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(3) $CH_2=CH_2$ — H_2/Ni → CH_3-CH_3; D_2/Ni → $CH_2(D)-CH_2(D)$

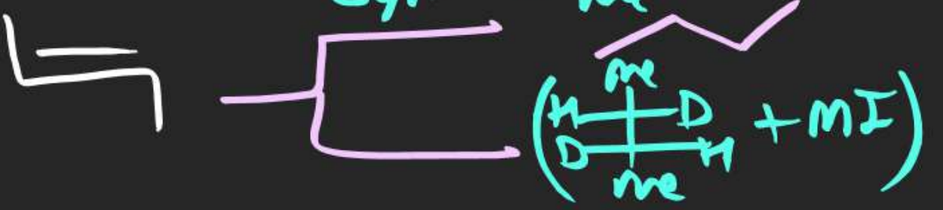
(4) 

(5) 

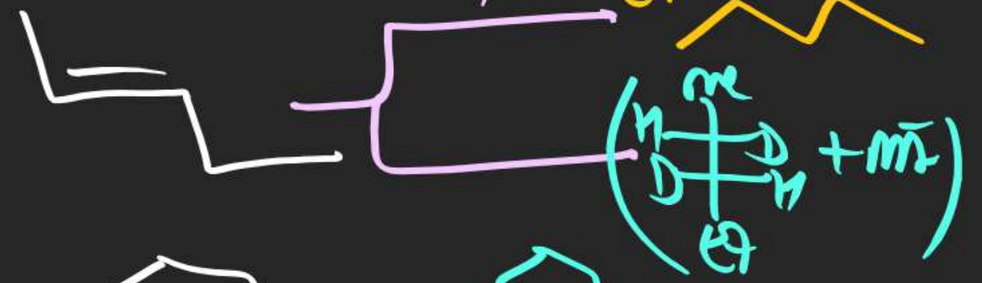
(6) 

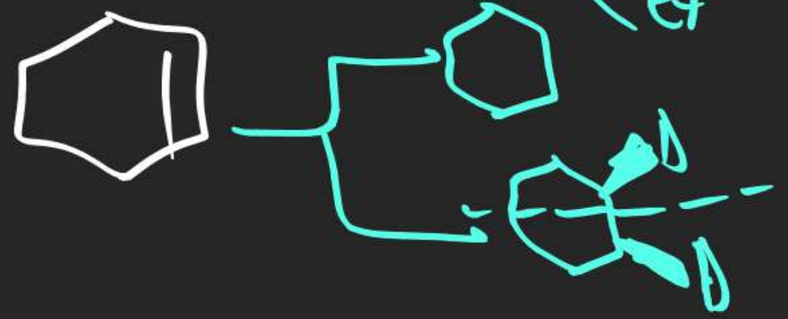
(7) 

(8) 

(9) 

(10) 

(11) 

(12) 

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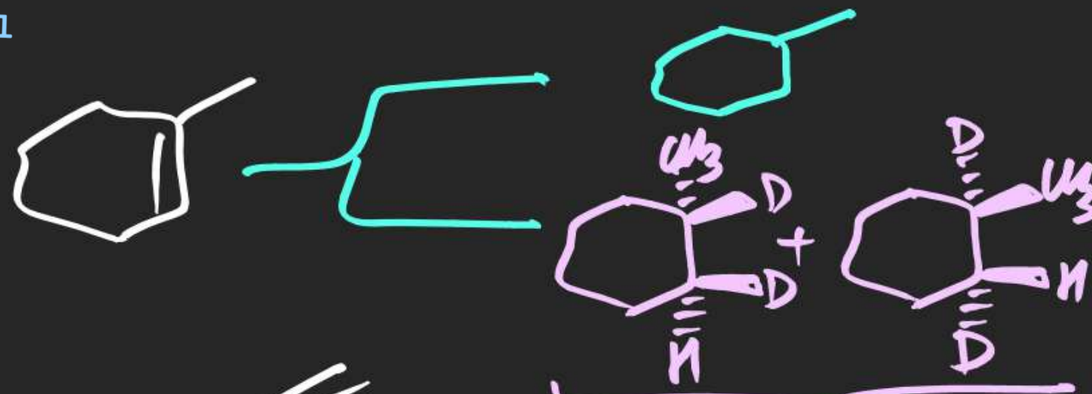
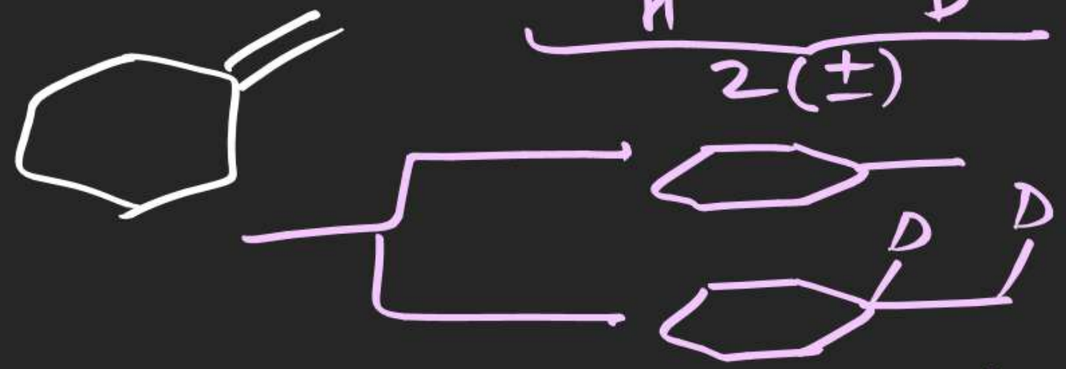
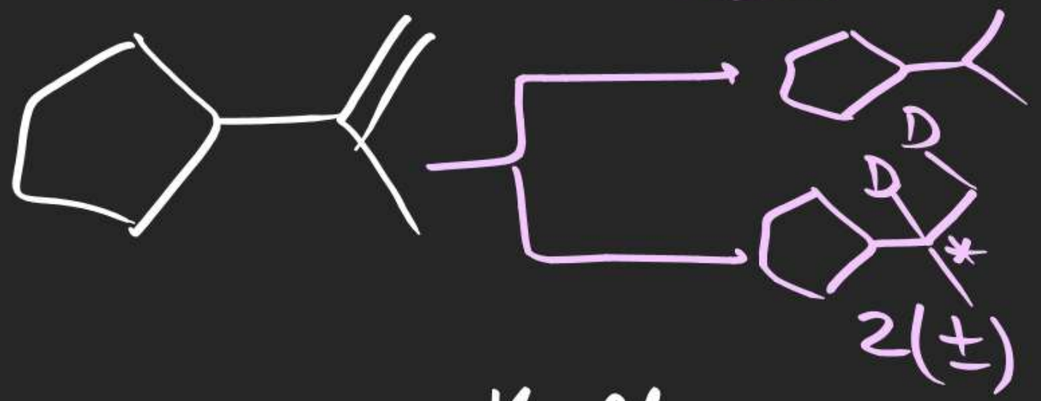
(13) 

