Examiners' Report
Principal Examiner Feedback

November 2023

Pearson Edexcel International GCSE
In Chemistry (4CH1) Paper 1C and Science
Double Award (4SD0) Paper 1C

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Int GCSE Chemistry 4CH1 1C

1a A well answered question with clearly drawn diagrams. A few candidates failed to follow the instruction to draw another four particles.

1b Most candidates knew that heating increased the (kinetic) energy of the particles. Far fewer went on to explain that evaporation involves the more energetic particles escaping the liquid. Some confused this process with reactions by talking about greater frequency of collisions.

1ci Well known that the process was condensation.

1cii Most candidates gave a correct equation. A few incorrectly wrote an equation for the formation of water. They did not realise that a change of state does not alter the molecules themselves.

1d The arrangement of particles in a solid was well known and clearly stated mostly as closely or tightly packed. Movement was correctly described by most candidates

2a The table was completed correctly by most with few errors seen.

2bi,bii and biii were well answered and did not cause any difficulty to most candidates.

2ci The definition of isotopes was well known and clearly stated. Same number of protons was needed not just same protons.

2cii Many good clear calculations seen that obtained full marks. The majority gave their answer correctly to one decimal place as requested though some rounding errors to 10.7 were seen.

3ai This method of separation was well known.

3aii A simple one stage process was given correctly by most.

3aiii A wide variety of letters seen here. Many could not match six carbon atoms with the required fraction.

3aiv A wide variety of answers seen and the name of mixture D was not well known.

3av Not many candidates identified a correct use for mixture B fuel oil.

3b Some well structured answers seen. Distinguishing the size of the hydrocarbon molecule for mixtures B and D was crucial but sometimes omitted. Boiling point differences are due to differences in the strength of intermolecular forces of attraction which require energy to overcome. This part of the answer required a comparison between mixtures B and D. Some candidates were confused and listed the breaking of bonds in their answer. Candidates need to be clear that intermolecular forces need to be overcome and that the breaking of bonds is not involved. Care needs to be taken by some candidates who readily interchange forces and bonds incorrectly in their response.

3ci The name of the catalyst used was well known.

3cii Many correctly gave the formulae of two alkenes but some did not pay attention to the starting hydrocarbon formula and gave molecules that were too large or did not follow the formula for an alkene. Candidates need to take care to write their subscript numbers clearly when writing a chemical formula.

3ciii The use of alkenes was not well known and too many suggested fuels (for cars).

4a The information given in the table was interpreted correctly by most candidates identifying the requested gases correctly. Part vii needed air to be recognised as a mixture of gases and this was not as well answered.

4bi The name of the reaction given was well known

4bii The correct colour change was seen often, but some candidates chose a starting colour of blue maybe linked to other copper compounds they knew.

4biii Many correct equations seen. Most common errors were Cu_2CO_3 and Cu_2O

5ai Most candidates gave a fully correct definition of isomers. Some did show some confusion between molecular, general, chemical and empirical formulae in their response. Others confused display and structural, saying same displayed and different structural or vice versa.

5aii Two correct isomers were seen regularly but some just bent the chain without changing its structure as their second isomer. Completely displayed formulae were required and very few failed to do this. There were far less careless errors than in previous years i.e., missing H's or H's loose and not attached to a bond.

5bi The use of ultraviolet light was well known.

5bii This equation proved to be more difficult with fewer correct answers here.

5biii Many knew this was a substitution reaction.

5c This question required candidates to clearly explain why ethane was a saturated compound with only single bonds present/ no double bonds present given that the vast majority of alkenes contain single bonds as well as double and secondly that it could not have any atoms added to it in a reaction.

5d A colour change or no colour change were often well described with bromine water correctly described as orange/yellow initially. Candidates need to understand that observation is what they would see happen.

5e Candidates that used information in the stem of the question produced clear explanations of the differences in the empirical formulae of alkanes and alkenes. It was necessary to show these empirical formulae from each series general formulae or use the specific examples suggested to get full marks.

