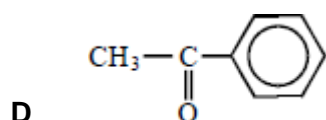
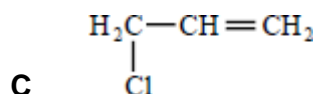
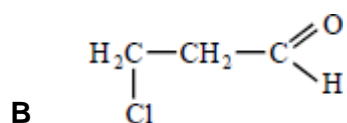
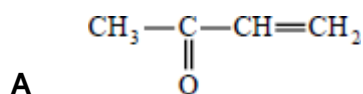
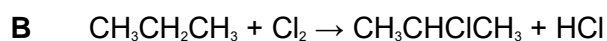
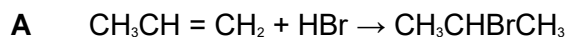


Q1. Which one of the following can react both by nucleophilic addition and by nucleophilic substitution?



(Total 1 mark)

Q2. Which one of the following reactions involves nucleophilic addition?



(Total 1 mark)

Q3. Which one of the following is **not** a suitable method for the preparation of ethanol?

A oxidation of ethane

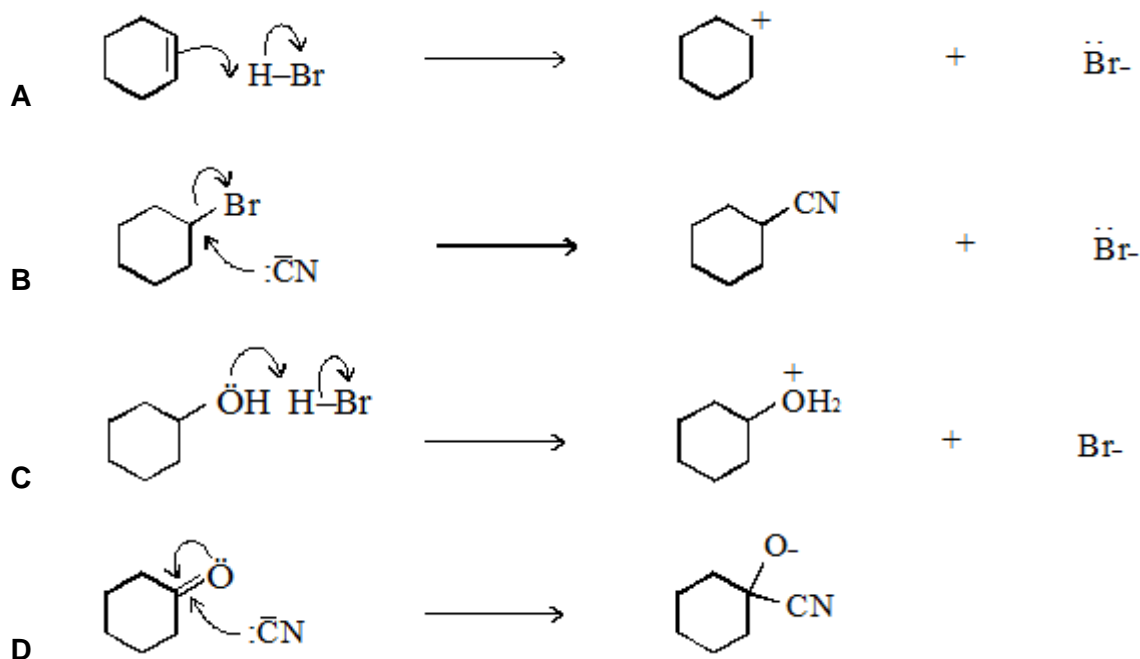
B hydration of ethene

C reduction of ethanal

D hydrolysis of bromoethane

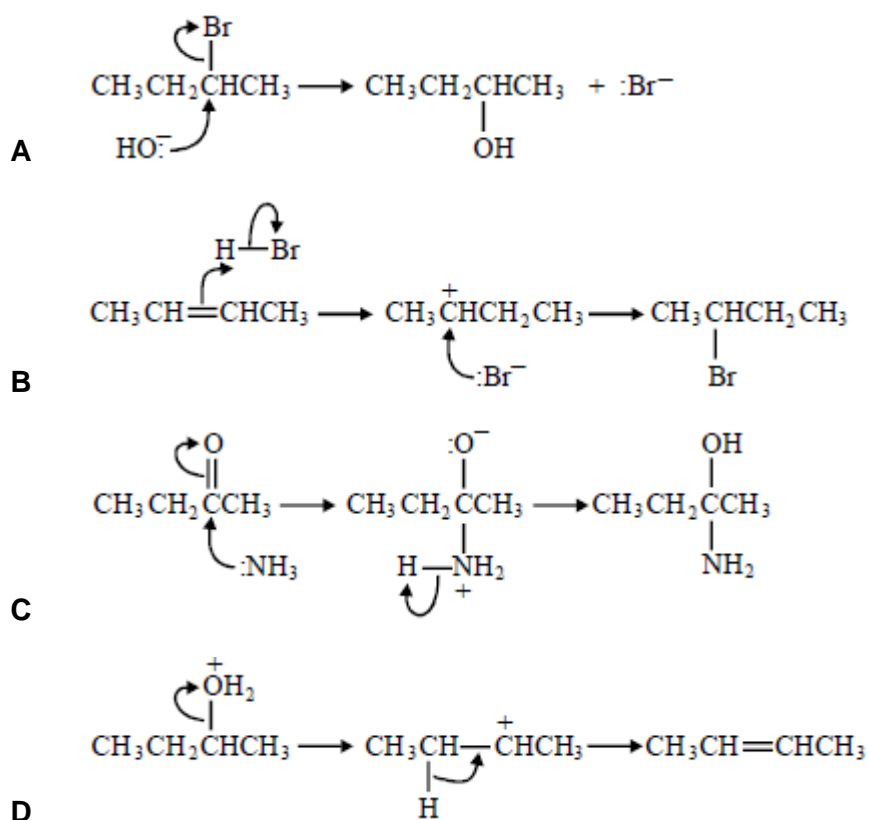
(Total 1 mark)

Q4. In which one of the following are the curly arrows **not** used correctly?



(Total 1 mark)

Q5. In which of the following is a curly arrow used incorrectly?



(Total 1 mark)

Q6. Which one of the following mechanisms is **not** involved in the reaction sequence below?



- A** electrophilic addition
- B** electrophilic substitution
- C** nucleophilic substitution
- D** free-radical substitution

(Total 1 mark)

Q7. (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

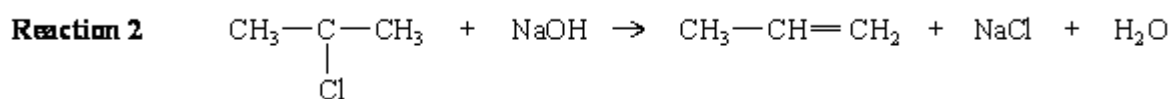
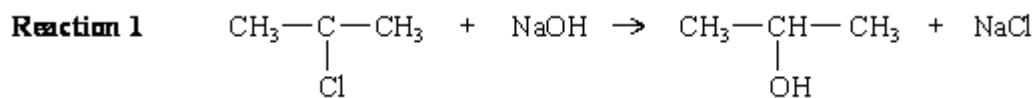
Isomer 2

(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

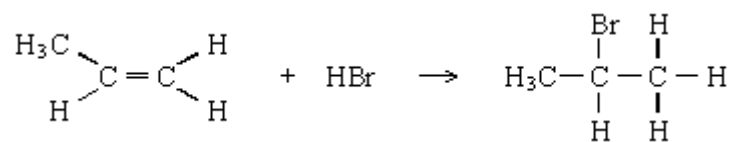
Role of the hydroxide ion

(7)
(Total 10 marks)

- Q8.** (a) Propene reacts with hydrogen bromide by an electrophilic addition mechanism

forming 2-bromopropane as the major product.

The equation for this reaction is shown below.



