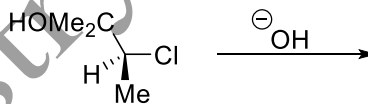


Group-A

(Answer any 5 questions, each question carries 2 marks)

- A.1. Write down the structure of the electrophile in Vilsmeier-Haack formylation. What is the product when *N,N*-dimethylformamide is subjected to this reaction?
- A.2. What is *ipso*-substitution? Give one example.
- A.3. Identify the product when 2,6-dichloro-1,4-dinitrobenzene is reacted with NaOMe.
- A.4. *Z*-2-butene reacts with CH_2I_2 and Zn-Cu to afford meso-1,2-dimethylcyclopropane. Provide a plausible mechanism.
- A.5. Which of the following alkynes is more suitable for synthesising 2-heptanone by Hg(II)-cat. hydration - i) 2-heptyne, or ii) 1-heptyne? Explain briefly.
- A.6. Draw the most stable conformer of $\text{HOCH}_2\text{CH}_2\text{F}$. Give reasons.
- A.7. Convert (*R*)-2-chlorobutane to (*S*)-2-chlorobutane.
- A.8. Indicate the product(s) in the following reaction and give mechanism.



Group-B

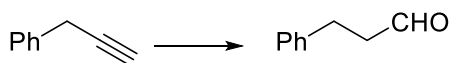
(Answer any 1 question, question carries 5 marks)

- B.1. Write a short note on Birch reduction of benzenoid aromatics, addressing the following points: i) specify the reagent used (taking benzene as substrate); ii) provide a plausible mechanism using benzene as substrate, iii) Justify why anisole reacts more slowly than benzoic acid in the respective Birch reductions of these substrate. (1 + 2 + 2)
- B.2. i) Arrange the following compounds with increasing enol content. Explain the order with reason. $\text{CH}_3\text{COCH}_2\text{COCH}_3$, $[(\text{CH}_3)_3\text{CCO}]_3\text{CH}$, and $\text{PhCH}_2\text{COCH}_2\text{COCH}_3$ (1 + 2)
- ii) Between ethanol and trifluoroethanol, which is more efficient solvent for $\text{S}_{\text{N}}1$ reaction? Explain. (2)

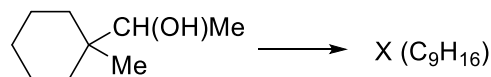
Group-C

(Answer any 1 question, question carries 10 marks)

- C.1. i) Both *o*-bromoanisole and its *m*-regioisomer afford the same product when treated separately with NaNH_2 in liq. NH_3 . Identify the product. Explain its formation from both precursors with a plausible mechanism in each case.
- ii) How can you achieve the following transformation? Provide appropriate reagents and a plausible mechanism.



- iii) A compound 'X' on ozonolysis affords nonane-2,8-dione. Identify 'X'. Suggest a plausible mechanism for the formation of A from the sec. alcohol, as shown below.



(4 + 3 + 3)

- C.2.** i) Alkyl halides produce mainly cyanides with aqueous ethanolic KCN, whereas with AgCN isocyanides are the main products. Explain.
- ii) The enol content of acetone is negligible, whereas phenol remains almost exclusively in the enolic state.
- iii) In the gaseous state, at 22 °C, 1,2-dichloroethane contains 73% *anti*-conformer, whereas *n*-butane contains 67% *anti*-conformer. Explain.

(4 + 3 + 3)

----- End of questions -----

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