

CLASS XII ACADEMIC PROGRAM 2020

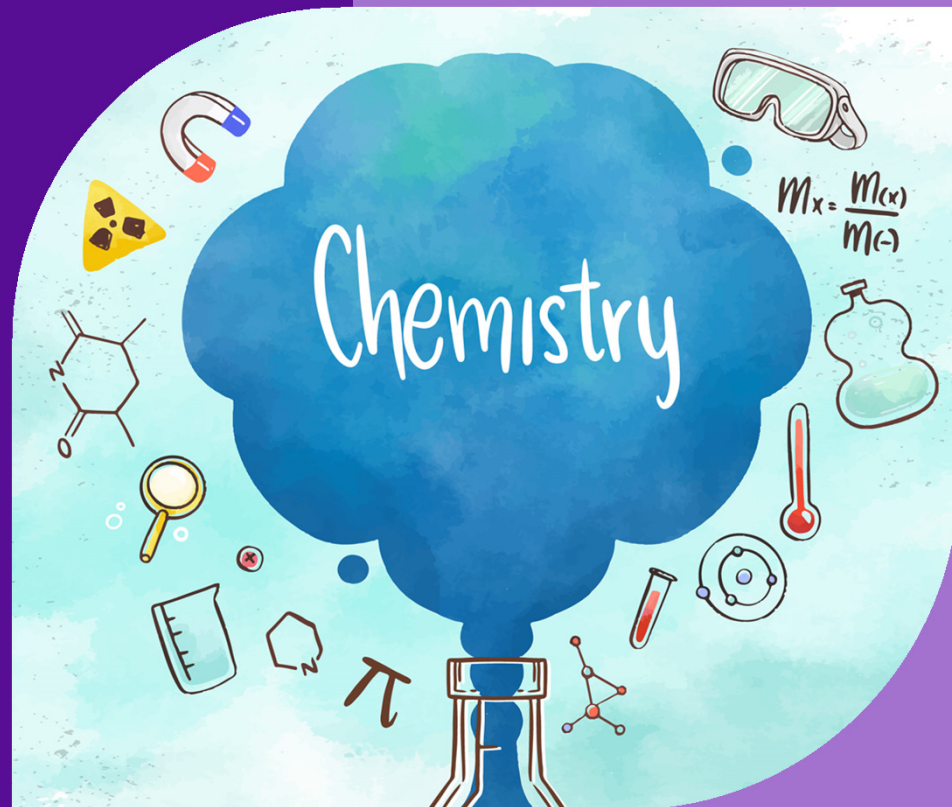
CHEMISTRY 2ND PAPER

LECTURE : C 08

CHAPTER 2 : ORGANIC CHEMISTRY

(Alkane)

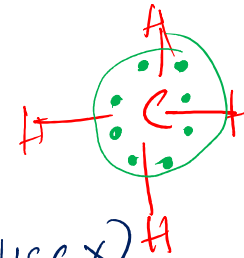
Sadat Ahmed Dipro



Covalent Bond Fission

(HC)

- (i) Homolytic Fission (equal) → # Free Radical C^\bullet
- (ii) Heterolytic Fission (not equal) → Mechanism (HSE \times)



no lone pair

4 Cov. bond
4 bp e⁻

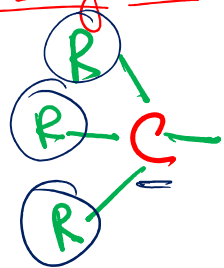


bond 4 → bp e⁻ → 4

na g e⁻ → 4x2 = 8

Carbocation C^+ # Carboanion C^-

Degree:



3°

Tertiary



2°

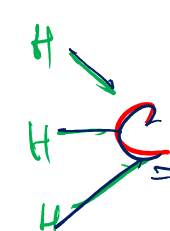
Secondary



1°

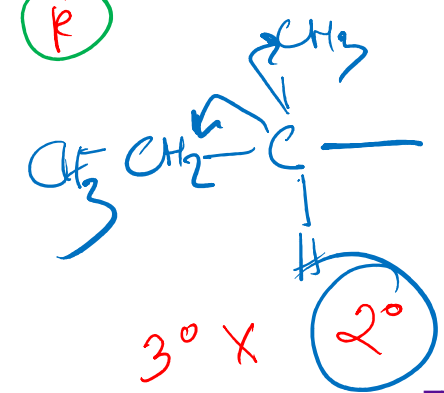
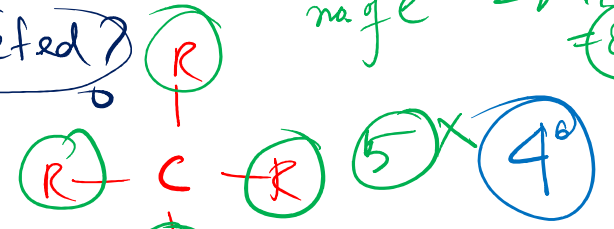
Primary

Alkyl connected



0° x 1° x

CH₃-methyl



Homolytic Fission

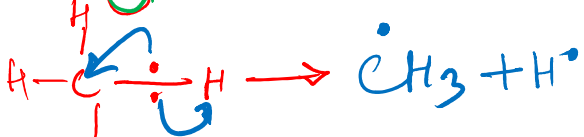
In this kind of fission two atoms or groups creating the covalent bond receives one electron each from the electron pair. So the **electrons are distributed equally**. This way **two charge diffused atoms or groups** are created. Charge diffused atoms or group produced from Homolytic Fission is called **Free radical**.

