

Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE
In Chemistry (1CH0)
Paper 2F

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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.

Chemistry 1CH0_2F

Question number	Answer	Additional guidance	Mark
1(a)(i)	At	allow AT/ at / aT	**AO1 1 (1)**

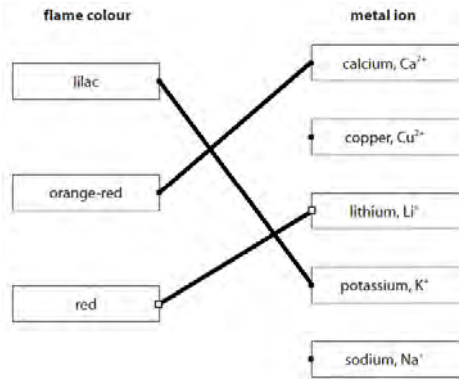
Question number	Answer	Mark
1(b)(i)	**A** yellow-green is the only correct answer **B** is not correct because this is the colour of bromine **C** is not correct because this the colour of iodine vapour **D** is not correct because this the (assumed) colour of astatine	**AO1 1 (1)**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	red (1) white (1)	mark independently allow 1 mark for white then red	**AO1 1 (2)**

Question number	Answer	Additional guidance	Mark
1(c)(i)	a description including: • (boiling point) increases (1) • as atomic number increases / down the group (1)	MP2 dependent on MP1. allow ORA allow 'goes up', 'gets higher' etc for increases allow temperature increases ignore hotter/ warmer down the group allow 'down the halogens' allow 'from fluorine to iodine' allow 'down the periodic table' ignore down the table alone 'positive correlation between bpt and atomic number' scores 2	AO3 1 (2)

Question number	Answer	Mark
1(c)(ii)	allow any number greater than 59	AO3 2 (1)

Total for Question 1 = 7 marks

Question number	Answer	Additional guidance	Mark
2(a)		if more than one line comes from any box, ignore these lines	AO1 1 (3)

Question number	Answer	Additional guidance	Mark
2(b)(i)	potassium hydroxide (+) copper chloride → copper hydroxide (+) potassium chloride LHS (1) RHS (1)	reject chlorine for chloride in each case reactants can be in either order products can be in either order ignore state symbols	AO2 1 (2)

Question number	Answer	Mark
2(b)(ii)	**D** blue is the only correct answer **A**, **B** and **C** are incorrect because copper hydroxide is blue	AO2 1 (1)

Question number	Answer	Mark
2(b)(iii)	2 / two	AO2 1 (1)

Total for Question 2 = 7 marks

Question number	Answer	Additional guidance	Mark
3(a)	thermometer		AO2 2 (1)

Question number	Answer	Additional guidance	Mark
3(b)(i)	to make the {magnesium chloride / solid} dissolve	allow 'so it dissolves' allow to increase the rate of the reaction allow to {mix / spread / distribute} the reactants allow so it reacts allow to help 'break up' the {magnesium chloride / solid} allow to get an even temperature ignore to make it more accurate / more reliable	AO2 2 (1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	• use a polystyrene cup / insulate the beaker (1) • add a lid to the beaker (1)	allow any relevant wrapping e.g. foil, cotton wool ignore draught shield ignore 'trap heat' ignore close the beaker / use a bung / cover (the beaker) / seal the beaker max 1 mark if methods of keeping a constant temperature e.g. water bath are given	AO3 3b (2)

Question number	Answer	Additional guidance	Mark
3(b)(iii)	13.4 with or without working scores 2 13.5 + 12.8 + 13.9 = 40.2 (1) $\frac{40.2}{3}$ = 13.4 (1)	-13.4 scores 1 40.2 with or without working scores 1 33.4 with or without working scores 1 allow ecf MP2 for correctly dividing by 3 a value derived from an attempt at adding the three temperature changes $\frac{13.5 + 13.9}{2}$ = 13.7 scores 2 **only** with working	**AO1 2 (2)**

Question number	Answer	Additional guidance	Mark
3(b)(iv)	an explanation linking: • exothermic (1) • (because) temperature increases (1)	mark independently allow heat is {given out / released / lost} / gets {hotter / warmer} allow energy is released	**AO3 2 (2)**

Total for Question 3 = 8 marks

Question number	Answer	Additional guidance	Mark
4(a)(i)	an explanation linking: • compound **B** (1) • (because) it contains a (carbon) double bond (1)	MP2 depends on MP1 allow unsaturated	**AO2 1 (2)**

Question number	Answer	Mark
4(a)(ii)	**D** CH_2 is the only correct answer **A** is incorrect because this is the structural formula **B** is incorrect because this is the molecular formula **C** is incorrect because this the formula of an alkane	**AO2 1 (1)**

