

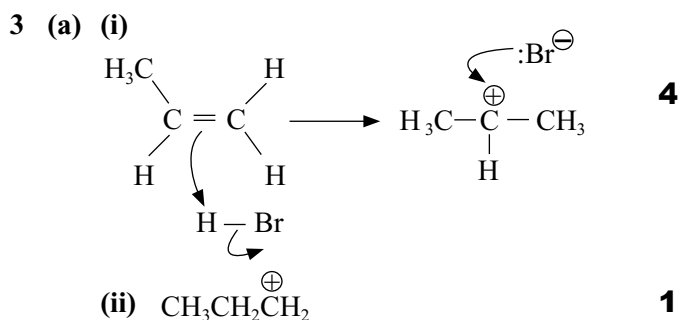
Answers to examination-style questions

Answers	Marks	Examiner's tips
<p>1 (a) <i>molecular formula:</i> C₄H₈ <i>empirical formula:</i> CH₂</p>	1 1	This is a revision of earlier chapters.
<p>(b) (i) <i>name of mechanism:</i> electrophilic addition</p>	1	Remember that reactions of alkenes are electrophilic addition.
	4	In the mechanism the δ ⁺ /δ ⁻ is on the HBr. You will not get a mark for this so you can leave them out. However if the δ ⁺ /δ ⁻ is the wrong way round then you will lose a mark.
<p>(ii) <i>structure:</i></p>	1	
<p><i>explanation:</i> major product formed via tertiary carbocation or minor product formed via primary carbocation primary carbocation less stable than tertiary carbocation</p>	1 1	
<p>(c) <i>Isomer 1</i> <u>either order</u> <i>Isomer 2</i></p>		
<p><i>name:</i> Z-but-2-ene <i>name:</i> E-but-2-ene</p>		If the two big groups are on the same side it is Z.
<p>2 (a) curly arrow <u>from lone pair</u> on oxygen of hydroxide ion to H atom on C-H adjacent to C-Br</p>	1	
<p>curly arrow <u>from single bond</u> of adjacent C-H to <u>adjacent single bond</u> C-C</p>	1	
<p>curly arrow <u>from C-Br bond</u> to side of Br atom</p>	1	You can get the last mark here even if you can't get the first two right.

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- (b) (i) curly arrow from middle of C=C bond to H atom on H-Br **1**
 curly arrow from middle of H-Br bond to side of Br atom **1**
 correct structure for correct secondary carbocation **1**
 curly arrow from lone pair on bromide ion to the positive carbon of carbocation, ensuring that bromide ion has a negative charge. **1**
- (ii) 2-bromopentane is formed via the secondary (or 2°) carbocation **1**
 a secondary carbocation is more stable than a primary carbocation **1**

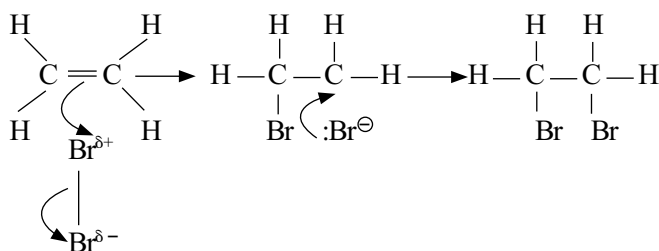


One mark will be penalised if polarity is included incorrectly, e.g. bond is shown as \rightarrow or \leftarrow or δ^+/δ^- is wrong way round.

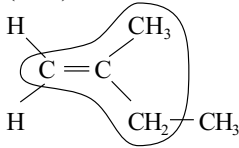
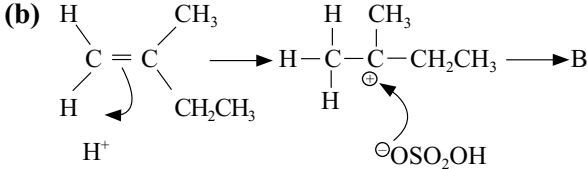
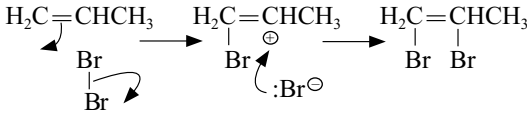
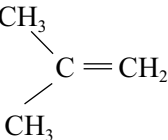
- 4 (a) (i) the joining together of monomers / small molecules **1**
 to form long chains / large molecules **1**
- (ii) $n\text{CH}_2=\text{CH}_2 \rightarrow (\text{CH}_2-\text{CH}_2)_n$ **1**

Allow $n\text{CH}_2\text{CH}_2$ on the left but not $n\text{C}_2\text{H}_4$. Try to remember that the n on the left here shows that there are n molecules of ethene and the n on the bottom right of the polymer outside the bracket shows the repeating unit, n times long.

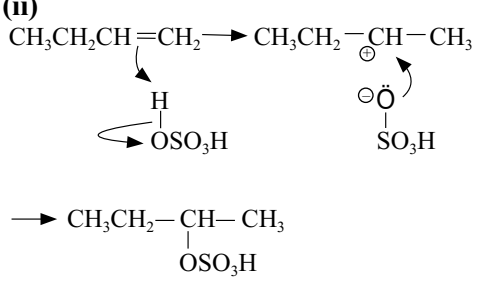
- (b) 1,2-dibromoethane **1**
- (c) electrophilic addition **1**



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words or diagrams to show attack by electrons from double bond onto Br atom and either δ^+/δ^- on Br_2 or electron shift on $\text{Br}-\text{Br}$	1	
correct carbocation intermediate	1	
attack by Br^- onto +ve carbon leading to correct product	1	
arrow from Br^- must come from a lone pair ($:\text{Br}^-$)	1	
5 (a) 	1	You may circle the 4 C's separately.
(b) 	4	The curly arrow goes from the centre of the double bond to the H^+ ion. Also you must show the lone pair on the O: and the curly arrow goes from the lone pair to the + ion.
(c) reagent: H_2O or water or steam	1	
6 (a) electrophile: electron pair / lone pair acceptor or electron-deficient species	1	A species can be an atom, molecule or ion, but not a + ion.
addition: reaction which increases number of substituents or converts a double bond to single bond	1	
(b) mechanism: 	4	Don't forget that the curly arrow shows from where the pair of electrons flow, i.e from the middle of the double bond to the δ^+ on the Br. Then, the lone pair (which must be shown) on the Br^- flows towards the + on the carbon giving the product.
name of product: 1,2-dibromopropane	1	
(c) addition	1	
7 (a) (i) but-1-ene	1	
(ii) two H on one carbon of double bond	1	
(iii) $\text{CH}_3\text{CH}=\text{CHCH}_3$	1	
(iv) 	1	

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(b) (i) electrophilic addition	1	Both words are needed.
(ii) 	1	
(iii) via more stable carbocation which is secondary	1 1	