ULTIMATE KCET

CRASH COURSE 2026

Chemistry

Lecture - 01

Hydrocarbon

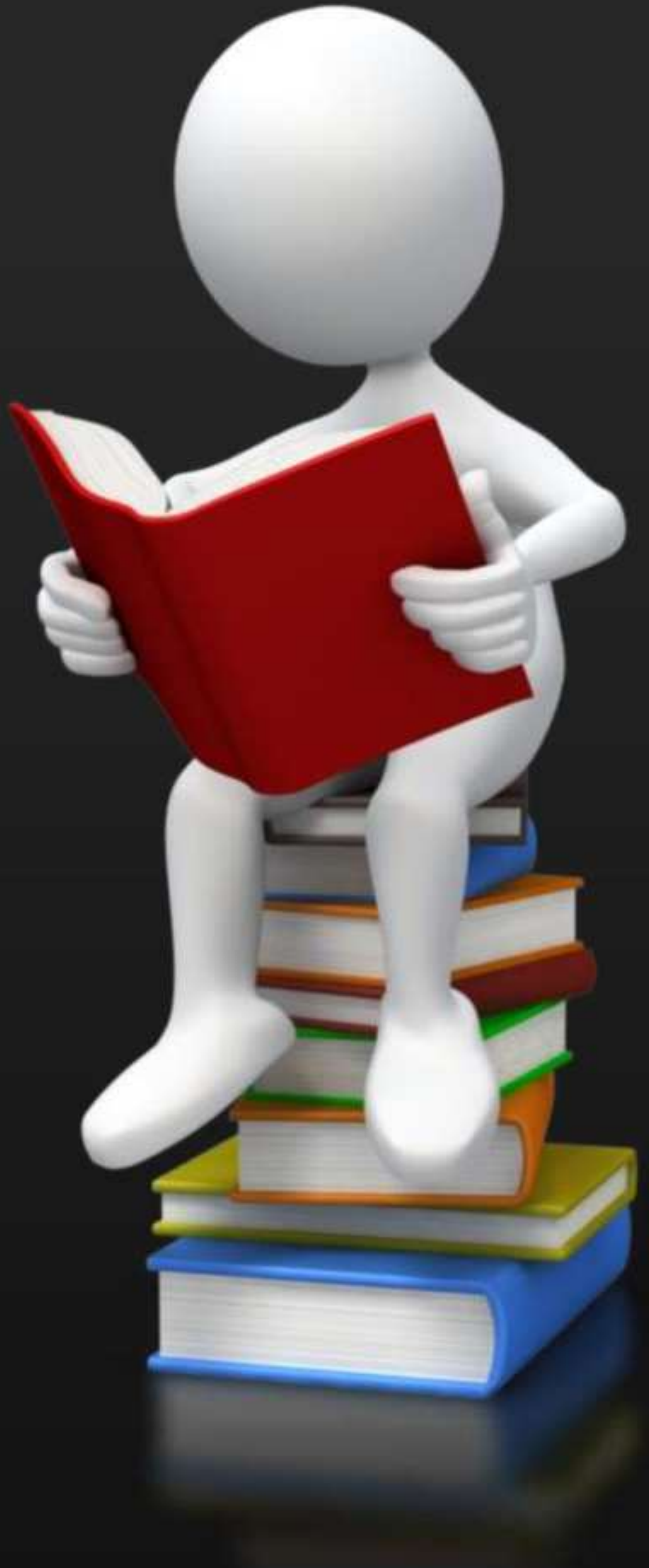
By – Sreeja Ma’am

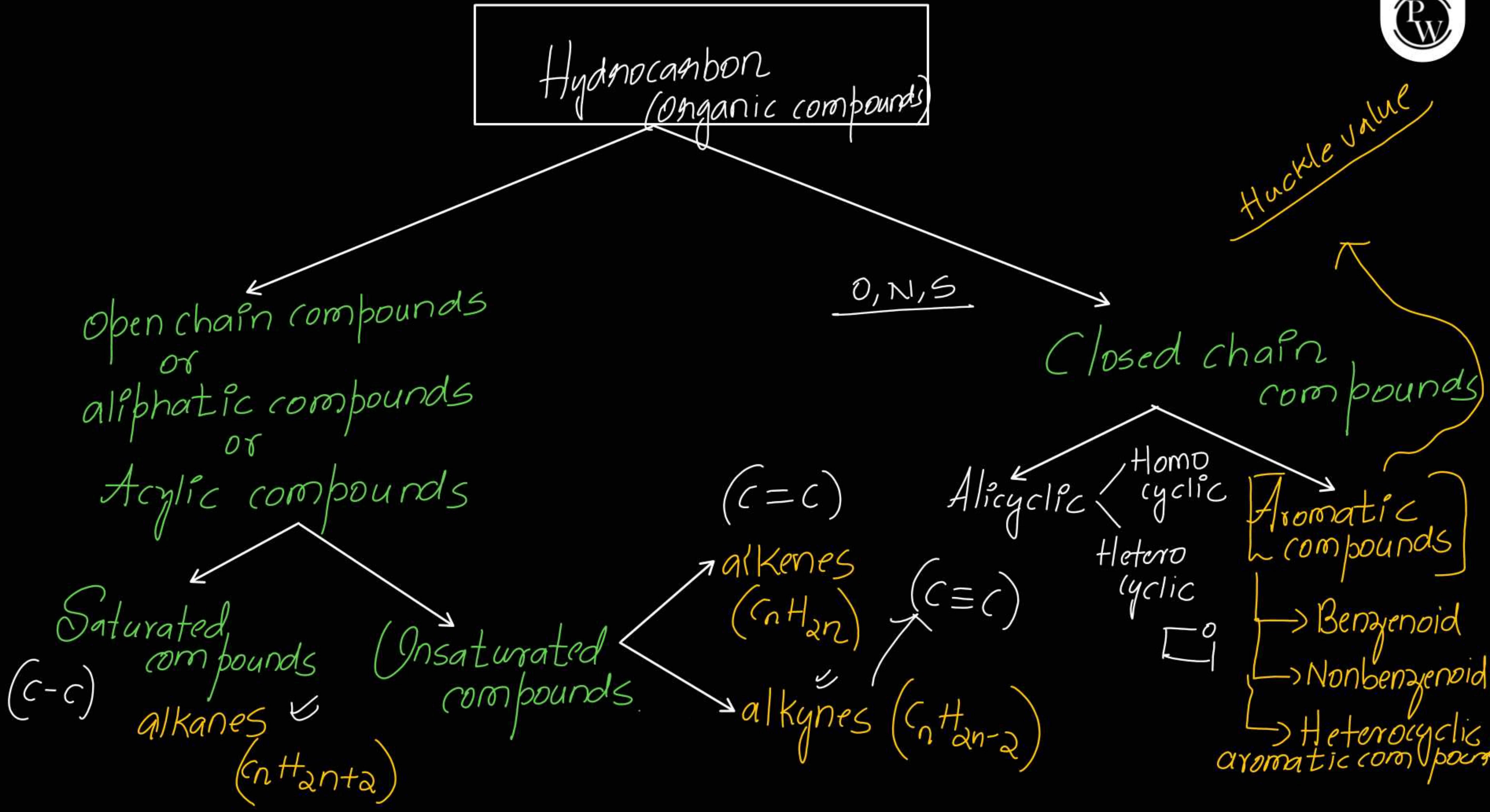
Recap of previous lecture

1. GOC chapter

Topics *to be covered*

1. Hydrocarbon – synopsis- alkanes, alkenes and alkynes
2. MCQS





Hydrocarbon
(Organic compounds)

Open chain compounds
or
aliphatic compounds
or
Acylic compounds

Saturated compounds
(C–C)
alkanes ✓
(C_nH_{2n+2})

Unsaturated compounds

alkenes
(C=C)
(C_nH_{2n}) ✓

alkynes (C_nH_{2n-2})
(C≡C)

O, N, S

Closed chain compounds

Alicyclic
- Homo cyclic
- Hetero cyclic

Aromatic compounds
- Benzenoid
- Nonbenzenoid
- Heterocyclic aromatic compoun

Huckle value

Aromatic hydrocarbon

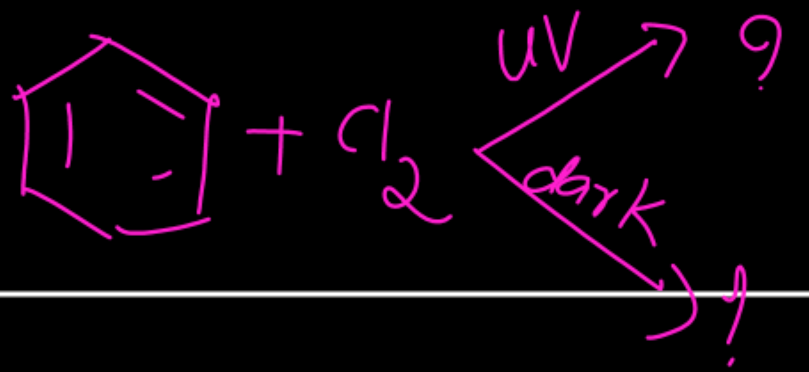
→ Aromaticity → $(4n+2)\pi e^{\ominus}$

→ Nitration

→ Sulphonation

→ Halogination

→ Friedel craft
- arylation
- alkylation

→ 

Gammaxene / BHC

benzene hexachloride

alkanes

→ wurtz
→ Kolbe's reaction
→ Decarboxylation
→ isomerisation
→ Aromatisation
→ Controlled oxidation
→ Newman projection

Staggered & Eclipsed form

alkenes

→ Ozonolysis ↓ to propene
→ Addition of HBr → Markovnikov's rule
→ Antimarkovnikov's rule
→ Ozonolysis
→ addition of H_2SO_4, H_2O
→ Geometrical isomerism < cis → Na/liq. NH_3
trans.

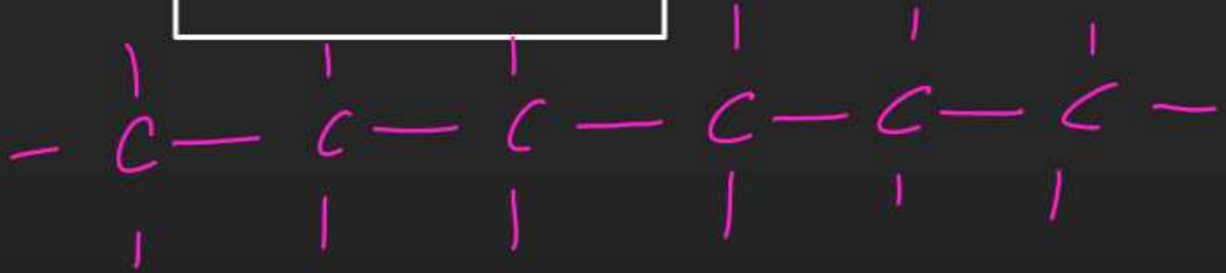
→ Lindlar catalyst

alkynes

preparation → from $CaC_2 + H_2O \longrightarrow Ca(OH)_2 + C_2H_2$
→ alc. KOH / $NaNH_2$
→ $HgSO_4$, H_2O addition to alkyne
→ cyclic polymarisation $CH \equiv CH$ →

Introduction of Alkanes

$\boxed{C_nH_{2n+2}}$



(a) Branched and unbranched aliphatic saturated open chain hydrocarbons are called member of alkanes.

Methane CH_4

Ethane → H_3C-CH_3

propane → $H_3C-H_2C-H_3C$

Butane → C−C−C−C

(b) CH_4 is also known as Marsh gas (fire damp).

(c) Calore gas : Mixture of n–butane and isobutane.

(d) LPG (Liquefied petroleum gas) : liquid propane, isobutane.

(e) Natural gas : 80% methane + 10% ethane + 10% propane + small amounts of H_2, N_2, CO_2 etc.

(f) Water gas : CO + H_2(1 : 1) ✓

(g) Synthesis gas : CO + $3H_2$ (1 : 3) ⟶ CH_3OH

General Methods of Preparation

(1) From alkenes and alkynes (Sabatier and Senderens reaction) or (By hydrogenation of alkenes and alkynes) : Alkenes and alkynes on catalytic hydrogenation give alkanes.

$$\underset{\text{Alkene}}{R{-}\overset{H}{C}H{=}\overset{H}{C}H{-}R + H_2} \xrightarrow[Pt/Ni/Pd]{\text{Catalyst}} \underset{\text{Alkane}}{R{-}CH_2{-}CH_2{-}R}$$

$$\underset{\text{Alkyne}}{R{-}\overset{H}{\overset{H}{C}}{\equiv}\overset{H}{\overset{H}{C}}{-}R + 2H_2} \quad 2H_2 \xrightarrow{\text{Catalyst}} R{-}CH_2{-}CH_2{-}R$$

Preparation

VVVIMP. → Decarboxylation reaction → $H_3C-\overset{O}{\overset{\|}{C}}-O^{-}Na^{+} \xrightarrow{NaOH+CaOH} CH_4 + Na_2CO_3$

alkene/alkyne + H_2 →

$CH\equiv CH + 2H_2 \xrightarrow{Pd} CH_3-CH_3$

ethyne ethane

$CH_2=CH_2 + H_2 \xrightarrow{Ni} H_3C-CH_3$

} Sabatier Senderen reaction

alkylhalide → $R-\underline{\underline{X}} + Zn \xrightarrow{dil.\ HCl} RH + ZnCl_2$

Wurtz reaction VIMP →

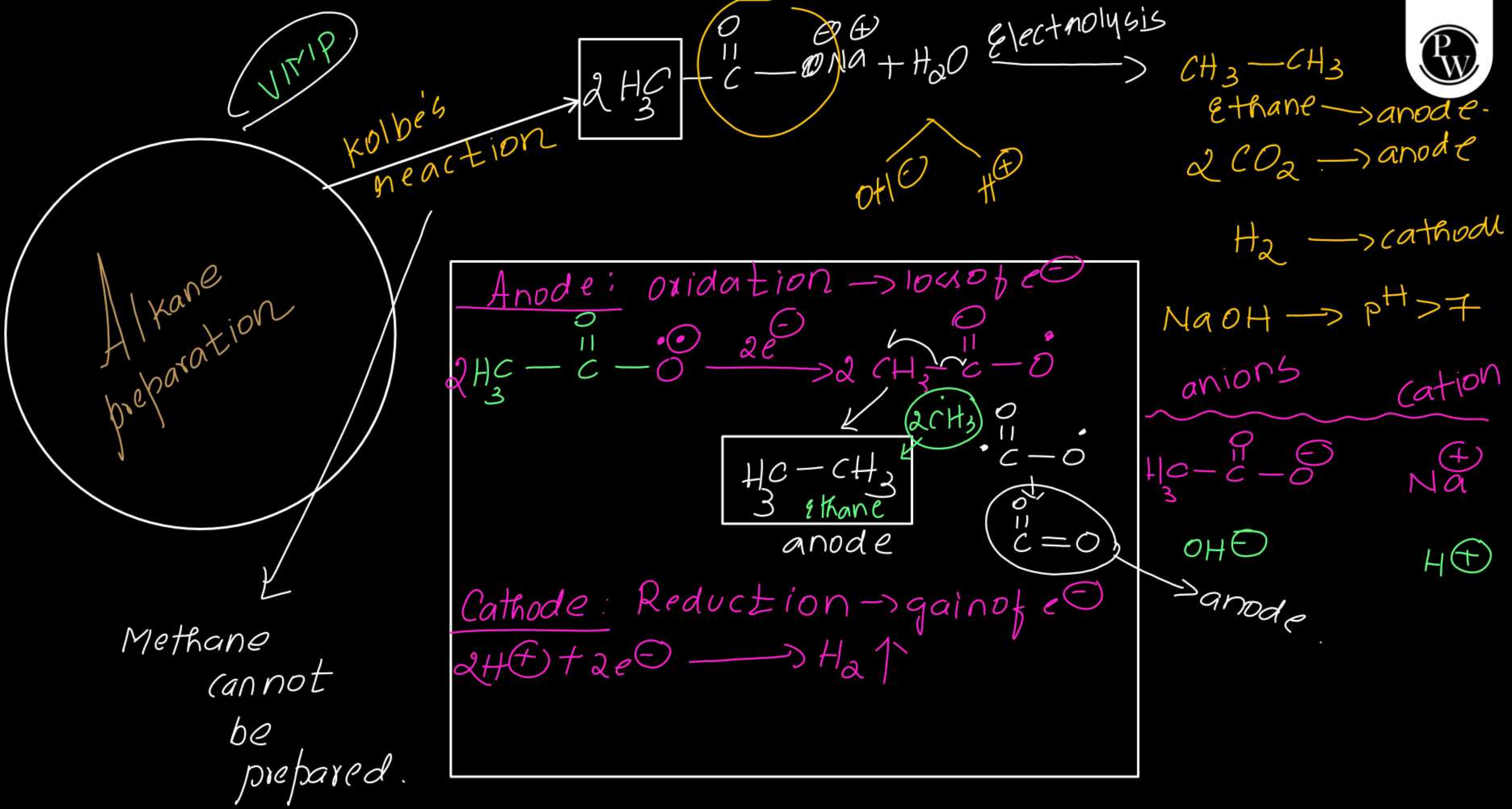
$R-\boxed{X+2Na+X}-R \xrightarrow{dry\ ether} R-R.$

$H_3C-\boxed{Cl+2Na+Cl}-CH_3 \longrightarrow H_3C-CH_3 + NaCl + NaBr$

✗ $H_3C-\boxed{Cl+2Na+Cl}-CH_3-CH_2 \longrightarrow H_3C-CH_3$ ethane

$\longrightarrow CH_3-CH_2-CH_2-CH_3$ butane

$\longrightarrow CH_3-CH_2-CH_3$ → propane



VIMP

Alkane preparation

Kolbe's reaction

$$\boxed{2H_3C}-\overset{O}{\overset{\|}{C}}-O^{\ominus}Na^{\oplus}+H_2O \xrightarrow{Electrolysis} CH_3-CH_3$$

$OH^{\ominus}$ $H^{\oplus}$

Ethane → anode

$2CO_2$ → anode

H_2 → cathode

$NaOH \longrightarrow pH>7$

anions　　cation

$H_3C-\overset{O}{\overset{\|}{C}}-O^{\ominus}$　　$Na^{\oplus}$

$OH^{\ominus}$　　$H^{\oplus}$

Methane cannot be prepared.

