



11 Alkenes are a homologous series of unsaturated hydrocarbons (unsaturated = at least one double bond)

- are used to make polymers and alcohols
- are insoluble in water
- contain the C=C double bond functional group
- can be represented by the general formula C_nH_{2n}

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12a 13a Straight-chain alkenes can be drawn. The position of the double bond must be indicated in the name for alkenes with four or more carbons in the main chain.

Alkene	Molecular Formula	Shortened Formula	Structural Formula
Ethene	C_2H_4	$CH_2=CH_2$	<pre> H-C=C-H H H </pre>
Propene	C_3H_6	$CH_3CH=CH_2$	<pre> H H-C-C=C-H H H H </pre>
But-1-ene	C_4H_8	$CH_3CH_2CH=CH_2$	<pre> H H H-C-C-C=C-H H H H H </pre>
But-2-ene	C_4H_8	$CH_3CH=CHCH_3$	<pre> H H H H H-C-C=C-C-H H H H H </pre>
Pent-1-ene	C_5H_{10}	$CH_3CH_2CH_2CH=CH_2$	<pre> H H H H-C-C-C-C=C-H H H H H </pre>
Pent-2-ene	C_5H_{10}	$CH_2CH=CHCH_2CH_3$	<pre> H H H H H-C-C=C-C-C-H H H H H </pre>
Hex-1-ene	C_6H_{12}	$CH_3CH_2CH_2CH_2CH=CH_2$	<pre> H H H H H-C-C-C-C-C=C-H H H H H </pre>
Hex-2-ene	C_6H_{12}	$CH_3CH_2CH_2CH=CHCH_3$	<pre> H H H H H H-C-C-C-C=C-C-H H H H H </pre>
Hex-3-ene	C_6H_{12}	$CH_3CH_2CH=CHCH_2CH_3$	<pre> H H H H H-C-C-C=C-C-C-H H H H H </pre>
Hept-1-ene	C_7H_{14}	$CH_3CH_2CH_2CH_2CH_2CH=CH_2$	<pre> H H H H H H-C-C-C-C-C-C=C-H H H H H </pre>
Oct-1-ene	C_8H_{16}	$CH_3CH_2CH_2CH_2CH_2CH_2CH=CH_2$	<pre> H H H H H H H-C-C-C-C-C-C-C=C-H H H H H </pre>

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12b 13b Alkenes with branches can be drawn:

<pre> H H H-C-C=C-C-H H H H </pre> <p>2-methylbut-2-ene</p>	<pre> H H H-C=C-C-C-H H H H </pre> <p>2-methylbut-1-ene</p>	<pre> H H H H-C=C-C-C-C-H H H H </pre> <p>3-methylbut-1-ene</p>
<pre> H H H H-C-C=C-C-C-H H H H H </pre> <p>2,3-dimethylbut-2-ene</p>	<pre> H H H H-C=C-C-C-C-H H H H H </pre> <p>3,3-dimethylbut-1-ene</p>	<pre> H H H H-C=C-C-C-H H H H </pre> <p>methylpropene</p>

☹️ ☺️ ☺️

	JAB chem	National 5 Chemistry Unit 2.1c Alkenes		JAB chem	Lesson	Traffic Light					
						Red	Red	Red			
14a 15a		Alkenes undergo addition reactions with hydrogen forming alkanes, known as hydrogenation.									
		$ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & & & \text{H} \end{array} $	+	$\text{H}-\text{H}$	\rightarrow	$ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $		☹	☹	☺	
		C_4H_8		H_2	\rightarrow	C_4H_{10}					
14b 15b		Alkenes undergo addition reactions with halogens forming dihaloalkanes									
		$ \begin{array}{cccc} \text{H} & \text{H} & & \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $	+	$\text{Br}-\text{Br}$	\rightarrow	$ \begin{array}{cccc} \text{H} & \text{H} & \text{Br} & \text{Br} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $		☹	☹	☺	
		C_4H_8		Br_2	\rightarrow	$\text{C}_4\text{H}_8\text{Br}_2$					
14c 15c		Alkenes undergo addition reactions with water forming alcohols, known as hydration.									
		$ \begin{array}{cccc} \text{H} & \text{H} & & \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $	+	$\text{H}-\text{O}-\text{H}$	\rightarrow	$ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{OH} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $ or $ \begin{array}{cccc} \text{H} & \text{H} & \text{OH} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $		☹	☹	☺	
		C_4H_8		H_2O	\rightarrow	$\text{C}_4\text{H}_9\text{OH}$					

