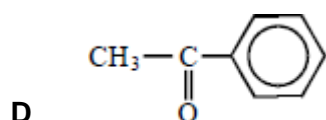
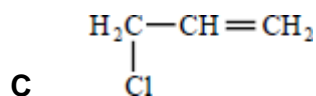
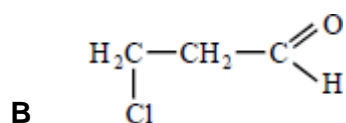
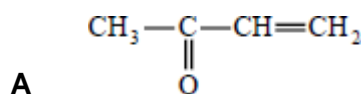
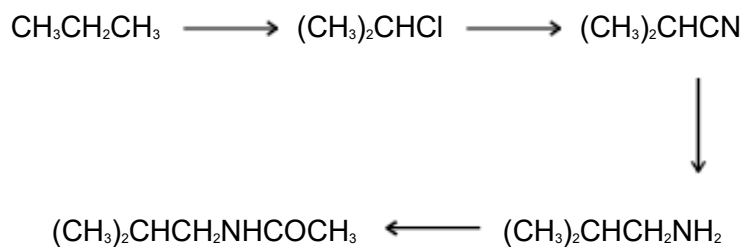


Q1. Which one of the following can react both by nucleophilic addition and by nucleophilic substitution?



(Total 1 mark)

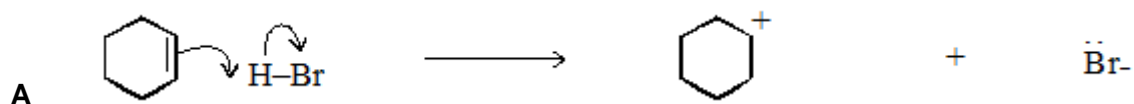
Q2. Which one of the following types of reaction mechanism is **not** involved in the above sequence?

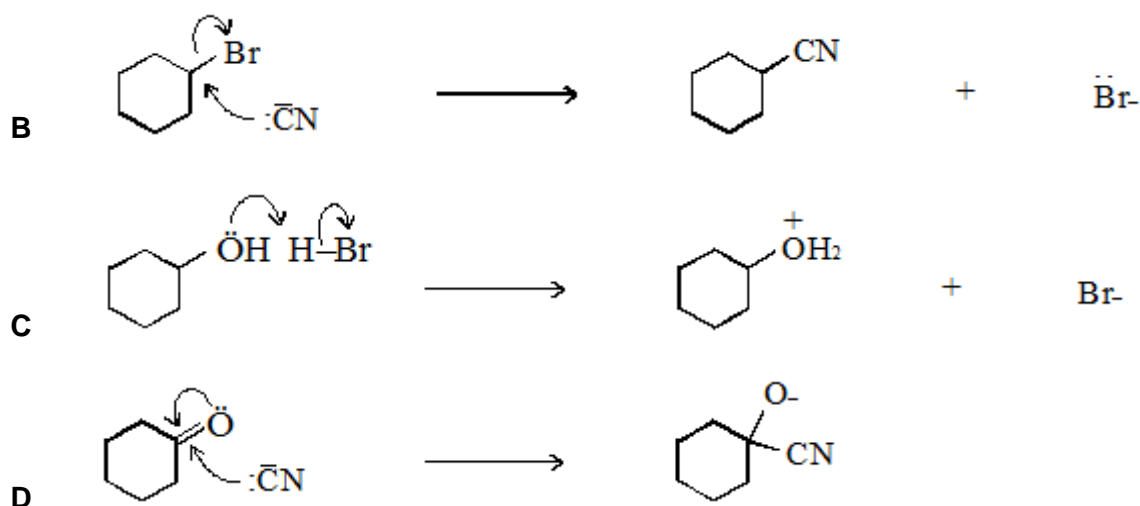


- A free-radical substitution
- B nucleophilic substitution
- C elimination
- D nucleophilic addition-elimination

(Total 1 mark)

