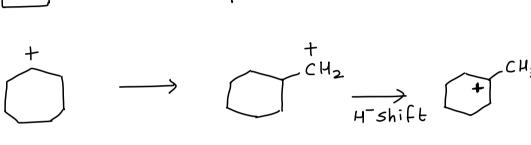


Hydrocarbons

Ring expansion
$$\longrightarrow$$
 $4 \longrightarrow 5$, $5 \longrightarrow 6$
 $\downarrow cH_2$
 $\downarrow cH_3$
 $\downarrow cH_3$

Ring contraction \rightarrow 4 \rightarrow 3, $7 \rightarrow 6$



Alkenes

*

*

*

Alkenes = olefins (oil forming)

General formula = Cn H2n

Bond length \rightarrow $C=C=1.34 \text{ A}^{\circ}$

 $C-H = I \cdot I A^{\circ}$

Bond energy \longrightarrow C=C = 143-1 Kcal./mol C-H = 98.7 Kcal./mol

methods of Preparation -

(1) By Alkanes -> Pyrolysis

By Alkynes --> Partial hydrogenation (2)

Hz + Pd/Basoy] quinoline/s R-c≡c-R' ---

or H₂ + Pd/caco₃

auinoline/s $Pd-C/H_2$ quinoline/s

Lindlar catalyst NI2B+H2 (P-2 Catalyst)

cis alkene (Syn Addition)

(PPh3), Rhcl WIKinson Catalyst

$$R-C \equiv C-R^{1} \xrightarrow{Na/Li} \qquad \qquad R \subset = C \\ \text{lig NH}_{3} \qquad \qquad R \subset = C \\ \text{R^{1}} \\ \text{Trans Alkene} \\ \text{$(Anti addition)} \\ \text{$nech.} \rightarrow \qquad Na \longrightarrow Na^{+} + e^{-}$$

Mech.
$$\rightarrow$$
 Na \rightarrow Na⁺ + e⁻
 $CH_3 - C \equiv C - CH_3 \rightarrow CH_3 - C = C - CH_3$
 $\downarrow Liq.NH_3 \rightarrow H^2$
 H_3C

$$CH_{3} - C = C - CH_{3} \longrightarrow CH_{3} - C = C - CH_{3}$$

$$\downarrow \text{liq. NH}_{3} \longrightarrow H$$

$$H_{3} C = C \downarrow H$$

$$CH_{3} - C = C \downarrow H$$

$$H_{3} C = C \downarrow H$$

$$CH_{3} - C = C \downarrow H$$

$$CH_{3} - C = C - CH_{3}$$

$$\downarrow \text{liq. NH}_{3} \longrightarrow H$$

$$\downarrow \text{liq. NH}_{3} \longrightarrow H$$

$$CH_3 - C - CH_2 - CH_3$$

$$CH_2$$

$$2 - \text{methyl but} - 1 - \text{ene}$$

$$EX: CH_3 - C - CH_3 + Ph_3P = CH - CH_3$$

EX. $CH_3-C-CH_3+Ph_3P=CH-CH_3$ $Ph_3P=0$ + CH_3-C-CH_3

CH — CH₃ 2-methyl but –2-ene

(b) E₂ (c) E_{1cB}

(a) E1

Elimination Unimolecular Rx^n (E1 Rx^n) \rightarrow

Dehydrohalogenation of 3° halide with 420/6

* Dehydrohalogenation of 3 haude with 120/

$$CH_2$$
 CH_3
 CH_3

Mech. →

 $\gamma = k \left(R - x \right)^{1} \left(H_{2} \circ \right)^{0}$

order = 1

molecularity = 1

M20 (Polar Protic solvent)

high dielectric constant

Step-2 $CH_3 - C - CH_2 - CH_3 - C = CH_2$ $CH_3 - C - CH_2 - CH_3 - C = CH_3$ $CH_3 - C - CH_3 - C - CH_3$ $CH_3 - C - CH_3 - C - CH_3$

(fast)

 $\frac{S+eP-1}{CH_3-C-BY} \xrightarrow{CH_3} CH_3 \xrightarrow{C} CH_3 \xrightarrow{C} CH_3$ $CH_3 \xrightarrow{CH_3} CH_3$ $CH_3 \xrightarrow{C} CH_3$

 $CH_{3} - C \xrightarrow{1}^{3} BY \xrightarrow{H_{2}O} CH_{3} - C$ $CH_{3} - C \xrightarrow{1}$ $CH_{3} - C \xrightarrow{1}$