Free radical



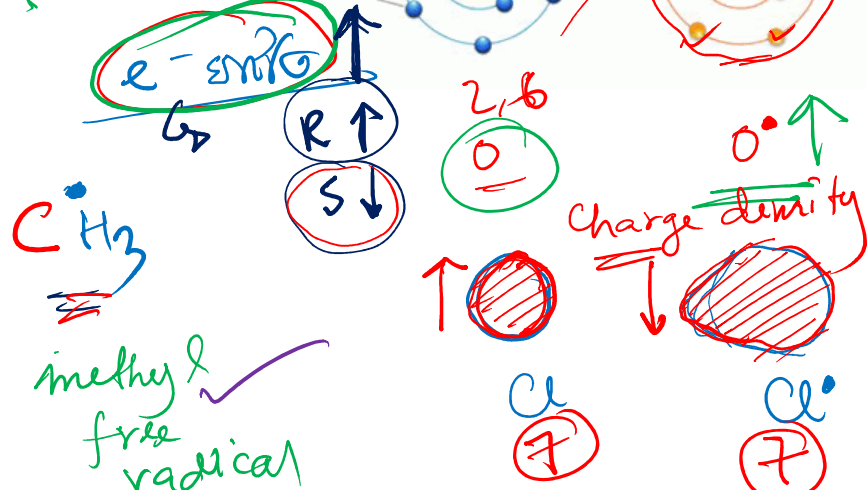
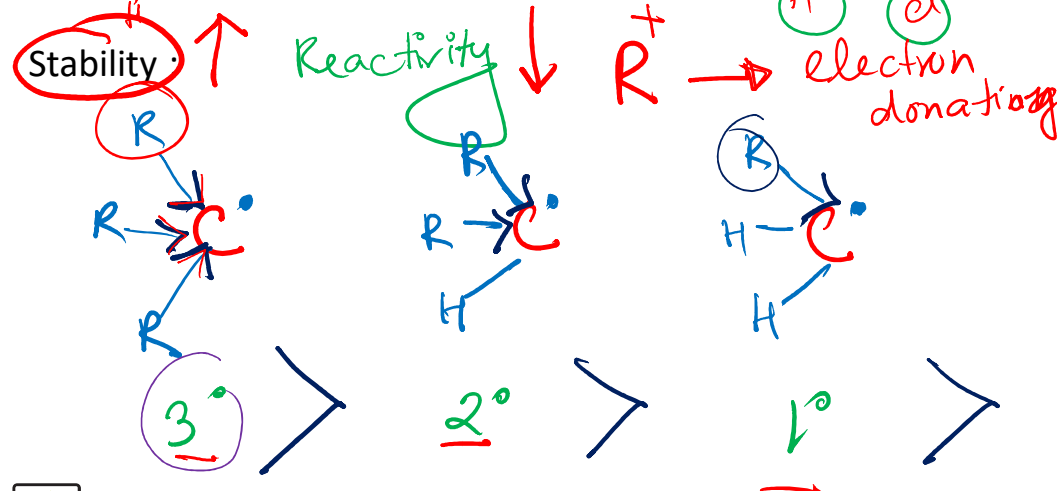
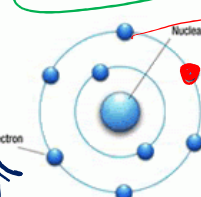
Reactive

Charge = ? **neutral**
0



Stable Molecule

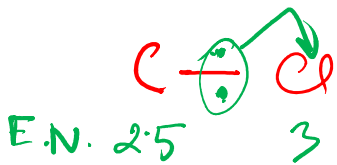
Unstable Molecule (Free Radical)



CH_3^{\cdot}
methyl free radical

Carbocation

(Hetero)

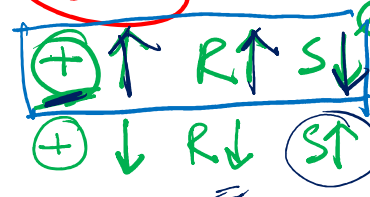
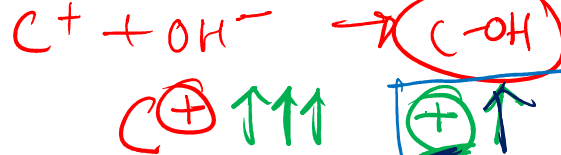


- Intermediate phase
- Highly reactive

Carbocation
Carbocationium
final product

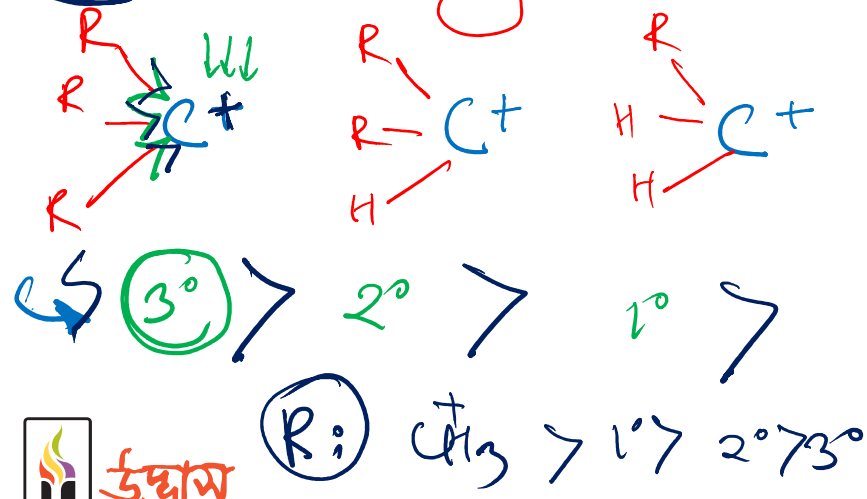
He, Ne, Ar

$A \rightarrow$ reactive \uparrow
Reaction করে
 $\rightarrow A \rightarrow$ stability \downarrow



r-crisis \rightarrow \uparrow
Reactivity \uparrow
Stability \downarrow

Stability: \uparrow Reactivity: \downarrow



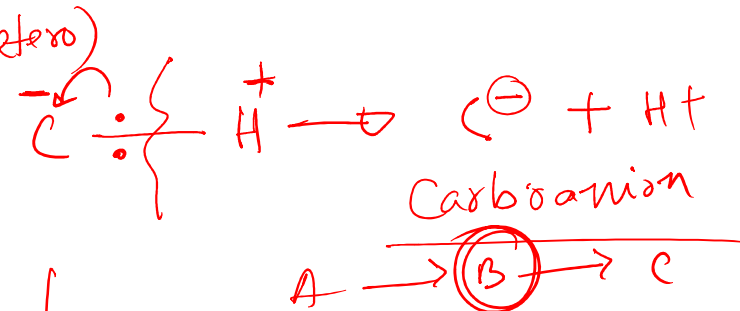
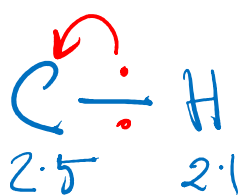
CH_3
Carbocation

Free Radical: (?)

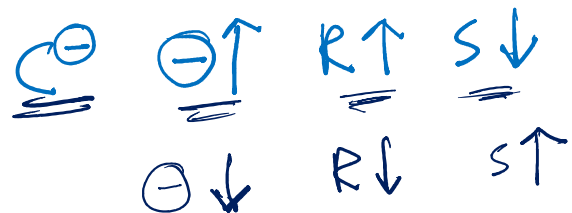
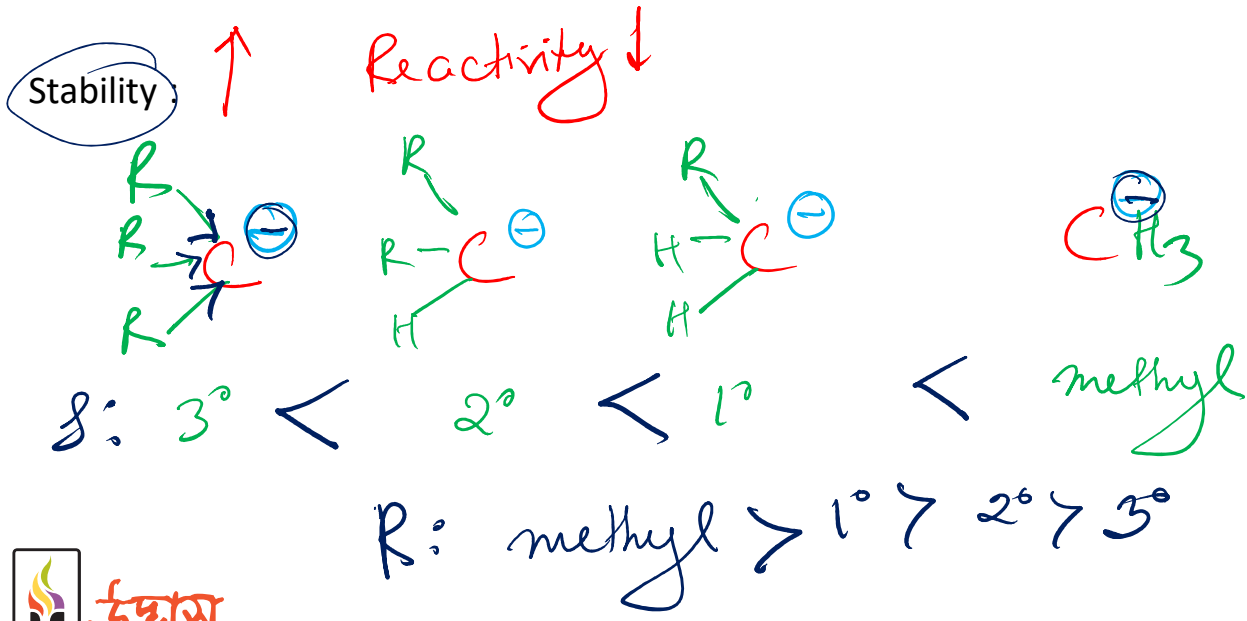
Stability: $3^\circ > 2^\circ > 1^\circ > CH_3$

