edexcel

Mark Scheme (Results)

Summer 2016

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2016
Publications Code 5CH3F_01_1606_MS

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

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) decomposed (1)		2
(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

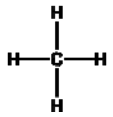
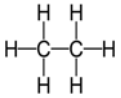
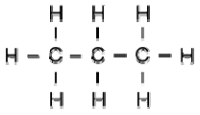
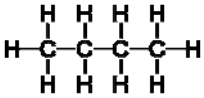
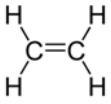
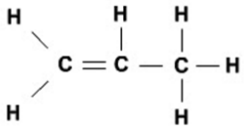
Question number	Answer	Notes	Marks
3 (d)	An explanation linking street {lamps/lights} (1) yellow (light is produced from sodium vapour) (1) **OR** nuclear reactors (1) good conductor of heat / coolant (1)	**ignore** uses of salt /sodium ions **allow** orange	2

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)	$N_2 + 3H_2 \rightarrow 2NH_3$ 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)***	A explanation to include some of the following points MIXING • put ethanoic acid in suitable piece of apparatus eg beaker • add magnesium carbonate • small amount at a time • stir • using glass/plastic rod ENSURING COMPLETE REACTION • 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 FILTRATION • filter • using filter funnel and paper • magnesium carbonate/solid residue MAKING CRYSTALS • 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**	• 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**	• 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**	• 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)	A description linking • dissolve (sugar in) water (1) • add yeast (1) and one of • leave in a warm place / warm (1) • air lock / anaerobic / cotton wool plug (1)	**accept** carbohydrate for sugar **accept** add sugar to water/use sugar solution **ignore** heat **allow** in absence of air **ignore** closed container	3
(iii)	C an ester (1)		1
(iv)	H_2O	**allow** OH_2	1

Question Number		Indicative Content	Mark
QWC	**6(b)***	ALKANES methane CH_4  ethane C_2H_6  propane C_3H_8  butane C_4H_{10}  alkanes have general formula C_nH_{2n+2} alkanes are saturated / single bonds only successive members of homologous series differ (in molecular formulae) by CH_2 ALKENES ethene C_2H_4  propene C_3H_6  A explanation to include some of the following points alkenes have general formula C_nH_{2n} alkenes are unsaturated / have C=C bond successive members of homologous series differ (in molecular formula) by CH_2	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• 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**	• 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**	• 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

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL