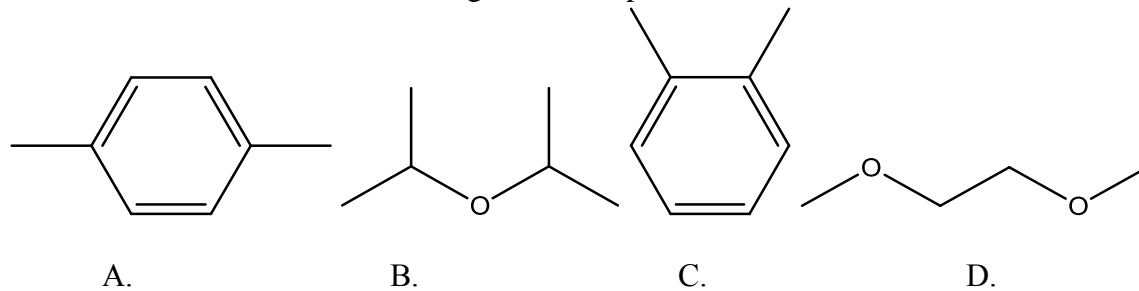
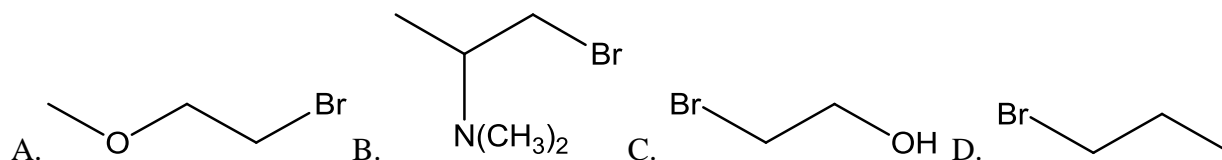


Practice Test, Chemistry 2220 Final Exam

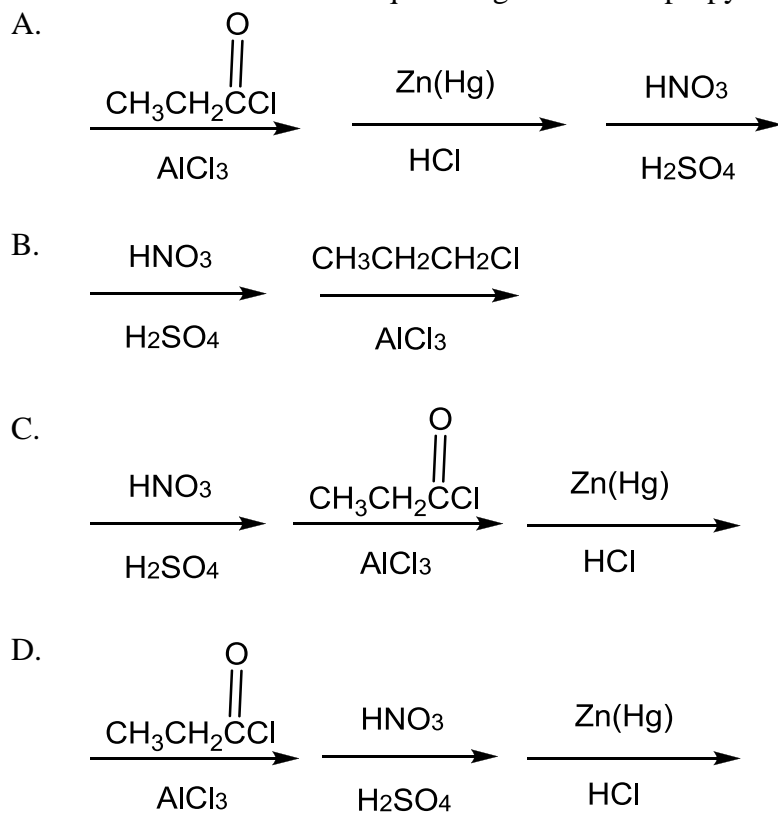
1. Which structure has the MOST signals for its proton NMR?



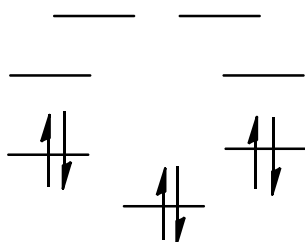
2. Which compound does not give a stable Grignard reagent when reacting with Mg metal?

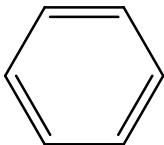
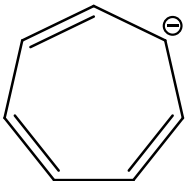
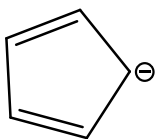
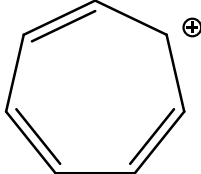


3. Which of these reaction sequences gives m-nitropropylbenzene from benzene?

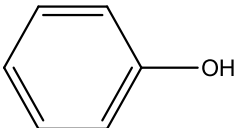
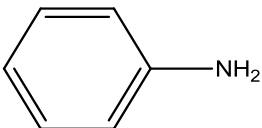
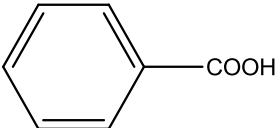
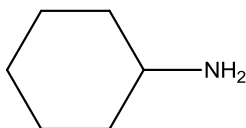


