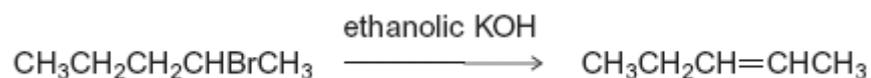


Q1. Organic reaction mechanisms help chemists to understand how the reactions of organic compounds occur.
The following conversions illustrate a number of different types of reaction mechanism.

(a) When 2-bromopentane reacts with ethanolic KOH, two structurally isomeric alkenes are formed.

(i) Name and outline a mechanism for the conversion of 2-bromopentane into pent-2-ene as shown below.



(4)

(ii) Draw the structure of the other structurally isomeric alkene produced when 2-bromopentane reacts with ethanolic KOH.

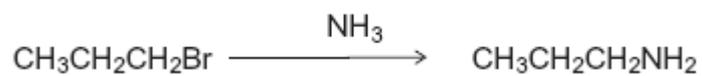
(1)

(b) Name and outline a mechanism for the following conversion.

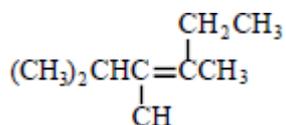


(5)

(c) Name and outline a mechanism for the following conversion.



(5)
(Total 15 marks)



Q2. The correct systematic name for _____ is

- A 2-ethyl-3,4-dimethylpent-2-ene
- B 4-ethyl-2,3-dimethylpent-3-ene
- C 2,3,4-trimethylhex-3-ene
- D 3,4,5-trimethylhex-3-ene

(Total 1 mark)

Q3. (a) Compounds with double bonds between carbon atoms can exhibit geometrical isomerism.

(i) Draw structures for the two geometrical isomers of 1,2-dichloroethene.

Isomer 1

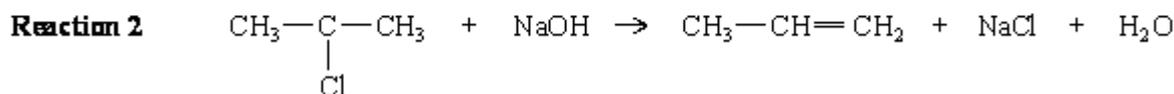
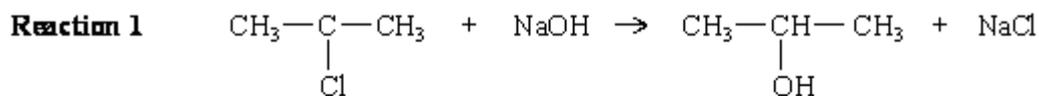
Isomer 2

(ii) What feature of the double bond prevents isomer 1 from changing into isomer 2?

.....

(3)

(b) When 2-chloropropane reacts with sodium hydroxide, two different reactions occur. Each reaction produces a different organic product.



(i) Outline a mechanism for **Reaction 1** and state the role of the hydroxide ion in

this reaction.

Mechanism

Role of the hydroxide ion

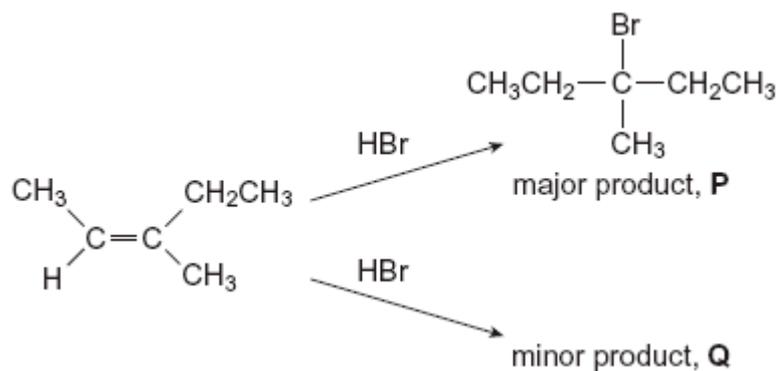
- (ii) Outline a mechanism for **Reaction 2** and state the role of the hydroxide ion in this reaction.