Anode: oxidation → loss of $e^{\ominus}$

$$2H_3C-\overset{O}{\overset{\|}{C}}-O^{\ominus} \xrightarrow{2e^{\ominus}} 2\,CH_3-\overset{O}{\overset{\|}{C}}-\dot{O}$$

$$2\dot{C}H_3 \quad \cdot\overset{O}{\overset{\|}{C}}-\dot{O} \quad \overset{O}{\overset{\|}{C}}=O$$

$$\boxed{H_3C-CH_3}$$

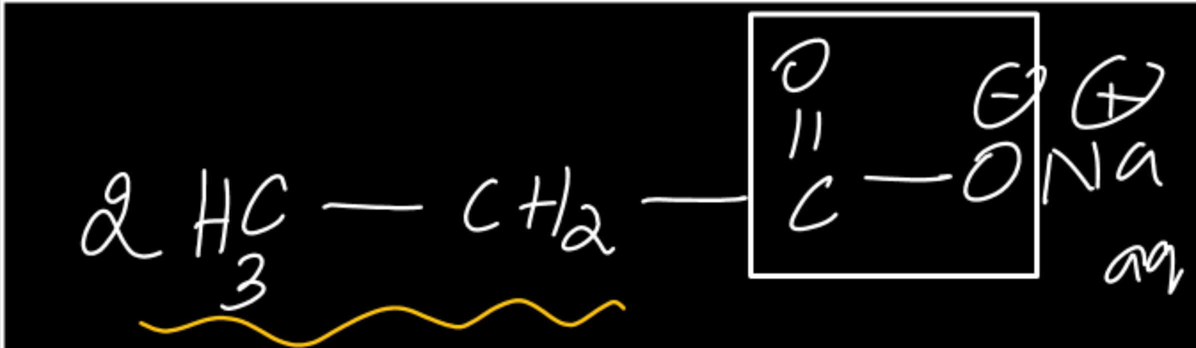
ethane

anode

→ anode.

Cathode: Reduction → gain of $e^{\ominus}$

$$2H^{\oplus}+2e^{\ominus} \longrightarrow H_2\uparrow$$



$$2\,H_3C-CH_2-\boxed{\overset{O}{\overset{\|}{C}}-\overset{\ominus}{O}}\overset{\oplus}{Na} \xrightarrow[\text{aq.}]{\text{electricity}} \boxed{H_3C-CH_2-CH_2-CH_3} + CO_2 + H_2 + NaOH$$

Kolbe's reaction.

Sodium prop + an~~e~~ + oate

Sodium propanoate

Butane gas.

paraffin

para → little

affin → reactivity

Alkanes chemical properties

Complete Combustion

IMP

$C_nH_{2n+2} + \left(\frac{3n+1}{2}\right) O_2 \longrightarrow nCO_2 + (n+1) H_2O$

n → no. of carbon atom present in the chain.

$C_5H_{12} + \left(\frac{3(5)+1}{2}\right) O_2 \longrightarrow 5CO_2 + 6H_2O$

$C_5H_{12} + 8O_2 \longrightarrow 5CO_2 + 6H_2O$

controlled oxidation

$H_4C + O_2 \xrightarrow[\Delta]{573K,\ Cu} CH_3OH$ Methanol

$H_4C + O_2 \xrightarrow[Cr_2O_3\ \Delta]{Mo_2O_3/Al_2O_3} H-\overset{\overset{O}{||}}{C}-H$

Methanal

$H_3C-CH_2 + O_2 \xrightarrow{(CH_3COO)_2Mn} H_3C-COOH$

$H_3C-CH_2-\boxed{CH_2} \xrightarrow{(CH_3COO)_2Mn} H_3C-CH_2-COOH$

incomplete combustion

→ carbon black

→ CO

Alkanes chemical properties.

Aromatisation →

C–C–C–C–C–C $\xrightarrow[\Delta]{Cr_2O_3/V_2O_5}$

n-hexane

benzene.

C–C–C–C–C–C–C →

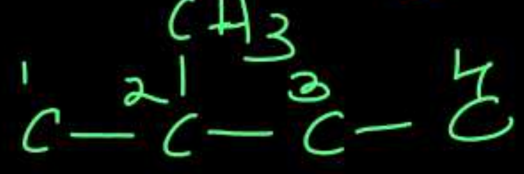
n-heptane

toluene

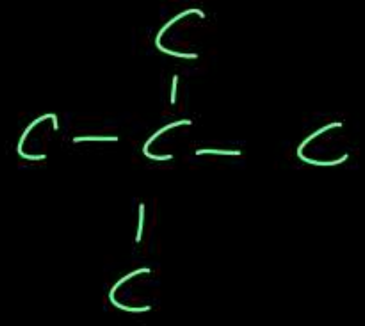
isomerisation →

C–C–C–C–C $\xrightarrow{\text{Anhyd. } AlCl_3/HCl}$

pentane

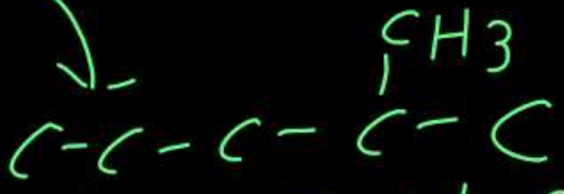


2-Methylbutane

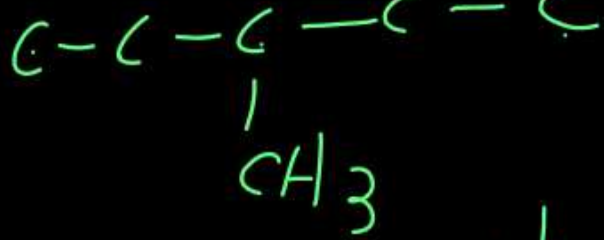


2,2-dimethylpropane

C–C–C–C–C–C



2-Methylpentane



3-Methylpentane

pyrolysis/cracking →

Chemical Properties

(1) Oxidation :

(a) Complete oxidation or combustion : Alkanes burn readily with non-luminous flame in presence of air or oxygen to give CO_2 and water with evolution of heat. Therefore, alkanes are used as fuels.

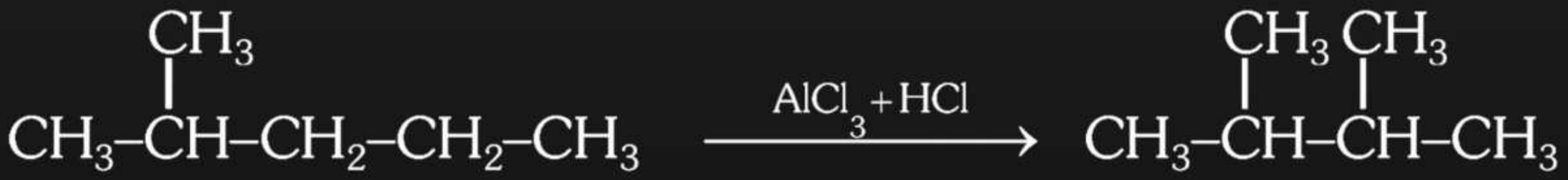
$$C_nH_{2n+2} + \left(\frac{3n+1}{2}\right)O_2 \longrightarrow nCO_2 + (n+1)\ H_2O + Q;\ (\Delta H = -ve)$$

(3) **Isomerization:** Unbranched chain alkanes on heating with $AlCl_3$ + HCl/2000C are converted into branched chain alkanes

$$CH_3-CH_2-CH_2-CH_3 \xrightarrow{AlCl_3+HCl} CH_3-\overset{\overset{\displaystyle CH_3}{|}}{C}H-CH_3$$

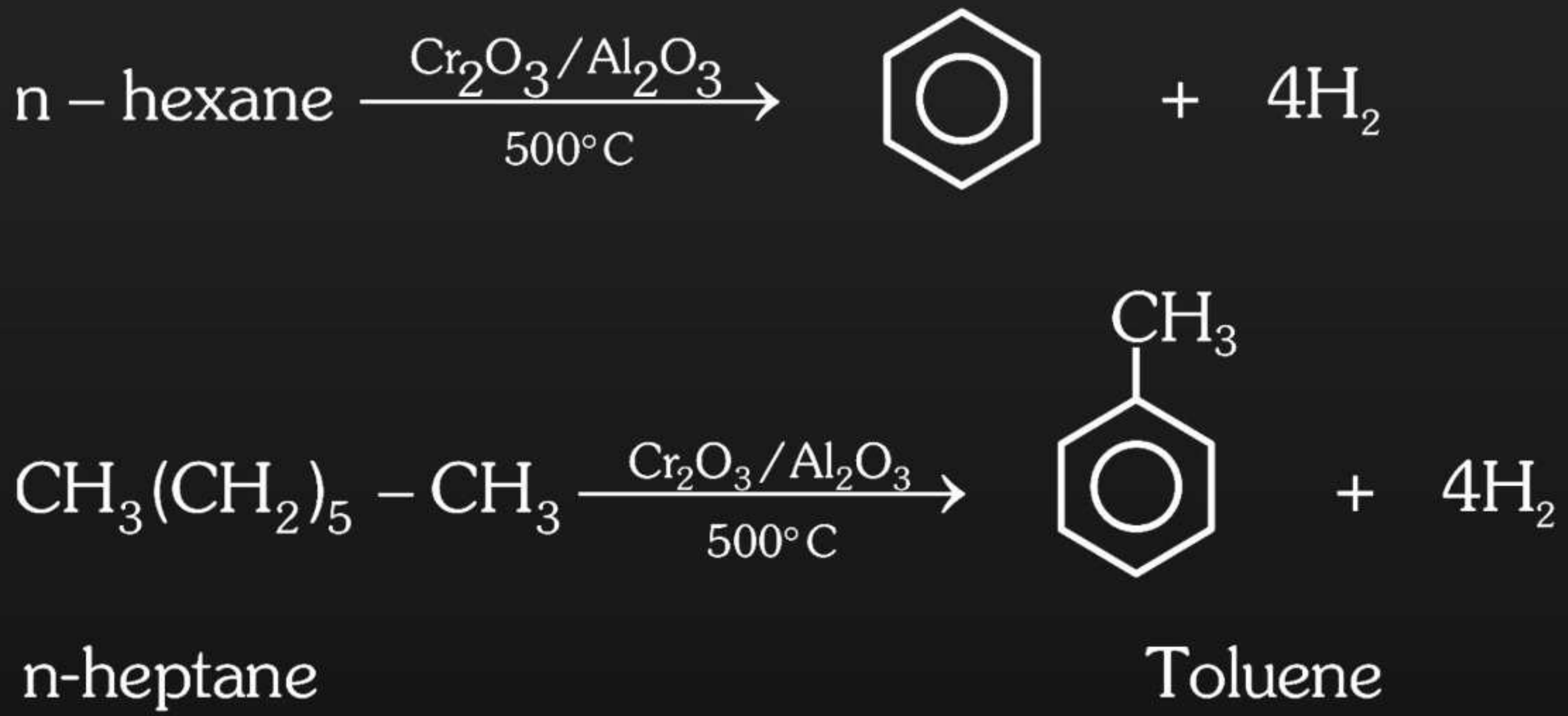
n-butane Isobutane

Branched chain alkanes converted to more branched alkane.



$$CH_3-\overset{\overset{\displaystyle CH_3}{|}}{C}H-CH_2-CH_2-CH_3 \xrightarrow{AlCl_3+HCl} CH_3-\overset{\overset{\displaystyle CH_3}{|}}{C}H-\overset{\overset{\displaystyle CH_3}{|}}{C}H-CH_3$$

Aromatization : Unbranched higher alkanes (from 6 to 10 carbon atoms) when heated in presence of oxides of Cr, Mo, V on Al_2O_3 support at 5000 C aromatic hydrocarbons are formed.



Controlled oxidation

Alkanes on heating with a regulated supply of dioxygen or air at high pressure and in the presence of suitable catalysts give a variety of oxidation products.

