OCR
RECOGNISING ACHIEVEMENT

GCE

Applied Science

Advanced GCE

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

Mark Scheme for June 2013

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.

Annotations

Annotation	Meaning
	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

Annotation	Meaning
/	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

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>To protect themselves/danger from falling objects/to conform with health & safety regulations✓</td><td>1</td><td>allow prevent injuries</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Does not allow water/liquid through it ✓</td><td>1</td><td>allow waterproof
reject reference to absorption</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Eye protection/gloves/reinforced boots ✓</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(iv)</td><td>10g – 2kg inclusive ✓

Needed for repeats/range of tests ✓</td><td>1

1</td><td>

ignore unqualified use
ignore reference to representative sampling</td></tr>
<tr><td></td><td></td><td>(v)</td><td>any TWO from
Location ✓
Health and safety ‘label’/hazards✓
Name of student ✓
Storage information✓</td><td>2</td><td>ignore mass/size/appearance/temperature/weather conditions
ignore dangerous</td></tr>
<tr><td></td><td></td><td>(vi)</td><td>To avoid contamination/loss of sample ✓</td><td>1</td><td>ignore oxidation/ references to deterioration</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Varied in colour ✓</td><td>1</td><td>ora</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Brushing/use of solvent which, removes impurities/does not dissolve caliche/use of fan /use of cloth✓</td><td>1</td><td>reject water /use of oven
ignore unqualified hot air</td></tr>
<tr><td></td><td></td><td>(iii)</td><td><u>Deliquescent</u> ✓</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(iv)</td><td>1) 1.2(0) ✓
2) 0.8(0) ✓</td><td>1
1</td><td></td></tr>
<tr><td></td><td></td><td>(v)</td><td>colourless (containing yellow particles)✓</td><td>1</td><td>ignore clear</td></tr>
<tr><td></td><td></td><td>(vi)</td><td>
<table>
<tr><td>1.17✓</td><td>1.18✓</td><td>1.2✓</td></tr>
<tr><td>22.5 ± 0.5✓</td><td>23.5 ± 0.5✓</td><td>25.5 ± 0.5✓</td></tr>
<tr><td><u>364.0 x 22.5</u> =
100</td><td><u>364.0 x 23.5</u> =
100</td><td><u>364.0 x 25.5</u> =
100</td></tr>
<tr><td>81.9(0) ✓✓</td><td>85.5(4) ✓✓</td><td>92.8(2) ✓✓</td></tr>
</table>
</td><td>4</td><td>allow ecf range 80.1 – 94.6
(22) (26)</td></tr>
</table>

Question			Answer	Marks	Guidance
	(c)		**Level 0 (0 marks)** Candidate includes fewer than **two** correct valid points **Level 1 (1–2 marks)** Candidate gives a **description** that shows some knowledge of experimental technique but not necessarily in a logical order. For 1 mark candidates should include two valid points. For 2 marks candidates should include at least three valid points. **Level 2 (3–4 marks)** Candidate gives a **description** of a workable experiment in a logical and ordered way but in less detail. For 3 marks candidates should include at least four valid points. For 4 marks candidates should include at least five valid points. **Level 3 (5–6 marks)** Candidate gives a **full description** of a workable experiment in a logical and well ordered way. For 5 marks candidates should include at least six valid points. For 6 marks candidates should include at seven valid points.	6	**valid points to include:** • Risk assessment/health & safety • Reference to filtering (to remove insoluble particles) • Place solution in a suitable named container (**ignore** test tube) • Suitable size mentioned ie 100 – 600 cm^3 • Reference to partially filling container • Heat /method of heating (to boiling) (**reject** heat to 300 - 350^oC) • Evaporate/reduce (to a small volume) • Leave to cool • Filter (to obtain crystals) • Leave to dry (in the air)/use of oven below 350^oC.
	(d)	(i)	Risk assessment/PPE/equipment must be clean ✓	1	
		(ii)	Fume cupboard/well ventilated area, as (sulfur dioxide) is a toxic/harmful/irritant gas ✓	1	Both the 'area' in the laboratory and a valid reason must be given for the mark **ignore** dangerous
		(iii)	0.25(4) ✓ 2.04/2.00✓	2	
		(iv)	Cleaning/washing ✓	1	**allow** sterilising