Mechanism

Role of the hydroxide ion

(7)
(Total 10 marks)

- Q4.** The alkene (Z)-3-methylpent-2-ene reacts with hydrogen bromide as shown below.



- (a) (i) Name the major product **P**.

.....

(1)

- (ii) Name the mechanism for these reactions.

.....

(1)

- (iii) Draw the displayed formula for the minor product **Q** and state the type of structural isomerism shown by **P** and **Q**.

Displayed formula for **Q**

Type of structural isomerism

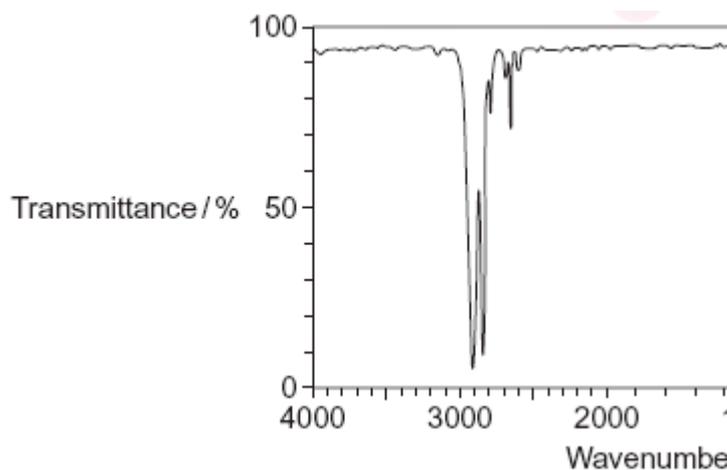
(2)

- (iv) Draw the structure of the (E)-stereoisomer of 3-methylpent-2-ene.

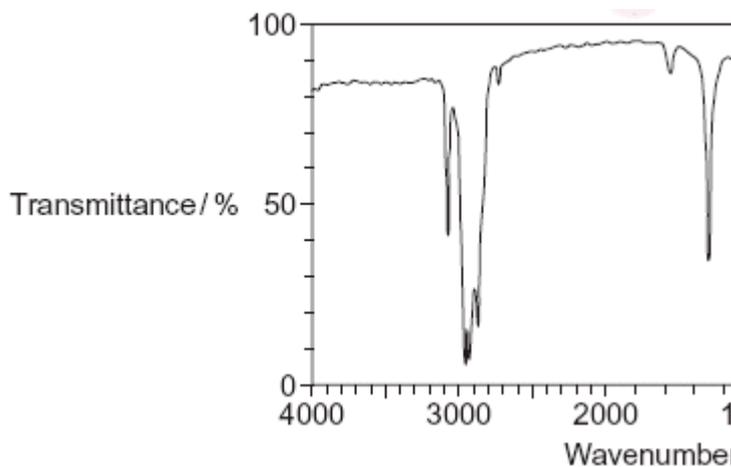
(1)

- (b) The infrared spectra of two compounds **R** and **S** are shown below. **R** and **S** have the molecular formula C_6H_{12} and are structural isomers of 3-methylpent-2-ene. **R** is an unsaturated hydrocarbon and **S** is a saturated hydrocarbon.

Spectrum 1



Spectrum 2



- (i) Identify the infrared Spectrum 1 or 2 that represents compound **R**. Use information from the infrared spectra to give **one** reason for your answer. You may find it helpful to refer to **Table 1** on the Data Sheet.

R is represented by Spectrum

Reason

.....

(2)

(ii) State the type of structural isomerism shown by **R** and **S**.

.....

(1)

(iii) Name **one** possible compound which could be **S**.

.....

(1)

(Total 9 marks)

Q5. The reaction of bromine with an alkene is used in a test to show that the alkene is unsaturated.

(a) State what is meant by the term *unsaturated* as applied to an alkene.

.....

(1)

(b) Name and outline a mechanism for the reaction of bromine with but-2-ene.

Name of mechanism

Mechanism

(5)

(c) But-2-ene can exist as a pair of stereoisomers.

(i) State what is meant by the term *stereoisomers*.

.....
.....
.....

(2)

(ii) Draw the structure of (*E*)-but-2-ene.

.....

(1)

(Total 9 marks)