OCR
Oxford Cambridge and RSA

GCE

Applied Science

Unit **G628**: Sampling, Testing and Processing

Advanced GCE

Mark Scheme for June 2014

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.

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

Annotation	Meaning
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.

/	=	alternative and acceptable answers for the same marking point
(1)		separates marking points
not	=	answers which are not worthy of credit
reject	**=**	answers which are not worthy of credit
ignore	**=**	statements which are irrelevant
allow	**=**	answers that can be accepted
( )	=	words which are not essential to gain credit
__	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

1 Annotations: the following annotations are available on SCORIS.

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

Highlighting is also available to highlight any particular points on the script.

The following questions should be annotated with ticks to show where marks have been awarded in the body of the text:

2 The Comments box

The comments box will be used by your PE to explain their marking of the practice scripts for your information. Please refer to these comments when checking your practice scripts.

You should only type in the comments box yourself when you have an additional object of the type described in Appendix B of the Handbook for Assistant Examiners and Subject Markers.

Please do not use the comments box for any other reason.

Any questions or comments you have for your Team Leader should be communicated by phone, SCORIS messaging system or e-mail.

3 Please send a brief report on the performance of the candidates to your Team Leader (Supervisor) by the end of the marking period. The Assistant Examiner's Report Form (AERF) can be found on the Cambridge Assessment Support Portal. This should contain notes on particular strengths displayed, as well as common errors or weaknesses. Constructive criticisms of the question paper/mark scheme are also appreciated.

Question			Expected Answers	Marks	Additional Guidance
1	a	i	Isolation /separation /no contact /no movement (to prevent the spread of the fungus) ✓	1	
	a	ii	Only effective where it touches the fungus /difficult to cover all of the fungus ✓ Can be washed /blown off ✓	2	**Ignore** references to harming environment/ plant/animals **Ignore** toxic
	a	iii	Keep off the skin /wear, goggles/gloves/safety clothing /PPE✓ Do not breathe in the spray /wear face mask✓	2	**Ignore** direction of spray
	b	i	(Gas-liquid) chromatography /HPLC /TLC ✓	1	**Accept** (fractional/vacuum) distillation
	b	ii	Bar, chart/graph /pie chart /rank order of data✓	1	**Ignore** graph **Reject** line graph
	b	iii	Total percentage of polyunsaturated acids is, 56.2/largest /> 50%✓	1	
	b	iv	Infrared (absorption) spectroscopy /IR✓	1	
	c		5 ✓	1	Accept 5.26
	d		$48 \times 8 \times 10^{12} / 3.84 \times 10^{14}$ ✓ 4×10^{14} ✓	2	
	e	i	Grouping of particles /solidifying ✓	1	**Accept** clumping/curdling/clotting/congealing Ignore reference to stiffening/hardening
	e	ii	Positive ions/H^+ (from acid), **neutralise/react** with negative charge (from rubber particles) ✓ Reduces/removes, repulsive charge between rubber particles ✓	2	**Ignore** attraction
	f	i	0.9216	1	**Accept** 0.92 /0.922 /0.9

Question			Expected Answers	Marks	Additional Guidance
					Reject 0.921
	f	**ii**	1.0 ✓	1	ecf **Accept** 1.01376 /1/any correct rounding
	f	**iii**	**[0 marks]** Candidate does not include any of the valid steps. **[1 - 2 marks]** Candidate includes at least one valid step and shows some basic understanding. **[3 - 4 marks]** Candidate includes at least three valid steps and shows a reasonable understanding. **[5 marks]** Candidate includes all the five steps and the results table contains **all** the valid points and shows a thorough understanding.	5	*Valid steps:* • Method of holding rubber band • Use of measuring device /ruler • Named suitable equipment to add masses • Measure initial and new length • Results table containing: original length new length extension load/mass added **Accept** graph showing extension vs load in place of results table **Accept** step information can be obtained from diagram.
	g	**i**	All values correctly plotted ✓	1	
	g	**ii**	Suitable straight line of best fit between A&E✓	1	
	g	**iii**	Lines drawn correctly for gradient ✓ Gradient calculated ✓	2	**Accept** 2.(0) to 2.2 **Answer** only 1 mark
	g	**iv**	Experiment repeated ✓	1	
	h	**i**	Butyl/silicone ✓ Resistant to atmospheric **and** sunlight ageing✓	2	**Accept** synthetics **Accept** acid rain **Ignore** resistance to dilute acid 8

