

2026

CHEMISTRY — HONOURS

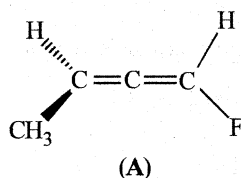
Paper : DSCC-6

(Organic Chemistry - II)

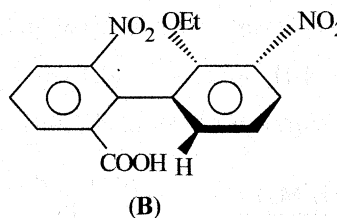
Full Marks : 75

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer **question nos. 1, 2, 3, 4** and **any four** questions from **question nos. 5-10**.1. Answer **any ten** questions :

2×10

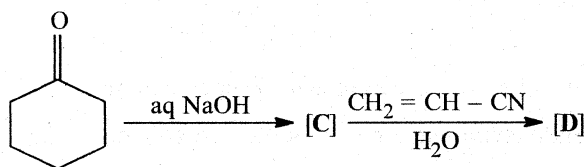
(a) Draw the most stable conformer of $\text{CH}_2\text{OH} - \text{CH}_2\text{F}$ in Newman projection formula.(b) Assign *R/S* descriptors

and

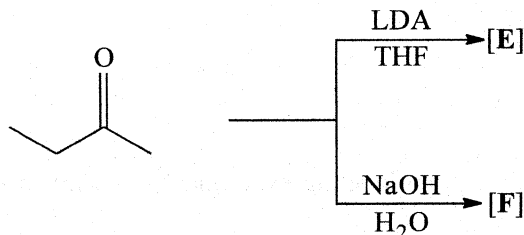


(c) Define prostereogenic centre with a suitable example.

(d) Identify [C] and [D] in the following reaction with plausible mechanism :



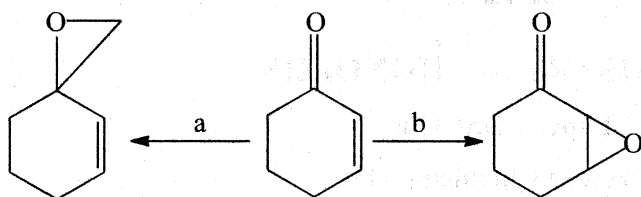
(e) Predict the structures of enolates formed.



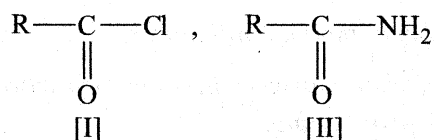
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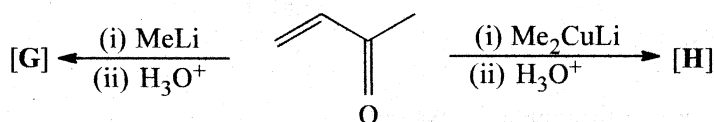
- (f) Write down the proper reagents of the following transformations :



- (g) Compare the rate of hydrolysis of the following compounds with proper explanations :



- (h) What happens when two equivalents of phenyl magnesium bromide is treated with one equivalent of ethyl acetate followed by hydrolysis?
- (i) Define ylide with example.
- (j) $\text{PH}_3\text{P}^{\oplus}-\text{CH}_2^{\ominus}$ on reaction with $\text{RCH}=\text{O}$ forms $\text{RCH}=\text{CH}_2$, whereas $\text{Me}_2\text{S}^{\oplus}-\text{CH}_2^{\ominus}$ on treatment with $\text{RCH}=\text{O}$ forms epoxide. Explain mechanistically.
- (k) Explain why 4-Hydroxybenzaldehyde does not undergo Cannizzaro reaction.
- (l) Identify the major products of the following transformations :



2. Write a short note on (using the following points) :

- (a) "Pseudoasymmetric centre"

- Definition/statement of pseudoasymmetric centre with proper example.
- Taking an example of propseudoasymmetric centre with two H atoms, identify pro-R and pro-S H atoms.
- A molecule having pseudoasymmetric centre may be achiral. If yes, give example. 2+2+1

Or

- (b) "Cannizzaro Reaction"

- Substrate and reagent.
- Mechanism of the reaction and deuterium labeling experiment to establish the mechanism.