(i) $2CH_4 + O_2 \xrightarrow{Cu/523\ K/100\ atm} \underset{\text{Methanol}}{2CH_3OH}$

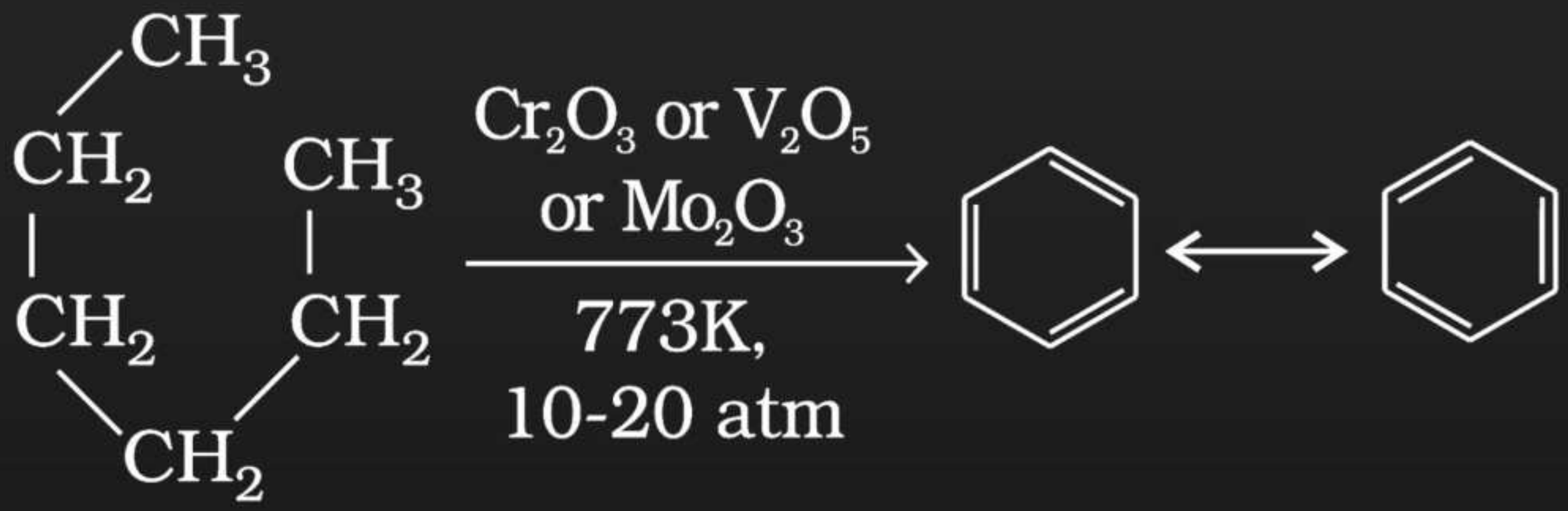
(ii) $CH_4 + O_2 \underset{\Delta}{\overset{Mo_2O_3}{\rightarrow}} \underset{\text{Methanal}}{HCHO} + H_2O$

(iii) $2CH_3CH_3 + 3O_2 \underset{\Delta}{\overset{(CH_3COO)_2Mn}{\rightarrow}} \underset{\text{Ethanoic acid + 2HO}}{2CH_3COOH}$

(iv) Ordinarily alkanes resist oxidation but alkanes having tertiary H atom can be oxidized to corresponding alcohols by potassium permanganate.

$$\underset{\text{2−Methylpropane}}{(CH_3)_3CH} \xrightarrow[\text{Oxidation}]{KMnO_4} \underset{\text{2−Methylpropan−2−ol}}{(CH_3)_3COH}$$

Aromatization



Reaction with steam

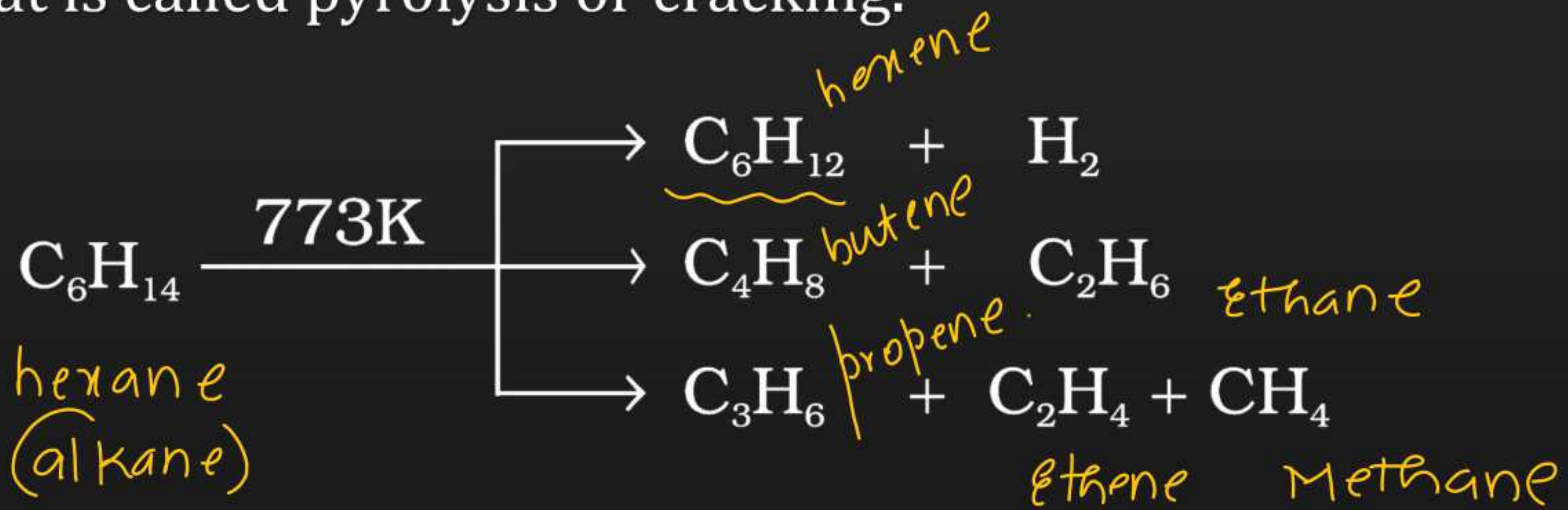
Methane reacts with steam at 1273 K in the presence of nickel catalyst to form carbon monoxide and dihydrogen. This method is used for industrial preparation of dihydrogen gas

$$\boxed{CH_4 + H_2O \xrightarrow[\Delta]{Ni} CO + 3H_2}$$

1:3 $CO + 3H_2 \longrightarrow$ Synthesis gas.

Pyrolysis

Higher alkanes on heating to higher temperature decompose into lower alkanes, alkenes etc. Such a decomposition reaction into smaller fragments by the application of heat is called pyrolysis or cracking.



$C_6H_{14} \xrightarrow{773K}$

$\rightarrow \underset{\sim\sim\sim}{C_6H_{12}} + H_2$

$\rightarrow C_4H_8 + C_2H_6$

$\rightarrow C_3H_6 + C_2H_4 + CH_4$

55 above

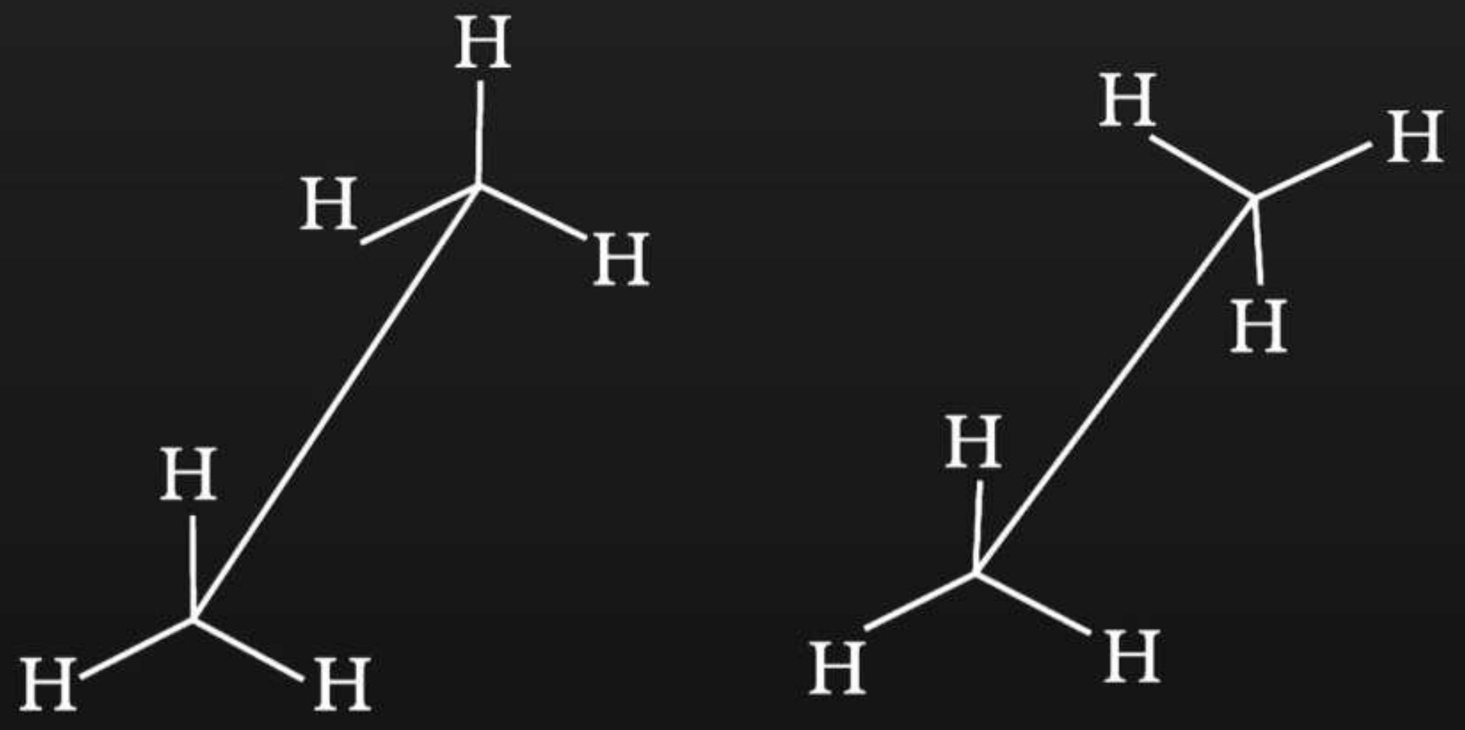
60

Sawhorse projections

Upper end of the line is slightly tilted towards right or left hand side.

The front carbon is shown at the lower end of the line, whereas the rear carbon is shown at the upper end.

Sawhorse projections of ethane



(i) Eclipsed

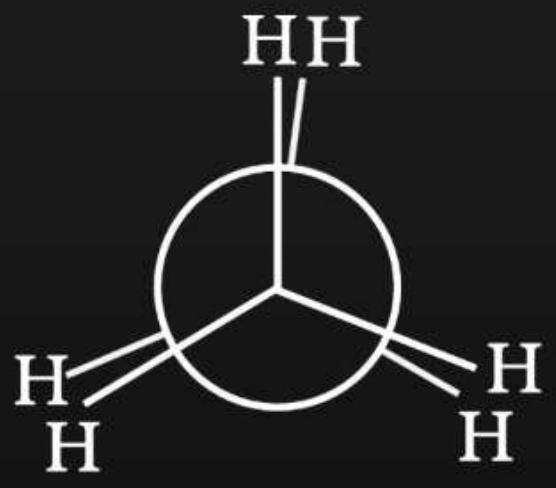
(ii) Staggered

Newman projections

In this projection, the molecule is viewed at the C–C bond head on.

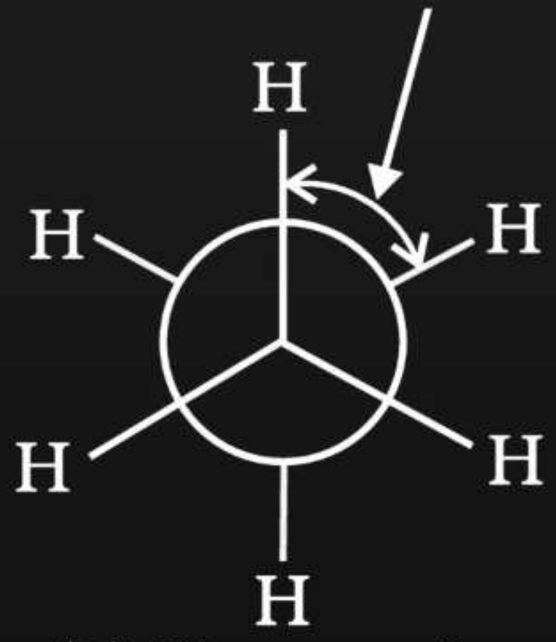
The carbon atom nearer to the eye is represented by a point.

Newman's projections of ethane



(i) Eclipsed

Angle of rotation or angle of tortion or dihedral angle



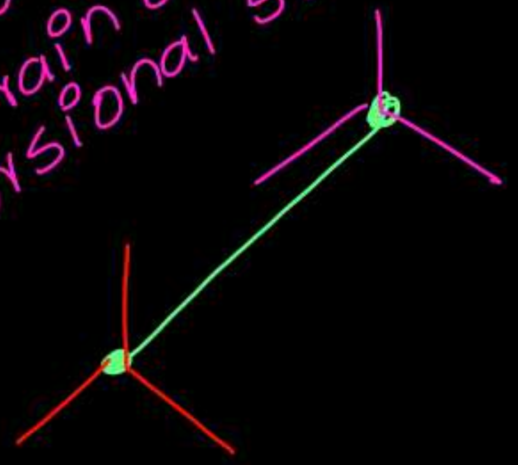
(ii) Staggered

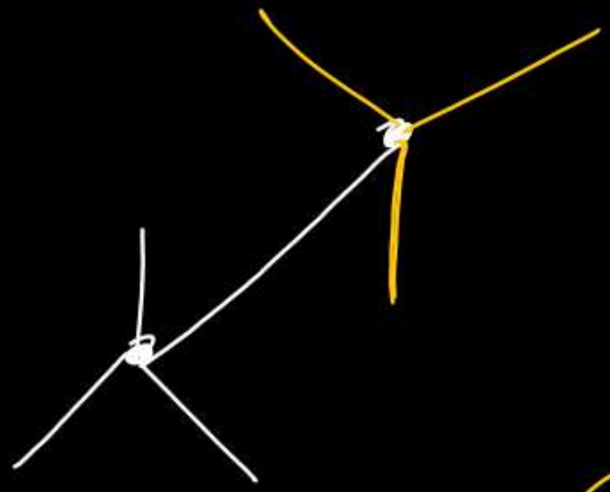
Conformational isomerism

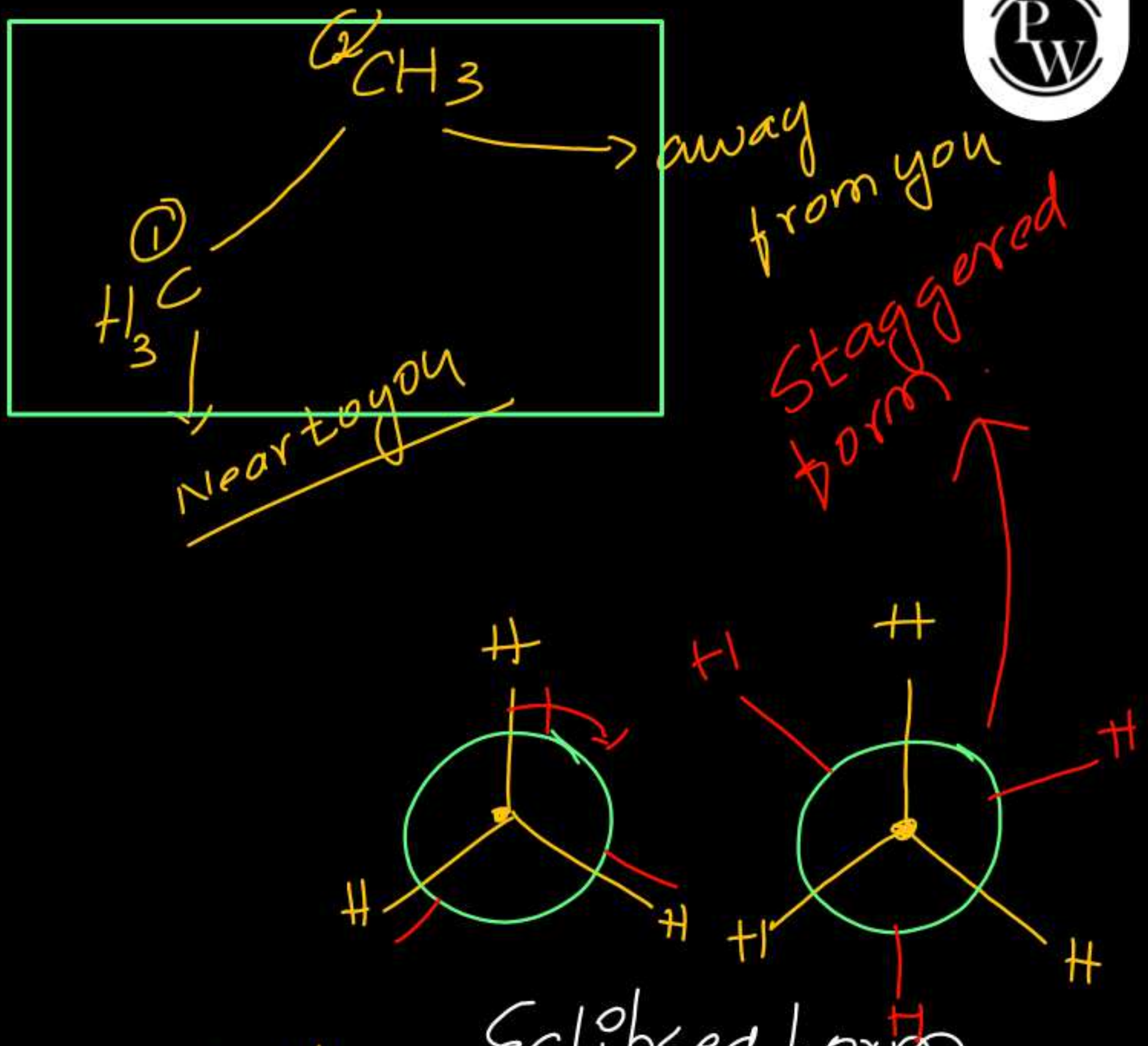
→ Conformers

→ Rotomers (Rotational isomers)