4. Which compound has the following π orbital energy level diagram?

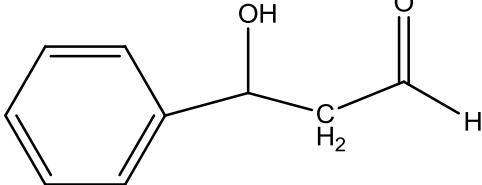
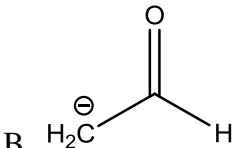
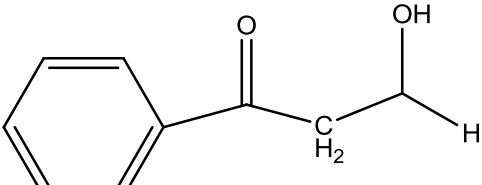
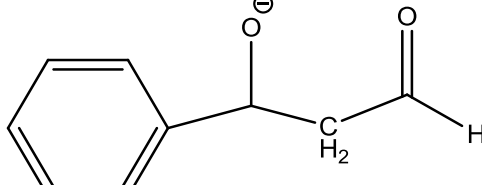


- A.  B.  C.  D. 

5. Which of the following compounds is insoluble in water and HCl (aq), and soluble in NaOH(aq) and NaHCO₃ (aq)?

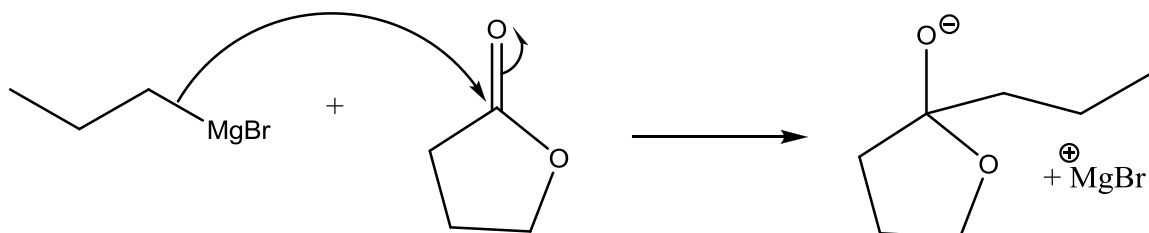
- A.  B.  C.  D. 

6. Which of the following structures is not involved in the aldol condensation of benzaldehyde and acetaldehyde with base catalyst?

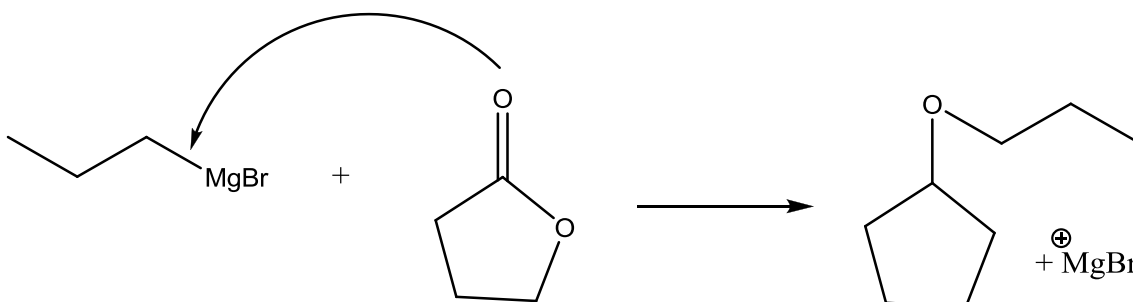
- A.  B.  C.  D. 

7. Which mechanistic step is involved in a Grignard reaction?

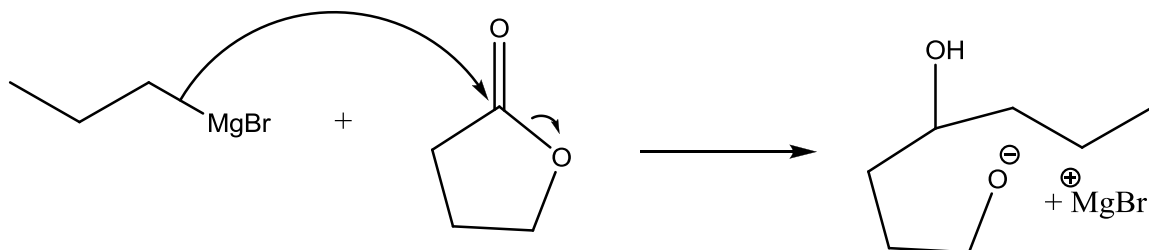
A.



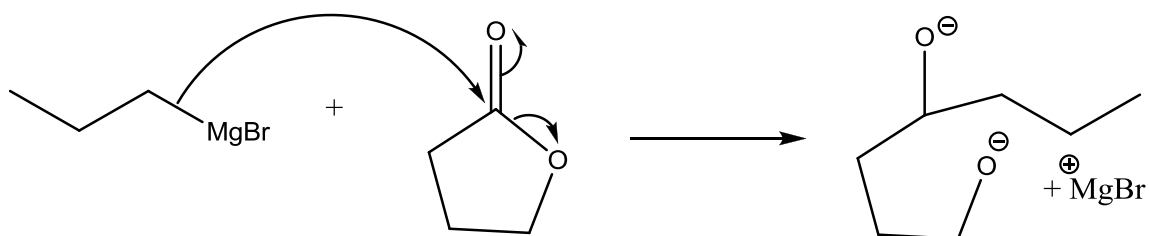
B.



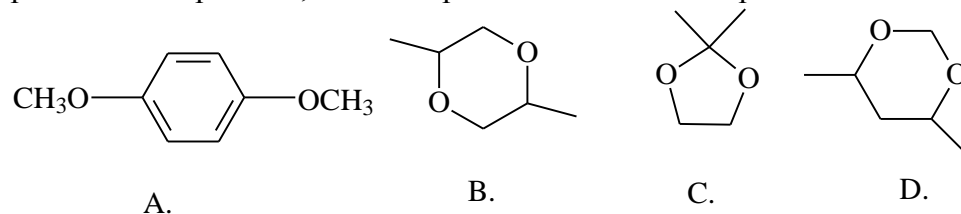
C.



