Exercise-1

Marked Questions may have for Revision Questions.



A-17. Sol. It is birch reduction



D-1. Sol. $\begin{pmatrix} O \\ II \\ CH_3CH_2-C-O \end{pmatrix}_{2Ca} \xrightarrow{\Delta} CH_3-CH_2-C-CH_2-CH_3 + CaCO_3$



CHEMISTRY FOR JEE Reduction, Oxidation, Hydrolysis & Decarboxylation reactions

esters are not reduced by NaBH₄, >C=O (carbonyl) change to - CH(OH)- by use of NaBH₄ 6. Sol. 7. Sol. A = COCIdue to presence of -COCI group 9. Sol. 10. OHdue to presence of -OH group Sol. $\mathsf{CH}_{3}-\mathsf{CH}_{2}-\mathsf{HC} \doteqdot \mathsf{CH}_{2}-\mathsf{CH}_{2}-\mathsf{CH}_{2}-\mathsf{CH}_{3} \xrightarrow{[O]} \mathsf{CH}_{3}-\mathsf{CH}_{2}\mathsf{COOH} + \mathsf{CH}_{3}(\mathsf{CH}_{2})_{3}-\mathsf{COOH}$ 12. Sol. cis / trans 14. Sol. Alkene gives epoxide on reaction with per acid, Bayer's reagent give syn addition of -OH group with Alkene. $CH_{3} - C \stackrel{\ddagger}{=} CH - C - CH_{3} \qquad O \\ CH_{3} \qquad CH_{3} \qquad CH_{3} \qquad \xrightarrow{NalO_{4}} CH_{3} - C - CH_{3} + (CH_{3})_{3}C. COOH$ 15. Sol. $\delta CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - OH \xrightarrow{\Lambda}_{-H_2O} OH$ Sol. 23. (δ-Lactone) (X) $CH_2 = CH - CH - CH_2 - CH_3$ I OH $CH_{3} - CH_{2} - CH - CH_{2} - CH_{3}$ $CH_{3} - CH_{2} - CH - CH_{2} - CH_{3}$ OH (achiral) (Y) $(CH_{2} - CH_{2} - CH_{3}$ $(H_{2} = CH - C - CH_{2} - CH_{3}$ $(H_{2} - CH_{3} - CH_{2} - CH_{3})$ (T)(Y) 16. Sol. (A)

CHEMISTRY FOR JEE

Reduction, Oxidation, Hydrolysis & Decarboxylation reactions



PART - II : MISCELLANEOUS QUESTIONS

- A-1. Ans. (1)
- Self explanatory. Sol.
- A-2. Ans. (1)
- A-3. Ans. (2)
- A-4. Ans. (3)

1.

Sol.

Section (B) : MATCH THE COLUMN

B-1. Ans. (A) - (p); (B) - (q); (C) - (t); (D) - (s).

Section (C) : ONE OR MORE THAN ONE OPTIONS CORRECT

C-1. For partial reduction of alkyne lindlar catalyst and Ni₂B (P-2 catalyst) are used. Sol.

C-2. Sol. When alcohols are passed into Cu tube at 300°C; primary alcohol \rightarrow Aldehyde

Secondary alcohol → Ketone

Tertiary alcohol → Alkene

When alcohols are treated with PCC then ;

primary alcohol → Aldehyde Secondary alcohol → Ketone

Tertiary alcohol → No reaction

Exercise-3

CH₃–CH₂–CH=CH₂ ⁻

PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

 $\xrightarrow{\text{Pd}/\text{H}_2} \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$