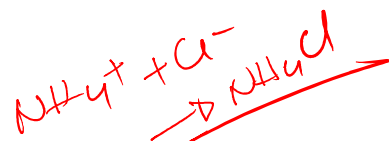
Reactivity: $CH_3 > 1^\circ > 2^\circ > 3^\circ$

Carboanion (Hetero)

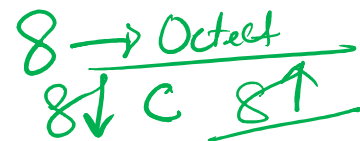


- Intermediate phase
- Highly reactive





Organic Reagents



Electrophilic

Ep.

Org + Org / Inorg

Nucleophilic

NP.

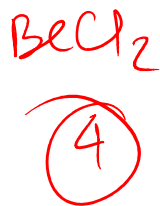
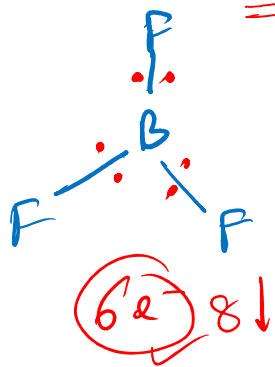
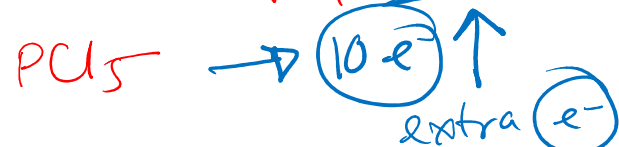


- # H^+ , NH_4^+ , CH_3^+

- # OH^- , Cl^- , CH_3^-

Octet compress. $6e^-$

Octet Expansion → 10



- # e^- donating group
(lone pair e^-)
- NH_3 H_2O

Details
১১/১০/২১

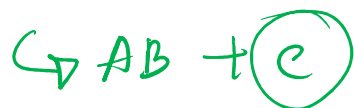
Organic Reaction

Alkane
Alkene/Alkyne

Addition ✓✓

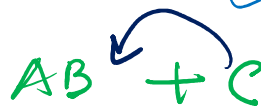


Elimination ✓

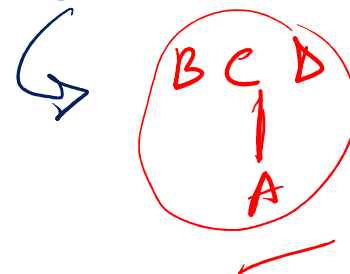


↔
same
H

Substitution ✓



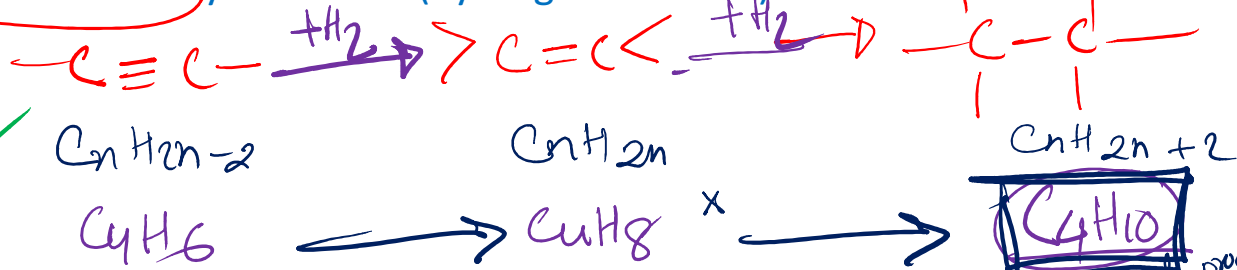
Isomeric ✓



General preparation of Alkane

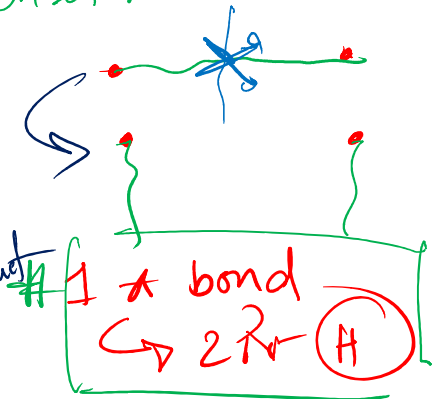
1. From unsaturated hydrocarbon (hydrogen addition)

Ni
200°C

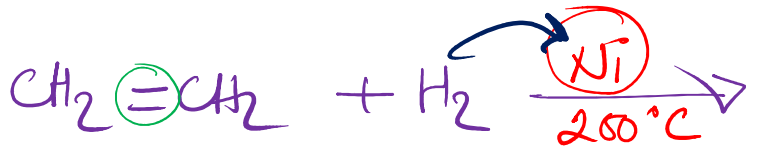


Hydrogenation

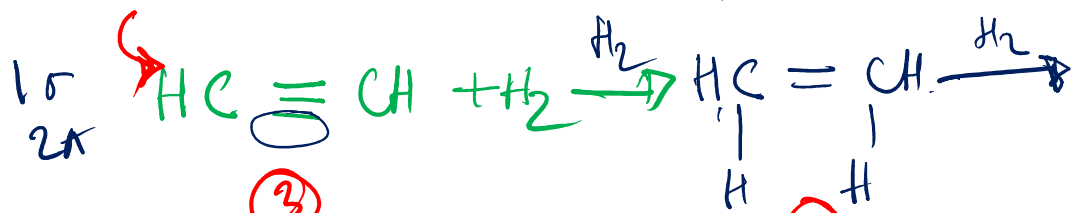
Unsaturated → Saturated



strong → 1σ
weak → 1π



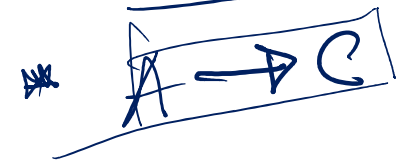
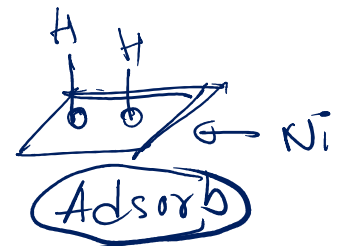
Intermediate



