

## 15 MCQs – Cycloaddition Reactions

Q1. Which of the following reactants are involved in the Diels–Alder reaction?

- A. Conjugated diene + alkene (dienophile)
- B. Ketone + alcohol
- C. Ester + amine
- D. Alkane + halide

Q2. What is the main product of a Diels–Alder reaction?

- A. 4-membered ring
- B. 5-membered ring
- C. 6-membered unsaturated ring
- D. Linear alkene

Q3. Which type of cycloaddition is involved in the Diels–Alder reaction?

- A. [2+2] cycloaddition
- B. [4+2] cycloaddition
- C. [3+2] cycloaddition
- D. Radical addition

Q4. Which reactant acts as the dienophile in the Diels–Alder reaction?

- A. Conjugated diene
- B. Alkene or alkyne with electron-withdrawing group
- C. Alcohol
- D. Amine

Q5. What type of groups increase the reactivity of the dienophile?

- A. Electron-donating groups
- B. Electron-withdrawing groups
- C. Alkyl groups only
- D. Hydrogen atoms

Q6. Which product is formed when 1,3-butadiene reacts with ethylene?

- A. Cyclobutane
- B. Cyclopentene
- C. Cyclohexene
- D. Benzene

Q7. Which reactants are used in the synthesis of pyridine derivatives via cycloaddition?

- A. Diene + nitrile (e.g., CN–CN)
- B. Ketone + alcohol
- C. Ester + amine
- D. Alkane + halide

Q8. What is the condition mentioned for nitrile cycloaddition in pyridine synthesis?

- A. Room temperature
- B. Low temperature ( $-10^{\circ}\text{C}$ )
- C. High temperature ( $\sim 400^{\circ}\text{C}$ )
- D. UV light

Q9. Which compound can act as a dienophile instead of nitrile in some cases?

- A. Alcohol
- B. Imine
- C. Alkane
- D. Ether

Q10. What happens when an unsymmetrical diene reacts with an unsymmetrical dienophile?

- A. Only one product forms
- B. No reaction occurs
- C. Two isomers can form
- D. Only symmetrical products form

Q11. Which group acts as a dienophile in the synthesis of 1,2-oxazine derivatives?

- A.  $\text{N}=\text{O}$  (nitroso group)
- B.  $\text{C}=\text{O}$
- C.  $\text{NH}_2$
- D.  $\text{OH}$

Q12. Which nitroso compounds are more stable and useful in cycloaddition?

- A. Alkyl nitroso compounds
- B. Aryl nitroso compounds
- C. Methane derivatives
- D. Alcohol derivatives

Q13. Which reactants are used to form pyran derivatives?

- A.  $\alpha,\beta$ -unsaturated ketone + diene
- B. Ketone + alcohol
- C. Ester + amine
- D. Alkane + halide

Q14. What is the product of 1,3-dipolar cycloaddition?

- A. 4-membered ring
- B. 5-membered heterocycle
- C. 6-membered ring
- D. Linear compound

Q15. Which reactants are used to form 1,2,3-triazole derivatives?

- A. Alkene + azide

- B. Ketone + alcohol
- C. Ester + amine
- D. Alkane + halide

## Model Answers

- 1. A
- 2. C
- 3. B
- 4. B
- 5. B
- 6. C
- 7. A
- 8. C
- 9. B
- 10. C
- 11. A
- 12. B
- 13. A
- 14. B
- 15. A