

**Chemistry A**

General Certificate of Secondary Education

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

**Mark Scheme for June 2012**

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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.

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**Annotations**

Used in the detailed Mark Scheme:

<b>Annotation</b>	<b>Meaning</b>
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant – applies to neutral answers
<b>allow/accept</b>	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:*

<del>✓</del>
<del>✓</del>

*This would be worth  
1 mark.*

✓
<del>✓</del>

*This would be worth  
0 marks.*

<del>✓</del>
<del>✓</del>
✓
✓

*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, eg 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, eg 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.

*eg if a question requires candidates to identify cities in England:*

Edinburgh	
Manchester	
Paris	
Southampton	

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	Mark	Guidance
1	(a)	long polymers polymerisation (2)	2	all three for 2 marks, two for 1 mark <b>allow</b> answers indicated by other means eg underlined
	(b) (i)	softness (1) flexibility (1)	2	<b>allow</b> (decrease) melting point / (more) durable
	(ii)	leach/migrate/diffuse out of products (1) get into food/air/soil / people eat contaminated food/breathe contaminated air/touch contaminated soil (1)	2	<b>allow</b> leak out of products <b>allow</b> transfer by direct contact with product/plasticized PVC eg sucking toys/medical equipment
	(c) (i)	<i>any two from:</i> boys with mothers who had high levels of phthalates ; (1) played less with traditional boys' toys ; (1) less likely to join in with rough and tumble games ; (1)	2	<b>ignore</b> references to sexuality e.g. "more feminine"
	(ii)	larger number of boys tested / repeat of research / similar findings from other scientists / use a control group (1)	1	<b>allow</b> "do more tests when the boys get older/ look at boys with different ages" <b>allow</b> "how high the level of phthalates needs to be before it has an effect"
	(d)	easily biodegradable (1) low toxicity (1)	2	<b>allow</b> "break down easily in the body"
	(e)	<i>any two from:</i> they already have ideas that they do not change easily / they had already formed opinions before looking at the evidence ; (1) they may be involved in phthalate industry / they may be biased / they may think the study is biased ; (1) data can be interpreted in different ways ; (1)	2	<b>allow</b> their expertise/experience/training of the two scientists may be in different areas (of science)  <b>ignore</b> reference to precautionary principle / not enough evidence
<b>Total</b>			<b>13</b>	

Question		Answer	Mark	Guidance
2	(a)	<i>any two from:</i> reaction can go in both directions/reversible ; (1) reaction reaches equilibrium ; (1) there are always products and reactants present ; (1)	2	
	(b)	distillation (1)	1	
	(c)	ethene is recycled (1) this has not reacted / this reacts with more steam (1)	2	<b>allow</b> "it may take longer to react" for 1 mark
	(d) (i)	ethene + steam on left line (this must be above the line) (1) energy change next to vertical arrow (1) ethanol on right line (allow above or below) (1)	3	
	(ii)	broken    made    gives out (2)	2	all three for 2 marks any two for 1 mark
	(e)	<i>any two from:</i> reactants need a minimum amount of energy to react ; (1) more energy at high temperature ; (1) this provides/overcomes the activation energy / at high temperature more molecules have activation energy ; (1) (activation) energy is needed to break bonds ; (1)	2	<b>allow</b> 'activation energy is the energy needed for a reaction to start/take place' <b>do not credit</b> 'they need energy to start the reaction'
	(f)	lowers activation energy (1) provides an alternative route (1)	2	<b>ignore</b> vague references to breaking bonds / holds reactants close to each other
		<b>Total</b>	<b>14</b>	