2(±)

(14) 

(15) 

2(±)

(16) $R-\underset{H}{\overset{H}{C}}=O \xrightarrow{H_2-Pd} R-CH_2-OH$

(17) $R-CH=NH \xrightarrow{[H]} R-CH_2-NH_2$

(18) $R-CH=CH-R \xrightarrow{[H]} R-CH_2-CH_2-R$

(19) $R-C\equiv C-R' \xrightarrow[(excess)]{H_2-Pd}$ $R-CH_2-CH_2-R'$

$R-C\equiv C-R' \xrightarrow{H_2} R-CH=CH-R' \xrightarrow{H_2} R-CH_2-CH_2-R'$

(20) $R-C\equiv N \xrightarrow{[H]} R-CH_2-NH_2$

$R-C\equiv N \longrightarrow R-CH=NH \longrightarrow R-CH_2-NH_2$

(21) $R-\underset{Cl}{\overset{O}{C}} \xrightarrow{[H]} R-\underset{H}{\overset{O}{C}} \xrightarrow{H_2} R-CH_2-OH$

M.M. 2 up

Lindlar's Catalyst

(22) $R-C\equiv C-R' + H_2 \xrightarrow[BaSO_4]{Pd}$  (100% Cis)

more Reactive

less Reactive

(#) Rosenmund Reduction:

M.M. 1 up

(23) $R-C(=O)-Cl + H_2 \xrightarrow[BaSO_4]{Pd} R-C(=O)-H$

(24) $R-C\equiv N + H_2 \xrightarrow[BaSO_4]{Pd}$

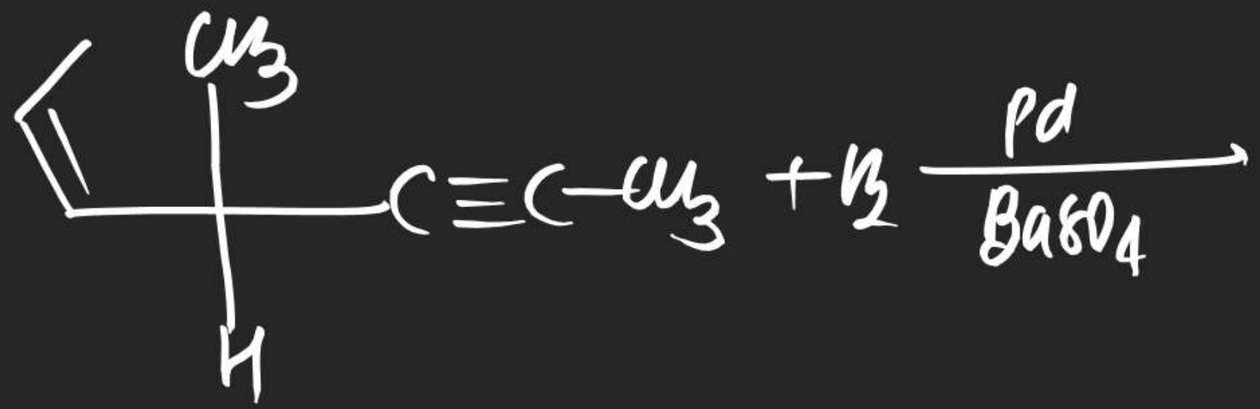
(25) 