Nat5 Traffic Lights	<h2 style="margin: 0;">Past Paper Question Bank</h2> <h3 style="margin: 0;">Unit 2.1c Alkenes</h3>	
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Outcome	Original Specimen Paper	New Specimen Paper	Nat5 2014	Nat5 2015	Nat5 2016	Nat5 2017	Nat5 2018	Nat5 2019	Nat5 2020	Nat5 2021						
11						L12a										
12a 13a																
12b 13b				L12a												
14a 15a					mc11			L5b(i)								
14b 15b		L10c			L8c(i) L8c(ii)			L5b(ii)								
14c 15c	L8b(i) L8b(ii)	L8c(i) L8c(ii)		L12c			mc12	mc15								

Nat5	Answer	% Correct	Reasoning
2016 <small>MC</small> 11	B	75	<input checked="" type="checkbox"/> A side groups cannot be placed on C ₁ (side groups must be on middle carbons) <input checked="" type="checkbox"/> B 5 carbons in main chain with C=C bon between C ₁ & C ₂ and -CH ₃ groups on C ₂ & C ₃ <input checked="" type="checkbox"/> C C=C double bond must be given lowest numbering system <input checked="" type="checkbox"/> D same numbering system must be used at all times (starting on right here)
2018 <small>MC</small> 12	C	-	<input checked="" type="checkbox"/> A Hydrogenation: Adding hydrogen across a C=C double bond to form alkane <input checked="" type="checkbox"/> B Combustion: burning compound in oxygen to form CO ₂ and H ₂ O <input checked="" type="checkbox"/> C Hydration: Adding H ₂ O across C=C double bond to form alcohol <input checked="" type="checkbox"/> D Reduction: Gaining electrons
2019 <small>MC5</small> 15	A	-	<input checked="" type="checkbox"/> A Oct-2-ene produces two products on hydration (octan-2-ol and octan-3-ol) <input checked="" type="checkbox"/> B Hex-3-ene produces one product on hydration (hexan-3-ol) <input checked="" type="checkbox"/> C But-2-ene produces one product on hydration (butan-2-ol) <input checked="" type="checkbox"/> D Ethene produces one product on hydration (ethanol)

Nat5	Answer	Reasoning
2015 12a	but-2-ene	<p style="text-align: center;">but - 2 - ene</p> <p style="text-align: center;"> </p> <p style="text-align: center;">4 carbons C=C on 2nd carbon C=C double bond</p>
2015 12c	Any structure of 3-methylpent-2-ene or 2-ethylbut-1-ene	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> $\begin{array}{ccccccc} & \text{H} & & \text{H} & \text{H} & & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} = \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & & & & \\ & \text{H} & & \text{H} & & \text{H} & & \text{H} & & \\ & & & & & & & & & \\ & & & & & \text{H} - \text{C} - \text{H} & & & & \\ & & & & & & & & & \\ & & & & & \text{H} & & & & \\ \end{array}$ <p>3-methylpent-2-ene</p> </div> <div style="text-align: center;"> <p>or</p> $\begin{array}{ccccccc} & \text{H} & \text{H} & & \text{H} & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & & & & & & \\ & \text{H} & \text{H} & & \text{H} & \text{H} & & \text{H} & & \text{H} & & \\ & & & & & & & & & & & \\ & & & & & \text{CH}_2 & & & & & & \\ \end{array}$ <p>2-ethylbut-1-ene</p> </div> </div>
2016 8c(i)	addition	<p>Bromine add across a C=C double bond in an addition reaction</p> $ \begin{array}{ccccccc} & \text{H} & \text{H} & & + & \text{Br}_2 & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & = & \text{C} & - & \text{H} & \longrightarrow & \begin{array}{ccccccc} & \text{H} & \text{H} & \text{Br} & \text{Br} & & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} & & \end{array} \end{array} $
2016 8c(ii)	C ₁₀ H ₁₆ Br ₄	<p>Limonene has two C=C double bonds and 2 molecules of Br₂ will be added to the limonene molecule: C₁₀H₁₆ + 2Br₂ → C₁₀H₁₆Br₄</p>
2017 12a	C=C double bond or -OH group	<p>C=C double bonds are the functional groups found in alkenes Hydroxyl -OH groups are the functional group found in alcohols</p>
2019 5b(i)	Hydrogenation	<p>The addition of hydrogen across C=C double bond is known as hydrogenation. The addition of water across C=C double bond is known as hydration.</p>
2019 5b(ii)	Chlorine	<p>Two chlorine atoms have joined across the location of where the C=C double bond used to be. Cl₂ is the reactant in formation of compound Y (1,2-dichloropropane)</p>

