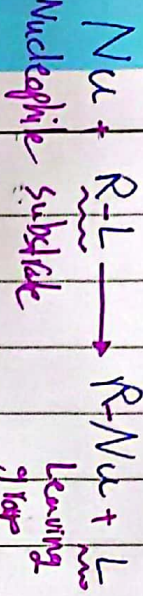


CH 8 "Substitution & Elimination Reactions"

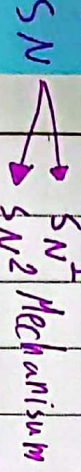
Nucleophilic Substitution (SN)



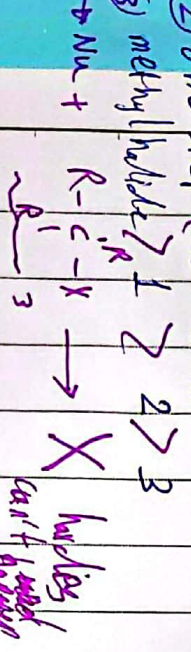
* Examples of Nucleophiles:-

- ① Carbon Nu: CN^- , $R-C \equiv C^-$
- ② Nitrogen Nu: NH_3 , RNH_2 , RNH^-
- ③ Oxygen Nu: OH^- , H_2O , RO^- , ROH , RO^-
- ④ Sulfur Nu: SH^- , SR^-
- ⑤ Halogen Nu: I^- , Br^- , Cl^-

* Note:- No SN Reaction for (sp^2) or (sp) carbons



* SN²:- ① Rate $[Nu][R-X]$ by molecular.
 ② one step (no intermediate is present).
 ③ methyl halide $> 1 > 2 > 3$



④ we have configuration is still as is

Follow

* SN¹:- ① Rate $[R-X]$ needed
 slow step has no effect on Nu.

② more than 1 step (in intermediate).

③ $3 > 2 > 1 >$ methyl halide.

* 3, 2 more stable.

* 1 methyl unstable; un stable!

② If Reactant has a chiral center products will be racemic mixture
 50:50 Enantiomers

* General Notes:-

① Strength of Nucleophilicity increase \rightarrow SN¹ increase

② Increase the strength of Nu \rightarrow SN² increase

③ Methyl Nu weaker than other groups

Organic Solvent

Protic Solvent
 SN^1 \rightarrow SN^2

Aprotic Solvent
 SN^1 \rightarrow SN^2

- \rightarrow Acetone
- \rightarrow DMSO
- \rightarrow DMF
- \rightarrow NMP
- \rightarrow CH₃-CN
- \rightarrow CH₃-C(=O)-CH₃
- \rightarrow CH₃-C(=O)-CH₂-CH₃
- \rightarrow CH₃-C(=O)-CH₂-CH₂-CH₃

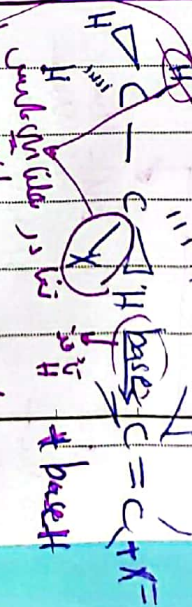
Elimination (E1) Reaction

\rightarrow alkyl halide \rightarrow alkene + HX

* addition \rightarrow E base bases

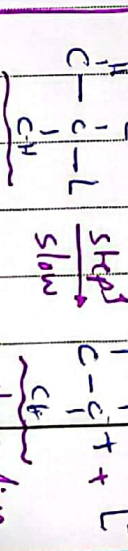
* E1, E2 mechanism.

* E2:-



H \rightarrow anti arrangement
 Rate $\propto [R-X][base]$
 one step & no intermediate

* E1:-



Remove H⁺ from adjacent carbon
 Carba cation intermediate

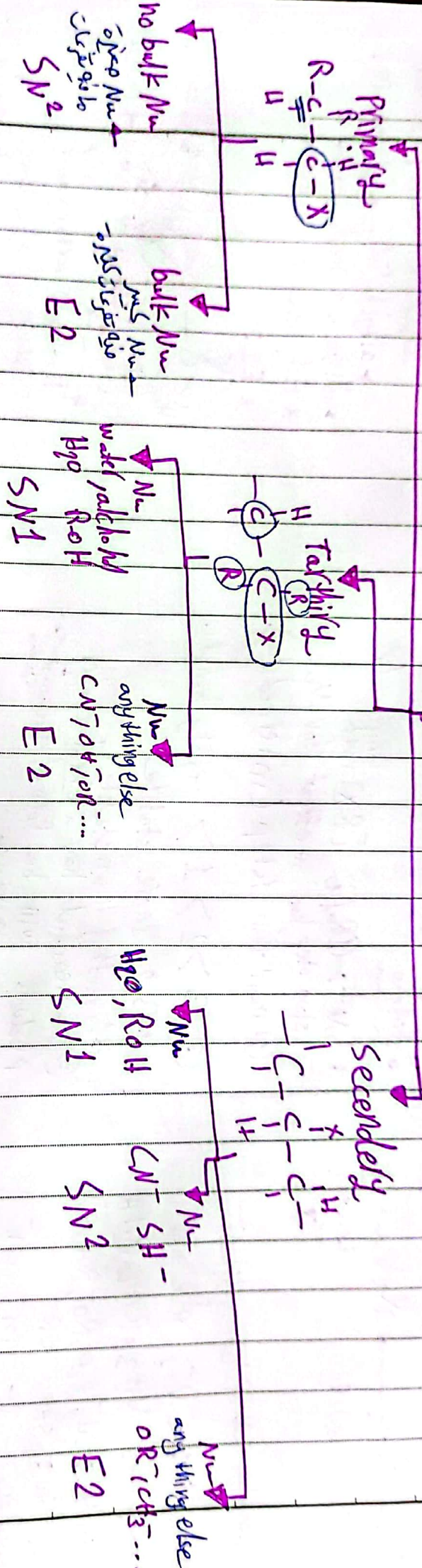
Remove H⁺ from adjacent carbon

Alkene
 Rate: $[R-X]$

\rightarrow more than one step, in intermediate

Follow chapter "6"

Alkyl halides



200-220 body 6.1
 200-220 body 6.1