

13. An introduction to AS Level organic chemistry

13.3 Shapes of organic molecules; σ and π bonds

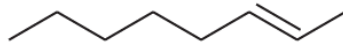
Paper 2

Question Paper

- 1 (e) (i) Both σ and π bonds are present in a molecule of **E** as a result of different types of hybridisation in the carbon atoms.

Complete Table 4.2 to show the number of carbon atoms with each type of hybridisation in a molecule of **E**.

Table 4.2

	number of carbon atoms		
	sp hybridised	sp ² hybridised	sp ³ hybridised
<p style="text-align: center;">E</p> 			

[2]

- (ii) Describe the essential feature of an unbranched hydrocarbon that causes its molecules to show stereoisomerism. Explain how this feature leads to stereoisomerism.

.....
.....
..... [3]

2 **V** is a colourless liquid.

(b) **V** reacts to form **Z** in a single reaction, as shown in Fig. 4.2.

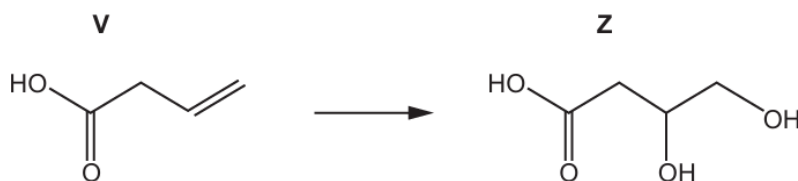


Fig. 4.2

(iii) Complete Table 4.1 to show the number of sp^2 and sp^3 hybridised carbon atoms that are present in a molecule of **V**.

Table 4.1

type of hybridisation	sp^2	sp^3
number of carbon atoms in V		

[2]

3 Fig. 3.1 describes a sequence of reactions that can be used to produce a food additive, compound **Y**, from CH_3CH_2Cl .

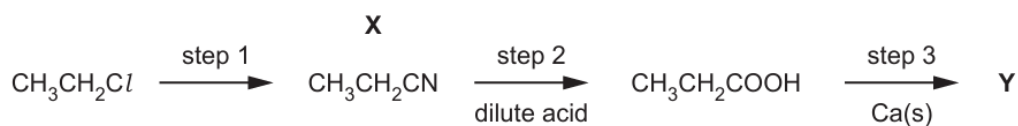


Fig. 3.1

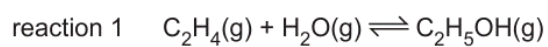
(c) Complete Table 3.1 to show the number of sigma bonds (σ) and pi bonds (π) present in a molecule of **X**.

Table 3.1

type of bond	number of bonds in X
sigma (σ)	
pi (π)	

[2]

- 4 In industry, ethanol is made by reacting ethene with steam in the presence of H_3PO_4 .



- (d) Describe the covalent bonds present between the carbon atoms in an ethene molecule by completing Table 4.2.

Table 4.2

	sigma (σ)	pi (π)
type of orbitals involved in bond		
how the orbitals overlap		

[2]