Nat5 Traffic Lights		Past Paper Question Bank Unit 2.1c Alkenes										JABchem				
Outcome	Int2 2000	Int2 2001	Int2 2002	Int2 2003	Int2 2004	Int2 2005	Int2 2006	Int2 2007	Int2 2008	Int2 2009	Int2 2010	Int2 2011	Int2 2012	Int2 2013	Int2 2014	Int2 2015
11			L12a(i)						mc13							mc17
12a 13a	mc14					mc12						mc13				
12b 13b																
14a 15a																
14b 15b			L12a(ii)								L5d					
14c 15c	mc10	mc13			mc14	L6a(ii)				mc17			L7a			L6b(i) L6b(ii)

Int2	Answer	% Correct	Reasoning
2000 MC 10	A	31	<input checked="" type="checkbox"/> A Hydration: Water is added across a C=C double bond <input checked="" type="checkbox"/> B Hydrolysis: Big molecule splits into smaller molecules with water added across the break <input checked="" type="checkbox"/> C Dehydration: Water is removed from a molecule leaving behind a C=C double bond <input checked="" type="checkbox"/> D Condensation: Small molecules join together with water removed at the join
2000 MC 14	B	71	<input checked="" type="checkbox"/> A but-2-ene has the formula C ₄ H ₈ but molecule drawn has the formula C ₅ H ₁₀ <input checked="" type="checkbox"/> B pent-2-ene: 5 carbons with C=C double bond between C ₂ and C ₃ <input checked="" type="checkbox"/> C but-3-ene is incorrectly named as C=C double bond must have the lowest numbering system <input checked="" type="checkbox"/> D pent-3-ene is incorrectly names as C=C double bond must have the lowest number system
2001 MC 13	B	42	<input checked="" type="checkbox"/> A Condensation: small molecules join together with water removed at the join <input checked="" type="checkbox"/> B Hydration: addition reaction with water added across C=C double bond <input checked="" type="checkbox"/> C Hydrolysis: molecule splits into smaller molecules with water added across break <input checked="" type="checkbox"/> D Oxidation: Loss of electrons by adding oxygen or removing hydrogen from molecule
2004 MC 14	C	41	<input checked="" type="checkbox"/> A Condensation: small molecules join together with water removed at join <input checked="" type="checkbox"/> B Dehydration: water is removed and a C=C double bond is left behind <input checked="" type="checkbox"/> C Hydration: water is added across a C=C double bond in ethane to make ethanol <input checked="" type="checkbox"/> D Hydrolysis large molecule breaks down with water inserted at the break
2005 MC 12	B	82	<input checked="" type="checkbox"/> A But-2-ene has 4 carbons and molecule shown has 5 carbons <input checked="" type="checkbox"/> B Pent-2-ene has 5 carbons with a C=C double bond between carbons 2 and 3 <input checked="" type="checkbox"/> C But-3-ene has 4 carbons and molecule shown has 5 carbons <input checked="" type="checkbox"/> D Pent-3-ene: wrong numbering system as C=C should have lowest number possible
2008 MC 13	D	67	<input checked="" type="checkbox"/> A Cycloalkanes do not have a C=C double bond to decolourise bromine solution <input checked="" type="checkbox"/> B Cycloalkenes do not have the general formula C _n H _{2n} <input checked="" type="checkbox"/> C Alkanes do not have a C=C double bond to decolourise bromine solution <input checked="" type="checkbox"/> D Alkenes have general formula C _n H _{2n} and C=C bond decolourises bromine solution
2009 MC 17	D	73	<input checked="" type="checkbox"/> A hydration would not produce 2-methylbutan-2-ol (-OH group on wrong carbon) <input checked="" type="checkbox"/> B hydration would not produce 2-methylbutan-2-ol(-OH group on wrong carbon) <input checked="" type="checkbox"/> C no C=C double bond for water to be added across (hydration) <input checked="" type="checkbox"/> D hydration reaction would produce 2-methylbutan-2-ol
2011 MC 13	B	78	<input checked="" type="checkbox"/> A but-2-ene has 4 carbons only <input checked="" type="checkbox"/> B Pent-2-ene has 5 carbons and C=C double bond between C ₂ and C ₃ <input checked="" type="checkbox"/> C but-3-ene has 4 carbons only (and should be renumbered to but-2-ene) <input checked="" type="checkbox"/> D Pent-3-ene is an incorrectly named compound as lowest number system has not been used
2015 MC 17	D	75	<input checked="" type="checkbox"/> A cyclopentane C ₅ H ₁₀ does not decolourise bromine solution as it has no C=C bond <input checked="" type="checkbox"/> B cyclopentene C ₅ H ₈ does not fit the general formula C _n H _{2n} <input checked="" type="checkbox"/> C pentane C ₅ H ₁₂ does not decolourise bromine solution as it has no C=C bond <input checked="" type="checkbox"/> D pentene C ₅ H ₁₀ decolourises bromine solution and fits general formula C _n H _{2n}

