

Mark Scheme (Results)

Summer 2025

Pearson Edexcel International Advanced Subsidiary Level in Chemistry (WCH12) Paper 01 Energetics, Group Chemistry, Halogenoalkanes and Alcohols

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:
- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities. Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Section A

Question Number	Answer	Mark
1(a)	**The only correct answer is D** $(-(55 \times 4.18 \times 6.5) \div 0.03)$ ***A*** *is incorrect because only the volume and moles of sodium hydroxide have been used* ***B*** *is incorrect because only the volume and moles of ethanoic acid have been used* ***C*** *is incorrect because the moles of sodium hydroxide have been used*	**(1)**

Question Number	Answer	Mark
1(b)	**The only correct answer is C** (15.4%) ***A*** *is incorrect because the measurement uncertainty for a single reading and this has been halved* ***B*** *is incorrect because that is the percentage uncertainty for a single reading* ***D*** *is incorrect because the percentage uncertainty has been doubled for each reading*	**(1)**

Question Number	Answer	Mark
2(a)	**The only correct answer is B** (801) ***A*** *is incorrect because only one oxygen molecule has been included* ***C*** *is incorrect because only two O-H bonds have been included and only one oxygen molecule has been included* ***D*** *is incorrect because only two O-H bonds have been included*	**(1)**

Question Number	Answer	Mark
(b)	**The only correct answer is B** (+40) ***A*** *is incorrect because this is the value for the enthalpy change of condensation* ***C*** *is incorrect because this is the value for the enthalpy change of condensation for two moles of water* ***D*** *is incorrect because this is the value for the enthalpy change of vaporisation for two moles of water*	**(1)**

Question Number	Answer	Mark
3	**The only correct answer is A**($(CH_3)_3N$) ***B*** *is incorrect because this amine can form hydrogen bonds* ***C*** *is incorrect because this amine can form hydrogen bonds* ***D*** *is incorrect because this amine can form hydrogen bonds*	**(1)**

Question Number	Answer	Mark
4	**The only correct answer is A** (purple,yellow) ***B*** *is incorrect because the upper layer is hexane* ***C*** *is incorrect because some iodine will dissolve in the lower aqueous layer* ***D*** *is incorrect because the upper layer is hexane*	**(1)**

Question Number	Answer	Mark
5	**The only correct answer is A** (NH_3 NO NO_3^-) ***B*** *is incorrect because N is +5 in* NO_3^- *whereas N is +2 in NO* ***C*** *is incorrect because N is -3 in* NH_3 *whereas N is +2 in NO* ***D*** *is incorrect because N is -3 in* NH_3 *whereas N is +5 in* NO_3^-	**(1)**

Question Number	Answer	Mark
6	**The only correct answer is D** (redox) ***A*** *is incorrect because no single species has been simultaneously oxidised and reduced* ***B*** *is incorrect because a salt has not been formed* ***C*** *is incorrect because although the iodide ions have been oxidised the iodine in iodate has been reduced*	**(1)**

Question Number	Answer	Mark
7	**The only correct answer is B** (an electron moving from a 3p to a 3s orbital) ***A*** *is incorrect because this transition is not in the visible region* ***C*** *is incorrect because this process is endothermic and would absorb radiation* ***D*** *is incorrect because this process is endothermic and would absorb radiation*	**(1)**

Question Number	Answer	Mark
8	**The only correct answer is D** (75%) ***A*** *is incorrect because 0.15 is the number of moles of carbon dioxide produced* ***B*** *is incorrect because 0.20 is the number of moles of calcium carbonate used* ***C*** *is incorrect because 25% is the percentage of the impurities*	**(1)**

Question Number	Answer	Mark
9	**The only correct answer is C** (increases, no change) ***A*** *is incorrect because the surface area of the magnesium has increased so the rate would increase* ***B*** *is incorrect because the surface area of the magnesium has increased so the rate would increase and magnesium is the limiting reagent* ***D*** *is incorrect because the magnesium is the limiting reagent*	**(1)**

