Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
Chemistry (1CH0 2F) 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.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		**Command Word**	
Strand	**Element**	**Describe**	**Explain**
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

Question Number	Answer	Mark
1(a)	R P S Q T R P S as first 3 (1) Q T as last 2 (1)	(2) AO 3 2a AO 3 2b

Question Number	Answer	Mark
1(b)	**A** always higher **The only correct answer is A** ***B*** *is not correct because temperature rise* ***C*** *is not correct because temperature always rises* ***D*** *is not correct because temperature rises*	(1) AO 2 2

Question Number	Answer	Additional guidance	Mark
1(c)	use a **measuring cylinder**	allow pipette/ burette ignore syringe , measuring jug/tube etc.	(1) AO 3 3a

Question Number	Answer	Additional guidance	Mark
1(d)(i)	An explanation including • the solid {dissolves/ reacts with the water} (1) • {takes in /absorbs} heat / is endothermic (1)	Ignore just 'a (chemical) reaction occurs' etc allow energy for heat ignore reference to temperature change	(2) AO 2 1

Question Number	Answer	Additional guidance	Mark
1(d)(ii)	(reaction) irreversible	allow **reaction** can only occur once allow reactants are used up / reaction is complete /the reaction has happened allow bag can only burst once/ cannot get water back into bag	**(1)** AO 3 1a

(Total for Question 1 = 7 marks)

Question Number	Answer	Mark
2(a)	**B** sodium **The only correct answer is B** ***A*** *is not correct because lithium gives red flame* ***C*** *is not correct because potassium gives lilac flame* ***D*** *is not correct because calcium gives red-orange flame*	**(1)** AO 1 1

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	carbon dioxide	Allow CO_2 Reject carbon monoxide/ CO	**(1)** AO 1 1

Question Number	Answer	Mark
2(b)(ii)	carbonate / CO_3^{2-}	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
2(c)(i)	• point plotted correctly (1) • line of best fit (1)	Point must be on correct line (35 mg dm^{-3}), +/- half a square, i.e. between 6.8-7.2 inclusive Line of best fit must be one **single ruler-drawn** line that goes through 3 printed points (allow within +/- half a square of every point). Ignore any extrapolation below first printed point or above last printed point	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	value taken from candidate's graph	Examiner to read value from candidates' line of best fit (whether correct line or not) and allow +/- 1 mg dm^{-3} If no best fit line at all, or if best fit line does not reach 9, then no marks scored.	**(1)** AO 2 1

(Total for Question 2 = 6 marks)

Question Number	Answer	Mark
3(a)	(gas) syringe	**(1)** AO 1 2

Question Number	Answer	Additional guidance	Mark
3(b)	(splint) (re)lights	allow alternatives indicating that splint burns e.g. flame allow glows more brightly reject squeaky pop	**(1)** AO 1 1

Question Number	Answer	Mark
3(c)(i)	**B** water and oxygen are the only products of the reaction **The only correct answer is B** ***A*** *is not correct because rate increases* ***C*** *is not correct because catalysts do not get used up* ***D*** *is not correct because amount of product is unaltered by catalyst*	**(1)** AO 1 1

Question Number	Answer	Mark
3(c)(ii)	**A** dry the filter paper and catalyst before finding their mass **The only correct answer is A** ***B*** *this does not remove the water* ***C*** *dry residue is needed, not filtrate* ***D*** *water would still be present*	**(1)** AO 3 3a

Question Number	Answer	Additional guidance	Mark
3(c)(iii)	powder / cut up / break up / use smaller pieces	ignore reference to surface area/ squash / flatten	**(1)** AO 1 2

Question Number	Answer	Additional guidance	Mark
3(d)	• slower • slower • unchanged all 3 rows correct – 2 marks one or two rows correct – 1 mark	may indicate correct answer in any way e.g. by underlining do not credit a row if more than one answer is indicated in a row	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
3(e)	**2**H_2O_2(aq) → 2H_2O(**l**) + O_2 (**g**) (2) OR **2**H_2O_2 (1) state symbols l, g (1)	 do not allow first marking point if equation unbalanced allow capital or small letters for state symbols do not allow words for state symbols	**(2)** AO 1 1 AO 2 1

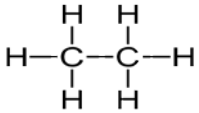
(Total for Question 3 = 9 marks)

Question Number	Answer	Mark
4(a)(i)	**C** 50 nm **The only correct answer is C** ***A*** *is not correct because this is too small* ***B*** *is not correct because this is too small* ***D*** *is not correct because this is too large*	**(1)** AO 1 1