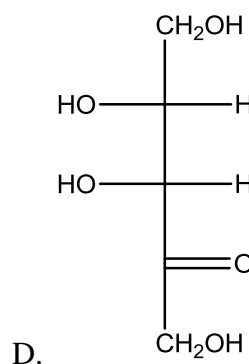
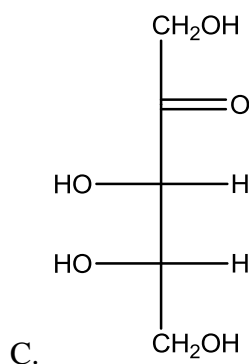
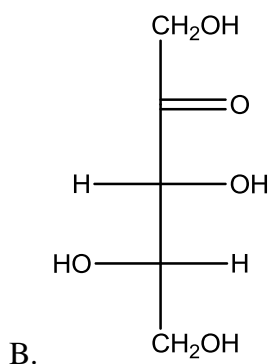
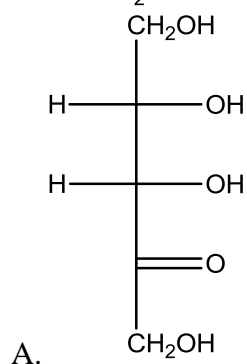
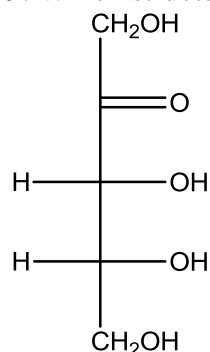
D.



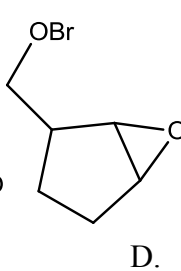
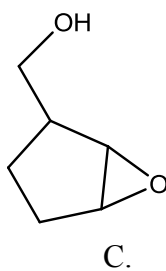
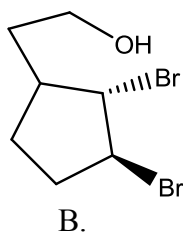
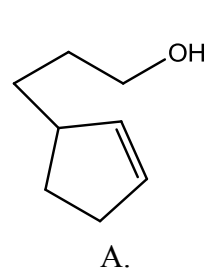
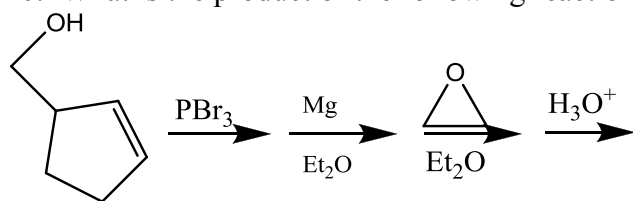
8. Which of the following compounds has two singlets, 1.30 ppm (6 H) and 4.00 ppm (4 H) in its proton NMR spectrum, and three peaks in its ^{13}C NMR spectrum?



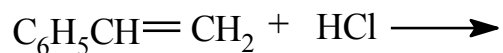
9. Which structure is not a stereoisomer of this sugar (ribulose) shown here?



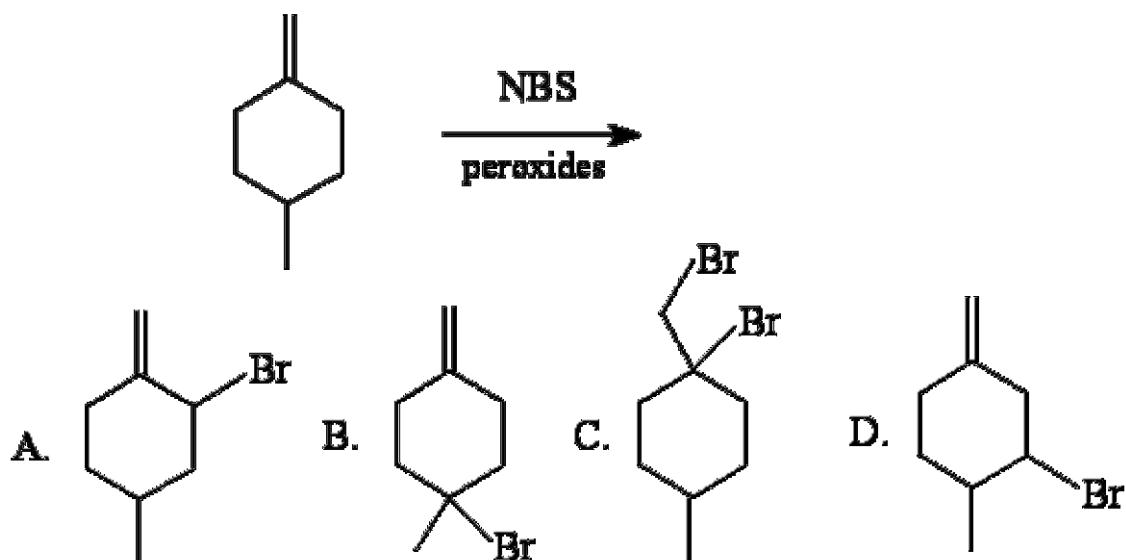
10. What is the product of the following reaction sequence?