2+3

3. Write a short note on (using the following points) :

(a) "Aldol condensation"

- (i) Write the mechanism of Aldol condensation in basic medium taking a suitable substrate.
- (ii) Mention the salient points of difference between acid and base catalysed Aldol condensation.
- (iii) Give an example of intramolecular Aldol condensation. 2+2+1

Or

(b) "Michael condensation"

- (i) Give an example of Michael condensation with proper mechanism taking suitable substrate(s).
- (ii) Give example of Michael condensation where α , β -unsaturated acid undergo Michael condensation.
- (iii) Give an example of α , β -unsaturated carbonyl compound which cannot undergo Michael condensation. 2+2+1

4. Write a short note on (using the following points) :

(a) "Acetal/Ketal"

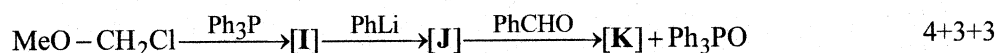
- (i) Write mechanism of acetal/ketal formation of a carbonyl compound taking a suitable substrate.
- (ii) Write the condition(s) required for acetal/ketal formation. Why acetals/ketals are good protecting groups?
- (iii) Cite an example of a reaction where cyclic ketal is formed. 2+2+1

Or

(b) "Reactions of Grignard Reagents"

- (i) Write a reaction with mechanism, where a G. R. reacts with sterically hindered ketone.
- (ii) Give example of one α , β -unsaturated ketone where same substrate can give 1,4 and 1,2-addition product with different reagents.
- (iii) Write a reaction of G. R. where carboxylic acids can be prepared. 2+2+1

5. (a) Draw energy profile diagram of 1,2-dichloroethane for rotation about C-C bond and label the maxima and minima with appropriate conformation. Compare the relative stability of the conformers with explanation.
- (b) Show the course of Robinson's annulation reaction for synthesizing fused ring in the reaction of cyclohexanone and methyl vinyl ketone.
- (c) Write the structure of [I] to [K] in the following reaction sequence :



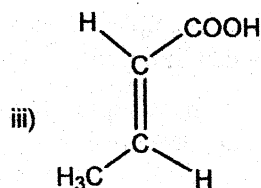
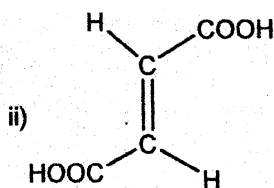
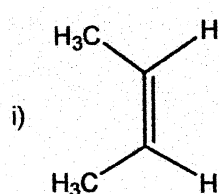
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6. (a) (i) Explain the role of Li^+ ion in the reduction of carbonyl compounds with LiAlH_4 . Give the mechanism of the reaction.
- (ii) Explain why the following aldehyde with no α -hydrogen atom do not undergo Cannizzaro reaction.

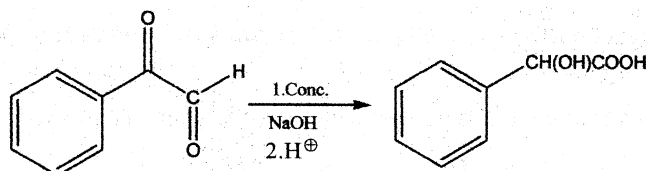


- (b) Write $\text{B}_{\text{AC}2}$ mechanism for the hydrolysis of ethyl benzoate. Hence arrange in increasing order the rate of hydrolysis of *p*-nitro ethyl benzoate, *p*-methoxy ethyl benzoate and ethyl benzoate.
- (c) Identify the Re-Re or Re-Si/Si-Re or Si-Si faces of the following compounds when viewed from the top face :

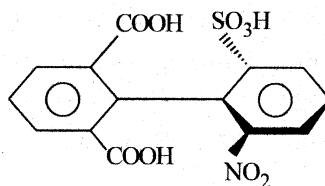
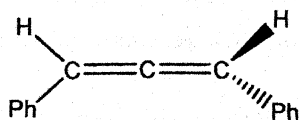


