OCR
Oxford Cambridge and RSA

GCSE

Chemistry A

Unit **A173/01**: Module C7 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2015

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, 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.

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
words	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:

BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	correct response
	incorrect response
BOD	benefit of doubt
NBOD	no benefit of doubt
ECF	error carried forward
0 , L1 , L2 , L3	indicate level awarded for a question marked by level of response
^	information omitted
CON	contradiction

R	reject
	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

ADDITIONAL OBJECTS: You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

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 <u>and</u> 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. 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	
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**

d. 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.

Here is the mark scheme for this question paper.

Question			Answer	Marks	Guidance
1	a		growing crops on farms	1	
	b		50 [million tonnes]	1	
	c		nitrogen + hydrogen ➔ ammonia or hydrogen + nitrogen ➔ ammonia	1	**Accept** $N_2 + 3H_2 \rightarrow 2NH_3$
	d		hydrogen and steam ☐ natural gas and steam ✓ nitrogen and steam ☐ water and steam ☐	1	
	e		2400 (2) 1.6 x 3000 (1)	2	
	f		Advantage: (crops or plants) faster growth / more growth / more yield / (1) Pollution: go into water / fertilisers contain nitrates / leaching / idea of eutrophication / energy to make fertilisers (1)	2	**Accept** 'growth' alone **Ignore** 'pollution' unless more detailed **Ignore** direct cause of air pollution
	g		room temperature (1) room pressure (1) enzymes (1)	3	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>h</td><td></td><td>
<table>
<tr><th>chemical</th><th>large scale</th><th>small scale</th></tr>
<tr><td>food additives</td><td></td><td>✓</td></tr>
<tr><td>phosphoric acid</td><td>✓</td><td></td></tr>
<tr><td>sodium hydroxide</td><td>✓</td><td></td></tr>
<tr><td>fragrances for perfumes</td><td></td><td>✓</td></tr>
</table>
</td><td>2</td><td>4 rows correct = 2
3 or 2 rows correct = 1</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>13</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
2	a		to give them energy ✓ to make them slippery to make them taste nasty to make them float in water	1	
	b		identifies saturated and unsaturated as the correct terms (1) Gets them the right way round (1)	2	**Allow** (1) for one correct term in the correct place

Question			Answer	Marks	Guidance
	c		**Level 3** Gives advantages and a disadvantage of using the enzyme, reaches a conclusion and makes a comparison between the two catalysts. *Quality of written communication does not impede communication of the science at this level.* (5 – 6 marks) **Level 2** Gives advantages and a disadvantage of using the enzyme. *Quality of written communication partly impedes communication of the science at this level.* (3 – 4 marks) **Level 1** Makes correct statements from the table. *Quality of written communication impedes communication of the science at this level.* (1 – 2 marks) **Level 0** *Insufficient or irrelevant science. Answer not worthy of credit.* (0 marks)	6	**This question is targeted at grades up to D** No marks for the conclusion itself **Indicative scientific points may include:** **<u>Level 3:</u>** • links heating to energy costs • NaOH produces waste / enzyme does not produce waste • NaOH dissolves in the reaction mixture / need to separate idea **<u>Level 1 and level 2:</u>** **Advantages of the enzyme** • gentle heating • easy to remove / purification of product / re-use of catalyst **ignore** speeds up this reaction only **Disadvantage** • expensive **Allow** other advantages/disadvantages which are not on the table e.g. enzymes are specific / work in narrow temperature bands / NaOH is very corrosive / alkaline **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Marks	Guidance
	d		similarity [1] reactants/products have the same energy (on both diagrams) / both reactions need an activation energy / both reactions are exothermic / energy level decreases / products have less energy than reactants difference [1] activation energy [of enzyme/diagram A] lower	2	**Accept** 'different' **Do not allow** produces/gives out activation energy
	e		carbon dioxide/CO_2 (1) water/H_2O/steam (1)	2	ignore carbon, carbon monoxide
			Total	13	