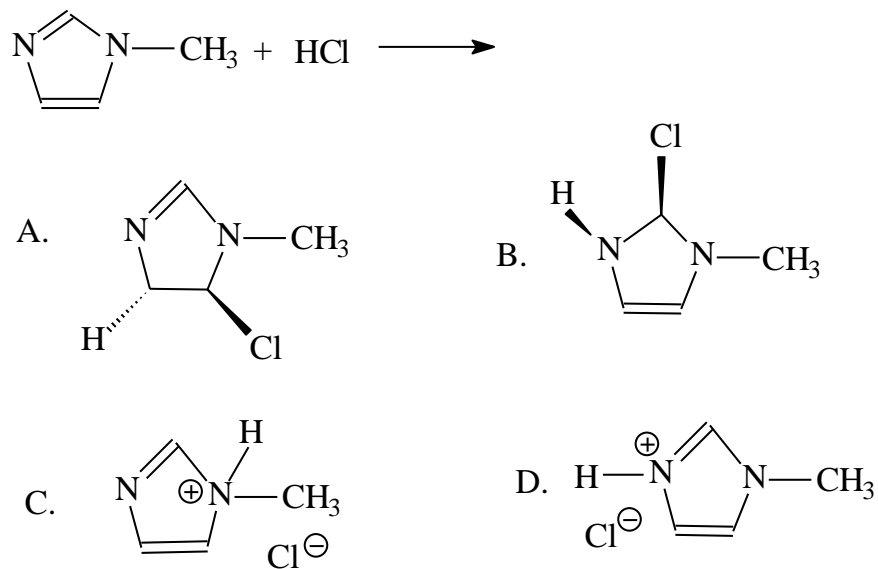
11. Which of the following is an intermediate involved in the reaction shown?



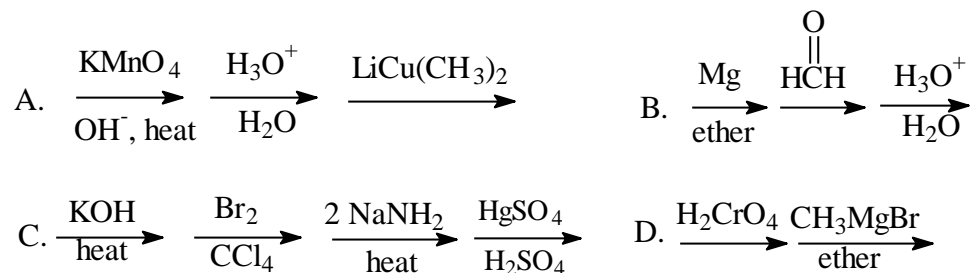
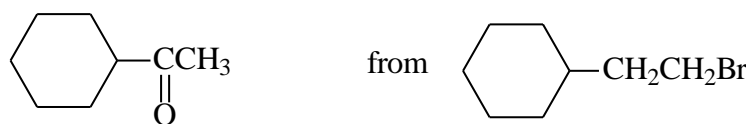
12. Which one is the major organic product expected from the following reaction?



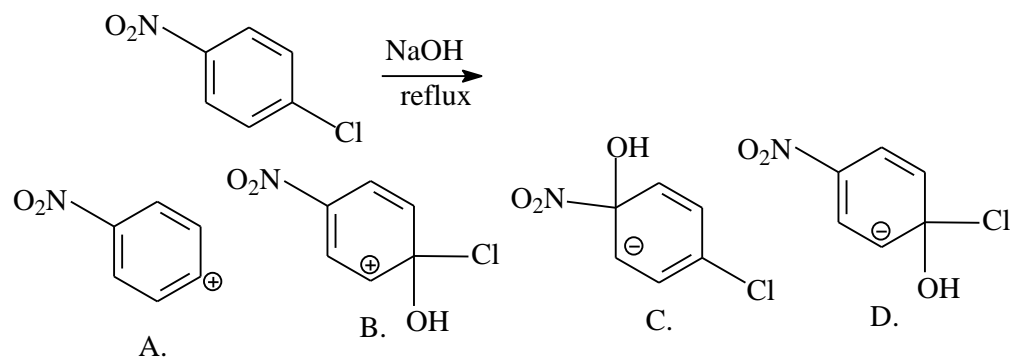
13. What is the structure of the major organic product expected from the following reaction?



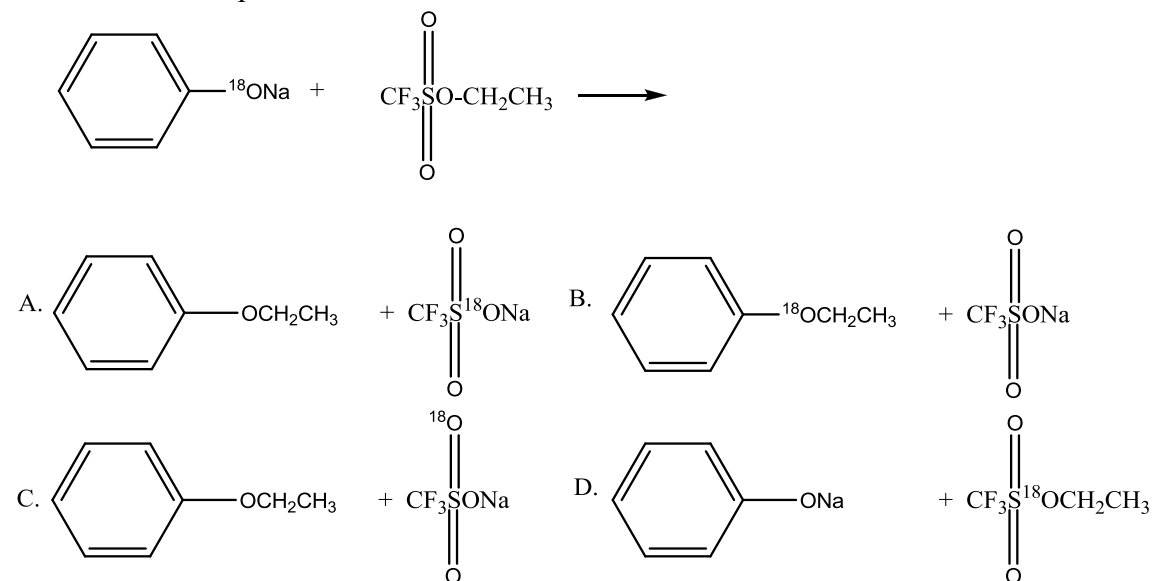
14. Which of the following pathways is the best for the synthesis of



