Pearson

Examiners' Report
October 2025

Pearson Edexcel International Advanced Subsidiary Level in Chemistry
WCH13/01

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Question 01(a)

The whole of question 1 concerned the chemistry of alcohols.

The colour changes were well known, especially the colour change for the reaction with acidified potassium dichromate. The colour change for the reaction with Fehlings reaction was less well known mainly because many responses missed out "precipitate".

Question 01(b)

This item was very well answered in almost all responses. The range of possible correct responses were found.

Question 01(c)

Frequently responses were given as displayed formulae, this error was penalised once only. The better responses did give the skeletal formulae asked for in the question. Some responses with skeletal formulae lost a mark as the structures had been transposed. A further common error was to miss the bond between the carbon chain and the hydroxyl group.

Question 02(a)(i)

Question 2 concerned group 2 halides.

Some responses identified the cation in substance U as Sr^{2+} instead of Ca^{2+}, probably having mis read the stem.
The cation in substance V was more often correctly identified.
A common error for both substances was not to put the ion with the correct charge.

Question 02(a)(ii)

This part required a confirmatory test for the cation in substance V.
The weaker responses repeated the idea of the flame test given in the stem.
Many responses did correctly mention the addition of sulfate ions and gave the correct colour of the solid formed.

Question 02(b)

Some responses confused the anions in substances U and V. Other responses confused the answers needed for ions and precipitate.

In the second part a confirmatory chemical test was required for the anion in V. the majority of the correct responses mentioned the addition of ammonia, a few mentioned the addition of concentrated sulfuric acid.

Question 03(a)(i)

Question 3 concerned the use of a volumetric method to determine the water of crystallisation in sodium carbonate.

The many correct responses were given, but some missed the point of requiring thorough mixing instead of just mixing or dissolving.

Question 03(a)(ii)

This proved to be a difficult question, with many responses confusing concentration and volume. So missed the point that the moles of material added would be unchanged.

Question 03(a)(iii)

The colour change of methyl orange indicator (from the alkaline colour to the acidic colour) at the end of the titration was required. Many incorrect responses had the colour change the wrong way round, another error was to confuse the indicator used with another indicator.

Question 03(b)

This question was split into 3 parts.

The first concerned the calculation of the titre volumes and then to use the concordant results to calculate the mean. Many responses were correct; the most common error was to use two or four titres instead of all three concordant results.

The second required a balanced equation for the neutralisation reaction. Again, many correct responses, those incorrect responses had failed to balance the equation.

The third required the calculation of the moles of water of crystallisation. Many responses carried out the calculation correctly, but a common error was to miss out the scaling factor from 25 cm^3 to 250 cm^3. Other responses had not used the stoichiometry of the balanced equation correctly.

Question 04(a)

Question 4 concerned the calculation of the composition of a mixture of carbonate and hydrogen carbonate, using thermal decomposition.

In this part the response required a balanced equation. A number of responses had given the incorrect formulae for potassium carbonate and potassium hydrogen carbonate. However, if the formulae were not too wrong then the state symbols mark could still be awarded.
The stem of the question noted that steam was produced but some responses put water as a liquid, other responses put the solids (potassium carbonate and potassium hydrogen carbonate) as aqueous, indicating a misconception about the term anhydrous.

Question 04(b)(i)

This part was about the experimental technique. There were many contradictory responses discussing the need for release of pressure while retaining gases. Other responses noted that the loose-fitting lid was to minimise heat loss and other responses had confused this experiment with the combustion of a reactive metal suggesting that the lid was loose to allow the ingress of oxygen.

There were some responses that correctly noted that the solid needed to be retained and that the gases produced should be allowed to leave.

Question 04(b)(ii)

This part also concerned experimental technique, this time to explain why the mixture had to be heated until a constant mass had been achieved.

Incorrect responses included “so all the water has evaporated” so missing that carbon dioxide was also lost. Other responses just repeated what was given in the question “to get a constant mass”.

Question 04(b)(iii)

This part covered the calculation of the proportions of the mixture.

This was a difficult question, with many responses only scoring the first marking point but missed that the mass lost was due to the loss of two compounds (water and carbon dioxide). The mark scheme did allow for transcription errors from 04(a).

Some responses were mostly correct and scored most of the marks.

However, many responses showed what appeared to be random calculations using the data given in the question. Usually misunderstanding the stoichiometry of the decomposition equation.

Question 04(b)(iv)

This part was about percentage error.

Many responses identified the small mass as the relevant point, but they did not explain why. Other responses repeated the stem so said it would be less reliable, without a reason for this. While other responses just said that the mass would be too small, or too small to measure. Some responses suggested that there would be no decomposition because the mass is so small. There were also many responses did not use a comparative so just said e.g. that the result would be inaccurate.

Question 05(a)(i)

This question concerned the preparation of a halogenoalkane from an alcohol.

The type and mechanism for the reaction was well known with the majority of responses being correct.

Question 05(a)(ii)

Here the dipole needed to be shown on the alcohol molecule.

There were a significant number of blank responses. Where a response had been given, many were correct.

Question 05(b)(i)

This question was about the experimental procedure.

There were many incorrect responses. Several responses just mentioned toxic gases without identifying the gas, other responses incorrectly identified the gas as chlorine. Other responses just mentioned 'bad for the lungs' which was not enough for the mark.

Question 05(b)(ii)

This question was about the experimental procedure.

Many responses scored one mark for the release of pressure but then did not mention why the pressure had increased. Some responses did mention that gases had been produced but then the incorrect gases were given. A small number of responses mentioned that the reaction was exothermic.

In some responses there was confusion with the removal of the aqueous layer.

Question 05(b)(iii)

This question was about the experimental procedure.

There many fully correct responses but there were some responses that correctly identified the aqueous layer but then failed to state why it was the lower layer.

Question 05(b)(iv)

This question was about the experimental procedure.

Many correct responses correctly identifying that sodium hydrogen carbonate is used to neutralise the excess hydrochloric acid.

Some incorrect responses suggested that the sodium hydrogen carbonate was used to remove carbon dioxide or unreacted alcohol.

Question 05(b)(v)

This question was about the experimental procedure.

The majority of responses correctly identified that sodium sulfate was used as a drying agent.

Incorrect responses included dehydration.

Question 05(b)(vi)

This question was about the experimental procedure.

Some responses alluded to the lack of heating and missing anti bumping granules, but this was stated in the stem of the question.

The stronger responses noted the three errors and described what would happen.

Many responses only made two scoring points either for two or three errors and no descriptions, so only scoring one mark only. Some responses concerned the shape of the reaction and collecting vessels.

Some response stated that the receiver flask should not be connected but did not mention a gap or vent or just stated that the apparatus should not be sealed generally.

Many responses mentioned incorrect water flow but then indicated this was not well understood: some responses suggested that water would flow into the inside jacket of the condenser, and some responses suggested that there would be no condensation.

Question 05(c)

This question was about the possible monitoring of the progress of the reaction.

Many of the scoring responses scored one mark for the correctly stating the wave number range for either the alcohol or the halogenoalkane. The responses did not then continue to explain how this could be used to monitor the reaction.

Some responses gave an incorrect wavenumber range for the alcohol.

Some responses indicated misconceptions around infra-red spectra and the meaning of % transmittance.

Question 05(d)

This question was a calculation for the percentage yield of the reaction.

Many responses scored all three marks. However, some responses confused percentage yield with percentage atom economy.

Other erroneous responses included using volumes to calculate moles, not being sure how the densities should be used and molar masses being used with the incorrect compounds.