

Alkenes (MCQ)

1. What is the best description for the bonding between the carbon atoms in an ethene molecule?

- A One σ -bond and one π -bond
- B One π -bond
- C Two σ -bonds
- D Two π -bonds

Your answer

[1]

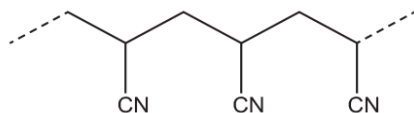
2. Which statement about an electrophile is correct?

- A It is an electron pair acceptor.
- B It is a proton donor.
- C It is a negative ion.
- D It is a species with an unpaired electron.

Your answer

[1]

3. A section of a polymer is shown below.



Which monomer could form this polymer?

- A $\text{CH}_3\text{CH}(\text{OH})\text{CN}$
- B $\text{HOCH}_2\text{CH}_2\text{CN}$
- C $\text{H}_2\text{C}=\text{CHCN}$
- D $\text{NCCH}=\text{CHCN}$

Your answer

[1]

4. A student reacts pent-2-ene with bromine in the laboratory.

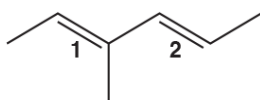
Which compound is formed?

- A 1,1-dibromopentane
- B 1,2-dibromopentane
- C 2,2-dibromopentane
- D 2,3-dibromopentane

Your answer

[1]

5. The molecule below has two double bonds, labelled 1 and 2.



The arrangement around each double bond can be identified as *E* or *Z*.

Which row in the table is correct for double bond 1 and double bond 2?

	Double bond 1	Double bond 2
A	<i>E</i>	<i>Z</i>
B	<i>Z</i>	<i>E</i>
C	<i>E</i>	<i>E</i>
D	<i>Z</i>	<i>Z</i>

Your answer

[1]

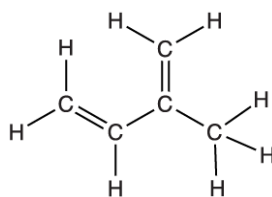
6. Which alcohol reacts with an acid catalyst to form *E* and *Z* stereoisomers?

- A pentan-3-ol
- B pentan-1-ol
- C 2-methylbutan-2-ol
- D 2,2-dimethylpropan-1-ol

Your answer

[1]

7. The displayed formula for a hydrocarbon is shown below.



How many σ and π bonds are present in a molecule of this hydrocarbon?

	σ bonds	π bonds
A	2	4
B	10	2
C	10	4
D	12	2

Your answer

[1]

8. A reaction sequence is shown below:



Which type of reaction mechanism is involved in each step?

	Step 1	Step 2
A	electrophilic addition	electrophilic substitution
B	electrophilic addition	nucleophilic substitution
C	nucleophilic addition	electrophilic substitution
D	nucleophilic addition	nucleophilic substitution

Your answer

[1]

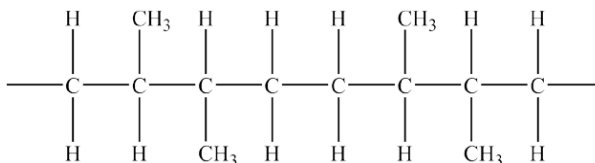
9. Which compound has non-polar molecules?

- A** *E*-1,2-dichlorobut-2-ene
B *E*-2,3-dichlorobut-2-ene
C *Z*-2,3-dichlorobut-2-ene
D *Z*-1,4-dichlorobut-2-ene

Your answer

[1]

10. A section of a polymer chain is shown below.



Identify the monomer that would give rise to this section of addition polymer.

- A. *E*-But-2-ene
 B. *Z*-But-2-ene
 C. Methylpropene
 D. Propene

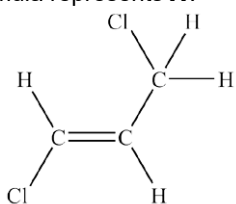
Your answer

[1]

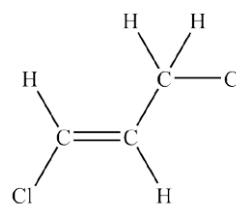
11. Three of the following displayed formulae represent the same isomer of $\text{C}_3\text{H}_4\text{Cl}_2$ but one structure represents a different isomer, **X**.

Which displayed formula represents **X**?

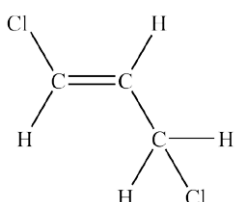
A



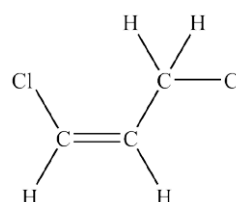
B



C



D



Your answer

[1]

END OF QUESTION PAPER

Mark scheme – Alkenes (MCQ)

Question			Answer/Indicative content	Marks	Guidance
1			A	1 (AO1.1)	<p><u>Examiner's Comments</u></p> <p>Candidates answered this question well with over two-thirds choosing the correct option A. Option D was the most common incorrect response suggesting that candidates are uncertain about the nature of a C=C double bond.</p>
			Total	1	
2			A	1 (AO1.1)	
			Total	1	
3			C	1 (AO1.2)	<p><u>Examiner's Comments</u></p> <p>This part discriminated well. Although most candidates did select C as the correct structure, many were diverted into selecting option D, the other alternative containing a double C=C bond. In identifying a monomer for an addition polymer, candidates are advised to identify the repeat unit and then to replace the single C–C bond with a double bond to give the monomer.</p>
			Total	1	
4			D	1	<p><u>Examiner's Comments</u></p> <p>Most candidates chose the correct option of D but a sizeable number chose B and C, the other options containing a '2' in their names. The best strategy here is to draw out the carbon skeleton of pent-2-ene from which it is clear that bromine atoms must be added at carbon positions 2 and 3.</p>
			Total	1	
5			C	1	<p><u>Examiner's Comments</u></p> <p>This was a difficult question but higher ability candidates selected the correct option of C. The main discriminator was B, which identifies the 1 double bond as Z. CIP analysis is required to show that the double bond is E. This is a good 'hard' example for illustrating E/Z isomerism.</p>

			Total	1	
6			A	1	Examiner's Comments Candidates found this question challenging, with only the more able candidates obtaining the correct alcohol. Answer option C was a common incorrect answer.
			Total	1	
7			D	1	Examiner's Comments B was a common incorrect answer with the sigma bond not counted as part of a double bond.
			Total	1	
8			B	1	Examiner's Comments Generally scored well.
			Total	1	
9			B	1	Examiner's Comments Candidates struggled with this very different polarity question. The majority of candidates are clearly used to applying symmetry to much simpler molecules.
			Total	1	
10			D	1	
			Total	1	
11			D	1	
			Total	1	