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June 2025

Int GCSE Chemistry 4CH1 2CR

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June 2025

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Introduction

Candidates performed well on Paper 2CR, which featured a broad range of accessible questions. Questions such as Q03(c)(ii), Q06(c)(i), and Q07(a)(ii) were answered particularly well, along with the relatively straightforward Q01 and Q02 at the start of the paper. The extended response question on structure and bonding was generally well attempted, with many candidates achieving at least one mark out of the five available. However, the use of imprecise terminology related to metallic and ionic bonding led to lower average marks in this section compared to others. Although the use of ratios in equations presented fewer problems in this series, a significant number of candidates lost marks through simple rounding errors, suggesting a need for greater care in evaluating final answers. Qualitative questions based on topics more typically assessed through calculations, such as solubility and energetics, proved more challenging. This highlights the need for candidates to develop a deeper understanding of the chemistry underlying the calculations they are often able to carry out successfully.

Question 1(a)

Most candidates were able to secure the first four accessible marks on the paper, which comprised Q01(a). Those who did not gain all four marks typically lost out on Q01(a)(ii), where a common error was incorrectly identifying 21% of air as nitrogen or carbon dioxide.

Question 1(b)

The test for carbon dioxide was successfully recalled by a large number of candidates, with a full range of correct outcomes seen — milky, cloudy, or white precipitate. Some candidates referred to calcium hydroxide (using either words or correct formulae) instead of limewater, though many of these failed to specify that it needed to be a solution of calcium hydroxide. A number of candidates also incorrectly wrote "lime water test" instead of "limewater test". Overall, this question was well answered, with incorrect responses typically describing the test for hydrogen or oxygen gas.

Question 2(a)

Fractional distillation was a common answer for Q02(a), with the response "distillation" alone rarely seen. The most common incorrect answer came from candidates confusing processes associated with crude oil, often giving "cracking" as their response.

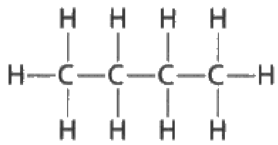
Question 2(b)

Candidates who lost the mark for Q02(b) most commonly stated that bitumen was used as a fuel for ships or aircraft. Unfortunately, some candidates gave both a correct and an incorrect response, resulting in zero marks. Overall, this question was well answered, as the mark scheme allowed for the standalone answer "roads" and did not require further detail, which benefitted many candidates.

Question 2(c)(i)

With the displayed formula provided, this question was accessible to most candidates and generally well answered. Less common responses that did not score included molecular formulae with very obvious superscript numbers, correct structural formulae, and the general formula for alkanes.

(c) The diagram shows the displayed formula of one of the alkanes in the refinery gases fraction.



(i) Determine the molecular formula of this alkane.

(1)

$CH_3CH_2CH_2CH_3$

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Examiner Comments

Some candidates were not familiar with the key term 'molecular formula' and instead provided a structural formula scoring zero marks.

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Examiner Tip

Interleaving terms required by specification point 4.2 throughout the course is a great method to help improve the quality of responses to questions like these.

Question 2(c)(iii)

Most candidates were able to identify the general formula, but a common error included confusion with the 'n' and the '2' resulting in responses such as $C_2H_{(2n+2)}$.

Other incorrect answers included $C_2H_{(2+2n)}$, $C_2 + H_{(2+2n)}$ or $C_nH_{2n}+2$.

Question 3(a)(i)

Some candidates confused the term *saturated solution* with the more familiar question asking for the definition of *saturated hydrocarbon*, leading to incorrect references to single or double bonds. Additionally, key terms such as *solvent* and *solute* were sometimes used incorrectly, with some candidates using *solvent* when they meant *solute*.

3 This question is about a compound called potassium permanganate.

(a) A teacher makes a saturated solution of potassium permanganate using this method.

The teacher adds 25 cm^3 of water at 50 °C to a beaker.

The teacher then adds solid potassium permanganate one spatula at a time, while stirring, until the solution is saturated.

(i) Give the meaning of the term **saturated solution**.

(1)

A solution where the maximum amount of solute is dissolved in a solvent at a specific temperature

ResultsPlus
Examiner Comments

This is an example of one of the higher quality responses that scored one mark.