Question			Answer	Marks	Guidance
3	a	i	3	1	
		ii	2	1	
		iii	COOH	1	
		iv	its formula contains carbon, hydrogen and oxygen ☐ it is more dilute than acids such as hydrochloric ☐ it is less reactive than acids such as hydrochloric ✓ it is more runny than acids such as hydrochloric ☐	1	

Question			Answer	Marks	Guidance
		v	a weak acid has a higher pH ✓ a weak acid has the same pH a weak acid has a lower pH a weak acid has a much lower pH	1	
	b	i	they are all solids they give off purple fumes they have a distinctive smell ✓ they have a distinctive colour	1	
		ii	the reaction is rapid the reaction is reversible ✓ the reaction is exothermic the reaction is hard to control	1	
		iii	only reactants are present only products are present reactants and products are both present ✓	1	
		iv	**any three from** increases / more ester made (over time); fast at first / slows down; stops increasing / amount stays the same; fast between 0 and 10; stops at 36-40;	3	**max 2:** Continues at a steady rate idea **ignore** levelling off
	c		46	1	
			Total	12	

Question			Answer	Marks	Guidance
4	a		taken in given out endothermic activation energy	3	4 correct = 3 3/2 correct = 2 1 correct = 1

Question			Answer	Marks	Guidance
	b		**Level 3** Explains both terms and discusses sustainability. *Quality of written communication does not impede communication of the science at this level.* (5 – 6 marks) **Level 2** Explains both terms but not how they make the process sustainable, or explains one term and discusses sustainability. *Quality of written communication partly impedes communication of the science at this level.* (3 – 4 marks) **Level 1** Makes a correct statement about 'renewable' or 'by-products' or sustainability *Quality of written communication impedes communication of the science at this level.* (1 – 2 marks) **Level 0** *Insufficient or irrelevant science. Answer not worthy of credit.* (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Sustainability** • resources available for future generations/long term future • environment not harmed in the long term/for the future • less waste linked to long term/future environment **Renewable:** • does not run out • can produce more • example – eg plants regrow **Ignore** 'used again' 'made again' 'remade' 'recycled' **By-product:** • by-product – unwanted product / waste product / another product • need for waste disposal • not all reactants utilised **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	9	

Question			Answer	Marks	Guidance
5	(a)		**Level 3** Explains in terms of solubility. *Quality of written communication does not impede communication of the science at this level.* (5 – 6 marks) **Level 2** Describes a simple mechanism for chromatography. *Quality of written communication partly impedes communication of the science at this level.* (3 – 4 marks) **Level 1** Makes a correct statement about the chromatogram. *Quality of written communication impedes communication of the science at this level.* (1 – 2 marks) **Level 0** *Insufficient or irrelevant science. Answer not worthy of credit.* (0 marks)	**6**	**This question is targeted at grades up to C** **Indicative scientific points may include:** **Solubilities** • spots/ink have different solubilities (in water) / dissolve more or less in water • spots 'stick' to the paper by different amounts **Level 2:** • move at different speeds • move different amounts • water carries the ink / spots • water moves up the paper • correct reference to the mobile phase **Level 1:** • ink contains two colours/inks/components • chromatography is a separation technique **Ignore** : more or less amounts of ink in each spot idea **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	b		0.8 (2) Shows 5 or 4 (**allow** 4-4.3) in working (1)	**2**	**Allow** range of 0.8–0.86 **Ignore** units If incorrect, shows suitable working (1)

Question			Answer	Marks	Guidance
	c		spots are colourless/cannot be seen/invisible; locating agent makes the spots coloured / locating agent reacts with the spots;	2	**Do not allow** idea that spots are not on the paper / lost **Ignore** disappear **Ignore** 'locate' or 'find' the spots **Allow** correct example of a locating agent e.g UV
	d		Any three points from idea of reproducibility / reliability; Jane does repeats / Jane can take an average / Mike does not do repeats; Jane takes representative sample; Jane samples only short amount of time / should be longer / Mike samples throughout the day; Mike equally spaced through the day / continuous sampling; Mike picks up a change straightaway / Jane does not pick up a change straightaway; Mike takes more samples overall;	3	 **Ignore** Mike can take averages
			Total	13	

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

OCR Customer Contact Centre

Education and Learning
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