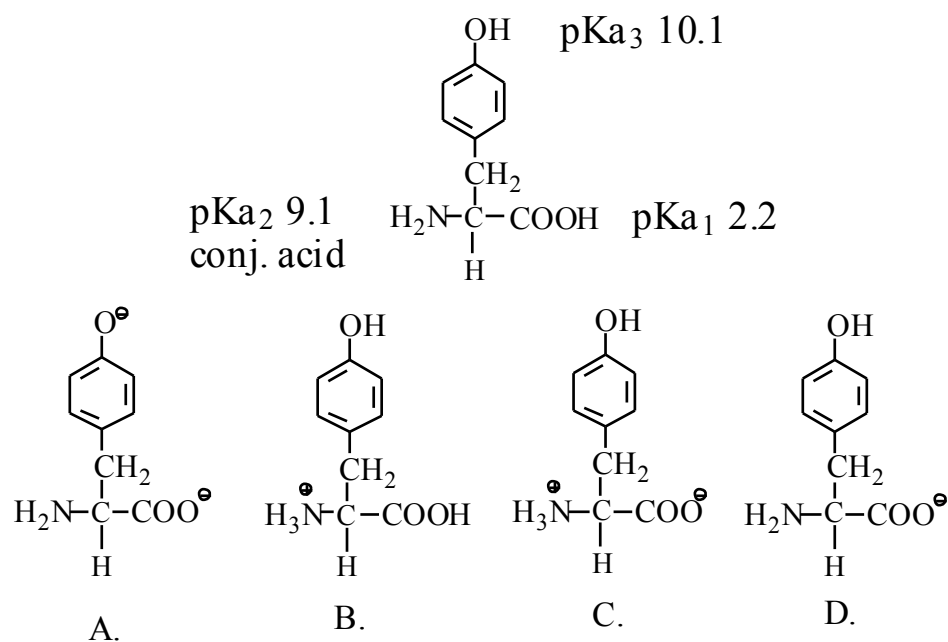
15. Which of the following is an intermediate in this reaction?



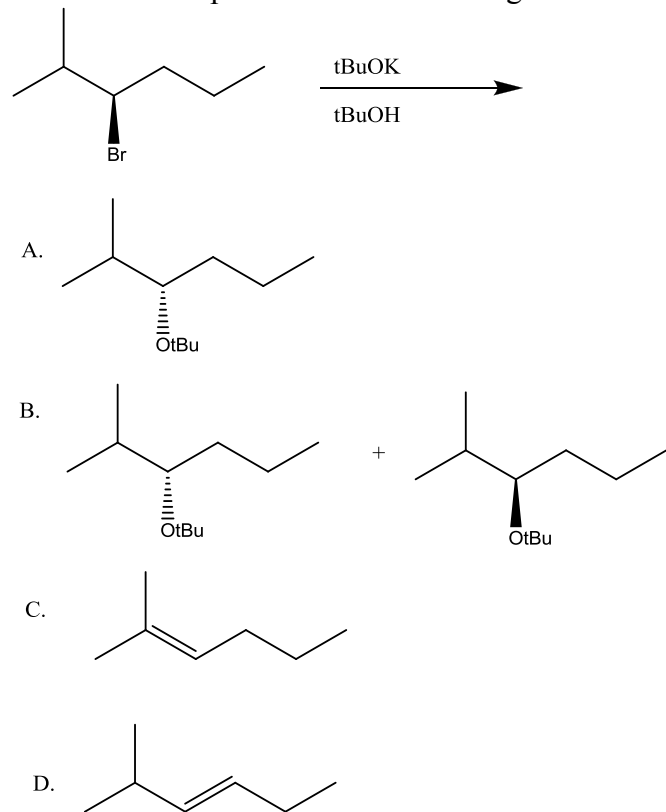
16. What are the products of this reaction?



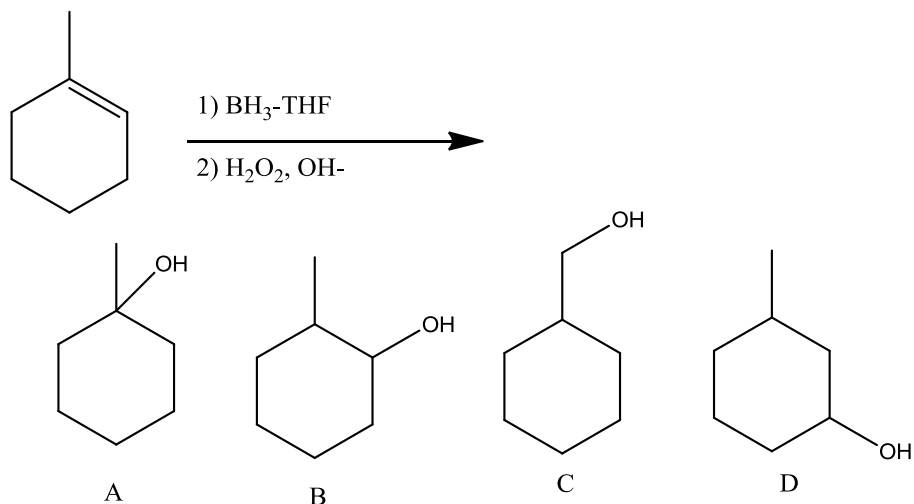
17. From the following information given for *tyrosine*, which of the following forms will be predominant in solution at a pH 12?



