

Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE in Chemistry
(5CH1F) Paper 01
Unit C1: Chemistry in Our World

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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.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- 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.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate 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.

Question Number	Answer	Acceptable answers	Mark
1 (a) (i)	bar drawn on the graph for nitrogen, to $78 \pm \frac{1}{2}$ small square	Ignore width of line	(1)

Question Number	Answer	Acceptable answers	Mark
1 (a) (ii)	C 21		(1)

Question Number	Answer	Acceptable answers	Mark
1 (b)	An explanation linking (growth of primitive) plants (1) photosynthesis/ (plants take in carbon dioxide and) release/let out/produce oxygen (1)	Allow trees Reject people planting Reject respiration/breathing	(2)

Question Number	Answer	Acceptable answers	Mark
1 (c) (i)	A description linking carbon (atom) (1) and oxygen (atoms) (1)	Ignore numbers of atoms/ symbols molecules = 1 mark max	(2)

Question Number	Answer	Acceptable answers	Mark
1 (c) (ii)	<p>Both answers must come from the same pair.</p> <p>An explanation linking any one of the following pairs</p> <p>burning/combustion (1)</p> <p>(fossil) fuels (1)</p> <p>OR</p> <p>deforestation/cutting down trees (1) reduces { the amount of carbon dioxide taken in/photosynthesis} (1)</p> <p>OR</p> <p>farming /increased {human/animal} population (1)</p> <p>breathing / respiration /exhaling carbon dioxide /decaying/decomposing (1)</p> <p>OR</p> <p>waste/dead organisms (1) decaying/rotting (in landfill) (1)</p> <p>OR</p> <p>limestone (1) decomposed/heated (in lime kiln) (1)</p> <p>OR</p> <p>volcano/volcanic (1) eruption(s) / activity / emits gas (1)</p>	<p>Ignore additional correct answers</p> <p>Maximum 1 mark if additional incorrect answers</p> <p>needs reference to burning Ignore driving/cars/pollution</p> <p>Allow named fossil fuel/any fuel that contains carbon</p> <p>Ignore other human activities</p>	(2)

Question Number	Answer	Acceptable answers	Mark
2(a)	B sodium hydroxide		(1)

Question Number	Answer	Acceptable answers	Mark
2(b)	hydrochloric acid LHS (1) carbon dioxide RHS (1)	Allow correct formulae HCl (1) CO ₂ (1) Reject hydrolic acid, HCL, hCl, carbon oxide, CO2, co2, Co2 and CO ²	(2)

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	glowing splint (1) MP1 relights (1) MP2 MP2 dependent on MP1	Ignore burned out/blown out splint lighted splint burns brighter (2)	(2)

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	A description linking <ul style="list-style-type: none"> • (volumes of oxygen and/or hydrogen) increase/bigger/goes up (1) • volume of hydrogen (evolved) is always greater than the volume of oxygen (1) <p>OR</p> A correct quantitative description/relationship linking volumes or time and volume <ul style="list-style-type: none"> • volume of hydrogen (evolved) is always double that of oxygen/ volume of oxygen is half that of hydrogen (2) 	just quoting numbers does not show a relationship	(2)

	<ul style="list-style-type: none"> • as time increases the volume (of gas/oxygen /hydrogen) evolved increases OWTTE (2) • as the time doubles the volume(s) (of gas/both gases/oxygen / hydrogen) doubles (2) • volume (of gas evolved) is (directly) proportional to time (2) 		
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Question Number	Answer	Acceptable answers	Mark
2(d)	chlorine (1)	Allow Cl ₂ Reject chloride, Cl, cl, cL	(1)

Question Number	Answer	Acceptable answers	Mark
3(a)	B C ₂ H ₆		(1)

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	fractional distillation (2)	Allow recognisable spellings distillation /fractionation (1)	(2)

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	B cars aircraft		(1)

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	propane + oxygen (1) {→ / =} carbon dioxide + water (1)	Allow reactants / products in either order, e.g. oxygen + propane LHS C ₃ H ₈ + O ₂ (1) RHS {→ / =} CO ₂ + H ₂ O (1) Ignore incorrect / no balancing Reject incorrect formulae. e.g. h ² O, h ₂ O, H ₂₀ , CO ₂ , CO ² and Co ₂ If a mixture of words and formulae are used, max 1 mark	(2)

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	C ₃ H ₈ (2)	C and H only with non subscripted/ incorrect / no numbers (1) Allow H ₈ C ₃ /correct structural/ displayed formula Reject 'h' for H	(2)

