



2013 Chemistry

Standard Grade Credit

Finalised Marking Instructions

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General Marking Principles for Chemistry Standard Grade Credit

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader/Principal Assessor.
- (b) Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

GENERAL MARKING ADVICE: Chemistry Standard Grade Credit

The marking schemes are written to assist in determining the “minimal acceptable answer” rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates’ evidence, and apply to marking both end of unit assessments and course assessments.

1. Markers are reminded to read candidate responses **in their entirety**. If the candidate shows a clear understanding of the chemistry but does not use the exact words of the Marking Instructions they should still be given credit.
2. Markers are reminded that **no** comments are to be written on scripts. Comments such as ‘ARITH’, ‘ERROR’ and ‘BOD’ (Benefit of doubt) are **not** acceptable.
3. A guiding principle in marking is to give credit for (partially) correct chemistry rather than to look for reasons not to give marks.

Example: A student measured the pH of four carboxylic acids to find out how the strength is related to the number of chlorine atoms in the molecule. The results are shown.

Structural Formula	pH
CH ₃ COOH	1.65
CH ₂ ClCOOH	1.27
CHCl ₂ COOH	0.90
CCl ₃ COOH	0.51

How is the strength of the acids related to the number of chlorine atoms in the molecule?

Although not completely correct, an answer such as “the more Cl₂, the stronger the acid” should gain the full mark.

4. Marks should **not** be deducted for incorrect spelling or loose language as long as the meaning of the word(s) is conveyed.

Example: Answers like “hydrolic acid” (for “hydrochloric acid”) and “it gets hotter” (for “the temperature rises”) should be accepted.

However the example below would not be acceptable, as an incorrect chemical term, which the candidate should know, has been given.

Example: If the correct answer is “ethene”, and the candidate’s answer is “ethane”, this should not be accepted.

5. A right answer followed by a wrong answer should be treated as a cancelling error and no marks should be given.

Example: What is the colour of universal indicator in acid solution?

The answer “red, blue” gains no marks.

6. If a right answer is followed by additional information which does not conflict, the additional information should be ignored, whether correct or not.

Example: Why can the tube not be made of copper?

If the correct answer is “It has a low melting point”, and the candidate’s answer is “It has a low melting point and is coloured grey” this would **not** be treated as a cancelling error.

7. Full marks should be awarded for the correct answer to a calculation on its own; the part marks shown in the Marking Instructions are for use when working is given.
8. A half mark should be deducted in a calculation for each arithmetic slip.
9. A half mark should be deducted for incorrect or missing units **only when stated in the Marking Instructions**.
10. A half mark should be deducted for a transcription error.
11. Where a wrong numerical answer (already penalised) is carried forward to another step, no further penalty is incurred provided the end result is used correctly.
12. Ignore the omission of one H atom from a full structural formula provided the bond is shown.
13. A symbol or correct formula should be accepted in place of a name.
14. If an answer comes directly from the text of the question, no marks should be given.

Example: Why do ionic compounds, like copper chloride, conduct electricity when in solution?

No marks for “because they are ionic” since the word “ionic” appears in the text.

15. Unless the question is clearly about a non-chemistry issue, eg costs in industrial chemistry, a non-chemical answer gains no marks.

Example: Why does the (catalytic) converter have a honeycomb structure?

A response such as “to make it work” may be correct but it is not a chemical answer and the mark should not be given.

16. When formulae of ionic compounds are given as answers it will only be necessary to show ion charges if these have been specifically asked for. However, if ion charges are shown, they must be correct. If incorrect charges are shown, no marks should be awarded.
17. When it is very difficult to make a decision about a partially correct answer, a half mark can be awarded.
18. When marks have been totalled, a half mark should be rounded up.

**2013 Standard Grade Chemistry
Credit Level**

Marking Instructions for each Question

Question		Expected Answer/s	Max Mark
1	a	B	1 or 0
1	b	D	1 or 0
1	c	A	1 or 0
2	a	C	1 or 0
2	b	A, F	1 or 0
2	c	F	1 or 0
3	a	C	1 or 0
3	b	B,D	1 or 0
4	a	D	1 or 0
4	b	C,E	1 or 0
4	c	A,B	1 or 0
5		B,E	1 or 0
6	a	F	1 or 0
6	b	E	1 or 0
6	c	B,D	1 or 0
6	d	A,C	1 or 0
7		D,E	2 or 1 or 0
8		C,E	2 or 1 or 0