Question Number	Answer	Mark
4(a)(ii)	**D** prevent harmful UV radiation reaching the skin **The only correct answer is D** ***A*** *is not correct because ratio is high* ***B*** *is not correct because this is not useful* ***C*** *is not correct because this is not useful*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
4(a)(iii)	allow 2 for correct answer with or without working 51200 (1) 38400 1 : 1.33 (1)	allow 2 marks for 3:4 allow 1.3, 1.333… Allow 1 mark for final answer 1.00: 0.75 or 4:3 Ignore 'rec' or dots	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
4(b)(i)	An explanation that includes • A is {an alkene/ unsaturated/ has C=C/ has double bond} (1) • B is {an alkene/ unsaturated/ has C=C/ has double bond} (1) • C {is alkane/ is saturated/ no C=C/ has no double bond/ has **only** single bonds} (1)	Do not accept alkines for alkenes	**(3)** AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	 Fully correct with all capital letters (2)	Allow 1 if fully correct but any small letters allow 1 for any molecule containing 2 carbon atoms and one single C-C bond Reject ethene (=0) Allow Dot-and-cross diagrams	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	contains carbon and hydrogen (atoms) (1) only (1) MP2 dependent on MP1	Allow 1: contains carbon and hydrogen molecules **only** Allow 1**:** Element containing carbon and hydrogen **only**	**(2)** AO 1 1

(Total for Question 4 = 11 marks)

Question Number	Answer	Mark
5(a)	**A** crude oil is a finite resource **The only correct answer is A** ***B*** *is not correct because crude oil is a mixture of compounds* ***C*** *is not correct because most molecules are chains* ***D*** *is not correct because crude oil must be fractionated first*	**(1)** AO 1 1

Question Number	Answer	Mark
5(b)	**C** are in the same homologous series **The only correct answer is C** ***A*** *is not correct because they have different formulae* ***B*** *is not correct because they have different bpts* ***D*** *is not correct because they all form carbon dioxide and water*	**(1)** AO 2 1

Question Number	Answer	Mark
5(c)(i)	• heated (1) • condensed (1)	(**2**) AO 1 1

Question Number	Answer	Additional guidance	Mark
5(c)(ii)	has more carbon atoms per molecule	allow any way of indicating answer e.g. circling reject any answer with two or more underlinings	**(1)** AO 1 1

Question Number	Answer	Mark
5(d)	fuel oil	**(1)** AO 3 2b

Question Number	Answer	Additional guidance	Mark
5(e)	380 000 with or without working scores 3 382 500 with or without working scores 2 OR $\frac{45}{100}$ (1) = (0.45) (0.45) x 850 000 (1) = (382 500) = 380 000 (1) OR $\frac{850\,000}{100}$ (1) (= 8500) (8500) x 45 (1) (= 382 500) 380 000 (1) OR 4x10% = 340 000 **and** 1x5% = 42 500 (1) 340 000 + 42 500 (= 382 500) (1) 380 000 (1)	allow ECF throughout (answers based on 55%) 470 000 scores 2 467 500 scores 1 allow alternative chunking methods that add to 45% The clear rounding of any worked out final answer (using data provided) to 2 sig figs scores 1	**(3)** AO 2 1

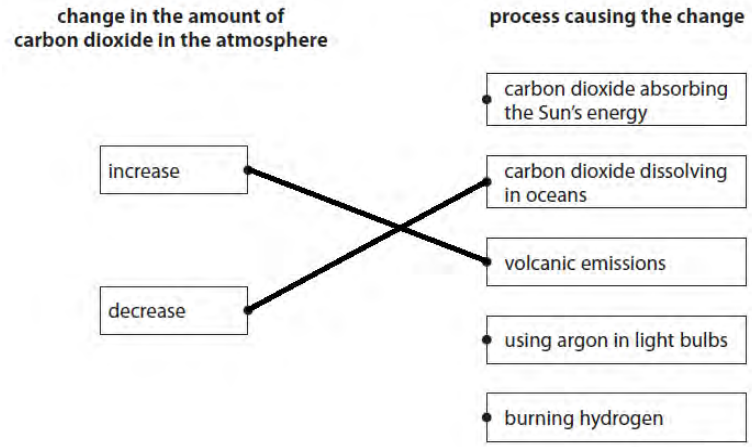
(Total for Question 5 = 9 marks)

Question Number	Answer	Additional guidance	Mark
6(a)	SO_2	allow O_2S reject SO2, SO^2	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
6(b)(i)	hydrogen + oxygen → **water**	allow $2H_2 + O_2 \rightarrow 2H_2O$: this must be fully correct and balanced with correct subscripts reject 'hydrogen and oxygen', hydrogen oxide, hydrogen hydroxide if word and symbol equation given or mixture of symbols and words, ignore all symbols allow = for →	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	B **and** D	For B allow SO_2 For D allow CO_2 reject answers containing any other letters/ names	**(1)** AO 3 2a

