OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry A

General Certificate of Secondary Education

Unit **A322/02**: Modules C4, C5, C6 (Higher Tier)

Mark Scheme for January 2011

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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
words	=	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. If a candidate alters his/her response, examiners should accept the alteration.

6. 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.

The example below illustrates how to apply this principle to an objective question.

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 zero marks.	*This would be worth one mark.*	*This would be worth one mark.*

7. 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.

8. 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 Answers	Marks	Additional Guidance
1	a	i	hydrogen (1) H_2 (1)	[2]	do **not** allow H^2 2 should be subscripted or clearly smaller than H e.g. H_2 / H_2
		ii	☐ ☐ ☐ rubidium hydroxide ☑ (1)	[1]	
	b		☐ Elements further down the group … ☑ (1) The reaction produces more energy. ☑ (1) ☐ ☐	[2]	

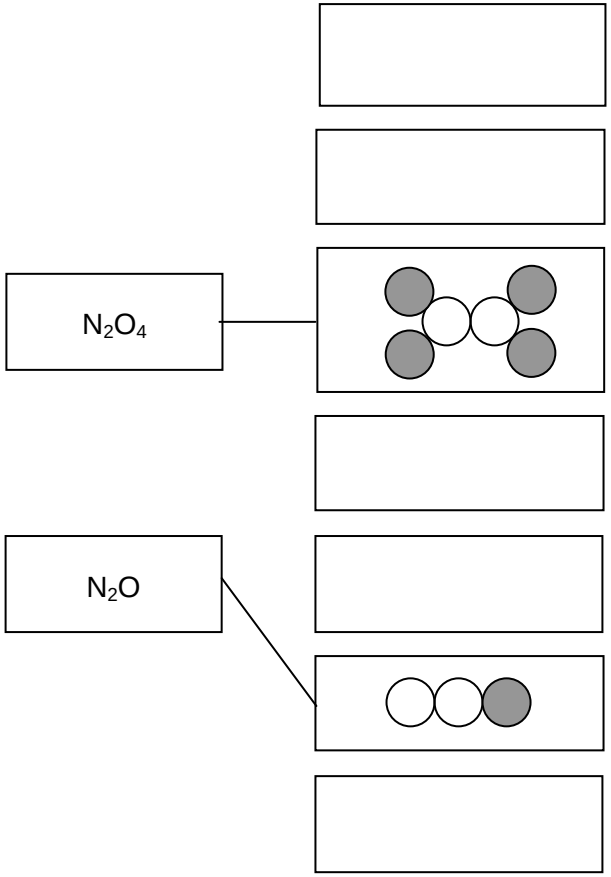
Question			Expected Answers	Marks	Additional Guidance
1	c	i	**any three from:**	[3]	**do not allow** things that cannot be seen eg forms an alkali/hydrogen
			(solution) goes purple/blue;		**allow** three correct marking points even if they are amongst some incorrect answers
			gas is made / fizzing / bubbles;		**ignore** hydrogen is made
			flash / explosion / flame;		**allow** it will burn / it catches fire
			(flame is) purple/lilac;		
			potassium moves around;		
			floats / is on top of water;		
			melts / forms a ball;		
			it disappears / gets smaller;		
			reaction is slower (than the other metals Gemma has used) / reaction is slower than caesium/rubidium / reaction is faster than sodium/lithium / faster than those above it / slower than those below it;		if say faster must be qualified eg by referring to sodium/lithium **allow** less violent/more violent, smaller explosion/bigger explosion, more reactive/less reactive instead of slower/faster

Question			Expected Answers	Marks	Additional Guidance
1	c	ii	**any two from:** identifies a specific hazard eg explosion / flame / something may spit out / glass bowl may break; produces a <u>corrosive</u> hydroxide/alkali/substance; identifies possible damage eg to skin/eyes; idea that safety screen is a barrier to prevent contact/protect from contact with material;	[2]	 ignore something may hit you (not specific enough) ignore hazardous / dangerous / it gets on you **ignore** to prevent/protect from harm/injury unqualified
			Total	**[10]**	