Question Number	Answer	Mark
10	**The only correct answer is A** (an increase in reaction temperature) ***B*** *is incorrect because at a lower temperature a smaller proportion of particles have sufficient energy to react* ***C*** *is incorrect because an increase in reactant concentration does not change the proportion of particles that have sufficient energy to react* ***D*** *is incorrect because a decrease in reactant concentration does not change the proportion of particles that have sufficient energy to react*	**(1)**

Question Number	Answer	Mark
11(a)	**The only correct answer is C** (the rate of formation of sulfur(VI) oxide is equal to the rate of its decomposition) ***A*** *is incorrect because the reactions do not stop* ***B*** *is incorrect because the equilibrium position does not require equal reactant and product masses* ***D*** *is incorrect because the equilibrium position does not require equal reactant and product concentrations*	**(1)**

Question Number	Answer	Mark
11(b)	**The only correct answer is D** (there is no effect on the position of equilibrium) ***A*** *is incorrect because the rates of both the forward and reverse reaction are increased* ***B*** *is incorrect because the use of a catalyst does not change the position of equilibrium* ***C*** *is incorrect because the use of a catalyst does not change the position of equilibrium*	**(1)**

Question Number	Answer	Mark
12(a)	**The only correct answer is C** (butan-2-ol) ***A*** *is incorrect because it would not have a peak at m/z 74* ***B*** *is incorrect because it would not have a peak at m/z 74* ***D*** *is incorrect because it would not have a peak at m/z 45*	**(1)**

Question Number	Answer	Mark
12(b)	**The only correct answer is C** (butan-2-ol) **A** *is incorrect because it is a ketone* **B** *is incorrect because it is an aldehyde which forms a carboxylic acid when oxidised* **D** *is incorrect because it is a tertiary alcohol*	**(1)**

Question Number	Answer	Mark
12(c)	**The only correct answer is B** (butanal) ***A*** *is incorrect because it is a ketone and not an aldehyde* ***C*** *is incorrect because it is an alcohol and not an aldehyde* ***D*** *is incorrect because it is an alcohol and not an aldehyde*	**(1)**

Question Number	Answer	Mark
13(a)	**The only correct answer is D** (the carbon-halogen bond strength decreases going down the group) ***A*** *is incorrect because the bond strength of the hydrogen halide does not affect the rate of reaction* ***B*** *is incorrect because although the bond polarity decreases, this does not affect the rate of reaction* ***C*** *is incorrect because the first ionisation energy of the halogen has no effect on the rate of reaction*	**(1)**

Question Number	Answer	Mark
13(b)	**The only correct answer is C (**a cream precipitate insoluble in dilute aqueous ammonia) **A** *is incorrect because bromide ions are produced which form silver bromide not bromine* ***B*** *is incorrect because silver bromide is insoluble in dilute aqueous ammonia* **D** *is incorrect because silver bromide is not yellow*	**(1)**

Question Number	Answer	Mark
13(c)	**The only correct answer is D** (nucleophilic substitution) ***A*** *is incorrect because water is not an electrophile* ***B*** *is incorrect because the elimination of H-X requires a base* ***C*** *is incorrect because water does not produce free radicals*	**(1)**