Question 3(a)(ii)

The majority of candidates were awarded zero marks for this question, which was generally answered poorly. The unfamiliar nature of the question required candidates to apply their understanding independently, rather than rely on experience with similar past paper questions. Many appeared to focus on the terms 'saturated solution' and 'cooling' and incorrectly associated the question with the method for preparing soluble salts. As a result, a significant number of responses referred to the evaporation of water followed by the solution reaching its crystallisation point.

(ii) Give a reason why crystals form when the saturated solution cools from 50 °C to room temperature.

(1)

The solubility of potassium permanganate ~~de~~ in water decreases as temperature decreases so it crystallises

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Examiner Comments

An example of a straightforward one mark response.

Question 3(b)

Q03(b) was generally well answered compared to the qualitative solubility questions in Q03(a). Most candidates were able to gain at least one mark by correctly calculating 1.25 g from the subtraction of the data provided in the question. Furthermore, many candidates then multiplied their answer by 4 to give the correct final solubility value.

(b) The teacher pours 25 cm^3 of a saturated solution of potassium permanganate at room temperature into an evaporating dish.

The teacher leaves the solution until all the water has evaporated.

The teacher records the mass of the evaporating dish and the mass of the evaporating dish with the dry crystals.

mass of evaporating dish = 64.10 g

mass of evaporating dish with dry crystals = 65.35 g

Calculate the solubility of potassium permanganate in grams per 100 g of water.

[1.00 cm^3 of water has a mass of 1.00 g]

(2)

65.35 − 64.10

= 1.25g

$$\frac{\text{mass of solute}}{\text{mass of solvent}} \times 100$$

$$\frac{1.25}{25} \times 100$$

$= \underline{5}$

solubility = 5 g per 100 g of water

ResultsPlus
Examiner Comments

The candidate has clearly written their method and included the equation they have used to calculate the final value. This is an example of one of the higher quality responses we observed scoring two marks.

(b) The teacher pours 25 cm^3 of a saturated solution of potassium permanganate at room temperature into an evaporating dish.

The teacher leaves the solution until all the water has evaporated.

The teacher records the mass of the evaporating dish and the mass of the evaporating dish with the dry crystals.

mass of evaporating dish = 64.10 g

mass of evaporating dish with dry crystals = 65.35 g

Calculate the solubility of potassium permanganate in grams per 100 g of water.

[1.00 cm^3 of water has a mass of 1.00 g]

(2)

$65.35 - 64.10 = 1.25$

$1.25 : 25$

$x : 100$

$25x = 125$

$x = \frac{125}{25}$

$x = 5$

solubility = 5.00 g per 100 g of water

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Examiner Comments

This response has an unusual layout and includes some additional steps. However, this is not penalised, as the candidate arrived at the correct answer without any contradictory annotations, resulting in a final score of two marks.

Question 3(c)(i)

This was a straightforward analysis question that candidates should have been very familiar with. A significant number of responses were correct and scored the mark, but the most common incorrect response was the test for hydrogen being given, or a “lit/burning splint” being used.

Question 3(d)

As one of the less familiar terms linked to redox, candidates found applying the concept of an oxidising agent in context challenging. Many referred to the loss or gain of electrons or oxygen but often gave these definitions the wrong way around. Some candidates wrote that it “oxidises another substance whilst being reduced itself,” which did not score, as this was not a sufficient explanation to be awarded the mark.

Question 4(a)(i)

Candidates were generally familiar with this Group 1 metal reaction and were mostly successful in assigning the correct state symbols. The most common errors were assigning an incorrect state symbol to LiOH and incorrectly stating the state of water as (aq) instead of (l).

4 This question is about Group 1 metals.

(a) A teacher adds a small piece of lithium metal to a trough containing water.

(i) Complete the equation for the reaction between lithium and water by adding the state symbols.

(2)

$$2Li(\overset{s}{\cancel{a}}) + 2H_2O(g) \rightarrow 2LiOH(l) + H_2(\overset{aq}{\cancel{g}})$$

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Examiner Comments

This response scored zero marks. Although all the state symbols are present in the correct quantity, only the state symbol for lithium is correctly assigned. At least two correct state symbols are required to be awarded the mark.