(A) C₂H₂
(alkyne)

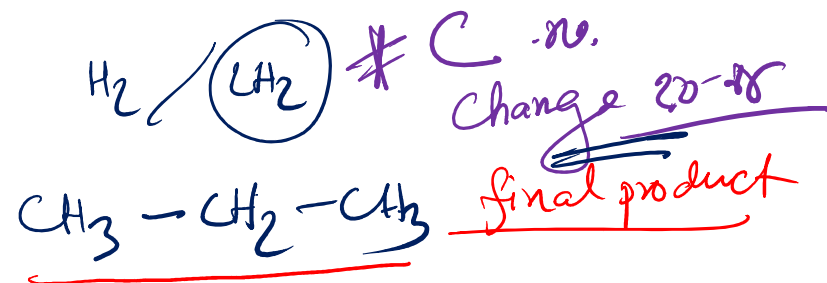
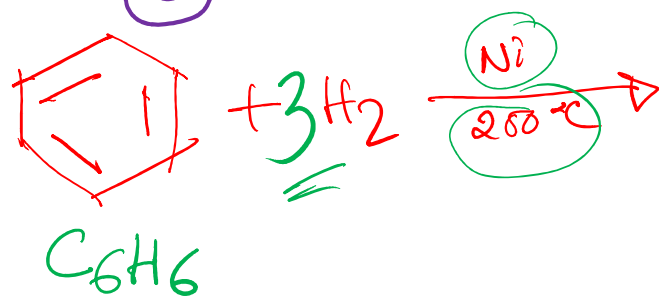
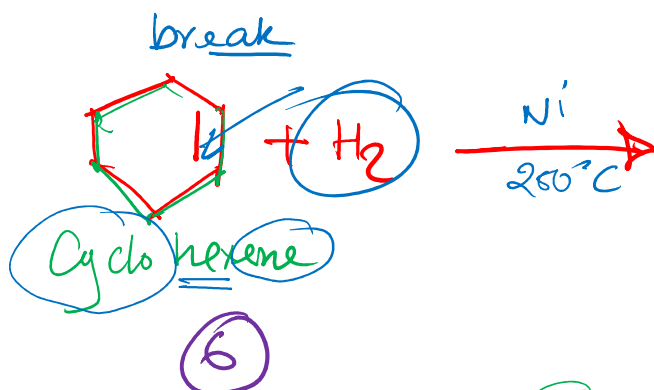
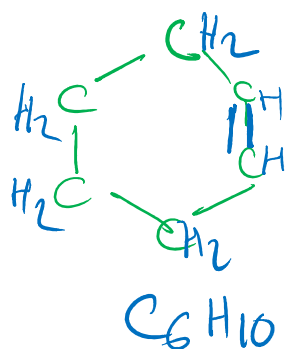
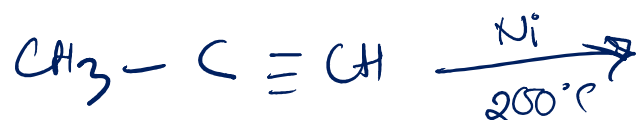
(B) C₂H₄
(alkene)

(C) C₂H₆
(alkane)

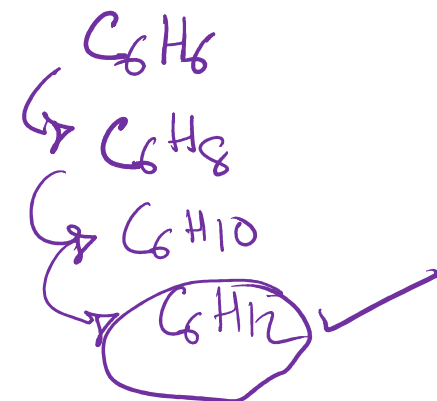
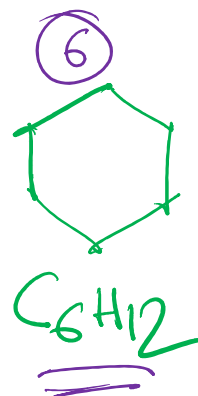
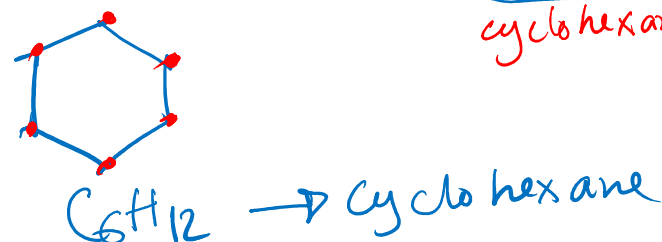


General preparation of Alkane

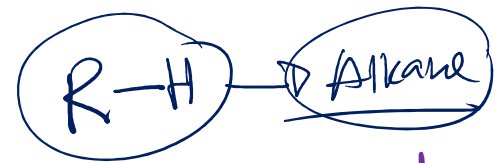
1. From unsaturated hydrocarbon (hydrogen addition)



benzene X
cyclohexane ✓

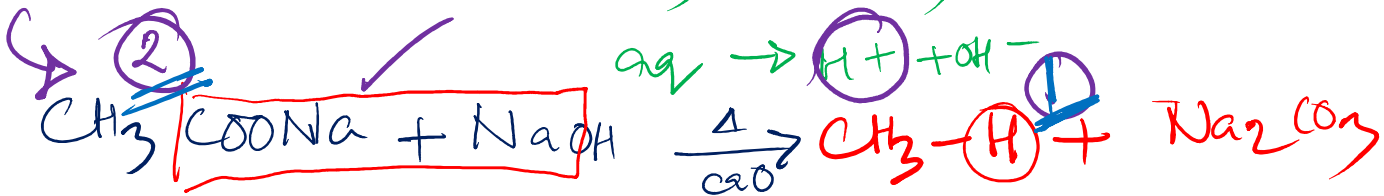
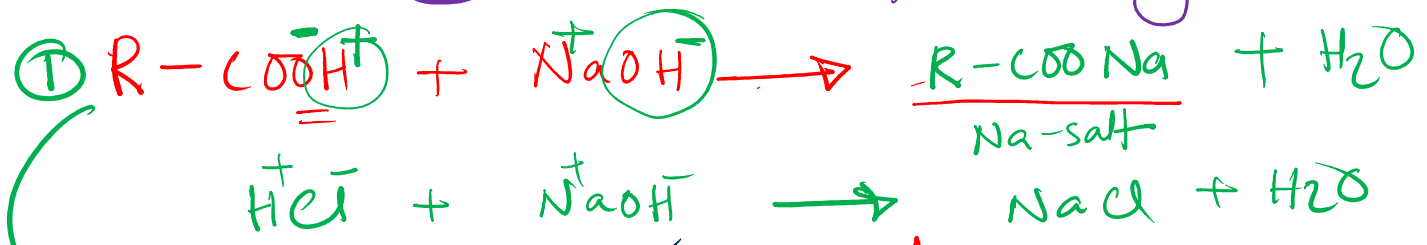