Int2	Answer	Reasoning
2002 12a(i)	Alkenes	Alkenes are a homologous series with a C=C double bond and general formula of C _n H _{2n}
2002 12a(ii)	Addition	Addition Reactions: Molecules are added across a C=C double bond
2005 6a(ii)	hydration	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} + \text{H}_2\text{O} \longrightarrow \begin{array}{c} \text{H} \quad \text{OH} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $
2010 5d	Addition	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} + \text{Br}_2 \xrightarrow{\text{fast}} \begin{array}{c} \text{H} \quad \text{Br} \quad \text{Br} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $
2012 7a	Hydration	Addition reactions involve the addition of a compound across a C=C double bond. Water can be added across a C=C double bond with -H added on one side and -OH added to the other side carbon.
2015 6b(i)		
2015 6b(ii)	addition or hydration	Addition reactions happen when a small molecule adds directly across a carbon to carbon double bond. Cl ₂ , F ₂ , Br ₂ , I ₂ , H ₂ , H ₂ O, HCl, HBr, HF and HI are all capable of adding across a double bond.

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Traffic Lights

Past Paper Question Bank

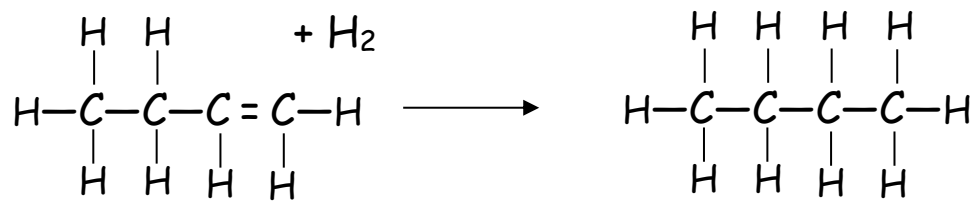
Unit 2.1c Alkenes

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Outcome	2000 Credit	2001 Credit	2002 Credit	2003 Credit	2004 Credit	2005 Credit	2006 Credit	2007 Credit	2008 Credit	2009 Credit	2010 Credit	2011 Credit	2012 Credit	2013 Credit		
11																
12a 13a																
12b 13b																
14a 15a												22c				
14b 15b				14a(i) 14a(ii)	20c								20c			
14c 15c			16c(i) 16c(ii)					16b(i)								

