

2004 Chemistry

Intermediate 2

Finalised Marking Instructions

Intermediate 2 Chemistry

General information for markers

The general comments given below should be considered during all marking.

- 1 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 'distiling' (for 'distillation') and 'it gets hotter' (for 'the temperature rises') should be accepted.

- 2 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.

- 3 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 related to 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 having a cancelling error.

- 4 Full marks should be awarded for the correct answer to a calculation on its own; the part marks shown in the marking scheme are for use when working is given.

- 5 A half mark should be deducted in a calculation for each arithmetic slip **unless stated otherwise in the marking scheme.**

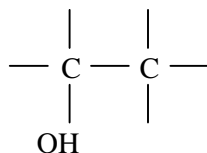
- 6 A half mark should be deducted for incorrect or missing units **only when stated in the marking scheme.**

- 7 Where a wrong numerical answer (already penalised) is carried forward to another step, no further penalty is incurred provided the result is used correctly.

- 8 Ignore the omission of one H atom from a full structural formula provided the bond is shown.

- 9 With structures involving an -OH or an -NH₂ group, a half mark should be deducted if the 'O' or 'N' are not bonded to a carbon, i.e. OH-CH₂ and NH₂-CH₂.

- 10 When drawing structural formulae, a half mark should be deducted if the bond points to the 'wrong' atom, eg

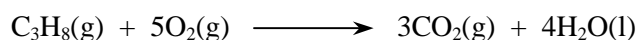


- 11 A symbol or correct formula should be accepted in place of a name **unless stated otherwise in the marking scheme.**

- 12 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.

13 If an answer comes directly from the text of the question, no marks should be given.

Example: A student found that 0.05 mol of propane, C₃H₈ burned to give 82.4 kJ of energy.

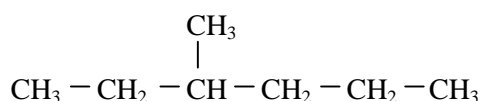


Name the kind of enthalpy change which the student measured.

No marks should be given for 'burning' since the word 'burned' appears in the text.

14 A guiding principle in marking is to give credit for (partially) correct chemistry rather than to look for reasons not to give marks.

Example 1: The structure of a hydrocarbon found in petrol is shown below.



Name the hydrocarbon.

Although not completely correct, the answer '3, methyl-hexane' should gain the full mark ie ignore wrong use of commas and dashes.

Example 2: A student measured the pH of four carboxylic acids to find out how their 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.

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 it is very difficult to make a decision about a partially correct answer, a half mark can be awarded.

17 When marks have been totalled, a half mark should be rounded up.

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Marking scheme

Section A

1.	D	11.	A	21.	D
2.	A	12.	C	22.	C
3.	B	13.	B	23.	B
4.	C	14.	C	24.	A
5.	A	15.	B	25.	D
6.	D	16.	B	26.	A
7.	A	17.	B	27.	D
8.	B	18.	D	28.	B
9.	C	19.	C	29.	D
10.	C	20.	A	30.	A

Section B

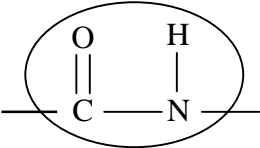
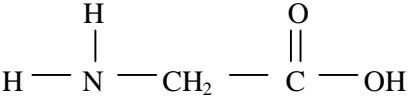
Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
1 (a)	(i) $\begin{array}{c} 81 \\ \text{Br} \\ 35 \end{array}$	1		$\begin{array}{c} 35 \\ \text{Br} \\ 81 \end{array}$
	(ii) 46 neutrons	1		
(b)	The percentages of each isotope are equal/ the same / both 50%	1		
2 (a)	$2\text{CO}(\text{g}) + 2\text{NO}(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + \text{N}_2(\text{g})$ (multiples acceptable)	1		
(b)	The catalyst is in a different state from the reactants	1		

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
3 (a)	Sealed system consisting of test tube with two holed stopper and inlet and outlet tubes (½ mark). Inlet tube below level of limewater (½ mark). Outlet tube above limewater and connected to pump (½ mark) Limewater labelled (½ mark)	2		
(b)	Water; H ₂ O	1		
(c)	Incomplete combustion or not enough oxygen/air to burn completely or not burning fully	1		
4 (a)	A diagram showing the outer electrons with one pair of shared electrons (Either a dot and cross or a "balloon" type would be acceptable).	1		
(b)	Polar	1		