Question			Expected Answers	Marks	Additional Guidance
	h	ii	Natural, high elasticity /easily stretched ✓	1	**Accept** score of 8
	h	iii	Natural/butyl/silicone, dilute acid resistance ✓	1	
	i		*Any two from* Resistant to, changing/high temperatures ✓ Long lasting /durable✓ Flexible✓ Resistant to brake fluids ✓	2	**Ignore** references to oil
	j	i	(Research on) fungal attack/ disease resistant rubber trees ✓	1	
	j	ii	(Find a way of slowing down) (dandelion) latex polymerisation /reason for (less) allergic reaction ✓	1	**Ignore** repeated information stated in table
	j	iii	Low growing plants /large quantities needed /collectors may be allergic to latex✓ Develop a suitable harvesting machine /increase, concentration/size of plants /provide PPE ✓	2	
			Total	**37**	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	To compare a **stated** property ✓	1	
	a	ii	Length/thickness/components (of wool fibres), varies/ wool obtained from different, breeds/animals ✓	1	
	a	iii	In case wool has undergone, contamination/ deterioration /the age of the wool✓	1	
	a	iv	To ensure that **all** of, the **soluble** material /potassium compound/perspiration was recovered ✓	1	**Ignore** dirt
	b	i	It spins at high speed ✓ Separates according to **density**✓ Denser/heavier material goes, to the bottom (of the tube) /further out ✓	3	
	b	ii	**[0 marks]** Candidate does not include any of the valid steps. **[1 - 2 marks]** Candidate includes at least one valid step and shows some basic	7	*Valid steps* • Use of beaker / flask containing cold water (as a water bath) • Lanolin-containing tube suspended in water • Lanolin level in tube below water bath level

Question			Expected Answers	Marks	Additional Guidance
			understanding. **[3 - 4 marks]** Candidate includes at least three valid steps and shows a reasonable understanding. **[5 - 6 marks]** Candidate includes at least five valid steps and shows a thorough understanding. **[7 marks]** Candidate includes at least six valid steps, including controlling the heating rates and/or the recording of the melting point range.		• Thermometer/temperature probe placed in water (adjacent to the lanolin-containing tube) • Heat (gently) / reference to temp above 25^{O} • Stir water • Warm until lanolin just melts • Control heating rate near melting point • Records temperature when melting starts and is complete If lanolin heated directly 3 marks maximum.
	c	**i**	Compare mass spectrum of the compound with, a known sample of compound **A**/data bank ✓	1	
	c	**ii 1**	1 (kg) contains $2.80 \times 10^{-3} \times 1000 / 5.2$ (mg) ✓ 0.54/0.538 ✓	2	
	c	**ii 2**	$1.00 \times 10^{-6} \times 5.20 / 2.80 \times 10^{-6}$ ✓ 1.86/1.9 ✓	2	Conversion to g is not essential
	d	**i**	160 ✓	1	
	d	**ii**	U or V shaped curve starts and finishes at 100% ✓ Minimum shown at 50% after 2 hours and 100% shown after 10 hours ✓	2	
	e		2.0 / 50 x 1000 ✓ 4×10^{-5} / 0.00004✓	2	No ecf

Question			Expected Answers	Marks	Additional Guidance
	f	**i**	*Any three from* Ease of use /level of expertise /training needed✓ Quick in operation /time /efficient ✓ Availability/amount of, apparatus/chemicals ✓ Sample size ✓ Temperature consideration ✓ Gives accurate /reliable results ✓ Cost (effective) ✓ Environmentally friendly✓	3	
	f	**ii 1**	Amount of solution to use ✓	1	
	f	**ii 2**	How long to stir ✓	1	**Ignore** speed
	f	**iii 1**	Y axis scaled correctly ✓ Straight line drawn through the origin✓ 4.00 ≡ 100% ✓	3	**Accept** tolerance 1 small square
	f	**iii 2**	2.4(0)	1	
	g	**i**	Indicates position of spots by formation of a colour /makes spots visible✓ (Amino acids give) spots, which are colourless/ cannot be seen ✓	2	**Accept** components/compounds
	g	**ii**	R_f value	1	
			Total	**36**	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	Hips may not all be ripe /vitamin C content (within bush) varies /to obtain reliability/to calculate an average ✓	1	**Accept** in case sample, gets lost/damaged **Ignore** comparison/ representative sample
	a	ii	(% of) vitamin C may vary from bush to bush / to obtain a wider range of results /a representative sample /comparisons/validity✓	1	**Ignore** if bush diseased/damaged
	a	iii	Allergies /protection from, pesticides/diseases on the hips/ thorns /contamination ✓	1	**Ignore** injury unless qualified
	a	iv	Same temperature/ cool environment/ same conditions/ in, **sealed/separate** containers ✓	1	
	a	v	***Any three from*** Date/time of collection ✓ Location ✓ Sample number/variety✓ Name of collector ✓	3	**Ignore** hazard labels/mass
	a	vi	Wash/ clean them ✓	1	**Ignore** risk assessment
	b		15 ✓	1	
	c	i	The result should be about 1.5%/ far too high✓	1	**Ignore** high unqualified ORA
	c	ii	Incorrect, weighing/concentration/volume ✓ Incorrect calculation ✓	1 1	**Accept** amount of solution
	d	i	Decay/ decomposition/ stay fresh/ prevent loss of, oil/water✓	1	**Accept** petals die **Ignore** contamination
	d	ii 1	Hexane flammable/ carbon dioxide not ✓	3	To gain three marks the response must consider both hexane and

Question			Expected Answers	Marks	Additional Guidance
			Hexane toxic/ carbon dioxide not✓ **Hexane** Has to be, evaporated off/removed ✓ **Carbon dioxide** Runs at room temperature ✓ Can be, recirculated/re-used ✓ No decomposition of extraction product will occur✓		liquid carbon dioxide **Ignore** reference to re-use of hexane heating hexane
	d	**ii 2**	Special equipment is required /relatively expensive to set up /high pressure needed ✓	1	Cost considerations need to be qualified
			Total	**17**	

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