EX.
$$CH_3 - CH - CH - CH_3$$

$$CH_2 - CH_3$$

$$CH_3 - CH - CH_3$$

$$CH_3 - CH_4$$

$$CH_3 - CH_5$$

$$CH_4 - CH_5$$

$$CH_5 - CH_6$$

$$CH_6 - CH_7$$

$$CH_7 - CH_8$$

$$CH_8 - CH_8 - CH_8$$

$$CH_8 - CH$$

* Dehydration of alcohols by conc. H2504/0,

$$CH_{2} = C - CH_{2} - CH_{3} + H_{3} C = C / CH_{3}$$
 $e+$
 (a)
 $+$
 $H_{3} C = C / H$
 $+$
 $C = C / H$

* Stereo selective Rxn

* Non Stereo specific Rxn

* Regio selective Rxn

* Non Regio specific Rxn

Key Points order = 1 = Molecularity (1) co is intermediate so it can rearrange (2) if Possible. 2 -bond break = endothermic Rxn
1 TI bond form (3) ΔH >0 $\Delta s > 0$ Higher temp makes DG < 0 =) Temp. is driving force. Polar Profic solvent, weak base, low conc. (4)of base favours E, Rxn. rate of Rxn & stab. of carbocation (5)saytzeff alkene will be major froduct (6) most stable alkene Compare rate of denydration? (a)

(b)
$$C > b > a > d$$
 $C > b > a > d$
 $C > b > a > d$
 $C > b > a$
 $C > b > a$

A > C > b > a

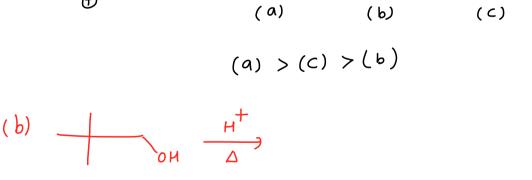
A > C > b > a

A > C > b > a

A > C > b > a

A > C > b > a

A > C > b > a



$$(C) \qquad \qquad H^{+} \longrightarrow$$

$$(d) \qquad \begin{array}{c} H_2 \\ \hline \Delta \end{array}$$

$$\begin{array}{ccc}
& & & & & & & & \\
& & \downarrow & & & \downarrow \\
& & \downarrow & & & \downarrow \\
& & & \downarrow & & \downarrow \\
& & & \downarrow & & \downarrow \\
& & & & \downarrow & & \downarrow \\
& & & & \downarrow \\$$

(e)
$$\xrightarrow{\text{OH}} \xrightarrow{\text{H'}} \xrightarrow{\text{Base}}$$

Elimination bimolecular Rx (E2 Rx) -> Dehydrohalogenation of 10/20 halide with * → AIC. KOH strong base -[

 $CH_3 - CH_2 - CH - CH_3 \xrightarrow{AIC. KOH} CH_3 - CH = CH - CH_3$

+ CH3-CH2-CH=CH2 (minor) Concerted mech. (Bond breaking and

(saytzeff product) CH3-CH2-CH = + -- Base
| H --- Base | L | L | CH2 | CH \rightarrow $CH_3 - CH_2 - CH = CH_2$ Minor (Hoffmann Product) Key Points -(1) rate $|aw \rightarrow \gamma = k [R-x]^{1} [Base]^{1}$ 0 = M = 2No Carbocation, No rearrangement (2)Rate of E2 Rx & stab. of Transition state (3) ΔH >0 , ΔS >0 (4)

Higher temp. favours this Rxn.

saytzeffalkene (zaitsev alkene) will be

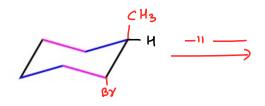
 \rightarrow $CH_3 - CH = CH - CH_3$

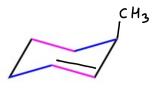
major

р | с н 3 — с н — с н — с н 3 р | t — с н — с н 3

(5)

major Product. It is exa of Antielimination. It means that 13-hydrogen and leaving group must be at Anti Position to each other. CH3 AIC. KOH V.v.V Ex Major CH3 ≣ AIC. KOH -, BY major (Hoffmann) CHz CH3 CH₃ AIC. KOH en Br CH3 CH3 CH₃ JBY Minor major Positional Isomers





Homework

Hydrocarbons workbook

DTS-1-11

Q.13,14,22,42,83

JEE MAIN: Q.5-8,14,18,27

JEE ADVANCED: Q.7,23,39,47,54,57,65,66,73,75,78,93,95,

97,100,103,104,114

Organic concepts workbook

DTS-1-11

Q.1-16,57,62-64,69,70,73-77,95,103,111,113,116,122,127,

137