Please note that **NO HALF MARKS** are awarded in Part 1

For Qs 7 & 8 additional answers affect the marks awarded
2 correct and 1 incorrect answers would be worth 1 mark

e.g. Q7 A, D and E is worth **1**
A, B and E is worth **0**
A, B, D and E is worth **0**

Marking Instructions

Chemistry Standard Grade – Credit

Part 2

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
9 a	Fe^{2+} $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$ $\text{Fe} - 2\text{e}^- \rightarrow \text{Fe}^{2+}$ Fe^{+2} Ignore state symbols (-ve sign not needed for e)	1	Fe II 2^+ $\text{Fe}^{2+} + 2\text{e}^-$	
9 b	Hydroxide (4) OH^-	1	OH without negative HO^-	
9 c	It (Magnesium) gives electrons to iron Sacrificial protection Mg more reactive than Fe/higher in ECS/reactivity series It is more reactive/higher in ECS/reactivity series (or vice versa) ...it is above it in ECS/reactivity series	1	Magnesium provides a physical barrier It passes a charge to the iron "Sacrificial" on its own Very reactive ...it is below it....	transfer of ions/ physical protection/ magnesium rusting/ galvanising
9 d	Covalent	1	Ignore any mention of single, double, network, polar or molecular	

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
10 a i	63 Cu 29	1	63 Cu 29	
10 a ii	34	1		
10 b	64	1		

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
11 a i	Sodium phosphate	1	trisodium phosphate sodium(III) phosphate	
11 a ii	To replace/add/supply/provide essential elements/N or P or K/nutrients/to the soil (for plant growth/nutrients) Compounds containing N or P or K (check for solubility)	1	Soil fertility For healthy plant growth The essentials For plants to grow / crop yield Minerals Any mention of neutralisation/ pH /acidity	
11 b	Iron/Fe	1	Fe^{2+}	
11 c	Bacteria Accept rhizobium on its own Ignore any other name with bacteria Ignore nitrifying / nitrogen fixing / denitrifying with bacteria	1		


Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
12 a	36 to 126 °C	1		
12 b	0.716 – 0.720 inclusive	1		
12 c i	Carbon C Hydrogen H or H ₂	1 or 0	Carbon, hydrogen <u>and oxygen</u> C,H,O	
12 c ii	Hydrogen (gas) H ₂ Hydrogen peroxide H ₂ O ₂	1	H for hydrogen	H for hydrogen

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
13 a	Precipitation or neutralisation Precipitate	1	Exothermic Reduction / Oxidation / Redox	
13 b	As temperature increases the rate of the reaction (it) increases/gets faster/quicker As temperature decreases rate decreases/gets slower Rate increases as temperature increases Rate decreases/gets slower as temperature decreases	1	Any mention of time on its own Wrong cause and effect i.e. Temp increases as rate increases etc.	

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
14 a	SO_4^{2-} Can be circled on either side or both sides or identified in some other way	1		
14 b	$\text{Zn} \longrightarrow \text{Zn}^{2+} + 2\text{e}^-$ $\text{Zn} - 2\text{e}^- \longrightarrow \text{Zn}^{2+}$ Ignore state symbols (-ve sign not needed for e)	1		
14 c i	Zinc copper carbon or any metal below copper in ECS Zinc sulphate solution/ $\text{Zn}^{2+}(\text{aq})$ (or any other soluble zinc salt) or a solution containing ions of metals above zinc in ECS	1	Zn^{2+} on its own or with any other state symbol Zinc sulphate without solution Zinc solution	
14 c ii	To complete/finish the circuit/cell To allow ions to flow/move/transfer (between the two beakers) To carry the ions (between the two beakers) To provide ions to complete the circuit	1	To transfer ions from zinc to copper To carry the current To conduct electricity To allow electrons to flow through the wire on its own Any mention of electrons on their own Allow electricity to pass through /flow To connect (the) electrolytes To keep (the) circuit flowing To connect the circuit	Allow electrons to flow - unless specifically stated through the wire