$\xrightarrow[BaSO_4\ (Excess)]{H_2-Pd}$

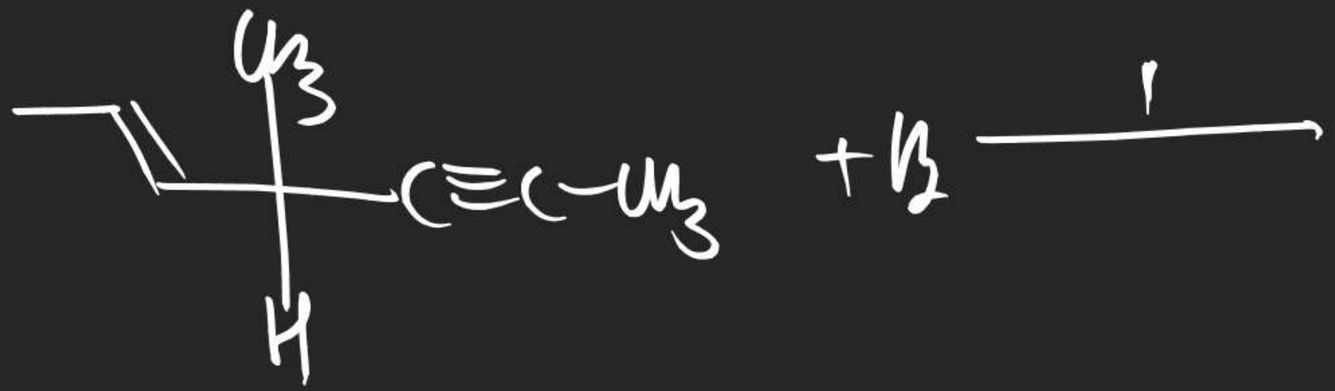
(26) $R-CH=CH-R + H_2 \xrightarrow[BaSO_4]{Pd}$ NO Rxn

(27) $R-CH=NH + H_2 \xrightarrow{''}$ NO Rxn

(28) $R-CH=O + H_2 \xrightarrow{''}$ NO Rxn

(29) 

$+ H_2 \xrightarrow[BaSO_4]{Pd}$

(30) 

$+ H_2 \xrightarrow{I}$

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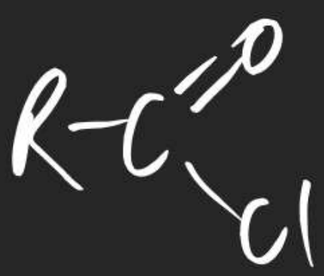
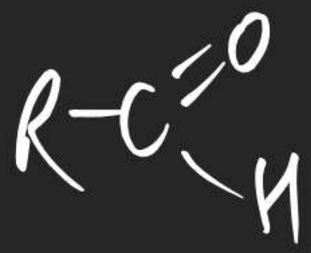
(31) Arrange following in ↓ order of rate of Hydration

Ans

(a) $CH_2=CH_2$ $CH_3-CH=CH_2$ I > II

(b) $CH_2=CH_2$ $HC\equiv CH$ II > I

(c) $R-C\equiv N$ $R-CH=NH$ I > II

(d)   I > II

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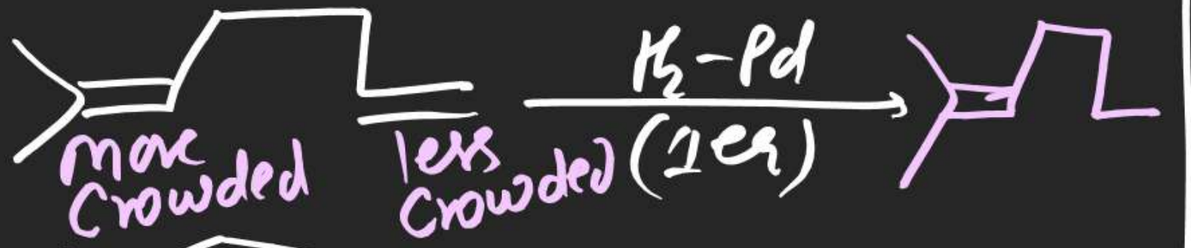
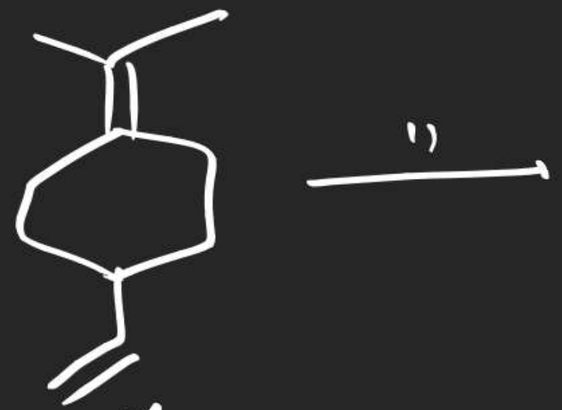
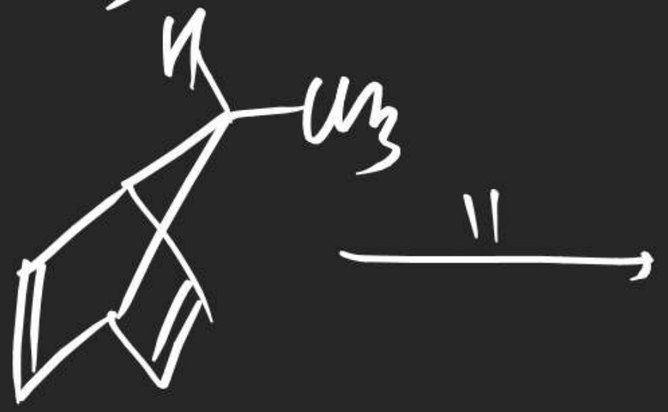
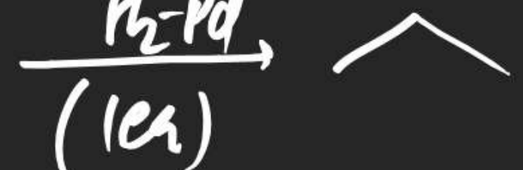
(32) 