CHEMISTRY FOR JEE Reduction, Oxidation, Hydrolysis & Decarboxylation reactions

2. Sol. LiAlH₄ is a strong reducing agent, it reduces carboxylic group into primary alcoholic group without affecting the basic skeleton of compound. $CH_2 = CH - COOH \xrightarrow{LiAlH_4} CH_2 = CH - CH_2OH$ 0 $\begin{array}{c} & \\ \mathsf{CH}_3 - \mathsf{C} - \mathsf{C}_2\mathsf{H}_5 \\ & 2 - \mathsf{Bu} \text{ tanone} \end{array} \xrightarrow{\mathsf{Zn}-\mathsf{Hg}} \begin{array}{c} \mathsf{CH}_3\mathsf{CH}_2\mathsf{CH}_2\mathsf{CH}_2\mathsf{CH}_3 \\ & \mathsf{Butane} \end{array}$ 3. Sol. It refers to as Clemensen's reduction 4. Sol. OH $\mathsf{CH}_3\mathsf{CH}_2 \ \mathsf{C} \equiv \mathsf{CH} \xrightarrow{\mathsf{Na}/\mathsf{Liq} \ \mathsf{NH}_3} \mathsf{CH}_3\mathsf{CH}_2\mathsf{C} \equiv \bar{\mathsf{CNa}}$ 5. Sol. $CH_{3}CH=CHCH_{3} \xrightarrow{O_{3}} O \xrightarrow{O} O \xrightarrow{O} O \xrightarrow{CH_{3}-HC} CH_{3} \xrightarrow{Zn, H_{2}O} 2CH_{3}-CH=O$ $Re ductive ozonolysis \xrightarrow{P} B'$ Sol. 6. 7. Sol. $C_n H_{2n} O = 44$ $C_nH_{2n} = 44 - 16$ $C_nH_{2n} = 28$ n = 2 $\mathsf{CH}_3-\mathsf{CH}=\mathsf{CH}-\mathsf{CH}_3\xrightarrow{\mathsf{O}_3/\mathsf{Zn}}\mathsf{CH}_3-\mathsf{CH}=\mathsf{O}$ $CH_2 = C \xrightarrow{H} O_3 \rightarrow H - C \xrightarrow{H} O = C \xrightarrow{H} O$ 8. Sol. Presence of one vinyl group gives formaldehyde as one of the product in ozonolysis. $CH_{3} - CH_{2} - CH_{2} - C \equiv C - CH_{3} \xrightarrow{\text{Li/NH}_{3}} CH_{3} - CH_{2} - CH_{2}$ 2-Hexyne $CH_{3} - CH_{2} - CH_{2}$ Trans-2-Hexene 9. Sol. CH=CH-CH₂-CH₃ NH₂NH₂/OH⁻ Wolf-kishner Reduction HO 10. HO Sol.

-OH group and alkene are acid-sensitive groups so clemmensen reduction can not be used.

CHEMISTRY FOR JEE

Reduction, Oxidation, Hydrolysis & Decarboxylation reactions



PART - II : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

1. Sol. Clemmensen's reagent or Wolff Kishner reagent are preferred for reduction of >C=O group into -CH₂. With Zn(Hg)/HCl, OH group will also undergo SN reaction.



2. Ans. cis-isomer

Sol. In presence of Lindlar's catalyst (Pd & CaCO₃ in quinoline) partial hydrogenation takes place and gives cis-isomer. Only alkynes are reduced by Lindlar's catalyst.



Aldehyde and acetone are the hydrolysis products of Q and P respectively. These products can be distinguished by Fehling solution.

7. Sol. $CH_3-C=C-CH_2-CH_3 \xrightarrow{C_2H_5OH} H_3C \xrightarrow{C} C = C \xrightarrow{H} CH_2-CH_2-CH_3$

8. Sol. In decarboxylation, β -carbon acquires δ - charge. Whenever δ - charge is stabilized, decarboxylation becomes simple. In (B), it is stabilized by -m & -I of C = O, which is best amongst the options offered,



9. Sol.



Sol. NaBH₄/C₂H₅OH & Raney Ni/H₂ in T.H.F do not reduce acid (–COOH), ester (–COOR) & epoxide

CHEMISTRY FOR JEE Reduction, Oxidation, Hydrolysis & Decarboxylation reactions

Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

Max. Marks : 120

Important Instructions

- **1.** The test is of **1 hour** duration.
- 2. The Test Booklet consists of **30** questions. The maximum marks are **120**.
- 3. Each question is allotted 4 (four) marks for correct response.
- Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question.
 ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
- 5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 4 above.

$$CH_3 - C \equiv CH + NH_3 + AgNO_3 \rightarrow CH_3 - C \equiv C. Ag + NH_4NO_3$$

while propene does not give any reaction with ammonical AgNO₃ due to absence of acidic hydrogen.

- **2. Sol.** Rate of hydrogenation will decreases on increasing steric hinderance at π bond.
- 3. Sol. It is birch reduction

10.

- 6. Sol. –COCI converts in –CHO by H₂/Pd-BaSO₄ (Rosenmund reduction)
- 8. Sol. Wolf-kishwner reduction (NH₂—NH₂/KOH) give alkane after reduction of carbonyl compound.

$$\succ \circ \xrightarrow{\mathsf{NH}_2 - \mathsf{NH}_2/\mathsf{KOH}}$$

9. Sol. All reagents are used to convert >C = O to $>CH_2$



. Sol. Trans ← Hargent (_____] ← Hargent Argent Cis Cis Cis Cis Syn addition with Baeyer's Reagent, So cis will form meso compound however peroxy acid in anti addition gives enantiomer.

11. Sol. β -Keto acid decarboxylates faster through 6 member cyclic transition state.

12. Sol. Alkene
$$(2)$$
 $Zn+H_2O$ CH_3CHO only

Max. Time : 1 Hr.