dihedral strain or torsional strain







Eclipsed form

Sawhorse projection

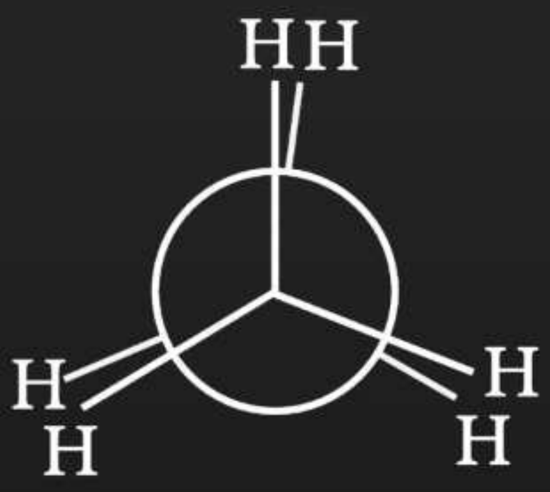
Staggered form → stable

Sawhorse projections

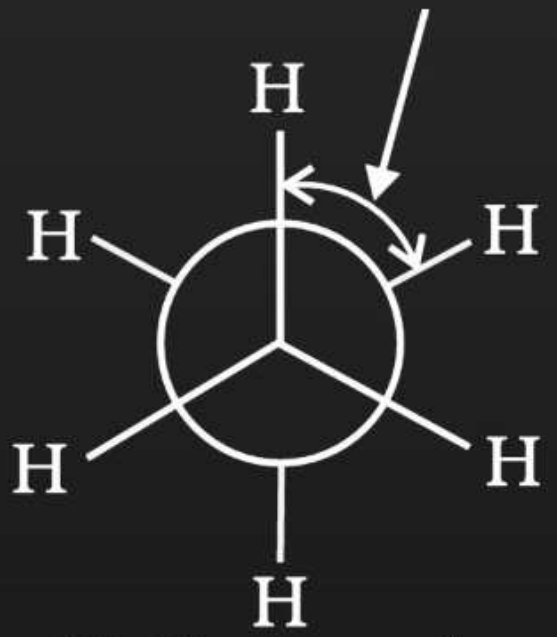
Eclipsed form

Newman projection

Angle of rotation or
angle of tortion or
dihedral angle



(i) Eclipsed



(ii) Staggered

Newman’s projections of ethane

Physical & Chemical Properties of alkane

Physical properties

(i) **Solubility :** Alkanes being non polar and thus insoluble in water but soluble in nonpolar solvents

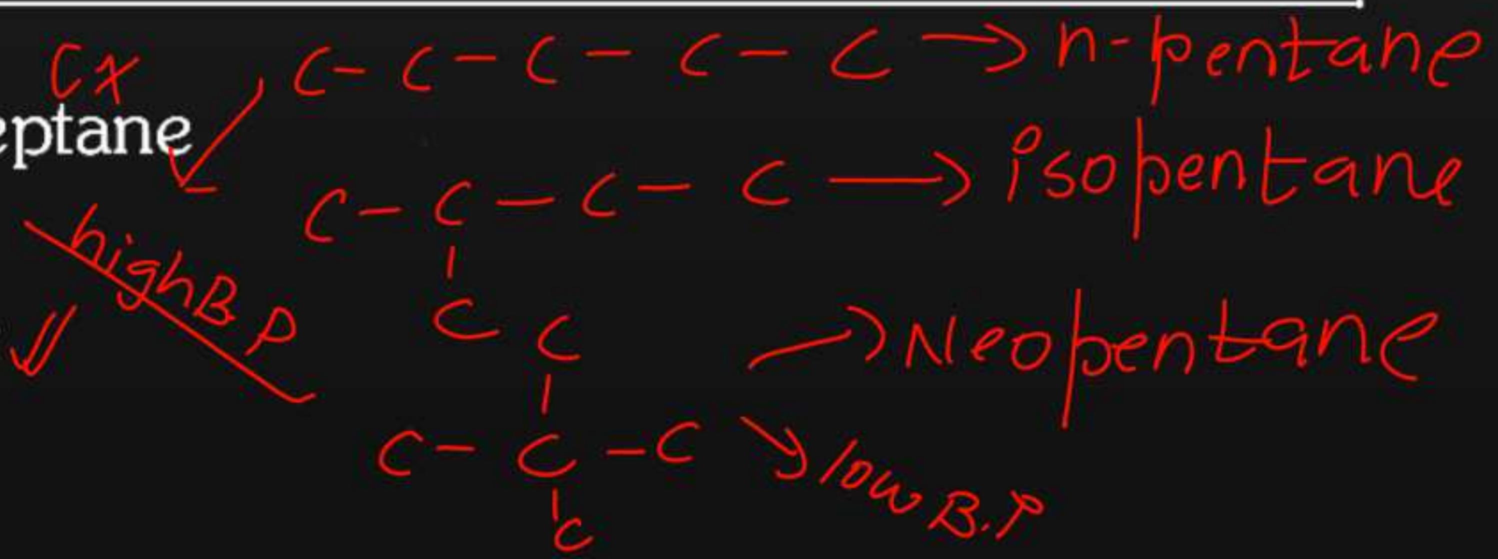
Ex. C_6H_6, CCl_4, ether etc.

(ii) **Boiling point** - ∝ molecular weight (for n-alkanes)

∵ $\boxed{\text{Vander Waals force of attraction} \propto \text{molecular weight} \propto \text{surface area of molecule.}}$

i.e. boiling point $\overset{C_5}{\text{Pentane}} < \overset{C_6}{\text{hexane}} < \overset{C_7}{\text{heptane}}$

Also boiling point $\propto \dfrac{1}{\text{number of side chain}}$



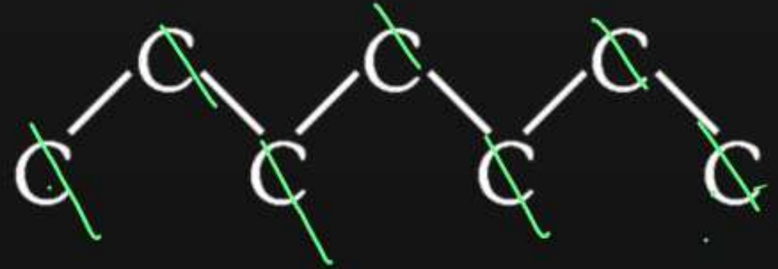
because the shape approaches to spherical which results in decrease in van der Waal's forces (as surface area decreases)

Thus boiling point n–Pentane > Isopentane > neopentane

(iii) **Melting Point :** M.P. of alkanes do not show regular trend. Alkanes with even number of carbon atoms have higher M.P. than their adjacent alkanes of odd number of carbon atoms.

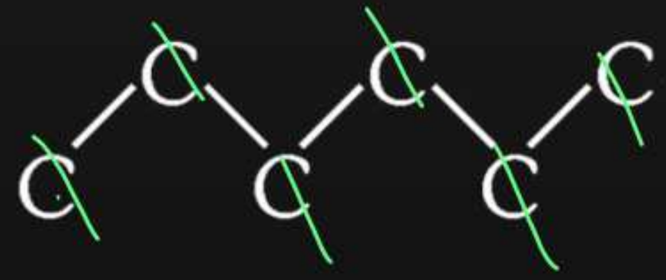
The abnormal trend in M.P. is due to the fact that alkanes with odd carbon atoms have their end carbon atom on the same side of the molecule and in even carbon atom alkane the end Carbon atom on opposite side. Thus alkanes with even carbon atoms are packed closely in crystal lattice to permit greater intermolecular attractions.

M.P.



Odd number of carbon

<



Even number of carbon

C_nH_{2n+2}

$CH_4 \longrightarrow$ methane

$C_2H_6 \longrightarrow$ ethane

CH_2

$C_3H_8 \longrightarrow$ propane

CH_2

$C_4H_{10} \longrightarrow$ butane

Homologous series.

Members → Homologues.

$$\boxed{CH_2 \longrightarrow 12+2 = 14\ a.m.u}$$

Alkenes.

C_nH_{2n}

Geometrician Isomerism

$[C=C]$
↓
Restricted rotation

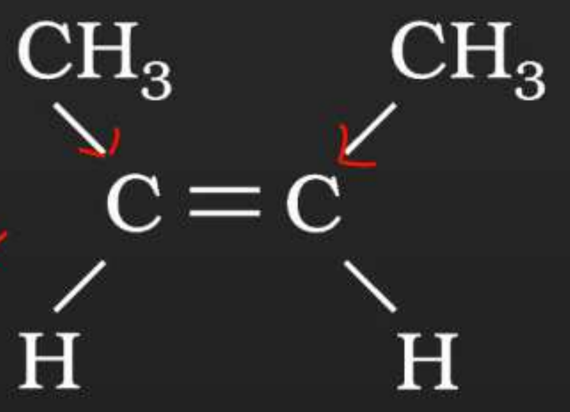
Same molecular formula but Spatial arrangement of chemical substance across carbon-carbon double bond is different such compounds are called geometrical isomers. And the phenomenon is called geometrical isomerism.

It is of two types

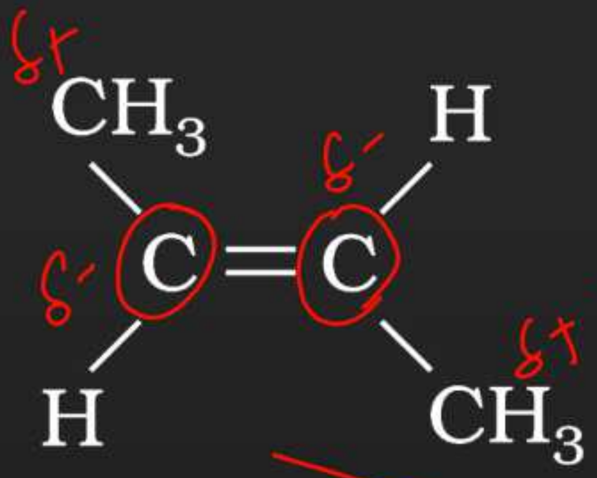
Cis isomer and Trans isomer

Due to different arrangement of atoms or groups in space, these isomers differ in their properties like melting point, boiling point, dipole moment, solubility etc.

$\mu \neq 0$
polar molecule



cis-But-2-ene
(b.p. 277 K)



trans-But-2-ene
(b.p. 274 K)

→ Symmetrical arrangement
↳ m P ↑

→ Non polar

→ $\mu = 0$

B. P ↓

$\mu = q^{\oplus \ominus} \times d$

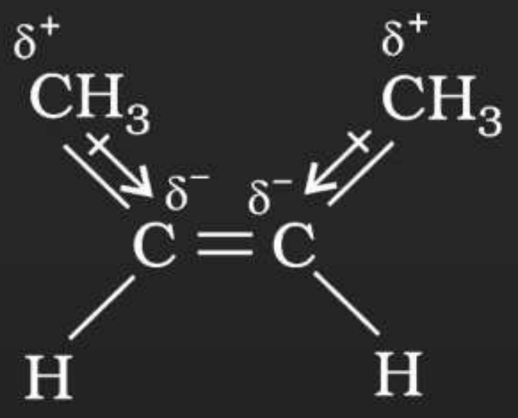
dipole moment
↳ charge separation measuring tool

It is of two types

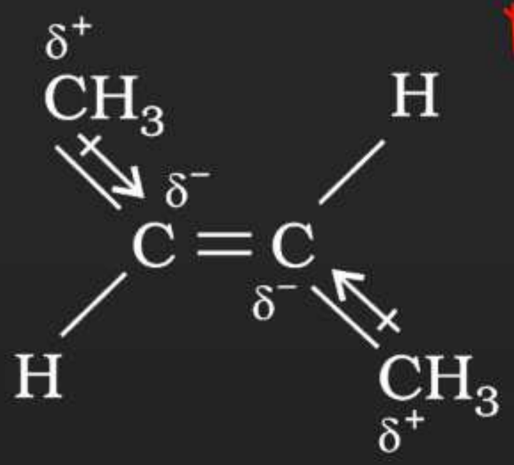
Cis isomer and Trans isomer

Due to different arrangement of atoms or groups in space, these isomers differ in their properties like melting point, boiling point, dipole moment, solubility etc.

polar
B.P↑
$\mu \neq 0$



cis-But-2-ene
(μ = 0.33D)



trans-But-2-ene
(μ = 0)

Non polar.
m.p↑.
$\mu = 0$

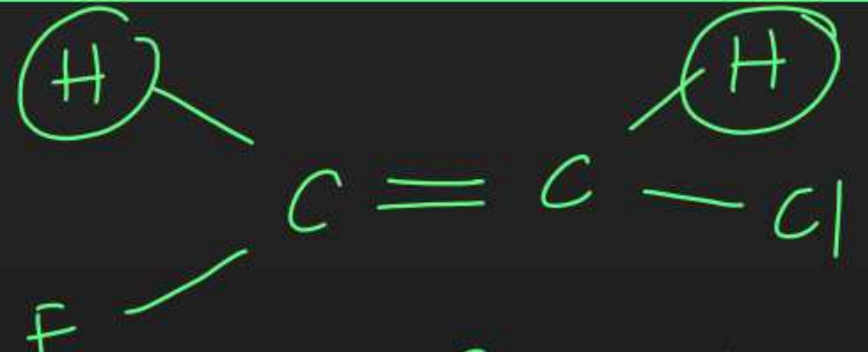
VIMP

Cis form of alkene is found to be more polar than the trans form. For example, dipole moment of cis-but-2-ene is 0.33 Debye, whereas, dipole moment of the trans form is almost zero or it can be said that trans-but-2-ene is non-polar. Cis isomer has high boiling point than trans isomer.

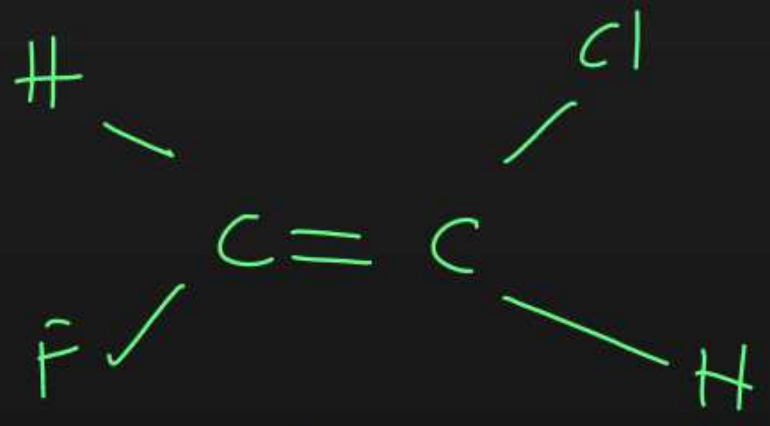
In the case of solids, it is observed that the trans isomer has higher melting point than the cis form.

↓
due to Symmetry.