(33) 

(34) 

(35) 

(36) Total possible alkene which on hydrogenation gives

(a) 

(b) 

(c) 

(d) 

(e) 

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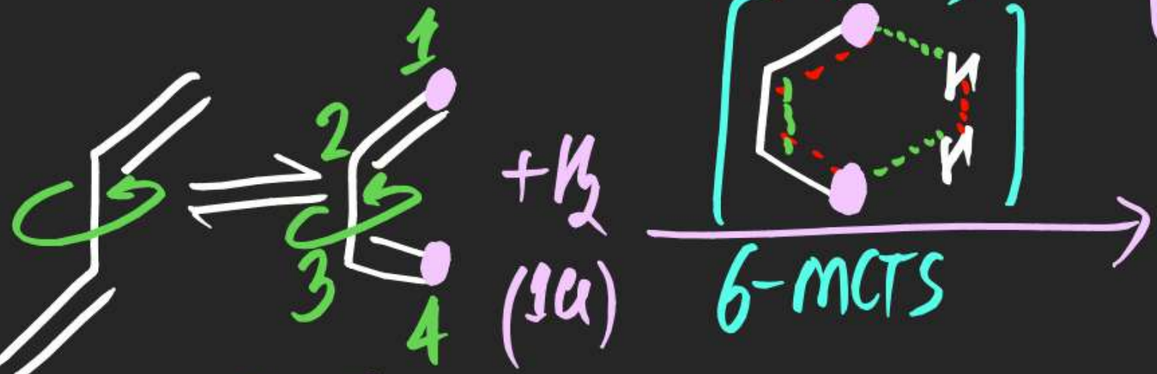
(f) ⟶

(g) ⟶

Hydrogenation of Conjugated alkene:

(37) $\overset{1}{CH_2}=\overset{2}{CH}-\overset{3}{CH}=\overset{4}{CH_2} + H_2 \xrightarrow{Pd}$

mechⁿ:



S-Trans S-Cis

(100% Cis Product)

Note (i) 1,4 addⁿ takes place only when Conjugated diene is Either S-Cis or may attain S-Cis Conformation.

(ii) If Conjugated diene is not S-Cis then 1,2 addⁿ takes place

(iii) 6-MCTS is involved.

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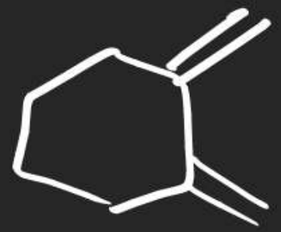
(38) 

$\xrightarrow[(1\,eq)]{H_2\text{-}Pd}$ 

(39)  $\xrightarrow{''}$

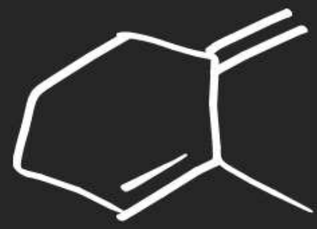
(40)  $\xrightarrow{''}$

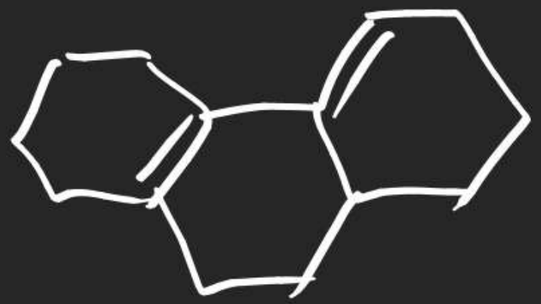
(41)  $\xrightarrow{''}$

(42)  $\xrightarrow{''}$

(43)  $\xrightarrow{''}$

(44)  $\xrightarrow{''}$

(45)  $\xrightarrow{''}$

(46)  $\xrightarrow{''}$

(47) $R-NO_2 \xrightarrow{H_2} R-NH_2$

(48) $R-\underset{\underset{Cl}{|}}{\overset{\overset{O}{\|}}{C}} \xrightarrow{H_2} R-CH_2-OH$

