

## Elimination Reactions

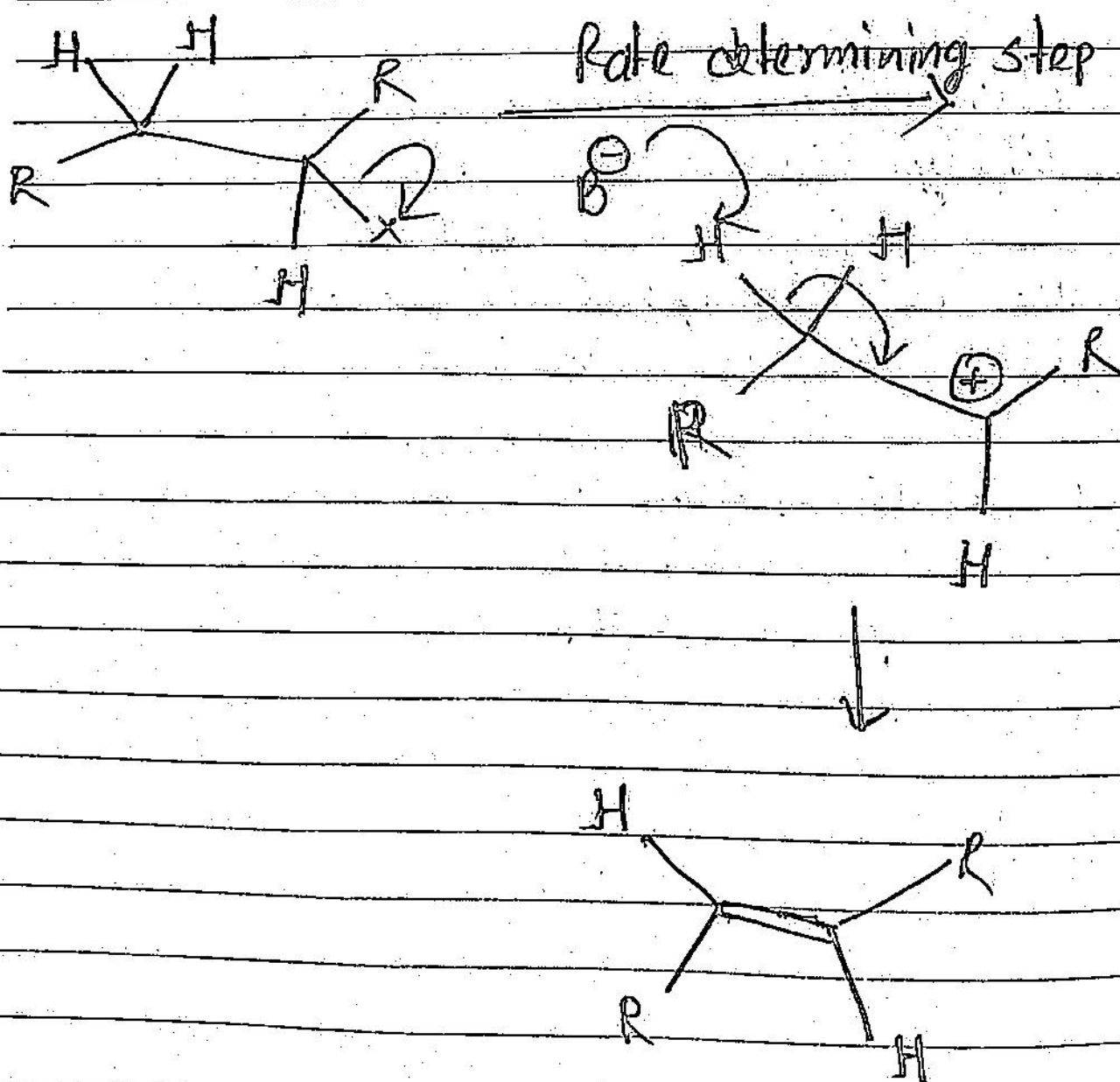
- Just like subst<sup>n</sup> (S<sub>N</sub>1 & S<sub>N</sub>2), Elim<sup>n</sup> also has more than one mech<sup>m</sup>.
- Elimination happens when the nucleophile attacks hydrogen instead of carbon.
- Attack of C leads to substitution  
Attack at H leads to elimination
- So, with strong bases, elimination is more likely.
- Small nucleophile (e.g. KOH) — substitution (∵ no steric hindrance to attack the C)
- Large nucleophile — Elimination (∵ there is steric hindrance, so it attacks H and not C).  
(e.g. KOt-Bu) (leads to the formation of alkene)

# E1 & E2 Mech<sup>ms</sup>:

1) E1  $\rightarrow$  Rate determining step is unimolecular (1) and does not involve the base.