Question Number	Answer	Additional guidance	Mark
6(c)	An explanation including • plants (grow/ evolve etc.) (1) • **photosynthesis** occurs (1)	allow trees or any other reference to plants reject respiration/breathing for MP2 ignore all other information	**(2)** AO 1 1

Question Number	Answer	Mark
6(d)	 reject multiple lines from a box	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
6(e)(i)	suitable description of variation (within a year) (1)	allow increases and decreases / goes up and down [or vice-versa] allow fluctuates reject a pattern described for a timescale other than a year e.g. goes up one year and down the next	**(1)** AO 3 2a

Question Number	Answer	Additional guidance	Mark
6(e)(ii)	increases (over time) (1)	ignore from (number) to (number) allow positive correlation, trend etc.	**(1)** AO 3 2a

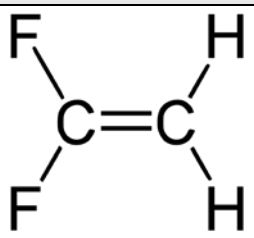
Question Number	Answer	Additional guidance	Mark
6(e)(iii)	15 with no working or correct working scores 2 figures read from graph 364-366 and 349-351 (1) subtraction of numbers from above (1)	negative answer does not score 2nd mark	**(2)** AO 2 1

(Total for Question 6 = 11 marks)

Question Number	Answer	Mark
7(a)(i)	**D** the metal conducts electricity **The only correct answer is D** ***A*** *is not correct because metals are not hard* ***B*** *is not correct because this is not useful* ***C*** *is not correct because this is not relevant*	**(1)** AO 2 1

Question Number	Answer	Mark
7(a)(ii)	**C** the polymer **The only correct answer is C** ***A*** *is not correct because this in not flexible* ***B*** *is not correct because this is not flexible* ***D*** *is not correct because this is a conductor*	**(1)** AO 3 1a

Question Number	Answer	Additional guidance	Mark
7(b)	Correct property • no reaction with water/unreactive/ high melting point / low flexibility (1) Linked to correct reason • drinks contain water/will not react with drink/ ceramic will not melt / cup will not distort / cup will keep shape (1)	No property given = no marks If more than one property given Ignore any incorrect propeties and associated reasons	**(2)** AO 3 1a AO 3 1b

Question Number	Answer	Mark
7(c)(i)	 (2) 1 mark for each correct bond -1 for each <u>additional</u> bond	**(2)** AO 2 1

Question Number	Indicative content	Mark
*7(c)(ii)	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. **Aspect 1: MANUFACTURE** • crude oil is a raw material • crude oil is finite • cracking requires a lot of energy • generation of energy for fractional distillation and cracking may cause release of carbon dioxide • carbon dioxide is a greenhouse gas and may lead to global warming **Aspect 2: DISPOSAL** • some polymers disposed of in landfill sites • non-biodegradable • persists in landfill • landfill space runs out • some plastic ends up as litter/ in oceans • this may be hazardous to wildlife • some polymers are recycled • polymers must be sorted into different types • public must make effort to sort/ recycle • some polymers are burnt • produces carbon dioxide • carbon dioxide is a greenhouse gas • greenhouse gases may cause global warming • toxic gases may be produced Ignore all irrelevant material Ignore general statements such as 'disposal of polymers is harmful to the environment' If carbon dioxide/ greenhouse effect etc. mentioned in both aspects, only credit once	**(6)** AO 1 1

Level	Descriptor
	No rewardable material.
Level 1	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents an explanation with some structure and coherence.

Level 2	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

(Total for Question 7 = 12 marks)

Question Number	Answer	Additional guidance	Mark
8(a)(i)	35	reject 35.5	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	2.8.7	allow any separator including gaps e.g. 2 8 7 send to review any diagrams	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(b)	A description to include • (blue litmus) (first turns) red (1) • (then) bleaches / turns white (1)	 allow shades of red and pink but not other colours e.g. red-purple allow colour disappears/goes colourless ignore yellow/ colour fades /discolours white then red = 0; just 'goes white' = 1	**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
8(c)(i)	A description to include • shared **electron**(s) (1) • {a pair of / two} (**electrons**) (1)	 allow a diagram for both mark points reference to ionic bonding/ions scores 0 e.g. gains two electrons = 0	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	An explanation linking any two from • intermolecular forces / forces **between** molecules (1) • (intermolecular) forces {weak / take little energy to break}/ little energy to separate molecules (1) • boiling point is below room temperature / has a low boiling point (1)	if answer relates to the breaking of any type of **bond** first two marking points cannot be scored (but 3rd could) allow "attractions" instead of "forces"	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(d)	(the solution is) acid(ic) / contains {hydrogen ions/ H^+}	allow pH < 7 allow hydrogen chloride is acidic If incorrect identity of acidic solution then 0 marks (e.g. chlorine is acidic = 0)	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
8(e)(i)	any value from 20 to 301	allow a range within these numbers e.g. 25 to 45 answer may be given in the table. if values are given on the answer line and the table mark only the answer on the answer line	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(e)(ii)	fluorine/ chlorine	reject iodine / astatine allow $F/F_2/Cl/Cl_2$	**(1)** AO 2 1