General preparation of Alkane



2. Decarboxylation → Decrease → কমে যাবে
 COO → কমে যাবে? Carboxylic Acid $R-COOH$

C.no
 1 কমে
 যাবে



truth:
 $H-NaOH$ থেকে
 আসে না।

mechanism

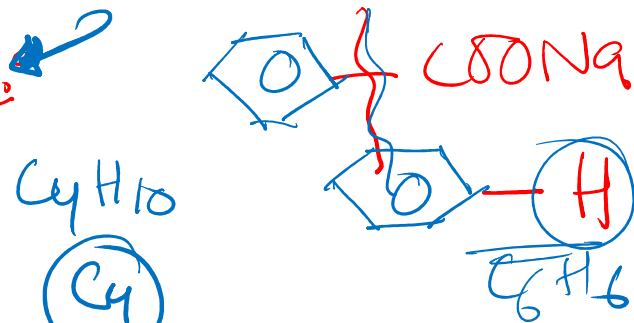
Soda + lime
 Caustic Soda NaOH Quick lime CaO
 dehydrating

General preparation of Alkane

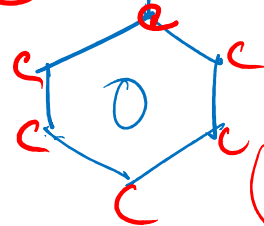
3. ~~From alkyl halide (Wurtz Reaction)~~

Decarboxylation

Pentanoic Acid \rightarrow



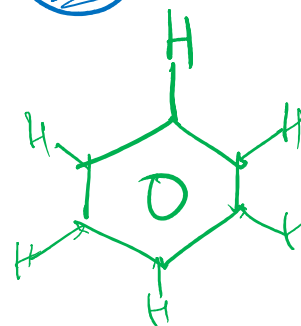
Na-Benzoate



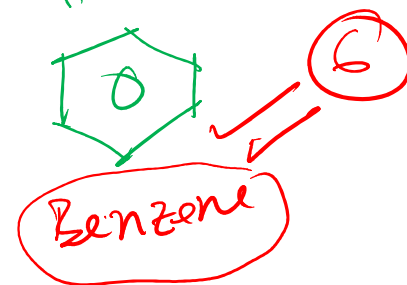
Benzoic Acid



?



$+ Na_2CO_3$



General preparation of Alkane

3. From alkyl halide (Wurtz Reaction)



C-double
সংখ্যা



moist.
ether
(N) ↑↑↑
explosion



myth: even C- to Alkane.

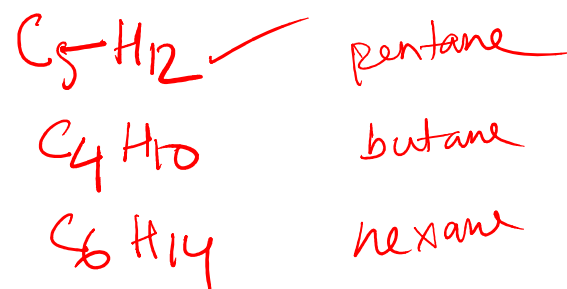
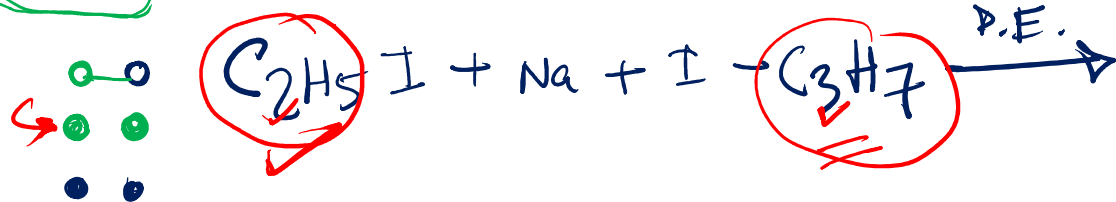
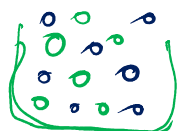
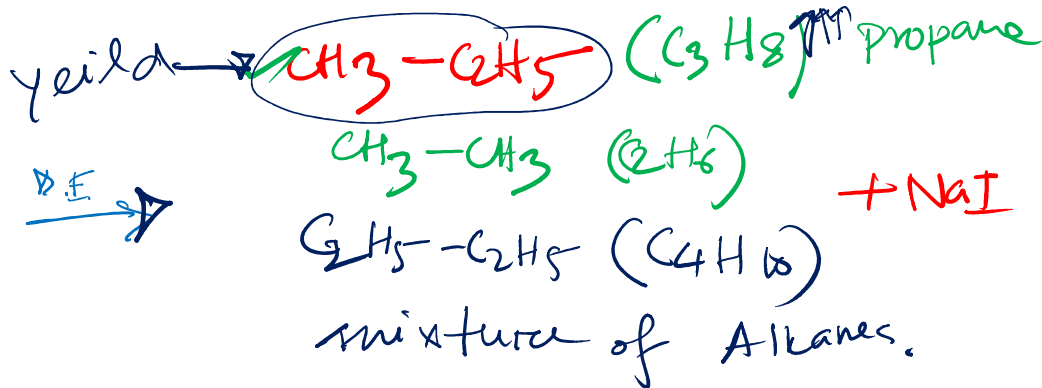
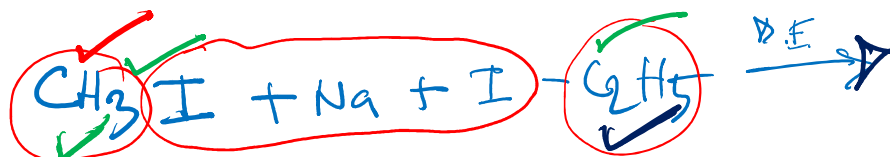
1	× 2	→ 2
2		→ 4
3		→ 6