Question 4(a)(ii)

Almost all candidates managed to score at least one mark for Q04(a)(ii), with fizzing or bubbling being the most commonly given correct answer. Some candidates lost marks for suggesting that lithium would melt or form a ball; occasionally, this was included on the same line as another correct answer (such as float, move, or dissolve), which, due to the list principle, meant they could not be awarded the second mark. A small number of candidates gave explanations of reactivity rather than observations. However, on the whole, candidates demonstrated a good understanding of what was required for an observation.

(ii) Give two observations made when the lithium is added to the water.

(2)

1 It forms a white trail and moves around the surface of the water

2 It then slowly disappears

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Examiner Comments

This response scored one mark. "White trail" is not accepted as a valid observation for lithium, and due to the list principle, the candidate does not receive a mark for the answer given on line 1. The single mark is awarded for the statement "it then slowly disappears." In this case, "it" is interpreted as referring to lithium based on the stem of the question; however, candidates should be cautious when using vague terms like "it," as such language can be problematic depending on how the question is phrased.

Question 4(a)(iii)

This gas calculation question was generally well answered, with most candidates attempting a response and very few leaving it blank. A significant number of candidates clearly showed their working, which made it easier to identify any issues and award error carried forward marks where appropriate. The most common issue was an error with the rounding of the final answer, with an unusually high number of candidates providing an incorrect evaluation, resulting in the loss of M3.

(iii) The reaction produces 375 cm^3 of hydrogen gas at room temperature and pressure (rtp).

Show, by calculation, that the mass of lithium added is between 0.20 g and 0.30 g.

[1 mol of gas has a volume of 24 000 cm^3 at rtp]

[for lithium, A_r = 7]

(3)

Volume = moles × 24000

375 = moles × 24000

$\frac{375}{24000}$ = moles

$\boxed{0.015625 = \text{moles}}$

Ratio = 2 : 1

2 : 1

? : 0.015625

0.015625 × 2 = 0.03125 moles

$n = \frac{m}{M_r}$

0.03125 × 7

= $\boxed{0.21875 g}$

∴ this is between 0.20 g and 0.30 g

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Examiner Comments

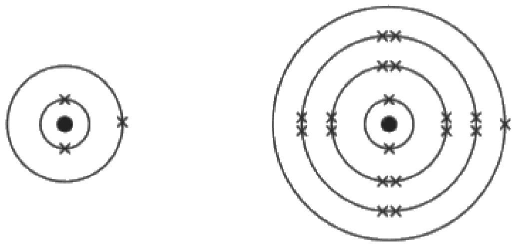
This response was awarded three marks and serves as an example of a clear, well-structured answer.

Question 4(b)(i)

The most common correct response was that potassium produces a flame or a lilac flame. Candidates who did not score the mark often failed to include an observation, instead stating that potassium is more reactive, reacts faster, or reacts vigorously without further justification. Some candidates also wrote that the metal “moves fast” rather than using the necessary comparative form, such as “moves faster” or even “moves more,” which was required for the mark.

(b) Potassium is more reactive than lithium.

The diagram shows the electronic structure of an atom of lithium and an atom of potassium.



Lithium Potassium

(i) Give one observation that is different when a small piece of potassium, instead of lithium, is added to water.

(1)

~~It doesn't react vigourksly.~~ The peice of potassium reacts more vigoursly.

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Examiner Comments

This response scored zero marks and was the most common mistake for this question. The response lacks an observation which is what the question required.

Question 4(b)(ii)

Precision of language was essential when answering this question. While many candidates showed familiarity with the required chemistry, their responses often fell short due to imprecise wording. For example, several candidates incorrectly suggested there were fewer or more 'outer shells', rather than recognising that there is always only one outer shell, resulting in the loss of M1. Some candidates referred to electrons being lost in the plural, instead of a single electron, which led to losing M3 as it implied more than one electron was lost—incorrect for a Group 1 metal. Additionally, some candidates provided good generic explanations about the trend in reactivity of Group 1 metals but failed to mention lithium or potassium specifically, resulting in lost marks as they did not directly answer the question but instead gave a summary of general knowledge.

(ii) Explain why potassium is more reactive than lithium.

Refer to the electronic structure of lithium and of potassium in your answer.

(3)

Because it has more outer shells, ~~so~~ so more energy is required to break down and the nucleus is further away from the electrons which is why its more reactive compared to lithium, lithium has less outer shells compared to potassium so it requires less heat

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Examiner Comments

This response appears to be heading in the right direction but unfortunately ends up scoring zero marks as either there is insufficient detail to score (M2/M3) or an error (M1).