(49) $R-\underset{\underset{OR'}{|}}{\overset{\overset{O}{\|}}{C}} \xrightarrow[\Delta]{''} R-CH_2-OH$

(50) $R-\underset{\underset{OH}{|}}{\overset{\overset{O}{\|}}{C}} \xrightarrow[\Delta]{''} R-CH_2-OH$

(51) $R-\underset{\underset{NH_2}{|}}{\overset{\overset{O}{\|}}{C}} \xrightarrow[\Delta]{''} R-CH_2-NH_2$

(52) $R-\overset{\overset{O}{\|}}{C}-O-\overset{\overset{O}{\|}}{C}-R \xrightarrow[\Delta]{''} R-CH_2-OH$

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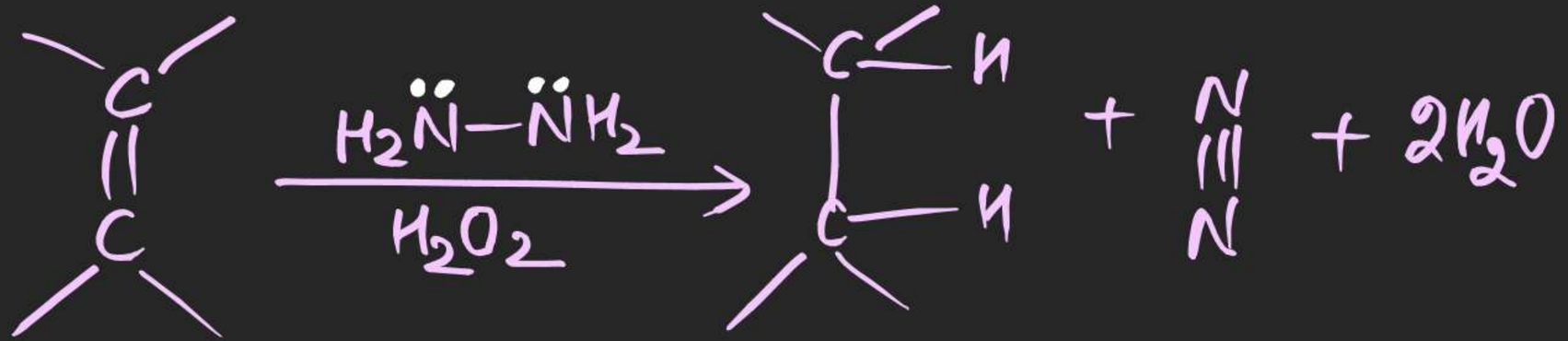
(#) Transfer Hydrogenation (DI-Imide Reduction)

⇒ In this Reaction alkene gets reduced By N_2H_4/H_2O_2 So that Alkane is obtained as a product.

(1) 

Mechⁿ: $H_2\ddot{N}-\ddot{N}H_2 \xrightarrow{H_2O_2} HN=NH + H_2O$

Diimide

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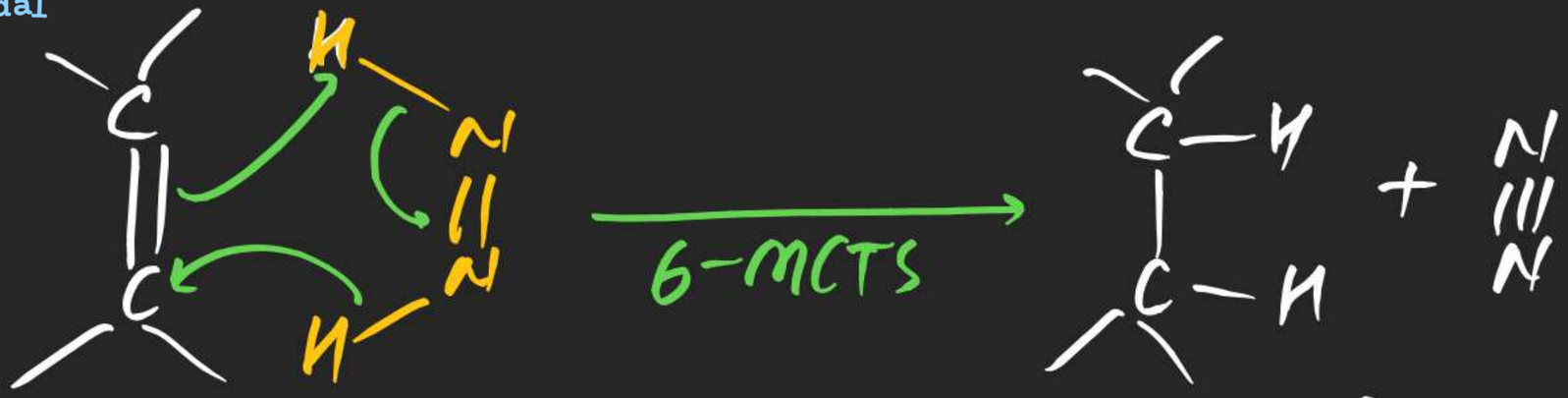