18. What is the product of the following reaction?



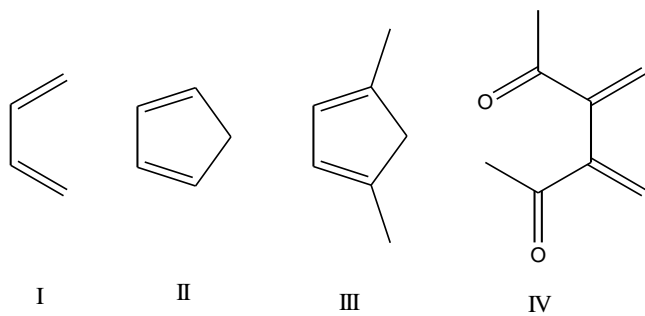
23. What is the major product of the following reaction



24. What would be a simple chemical test to distinguish between benzene and cyclohexene?

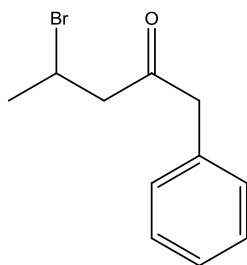
- A. NaOH in water
 B. Br_2 in CCl_4
 C. AgNO_3 in $\text{C}_2\text{H}_5\text{OH}$
 D. NaHSO_3 in water

25. Rank the reactivity order of the following dienes with maleic anhydride, starting with the slowest



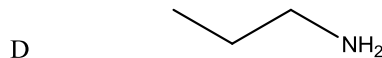
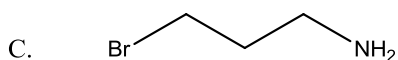
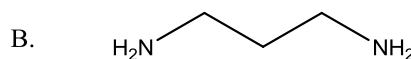
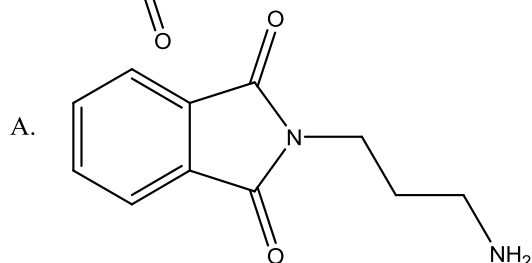
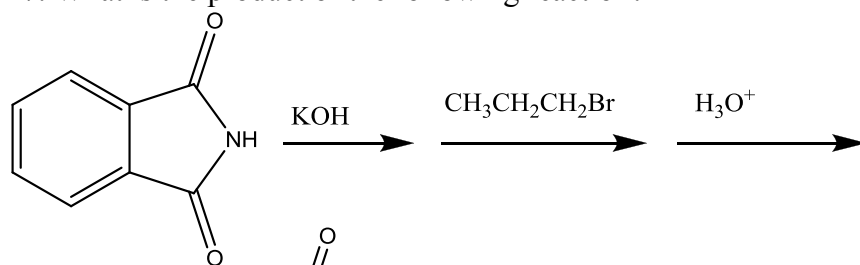
- A. $\text{IV} < \text{I} < \text{II} < \text{III}$
 B. $\text{III} < \text{IV} < \text{II} < \text{I}$
 C. $\text{III} < \text{II} < \text{I} < \text{IV}$
 D. $\text{IV} < \text{III} < \text{II} < \text{I}$

26. What is the IUPAC name for



- A. 4-bromo-1-phenyl-2-pentanone
 B. 2-bromo-5-phenyl-4-pentanone
 C. 4-bromo-1-benzyl-2-pentanone
 D. 2-bromo-5-benzyl-2-pentanone

27. What is the product of the following reaction?

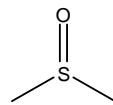


28. The relative reactivity of acyl compounds towards nucleophilic substitution is

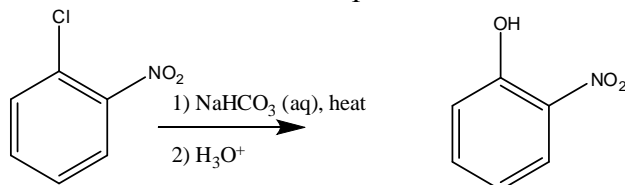
- A. Amide > ester > acid anhydride > acyl chloride
- B. Acyl chloride > ester > acid anhydride > amide
- C. Acyl chloride > acid anhydride > ester > amide
- D. Acid Anhydride > acyl chloride > ester > amide

29. What is the name of the following compound?

- A. Dimethylthioketone
- B. Dimethylsulfoxide
- C. Dimethylsulfone
- D. Dimethylsulfide

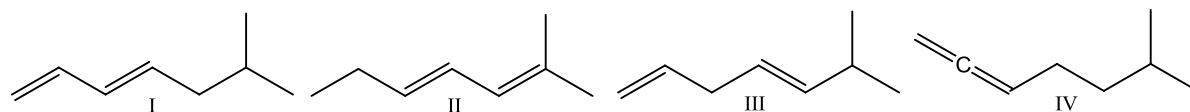


30. The reaction that takes place here is called:



- A. Electrophilic Aromatic Substitution
- B. Electrophilic Aromatic Addition
- C. Nucleophilic Aromatic Substitution
- D. Nucleophilic Phenolation