(i) Outline the mechanism for this reaction, showing the structure of the intermediate carbocation formed.

(ii) Give the structure of the alternative carbocation which could be formed in the reaction between propene and hydrogen bromide.

(5)

(b) A substitution reaction occurs when 2-bromopropane reacts with aqueous sodium hydroxide.

(i) Draw the structure of the organic product of this reaction and give its name.

Structure

Name

- (ii) Name and outline the mechanism for this reaction.

Name of mechanism

Mechanism

(5)

- (c) Under different conditions, 2-bromopropane reacts with sodium hydroxide to produce propene.

- (i) Name the mechanism for this reaction.

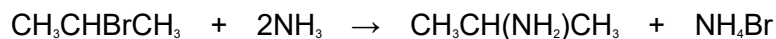
.....

- (ii) State the role of sodium hydroxide in this reaction.

.....

(2)

- Q9.** (a) The equation below shows the reaction of 2-bromopropane with an excess of ammonia.



Name and outline the mechanism involved.

Name of mechanism

Mechanism

(5)

- (b) When 2-bromopropane is heated with ethanolic potassium hydroxide, an elimination reaction occurs. State the role of potassium hydroxide and outline a mechanism for this reaction.

Role of potassium hydroxide

Mechanism

producing the alcohol occurs.

(5)

- (c) When 2-bromobutane reacts with ethanolic potassium hydroxide, two structurally isomeric alkenes are produced, one of which shows stereoisomerism.

Outline the mechanism for the formation of one of the structurally isomeric alkenes. Explain why two structurally isomeric alkenes are formed and draw the structure of the second structural isomer. Draw the structural formulae of the two stereoisomers.

(8)

(Total 17 marks)