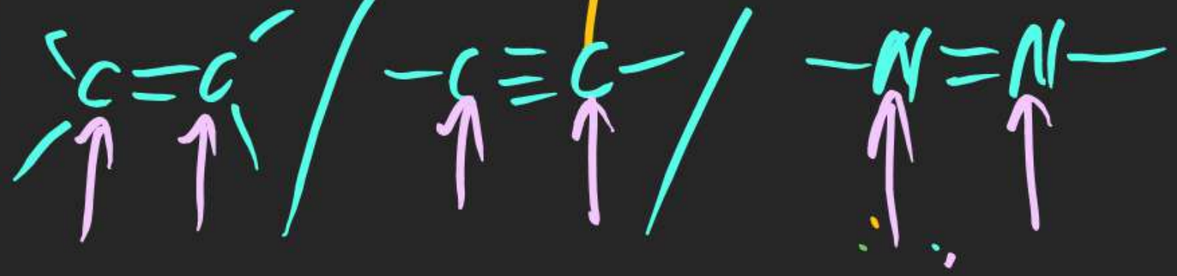
Note (i) Cis-Di Imide is Actual Reducing agent

(ii) DI-Imide is highly unstable & having very low half life.

(iii) It involves 6-MCTS

(iv) 1,2 addn even in case of Conjugated diene.

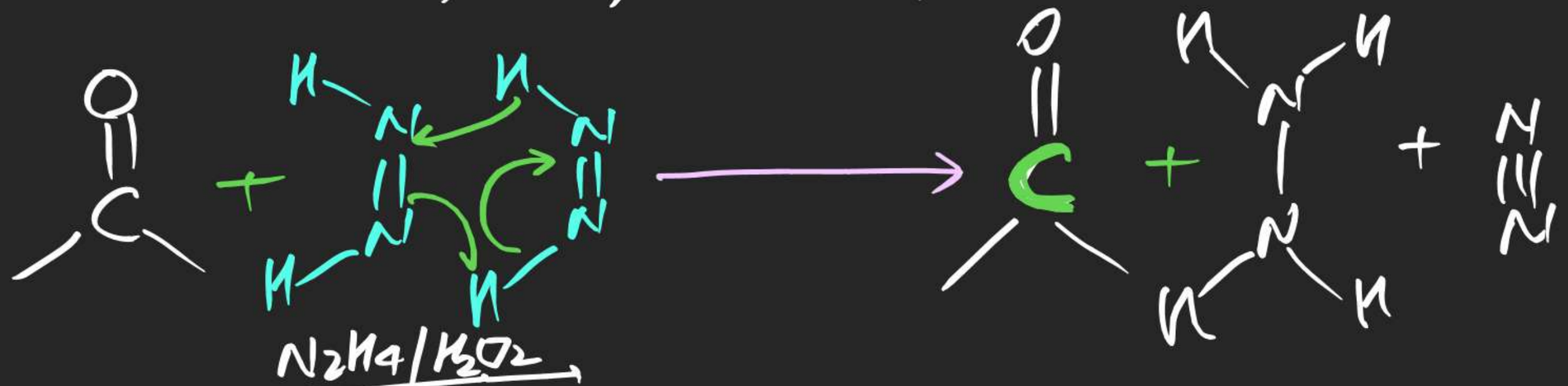
(v) Transfer Hydrogenation selectively reduces



(vi) Transfer Hydrogenation

Never Reduces $>C=O$ / $-C=N-$ / $-C\equiv N$

(2)



N_2H_4/H_2O_2

(3) $CH_2=CH_2$ — N_2D_4/D_2O_2

(4)

(5)

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(6) 

(7) 

2(±)

(8) 
H_2-Pd
1 eq

(9) 
N_2H_4/H_2O_2
"

(10) 
"

(11) 
H_2-Pd
Excess
N_2H_4 (Excess)
H_2O_2

(12)
Alkene + Azine $\xrightarrow{H_2O_2}$ 

(100%)

(13) 
$\xrightarrow[D_2O_2]{N_2D_4}$

(14) 
"

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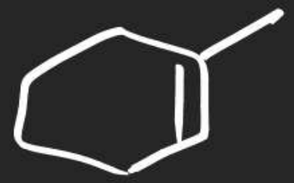
(15)  $\xrightarrow[H_2O_2]{N_2D_4}$