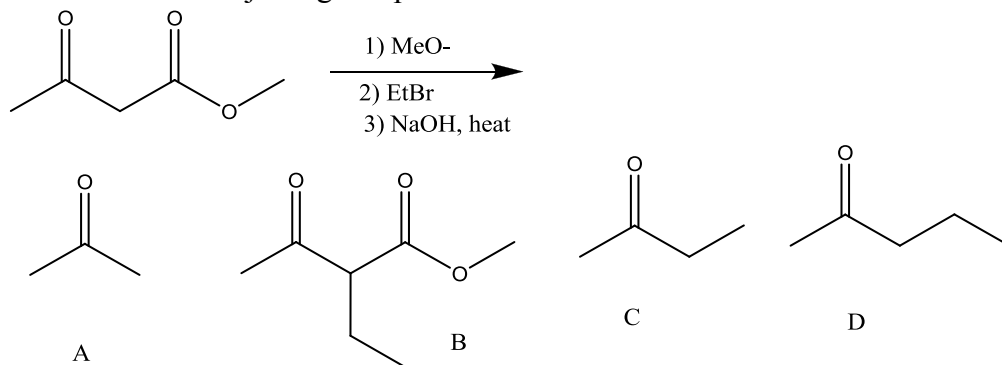
31. Arrange these dienes by stability, most stable first.



A. I > II > III > IV
C. IV > III > I > II

B. II > I > III > IV
D. IV > I > III > II

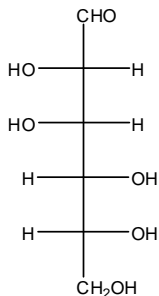
32. What is the major organic product of this reaction?



33. A pentapeptide has the following composition: Asp, Glu, His, Phe, Val. After partial hydrolysis, the fragments are: Val-Asp, Glu-His, Phe-Val, Asp-Glu. What is the sequence?

A. His-Glu-Asp-Val-Phe
B. Asp-Glu-His-Phe-Val
C. Phe-Val-Asp-Glu-His
D. Phe-Val-Glu-His-Asp

34. What class of sugars does the following molecule belong to?

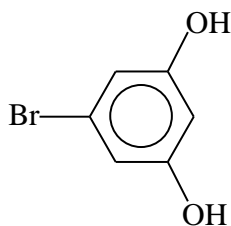


A. L-Ketopentose B. D-Aldopentose C. L-Aldohexose D. D-Aldohexose

35. How would you convert an unsaturated fatty acid into a saturated fatty acid?

- A. KMnO_4 , OH^- , heat
B. OH^- , H_2O heat; then H_3O^+
C. H_2 , Ni, pressure
D. H_3O^+ , H_2O , heat

36. Which of the following pathways is the best for the synthesis of the following compound from benzene?



- A. $\text{Br}_2/\text{FeBr}_3$, then KOH
B. $\text{Br}_2/\text{FeBr}_3$, then $\text{HNO}_3/\text{H}_2\text{SO}_4$, then NaNO_2/HCl , then H_2/Pt , then $\text{Cu}_2\text{O}/\text{Cu}^{2+}/\text{H}_2\text{O}$
C. $\text{Br}_2/\text{FeBr}_3$, then $\text{HNO}_3/\text{H}_2\text{SO}_4$, then $\text{HNO}_3/\text{H}_2\text{SO}_4$, then H_2/Pt , then NaNO_2/HCl , then $\text{Cu}_2\text{O}/\text{Cu}^{2+}/\text{H}_2\text{O}$
D. $\text{HNO}_3/\text{H}_2\text{SO}_4$, then $\text{HNO}_3/\text{H}_2\text{SO}_4$, then $\text{Br}_2/\text{FeBr}_3$, then H_2/Pt , then NaNO_2/HCl , then $\text{Cu}_2\text{O}/\text{Cu}^{2+}/\text{H}_2\text{O}$

37. Which compound reacts with H_2NCH_3 and H_2/Pt to form $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{NHCH}_3$?

- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$
B. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$
C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
D. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$

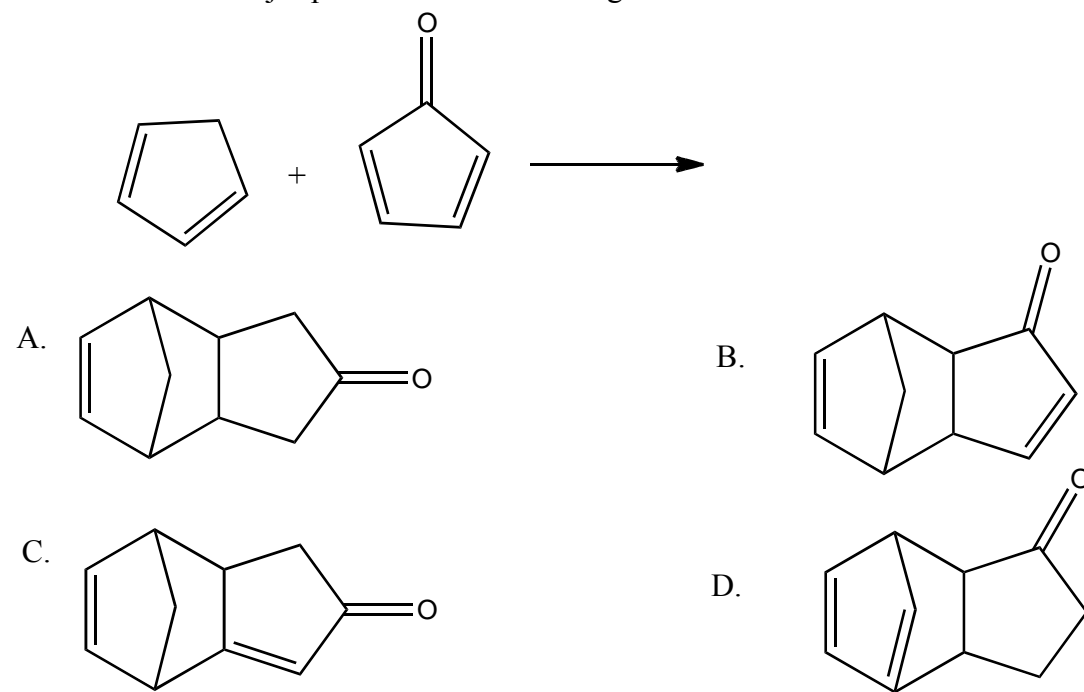
38. Which of these can be used to transform butanoic acid into 1-butanol?

