

GCE

Applied Science

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

Advanced GCE

Mark Scheme for June 2015

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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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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:

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.

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	Mild/moderate/warm/not too hot climate ✓	1	Ignore constant temperature not qualified
	b	i	1	Ignore air Accept does not use/need oxygen
	b	ii	1	Accept gas chromatography/GC/liquid chromatography/HPLC Ignore just chromatography/mass spectrometry /fractional distillation
	b	iii	2	Ignore larger scale / continuous process / better technology / more machinery
		Any two from: A new/other process of separation ✓ Shortage of petroleum / price of petroleum rises too high ✓ Recycling reactants ✓ Use of, other/by products ✓ More automation / fewer personnel ✓		
	c	i	2	ecf on line Accept 7 or 7.0 if correct
	c	ii	3	Ignore references to just change/different, temperature/concentration Ignore references to surface area
		Any three from: Heat / increase temperature ✓ More concentrated solution /add more saponin ✓ Immerse for longer ✓ Stir ✓		
	c	iii	1	Accept references to change
	d	i	1	Accept reference to COSHH /CLEAPSS/Hazcards Ignore references to PPE
		For comparison ✓		
	d	ii	2	Ignore use distilled or tap water / amount of conker/pieces / references to stirring
		Volume/quantity of water ✓ How long to boil / specified time ✓		
	d	iii	1	
		Any one from:		

Question		Expected Answers	Marks	Additional Guidance
		Increased concentration, of sodium hydrogencarbonate/vinegar (solutions) ✓ Add catalyst ✓ Stir/shake ✓		Ignore heat / modifications to apparatus design / more solution
	d	iv Excludes oxygen/air from the fire ✓ Carbon dioxide is denser/heavier than air ✓	2	Ignore reference to removal of oxygen Accept foam cools (the fire)
	e	i Concentration ✓	1	Ignore quantity / amount / volume / temperature
	e	ii Test using humans/animals/skin / in vivo ✓	1	
	f	i 400 ✓	1	
	f	ii Any two from: More saponin extracted ✓ At a lower temperature ✓ For a shorter period of time / is quicker ✓	2	Ignore references to cost/safety/energy/simpler method

Question		Expected Answers	Marks	Additional Guidance
1	g	<p>Level 0 [no marks] Candidate does not include any valid points</p> <p>Level 1 [1- 2 marks] Candidates present only an outline plan of the task. The text is generally legible but few scientific words are used accurately to ensure a clear meaning. The information covers one to two valid points.</p> <p>Level 2 [3-4 marks] Candidates present a basic plan of the task. The text is organised and scientific words are used accurately so that the meaning is clear. The information covers at least three to four valid points to produce a workable plan.</p> <p>Level 3 [5-6 marks] Candidates present a detailed plan of the task. The text is organised and scientific words are used accurately so that the meaning is clear. The information covers at least five valid points to produce a detailed plan.</p>	6	<p>Valid points</p> <ul style="list-style-type: none"> • Identify the symptoms of pest attack on horse chestnut trees • Choose an area to monitor • Count/record the number of horse chestnut trees that have symptoms at start • Calculate the percentage of attacked horse chestnut trees • Identify when the attack occurs • Investigate new areas (north of original) • Repeat survey over a period of time • Produces an overall report/record all data/graph <p>Ignore carry out risk assessment</p>
	h	i	Correct data extraction (40 and 84)✓ 210 ✓	2
	h	ii	24 ✓	1
		iii	Any two from:	2

Question			Expected Answers	Marks	Additional Guidance
			Temperature ✓ How long to heat ✓ Source/type/freshness of chestnuts ✓		Ignore heat
1	h	iv	93 ✓	1	
	h	v	$\frac{200 \times 100}{11}$ for answer in kg OR $\frac{200 \times 100 \times 1000}{11}$ for answer in g ✓ Values 1.81 to 1.82×10^6 (g) inclusive OR Values 1810 to 1820 <u>kg</u> ✓	2	Accept 1810 to 1820 for 1mark
	h	vi	(Systemic) kills sap sucking aphids / Contact kills only on 'touching' aphids ✓ (Systemic) is retained in the tree for a period of time / Contact can be washed off by rain ORA ✓	2	Accept Contact could miss sections
Total				38	