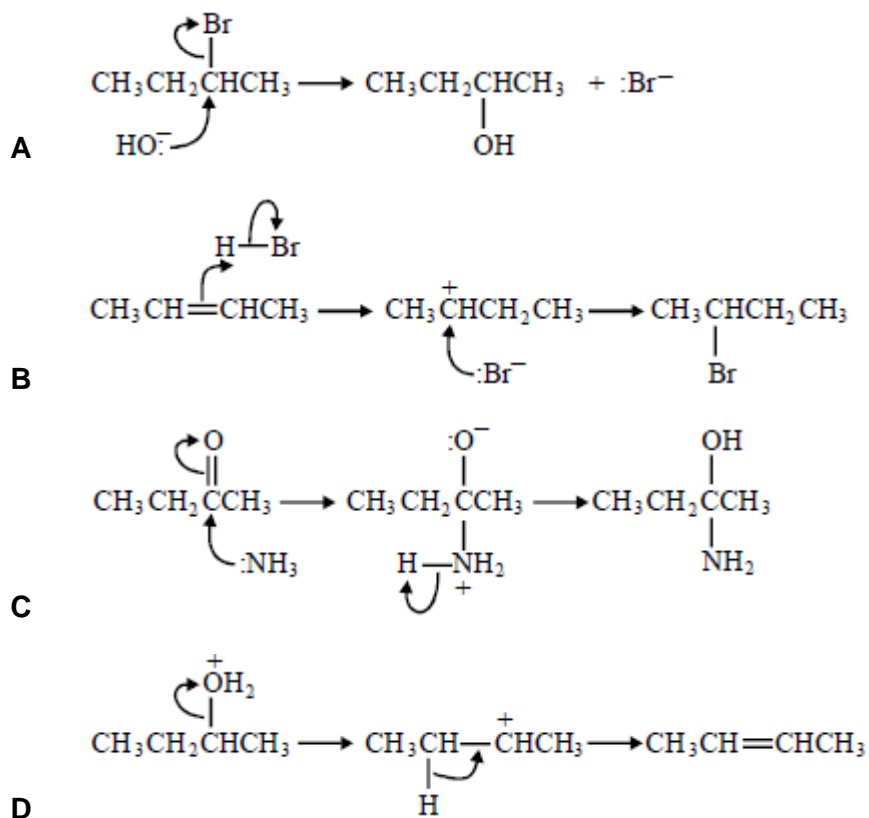
Q3. In which one of the following are the curly arrows **not** used correctly?





(Total 1 mark)

Q4. In which of the following is a curly arrow used incorrectly?



(Total 1 mark)

Q5. 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)

Q6. In the presence of ultraviolet light, methane and chlorine react to form a number of chlorine-containing products, including CH_2Cl_2 and CHCl_3

- (i) Write an equation for the initiation step in the mechanism for this reaction.

.....

- (ii) Write the overall equation for the formation of CHCl_3 from CH_2Cl_2 and Cl_2

.....

- (iii) Write equations for the two propagation steps by which CH_2Cl_2 is converted into CHCl_3

Equation 1

Equation 2

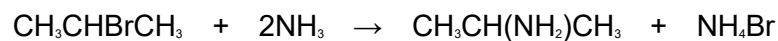
- (iv) Suggest what effect increasing the intensity of the ultraviolet light would have on the rate of the reaction between methane and chlorine. Explain your answer.

Effect on rate

Explanation

(Total 6 marks)

- Q7.** (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

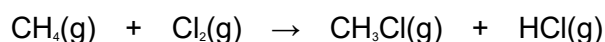
(5)

- (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

Q8. The equation below represents a reaction between methane and chlorine.



- (a) State an essential condition required for this reaction to occur. Explain why this condition is essential.

Condition

Explanation

(2)

- (b) (i) State the type of mechanism involved in the above reaction.

.....

- (ii) Name the three types of step involved in this mechanism.

Step 1

Step 2

Step 3

(4)

- (c) In addition to CH_3Cl , compounds such as CH_2Cl_2 and $\text{CH}_3\text{CH}_2\text{Cl}$ may also be formed when chlorine reacts with methane.

