OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education **A323/02**

Unit 3: Ideas in Context plus C7

Mark Scheme for June 2010

Oxford Cambridge and RSA Examinations

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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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Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

   / = 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 = alternative wording
   ORA = or reverse argument

   E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)
   work done = 0 marks
   work done lifting = 1 mark
   change in potential energy = 0 marks
   gravitational potential energy = 1 mark

5. Annotations:
   The following annotations are available on SCORIS.

   ✓ = correct response
   ✗ = incorrect response
   bod = benefit of the doubt
   nbod = benefit of the doubt **<u>not</u>** given
   ECF = error carried forward
   ^ = information omitted
   I = ignore
   R = reject

6. If a candidate alters his/her response, examiners should accept the alteration.
7. 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 boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.
☐	☐	☑
☐	☐	☑
✓	☑	✓
☑	☑	✓
☐	☐	☐
This would be worth 0 marks.	This would be worth one mark.	This would be worth one mark.

8. 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.

9. Marking method for tick boxes:

Always check the additional guidance.

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. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.
Credit should be given for each box correctly ticked. 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 a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

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

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

Question			Expected Answer	Mark	Additional Guidance
1	a		**any two from:** reference to using fertilisers (1) reference to using pesticides (1) cotton is bleached (using harmful chemicals) (1)	**[2]**	
	b		they are easier to use/more convenient / they do not need to be washed / they are kinder to a baby's skin (1)	**[1]**	**allow** more comfortable for baby / less likely to leak do **not** allow economy answers
	c		from getting the raw material used to make the product to the disposal of the product (1)	**[1]**	do **not** allow answers that start from making product from raw material
	d		description: electricity/detergent used for washing (1) explanation: generating electricity causes pollution / detergent released into rivers etc (1)	**[2]**	**allow** use of energy instead electricity **allow** any reasonable explanation of how this causes environmental impact
	e		not everyone would collect used nappies for recycling / may be difficult to collect all used nappies (1) there are not enough recycling plants available / so many nappies are used that this would be difficult (1) there may not be enough demand for the materials produced by recycling (1)	**[3]**	three areas for marks: • collection • huge volume • demand for products
	f	i	forces (of attraction) between polymer chains/molecules are low (1) so little energy is needed to separate the chains/molecules (1)	**[2]**	for the first mark candidates must write about forces between chains/molecules **not** bonds for second mark allow reference to breaking bonds between chains/molecules as long as energy mentioned **ignore** references to short chains
		ii	decrease chain length / decrease crystallisation / add plasticizer / decrease density (1) to decrease forces/attraction between chains/molecules (1)	**[2]**	**allow** make branched polymer **allow** decreases number/strength of bonds between chains/molecules **ignore** references to less energy needed
			Total	**[13]**	

Question			Expected Answer	Mark	Additional Guidance
2	a		sodium + ethanol (slow) fizzing / dissolves / gets smaller / moves slowly across the surface (1) sodium + water (fast) fizzing / dissolves (quickly) / gets smaller (quickly) / shoots around on surface / melts / produces flame (1) sodium + hexane no reaction (1) answer shows that reaction with water is more vigorous than that with ethanol (1)	[4]	one mark each for a valid observation for each of the three demonstrations if a mixture of valid and non-valid observations are made this loses the mark for that box plus one additional mark for a correct comparison of the same observation with ethanol and with water **allow** bubbling=fizzing=hydrogen/gas given off
	b		similarity: ethanol and water have O-H group/same functional group/oxygen and so react in a similar way (1) difference: hexane has only carbon and hydrogen atoms/does not have an O-H group/does not have oxygen and so does not react (1)	[2]	**allow** water and ethanol have polar bonds **allow** hexane is a hydrocarbon/has unreactive C-C and C-H bonds and so does not react to score the answers must refer to the reactions not just to the structures
	c	i	(high concentration of) ethanol kills yeast (1)	[1]	**allow** the ethanol denatures/destroys the yeast **allow** ethanol denatures enzymes but do **not** allow kills enzymes
		ii	distillation (1) **plus any two from:** mixture is heated/evaporated/boiled (1) vapour cooled to condense it (1) ethanol has lower/different boiling point (so is collected on its own/separately) (1)	[3]	**allow** fractional distillation **allow** explanation marks independent of name but do not give marks for a method that does not separate eg reflux **ignore** ethanol has low boiling point
			Total	[10]	

