



**2007 Chemistry**

**Intermediate 2**

**Finalised Marking Instructions**

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## 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 'distilling' (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**.

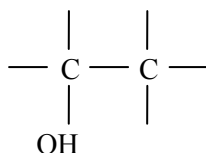
- 6 A half mark should be deducted for incorrect or missing units **only when stated in the marking scheme**.

- 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 – NH<sub>2</sub> group, a half mark should be deducted if the 'O' or 'N' are not bonded to a carbon, ie OH–CH<sub>2</sub> and NH<sub>2</sub>–CH<sub>2</sub>.

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

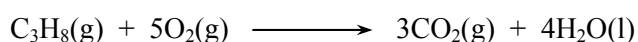


- 11 A symbol or correct formula should be accepted in place of a name **unless stated otherwise in the marking scheme**.

- 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, C<sub>3</sub>H<sub>8</sub> burned to give 82.4 kJ of energy.

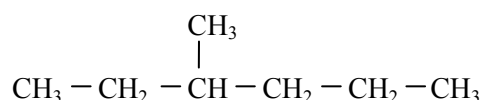


Name the kind of enthalpy change which the student measured.

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 <sub>3</sub> COOH	1.65
CH <sub>2</sub> ClCOOH	1.27
CHCl <sub>2</sub> COOH	0.90
CCl <sub>3</sub> 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 Cl<sub>2</sub>, 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.

## 2007 Chemistry Intermediate 2

### Marking Scheme

#### Section A

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

Marking Instructions

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Section B

Question	Acceptable Answer	Mark	Worth $\frac{1}{2}$	Worth 0
1 (a)	1 0/Zero (no charge/neutral) Electron -/negative	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$		
(b) (i)	2 (accept number of protons)	1 or 0		-2
(ii)	X	1 or 0		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
2 (a)	1.45 1.5 (with full working)	1 or 0	29-0/20 1.5 (no working) from graph 28-0/20 from graph 30-0/20	
(b) (i)	Reactant and catalyst are in the same state They are in the same state	1		Any mention of product
(b) (ii)	Amber Would be the same	1		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
3 (a)	Delocalised (free) electrons Electrons are free to move Electrons can pass through	1 or 0	Charged particles are free to move	Ions Contains electrons Particles
(b) (i)	Neutralisation	1 or 0		
(b) (ii)	(Polar) Covalent	1 or 0	Polar	

Question	Acceptable Answer	Mark	Worth ½	Worth 0
4 (a)	(i) (aq)	1 or 0		
	(ii) (Burning splint) burns with a pop/squeak	1 or 0		Any mention of glowing splint
(b)	1 mole $\longrightarrow$ 1 mole 24.3g $\longrightarrow$ 2g 4.9g $\longrightarrow$ $4.9/24.3 \times 2$ = 0.4g	½ ½ ½ ½	4.9/24.5 = 0.2 <b>1 mark</b>	10g if no working shown

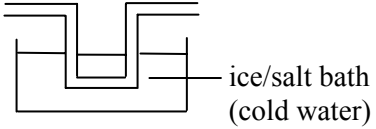


Question	Acceptable Answer	Mark	Worth ½	Worth 0
5 (a)	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{S}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array} \quad \begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{SH} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	1 or 0	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{HS} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	Two slips – missing 'H' atom and bond
(b)	2-methylpropane-1-thiol 2methylpropane-1-thiol 2methylpropane 1 thiol  (or any of the above without the 2)	1		propanethiol
(c)	Sulphur dioxide/SO <sub>2</sub>	1	Oxides of sulphur Sulphur oxides	Sulphur

Question	Acceptable Answer	Mark	Worth $\frac{1}{2}$	Worth 0
6 (a)	Saturated Bromine decolourises No change Unsaturated	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$		
(b)	Safety gloves Wash off any spills with sodium thiosulphate	<b>1 or 0</b>		Any general safety consideration eg Tie hair back
(c)	Hexene or any isomer of hexene with double bond	<b>1</b>		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
7 (a)	Carbon to carbon double bond Double bond	1 or 0		Functional group
(b)	$  \begin{array}{cccccc}  \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\    &   &   &   &   &   \\  \sim\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}\sim \\    &   &   &   &   &   \\  \text{C}_6\text{H}_5 & \text{H} & \text{C}_6\text{H}_5 & \text{H} & \text{C}_6\text{H}_5 & \text{H}  \end{array}  $	1	$  \begin{array}{cccccc}  \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\    &   &   &   &   &   \\  \sim\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}\sim \\    &   &   &   &   &   \\  \text{C}_6\text{H}_5 & \text{H} & \text{C}_6\text{H}_5 & \text{H} & \text{C}_6\text{H}_5 &   \end{array}  $	2 hydrogens missing
(c)	Poly (phenylethene) Polyphenylethene	1 or 0		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
8 (a)	$2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$ or multiples of $2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$	1 or 0		
(b)	(i) Labelling axes Correct scales Plotting points Drawing line  (ii) Enzyme has been denatured/destroyed/changes shape Enzyme can't function/doesn't work	½ ½ ½ ½  1 or 0		Enzyme has been killed Passed optimum temp