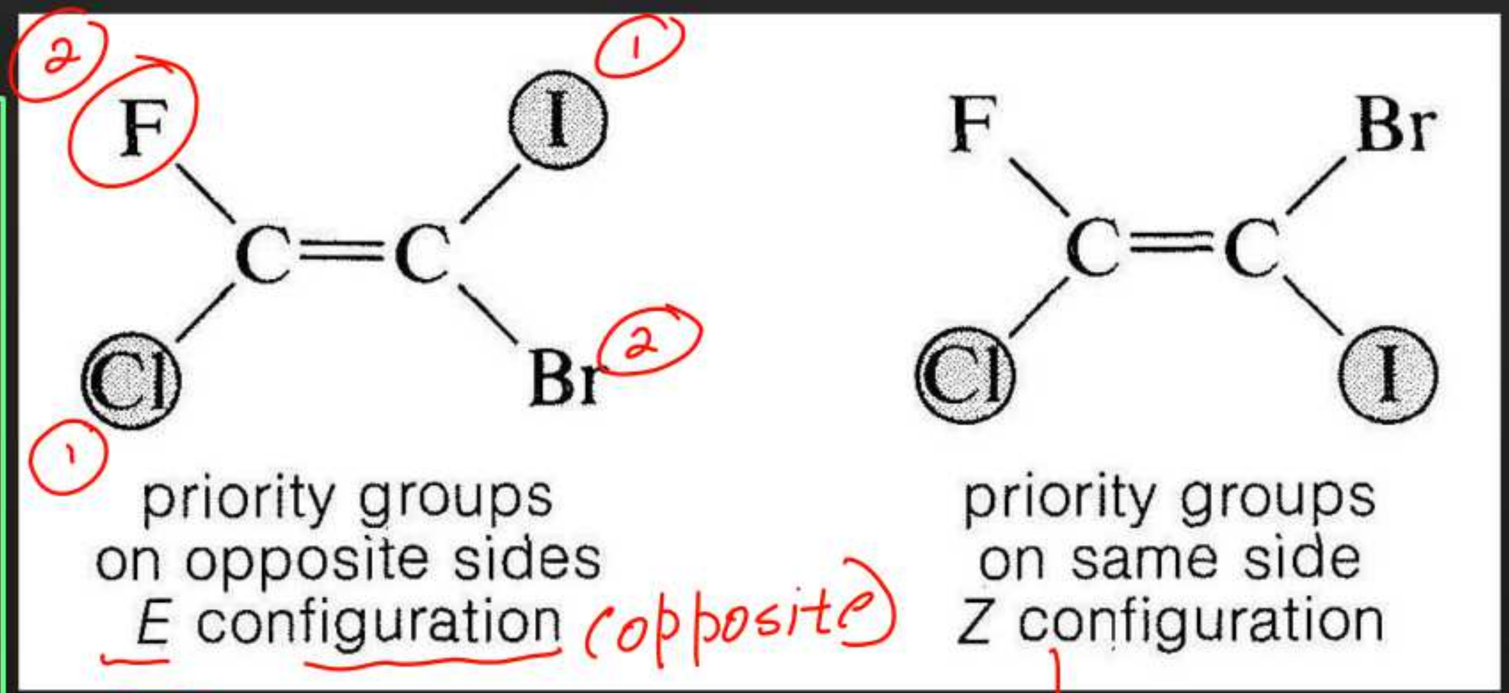
Geometrical or cis-trans isomerism is also shown by alkenes of the types XYC = CXZ and XYC = CZW → E/Z.



cis isomer



trans isomer.



priority groups
on opposite sides
E configuration (opposite)

priority groups
on same side
Z configuration

same side.

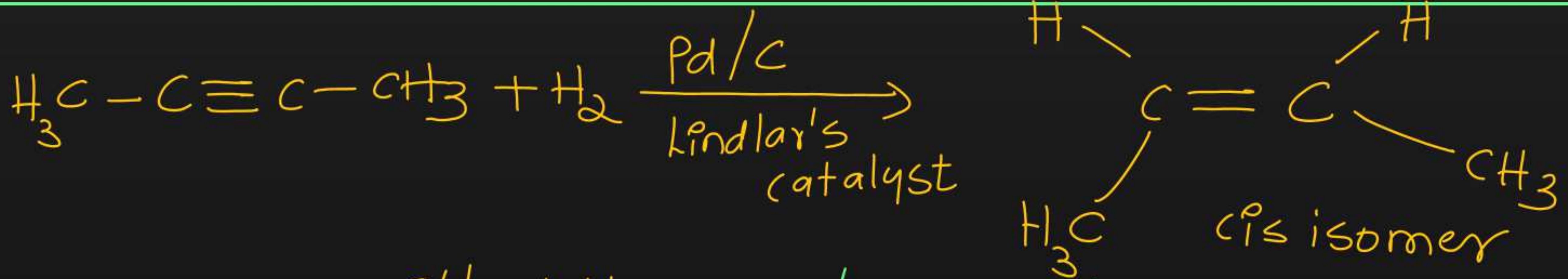
F
Cl
Br
I

VVVV IMP

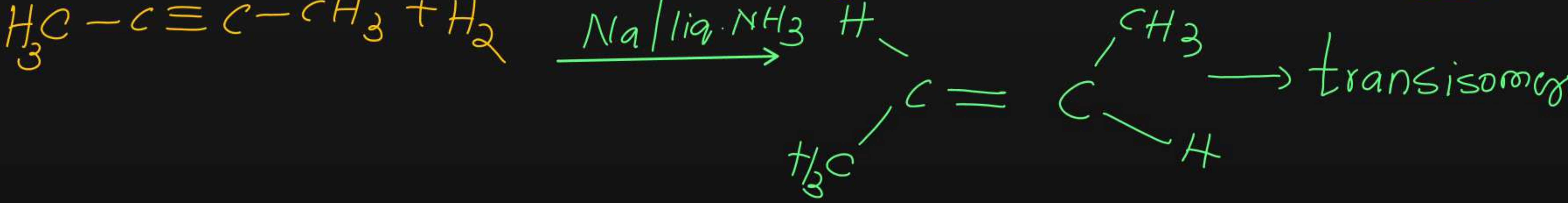
Preparation

(1) Partially deactivated palladised charcoal is known as Lindlar's catalyst. Alkenes thus obtained are having **cis geometry**.

(2) However, alkynes on reduction with sodium in liquid ammonia form trans alkenes.



VVVVVV IMP



Chemical properties.

✓ ✓ ✓

(3) **Addition of hydrogen halides:** Hydrogen halides (HCl, HBr, HI) add up to alkenes to form alkyl halides.

(4) Note: The order of reactivity of the hydrogen halides is $\boxed{HI > HBr > HCl}$.

Addition reaction of HBr to symmetrical alkenes

$H \vdots I$

$$\overset{H}{H_2C}=\overset{Cl}{CH_2} + HCl \longrightarrow H_3C-CH_2-Cl$$

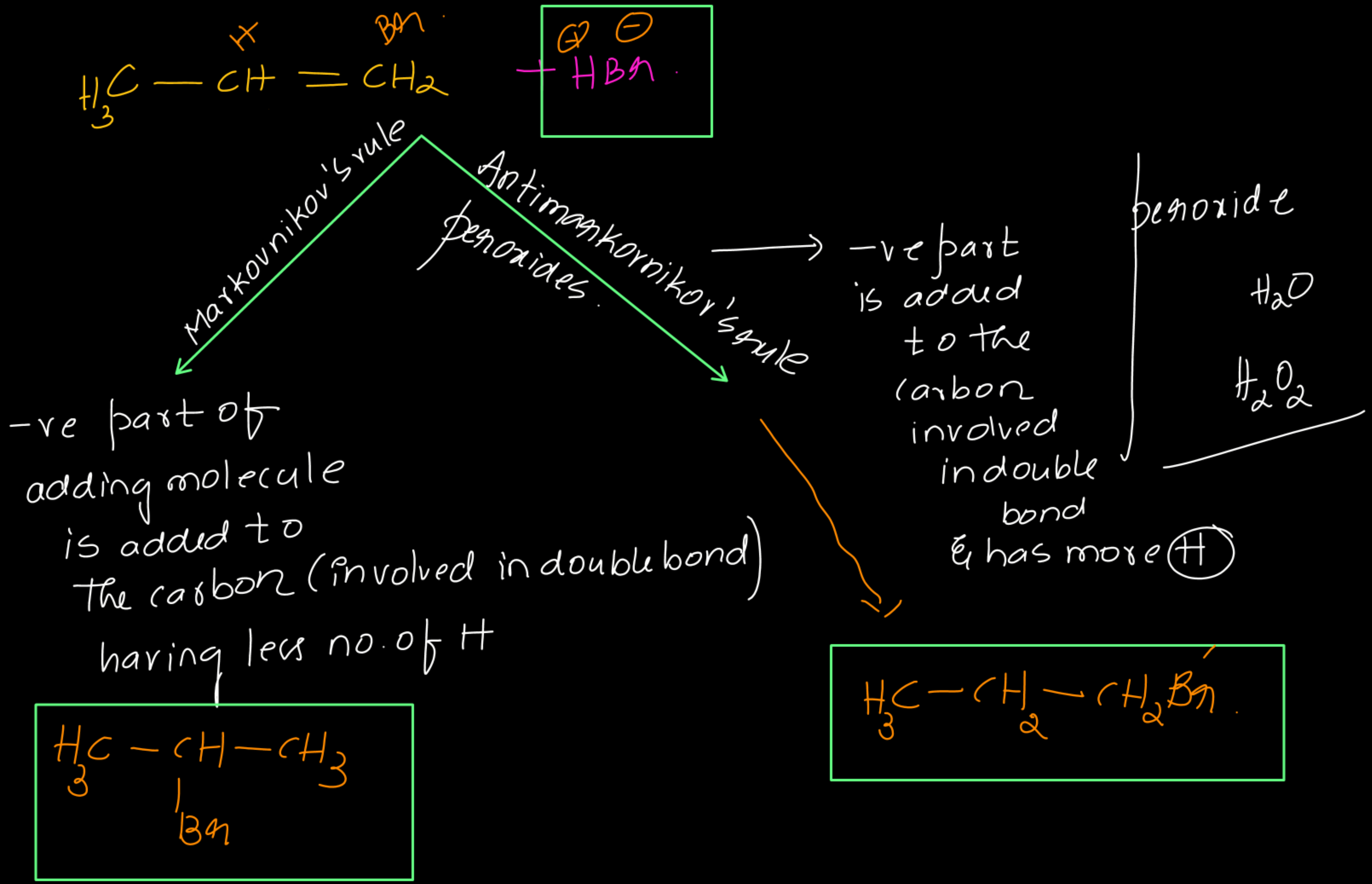
Addition to unsymmetrical alkene.

$$H_3C-\overset{Cl}{C}H=\overset{H}{C}H_2 + \overset{\ominus}{HCl} \text{ or } HI \xrightarrow[\text{rule}]{\text{Markownikov's}} H_3C-\underset{Cl}{\underset{|}{CH}}-CH_3$$

unsymmetrical alkene

propene

-ve part is added to the carbon having less No. of H



Anti markovnikov's rule is applicable to only with HBr but not with HCl and HI. Why?

This may be due to the fact that the H–Cl bond being stronger (430.5 kJ mol^{-1}) than H–Br bond (363.7 kJ mol^{-1}), is not cleaved by the free radical,

VIMP

(free radical)
Hydrogen peroxide

The H–I bond is weaker (296.8 kJ mol^{-1}) and iodine free radicals combine to form iodine molecules instead of adding to the double bond.

$H-I \rightarrow H^{\cdot} + I^{\cdot}$ ✗ I_2

$H^{\circ} + I^{\circ}$

Karasch's effect

H^{+}, Br^{-}

$H_3C-HC=CH_2$

HBr^{-}

$H-I$

HBr

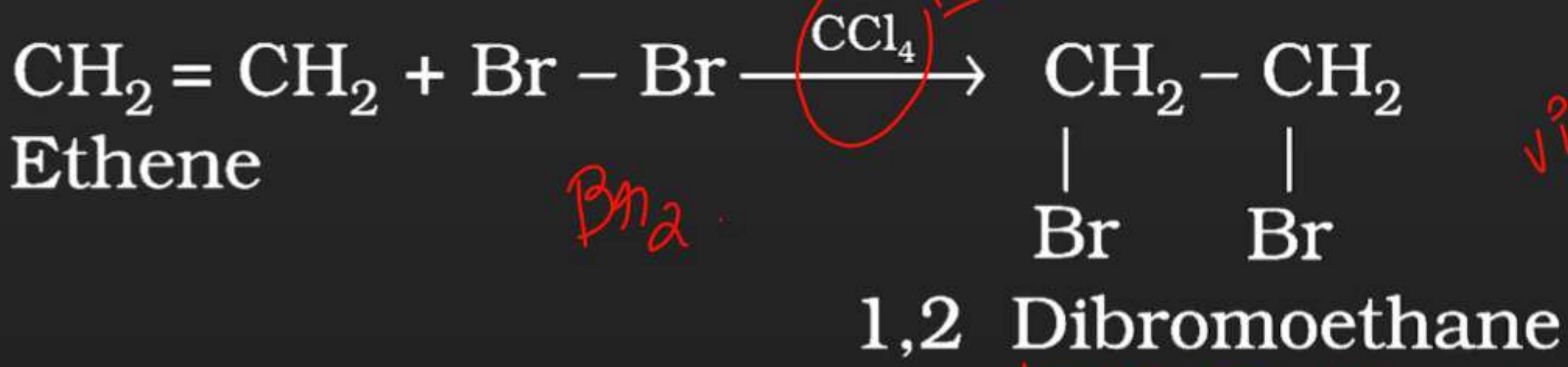
HI ✗

HCl ✗

$H-Cl$ ✗

$H-I$ H° $I^{\cdot}$

$I^{\cdot} + I^{\cdot}$ ✓ I_2

(i) 

$$CH_2=CH_2 + Br-Br \xrightarrow{\boxed{CCl_4}} \underset{Br}{CH_2}-\underset{Br}{CH_2}$$

Ethene

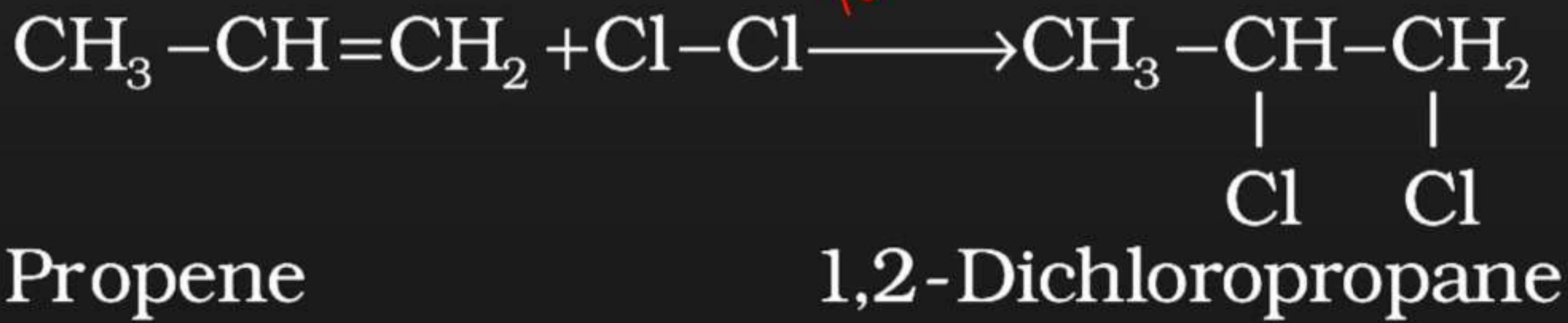
1,2 $\underbrace{\text{Dibromoethane}}$

Br_2.

→ Nonpolar reagent

vicinal dihalide

Room temp.