- (i) Write equations for the two steps in the mechanism by which CH_2Cl_2 is formed from CH_3Cl

Equation 1

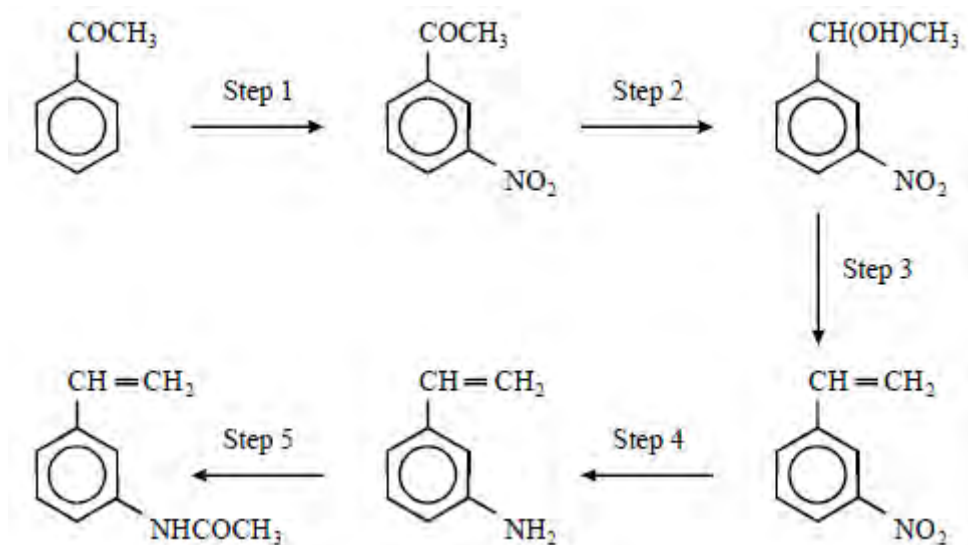
Equation 2

- (ii) Write an equation to represent a step in the mechanism in which $\text{CH}_3\text{CH}_2\text{Cl}$ is formed.

.....

(3)
(Total 9 marks)

Q9. Refer to the following reaction sequence:

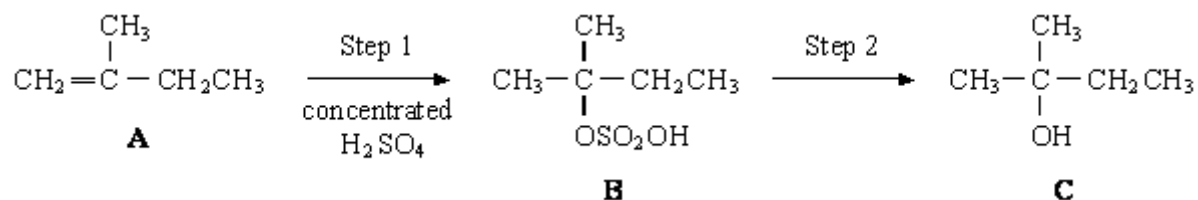


Which one of the following types of reaction mechanism is **not** involved in the above sequence?

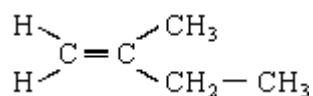
- A electrophilic addition
- B electrophilic substitution
- C addition-elimination
- D elimination

(Total 1 mark)

Q10. The reaction scheme below shows the conversion of compound **A**, 2-methylbut-1-ene, into compound **B** and then into compound **C**.



- (a) The structure of **A** is shown below. Circle those carbon atoms which must lie in the same plane.



(1)

- (b) Outline a mechanism for the reaction in Step 1.

(4)

- (c) State the reagent and condition used in Step 2. Name compound **C**.

Reagent

Condition

Name of compound C

(3)

- (d) When compound **A** is converted into compound **C**, a second alcohol, **D**, is also formed. Alcohol **D** is isomeric with **C** but is formed as a minor product. Identify alcohol **D** and explain why it is formed as the minor product.

Identity of alcohol D

Explanation

.....

.....

(3)
(Total 11 marks)