Question			Answer	Mark	Guidance
3	(a)	(i)	time taken for a chemical to pass through (the column) (1)	1	
		(ii)	to allow identification of methyl esters (1)	1	<b>allow</b> to use as a reference material / for comparison with substances on the chromatogram <b>ignore</b> references to purity/concentration
		(iii)	as number of carbon atoms increases retention time increases ORA (1)	1	<b>do not credit</b> 'positive correlation' without qualification
	(b)	(i)	lauric myristic heptadecanoic (2)	2	any order, all three for 2 marks, two for 1 mark <b>do not allow</b> retention times instead of names
		(ii)	other compounds/chemicals/products/esters are present (1)	1	<b>allow</b> impurities present / it is contaminated
		(iii)	myristic (1)	1	<b>do not allow</b> retention time instead of name
	(c)		<i>any four from:</i> sample is injected ; (1) sample added with solvent ; (1) sample is vaporised ; (1) sample moves with carrier gas ; (1) carrier gas is mobile phase ; (1) stationary phase is liquid/solid ; (1) carrier gas/mobile phase moves through stationary phase ; (1) components move at different speeds ; (1)	4	<b>allow</b> "sample is placed into the machine"
	(d)	(i)	they have (distinctive/pleasant) smells <i>owtte</i> (1)	1	<b>allow</b> they evaporate easily/ low boiling point
		(ii)	food flavouring / solvents / plasticizers (1)	1	
<b>Total</b>				<b>13</b>	

Question			Answer	Mark	Guidance
4	(a)	(i)	0.1 dm <sup>3</sup> /100cm <sup>3</sup> of stock solution (1) add 0.9 dm <sup>3</sup> /900 cm <sup>3</sup> of water / make up to 1 dm <sup>3</sup> /1000 cm <sup>3</sup> with water (1)	2	<b>allow</b> 1/10 stock solution and 9/10 water for one mark only <b>allow</b> correct proportions with incorrect final volume for one mark only eg 25 cm <sup>3</sup> made up to 250 cm <sup>3</sup>
		(ii)	D (1)	1	
		(iii)	adds acid to alkali in some way (1)  <i>plus any two from:</i> add indicator to (conical) flask ; (1) use of burette/any precision implied for addition of solutions ; (1) (until) <u>indicator</u> changes colour ; (1)	3	<b>allow</b> "swirl or stir the (conical) flask" for 1 mark  <b>allow</b> "end point" for colour change  <b>2 marks maximum</b> if candidate has not described addition of acid to alkali
	(b)	(i)	23 + 16 + 1 = 40 (1)	2	all three RAMs correct = 1 mark added together to total 40 = 1 mark (second mark cannot be given without first mark) <b>no mark for 40 without working</b>
		(ii)	(27.4 x 180)/10 000 (1) = 0.493 (1)	2	<b>allow</b> 0.4932 / 0.49/ 0.5 correct answer with no working = 2 marks
<b>Total</b>				<b>10</b>	

Question		Answer	Mark	Guidance
5	(a)	glucose → ethanol + carbon dioxide (1)	1	<b>allow</b> yeast over arrow but not anywhere else
	(b) (i)	34 (1)	1	
	(ii)	<p><b>description</b>  <i>any one from:</i>  rate increases/ reaction speeds up with temperature until optimum/ maximum ; (1)  rate decreases/ reaction slows down after 34°C/ optimum ; (1)</p> <p><b>explanation</b>  <i>any one from:</i>  particles have more energy/move faster ; (1)  more particles have activation energy / more successful collisions ; (1)  yeast less active after optimum ; (1)</p> <p>QWC correct spelling (1)</p>	3	<p>any one from description, and any one from explanation, plus one for QWC</p> <p><b>allow</b> “rate (owtte) goes up to a maximum and then goes back down”</p> <p><b>allow</b> correct numerical values for rates e.g. “it starts at 12cm<sup>3</sup>/minute and increases to 52 cm<sup>3</sup>/minute OR 34°C, then it decreases to 8cm<sup>3</sup>/minute (1)”</p> <p><b>allow</b> enzyme denatured/deactivated (1)</p> <p><b>ignore</b> frequency arguments</p>
<b>Total</b>			<b>5</b>	

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