(16)  $\xrightarrow{\quad\quad}$

(17)  $\xrightarrow{\quad\quad}$

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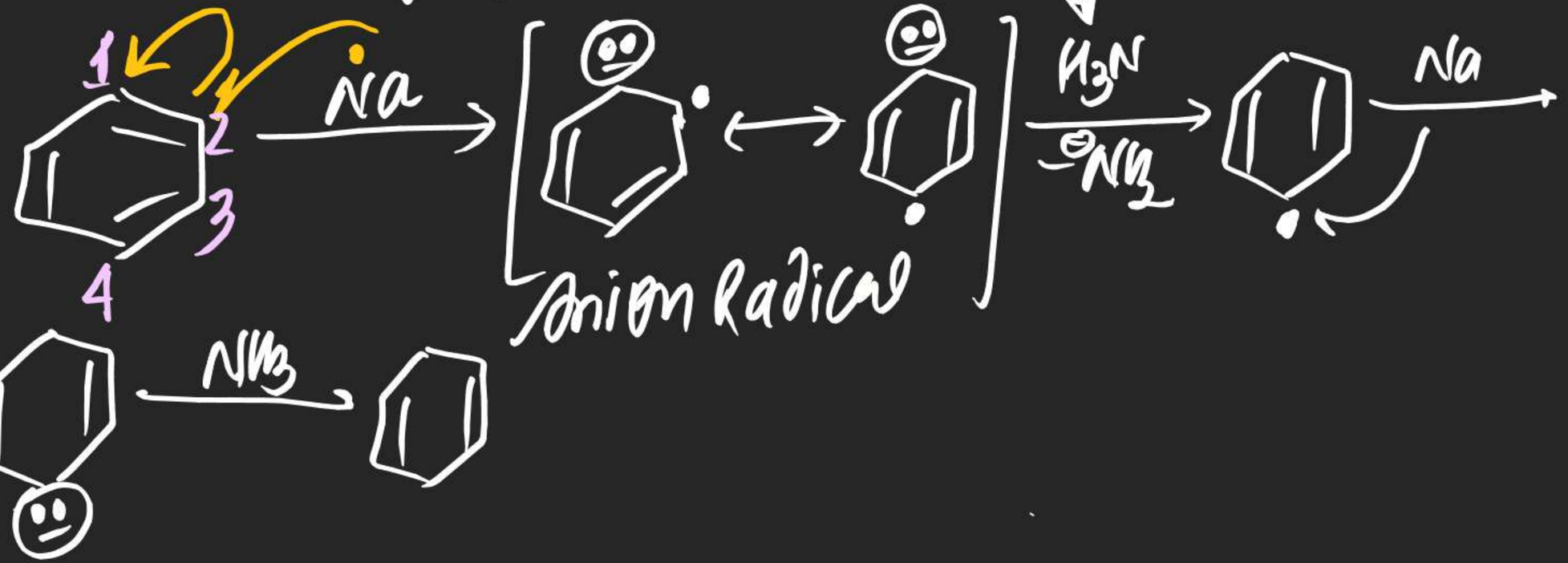
(#) Birch Reduction :-

In this Reduction Aromatic Compounds gets Reduced By Using Na-liq NH_3 into non Conjugated Cycloalkadiene.

(1)

Mechⁿ :-



Note (i) 1,4 addⁿ of e^- & proton

(ii) Presence of EWG ↑ rate of rxⁿ

(iii) ——— EDG ↓ ———

(iv) Birch Reduction doesn't react with Alkene

(2) $R-CH=CH-R \xrightarrow[\text{liq } NH_3]{Na}$ NO Rxⁿ

(v) Birch Reduction doesn't Reduce Terminal alkyne. It shows Acid-Base rxⁿ

(3) $R-C\equiv C-H \xrightarrow[\text{liq } NH_3]{Na} R-C\equiv C^{\ominus}\,Na^{\oplus} + \frac{1}{2}H_2\uparrow$

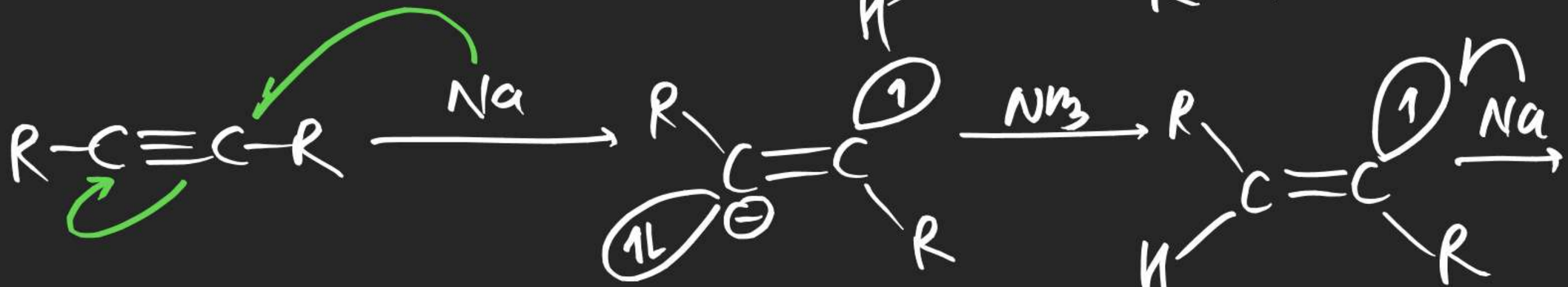
(δ− on C, sp; δ+ on H; H transfers to Na)

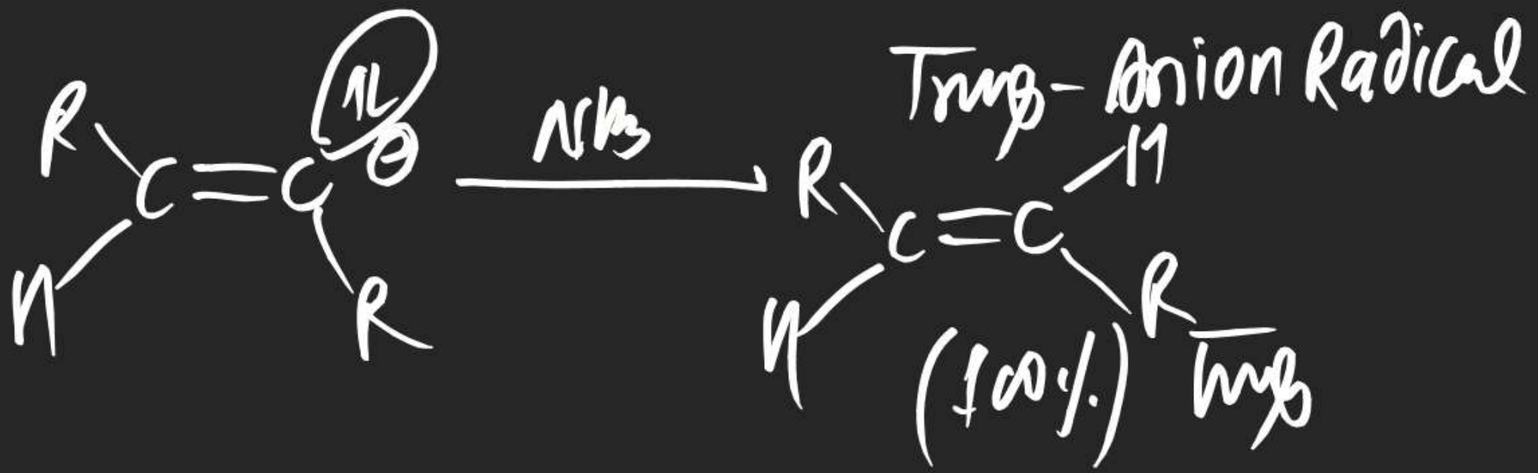
Terminal alkyne

(VI) Birch Reduction Reduces Non Terminal alkyne & gives Exclusively Trans alkene.

(4) $R-C\equiv C-R + Na \xrightarrow[NH_3]{Liq} \underset{\text{(100\% Trans)}}{\text{R, H, C=C, H, R}}$

mechn:





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(5)  $\xrightarrow[\text{liq } NH_3]{Na}$

(6)  $\xrightarrow{\;\;//\;\;}$

(7)  $\xrightarrow{\;\;//\;\;}$

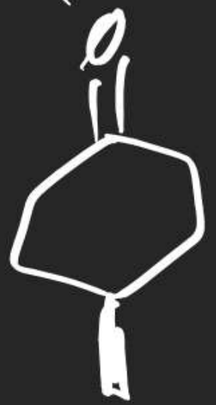
(8) 

Naphthalene

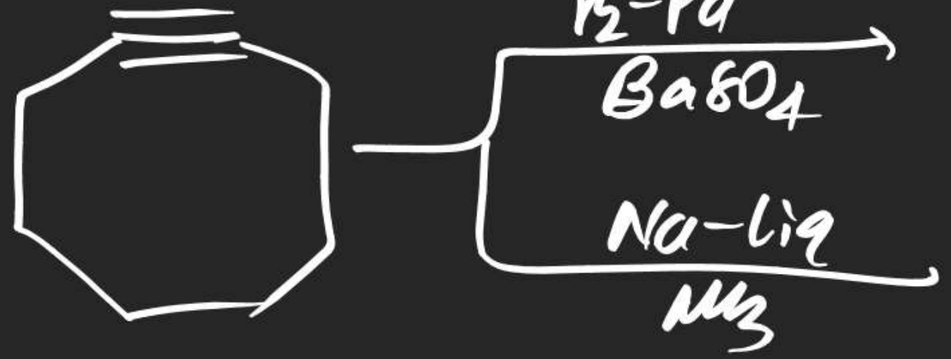
(9) 

Anthracene

(10) $R-CH=O$ ⟶

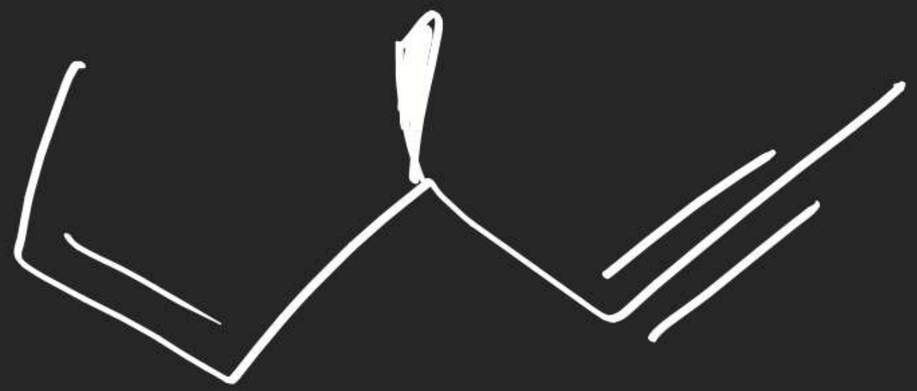
(11) 

(12)



(13)

(14)



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