The leaving grp. leaves in this step, the  $H^+$  is removed in a separate 2<sup>nd</sup> step.

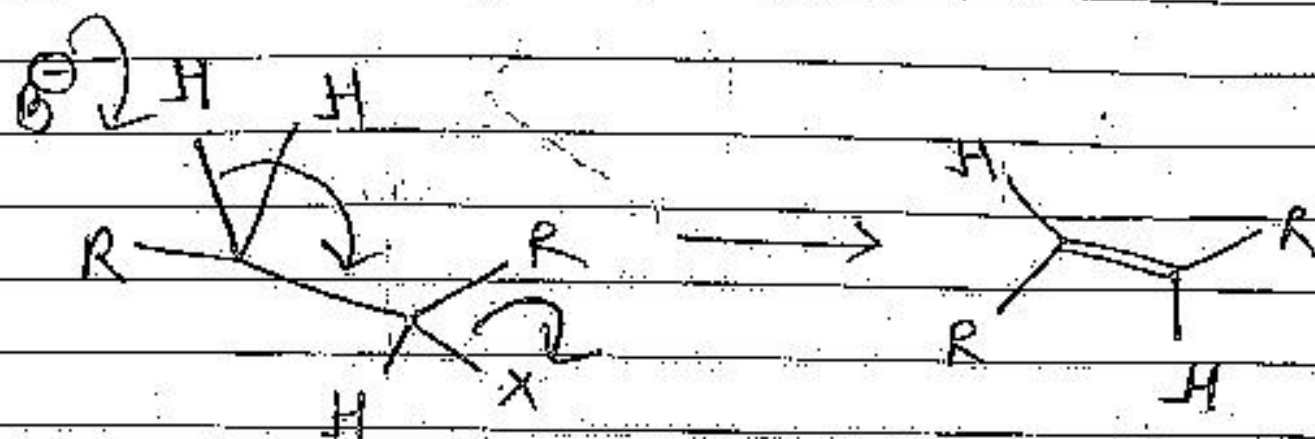
## General Mech<sup>sm</sup>:



$$\text{Rate} = k[\text{alkyl halide}]$$

e) E2  $\rightarrow$  It has a bimolecular (2) rate-determining step that must involve the base. Loss of the leaving group is simultaneous with removal of the proton by the base.