(ii) 

$$CH_3-CH=CH_2 + Cl-Cl \xrightarrow{} CH_3-\underset{Cl}{CH}-\underset{Cl}{CH_2}$$

Propene

1,2-Dichloropropane

(13.39)

NBS

└→ N-bromosuccinamid

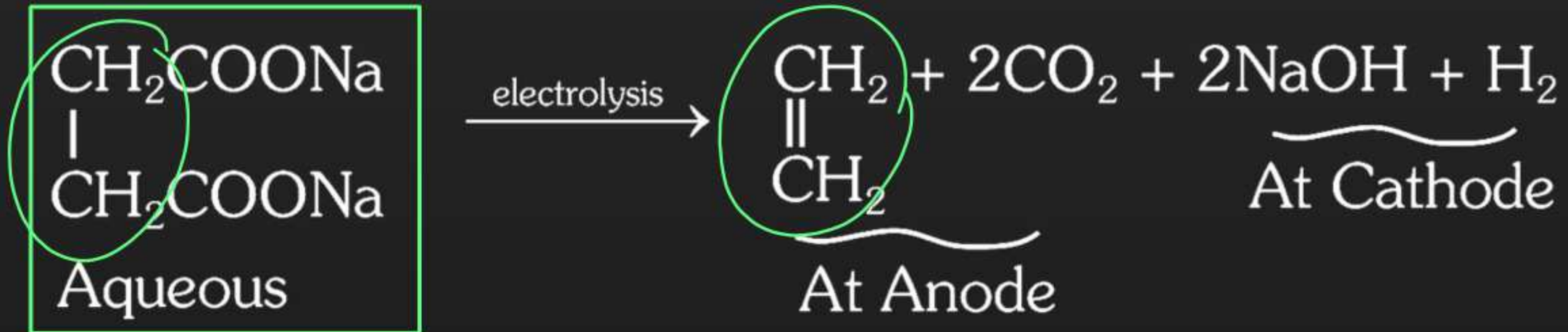
$H_3C-CH=CH + Cl_2.$

$\Big\downarrow$ High temp. or NBS-reagent

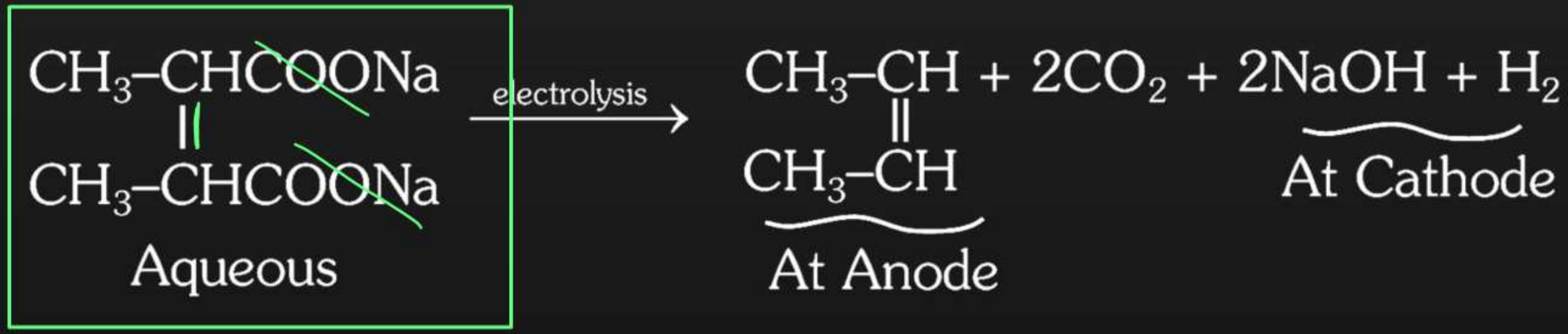
allylic substitution.

$\underset{Cl}{H_2C}-CH=CH + HCl$

By Kolbe's method: Electrolysis of potassium or sodium salt of saturated dicarboxylic acid gives alkene.



$$\boxed{\begin{array}{l} CH_2COONa \\ | \\ CH_2COONa \\ \text{Aqueous} \end{array}} \xrightarrow{\text{electrolysis}} \underbrace{\begin{array}{c} CH_2 \\ \| \\ CH_2 \end{array}}_{\text{At Anode}} + 2CO_2 + \underbrace{2NaOH + H_2}_{\text{At Cathode}}$$



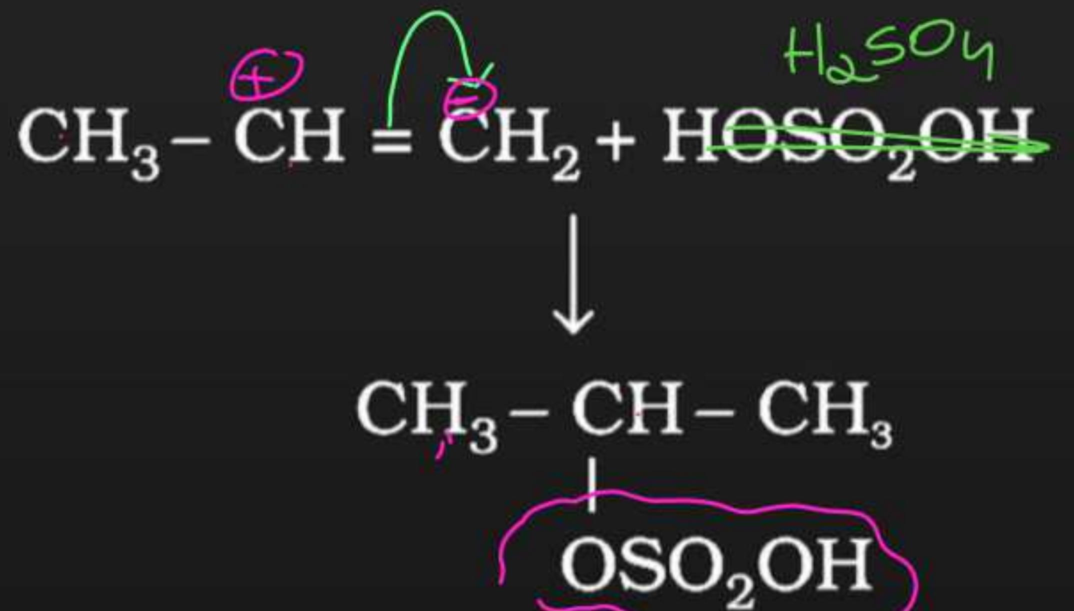
$$\boxed{\begin{array}{l} CH_3\text{–}CH\cancel{COO}Na \\ \quad\quad\ \| \\ CH_3\text{–}CH\cancel{COO}Na \\ \quad\quad \text{Aqueous} \end{array}} \xrightarrow{\text{electrolysis}} \underbrace{\begin{array}{c} CH_3\text{–}CH \\ \| \\ CH_3\text{–}CH \end{array}}_{\text{At Anode}} + 2CO_2 + \underbrace{2NaOH + H_2}_{\text{At Cathode}}$$

Extra

Markovnikov's addition

VIMP

Addition of sulphuric acid : Cold concentrated Sulphuric acid adds to alkenes in accordance with Markovnikov rule to form alkyl hydrogen sulphate by the electrophilic addition reaction.

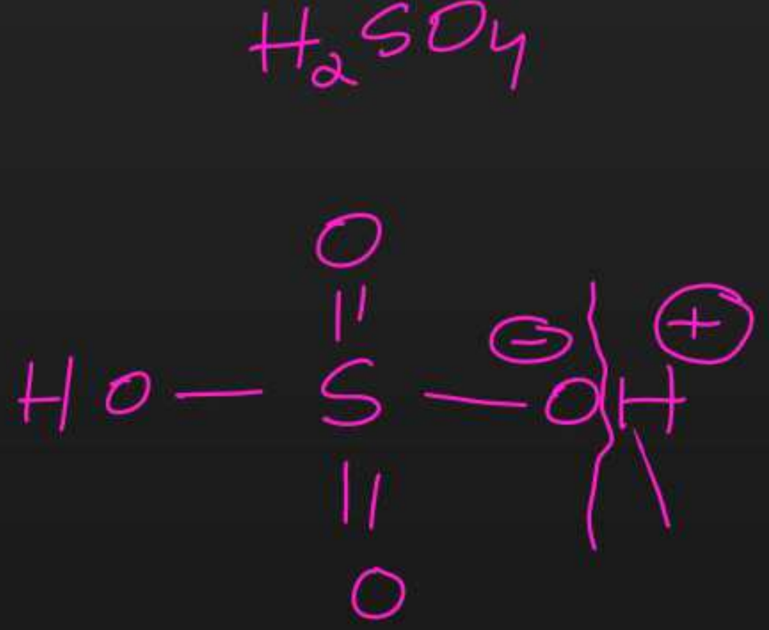


$$CH_3-\overset{\oplus}{C}H=\overset{\ominus}{C}H_2+H\cancel{OSO_2OH}$$

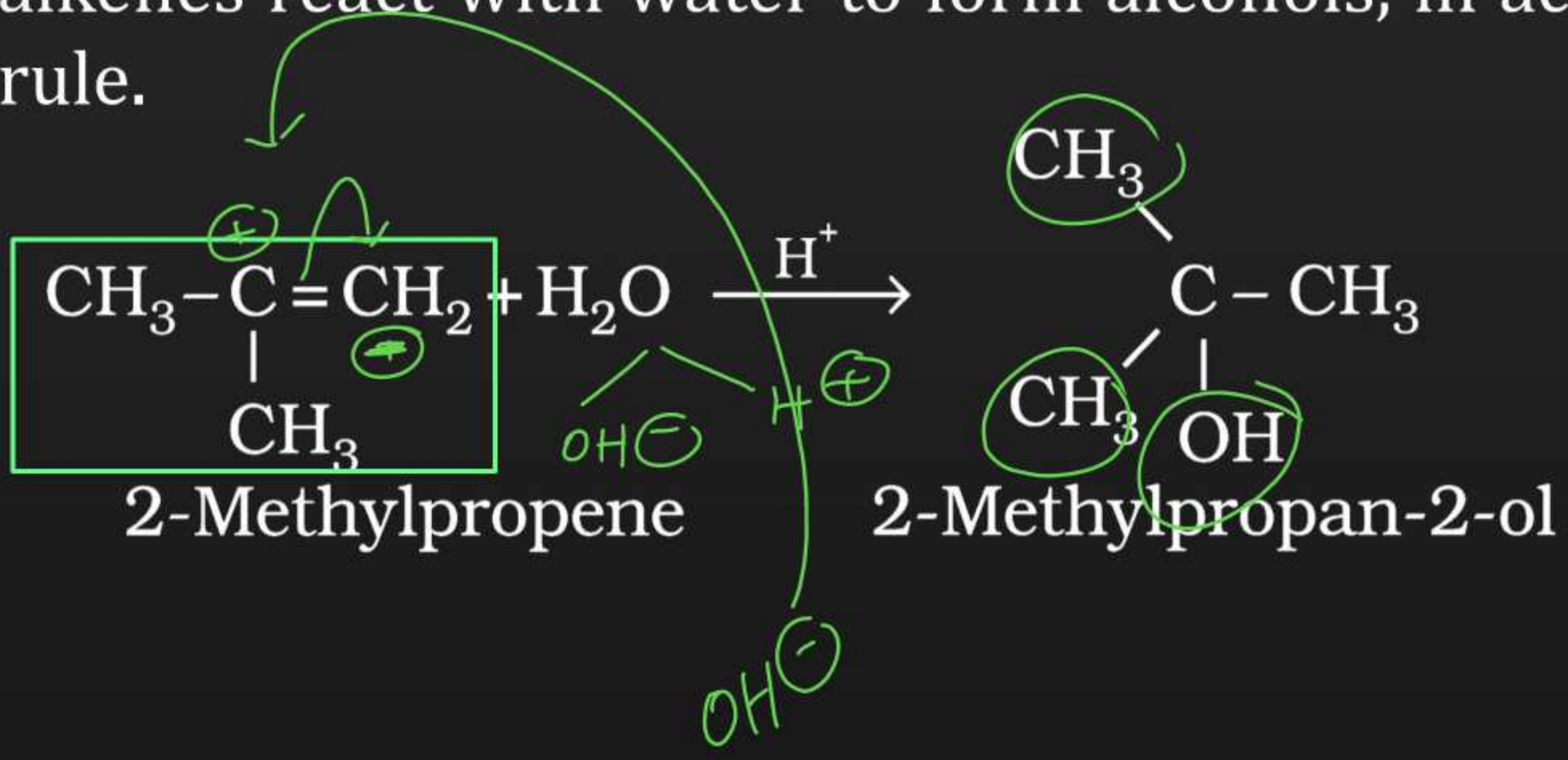
$$\downarrow$$

$$CH_3-\underset{\substack{|\\ OSO_2OH}}{CH}-CH_3$$

Propyl hydrogen sulphate



Addition of water : In the presence of a few drops of concentrated sulphuric acid alkenes react with water to form alcohols, in accordance with the Markovnikov rule.



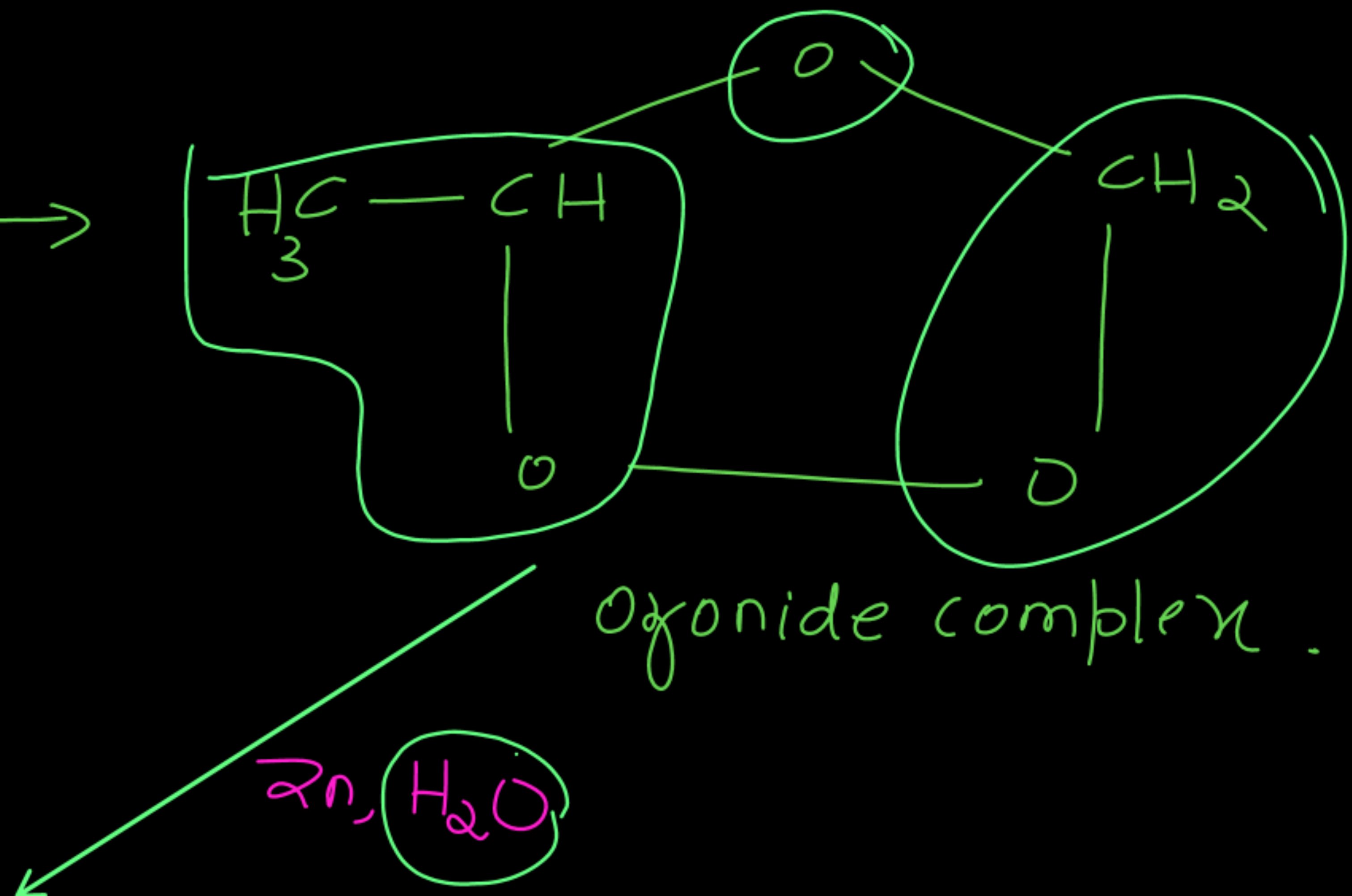
$$CH_3-\underset{\underset{CH_3}{|}}{C}=CH_2+H_2O\xrightarrow{H^+}\underset{\underset{\displaystyle CH_3\;\;OH}{/\;\;|}}{\overset{\overset{\displaystyle CH_3}{\backslash}}{C}}-CH_3$$

2-Methylpropene 2-Methylpropan-2-ol

V IMP

Ozonolysis.