5f Very many clearly set out correct calculations for the empirical formula were seen. Only on a few rare occasions were atomic numbers incorrectly used or the calculation attempted upside down.

6a Many correctly described a test for oxygen saying what to use and giving the result required. A glowing splint test as an answer was insufficient.

6b Correct diagrams were frequently seen, with or without the use of circles. Candidates need to be precise when drawing their diagrams so the dots and crosses are clearly seen.

6c The plotting of the points was mostly accurate as was the drawing of the curve of best fit.

6di Responses to the decreasing of the concentration were more variable. Many stated that less particles would be present. Those that confined their answer to less frequent collisions and a slower rate scored full marks. M2 often lost by omission of frequent or unit time although fewer successful collisions was seen in nearly all the answers. Some candidates incorrectly suggested less/more kinetic energy or less/more movement was involved displaying confusion with the effect of temperature.

6dii Most candidates drew a less steep curve as required but not all lines finished at half the value of oxygen as expected from using half the original concentration of hydrogen peroxide. Only a few candidates did not attempt to add another curve.

7a Many clear concise answers seen that scored full marks. Most knew that sodium hydroxide and silver nitrate were the reagents needed for the relevant chemical tests. A few failed to state that a precipitate would be formed in each case. Only few candidates described incorrectly chlorine or bromine ions being involved. The appearance and colour of the precipitates was well known.

7b This calculation to show iron powder was in excess was well answered. Candidates either calculated the amount of moles of iron used and from the equation how much was needed or from the equation the mass of iron that was needed in the reaction or how much chlorine would be needed to react with all the mass of iron powder.

7c Most gave a correct colour for litmus in acid but fewer correctly identified the ion responsible.

8a Many correct definitions of a covalent bond were seen. The most common error was not to state a pair of electrons was involved.

8b Many good descriptions of diamond's structure, its strong covalent bonds and large amounts of energy needed to break these were seen. Some candidates could not suggest a giant structure was involved. Some candidates introduced in error intermolecular forces as well as covalent bonds. High melting points require large amounts of energy to be used not just more energy.

8c Well answered as many candidates knew that delocalised electrons that could move was the required answer.

8d This was not a well answered question as the number of atoms in a mole was often divided by 60 or 720 (12X60) and not multiplied and many struggled to give their answer in standard form matching the form of the number given in the question.

9 This question was based on one of the core practicals and is described in the core practical guide.

9ai The most common answer was the metal oxide lost oxygen. Some candidates incorrectly referred to the metal losing oxygen. Precision is needed in answering oxidation and reduction within reactions.

9aii Not many candidates referred to the safety aspect of why hydrogen should not be able to escape due to its flammability or risk of explosion.

9aiii It was rare to see an answer that continued passage of hydrogen was needed to prevent oxygen/air entering the tube so preventing the hot metal being oxidised.

9aiv This question produced much better answers as reheating to constant mass to show reaction was complete was well known.

9b Many candidates could work through the steps to calculate the relative atomic mass of M and so identify it. In bi some candidates used the mass of oxygen molecules instead of oxygen atoms but further marks could still be obtained by carrying their error forward. Some seemed to realise this was a division but not at all sure what they needed to divide by and this then lead to an array of numbers that did not quite fit any mass on their periodic tables so lead to some inventive extra calculations or rounding up/down to force it to fit something. Some missed the point that it was a metal so were able to shoehorn their calculation from biii to fit a non-metal.

10a Most correctly stated why the mixture was filtered. Only a few suggested it was to remove crystals.

10b Clearly set out steps were regularly seen to describe this practical procedure of obtaining pure dry crystals from the filtrate. Very few suggested heating the filtrate to dryness. The most often step omitted if there was an error was filtering out the crystals.

10c Both parts of this calculation were well answered, the most common difficulty for some candidates was incorrect rounding of the numbers they obtained with many simply dropping the last figures from their calculator.