TOTAL FOR SECTION A = 20 MARKS

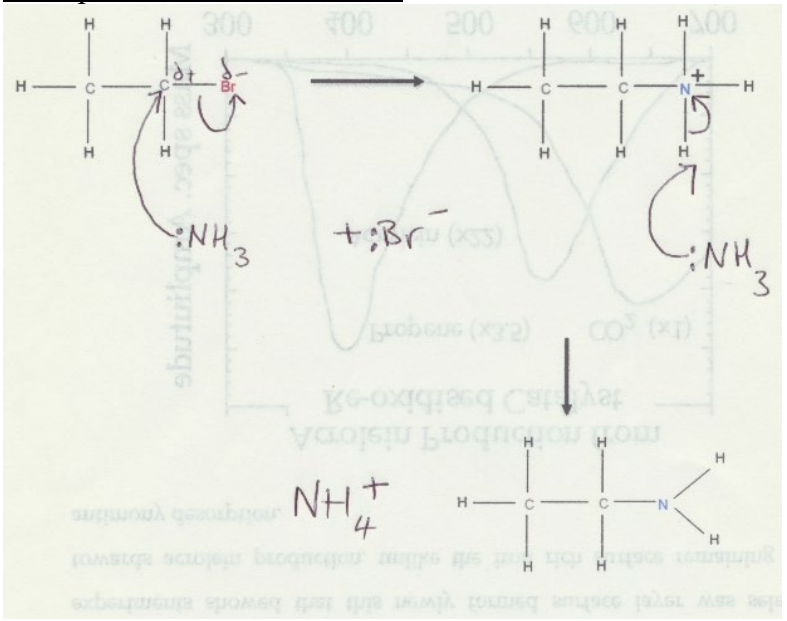
Section B

Question Number	Answer	Additional Guidance	Mark
14(a)	An explanation that makes reference to the following points: • a catalyst decreases the activation energy (by introducing an alternative pathway) **(1)** • so more molecules/particles have energy > E_a/ energy required for the reaction **(1)** • the frequency/number per unit time of successful collisions increases **(1)**	This could be shown on the diagram by the addition of a line to the left of E_a Do not award if the new E_a is at or to the left of the peak Ignore rate of successful collisions	**(3)**

Question Number	Answer	Additional Guidance	Mark
14(b)(i)	An explanation that makes reference to the following points: • the hydrides have London forces **(1)** • number of **electrons** increases so London dispersion forces become stronger (down the group) **(1)** • (only) ammonia has hydrogen bonding **(1)** • (which) is (much) stronger than the London forces (in ammonia) **(1)**	Accept van der Waals'/ vdW/ dispersion/ instantaneous dipole-induced dipole for London forces throughout Ignore omission of ammonia Do not award London forces are similar (down the group) Do not award if any other hydride mentioned Accept hydrogen bonding is the strongest intermolecular force Accept the London forces in SbH_3 are stronger than the hydrogen bonds (in ammonia) Ignore references to dipole-dipole interactions.	**(4)**

Question Number	Answer	Additional Guidance	Mark
14(b)(ii)	An explanation that makes reference to three of the following points • hydrogen (burns to) produce water (only) **(1)** • alkanes (burn to) produce carbon dioxide (and water) **(1)** • carbon dioxide is a greenhouse gas/ contributes to (enhanced) global warming **(1)**	both M1 and/or M2 could be scored from equation(s) Allow steam Allow hydrogen does not produce carbon dioxide Allow water is not (considered to be) a greenhouse gas/ water does not contribute to (enhanced) global warming Ignore incomplete combustion/CO or other gases e.g. NOx Ignore references to renewable/carbon neutral DNA ozone layer depletion	**(3)**

Question Number	Answer	Additional Guidance	Mark
14(c)(i)	An explanation that makes reference to two of the following points: • in ethanolic/ alcoholic (solvent) **(1)** • sealed tube/under pressure **(1)**	 Do not award aqueous Allow excess ammonia Ignore just heat Do not award “heat under reflux”	**(2)**

Question Number	Answer	Additional Guidance	Mark
14(c)(ii)	An answer that makes reference to six of the following points: • dipole on C-Br bond • curly arrow from lone pair on N of ammonia to correct carbon atom • curly arrow from C-Br bond to Br or just beyond • curly arrow from N-H bond of intermediate to N • curly arrow from lone pair on N of ammonia to H on intermediate • Br^- and NH_4^+ shown/NH_4Br	<u>Example of correct mechanism</u>  penalise missing lone pair once only penalise charge on ammonia once only penalise "fish hook" arrows once only All 6 BPs scores 3 marks 4/5 BPs scores 2 marks 2/3 BPs score 1 mark	**(3)**

Question Number	Answer	Additional Guidance	Mark
14(c)(iii)	An answer that makes reference to the following points: • (ethylamine) has a lone pair on the nitrogen **(1)** • (and a) hydrogen(s) attached to the nitrogen (which can be substituted) **(1)**	Allow (ethylamine) is a primary amine/ has -NH_2 Allow lone pair on the NH_2 group scores 2 Ignore references to polarity/ intermolecular forces or structure of halogenoalkane	**(2)**

(Total for Question 14 = 17 marks)

Question Number	Answer	Additional Guidance	Mark
15(a)	An answer that makes reference to the following point: • $Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$	Allow ½ $Cl_2 + Br^- \rightarrow Cl^- + ½ Br_2$ Ignore state symbols even if incorrect Ignore equations used as "working" Do not award equations with uncancelled cations e.g. K^+	**(1)**

