many. The most common reason for scoring 2 marks was for failing to use the mole ratio correctly. Many candidates multiplied the moles of aluminium by 4 rather than by 2 or didn't use the ratio at all.

Question 6

6b question was strictly marked. Candidates are reminded that a displayed formula should show every bond. The functional group needed to be clearly shown as -O-H here -OH was not given credit. Many candidates found the concentration calculation in 6ci tricky and use the wrong volumes or added the two volumes together. Many scored one mark by calculating the moles of KOH, but then couldn't calculate the conc of ethanoic acid. 6cii was better answered, most candidates were familiar with gas volume calculations. The most common reason for losing a mark was for failing to use the mole ratio from the equation.

In 6ei, many candidates clearly understood the difference between addition and condensation polymers and knew that the formation of condensation polymers involves elimination of a small molecule, usually water. 6eii, however, was poorly answered by many. A lot of candidates tried to draw the functional groups only whereas others drew the displayed formulae for ethanol and ethanoic acid rather than ethane-1,2-diol and ethandioic acid. Examiners were strict with the displayed formula of the alcohol functional group in 6d but allowed -OH here for both the diol and the dicarboxylic acid to prevent candidates being penalised multiple times for the same error. In 6eiii, most candidates knew that biopolyesters are biodegradable.

Question 7

Many candidates found 7ai challenging. Many candidates failed to recognise that with the same number of moles of gas on both sides of the equilibrium, an increase in pressure would have no effect on the yield presumably because candidates were more familiar with the Haber process or other equilibria with different numbers of moles on either side. 7aii was slightly better answered. Many candidates knew that a catalyst increases the rate of a reaction but not the yield, but the explanation was less well expressed. Many candidates failed to state that a catalyst will increase the rate of both the forwards and reverse reactions equally. Many treated this question as a rate question and explained how a catalyst works.

In 7b and 7c, many candidates were able to calculate ΔH correctly. Some lost a mark for an answer of +530, others lost a mark for not using the balancing number in front of hydrogen fluoride. There were many high scoring energy level diagrams in c but candidates need to be careful to show the arrow going down in an exothermic diagram (or up in an endothermic diagram which was given error carried forward marks from b) to show ΔH . In some cases, there was confusion with ΔH and E_a .