Question			Answer	Marks	Guidance
	(e)		1000 x 1000 =, 1 x 10^6/1 000 000/million✓	1	
	(f)	(i)	30 ✓	1	
		(ii)	70 ✓	1	**allow** ecf
	(g)		To show the end point of a titration ✓	1	**allow** 'to show finish/completion' **allow** neutralisation
	(h)	(i)	Plots correct ✓ Suitable straight line ✓	1 1	
		(ii)	**correct** extrapolation and **correct** reading ✓	1	**allow** 0.060 to 0.10 inclusive (plus or minus 1 square)
			Total	**36**	

Question			Answer	Marks	Guidance
2	(a)	(i)	Pick, flush/sample and test it/check, for insects/disease ✓	1	**ignore** reference to state of plant **allow** healthy
		(ii)	Take samples from different, plants/areas ✓	1	
		(iii)	A new flush grows/more growth ✓	1	
		(iv)	They prevent, decay/decomposition/rot/fungi/bacteria ✓	1	**ignore** reference to chemical reactions
	(b)	(i)	any **THREE** from Ease of use ✓ Effectiveness/reliability/efficiency/frequency(of insecticide) ✓ Concentration/quantity needed ✓ Health and safety considerations/toxicity ✓ Danger to animals/humans/beneficial insects ✓ Persistence/contact or systemic type/effect on tea taste✓ Environmental impact ✓ Availability ✓	3	**ignore** effect on plants/tea
		(ii)	When the insects are feeding/active/attack/around ✓	1	**ignore** reference to numbers of insects
		(iii)	any **ONE** from where to spray ✓ when to spray ✓ quantity/concentration of spray ✓ effectiveness of spray on insects ✓ to record concentration ✓ to monitor use/make comparisons ✓	1	**ignore** which to spray **ignore** effect on plants
		(iv)	any **ONE** from greater frequency ✓ more (concentrated) insecticide ✓ change insecticide ✓ change time ✓ method of application ✓	1	**allow** appropriate reference to faulty equipment
		(v)	Is it 1% of each or 1% in total?/ratio of oil to soap not specified /meaning of concentration/amounts not clear✓	1	**allow** is concentration mass/volume or mass/mass etc.

Question			Answer	Marks	Guidance
	(c)	(i)	Textbooks/**scientific** books/internet/suppliers (catalogues)/ label/ask expert ✓	1	
		(ii)	(amount) too small ✓	1	
		(iii)	any **ONE** from Time to take effect ✓ Time to degrade/to be removed✓ No longer harmful for consumption✓	1	
		(iv)	any **ONE** from (Safe) disposal ✓ (Safe) storage ✓	1	**ignore** dilution **ignore** poured away

Question			Answer	Marks	Guidance
	(d)	(i)	300 000 ✓	1	
		(ii)	75 000 ✓	1	**ecf** on (d) (i) (25% of answer to d(i))
	(e)	(i)	any **TWO** from Choose suitable filter ✓ Zero/reset instrument/use of water ✓ Use of standard solutions/plot calibration curves✓	2	
		(ii)	**Level 0 (0 marks)** Candidate includes fewer than **two** correct valid points **Level 1 (1–2 marks)** Candidate shows a basic understanding of the procedure. There is minimal structure in the presentation. For 1 mark candidates should include two valid points. For 2 marks candidates should include at least three valid points. **Level 2 (3–4 marks)** Candidate shows an understanding of the procedure. There is some structure to the presentation. For 3 marks candidates should include at least four valid points. For 4 marks candidates should include at least five valid points. **Level 3 (5–6 marks)** Candidate shows a high level of understanding and gives a full description of the correct procedure in a **logical** and well- structured way. Scientific terminology has been used correctly and appropriately. For 5 marks candidates should include at least six valid points. For 6 marks candidates should include at least seven valid points.	6	**valid points to include :** • Add tea bag to the (hot/boiling) water • Use of suitable named container **(ignore** cuvette) • Reference to size up to 500 cm^3 • Maintain constant temperature (use of water bath) • Use of clock • Stir the mixture • Remove samples at suitable time intervals • Allow samples to cool • Place (sample) in cuvette • Place (cuvette) into colorimeter and take reading • Record/compare results (**ignore** references to graphs)