(ii) Explain why potassium is more reactive than lithium.

Refer to the electronic structure of lithium and of potassium in your answer.

(3)

Potassium is a larger atom than lithium as it has a larger atomic radius. This means that attraction between the nucleus and outer electron is weaker/not as strong, making it easier for potassium to lose an electron

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Examiner Comments

An example of a response that is succinct and covers all the key points, scoring three marks.

Question 5(a)

This question was of moderate difficulty but was generally well attempted by candidates. Many correctly identified electrolysis as the method of extraction, but then lost the mark by referring to the electrolysis of aqueous sodium chloride. Among those who correctly stated electrolysis of (molten) sodium chloride, some failed to score M2 as they did not reference the reactivity of sodium compared to carbon, which linked to the statement in the stem of the question: *"The method used to extract a metal depends on the reactivity of the metal."* A number of candidates incorrectly suggested that sodium could be extracted via a displacement reaction with potassium, which was not credited in the context of this question. Other unusual and incorrect responses included filtration, distillation, and crystallisation.

5 **This question is about metals and metal compounds.**

(a) **The method used to extract a metal depends on the reactivity of the metal.**

Explain which method is used to extract sodium metal from sodium chloride.

(2)

Use electrolysis of sodium chloride in an ~~[illegible]~~
~~[illegible]~~. aqueous solution

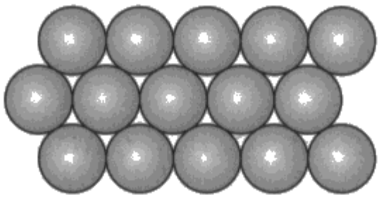
ResultsPlus
Examiner Comments

This response scored zero marks. M1 could have been scored for electrolysis but the candidate then adds 'in an aqueous solution' which makes the answer no longer correct as this would not give sodium as a product.

Question 5(b)

Overall, this question was well attempted, with the majority of candidates at least recognising that the structure was layered — helped by the diagram provided. Many then followed this with a concise explanation of how the layers can slide. A number of responses also included comments about the atoms being the same size, likely due to candidates' familiarity with answering the reverse question about the hardness of alloys.

(b) The diagram shows the arrangement of particles in a pure metal.



Explain why pure metals are soft.

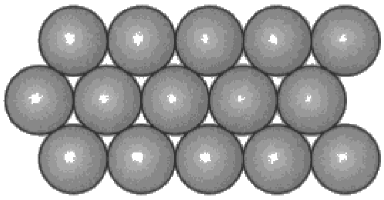
(2)

They have layers of metal ions/cations that can slide over eachother easily

ResultsPlus
Examiner Comments

One sentence which secures both M1 and M2 scoring two marks.

(b) The diagram shows the arrangement of particles in a pure metal.



Explain why pure metals are soft.

(2)

Pure metals have same sized atom which ~~to~~ help them slide over each other making them softer

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Examiner Comments

An example of a response that only achieves M2, with the candidate focusing on the atoms being the same size, rather than explaining how this allows layers to form.

Question 5(c)

Most candidates understood that the direction of electron transfer was from the sodium to the oxygen atom. However, explanations that followed stating that two sodium atoms each lose one electron and one oxygen atom gains both were often unclear or clumsily expressed. This made it difficult to determine whether candidates correctly understood that the two electrons came from two separate sodium atoms rather than both from a single atom. Appropriate diagrams showing the electron transfer and the resulting ions could have scored the marks as an alternative response, but very few were seen. A number of candidates incorrectly referred to the electrons being shared, which meant they scored zero marks.

Question 5(d)

Many candidates found Q05(d) challenging, with the modal score being one mark, usually gained for the comparison mark (M5). A number of responses incorrectly identified sodium as having a simple molecular structure, and more surprisingly, some stated that sodium oxide was covalent. This was unexpected given the stronger performance by candidates on Q05(c), where they correctly showed electron transfer. The metallic lattice structure of sodium was the point most frequently missed, with many suggesting sodium consisted of a single atom or even a molecule. This was again surprising considering how many candidates answered Q05(b) correctly. Many responses lacked clarity regarding the nature of the forces involved and the particles responsible for these forces. It was common for candidates to omit reference to the types of particles present, such as metal cations, delocalised electrons, or oppositely charged ions, all of which are essential for a complete explanation.

