

30 MCQs – Pyridine (π -deficient Aromatic Systems)

Q1. Pyridine is best described as:

- A. Benzene with one CH replaced by nitrogen
- B. Cyclohexane derivative
- C. Aromatic ring with oxygen
- D. Aliphatic amine

Q2. The nitrogen atom in pyridine has which hybridization?

- A. sp
- B. sp^2
- C. sp^3
- D. dsp^2

Q3. Why is pyridine described as π -deficient?

- A. Presence of extra electrons
- B. Electron-donating nitrogen
- C. Electron-withdrawing nitrogen reduces electron density
- D. Lack of resonance

Q4. Which positions in pyridine carry positive charge in resonance?

- A. C-3 only
- B. C-2 and C-4
- C. C-1 only
- D. All carbons equally

Q5. Why is pyridine less basic than aliphatic amines?

- A. Nitrogen has no lone pair
- B. Lone pair is part of aromatic sextet
- C. Lone pair is in sp^2 orbital and less available
- D. Pyridine is nonpolar

Q6. Which of the following increases the basicity of pyridine?

- A. Nitro group
- B. Electron-withdrawing group
- C. Alkyl group
- D. Halogen

Q7. Which substituent greatly decreases pyridine basicity?

- A. CH_3
- B. NH_2
- C. NO_2
- D. OH

Q8. The lone pair on pyridine nitrogen is:

- A. In π -system
- B. Delocalized in ring
- C. In plane and available for bonding
- D. Shared with hydrogen

Q9. Pyridine typically undergoes which type of reaction instead of addition?

- A. Radical substitution
- B. Electrophilic substitution
- C. Nucleophilic addition
- D. Elimination

Q10. Electrophilic substitution in pyridine occurs mainly at:

- A. α -position
- B. β -position
- C. γ -position
- D. Nitrogen

Q11. Why is electrophilic substitution slow in pyridine?

- A. Ring is electron-rich
- B. Nitrogen donates electrons
- C. Ring is electron-deficient
- D. No resonance stabilization

Q12. Which reaction is NOT common in free pyridine?

- A. Nitration
- B. Sulfonation
- C. Friedel–Crafts reaction
- D. Halogenation

Q13. Friedel–Crafts reactions fail in pyridine because:

- A. Ring is too stable
- B. Nitrogen coordinates with Lewis acids
- C. No π electrons
- D. Too many substituents

Q14. Nitration of pyridine requires:

- A. Mild conditions
- B. Neutral medium
- C. Strong acidic conditions
- D. Basic conditions

Q15. Sulfonation of pyridine gives:

- A. High yield directly

- B. Low yield unless special methods used
- C. No reaction
- D. Only N-substitution

Q16. Halogenation of pyridine requires:

- A. Mild heating
- B. UV light
- C. Forcing conditions
- D. No catalyst

Q17. Quaternization of pyridine involves:

- A. Reduction
- B. Oxidation
- C. Reaction with alkyl halide
- D. Reaction with acid

Q18. Quaternization proceeds via which mechanism?

- A. SN1
- B. SN2
- C. E1
- D. Radical

Q19. Which alkyl halides are most suitable for quaternization?

- A. Tertiary
- B. Primary
- C. Aromatic
- D. Vinyl

Q20. Why are tertiary halides not suitable for quaternization?

- A. No reactivity
- B. Undergo elimination instead
- C. Too stable
- D. Do not dissolve

Q21. Pyridine promotes ester formation by:

- A. Acting as nucleophile
- B. Acting as oxidizing agent
- C. Forming acyl intermediate
- D. Breaking ester

Q22. In nucleophilic addition, pyridine acts as:

- A. Electron donor
- B. Electron sink
- C. Radical

D. Acid

Q23. Nucleophilic substitution is favored at:

- A. β -position
- B. α -position
- C. Nitrogen
- D. Any position equally

Q24. Why is β -substitution less favorable? in nucleophilic substitution

- A. Steric hindrance
- B. No resonance stabilization
- C. Too reactive
- D. Too stable

Q25. What restores aromaticity after nucleophilic addition?

- A. Reduction
- B. Oxidation or leaving group loss
- C. Protonation
- D. Hydration

Q26. Electron-withdrawing groups affect nucleophilic substitution by:

- A. Decreasing rate
- B. Increasing rate
- C. No effect
- D. Preventing reaction

Q27. Best leaving groups in pyridine substitution are:

- A. OH
- B. NH \blacksquare
- C. Halogens or NC \blacksquare
- D. CH \blacksquare

Q28. Conversion to pyridinium ion results in:

- A. Decreased reactivity
- B. No change
- C. Increased nucleophilic substitution rate
- D. Ring breakdown

Q29. In pyridinium ions, substitution occurs mainly at:

- A. β -position
- B. α -position
- C. Random
- D. Nitrogen only

Q30. Which statement is correct about pyridine reduction?

- A. Harder than benzene
- B. Easier than benzene
- C. Impossible
- D. Only side-chain reduction occurs

Model Answers

- 1. A
- 2. B
- 3. C
- 4. B
- 5. C
- 6. C
- 7. C
- 8. C
- 9. B
- 10. B
- 11. C
- 12. C
- 13. B
- 14. C
- 15. B
- 16. C
- 17. C
- 18. B
- 19. B
- 20. B
- 21. C
- 22. B
- 23. B
- 24. B
- 25. B
- 26. B
- 27. C
- 28. C
- 29. B
- 30. B

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Model Answers

- 1. A
- 2. B
- 3. C
- 4. B
- 5. C
- 6. C
- 7. C
- 8. C
- 9. B
- 10. B
- 11. C
- 12. C
- 13. B
- 14. C
- 15. B
- 16. C
- 17. C
- 18. B
- 19. B
- 20. B
- 21. C
- 22. B
- 23. B
- 24. B
- 25. B
- 26. B
- 27. C
- 28. C
- 29. B
- 30. B