SG Credit	Answer	Reasoning
2002C 16c(i)	Addition Or Hydration	<p>Addition: molecule adds across the C=C double bond</p> $ \begin{array}{ccc} & + \text{H}_2\text{O} & \\ & & \begin{array}{c} \text{H} \quad \text{OH} \\ \quad \\ \text{H}-\text{C}=\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \\ \text{ethene} \end{array} \longrightarrow \begin{array}{c} \text{H} \quad \text{OH} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \\ \text{ethanol} \end{array} \end{array} $ <p>Hydration: H₂O molecule adds across the C=C double bond</p>
2002C 16c(ii)	One from:	$ \begin{array}{ccc} \begin{array}{c} \text{OH} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{CH}_3 \quad \text{H} \quad \text{H} \\ \text{2-methylbutan-1-ol} \end{array} & \text{or} & \begin{array}{c} \text{H} \quad \text{OH} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{CH}_3 \quad \text{H} \quad \text{H} \\ \text{2-methylbutan-2-ol} \end{array} \end{array} $
2003C 14c(i)	addition	Br ₂ molecule adds across the C=C double bond
2003C 14c(ii)	$ \begin{array}{c} \text{Br} \quad \text{Br} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $	Bromine on adjacent atoms of carbons which had C=C previously
2004C 20c	C ₅ H ₈ Br ₄	Bromine Br ₂ add across a C=C double bond. There are two double bonds in C ₅ H ₈ so 2Br ₂ molecules (and therefore 4Br atoms) adds to the molecule to form C ₅ H ₈ Br ₄ .
2007C 16b(i)	Addition or hydration	Addition Reaction: Molecule adds across a C=C double bond Hydration is the addition of water across a C=C double bond
2011C 22c	Addition	$ \begin{array}{ccc} \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} & \xrightarrow{\text{addition reaction}} & \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{S}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array} \\ & & \begin{array}{c} \text{C}=\text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array} \end{array} $
2012C 20c	$ \begin{array}{c} \text{H} \quad \text{COOCH}_3 \\ \quad \\ \text{Br}-\text{C}-\text{C}-\text{Br} \\ \quad \\ \text{H} \quad \text{CH}_3 \end{array} $	$ \begin{array}{ccc} \begin{array}{c} \text{H} \quad \text{COOCH}_3 \\ \quad \\ \text{C}=\text{C} \\ \quad \\ \text{H} \quad \text{CH}_3 \end{array} + \text{Br}-\text{Br} & \xrightarrow{\text{Br}_2 \text{ adds across the C=C double bond}} & \begin{array}{c} \text{H} \quad \text{COOCH}_3 \\ \quad \\ \text{Br}-\text{C}-\text{C}-\text{Br} \\ \quad \\ \text{H} \quad \text{CH}_3 \end{array} \end{array} $



Nat5 Traffic Lights		Past Paper Question Bank													Copyright JABchem	
		Unit 2.1c Alkenes														
Outcome	2000 General	2001 General	2002 General	2003 General	2004 General	2005 General	2006 General	2007 General	2008 General	2009 General	2010 General	2011 General	2012 General	2013 General		
11																
12a 13a							14b(i)									
12b 13b																
14a 15a						14a(i) 14a(ii)										
14b 15b							14a									
14c 15c				15b												

SG General	Answer	Reasoning
2003G 15b	H ₂ O	<p>Addition: molecule adds across the C=C double bond</p> $ \begin{array}{c} + \text{H}_2\text{O} \\ \text{H}-\text{C}=\text{C}-\text{H} \longrightarrow \text{H}-\text{C}-\text{C}-\text{H} \\ \begin{array}{cc} & \\ \text{H} & \text{H} \end{array} \qquad \begin{array}{cc} \text{H} & \text{OH} \\ & \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \begin{array}{cc} & \\ \text{H} & \text{H} \end{array} \\ \text{ethene} \qquad \qquad \qquad \text{ethanol} \end{array} $ <p>Hydration: H₂O molecule adds across the C=C double bond</p>
2005G 14a(i)	Addition or hydrogenation	<p>Addition reactions add across a C=C double bond. Addition of hydrogen is also known as hydrogenation.</p>
2005G 14a(ii)	C ₄ H ₁₀	$ \begin{array}{c} \text{H} \quad \text{H} \qquad + \text{H}_2 \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{C}-\text{H} \longrightarrow \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \begin{array}{cccc} & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} \end{array} $
2006G 14a	medium or slow	Reactivity of halogens decreases down group 7.
2006G 14b(i)	C ₄ H ₈	<p>Butene</p> $ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{C}-\text{H} \\ \qquad \qquad \quad \\ \qquad \qquad \text{H} \quad \text{H} \end{array} $ <p>4 carbons C=C double bond</p>