

# **Chemistry A**

General Certificate of Secondary Education

Unit **A323/01**: Ideas in Context plus C7 (Foundation Tier)

## **Mark Scheme for January 2013**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.










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## Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
<u>words</u>	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt

	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

### Subject-specific Marking Instructions

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

*e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:*




*This would be worth  
1 mark.*




*This would be worth  
0 marks.*






*This would be worth  
1 mark.*

- c. The list principle:  
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

## d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

## e. For answers marked by levels of response:

i. **Read through the whole answer from start to finish**

ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor

iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Marks	Guidance
1	(a)	(i)	sugar beet	1	
		(ii)	it can be made/replaced / grown indefinitely	1	<b>allow</b> will not run out OWTTE <b>reject:</b> can be used again / more than once
		(iii)	<b>any two from:</b> burning ethanol produces less carbon dioxide (than petrol) / ora (1) carbon dioxide from petrol is from plants grown long ago (1) carbon dioxide from bioethanol is removed by growing more plants (to produce more bioethanol) / this is returning to the air the carbon dioxide taken in by the plants used to make the bioethanol (1)	2	<b>allow:</b> using = burning <b>allow:</b> bioethanol releases less carbon dioxide <b>ignore:</b> reference to burning fossil fuels unqualified <b>allow:</b> idea of carbon neutral only if explained
		(iv)	produces less carbon monoxide (1) produces less particulate carbon (1)	2	
	(b)	(i)	$32\,000\,000 \times 15\,000 / 30\,000$ (1) $= 16\,000\,000 / 16\text{ million}$ (1)	2	<b>allow:</b> 2 marks for correct answer without working
		(ii)	it would not be possible using wheat grown in the UK not enough wheat could be grown / not enough land	1	ECF from (b)(i) <b>allow</b> import of other crops
	(c)		it is biodegradable (1) it is less toxic (than fossil fuels) (1)	2	
	(d)	(i)	less wheat will be available for bread / there will be competition for use of wheat / demand for wheat will increase / wheat may have to be imported	1	
		(ii)	they may not grow enough wheat for both uses / they need all their wheat for food	1	<b>allow:</b> economic arguments – e.g. competition for land / bread price rises too far.
<b>Total</b>				<b>13</b>	

Question			Answer	Marks	Guidance
2	(a)	(i)	methane + oxygen -> carbon dioxide + water	1	<b>allow</b> ; formulae if correct (including balancing)
		(ii)	energy level of reactants is higher than that of products / energy level decreased during the reaction (1); so energy is given out/released / exothermic / heat given out (1)	2	<b>allow</b> : less energy to break reactant bonds than energy given out when product bonds formed
	(b)		taken in / required given out	1	both required
	(c)		(burning) match supplies activation energy (1) (activation) energy is needed to break bonds/start the reaction (1)	2	Do not allow idea that the match is the activation energy
<b>Total</b>				<b>6</b>	

Question			Answer	Marks	Guidance
3	(a)		propanoic acid ; butanol ; sulfuric acid	2	all three correct = 2 marks two correct = 1 mark
	(b)		propanoic acid + butanol $\rightarrow$ butyl propanoate + water	1	either order
	(c)		<b>any two from:</b> flavouring (1) perfume (1) plasticiser (1)	2	
	(d)		fatty acids	1	
<b>Total</b>				<b>6</b>	



Question		Answer	Marks	Guidance
4	(a)	C ADEFB	3	ADEFB Scores 3 A before D and D before F Scores 2 A before D or D before F scores 1
	(b) (i)	will measure to 0.1 cm <sup>3</sup> / allow solution to be added dropwise	1	<b>ignore:</b> more accurate
	(ii)	for quality control / to match information on the label / to ensure product is safe / to make sure product works / to avoid damage to the kettle	1	<b>ignore:</b> fair test
	(iii)	indicator (change) colour; to show the end point / to show when all of the acid has been neutralised by the alkali; QWC one mark for correct use of one of the terms end point or neutralised	3	OWTTE
	(c) (i)	2(.0)g	1	
	(ii)	H = 1 P = 31 O = 16 (1) (3x1) + 31 + (4x16) = 98 / 3 + 31 + 64 = 98 (1)	2	no mark for 98 without working
	(iii)	2.0 x 98 / 120 = 1.63g	1	<b>allow:</b> 1.6 <b>allow:</b> ecf from (i) and (ii)
<b>Total</b>			<b>12</b>	

Question			Answer	Marks	Guidance
5	(a)	(i)	a bulk chemical is made in larger quantities	1	ORA
		(ii)	(to show that) the reaction is reversible OWTTE	1	<b>allow:</b> to show that it is a (dynamic) equilibrium
	(b)		<i>nitrogen</i> makes the process more sustainable / it is sustainable (1) because the supply of air is not limited / air is renewable (1) <i>hydrogen</i> makes the process less sustainable / it is not sustainable (1) will one day run out / comes from a finite source/crude oil/natural gas (1)	4	do not allow idea that hydrogen comes from water
	(c)		speed up the reaction	1	<b>allow:</b> provides an alternative route / lowers activation energy
	(d)		<b>any two from:</b> tanker vessel must be strong (1); tanker vessel must be leak proof (1); tanker must carry a hazard warning sign (1)	2	
<b>Total</b>				<b>9</b>	

Question		Answer	Marks	Guidance
6	(a)	hydrogen (1) carbon (1) compounds (1)	3	either order
	(b)	ethane $\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array};$ $\text{C}_3\text{H}_8$ $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array};$	4	
	(c)	alkanes have C-C and C-H bonds (1) bonds (in alkanes) are unreactive/strong (1)	2	
<b>Total</b>			<b>9</b>	

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