

Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE in Chemistry
(5CH3F) Paper 01
Unit C3: Chemistry in Action

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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	Notes	Marks
1 (a)	to check purity / no bacteria / does not cause illness / is safe to drink	accept to check if it contains any harmful/dangerous/ toxic substances /chemicals ignore to test quality ignore to ensure it is clean	1
(b) (i)	An explanation linking (use/mix/shake with) soap (1) hard water forms a scum / no lather (1) soft water forms a lather / no scum (1)	accept react with/add soap accept needs more soap to lather/harder to lather reject (only) forms a little scum all marks indep	3
(ii)	B magnesium ions		1
(iii)	A description including boil/heat samples (1) and EITHER one from temporary hard water would then (need less soap to) lather (after boiling than before boiling) (1) permanently hard water would need same amount of soap to lather (before and after boiling) (1) OR one from temporary hard water forms precipitate / forms limescale / goes cloudy (1) permanent hard water remains clear (1)	no reference to boil/heat then answer scores 0 answers involving evaporating score 0 allow would (still) not lather / would (still) form scum ignore scum in this part as no soap used allow (see) no change	2

1 (c)	B 1.0		1
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Question number	Answer	Notes	Marks
2 (a) (i)	A description including add sodium chloride/crystals to water or vice versa (1) and either use of suitable container: test tube / boiling tube / beaker / flask (1) or shake / stir (1)	accept dissolve ignore heat ignore any further steps eg attempts at crystallisation	2
(ii)	1/2: SP / PS (1) 3: Q (1)		2
(b) (i)	C NaOH		1
(ii)	B alkaline		1
2 (c)	sodium (1) carbonate / hydrogencarbonate (1)	accept Na_2CO_3 (2) accept correct formulae of ion Na^+ accept bicarbonate accept correct formulae of ion CO_3^{2-} / HCO_3^-	2

Question number	Answer	Notes	Marks
3 (a) (i)	ions (1)		2
	decomposed (1)		
(ii)	C a cation is positively charged		1
(b) (i)	accept in either order zinc (1) chlorine (1)	accept Zn accept Cl ₂ ignore Cl	2
(ii)	oxidation	accept oxidised allow oxidated	1
(c)	A description including (pale) blue (1) precipitate /solid (1)	reject other colours with green eg blue-green or blue/green allow ppt(e) ignore references to other observations indep marks	2

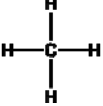
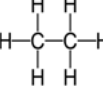
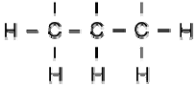
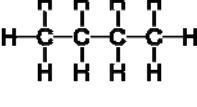
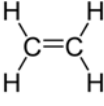
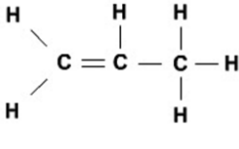
Question number	Answer	Notes	Marks
3 (d)	<p>An explanation linking street {lamps/lights} (1)</p> <p>yellow (light is produced from sodium vapour) (1)</p> <p>OR</p> <p>nuclear reactors (1)</p> <p>good conductor of heat / coolant (1)</p>	<p>ignore uses of salt /sodium ions</p> <p>allow orange</p>	2

Question number	Answer	Notes	Marks
4 (a) (i)	Haber		1
(ii)	the air/atmosphere (1) natural gas/methane/CH ₄ (1)	accept North Sea gas ignore references to electrolysis	2
(iii)	N ₂ + 3H ₂ → 2NH ₃ formulae on correct side (1) balancing of <u>correct</u> formulae (1)	accept reversible arrows reject incorrect subscripts eg N ² reject incorrect cases eg Nh	2
(iv)	corrosive (1)	allow damage to/burns (skin) ignore irritant / harmful / etc	1
(b)	A description including identifies nitrogen and hydrogen (atoms) (1) one (nitrogen atom) and three (hydrogen atoms) (1)	answers involving molecules/ions/ionic bonding scores max 1 for the question one nitrogen atom and three hydrogen atoms scores two marks allow 1 N and 3 H for 1 mark	2
4 (c)	An explanation linking (ammonium compounds used as) fertiliser (1) (promotes) plant growth/increases crop yields (1)	ignore neutralisation/reference to pesticides etc	2

Question number	Answer	Notes	Marks
5 (a)	A colourless		1
(b) (i)	neutralisation (1)	accept exothermic	1
(ii)	ethanoic acid + sodium hydroxide → sodium ethanoate + water LHS (1) RHS (1)	ignore symbols but allow correct balanced equation for 2 marks	2
(c) (i)	flavouring / (improve) taste / OWTTE (1)		1
(ii)	preservative / pickling/ prevents deterioration / kills bacteria / OWTTE (1)	ignore keep food fresh ignore prevent food losing taste	1

Question Number		Indicative Content	Mark
QWC	5(d)*	<p>A explanation to include some of the following points</p> <p>MIXING</p> <ul style="list-style-type: none"> • put ethanoic acid in suitable piece of apparatus eg beaker • add magnesium carbonate • small amount at a time • stir • using glass/plastic rod <p>ENSURING COMPLETE REACTION</p> <ul style="list-style-type: none"> • repeat adding of magnesium carbonate • until solid at bottom of beaker • until no more effervescence/fizzing/bubbles • or until no more 'dissolves'/reacts • magnesium carbonate in excess <p>FILTRATION</p> <ul style="list-style-type: none"> • filter • using filter funnel and paper • magnesium carbonate/solid residue <p>MAKING CRYSTALS</p> <ul style="list-style-type: none"> • heat/evaporate magnesium ethanoate solution • in evaporating basin • until crystals start to form • allow to cool • wash solid/crystals • dry solid/crystals with absorbent paper 	(6)
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> • a limited description of one of the stages. • 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 of at least two stages. • 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 to include aspects of at least three of the four stages. • 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	Notes	Marks
6 (a) (i)	(also) contains oxygen (atoms) / hydrocarbons only contain carbon and hydrogen (atoms)	allow O ignore reference to hydroxide	1
(ii)	<p>A description linking</p> <ul style="list-style-type: none"> dissolve (sugar in) water (1) add yeast (1) <p>and one of</p> <ul style="list-style-type: none"> leave in a warm place / warm (1) air lock / anaerobic / cotton wool plug (1) 	<p>accept carbohydrate for sugar</p> <p>accept add sugar to water/use sugar solution</p> <p>ignore heat</p> <p>allow in absence of air ignore closed container</p>	3
(iii)	C an ester (1)		1
(iv)	H ₂ O	allow OH ₂	1

Question Number	Indicative Content	Mark
QWC	<p data-bbox="285 331 378 363">6(b)*</p> <p data-bbox="394 331 526 363">ALKANES</p> <div data-bbox="394 363 812 468"> <p>methane CH_4</p>  </div> <div data-bbox="394 510 812 615"> <p>ethane C_2H_6</p>  </div> <div data-bbox="394 657 919 762"> <p>propane C_3H_8</p>  </div> <div data-bbox="394 804 854 909"> <p>butane C_4H_{10}</p>  </div> <p data-bbox="394 940 914 972">alkanes have general formula $\text{C}_n\text{H}_{2n+2}$</p> <p data-bbox="394 1003 967 1035">alkanes are saturated / single bonds only</p> <p data-bbox="394 1077 1260 1140">successive members of homologous series differ (in molecular formulae) by CH_2</p> <p data-bbox="394 1203 526 1234">ALKENES</p> <div data-bbox="394 1266 789 1371"> <p>ethene C_2H_4</p>  </div> <div data-bbox="394 1434 907 1581"> <p>propene C_3H_6</p>  </div> <p data-bbox="394 1612 1130 1644">A explanation to include some of the following points</p> <p data-bbox="394 1675 889 1707">alkenes have general formula C_nH_{2n}</p> <p data-bbox="394 1738 979 1770">alkenes are unsaturated / have $\text{C}=\text{C}$ bond</p> <p data-bbox="394 1801 984 1864">successive members of homologous series differ (in molecular formula) by CH_2</p>	(6)

Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited description e.g. names and gives formula/structure/relevant comment for at least one alkane / alkene • 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 e.g. names and gives formulae/structures for some alkanes and alkenes with relevant comments. • 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 e.g. names and gives formulae/structures for several alkanes and alkenes with relevant comments. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Total for paper = 60 marks