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
5 (a)	$\begin{array}{c} \text{H} \quad \text{O} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{N}-\text{C}-\text{N}-\text{H} \end{array}$ <p>[$\begin{array}{c} \text{O} \\ \\ -\text{C}- \end{array}$ must be shown as extended form]</p>	1		
(b)	0.5 mole	1	1 mole = 60 g	
(c)	<p>(i) x and y axes correctly labelled (½ mark) x and y axes correctly scaled (½ mark) points correctly plotted to a tolerance of ½ scale division (½ mark) line drawn (½ mark) (penalty of ½ if less than half graph paper used in either direction) [minimum label for x-axis is “concentration (mol^l⁻¹)”]</p> <p>(ii) Answer consistent with candidate's graph to ± 0.01 [expected answer 0.22 ± 0.01]</p>	2 1		

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
6 (a)	$2\text{OH}^-(\text{aq}) + 2\text{H}^+(\text{aq}) \longrightarrow 2\text{H}_2\text{O}(\text{l})$ [states not required] $\text{OH}^- + \text{H}^+ \longrightarrow \text{H}_2\text{O}$ acceptable	1		
(b)	It will turn it blue or blue/purple	1		
(c)	It can be used as a fertiliser/smelling salts	1		
7 (a)	Three labels correct	1	Two labels correct	
(b)	The delivery tube should be removed from the bromine solution	1	Prevent suckback	

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
8 (a)	Neutralisation	1		
(b)	$\text{FeO} \longrightarrow \text{FeSO}_4$ $1 \text{ mole} \longrightarrow 1 \text{ mole } (\frac{1}{2})$ $72 \text{ g} \longrightarrow 152 \text{ g } (\frac{1}{2})$ $144 \text{ g} \longrightarrow 304 \text{ g}$ $144 \text{ kg} \longrightarrow 304 \text{ kg } (1)$	2	An answer of 313.4 g obtained using atomic numbers would be worth 1 mark	
9 (a) & (b)	<p style="text-align: right;">½ mark</p> <p style="text-align: right;">½ mark</p> <p style="text-align: right;">(b) 1 mark</p>	2 1		
(c)	An acid which is completely dissociated into ions in water	1	Contains more hydrogen ions	

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
10 (a)	Amino acids	1		
(b) (i)		1		
(b) (ii)		1	Either end of monomer correctly completed	
(c)	The papain is denatured/destroyed by high temperatures	1		
11 (a)	Condensation or esterification	1		
(b) (i)	Hydrogen or H ₂	1		
(b) (ii)	Sugar cane/sugar	1		

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
12 (a)	$2\text{Cl}^- + 2\text{H}_2\text{O} \longrightarrow \text{Cl}_2 + 2\text{OH}^- + \text{H}_2$	1	Equations combined with electrons still shown on each side	
(b)	Hydroxide ions are repelled by the negatively charged groups on the PTFE membrane	1	negatively charged groups like charges repel	
(c)	Thermoplastics	1		
13 (a)	Molecular/discrete	1		
(b)	Carbon, nitrogen and hydrogen	1	Any two correct	Any mention of oxygen

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
14 (a)	2,4,6	1		
(b)	When the solution in the flask turns blue-black or When the tile is obscured or When colour changes sharply or When the cross is obscured	1		
(c)	The reaction rate is too slow or Change too slow to distinguish end point	1		
(d)	$\text{Na}_2\text{S}_2\text{O}_8$ or $(\text{Na}^+)_2\text{S}_2\text{O}_8^{2-}$	1		

Question	Acceptable Answer	Mark	Worth 1/2	Worth 0
15 (a)	(i) Electrons flow onto the ship from the negative terminal of the power source	1		
	(ii) It contains ions/it is an electrolyte/it acts as an ion bridge	1	It contains dissolved salts	It is salty
(b)	Painting or sacrificial protection or attaching blocks of zinc/magnesium to the hull	1		
16 (a)	Universal or pH indicator or named pH indicator	1	An indicator	
(b)	$ \begin{array}{l} \text{1 mole reacts with 1 mole} \\ \text{vol * concn (alkali) = vol * concn (acid)} \left. \vphantom{\begin{array}{l} \text{1 mole reacts with 1 mole} \\ \text{vol * concn (alkali) = vol * concn (acid)} \end{array}} \right\} (\frac{1}{2}) \\ 24.6 * 0.1 \quad \quad \quad = 20 * \text{concn (acid)} \quad (\frac{1}{2}) \end{array} $			
	<hr style="border-top: 1px dashed black;"/> Acid Concentration = <u>0.123</u> mol l ⁻¹ (1)	2		

[END OF MARKING INSTRUCTIONS]