Question number	Answer	Additional guidance	Mark
4(b)(i)	(moderate) hazard	allow harmful allow irritant allow hazardous allow hazardous to the ozone layer ignore dangerous ignore caution reject names of other hazard symbols e. g corrosive / toxic / explosive / flammable	**AO1 1 (1)**

Question number	Answer	Additional guidance	Mark
4(b)(ii)	bromine (water / solution)	allow aqueous bromine ignore symbols	**AO1 1 (1)**

Question number	Answer	Mark
4(b)(iii)	**A** colourless is the only correct answer **B**, **C** and **D** are incorrect because alkenes decolourise bromine water	AO2 1 (1)

Question number	Answer	Additional guidance	Mark
4(c)(i)	an explanation linking: • addition of oxygen (1) • (oxygen added to) {hydrogen / carbon} (1)	 allow oxygen is gained reject oxygen is formed MP2 depends on MP1 if no other mark awarded allow 1 mark for (oxidation is the) loss of electrons	**AO2 1 (2)**

Question number	Answer	Additional guidance	Mark
4(c)(ii)	90 with or without working scores 2 marks 5 x 18 (1) = 90 (1)	 allow 1:5	**AO2 1 (2)**

Total for Question 4 = 10 marks

Question number	Answer	Mark
5(a)	**C** carbon dioxide is the only correct answer **A**, **B** and **D** are incorrect as carbon dioxide made up most of the Earth's early atmosphere	AO1 1 (1)

Question number	Answer	Additional guidance	Mark
5(b)(i)	nitrogen	allow N, n, N_2, n2, n^2 , N^2, N2	AO3 1 (1)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	1	allow one	AO2 1 (1)

Question number	Answer	Additional guidance	Mark
5(c)(i)	an explanation linking any **two** from: • volume of gas decreases (1) • because oxygen is used up (1) • there is a colour change (1) • due to {formation of zinc oxide / zinc oxidising} (1)	 allow less {gas / oxygen / volume / air} (in syringe) ignore movement of plungers correct or otherwise ignore **zinc reacts with oxygen** allow any colour change even if incorrect ignore the gas changes colour allow zinc corrodes ignore zinc rusts ignore **zinc reacts with oxygen**	**AO2 2 (2)**

Question number	Answer	Additional guidance	Mark
5(c)(ii)	zinc oxide	allow ZnO, ZNO, oZn ignore Zn_2O	**AO2 2 (1)**

Question number	Answer	Additional guidance	Mark
5(d)(i)	outer (electron) shell {is full / has 8 electrons}	allow orbital / energy level for shell allow (all) shell**s** are {full / complete} allow it does not need to {gain / lose / share} electrons ignore it is inert / noble gas ignore the electronic configuration	**AO3 1 (1)**

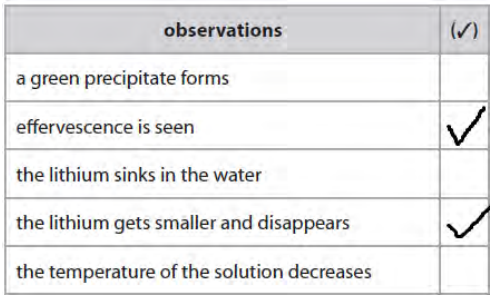
Question number	Answer	Additional guidance	Mark
5(d)(ii)	37.2 / 37 with or without working scores 2 $\frac{0.93}{100} \times 4000 = 37.2$ (2)	37.2 to any power of 10 scores 1 e.g. 3720, 37200 $\frac{0.93}{100} = 0.0093$ (1) [x 4000 (1) = 37.2] 0.93 x 4000 = 3720 (1) [/100 (1) = 37.2] $\frac{4000}{100} = 40$ (1) [x 0.93 (1) = 37.2] allow ecf from any of these alternatives allow **correct** rounding at any point	**AO2 1 (2)**

Total for Question 5 = 9 marks

Question number	Answer	Additional guidance	Mark
6(a)(i)	(group) 1 / one	ignore alkali metals	**AO1 1 (1)**

Question number	Answer	Mark
6(a)(ii)	**D** malleable is the only correct answer **A, B** and **C** are incorrect because they are not properties of alkali metals	**AO1 1 (1)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	from green to {purple / blue}	reject colours in reverse order allow named shades e.g. light green, dark blue reject any other colours given	**AO2 2 (1)**

Question number	Answer	Additional guidance	Mark
6(b)(ii)		if 1-2 ticks: 1 mark per correct tick if 3 ticks: 1 mark only if **both** correct ticks included if 4-5 ticks: 0 marks	AO1 2 (2)