Question		Expected Answers	Marks	Additional Guidance	
2	a	Used in explosives manufacture / as a substitute for glycerine ✓	1		
	b	i	Any two from: Higher yield / greater than 90%✓ Straightforward removal of other products✓ Other products recycled ✓	2	Ignore just straightforward Ignore references to waste
	b	ii	A two stage process ✓	1	Accept more stages/steps Ignore references to length of process / energy
	b	iii	Any two from: Runs at lower temperatures ✓ Less energy used in manufacture✓ Less chance of thermal decomposition✓	2	Ignore references to safety/cost/speed/time/ quality/quantity of product
	c	i	The bonds present ✓	1	Reject references to ionic /intermolecular bonding
	c	ii	Larger surface area✓	1	Ignore reference to depth/width/air
	c	iii	Safety manual / CLEAPSS / Hazcards /risk assessment /ask a relevant expert/ science book✓	1	Accept look on bottle (label) /COSHH /REACH Ignore Internet/scientific journals/text book/teacher
	c	iv	The temperature / air movement ✓	1	Ignore environment /weather / humidity / just location of dish
	d		33 ✓	1	
	e	i	Toxic / corrosive / to prevent, absorption/contact ✓	1	Accept poisonous Ignore contamination
	e	ii	Burette /graduated pipette ✓	1	
	e	iii	Mass = <u>26.21 g</u> ✓ Density = 1.048✓ ecf	2	Accept 1.05 / 1.0484
	e	iv	Values 1.052 to 1.055 (inc) ✓ There is 0.012 to 0.014 (change for each 10% rise) ✓	2	Accept 0.026÷2
	f		Any two from: Less energy used✓ Makes more, in the same time/faster✓ Does not require cleaning so often✓ Requires less labour /automated✓	2	Ignore reference to cost / large scale production / waste / contamination / details of continuous process / recycling Ignore faster unqualified

Question		Expected Answers	Marks	Additional Guidance	
	g	i	Use of sodium hydroxide / danger of spitting ✓	1	Accept step 2
2	g	ii	How much water to use / temperature of water ✓	1	Accept specified volume 300cm ³ max
	g	iii	Use a spatula/ knife/ spoon ✓	1	Accept (vacuum) filtration / decant /scoop
	g	iv	Clean equipment after use ✓ Dispose of waste materials ✓	2	Ignore leave to cool /put away equipment
	h		Add, water/acid/suitable solvent ✓ Test for neutrality with indicator/pH/pH7 ✓	2	Accept wash
	i		<p>Level 0 [no marks] Candidate does not include any valid points</p> <p>Level 1 [1- 2 marks] Candidates present only an outline plan of the experiment. There is some organisation of the answer. The information covers one to two valid points.</p> <p>Level 2 [3-4 marks] Candidates present a basic plan of the experiment. There is more organisation of the answer. The information covers at least three to four valid points to produce a workable experiment.</p> <p>Level 3 [5-6 marks] Candidates present a detailed plan of the experiment. The text is well organised and clear. The information covers at least five valid points to produce a detailed plan of the experiment. For 6 marks candidates need to include a weakness of the plan.</p>	6	<p>Valid points</p> <p><u>Ball bearing method</u></p> <ul style="list-style-type: none"> • measuring cylinder/long tube used • of size 250 cm³ or greater • size/mass of ball bearing stated • time how long ball takes to fall and repeat • measured distance • repeat with the other solutions • displays results in table / graph • states one weakness eg time too short <p><u>Falling drop method</u></p> <ul style="list-style-type: none"> • narrow orifice (at base of funnel etc)/burette • graduated collecting device • of size 10 or 25 cm³ • times how long for a certain volume or measures time • and reads volume • repeats with the other solutions • displays results in table / graph • comments on size of orifice – too large / small

Question			Expected Answers	Marks	Additional Guidance
2	j		There is an excess/surplus (of glycerine) ✓	1	
	k	i	(Relative) molecular mass ✓	1	
	k	ii	Retention time ✓	1	
			Total	35	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	To collect glassworts ✓	1	
	a	ii	Any one from: Weather changes ✓ Tides/sea ✓ Uneven/boggy/marshy conditions / trip hazards ✓ Risks from plant toxins ✓	1	Ignore drowning
	a	iii	Take samples from different areas /representative sampling ✓	1	Accept random /quadrat sampling
	b	i	Mass may decrease/water evaporation/drying out /deterioration	1	Allow contamination
	b	ii	So that constant mass had been reached / to make sure that all the water is removed ✓	1	Ignore references to impurities/surplus plant material
	b	iii	All the same /consistent /composition does not vary ✓	1	Accept definition of homogeneous
	b	iv	Distilled water pure / impurities/calcium ions, in tap water ✓	1	Ignore cleaner/other products / chemicals /bacteria /contaminate /reference to pH/neutral
	b	v	To remove any remaining soluble material ✓	1	
	b	vi	Correct extraction of data (0.55) ✓ 0.11 ✓	2	
	c	i	Danger of falling rocks/hitting roof / dust in the eyes ✓	1	Ignore risk of accidents / head/eye injury
	c	ii	To avoid contamination ✓	1	
	c	iii	Gives reasonably sized gravimetric results / enough material for a number of tests ✓	1	Ignore reference to size of apparatus used /carrying
	c	iv	What is the sample / hazard /	1	Ignore reference weather conditions / time

Question			Expected Answers	Marks	Additional Guidance
			mass /storage instructions√		
	c	v	$\frac{0.90 \times 100}{1.28}$ ORA √	1	
	c	vi	Reference to either 0.91 OR 1.27√ 71.7/71.65 √	2	
			Total	17	

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