4+3+3

7. (a) PhCHO and $\text{CH}_3\text{COCH}_2\text{CH}_3$ give $\text{PhCH}=\text{CHCOCH}_2\text{CH}_3$ in base and $\text{PhCH}=\text{C}(\text{Me})\text{COCH}_3$ in acid. Give the mechanistic explanation.
- (b) Write the mechanism of the following reaction :

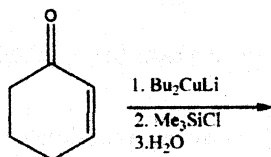


- (c) Explain whether the following compounds are resolvable or not :



4+3+3

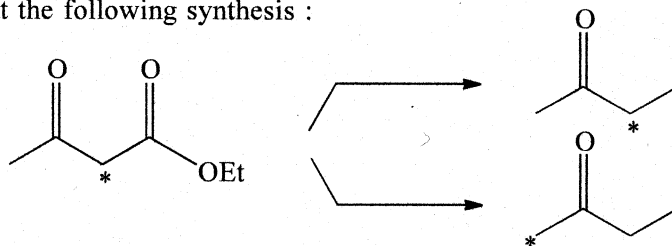
8. (a) What is Gilman cuprate? How is it prepared? Complete the following reaction :



(5)

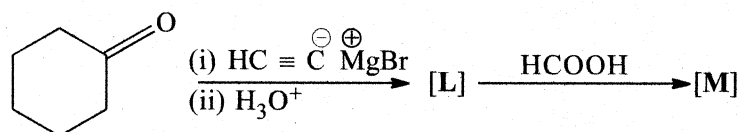
F(4th Sm.)-Chemistry-H/DSCC-6/CCF

(b) Carry out the following synthesis :

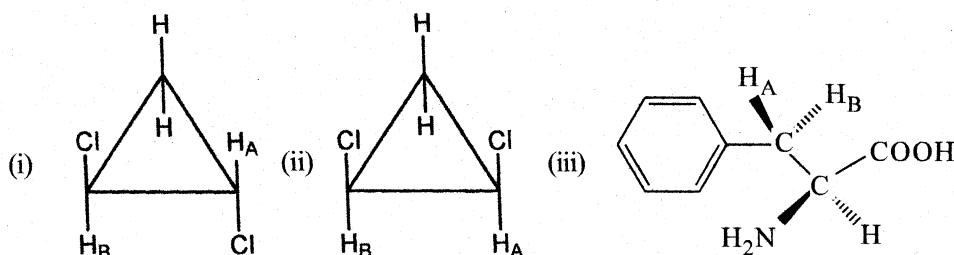


(c) Draw the preferred conformer of 1-Bromopropane in Newman projection with appropriate reason. 4+3+3

9. (a) Identify [L] and [M] in the following reaction :

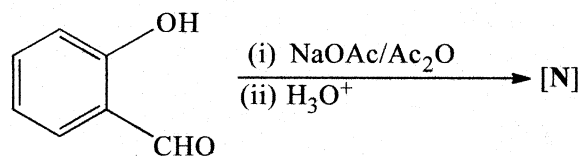


Give the mechanism for the step [L] → [M].

(b) Convert acetone to $\text{CH}_3\text{COCH}=\text{CH}_2$ via Mannich reaction. Give mechanism.(c) Identify H_A and H_B in each of the following structures as homotopic, enantiotopic or diastereotopic and explain.

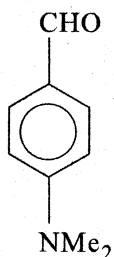
4+3+3

10. (a) Identify the product [N] in the following reaction with mechanism :



Name the reaction.

(b) Give the reagents for Benzoin condensation. Explain the importance of the reagent.



does not undergo Benzoin condensation. — Why?

(c) Represent $\text{CH}_3\text{COC}_2\text{H}_5$ in Re-face. One mole of vinyl magnesiumbromide is added to $\text{CH}_3\text{COC}_2\text{H}_5$ which reacts from Re-face. Find the R/S configuration of the product. 4+3+3

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