$\longrightarrow H_3C-CH=CH_2 + O_3 \longrightarrow$



Ozonide complex.

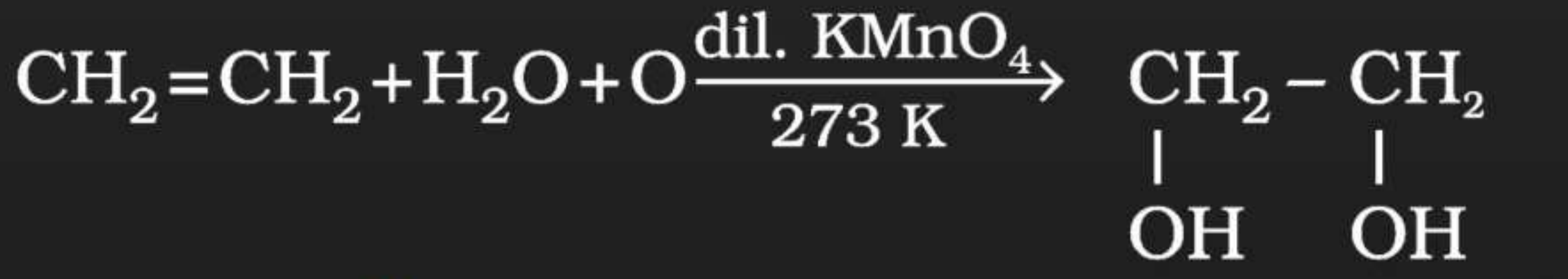
$H_2O_2 + CH_3CHO + HCHO$

↓

Acetaldehyde. formaldehyde

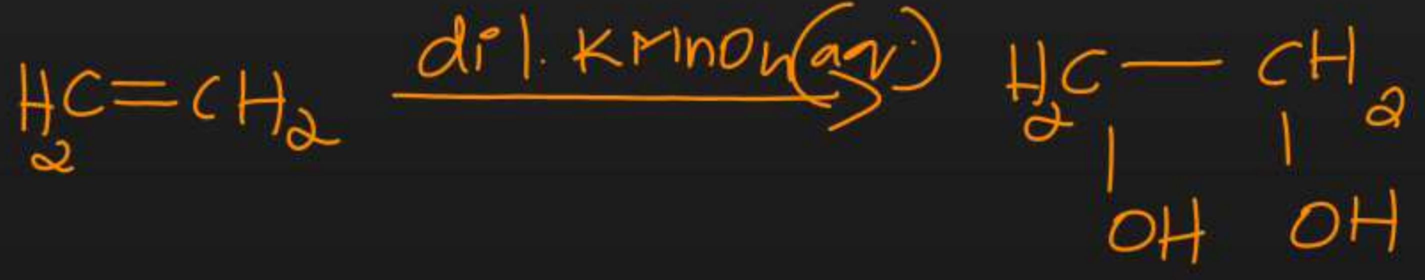
VIMP

Oxidation: Alkenes on reaction with cold, dilute, aqueous solution of potassium permanganate (Baeyer's reagent) produce vicinal glycols. Decolorization of $KMnO_4$ solution is used as a test for unsaturation.



$$CH_2=CH_2+H_2O+O \xrightarrow[273\ K]{\text{dil. }KMnO_4} \underset{OH}{CH_2}-\underset{OH}{CH_2}$$

Ethane-1, 2-diol
(Glycol)



$$H_2C=CH_2 \xrightarrow{\text{dil. }KMnO_4\text{(aq.)}} \underset{OH}{H_2C}-\underset{OH}{CH_2}$$

[redacted]

✓

$$CH_3-CH=CH_2+H_2O+O \xrightarrow[273\ K]{\text{dil. }KMnO_4} CH_3CH(OH)CH_2OH$$

Propane-1, 2-diol

[redacted]

VIMP

Acidic potassium permanganate or acidic potassium dichromate oxidises alkenes to ketones and/or acids depending upon the nature of the alkene and the experimental conditions

$$\underset{\text{2-Methlypropene}}{(CH_3)_2C=CH_2} \xrightarrow{KMnO_4/H^+} \underset{\text{Propan-2-one}}{(CH_3)_2C=O} + CO_2 + H_2O$$

$$\underset{\text{But-2-ene}}{CH_3-CH=CH-CH_3} \xrightarrow{KMnO_4/H^+} \underset{\text{Ethanoicacid}}{2CH_3COOH}$$

$(H_3C)_2C=O$

$(CH_3)_2C=CH_2$ $\quad CO_2+H_2O$

$H_3C-CH=CH_2$

$H_3C-CH=CH-CH_3$

$KMnO_4/H^{\oplus}$

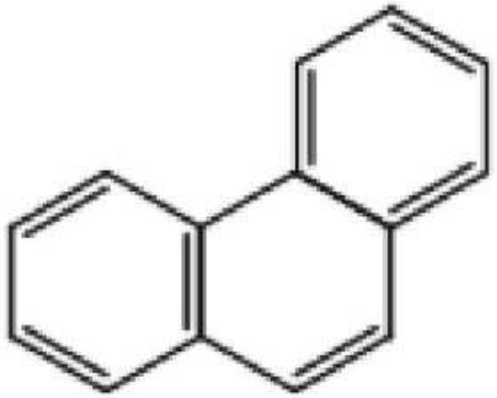
$$\boxed{\begin{array}{l} H_3C-COOH \\ H_3C-COOH \end{array}}$$

19. Which of the following is not an aromatic compound

(*a*)

(*b*)

(*c*)



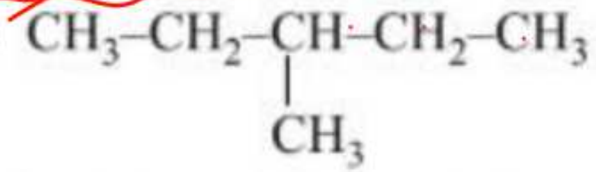
(*d*)

$C_6H_{14} \longrightarrow$ hexane

↳ C_nH_{2n+2}

21. Among the following, identify the compound that is not an isomer of hexane

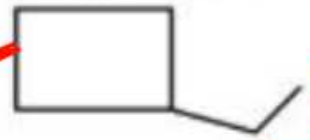
(*a*)



$CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_3$

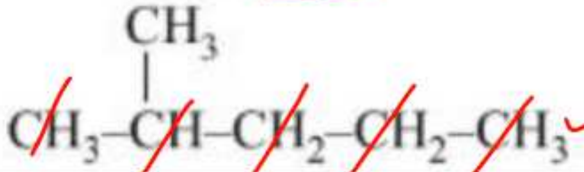
(*b*) $CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$

~~(*c*)~~



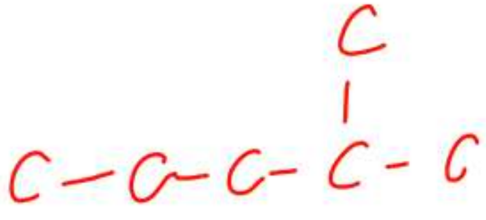
Not a isomer

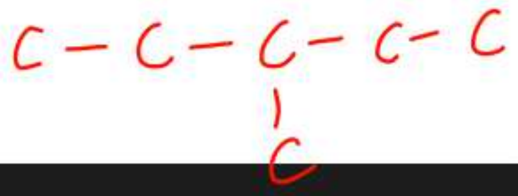
(*d*)

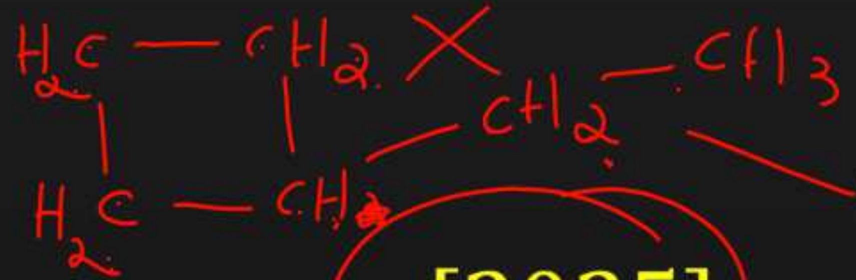


$CH_3-\overset{\displaystyle CH_3}{\overset{|}{CH}}-CH_2-CH_2-CH_3$ ✓

C–C–C–C–C–C







$\longrightarrow C_6H_{12}$.

[2025]

20. The IUPAC name of the given organic compound is
$HC \equiv C-CH=CH-CH=CH_2$

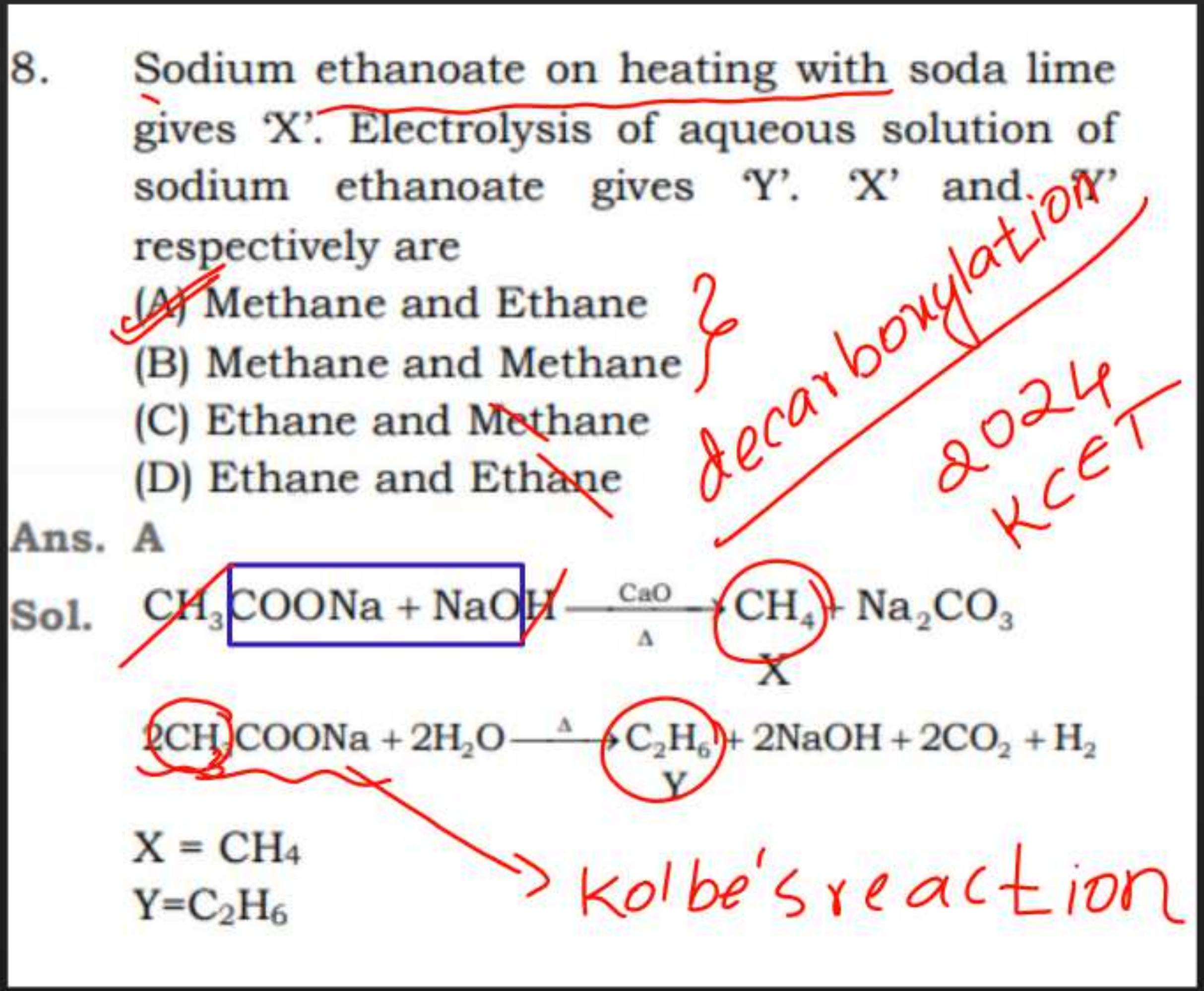
(*a*) Hexa - 1 - yn - 3,5 - diene

(*b*) Hexa - 5 - yn - 1,3 - diene

(*c*) Hexa -1,3 - dien - 5 - yne

(*d*) Hexa - 3,5 - dien - 1 - yne

Homework



8. Sodium ethanoate on heating with soda lime gives 'X'. Electrolysis of aqueous solution of sodium ethanoate gives 'Y'. 'X' and 'Y' respectively are

(A) Methane and Ethane
(B) Methane and Methane
(C) Ethane and Methane
(D) Ethane and Ethane

decarboxylation

2024 KCET

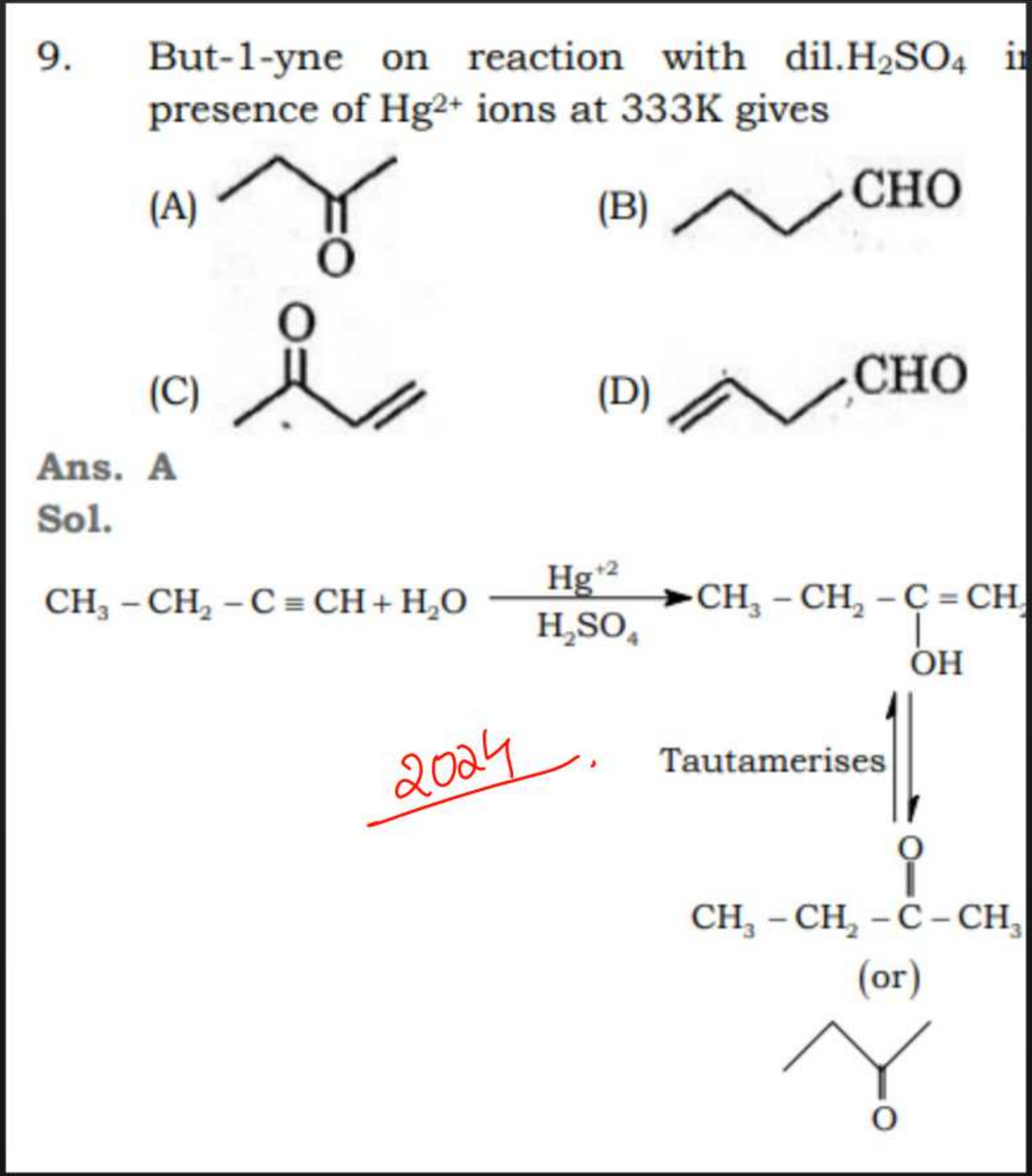
Ans. A

Sol. $CH_3\boxed{COONa + NaOH} \xrightarrow[\Delta]{CaO} \underset{X}{CH_4} + Na_2CO_3$

$2CH_3COONa + 2H_2O \xrightarrow{\Delta} \underset{Y}{C_2H_6} + 2NaOH + 2CO_2 + H_2$

$X = CH_4$
$Y = C_2H_6$

Kolbe's reaction



9. But-1-yne on reaction with dil.H_2SO_4 i presence of Hg^{2+} ions at 333K gives

(A)
(B) CHO
(C) O
(D) CHO

Ans. A

Sol.