Question	Acceptable Answer	Mark	Worth ½	Worth 0
9 (a)	 <p data-bbox="427 536 757 568">No penalty for closed tubes</p>	1	If apparatus correct but not labelled	
(b)	<p data-bbox="427 603 1016 703">Carbon dioxide dissolves to form an acid solution In solution carbon dioxide is acidic Strong acid/weak acid – no penalty</p>	1		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
10 (a)	$\begin{array}{c} \text{O} \quad \text{H} \\ \parallel \quad   \\ -\text{C}-\text{N}- \end{array}$	1 or 0		
(b)	$\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ -\text{N}-\text{C}-\text{C}- \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ -\text{N}-\text{C}-\text{C}-\text{O}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ -\text{N}-\text{C}-\text{C}-\text{N}- \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ \text{N}-\text{C}-\text{C}-\text{H} \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	1 or 0	$\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ -\text{N}-\text{C}-\text{C}- \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ -\text{N}-\text{C}-\text{C}-\text{O} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{O} \\   \quad \parallel \\ -\text{N}-\text{C}-\text{C}-\text{O}-\text{H} \\   \quad   \\ \text{H} \quad \text{CH}_3 \end{array}$ (Adding Als ½)	
(c)	Condensation	1 or 0		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
<b>11 (a)</b>	Iron loses electrons to the copper Electrons 'flow' from iron to copper Iron gives sacrificial protection to copper	<b>1 or 0</b>	Iron is higher up	Any mention of ions
<b>(b)</b>	Seawater contains ions (which acts as an electrolyte) It is a better electrolyte Contains more ions	<b>1 or 0</b>		Contains salt Better conductor
<b>(c)</b>	$\text{Fe}_2\text{O}_3$ $(\text{Fe}^{3+})_2 (\text{O}^{2-})_3$	<b>1 or 0</b>		Wrong ionic formula

Question	Acceptable Answer	Mark	Worth ½	Worth 0
12 (a)	Electrode A Positive electrode	1 or 0		
(b)	$2\text{Na}^+ + 2\text{H}^+ \rightarrow 2\text{Na} + \text{H}_2$	1 or 0	$2\text{Na}^+ + 2\text{H}^+ + 2\text{e}^- \rightarrow 2\text{Na} + \text{H}_2 + 2\text{e}^-$	
(c)	higher higher	½ ½		



Question	Acceptable Answer	Mark	Worth ½	Worth 0
<b>13 (a) (i)</b>	2 or  2,0	<b>1 or 0</b>		20
<b>(ii)</b>	Lithium atoms are too/very reactive Lithium ions are more stable/less reactive	<b>1 or 0</b>		
<b>(b)</b>	The further apart the metals are from copper the greater the voltage The higher in the ECS the metal is, the greater the voltage The more reactive the higher the voltage	<b>1 or 0</b>		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
<b>14 (a)</b>	Chlorine Carbon dioxide Distillation Magnesium chloride	½ ½ ½ ½		
<b>(b) (i)</b>	3.6g	<b>1</b>	$\frac{45}{100} \times 8$	
<b>(ii)</b>	0.075 (0.08 rounding up)  Allow for error to be carried forward	<b>1</b>	$\frac{3 \cdot 6}{48}$ $\frac{8}{48} = 1.66$ – only if no answer in b(i)	

Question	Acceptable Answer	Mark	Worth ½	Worth 0
15 (a)	Sulphuric acid/H <sub>2</sub> SO <sub>4</sub> Or correct formula	1 or 0		Incorrect formula
(b) (i)	To remove unreacted magnesium To remove any solid (or residue) which is left over To make sure no solid is left over	1 or 0		Precipitate To get pure solution Crystallisation
(b) (ii)	Evaporation/boil off water	1 or 0		
(c)	The energy of the products is less than the reactants Energy decreases from reactants to products therefore energy is lost Reactants have higher chemical energy	1 or 0		Definition of exothermic is not acceptable

[END OF MARKING INSTRUCTIONS]