Question			Answer	Marks	Guidance
		(iii)	Graph goes through origin ✓ Upward **curve** ✓ Curve becomes flatter/gradient reduced ✓	1 1 1	**allow** 1 square error curve to be drawn for 3 marks
	(f)		any **ONE** from (Carbon dioxide) is safe(r)/less harmful✓ Dichloromethane is toxic✓ (Carbon dioxide) recovery is easier ✓ (Carbon dioxide) more accessible✓	1	**ignore** quicker/easier/reference to taste **accept** ORA **ignore** dangerous
	(g)		biodegradable/(easily)decomposes/uses unbleached material /made into compost ✓	1	**allow** other realistic responses **ignore** unqualified recycling **ignore** synthetic
	(h)		100-93/7% 3.5 ✓✓ **ecf**	2	
			Total	**32**	

Question			Answer	Marks	Guidance
3	(a)	(i)	a bigger surface area (for extraction)/ expose the inside of the bud/easier/quicker extraction of oil ✓	1	**reject** references to a chemical reaction
		(ii)	Gases/vapours into liquids/condensation/condenses ✓	1	**allow** steam
		(iii)	(stops/relieves) **pressure** build up ✓ **Water** is forced up the tube (to release the pressure) ✓	2	
		(iv)	any **ONE** from needs recharging/stopping starting/cleaning✓ boiler needs refilling✓ time consuming ✓	1	**ignore** cost /more people/small amounts
		(v)	Any **TWO** from Remove stopper and open tap ✓ Run off dichloromethane layer until interface just reaches the tap/lower layer removed ✓ Close tap ✓	2	
		(vi)	Use an evaporating basin/beaker in a fume cupboard /distillation ✓ Use of water bath/controlled electrical heating ✓	2	
		(vii)	6 x 0.66 = 4 ✓ Spot drawn at 4 cm above start line ✓ **ecf** on calculation	2	**allow** 3.9 - 4-1
		(viii)	Repeat with a different solvent/adsorption medium✓	1	
		(ix)	Mr (of the compound is 204) ✓	1	**allow** molecular/molar mass
		(x)	Infrared/IR (absorption spectroscopy) ✓	1	
	(b)	(i)	Repeat it/reject/treat as an anomaly/outlier✓	1	
		(ii)	<u>82.0</u> ✓	1	

Question			Answer	Marks	Guidance
	(c)	(i)	87 ✓	1	**allow** values from 86 to 90 inclusive
		(ii)	It is a straight line graph/direct/linear relationship ✓	1	**allow** increase at a steady rate
	(d)	(i)	Any **THREE** from Volume/quantity of hexane ✓ Volume/quantity of ethanol ✓ Time of stirring ✓ Type of rose petal ✓ Type/method of filtration ✓ Temperature used ✓ Method of evaporation/heat✓ Where to evaporate/fume cupboard✓	3	**ignore** reference to safety precautions **ignore** solution 2 marks if reference to quantity of solvents
		(ii)	Recovery/reuse (of the solvent) ✓	1	**ignore** references to small amounts/lower temperature/scaling **ignore** references to rose petals
			Total	**22**	

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