- A. NaBH_4 B. LiAlH_4 C. PCC D. H_2CrO_4

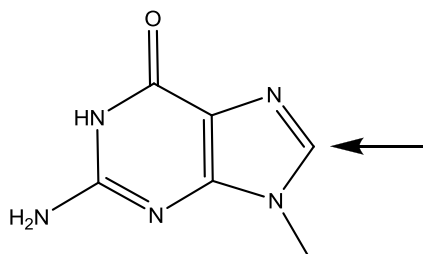
39. Which of these forms when 1,3-butadiene reacts with HBr (no peroxides)?

- A. $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_2\text{Br}$
B. $\text{CH}_2=\text{CH}-\text{CBr}=\text{CH}_2$
C. $\text{CH}_3-\text{CBr}=\text{CH}-\text{CH}_3$
D. $\text{CH}_2=\text{CH}-\text{CHBr}-\text{CH}_3$

40. Which is the major product of the following reaction?



41. In the following derivative of guanine, what is the splitting pattern of the proton located at the position marked?



- A. singlet B. doublet C. triplet D. multiplet

42. Which of the following reagents would you use in order to synthesize 2-methyl-1-propanamine, using NaN_3 followed by reduction?

- A. *tert*-butyl bromide B. isobutyl bromide C. isopropyl bromide D. propyl bromide

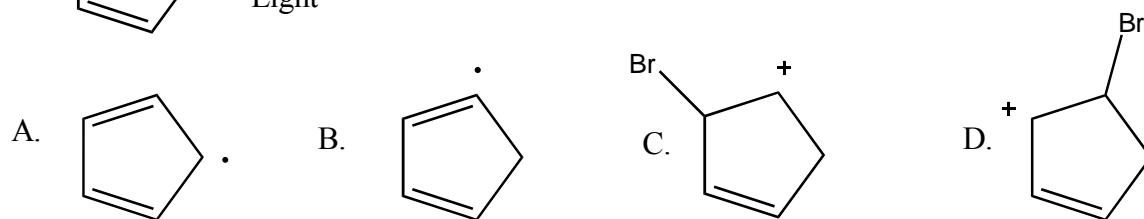
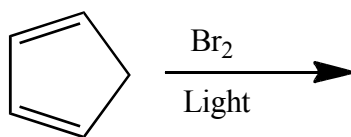
43. Which functional group is not present in all peptides?

- A. Amine B. Aldehyde C. Carboxylic acid D. Amide

44. omit

45. omit

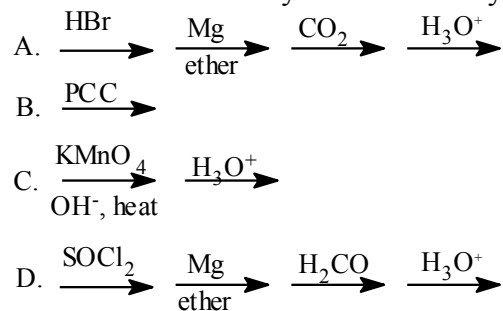
46. Which of these is an intermediate involved in the following reaction:



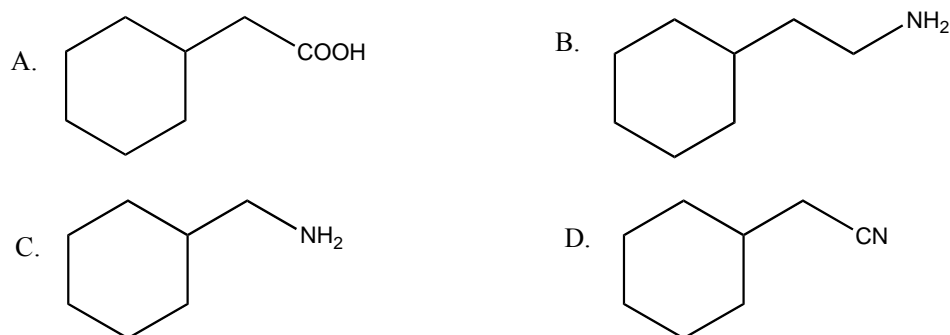
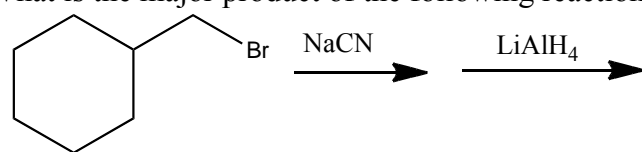
47. Which of the following is the strongest acid?

- A. Aniline B. Toluene C. Phenol D. Styrene

48. Which of these syntheses would yield butanoic acid from 1-propanol:



49. What is the major product of the following reaction?



50. Which statement is correct for this sugar?

- A. This is a hemiacetal and a reducing sugar.
 B. This is an acetal and a reducing sugar.
 C. This is a hemiacetal and a non-reducing sugar.
 D. This is an acetal and a non-reducing sugar