Question Number	Answer	Acceptable answers	Mark
<p>3(d)</p>	<p>Both marks must come from the same pair.</p> <p>An explanation linking one of the following pairs</p> <p>EITHER carbon monoxide/CO formed (1)</p> <p>toxic/poisonous / restricts the amount of oxygen carried (by the blood)/replaces oxygen in the blood/binds to red blood cells or haemoglobin/causes death (1)</p> <p>OR</p> <p>smoke/soot formed (1)</p> <p>damages lungs/chokes people/breathing difficulties/makes things dirty (1)</p>	<p>Ignore additional correct answers</p> <p>maximum 1 for additional incorrect answers</p> <p>Ignore carbon dioxide</p> <p>Ignore dangerous/harmful Allow the second mark if an incorrect gas e.g. methane Allow second mark if "gas" stated but no name is given Allow kills Allow less energy released</p> <p>Allow carbon</p> <p>Ignore harmful/dangerous Allow blocks fuel jets Allow less energy released</p>	<p>(2)</p>

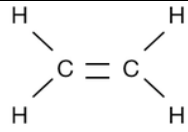
Question Number	Answer	Acceptable answers	Mark
4(a)		if more than one line drawn from/to any metal/method of extraction no marks can be scored for that metal/method of extraction	(3)

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	(zinc oxide +) carbon (→) (1) (zinc +) carbon dioxide / monoxide (1)	Allow correct symbol, C (1) Ignore carbon oxide Allow correct formula, CO ₂ /CO (1)	(2)

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	reduction		(1)

Question Number	Answer	Acceptable answers	Mark
4(c)	Any two from: <ul style="list-style-type: none"> • (good) electrical conductor (1) • ductile/drawn into a wire (1) • flexible/bendable (1) • unreactive / low reactivity/ resistant to corrosion (1) • high melting point/heat resistant (1) 	Ignore (good) thermal conductor /conductor Ignore malleable Ignore rusting	(2)

Question Number	Answer	Acceptable answers	Mark
4(d)	<p>An explanation linking any two of</p> <ul style="list-style-type: none"> • in pure gold the atoms/particles are all the same size OR in pure gold {layers/sheets/rows} (of atoms) {slide/slip/move} (over each other easily) (1) • (in the alloy there are two types/different sizes of atom/particle) so {structure/layers/sheets/rows} disrupted in alloy (1) • stops/prevents {atoms /particles /layers /sheets /rows} {sliding /slipping /moving} (over one another easily in alloy) (1) 	<p>Allow correct particle diagram(s)</p> <p>Reject molecules <i>once</i></p>	(2)

Question Number	Answer	Acceptable answers	Mark
5(a)1	 <p>(1)</p>	Ignore bond angles	(1)

Question Number	Answer	Acceptable answers	Mark
5(a)2	propene (1)	Reject propane	(1)

Question Number	Answer	Acceptable answers	Mark
5(a)3	C ₄ H ₈ (1)	H ₈ C ₄ numbers must be subscript	(1)

Question Number	Answer	Acceptable answers	Mark
5(b)	<p>A description linking (turns) from orange / red / yellow / brown (1)</p> <p>to colourless/decolourises (1)</p>	<p>Ignore extra incorrect observations</p> <p>Ignore discoloured/clear/transparent</p> <p>Allow stays orange = max 1 mark</p> <p>Reject turns orange</p>	(2)

Question Number	Answer	Acceptable answers	Mark
5(c)	B cracking		(1)