Question number	Answer	Mark
6(b)(iii)	**C** hydrogen is the only correct answer **A**, **B** and **D** are incorrect because hydrogen is formed when sodium reacts with water	AO1 1 (1)

Question number	Answer	Additional guidance	Mark
6(b)(iv)	A description to include: • loses **electron**(s) (1) • **{one / an}** (electron) (1)	reject shares electron(s) for MP1 and MP2 ignore mention of any bonding type allow {transfers / donates / gives away} electron(s)	**AO1 1 (2)**

Question number	Answer	Additional guidance	Mark
6(b)(v)	4.166666…**correctly rounded** with or without working scores 3 7 + 16 + 1 = 24 (1) $\frac{1}{24}$ (= 0.0416666666) (1) 0.0417 x 100 = 4.2 (1)	4.1ḃ scores 3 marks with or without working 24 seen scores 1 allow ECF from Mr calculated by adding at least two Ar with working allow ECF to MP3 using $\frac{1}{Mr}$ x 100 or $\frac{2}{Mr}$ x 100 only	**AO2 1 (3)**

Total for Question 6 = 11 marks

Question number	Answer	Additional guidance	Mark
7(a)(i)	R Q S U T P	allow 1 mark for P in correct position	AO1 2 (2)

Question number	Answer	Additional guidance	Mark
7(a)(ii)	(electronic) balance	allow scale**s** allow weighing scale ignore scale alone	AO1 2 (1)

Question number	Answer	Additional guidance	Mark
7(a)(iii)	0.028		AO2 1 (1)

Question number	Answer	Additional guidance	Mark
7(b)	ethanol / ethanoic acid (1) propanol / propanoic acid butanol (1) / butanoic acid		AO3 2 (2)

Question number	Indicative content	Mark
*7(c)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. AO1 (3 marks) AO3 (3 marks) **ATOMS** similarities • both contain carbon atom, hydrogen atoms and oxygen atoms • both have an oxygen joined to a hydrogen • both contain one carbon differences • J contains two hydrogens, K contains four • J contains two oxygens, K contains one **STRUCTURE AND BONDING** similarities • both have 5 bonds • both have covalent bonds differences • J contains a (carbon-oxygen) double bond and K has all single bonds • Functional group for K is OH • K is methanol • Functional group for J is COOH • J is methanoic acid **PROPERTIES** similarities • both have low melting points differences • solution of K has a neutral pH • solution of J is acidic • J shows acidic properties	**AO1 2 AO3 3a (6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) • Presents a description which is not logically ordered and with significant gaps. (AO1) • Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3)
Level 2	3–4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1) • Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3)
Level 3	5–6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) • Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1) • Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3)

Level	Mark	Descriptor	Additional Guidance
	0	No rewardable material.	Read whole answer and ignore all incorrect material/ discard any contradictory material then:
Level 1	1–2	Additional Guidance Fully describes one aspect in terms of similarities and/or differences or States two similarities and/or differences	Possible candidate response • **K** is neutral (1) • **K** has all single bonds, whereas J has a double bond (1) • Both contain carbon, hydrogen and oxygen atoms (1) • **K** has 3 more hydrogens and one more oxygen than **J** (2) • Both contain one carbon (2) • **J** acid is acidic whereas **K** is neutral (2) • Both contain carbon, hydrogen and oxygen atoms joined by covalent bonds (2)
Level 2	3–4	Additional Guidance Fully describes two aspects in terms of similarities and/or differences. OR Fully describes one aspect in terms and partially describes two of similarities and/or differences OR Fully describes one aspect in terms of similarities AND differences.	Possible candidate response • **J** acid is acidic whereas **K** is neutral and **J** is has a double bond whereas **K** has only single bonds (3) • Both contain carbon, hydrogen and oxygen atoms joined by covalent bonds, they both have low melting points (3) • **K** is neutral and has a all single bonds covalent bonds, whereas **J** acid is acidic and a double covalent bond (4) • Both contain carbon, hydrogen and oxygen atoms joined by covalent bonds but **K** is called methanol, whereas **J** is called methanoic acid (4)
Level 3	5–6	Additional Guidance Fully describes from all three aspects including similarities AND differences	Possible candidate response • **K** has 3 more hydrogens than **J**. **K** is called methanol, is neutral and only has single bonds, whereas **J** is called methanoic acid, is acidic and has a double bond. **K** has the functional group OH whereas **J** has the functional group COOH (5) • Both contain carbon, hydrogen and oxygen atoms joined by covalent bonds but **K** has 3 more hydrogens than **J**. **K** is called methanol, is neutral and only has single bonds, whereas **J** is called methanoic acid is acidic (6)