C_4H_{10}
Butane

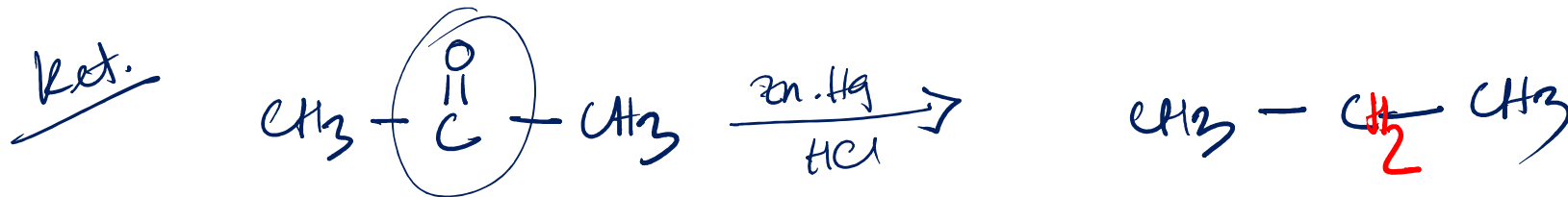
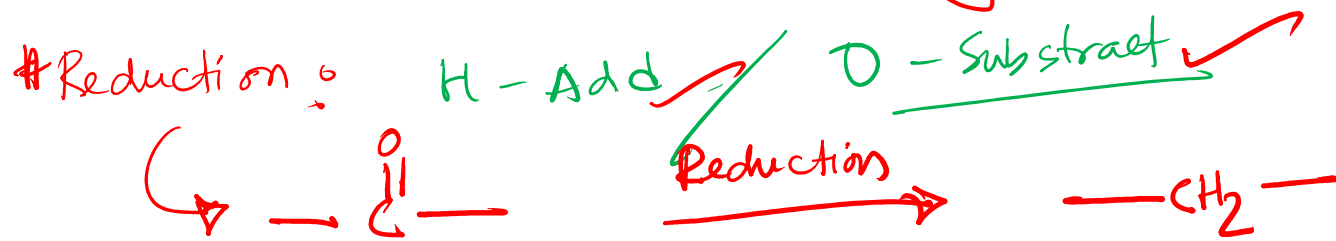
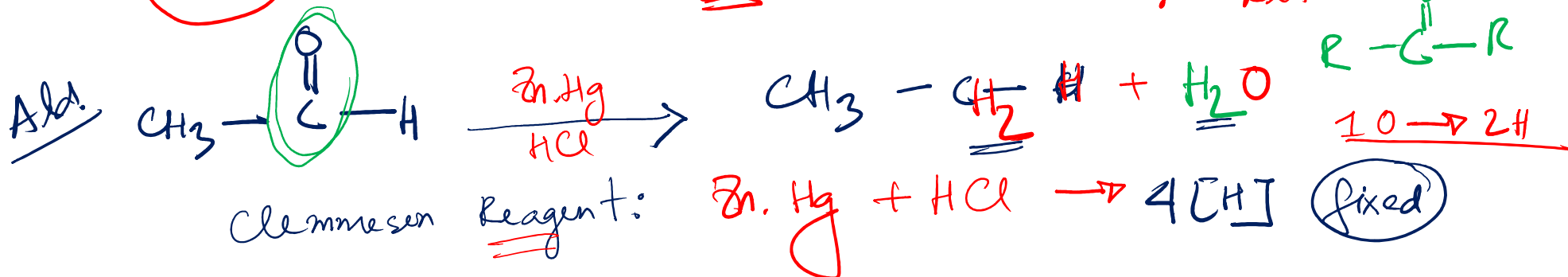
General preparation of Alkane