$CH_3-CH_2-C\equiv CH + H_2O \xrightarrow[H_2SO_4]{Hg^{+2}} CH_3-CH_2-\underset{OH}{C}=CH$

2024

Tautamerises $\rightleftharpoons$

$CH_3-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$

(or)

O

Question No.-01 → VIMP

Arrange the following in decreasing order of their boiling points.

(A) n-butane (B) 2-methylbutane

(C) n-pentane (D) 2, 2-dimethylpropane

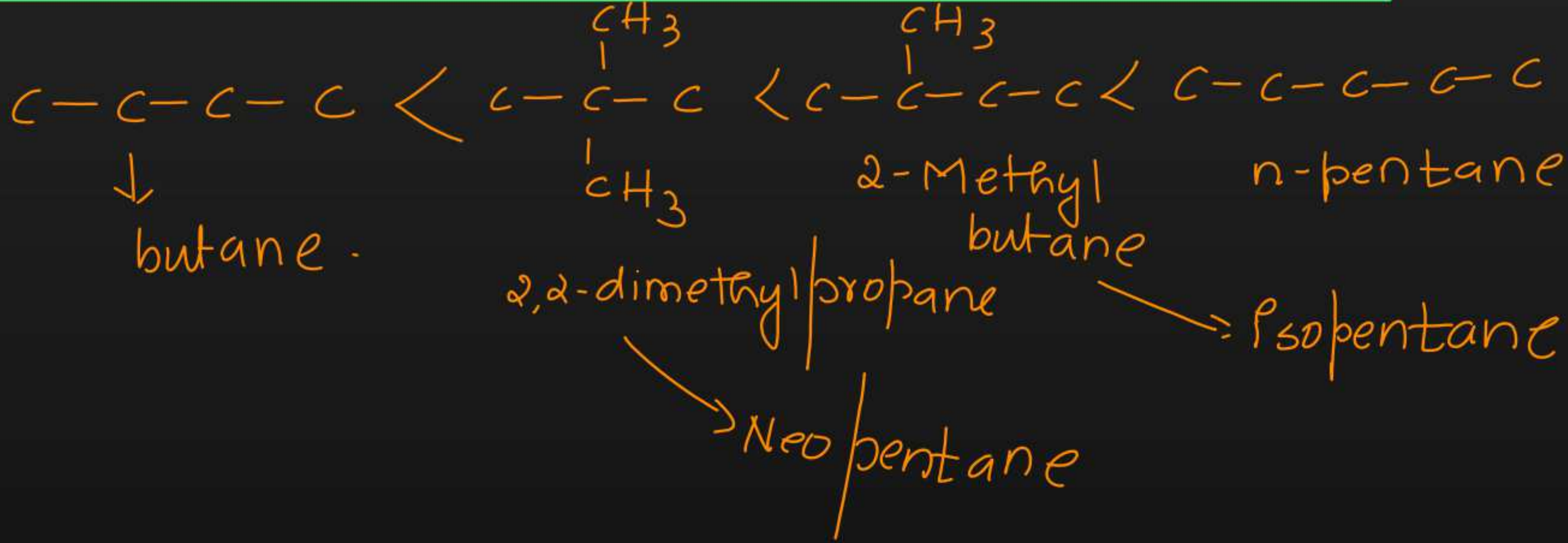
A < D < B < C

A A > B > C > D

B B > C > D > A

C D > C > B > A

[✓ D] C > B > D > A



$$C-C-C-C < C-\overset{CH_3}{\underset{CH_3}{C}}-C < C-\overset{CH_3}{C}-C-C < C-C-C-C-C$$

↓ butane.

2,2-dimethylpropane → Neopentane

2-Methyl butane → Isopentane

n-pentane

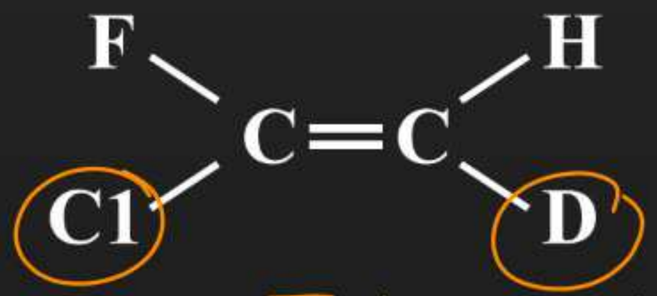
Question No.-06

Which of the following will not show geometrical isomerism?

1P H   1P+1N D   1P+2N T

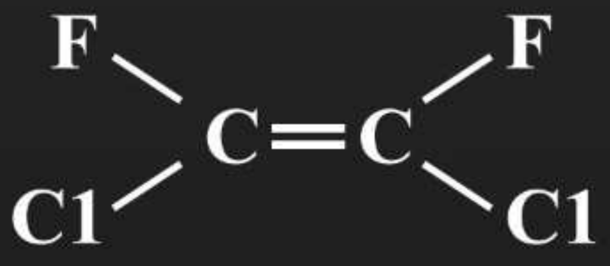
^{1}H ^{2}D ^{3}T

A



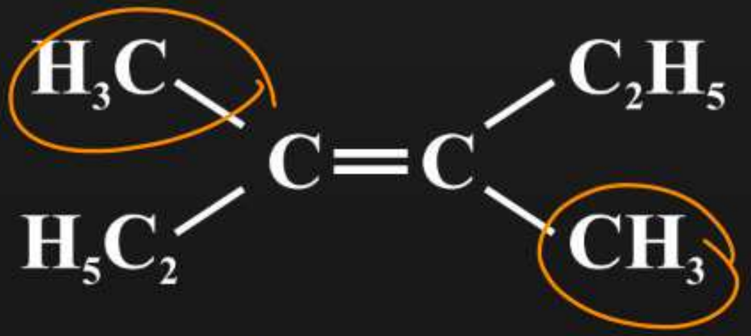
Z isomer

B



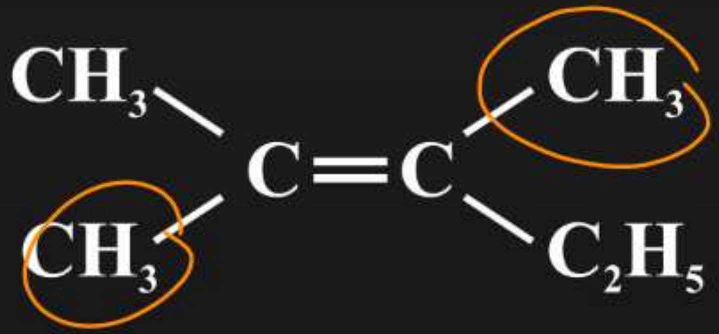
cis isomer

C



trans isomer.

~~**D**~~



QUESTION-01

In catalytic reduction of hydrocarbons which catalyst is mostly used

[✓ **A**] Pt/Ni

B SiO_2 ×

C Misch Metal ×

D Pd → Room temp

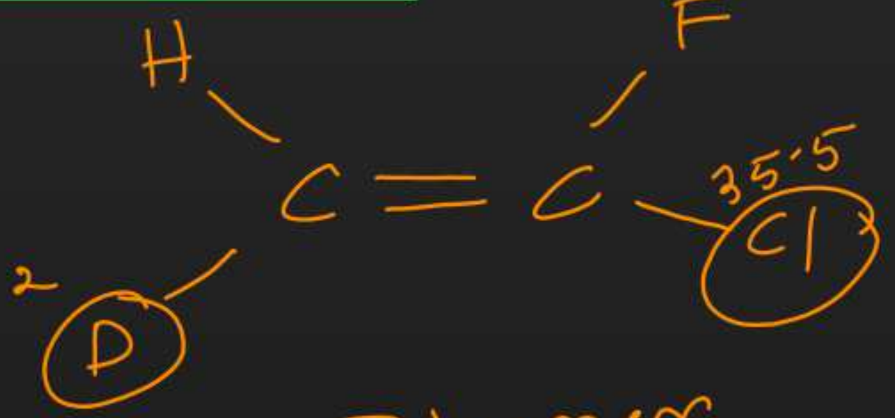
Ni^{0} → Raney Nickel

→ $\boxed{Al + Ni^{0}}$ powder

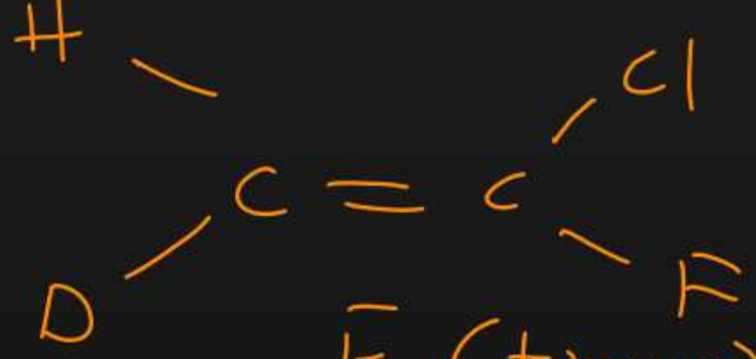
↓ highly active

↓ industrial usag

→ high temp



2 isomer (same side)



E (trans)

QUESTION-03

Methane can be prepared by

- **A** Hydrogenation reaction ×
- **B** Wurtz's reaction ×
- **C** Decarboxylation ✓
- **D** All of these

$$H_2C=CH_2+H_2 \xrightarrow{Pd|Ni|Pt} H_3C-CH_3$$

$$H_3C-\boxed{Cl+2Na+Cl}-CH_3 \longrightarrow \boxed{H_3C-CH_3}$$

Ethane.

$$H_3C-\boxed{\overset{O}{\overset{\|}{C}}-ONa^{\oplus}\quad NaO}H \xrightarrow[\text{[Sodalime]}]{NaOH+CaO} CH_4+Na_2CO_3$$

QUESTION-04

Main constituent of marsh gas is

A H_2S

B C_2H_2

[✓ C CH_4]

D CO

QUESTION-06

By Wurtz reaction a mixture of methyl iodide and ethyl iodide gives

- **A** Butane ✓
- **B** Propane ✓
- **C** Ethane ✓
- **D** A mixture of above three ✓

$H_3C-I + 2Na + I-C_2H_5$

$\downarrow$

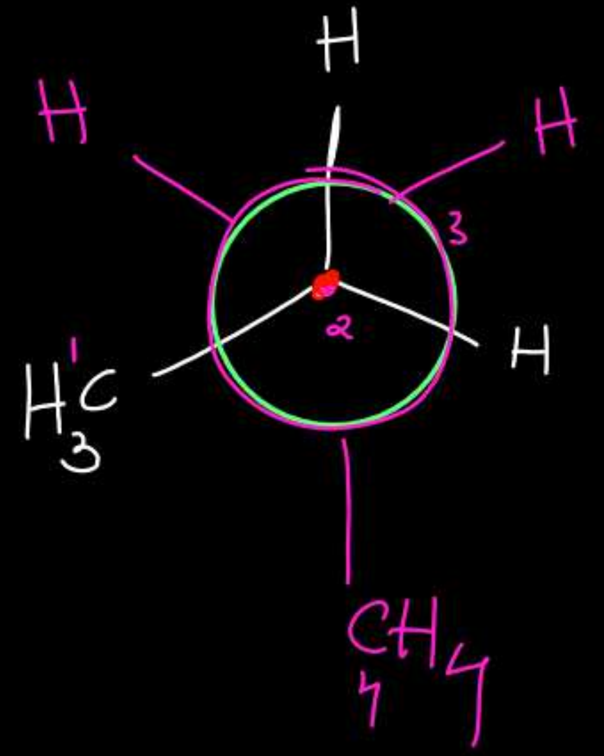
CH_3-CH_3

$C_2H_5-C_2H_5 \longrightarrow C-C-C-C$

$CH_3-C_2H_5$

$\overset{1}{H_3C}-\overset{2}{C}H_2-\overset{3}{C}H_2-\overset{4}{C}H_3$

→ butane

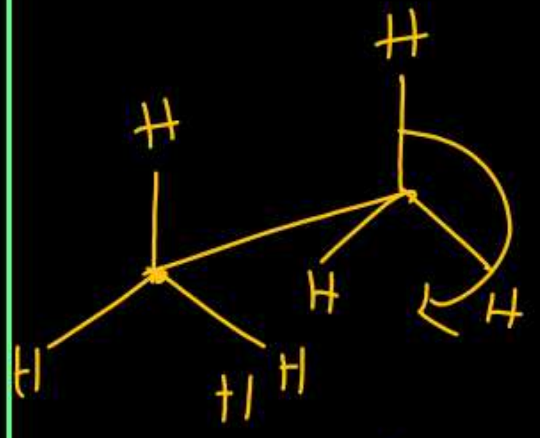


→ Staggered conformation

Sawhorse

① ②

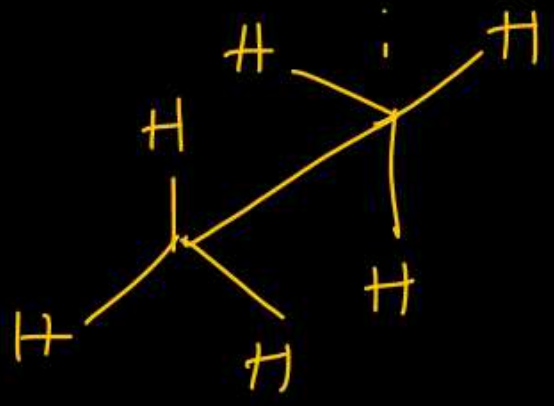
$H_3C - CH_3$



Eclipsed form

↓

Skew/guche conformation.



→ stable

Staggered conformation

Newman projection.

① ②

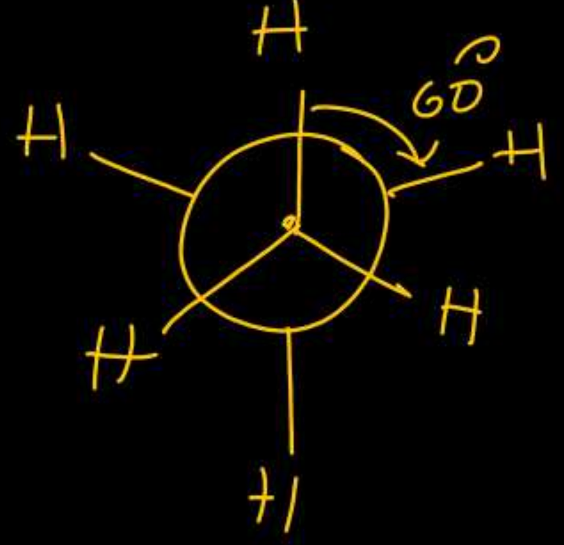
$H_3C - CH_3$

Skew or guche conformation.

↓

Eclipsed

→ stable



Staggered.

Thank

You