Total for Question 7 = 12 marks

Question number	Answer	Additional Guidance	Mark
8(a)	measuring cylinder	allow (graduated) pipette / burette reject dropping pipette	**AO3 3b (1)**

Question number	Answer	Additional Guidance	Mark
8(b)(i)	any **one** from • (same) volume • (same) (conical) flask • (same) cross	allow (same) amount of solution allow (same) surface area of liquid allow (same) person observing / distance of observer ignore amount of {stirring / mixing} ignore room temperature / same conditions ignore beakers ignore same solutions reject same time	**AO3 3a (1)**

Question number	Answer	Additional guidance	Mark
8(b)(ii)	an explanation linking any three from • time taken decreases (1) • (because) particles have more energy (1) • more <u>frequent</u> collisions (1) • more particles have the activation energy / more successful collisions (1)	 allow idea of time less than 10 s allow cross appears quicker allow rate increases / it would be fast**er** allow particles move more/fast**er**	**AO2 1 (3)**

Question number	Answer	Additional guidance	Mark
8(c)	0.67 with or without working scores 2 25 cm^3 = $\frac{25}{1000}$ = 0.025 dm^3 (1) 0.025 x 26.8 = 0.67 (1) or 26.8 x 25 = 670 (1) $\frac{670}{1000}$ = 0.67 (1) or 1000/25 = 40 (1) 26.8 / 40 = 0.67 (1)	0.67 to any other power of 10 scores 1 e.g. 6.7 allow with working (26.8 / 0.025 =) 1072 (1) (0.025/26.8 =) 0.0009328… correctly rounded (1)	**AO2 1 (2)**

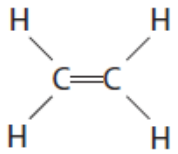
Question number	Answer	Additional guidance	Mark
8(d)	an explanation linking • increases (rate) (1) • (because) lowers activation energy (1)	 allow speeds up (rate) / faster reaction / takes less time (1) allow alternative {pathway / route} (1) allow more {frequent/successful} collisions (1) ignore catalyst doesn't get used up reject particles speed up / have more energy for MP2	**AO1 1 (2)**

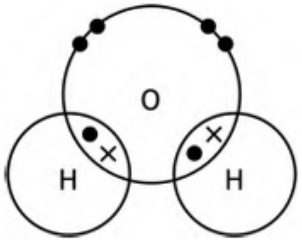
Question number	Answer	Additional guidance	Mark
8(e)(i)	stays the same	if no answer on answer line, allow stays the same circled or underlined in box	**AO1 1 (1)**

Question number	Answer	Additional guidance	Mark
8(e)(ii)	**2**H_2O_2 (aq) $\rightarrow$ 2H_2O (**l**) + O_2 (g) 1 mark for 2 with no other numbers added 1 mark for l	 allow L reject liquid	**AO2 1 (2)**

Total for Question 8 = 12 marks

Question number	Answer	Additional guidance	Mark
9(a)(i)	alkane(s)	ignore saturated hydrocarbons reject alkenes reject unsaturated hydrocarbons	AO1 1 (1)

Question number	Answer	Mark
9(a)(ii)	**B**  is the only correct answer **A**, **C** and **D** are not correct because they are not hydrocarbons	AO2 1 (1)

Question number	Answer	Additional guidance	Mark
9(b)	 a shared pair of electrons (1) rest of molecule correct including correct atomic symbols, if given (1)	allow all dots / all crosses allow unlabelled atoms ignore inner electrons even if incorrect if no circles present, atomic symbols must be present ignore double / triple bonds MP2 depends on MP1	AO1 1 (2)

Question number	Answer	Additional guidance	Mark
9(c)	CH_4 **without** working (0) carbon $\frac{0.96}{12}$ (= 0.08) **and** hydrogen $\frac{0.32}{1}$ (= 0.32) (1) simplest whole number ratio 1 : 4 (1) empirical formula CH_4 (1)	marks awarded for working using the masses from the question MP2 for MP1 converted to simplest whole number ratio MP3 for whole number ratio from MP2 correctly converted to formula allow C_1H_4 / CH4 (3 with working) allow C_4H / C_4H_1 (2 with working, scores MP2 and 3 only)	**AO2 1 (3)**