3. From alkyl halide (Wurtz Reaction)



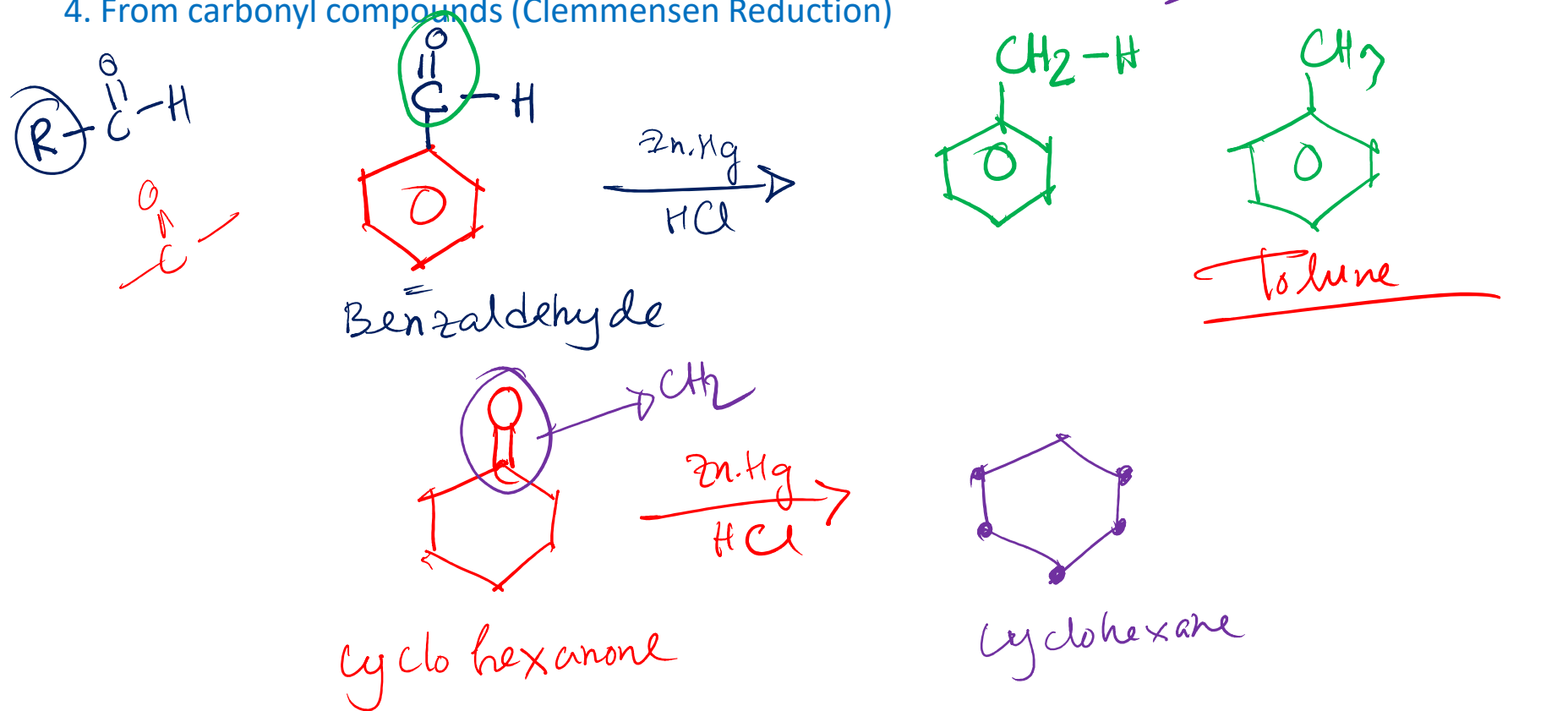
General preparation of Alkane

4. From carbonyl compounds (Clemmensen Reduction)



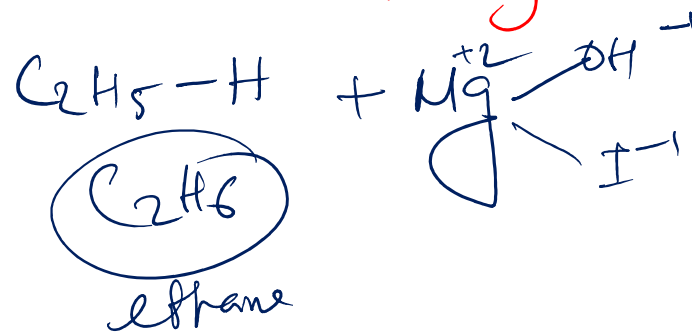
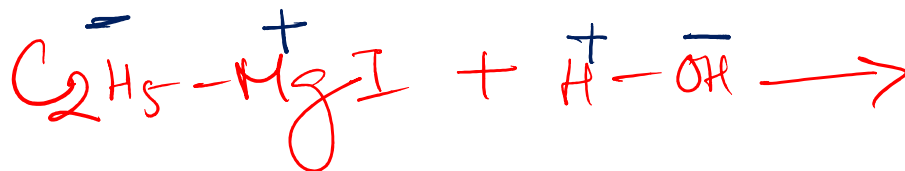
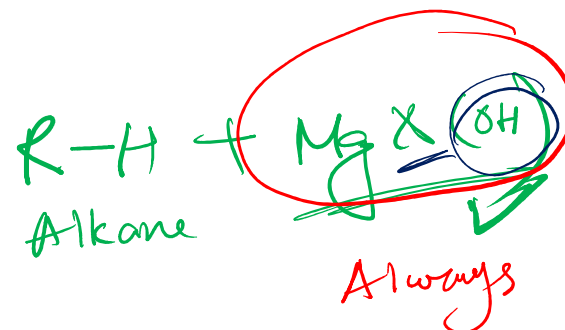
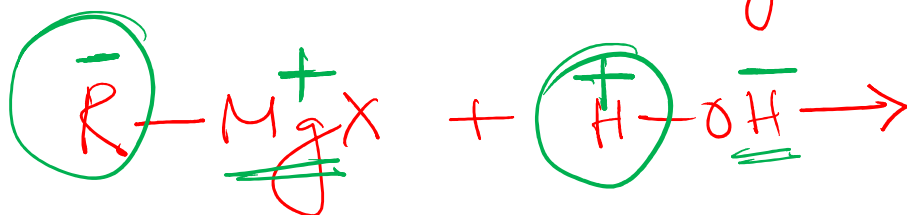
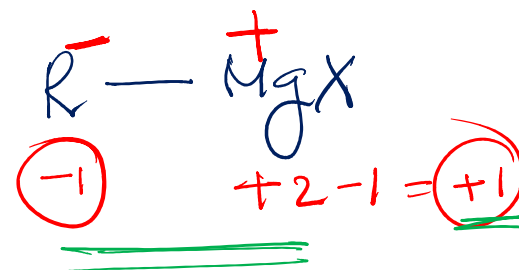
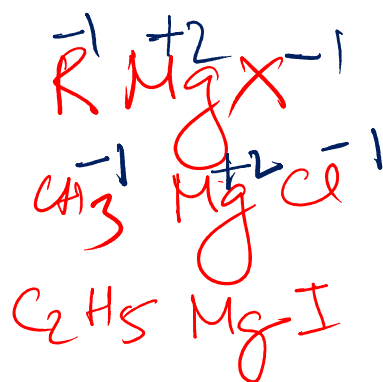
General preparation of Alkane

4. From carbonyl compounds (Clemmensen Reduction)



General preparation of Alkane

5. By Hydrolysis of Grignard Reagents



Chemical Reactions of Alkane

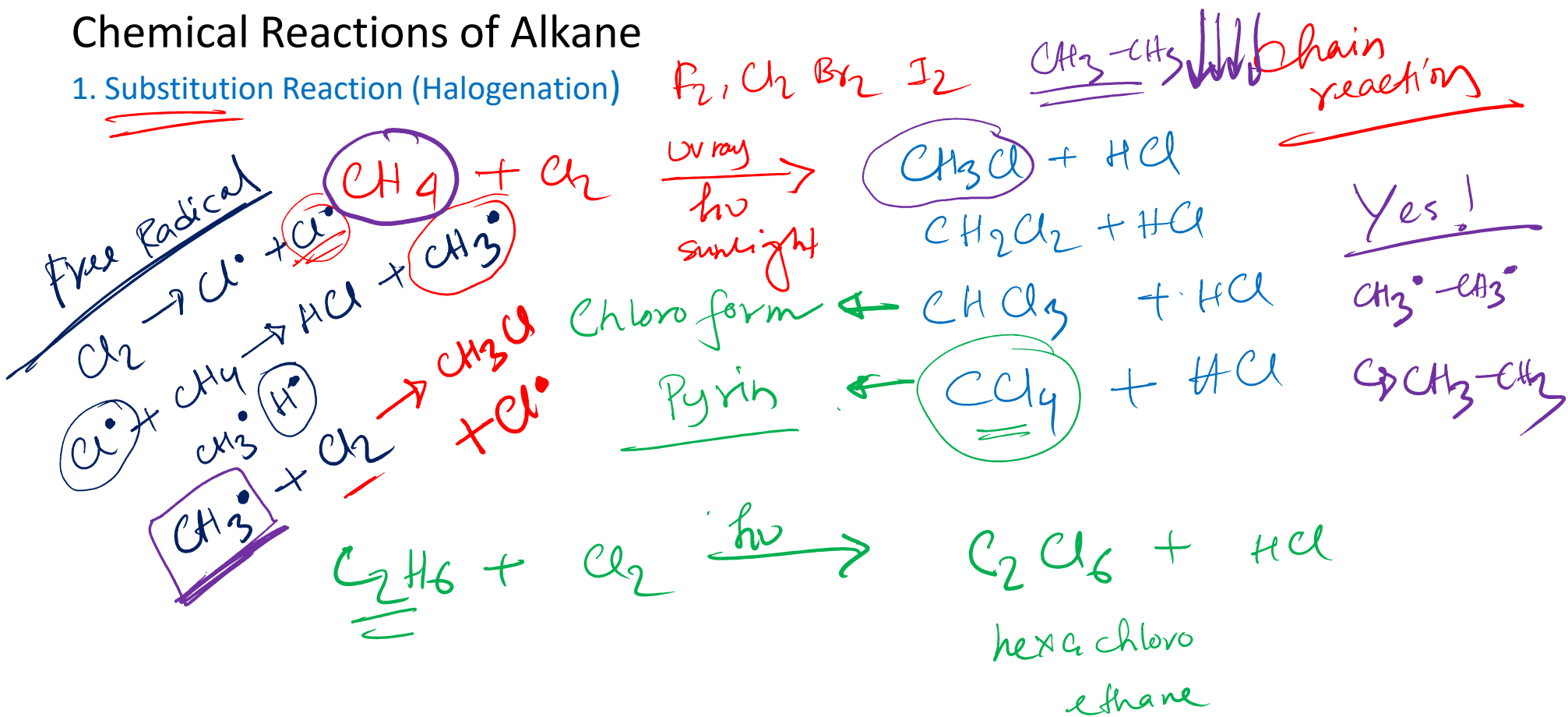
Alkane shows four types of reaction. Example,

- (i) Substitution Reactions
- (ii) Thermal Reactions
- (iii) Isomerisation Reactions
- (iv) Aromatization