Question Number	Answer	Additional Guidance	Mark
15(b)	An answer that makes reference to two of the following points: • Cl in Cl_2 goes from 0 to (+)1 in HClO and is oxidised **(1)** • Cl in Cl_2 goes from 0 to −1 in HCl and is reduced **(1)**	Oxidation numbers may be written on the equation. If no other mark is scored, allow (1) for all three correct oxidation numbers for chlorine Or Oxidation and reduction correctly linked to change in ON Do not award incorrect changes in oxidation numbers for H or O	**(2)**

Question Number	Answer	Additional Guidance	Mark
15(c)(i)	An answer that makes reference to the following point: • no oxidation number has changed (between reactants and products)	This could be shown for sulfur (+6) and chlorine (-1) in the equation above Allow no electrons have been transferred Ignore **just** no oxidation or reduction has taken place.	**(1)**

Question Number	Answer	Additional Guidance	Mark
15(c)(ii)	An answer that makes reference to the following point: • $8I^- + 8H^+ + H_2SO_4 \rightarrow H_2S + 4H_2O + 4I_2$	 Ignore state symbols even if incorrect Do not award uncancelled electrons	**(1)**

Question Number	Answer	Additional Guidance	Mark
15(c)(iii)	An explanation that makes reference to the following points: • iodide (ions) are better reducing agents (than chloride ions) **(1)** • because electrons are more easily lost from iodide (ions than from chloride ions) **(1)**	Accept reverse argument throughout Allow iodide ions are more easily oxidised (than chloride ions) Do not award iodine/chlorine Allow outer electrons are further from nucleus/more shielded in iodide (ions than in chloride ions) Do not award if linked to iodide being a better oxidising agent/more easily reduced	**(2)**

(Total for Question 15 = 7 marks)

Question Number	Answer	Additional Guidance	Mark
16(a)	An answer that makes reference to two of the following points: • add PCl_5 **(1)** • (white) misty fumes **(1)**	 Allow PCl_3/$SOCl_2$ Accept steamy fumes Allow add sodium/Na **(1)** Effervescence/ fizzing / bubbles **(1)**	**(2)**

Question Number	Answer	Additional Guidance	Mark
16(b)	 • division by A_r carbon, hydrogen and oxygen **(1)** • mole ratio linked to given formula **(1)**	Example of calculation 7.13 ÷ 12 : 1.19 ÷ 1 : 1.58 ÷ 16 $\frac{0.59417}{0.09875} : \frac{1.19}{0.09875} : \frac{0.09875}{0.09875}$ 6:12:1 Ignore SF throughout	**(2)**

Question Number	Answer	Additional Guidance	Mark
16(c)(i)	An answer that makes reference to the following points: • sodium/potassium dichromate((VI))/ $Na_2Cr_2O_7$ / $K_2Cr_2O_7$ **and** (dilute) sulfuric acid/H_2SO_4 **(1)** • (heat under) reflux **(1)**	 Ignore $Cr_2O_7^{2-}$/H^+ Do not award hydrochloric acid/HCl	**(2)**

Question Number	Answer	Additional Guidance	Mark
16(c)(ii)	A description that makes reference to the following points: • the O-H (stretching absorption) would be absent **and** at wavenumber range 3750 -3200 (cm^{-1}) **(1)** • the C=O (stretching) absorption would be present **and** at wavenumber **range 1720-1700** (cm^{-1}) **(1)**	Allow single value within range as shown on QP e.g. 3300 (cm^{-1}) Allow one mark for two correct bonds identified Or correct wavenumber value/ranges for O-H and range for C=O Ignore comments on fingerprint region absorptions Ignore comments on C-H absorptions	**(2)**

Question Number	Answer	Additional Guidance	Mark
16(c)(iii)	An answer that makes reference to the following point: • the boiling temperatures are (too) similar/close (to each other)	Ignore just “different boiling temperatures”	**(1)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr>
<td>*16(d)</td>
<td>
This question assesses the student's ability to show a coherent and logically structured answer with linkages and fully sustained reasoning.

Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning.

The following table shows how the marks should be awarded for indicative content.
<table>
<tr><th>Number of indicative marking points seen in answer</th><th>Number of marks awarded for indicative marking points</th></tr>
<tr><td>6</td><td>4</td></tr>
<tr><td>5-4</td><td>3</td></tr>
<tr><td>3-2</td><td>2</td></tr>
<tr><td>1</td><td>1</td></tr>
<tr><td>0</td><td>0</td></tr>
</table>
The following table shows how the marks should be awarded for structure and lines of reasoning
<table>
<tr><th></th><th>Number of marks awarded for structure of answer and sustained lines of reasoning</th></tr>
<tr><td>Answer shows a coherent logical structure with linkages and fully sustained lines of reasoning demonstrated throughout</td><td>2</td></tr>
<tr><td>Answer is partially structured with some linkages and lines of reasoning</td><td>1</td></tr>
<tr><td>Answer has no linkages between points and is unstructured</td><td>0</td></tr>
</table>
</td>
<td>
Guidance on how the mark scheme should be applied.

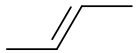
The mark for indicative content should be added to the mark for lines of reasoning. For example, a response with five indicative marking points that is partially structured with some linkages and lines of reasoning scores 4 marks (3 marks for indicative content and 1 mark for partial structure and some linkages and lines of reasoning).

If there were no linkages between the points, then the same indicative marking points would yield an overall score of 3 marks (3 marks for indicative content and no marks for linkages).

In general it would be expected that
5 or 6 indicative points would get 2 reasoning marks
3 or 4 indicative points would get 1 reasoning mark
0, 1 or 2 indicative points would get zero reasoning marks

If there is any incorrect chemistry, deduct mark(s) from the reasoning. If no reasoning mark(s) awarded do not deduct mark(s).

Comment: Look for the indicative marking points first, then consider the mark for the structure of the answer and sustained line of reasoning
</td>
<td>(6)</td>
</tr>
</table>

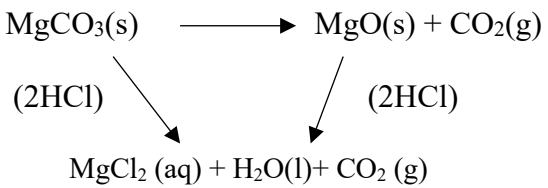
	Indicative content **IP1** in aqueous conditions the reaction is substitution **IP2** (to produce) $CH_3CHOHCH_2CH_3$ (butan-2-ol) **IP3** in ethanolic/alcoholic conditions the reaction is elimination **IP4** (to produce) $CH_2=CHCH_2CH_3$ (but-1-ene) **IP5** *E*-$CH_3CH=CHCH_3$ and *Z*-$CH_3CH=CHCH_3$ (*E*-but-2-ene and *Z*-but-2-ene) is formed *E*-but-2-ene  Z-but-2-ene  **IP6** in substitution the hydroxide ion acts as a nucleophile and in elimination the hydroxide ion acts as a base	Accept structural/skeletal/displayed or hybrid formulae Ignore mechanisms even if incorrect Ignore references to temperature/concentration Ignore just molecular formulae In **IP2, 4 and 5,** penalise use of just names once only Do not award incorrect conditions in **IP1 and 3** Allow the hydroxide ion replaces the chlorine atom. Ignore just alcohol/ butanol Do not award $CH_2OHCH_2CH_2CH_3$(butan-1-ol) If conditions reversed allow 1 IP for **IP1 and IP3** Accept trans/cis for E/Z Just butene/ but-2-ene scores 1 IP for IP4 and IP5 (if not already scored)	