Question 6(a)

The wording of the question in Q06(a) included the phrase "...that would give a more accurate result", which meant that explanations for M2 such as "use a pipette because it gives a more accurate result" did not score. For many candidates, the pipette was the more obvious improvement, but explaining this choice by linking it to a more precise measurement was less straightforward than other alternatives. A number of responses suggested altering the indicator to give a clearer colour change, which did not score, as the indicator was not specified in the method — making it impossible to determine whether this would constitute an actual improvement. Additionally, many candidates listed more than two improvements rather than providing fully explained suggestions, which limited their ability to access all the marks available.

6 A student does a titration to find the volume of phosphoric acid solution (H_3PO_4) needed to neutralise a sample of potassium hydroxide solution (KOH).

One of the products of the reaction is potassium phosphate.

This is the student's method.

- use a measuring cylinder to transfer 25 cm^3 of potassium hydroxide solution to a conical flask
- add two drops of an indicator
- fill a burette with phosphoric acid solution and record the initial reading on the burette
- add the acid to the conical flask
- record the final burette reading when the indicator changes colour

This is the equation for the reaction.

$$H_3PO_4(aq) + 3KOH(aq) \rightarrow K_3PO_4(aq) + 3H_2O(l)$$

(a) Explain two improvements to the student's method that would give more accurate results.

(4)

1 · Place the conical flask on a white tile.
· In order to give more clear color change.

2 · Swirl the flask continuously while adding the acid.
· In order to speed up reaction & also make sure that the alkali has been fully neutralized by the acid.

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Examiner Comments

This an example of a response that scored four marks where two changes and two clear and correct explanations were provided.

Question 6(b)

This question was generally well attempted, with over 90% of candidates achieving at least one mark out of the four available. Similar issues to those seen in earlier quantitative questions arose, such as rounding errors in the final answer and candidates not understanding or forgetting to present their answer to the appropriate number of significant figures.

A number of candidates did not convert the volume into dm³. However, this did not always impact the final answer, as this mistake was typically made twice, resulting in a cancellation that gave an apparently correct answer. That said, candidates should ensure they consistently convert volumes into the correct units. Otherwise, in questions where the number of moles is used in subsequent calculations (eg gas volume calculations), an error of a factor of 1,000 can result.

(b) The student repeats the titration correctly.

The potassium hydroxide solution has a concentration of 0.150 mol / dm³.

The phosphoric acid solution has a concentration of 0.0400 mol / dm³.

Calculate the volume, in cm³, of phosphoric acid solution needed to neutralise 25.0 cm³ of 0.150 mol / dm³ potassium hydroxide solution.

Give your answer to **three** significant figures.

(4)

$C = \frac{M}{V}$

$0.15 = \frac{M}{0.025}$ $\quad M = 0.15 \times 0.025 = 0.00375$ mol

$\frac{0.00375}{3} = 0.00125$ $\quad C = \frac{M}{V}$

$V = \frac{M}{C} = \frac{0.00125}{0.04} = 0.03125$

≈ 0.0313

volume of phosphoric acid solution = 0.0313 cm³

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Examiner Comments

This response scored three marks. The candidate correctly converted the volume into dm^3 in the first step and calculated the correct number of moles. However, in the final step, they did not convert their answer from dm^3 back into cm^3, as required by the units stated on the answer line. They were awarded M4 for error carried forward.

Question 6(c)(i)

Candidates found this a relatively straightforward equation to balance, aided by the fact that half of the coefficients for the reactants and products were already provided.

Question 6(c)(ii)

This question was generally well attempted, with both acceptable options from the mark scheme seen in candidates' responses. A small number of candidates did not multiply the final division by 100 to express the result as a percentage, resulting in a loss of M3. Candidates should ensure they evaluate the calculation they have carried out and check their rounding carefully to avoid losing M3.

Question 6(c)(iii)

Most candidates were able to describe a suitable drying method and scored at least one mark out of the three available. Incorrect answers for M3 included using a "towel", which did not score. Some candidates gave a full or partial description of the preparation of a soluble salt, not recognising that the question referred to the preparation of an insoluble salt which meant a maximum of one mark could be scored.

(iii) Describe how the student can obtain a pure, dry sample of calcium phosphate from the mixture at the end of the reaction.