Question number	Indicative content	Mark
***9(d)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. AO1 (6 marks) PROPERTY DIFFERENCES • boiling point of kerosene is low**er** (than fuel oil) • viscosity of kerosene is low**er** (than fuel oil) • ease of ignition of kerosene is greater (than fuel oil) • kerosene is **more** volatile / **more** flammable • kerosene is light**er** in colour (than fuel oil) • kerosene burns with clean**er** flame (than fuel oil) USES • kerosene used as jet fuel / in lamps / cooking etc. • fuel oil used as fuel for ships / power stations etc. CRACKING • process is known as cracking • using high temperature • and catalyst (of aluminium oxide / ceramic) • fewer carbon and hydrogen atoms in a molecule of kerosene • long chain hydrocarbons (fuel oil) broken into shorter chains (kerosene) • cracking also produces alkenes	**AO1 1 (6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) • Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3–4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5–6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) • Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Descriptor	Additional Guidance
	0	No rewardable material.	Read whole answer and ignore all incorrect material/ discard any contradictory material then:
Level 1	1–2	Additional Guidance Full description of **one** aspect OR Description of two aspects	Possible candidate response • Fuel oil is more viscous than kerosene (1) • Fuel oil has a high**er** boiling point and viscosity (2) • Fuel oil is a used in ships and kerosene is used in planes (2) • Fuel oil is heated with a catalyst to form kerosene (2) • Kerosene has low bpt **and** fuel oil high bpt (1) • Kerosene is used as jet fuel and is easier to ignite than fuel oil (2) • Kerosene **and** fuel oil are fuels (1) • Kerosene is a fuel (0)
Level 2	3–4	Additional Guidance Full description of **two** aspects OR Full description of one aspect AND description of other two aspects	Possible candidate response • Fuel oil is cracked by passing it over a catalyst to form kerosene. Kerosene is then used as jet fuel (3) • Fuel oil is a fuel in ships and kerosene in aeroplanes. Fuel oil is harder to ignite and is more viscous (4) • Kerosene is used in planes and fuel oil is used in ships. Fuel oil has a higher boiling point than kerosene, and can be cracked (4)
Level 3	5–6	Additional Guidance Full description of **three** aspects	Possible candidate response • Fuel oil is a fuel in ships and kerosene in aeroplanes. Fuel oil is harder to ignite and is more viscous. Fuel oil can be converted to kerosene using cracking (5) • Fuel oil is a fuel in ships and kerosene in aeroplanes. Fuel oil is harder to ignite and is more viscous. Fuel oil can be converted to kerosene using cracking with a catalyst (6)

Total for Question 9 = 13 marks

Question number	Answer	Mark
10(a)(i)	**C** 42 is the only correct answer **A**, **B** and **D** are not correct because they are not 42	AO2 1 (1)

Question number	Answer	Additional guidance	Mark
10(a)(ii)	a description including: • the <u>double</u> bond breaks (1) • (monomers) {link / bond / join / attach} (to form long chain) (1)	allow <u>double</u> bond 'opens up' ignore monomers combine / react ignore addition / condensation polymerisation reject joins by ionic bonds for MP2	AO1 1 (2)

Question number	Answer	Additional guidance	Mark
10(b)	an explanation linking: • (advantage) low relative mass (1) • (so) less energy to <u>transport</u> (1) **or** • (advantage) it does not tear (1) • (so) (crisps) won't go stale / won't be exposed to {water/air/oxygen} / prevents oxidation of crisps (1)	 allow cheaper to <u>transport</u> allow remain sealed allow (crisps) won't fall out ignore crips won't be damaged ignore anything about recycling	**AO3 2 (2)**

Question number	Answer	Additional guidance	Mark
10(c)(i)	an explanation linking • less material used (1) • (so) resources conserved (1)	 allow lower mass / lightweight ignore thinner allow costs less ignore recycling	**AO3 2 (2)**

Question number	Answer	Additional guidance	Mark
10(c)(ii)	ratio 3 x 75 (=225) **and** 2 x 18 (=36) (1) $\frac{105}{225}$ x 36 = 16.8 (1)	16.8 / 17 with or without working scores 2. allow 225 and 36 seen (1) $\frac{105}{75}$ (= 1.4) moles amino acid and $\frac{2}{3}$ x 1.4 = 0.933 moles H_2O (1) so mass of water = 0.933… x 18 = 16.8 (1) allow with working 0.467 / 8.4 / 8.57 / 25.2 / 37.80 / 50.4 / 3780 (1)	**AO2 1 (2)**

Question number	Answer	Additional guidance	Mark
10(d)(i)	carboxyl / carboxylic acid		**AO2 1 (1)**

Question number	Answer	Additional guidance	Mark
10(d)(ii)	hydroxyl / alcohol		**AO2 1 (1)**

Total for Question 10 = 11 marks

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