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
15 a	$C_nH_{2n+2}O$ $C_nH_{2n+2}O_1$ $C_nH_{2n+1}OH$ (any order) Accept mathematically correct formulae ($O_{n/n}$)	1	$C_nH_{2n+2}O_n$	
15 b i	Carbon dioxide/ CO_2	1		
15 b ii	(Fractional) distillation or Correct description of distillation (evaporation and condensation)	1	fractionating evaporation on its own condensation on its own brewing distillery	
15 c	$ \begin{array}{cccc} H & H & H & O \\ & & & \\ H-C & -C & -C & -C-O-H \\ & & & \\ H & H & H & \end{array} $ -OH acceptable	1		
15 d	Pentyl butanoate pentylbutanoate	1	Anything else	

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
16 a	Heat alone (Reacting with) carbon Electrolysis	1 or 0		
16 b i	FM = 232.5 (1) 200.5/232.5 x 100 = 86.2% or 86% (1) 86.2% or 86% on its own 2 marks Use of atomic numbers max 1 mark, must have working to gain the mark, 83.3% Incorrect rounding (with working) $-(\frac{1}{2})$ Metal other than Hg max 1 mark	2		
16 b ii	Hg ²⁺ Hg ²⁺ S ²⁻ Hg ²⁺ S Ignore state symbols	1	Hg → Hg ²⁺ + 2e ⁻ Hg ²⁺ + 2e ⁻	

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
17 a	<p>Any suitable diagram showing symbols N,F and all outer electrons not just the shared pairs</p> <p>Cross dot (with or without circles) or similar type of diagram, lobes or petals</p> <p>2 non-bonding electrons need to be shown on N, but not in an overlap area</p> <p>Non-bonding electrons needn't be in pairs</p> <p>N and F symbols can be missed</p>	1		
17 b		1 or 0		

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
17 c	<p>1 mole N₂ = 28 g</p> <p>$7/28 = 0.25$ moles (½)</p> <p>0.25 to 0.5 (1 mole to 2 moles) (½)</p> <p>1 mole NF₃ = 71 g (½ for both formula masses)</p> <p>$71 \times 0.5 = \underline{35.5}$ (½)</p> <p>35.5 on its own 2 marks</p> <p>1 : 2 (½) 28 : 142 (½)</p> <p>1 → 142/28 (½)</p> <p>7 → $142 \times 7/28 = \underline{35.5}$ (½)</p> <p>or any other acceptable method</p>	2	<p>Use of any atomic number maximum 1 mark <u>if working is shown</u>.</p> <p>If no working is shown then zero marks.</p> <p>(Possible answers using atomic numbers in one or both formula masses: 34 g, 71 g, 17 g.)</p> <p>Using 2NF₃ as 2N and 3F to calculate FM (85) max 1 mark</p> <p>28 → 85 7 → 21.25</p>	

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
18 a i	Both labels with units ½ mark Both scales ½ mark Plots correct (allow one error and ½ box tolerance) ½ mark Plots joined ½ mark Max 1 mark if bar graph/spike graph drawn Deduct ½ mark if <u>less than</u> half of graph area is used Max 1 mark if instead of scales the numbers in the table are applied directly to the axes If 0,0 is <u>not plotted</u> or <u>joined</u> the usual rules apply and the candidate loses ½ mark Join the dots is accepted Missing points with a freehand curve OK	2		
18 a ii	37 cm ³	1 or 0		
18 b i	(n = c x V) n = 0.05 x 0.02 (½) n = <u>0.001</u> (½) If 20 cm ³ used in place of 0.02 (-½) Using wrong substance i.e. 0.025 (-½)	1	n = c x V on its own 1 on its own zero marks 0.01 on its own zero marks 25 cm ³ used as volume zero marks	

Question	Acceptable Answers	Mark	Unacceptable Answers	Negates
18 b ii	<p>Apply mole ratio 1:1</p> <p>0.001 \longrightarrow 0.001 (½)</p> <p>0.001 = c x 0.025</p> <p>c = <u>0.04</u> (½)</p> <p>allow for follow through from (b) (i)</p> <p>Don't penalise for non-conversion to litres here if already penalised in (b) (i)</p> <p>PVC method can give an answer for b (ii) even if b (i) is wrong or blank ... if correct 1 mark for b (ii)</p> <p>If 25 cm³ used in place of 0.025 (-½) mark</p> <p>Using wrong substance i.e. 0.020 (-½) mark</p>	1	20 cm ³ used as volume zero marks	
18 c	<p>Sodium sulphate Na₂SO₄</p> <p>Check the name is not -ite or -ide</p> <p>Ignore charges</p>	1	Sulphuric carbonate	

[END OF MARKING INSTRUCTIONS]