Question			Expected Answers	Marks	Additional Guidance
2	a		… different pattern of lines … ☐ ✓ (1) The lines can be compared … ☐ ✓ (1)	[2]	apply list principle if more than 2 boxes are ticked
	b		true / false lithium atoms gain … ☐ ✓ lithium ions have a greater … ☐ ✓ lithium ion have fewer … ✓ ☐ lithium atoms lose neutrons … ☐ ✓	[2]	all 4 correct = 2 marks 2 or 3 correct = 1 mark 1 correct = 0 marks if both boxes are ticked in any row, that row is incorrect **ignore** crosses if both crosses and ticks are shown **allow** crosses to represent choice if no ticks are shown.
			Total	[4]	

Question			Expected Answers	Marks	Additional Guidance
3	a		$MgCl_2$ (l) → Mg (l) + ……. (g) (1) ($MgCl_2$ → Mg + Cl_2 (1)	[2]	state symbols (l) (l) and (g) for first mark. **allow** capitals (L) (L) and (G) formula Cl_2 for second mark. do **not** allow Cl^2. do **not** allow C**L**$_2$ 2 must be subscripted or clearly smaller than Cl e.g. Cl_2 / Cl_2
	b		the magnesium ions gain electrons ☑ (1) ☐ ☐ ☐ a non-metal is made ☑ (1)	[2]	
	c	i	142 g (1)	[1]	
		ii	12 tonnes (1)	[1]	
	d	i	(contains) ions; ions flow / move / carry charges / carry current;	[2]	ions move = 2 marks do **not** allow 'electrons move' **allow** ions carry electricity = 2 marks
		ii	electrons flow / move / carry charges / carry current (1) sea of electrons / delocalised (1)	[2]	**note** 'electrons are free to move' gets first marking point only **allow** 'metals contain 'free' electrons' as alternative wording for delocalised
			Total	[10]	

Question			Expected Answers	Marks	Additional Guidance
4	a		<table><tr><th></th><th>true</th><th>false</th></tr><tr><td>Some of these gases have …</td><td>☐</td><td>✓</td></tr><tr><td>Molecules of these gases …</td><td>✓</td><td>☐</td></tr><tr><td>These gases conduct …</td><td>☐</td><td>✓</td></tr><tr><td>These gases only contain …</td><td>✓</td><td>☐</td></tr></table>	[2]	all 4 correct = 2 marks 2/3 correct = 1 mark 1 correct = 0 marks If both boxes are ticked in any row, that row is incorrect **Ignore** crosses if both crosses and ticks are shown. **Allow** crosses to represent choice if no ticks are shown.
	b		below and below (1) molecular and weak (1)	[2]	**allow** wrong choice crossed out as indication for each pair

Question			Expected Answers	Marks	Additional Guidance
4	c			[2]	one mark for each correct line two lines to or from one box loses the mark for that box
			Total	**[6]**	

Question			Expected Answers	Marks	Additional Guidance
5	a		☐ ☐ pH probes do not rely on colour … ☑ (1) ☐	[1]	
	b		**any three from:** idea of repeats or averages; check to see if results are the same / close together; wash burette with solution to be used/vinegar; wash flask with distilled water; adding small amounts at a time / slowly / drop by drop; swirl/shake/stir/mix flask; Idea of carefully adding acid <u>near end point</u> / stop when colour has changed / when neutralised; read using meniscus;	[3]	**allow** to identify outliers / leave out 'different' results; **ignore** 'see if the results are different' (not enough)
	c	i	40 (1)	[1]	
		ii	60 (1)	[1]	

Question			Expected Answers	Marks	Additional Guidance
5	d		an equation for the reaction ☑ ☐ the concentration of the alkali used ☑ ☐ ☐	[1]	**both ticks** required for one mark
	e	i	cafe vinegar (1)	[1]	
		ii	50 g/dm^3 (1)	[1]	
			Total	[9]	

Question			Expected Answers	Marks	Additional Guidance
6	a	i	copper sulfate (1)	[1]	**allow** copper sulphate **do not allow** copper sulfide **allow** correct formula $CuSO_4$ **ignore** carbon dioxide/CO_2 and water/H_2O if given as additional answers
		ii	CO_2 H_2O	[1]	both required if three or more answers ringed no mark
	b		Particles collide less often in … ☐ ☑ ☐ ☐ ☐ (1)	[1]	
			Total	[3]	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553