(3)

- Heat the mixture until crystals start to form.
- Filter it out.
- leave to dry using a drying oven.

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Examiner Comments

This response scored M3 for the method of drying but did not score M1 for 'filter' as the start of the method describes the preparation of crystals for a soluble salt.

(iii) Describe how the student can obtain a pure, dry sample of calcium phosphate from the mixture at the end of the reaction.

(3)

- Heat the mixture /solution untill it is saturated
- Allow solution to cool down and powder/solids ~~crystals~~ to form
- Filter the calcium phosphate solids/powder ~~crystals~~ using filter paper
- Wash the solids/powder ~~crystals~~ with distilled water / de ionised water
- Dry the solids/powder ~~crystals~~ using suitable method such as placing ~~crystals in warm oven~~ the powder ~~powder~~ / solids in warm oven

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Examiner Comments

An excellent answer for a different question, but this response is not a suitable description for obtaining a pure, dry sample of an insoluble salt. M3 was awarded for the inclusion of a suitable drying method.

Question 7(a)(iii)

This question appeared in the May 2024 2CR paper, but candidate performance showed notable improvement this year. The mark scheme was slightly adjusted compared to previous series to place greater emphasis on the chemistry, with biology-based answers (which are not part of the chemistry specification) included only under the 'allow' section. Going forward, the format of this year's mark scheme will be the standard for similar future questions.

Both acceptable pairs of responses from the mark scheme were evident in candidate answers. Those who scored zero marks typically focused on anaerobic respiration, failing to address the actual question about why air needs to be excluded.

(iii) Explain why fermentation is done in the absence of air.

(2)

If it is done in presence of air, then the yeast and glucose will give the products carbondioxide and water.

This response scored one mark for M2 from the second pair of possible answers by providing a response listed under the 'allow' section of the mark scheme.

Question 7(b)(i)

This question was generally well attempted, with a significant number of candidates demonstrating a sound understanding. Candidates who made an error in one of the energy calculations were awarded error carried forward (ecf) marks for a correct subtraction, allowing them to still achieve two marks. Very few candidates approached the question using the alternative method of calculating only the bonds broken and made.

Some errors arose from incorrectly transcribing data from the question, such as using 436 instead of 463, which resulted in the loss of one mark. Although the inclusion of guidance on the expected value for the enthalpy change helped direct candidates, some answers still gave values that would not be considered similar.

Candidates should be encouraged to review their responses to these types of questions at the end of the paper, as this is often where small, avoidable mistakes can be corrected through careful checking.

The table shows some bond energies.

Bond	Bond energy in kJ/mol
C—H	414
C—C	346
C—O	358
O—H	463
O=O	498
C=O	804

(i) Use the bond energies to show that the molar enthalpy change, ΔH, is about −1300 kJ/mol.

(3)

$414 \times 5 = 2070$
358 -
463 +
2891
$498 \times 3 = 1494$ +
4385

$804 \times 4 = 3216$
$463 \times 6 = 2778$ +
5994

$4385 - 5994 = -1609$

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Examiner Comments

This response scored two marks. M1 was not awarded as the C–C bond was not included in the calculation of the energy associated with bonds broken. M2 was awarded for correctly calculating the energy associated with bonds formed, and M3 was credited with an error carried forward (ecf) mark for correctly subtracting and evaluating the data based on the candidate's earlier values.

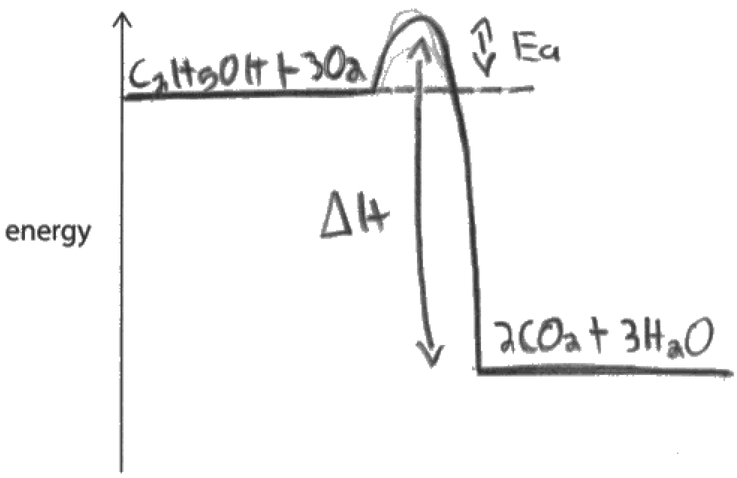
Question 7(b)(ii)

Most candidates were able to produce a sensible energy level diagram, with only a small number submitting unusual responses or guesses. There were some excellent activation energy labels which, while not creditworthy in this particular question, demonstrated candidates' confidence with this topic.