Paraffin
Para + Affine
Little

Chemical Reactions of Alkane

1. Substitution Reaction (Halogenation)

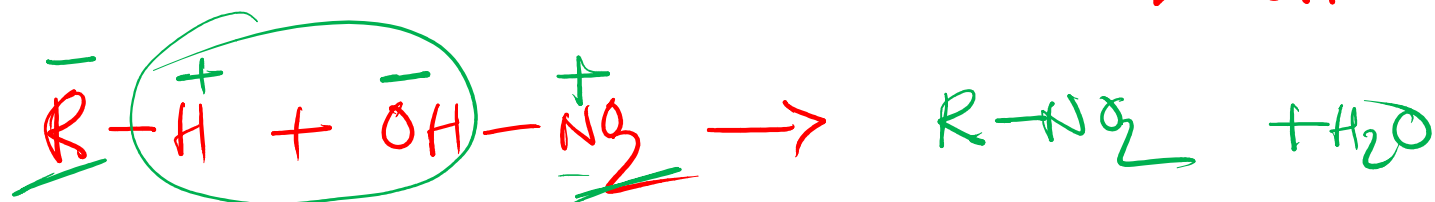
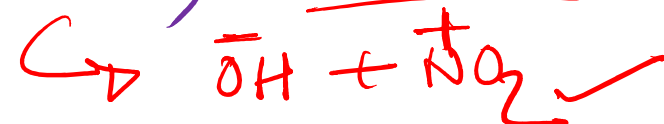


Chemical Reactions of Alkane

1. Substitution Reaction (Nitration)



Source:



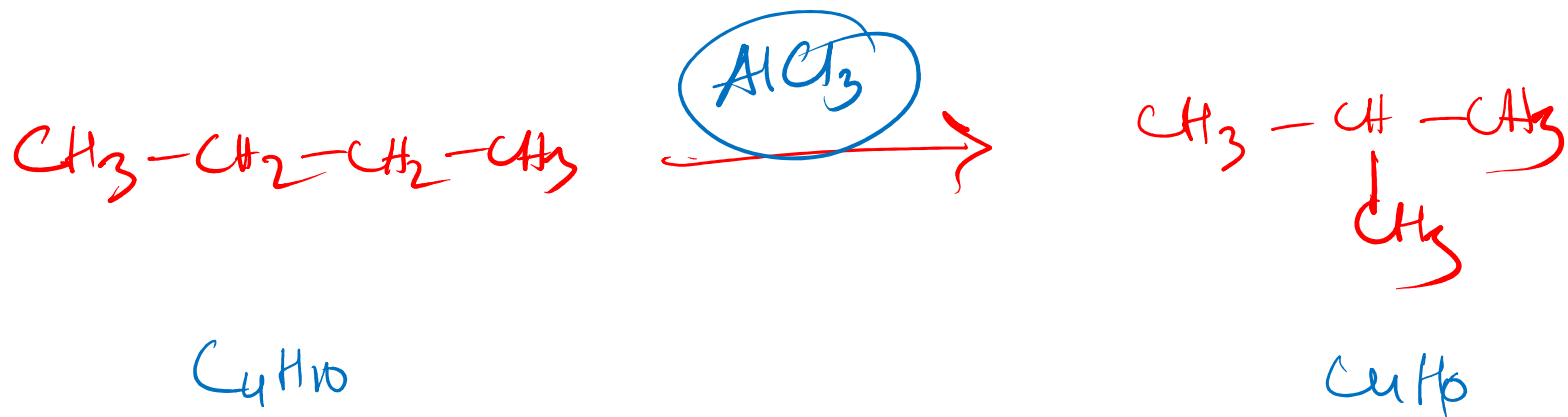
Chemical Reactions of Alkane

2. Thermal Reactions (Combustion/Oxidation)



Chemical Reactions of Alkane

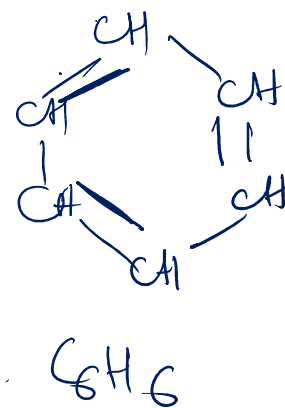
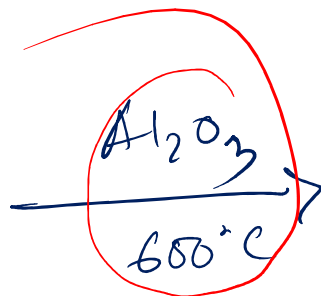
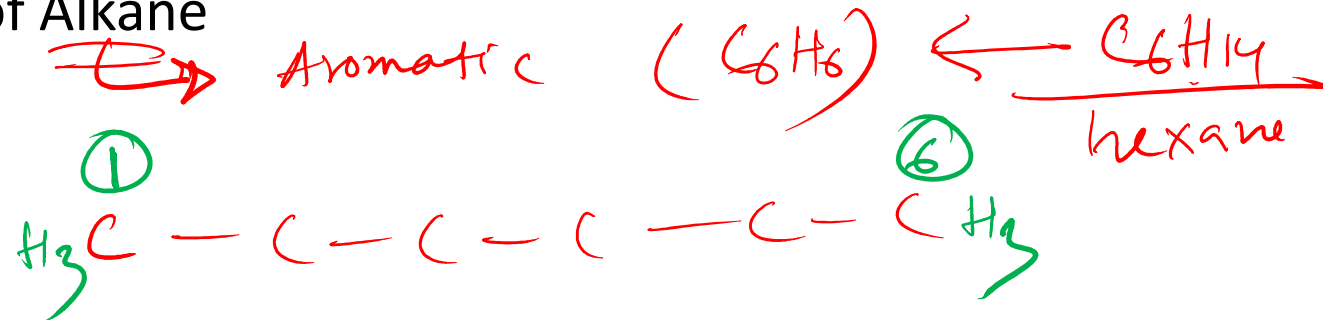
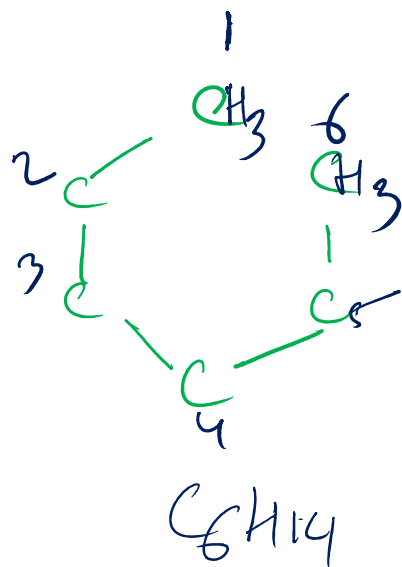
3. Isomerization reaction



Chemical Reactions of Alkane

4. Aromatization reaction

→ Aromatic



Step by step
reaction

We will learn

Benzene
preparation

লেগে থাকো সৎ ভাবে,
স্বপ্ন জয় তোমারই হবে।