Question			Expected Answer	Mark	Additional Guidance
3	a		energy level of reactants is higher than that of products (1) so energy/heat given out during the reaction (1)	[2]	**allow** energy level at end is lower than at beginning / energy level goes down / energy change is negative
	b		energy needed to start a reaction (1) energy needed to break bonds (1)	[2]	**allow** first mark for energy needed for a reaction to take place/begin / energy needed for successful collisions **ignore** reference to catalysts
	c	i	(2 x 805 =) 1610 (1) (4 x 464 =) 1856 (1) energy released = 3466 (1)	[3]	**allow** 3 marks for 3466 without working (even if not on answer line) **ignore** if go on to calculate 730 here
		ii	730 (1)	[1]	**ignore** sign (plus or minus) **allow** ecf from ci give mark for 730 without working
			Total	[8]	

4	a	i	4.8 (1) divided by 7.0 = 0.69 (1)	[2]	give 2 marks for correct answer without working do **not** allow 4.9 or 0.7 **allow** 0.68 or 0.685 or 0.686 (max 3 sf)
		ii	Rf value is always the same for each compound (1) distance travelled by spot/solvent front may be different on different chromatograms (1)	[2]	**allow** can be used to identify compound **ignore** reference to accuracy/precision
	b		stationary phase is paper and mobile phase is solvent / mobile phase moves up through stationary phase (1) for each compound there is a dynamic equilibrium between the two phases (1) how far each compound moves depends on its distribution between the two phases / if the compound is more soluble in the mobile phase it will move further up the paper (1)	[3]	 for third mark **allow** compounds travel different distances because they have different solubility in phases / dynamic equilibrium is more to one side / spend different amounts of time in the two phases
			Total	[7]	

Question			Expected Answer	Mark	Additional Guidance
5	a		measure out 25.0 cm^3 of the stock solution (1) make up to 250 cm^3 with (distilled/deionised) water (1)	[2]	**allow** one mark for adding 1 part stock solution to 9 parts water **ignore** references to dilution to a tenth of stock concentration
	b	i	28.2 x 6.3/1000 = 0.178 (1)	[1]	be careful not to give this mark just for getting 0.178 the mark is for the correct method used to get 0.178 do **not** allow a mark for eg 28.2 x 6.3/100 = 0.178
		ii	0.178 x 40/63 (1) = 0.113 (1) 0.113 x 1000/25 = 4.52 (1)	[3]	**allow** any correct method for working eg 40 x 6.3/63 x 28.2/1000 **allow** 0.113 without working for 2 marks **allow** ecf from mass to concentration ie x40
		iii	uncertainty is low / value is reliable (1) because titration results show little variation/are very close/are within 0.2/have small range (1)	[2]	**ignore** references to accuracy **ignore** references to outliers
			Total	[8]	

6	a		air makes the process (more) sustainable (1) because the supply of air is not limited / air is renewable (1) natural gas makes the process less/not sustainable (1) because it is finite/will one day run out/not renewable (1)	[4]	
	b		catalyst provides an alternative route (1) with a lower activation energy / less energy needed to begin the reaction / less energy needed to break bonds (1) QWC is for correct use of the term activation energy (1)	[2] [1]	do **not** allow marks for other explanations of how a catalyst works **ignore** references to collisions
	c		reactants/nitrogen and hydrogen that have not reacted are recycled (1) ammonia is removed so the system does not reach equilibrium/reverse reaction is not possible/pushes equilibrium to the right (1)	[2]	no mark simply for saying 85% recycled, must have idea that this gas has not reacted / goes back to react
			Total	[9]	

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