The most common cause of lost marks was incorrect annotations, such as mislabelling the reactants and products or omitting coefficients in the balanced equation — most frequently the '3' in front of the O_2. A few candidates drew endothermic diagrams, although the approximate enthalpy change given in Q07(b)(i) could have served as a helpful guide.

(ii) Complete the energy level diagram for the reaction between C_2H_5OH and O_2

(3)



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Examiner Comments

This response was awarded three marks, as the candidate met all the necessary criteria to achieve full marks. While the enthalpy change and activation energy were not assessed in this question, they would have been penalised if they had been part of the mark scheme. Candidates should be aware of where these arrows should start and end, as well as the correct direction for each.

Question 7(b)(iii)

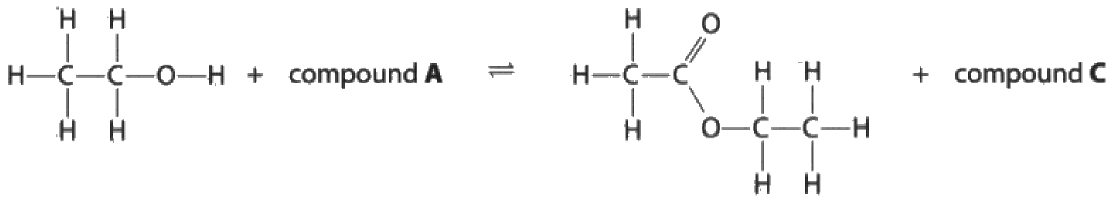
Whilst this question was not particularly well answered, there was an improvement in the quality of responses compared to previous papers. Most candidates recognised that exothermic reactions release energy, but common errors included incorrect comparisons of the number of bonds broken and made, and suggestions such as “more energy was needed for bond breaking than bond making”. The most common score was zero marks, highlighting that this remains one of the more challenging qualitative questions found on Paper 2.

Question 7(c)(i)

It was pleasing to see so many candidates attempt this question, with most understanding what was required by the term displayed formula. Common errors included omitting the bond between the O–H group in ethanoic acid, and incorrectly representing the displayed formula of water as HO□.

(c) Ethanol reacts with compound **A** to produce ester **B** and compound **C**.

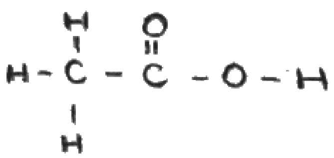
This is the equation for the reaction.



ester **B**

(i) Draw the displayed formula for compound **A** and for compound **C**.

(2)

compound **A**	compound **C**
	

ResultsPlus
Examiner Comments

This response scored one mark for the correct displayed structure of ethanoic acid. A surprising number of candidates gave the same incorrect answer for the displayed structure of water.

Question 7(c)(ii)

Ethyl ethanoate is specifically required knowledge in specification point 4.40C, so it was surprising to see such a wide range of incorrect spellings — many of which did not even phonetically resemble the correct answer. A number of candidates incorrectly referred to polymers or used the prefix 'butyl', likely due to the presence of four carbon atoms. Other common incorrect responses included 'ethyl methanoate' and 'ethyl ethanoic'. That said, it was encouraging to see that nearly all candidates attempted an answer to this question.

Paper Summary

Based on their performance on this paper, candidates should remember to:

- Consider the question as a whole. Understanding that all parts of a question are linked, and thinking about the area being covered or information from earlier parts, can help provide a wider context and aid understanding.
- Ensure that final evaluations in quantitative responses are correctly rounded and given to the appropriate degree of precision when specified in the question.

Based on their performance on this paper, candidates should spend more time reviewing:

- Qualitative responses related to solubility.
- Qualitative responses related to energetics.
- Application of the terms *oxidising agent* and *reducing agent*.

Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link: https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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