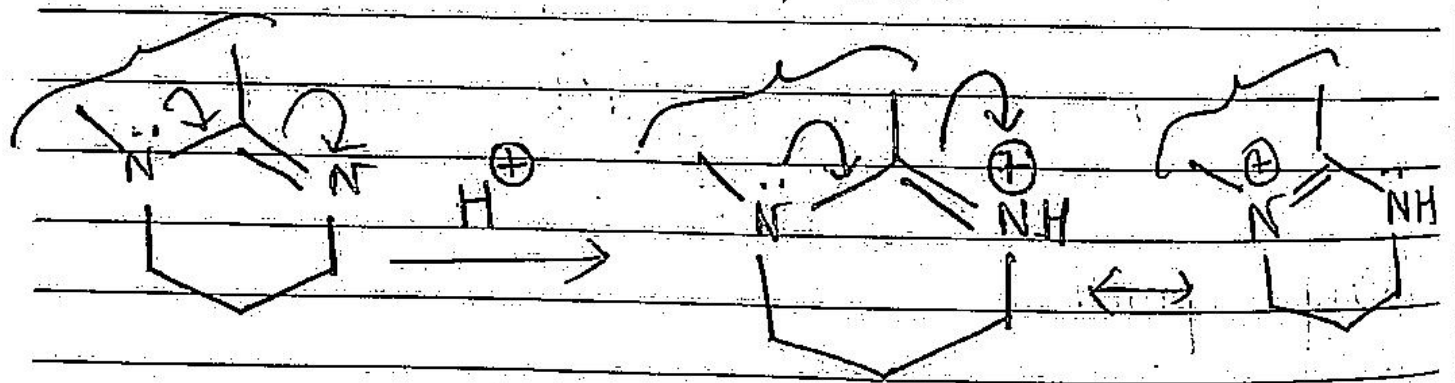
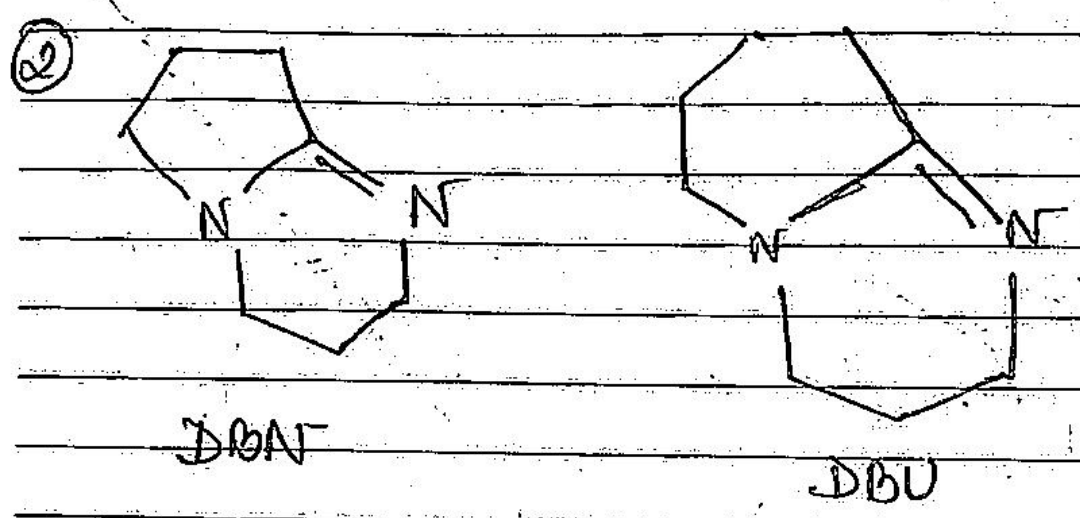
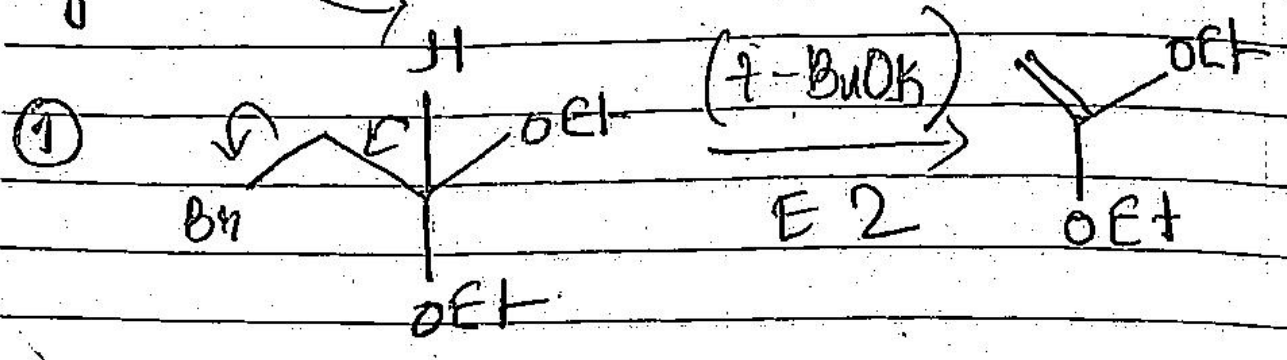
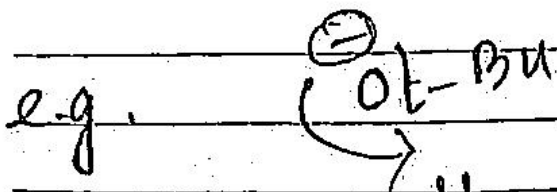
General mech<sup>n</sup>:



$$\text{Rate} = k [\text{B}^-] [\text{alkyl halide}]$$

Imp. points:

- 1) With less hindered alkyl halides,  $\text{OH}^-$  would not be a good choice as a base for elimination as it is rather small and also good at  $\text{S}_{\text{N}}2$  substitutions.
- 2) Bulky  $t$ -butoxide is ideal for promoting E2 as it's both bulky and a strong base.



→ by abstracting  $H^+$  & by stabilization by resonance these DBN & DBU become ~~more~~ <sup>strongly</sup> basic. Since it is bulky, so it will eliminate the readily available protons rather than attacking  $C$  atoms in subst<sup>n</sup> rxns.

∴ DBU or DBN will eliminate HX from

alkyl halides to give alkenes.