(Total for Question 8 = 11 marks)

Question Number	Answer	Additional guidance	Mark
9(a)	Na : O $\frac{0.92}{23}$: $\frac{0.32}{16}$ (1) 0.04 : 0.02 OR 2 : 1 (1) (empirical formula from ratio) Na_2O (1)	formula alone scores 0 2nd MP is either for working out correct number of moles OR for finding the correct ratio by dividing by the smaller number from an incorrect first step 3rd MP is for correctly converting a ratio to a formula with whole numbers only example $\frac{23}{0.92}$: $\frac{16}{0.32}$ 25 : 50 (0) 1 : 2 (1) NaO_2 (1)	**(3)** AO 2 1

Question Number	Answer	Additional guidance	Mark
9(b)	$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$ 2Na (1) 2NaOH (1) s, l, aq, g (1)	allow S, L, AQ, G ignore words	**(3)** AO 2 1

Question Number	Answer	Mark
9(c) (i)	**C** is the most reactive **The only correct answer is C** ***A*** *is not correct because this is irrelevant* ***B*** *is not correct because this is irrelevant* ***D*** *is not correct because this is irrelevant*	**(1)** AO 2 1

Question Number	Indicative content	Mark
*9(c)(ii)	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. **Aspect one: METHOD** • trough/large container of water • equal volumes of water for each experiment • remove metal from container with tongs • remove oil • cut small piece • add metal with tongs/tweezers etc. to water • teacher wears safety glasses • gloves • use of safety screen • class well back • class wear goggles ignore general safety ideas – hair tied back, lab coat etc. ignore equal sized pieces of metal **Aspect 2: ANALYSIS** • most vigorous effervescence of hydrogen with potassium and least with lithium • fastest movement with potassium and slowest with lithium • potassium is most reactive, then sodium, then lithium ignore copying of results from table e.g potassium bubbles very fast ignore writing up of results/ put in table etc	**(6)** AO 2 2 AO 3 1a AO 3 1b

Level	Descriptor
	No rewardable material.
Level 1	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents an explanation with some structure and coherence.
Level 2	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

(Total for Question 9 = 13 marks)

Question Number	Answer	Additional guidance	Mark
10(a)(i)	{heat/energy} is lost/escapes	Allow anywhere heat is transferred e.g. can absorb heat, heat lost to air etc.	**(1)** AO 3 2b

Question Number	Answer	Additional guidance	Mark
10(a)(ii)	An explanation including: • add a lid/ use of draught shield (1) • so more {heat/energy} goes to water/ less {heat/energy} escapes (1) MP2 dependent on MP1	Ignore altering distance between flame and can Allow any <u>suitable</u> insulating material Ignore burning more fuel/ less water	**(2)** AO 3 3b

Question Number	Answer	Additional guidance	Mark
10(a)(iii)	Final answer of 7308 with or without working scores 2 210 x 34.8 (1) = 7308 (1)	Allow 1 for 210 x (any temp change) **correctly evaluated with working** e.g. 210 x 82.4 = 17304 (1) Allow 7300, 7310; Do not allow 7000 Ignore any units	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
10(b)	Any three of the following • all have –OH group/ hydroxyl group / same functional group (1) • same **general formula**/ $C_nH_{2n+1}OH$ (1) • formulae differ by CH_2 units (1) • react similarly with oxygen/all burn to form carbon dioxide and water (1) • trend in physical properties	Ignore 'all alcohols' Do not allow 'hydroxide' Allow similar chemical reactions/ chemical properties/ a specified reaction Allow any sensible physical property e.g. increase in boiling point Ignore reference to containing C,H,O or single bonds or no double bonds	**(3)** AO 2 1

Question Number	Answer	Additional guidance	Mark
10(c)(i)	propanol + oxygen → propanoic acid + water (2) allow $CH_3CH_2CH_2OH + O_2 \rightarrow CH_3CH_2COOH + H_2O$ (2)	Allow 1 mark for any three correctly named substances Air is not acceptable for oxygen If a mixture of words and symbols, ignore all of the symbols If 5 substances in equation, remove 1 mark If 6 or more substances in equation, score 0	**(2)** AO 2 1

Question Number	Answer	Mark
10(c)(ii)	**C** -COOH **The only correct answer is C** ***A*** *is not correct because this is functional group of alcohols* ***B*** *is not correct because this is a methyl group* ***D*** *is not correct because this is not a functional group*	**(1)** AO 1 1

(Total for Question 10 = 11 marks)

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