

Mark Scheme (Results) January 2008

GCE

GCE Chemistry (6246) Paper 1A

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Using the mark scheme	
1	/ means that the responses are alternatives and either answer should receive full credit.
2	() means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
3	[] words inside square brackets are instructions or guidance for examiners.
4	Phrases/words in bold indicate that the meaning of the phrase or the actual word is essential to the answer.
5	ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(a)	Observation: green (1) Inference: d-block (1)	Transition series/metals		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(b)	Observation: white ppt in limewater (1) black (residue) (1) Inference: Carbon dioxide/CO ₂ (1) Carbonate/CO ₃ ²⁻ (1)	Goes cloudy/milky hydrogencarbonate /bicarbonate/ HCO ₃ ⁻		4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(c)	green solution and effervescence		CO ₂ evolved	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(d)(i)	Observation: Any blue ppt (1) (Deep/Dark) blue solution (1) Inference: copper(II)/ Cu ²⁺ / copper (2+) (1)		Copper/copper (II) hydroxide	3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(d)(ii)	Observation: Brown (precipitate) (1) Black (coloration) (1) Inference: Iodine / I ₂ (1) Redox (1)	Blue/black Oxidation/reduction of S/Cu ²⁺	Blue alone I Just "reduction"	4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(e)(i)	CuCO ₃	Cu(HCO ₃) ₂ cq on 1(b)	Copper carbonate	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(e)(ii)	O.N. in S: +2 (1) O.N. in product of test (d) (ii): +1 (1)	II/2/2+/Cu ²⁺ I/1/1+/Cu ⁺		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(a)	Observation: Orange/yellow ppt (1) Inference: Carbonyl/ $>C=O/C=O$ /aldehyde or ketone (Both needed) (1)	Orange/yellow solid	Goes orange/goes yellow	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(b)	Observation: Remains orange (1) Inference: Not oxidised (1) Ketone (1) No consequential marking	No change No (observable) reaction Not oxidisable/ not a reducing agent Allow "not aldehyde" if BOTH are given in (a)	"nothing"	3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(c)	$M^+ = 86$ (1)			1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(d)	2 environments for protons/hydrogen (atoms) (1)			1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(e)(i)	$ \begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & \text{H} & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & \text{H} & \text{H} & \end{array} $ (1)	$ \text{CH}_3\text{CH}_2 - \overset{\text{O}}{\underset{\text{O}}{\parallel}}{\text{C}} - \text{CH}_2\text{CH}_3 $		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(e)(ii)	Because there are 6 H atoms in one environment and 4 in the other the ratio of H atoms in different environments is 6:4 (1) Dependent on 2 (e) (i)			1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(a)	<p>Check subtractions and averaging arithmetic, correcting if necessary</p> <p>All volumes read to 0.05 cm³ (1)</p> <p>All subtractions complete (1) ✓✓ top RHS of Table 1</p> <p>Mean titre For correct averaging of chosen values/choosing identical values and for recording the average correct to 2 or 3 dps or to nearest 0.05 cm³ [unless already penalised] Allow loss of 2nd dp if zero ✓ by the mean titre (1)</p> <p>Accuracy</p> <p>If the candidate has made an arithmetical error in Table 1 volumes used in the mean or in averaging, the examiner must calculate a new average.</p> <ul style="list-style-type: none"> • For an averaging error simply calculate a new value using the candidate's chosen titres • If a wrongly subtracted titre has been used in the mean then choose any two identical titres or take an average of the closest two titres <p>Calculate the difference between the candidate's mean titre and that of the examiner or supervisor Record the difference on the scripts as d = ***</p> <p>Examiner's titre TO BE CONFIRMED BY LOCAL SUPERVISOR Examiner to write SR= titre value on each script</p> <p>Award marks for accuracy as follows:</p>	<p>Allow 1 slip but withhold this mark if any readings are in the wrong boxes Accept 0; 0.0; 0.00 as initial volume</p>	<p>Reject 50 as initial volume</p>	10

	Difference ± 0.20 (4) Difference ± 0.30 (3) Difference ± 0.40 (2) Difference ± 0.60 (1) Difference >0.60 (0)			
	<p>Range Award a mark on the range of titres used by the candidate to calculate the mean. The range (r) is the difference between the outermost titres used to calculate the mean. If the examiner has corrected titres because of incorrect subtraction then award the range mark on the corrected titres used by the examiner to recalculate the mean.</p> <p>Range ± 0.20 (3) Range ± 0.30 (2) Range ± 0.50 (1) Range > 0.50 (0)</p> <p>Examiner to show the marks awarded for accuracy and range as $d = \sqrt{4} \text{ max}$ $r = \sqrt{3} \text{ max}$</p>			

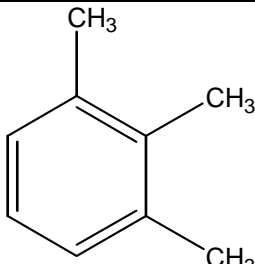
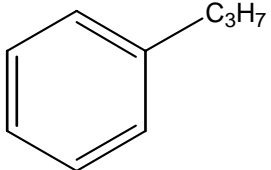
Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(b)	<p>Calculations</p> <p>Moles $\text{MnO}_4^- = 5.00 \times 10^{-4}$ (mol) (1) Moles of $\text{NO}_2^- = 1.25 \times 10^{-3}$ (mol) (1)</p> <p>Molar conc. = $\frac{1.25 \times 10^{-3}}{\text{titre}/1000}$ mol dm^{-3} (1)</p> <p>Mass conc. = molar conc. $\times 69 \text{ g dm}^{-3}$ (1) [cq. on third mark]</p>	Final answers to > 2 sig fig		4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(c)(i)	Blue solution (1) Brown gas (1)			2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(c)(ii)	titre value too low (1) Because NO ₂ lost / sodium nitrite decomposed (by acid) (1) Dependent on 3 (c) (i)	goes down/becomes smaller	Reject "titre wrong/ inaccurate"	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(a)	low hydrogen:carbon ratio	It is not C_nH_{2n+2} / Too few hydrogen atoms.		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(b)	equal masses/amounts (of C_9H_{12}) (1) react with bromine water/solution (1) expect equal volumes/amounts (1) for bromine colour to remain/until no more decolourisation (1)	Allow equal volumes		4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(c)	 <p>Or other isomers</p>			1