Question Number	Indicative Content	Mark
QWC	<p data-bbox="272 104 365 137">*5(d)</p> <p data-bbox="396 104 1222 169">A description / explanation including some of the following points</p> <p data-bbox="396 205 800 237">properties related to uses</p> <ul data-bbox="440 237 1256 1157" style="list-style-type: none"> <li data-bbox="440 237 1256 504">• poly(ethene) : plastic bags / plastic bottles – flexible/bendable, inert/unreactive, waterproof/weatherproof, light insulation for electrical wires – flexible, bendable, good insulator, waterproof/weather proof, inert/unreactive <li data-bbox="440 528 1256 870">• poly(chloroethene) : window frames / gutters - tough/hard, long-lasting, durable/good insulator, waterproof/weatherproof, inert/unreactive insulation for electrical wires – flexible /bendable, good insulator, waterproof/weather proof, inert/unreactive <li data-bbox="440 895 1256 1157">• poly(tetrafluoroethene): coating for pans - slippery, non-stick, tough, high melting point/heat resistant, inert/unreactive skis - slippery stain proofing fabrics and carpets – slippery containers for corrosive substances – inert/unreactive <p data-bbox="396 1165 760 1197">problems with disposal</p> <p data-bbox="553 1229 1149 1294">Ignore references to cost and/or pollution <u>landfill</u></p> <ul data-bbox="440 1298 1125 1495" style="list-style-type: none"> <li data-bbox="440 1298 1125 1362">• (in landfill) non biodegradable/do not decay/rot/decompose/break down <li data-bbox="440 1366 1125 1399">• waste persists in landfill sites OWTTE <li data-bbox="440 1403 1125 1467">• landfill sites take up space or land / new sites needed when old ones filled <li data-bbox="440 1471 1125 1495">• destroys habitats <p data-bbox="488 1532 602 1564"><u>burning</u></p> <ul data-bbox="440 1568 1097 1729" style="list-style-type: none"> <li data-bbox="440 1568 1097 1632">• (burning polymers) produces carbon dioxide/greenhouse gases <li data-bbox="440 1636 1097 1669">• produces carbon monoxide <li data-bbox="440 1673 1097 1705">• can release toxic/harmful fumes into the air <li data-bbox="440 1709 1097 1741">• produces (toxic) ash <p data-bbox="488 1745 613 1778"><u>recycling</u> (different polymers) need to be separated in order to recycle</p>	(6)

Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited description / explanation e.g. one property related to use OR one problem of disposal • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple description / explanation e.g. an account including at least one properties related to uses and at least one problems with disposal OR a detailed description of at least two different properties related to uses or at least two problems with disposal • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed description / explanation e.g. an account including at least two different properties related to uses AND at least one problem with disposal OR at least one property related to use AND at least two problems with disposal • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question Number	Answer	Acceptable answers	Mark
6(a)	(contains) fossils (1)	Allow ammonite	(1)

6(b)	D marble		(1)
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Question Number	Answer	Acceptable answers	Mark
6(c)(i)	thermal decomposition (2)	decomposition (1) Allow recognisable spellings	(2)

Question Number	Answer	Acceptable answers	Mark
6(c)(ii)	calcium oxide + water (1) {→ / =} calcium hydroxide (1)	Allow reactants in either order, e.g. water + calcium oxide LHS CaO + H ₂ O (1) RHS {→ / =} Ca(OH) ₂ (1) Ignore incorrect / no balancing If a mixture of words and formulae are used, max 1 mark	(2)

Question Number	Indicative Content	Mark
QWC	<p data-bbox="256 165 347 197">*6(d)</p> <p data-bbox="375 165 1101 197">A explanation including some of the following points</p> <p data-bbox="418 217 708 249">causes of acid rain</p> <ul data-bbox="418 274 1149 733" style="list-style-type: none"> <li data-bbox="418 274 945 306">• burning sulfur/coal (in oxygen/air) <li data-bbox="418 326 818 358">• sulfur reacts with oxygen <li data-bbox="418 379 792 411">• produces sulfur dioxide <li data-bbox="418 431 604 463">• acidic gas <li data-bbox="418 483 1149 556">• in atmosphere dissolves/mixes/absorbs/reacts in rain/clouds/water <li data-bbox="418 576 1075 677">• to form acid solution/sulfuric acid/sulfurous acid/credit name/correct formula of an acid formed <li data-bbox="418 697 886 729">• sulfur dioxide causes acid rain <p data-bbox="418 810 708 842">effects of acid rain</p> <ul data-bbox="418 866 1052 1096" style="list-style-type: none"> <li data-bbox="418 866 1052 939">• damage/erosion/(chemical) weathering of buildings/monuments <li data-bbox="418 959 967 991">• acidification of lakes /soil/lowers pH <li data-bbox="418 1012 743 1044">• kills fish/aquatic life <li data-bbox="418 1064 961 1096">• kills/damages trees/ plants/ forests <p data-bbox="418 1177 1010 1237">reduction of the effects of acid rain by limestone</p> <ul data-bbox="418 1262 1123 1560" style="list-style-type: none"> <li data-bbox="418 1262 961 1294">• calcium carbonate (from limestone) <li data-bbox="418 1314 1123 1387">• acidic gas passed through calcium carbonate in chimney <li data-bbox="418 1407 1075 1479">• (calcium carbonate) neutralises/reacts with acidic gases OWTTE <li data-bbox="418 1499 1042 1560">• acidic gases prevented from entering the atmosphere 	(6)

Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited explanation e.g. at least one valid idea, e.g. a cause, an effect or a method of reduction of acid rain • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple explanation e.g. at least two ideas from one aspect OR a mention of a least two aspects • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed explanation with ideas from all three aspects • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