(Total for Question 16 = 15 marks)
TOTAL FOR SECTION B = 39 MARKS

Section C

Question Number	Answer		Additional Guidance	Mark
17(a)			<u>Example of calculation</u>	**(7)**
	• moles of NaOH in titre	**(1)**	$27.15 \div 1000 \times 0.0960 = 2.6064 \times 10^{-3}$ / 0.0026064 / 0.00261 (mol)	
	• total moles of HCl in solution after reaction with the carbonate	**(1)**	$0.0026064 \times 10 = 2.6064 \times 10^{-2}$ / 0.026064 / 0.0261 (mol)	
	• moles of HCl which reacted with $MgCO_3$ nH_2O	**(1)**	$0.0600 - 0.026064 = 3.3936 \times 10^{-2}$ / 0.033936 / 0.0339 (mol)	
	• moles of $MgCO_3$ nH_2O in sample	**(1)**	$0.033936 \div 2 = 1.6968 \times 10^{-2}$ / 0.016968 / 0.0170 (mol)	
	• mass $MgCO_3$ in the sample	**(1)**	$0.016968 \times (24.3 + 12.0 + 3(16.0)) = 1.43040$ / 1.4304 / 1.43 (g)	
	• mass of water	**(1)**	$2.35 - 1.4304 = 0.9196$ (g)	
	• value of n to 1 SF	**(1)**	$(0.9196 \div 18) : 0.016968 = 3.01 = 3$ to 1 SF	
			Allow TE throughout Ignore SF throughout	
	Alternative method for M5,6,7 • M_r hydrated salt	**(1)**	$2.35 \div 0.016968 = 138.500$	
	• mass of water	**(1)**	$138.500 - (24.3 + 12.0 + 3(16.0)) = 54.196$	
	• value of n to 1 SF	**(1)**	$54.196 \div 18 = 3.0109 = 3$ to nearest whole number	

Question Number	Answer	Additional Guidance	Mark
17(b)(i)	• calculation of energy produced **(1)** • calculation of mols magnesium oxide and use in calculation **(1)** • calculation of Δ_rH_1 and sign and units **(1)**	Example of calculation $Q = 40 \times 30.8 \times 4.18 = 5149.8 / 5150$ (J) $1.92 \div (24.3 + 16) = 4.76 \times 10^{-2} / 0.047643 / 0.0476 / 0.048$ (mol) $5149.8 \div 1000 \div 0.047643 = -108.09 / -108.1 / -108$ kJ mol^{-1} Allow -108090 J mol^{-1} Ignore SF except 1 SF Correct answer with no working scores (3) Allow TE throughout +108.09 scores 2 marks	**(3)**

Question Number	Answer	Additional Guidance	Mark
17(b)(ii)	• completed Hess cycle **(1)** • $\Delta_rH = \Delta_rH_2 - \Delta_rH_1$ **(1)** • answer to 2/3 SF **(1)**	Example of calculation  3.58 –(–108.09) = (+) 111.67 / 111.7 / 112 / 110 = (+)112 / (+)110 (kJ mol^{-1}) TE from (i) Correct answer with no working scores M2 and M3	**(3)**

Question Number	Answer	Additional Guidance	Mark
17(b)(iii)	An answer that makes reference to the following point: • it is difficult to measure the **temperature** of a solid/powder/ while it is being heated	Ignore references to non-standard conditions	(1)

Question Number	Answer	Additional Guidance	Mark
17(c)(i)	An explanation that makes reference to the following points: • the temperature required to decompose calcium carbonate is higher (than that for magnesium carbonate)/the thermal stability of the Group 2 carbonates increases down the Group **(1)** • (because) the calcium ion is larger than magnesium ion/ the surface charge density of calcium ion is less/ magnesium ion is more polarising **(1)** • (so the) carbon - oxygen bond is less weakened **(1)**	Allow reverse arguments for M1 and M2 Do not award references to electronegativity/intermolecular forces Allow so carbon - oxygen bond is less polarised	(3)

Question Number	Answer	Additional Guidance	Mark
17(c)(ii)	An explanation that makes reference to the following points: • the (forward) reaction is exothermic so a low(er) temperature increases the yield of methanol **(1)** • but the rate will be too low (so a compromise temperature is used) **(1)** • there are fewer moles of gas on the RHS/products **(1)** • so high pressure will move the equilibrium position to the RHS/ increase the yield of methanol **(1)**	Allow reverse arguments Allow shifts the equilibrium position to RHS for increasing the yield of methanol Allow annotation on the equation Allow high pressure will cause more collisions / increase rate Ignore references to catalysts	**(4)**

(Total for Question 17 = 21 marks)

TOTAL FOR SECTION C = 21 MARKS
TOTAL FOR PAPER = 80 MARKS

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