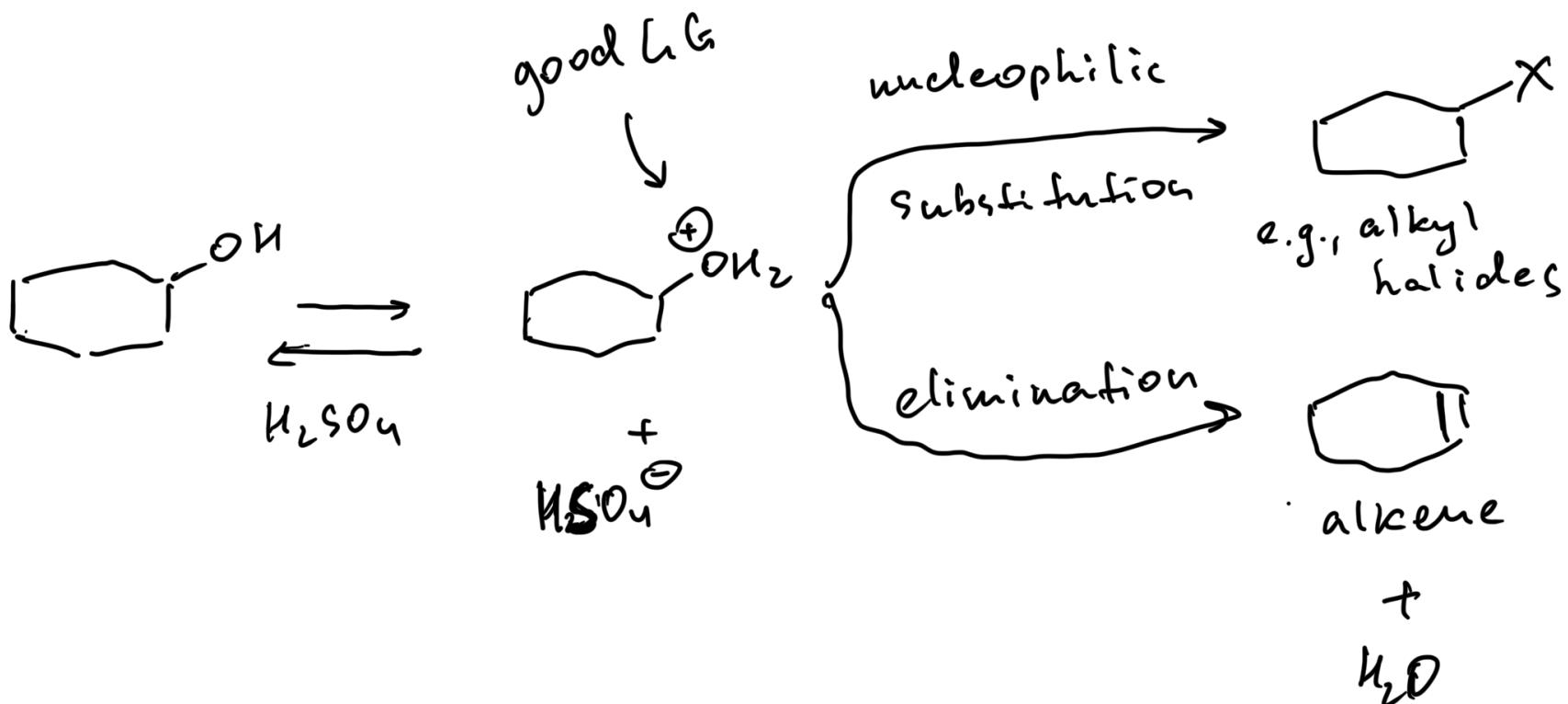
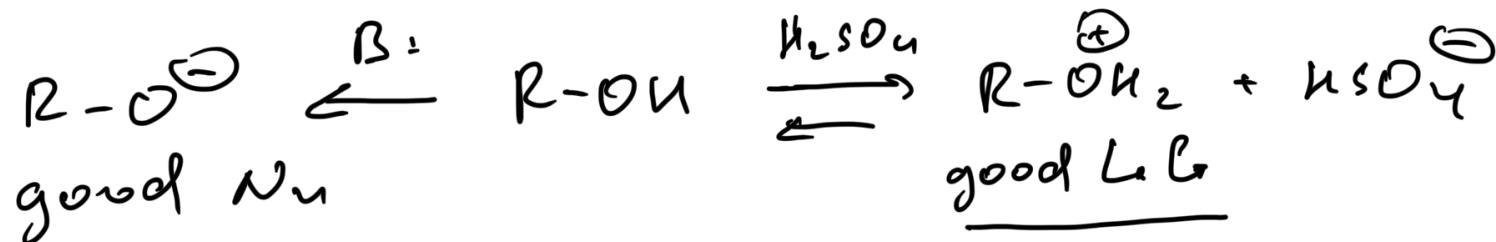


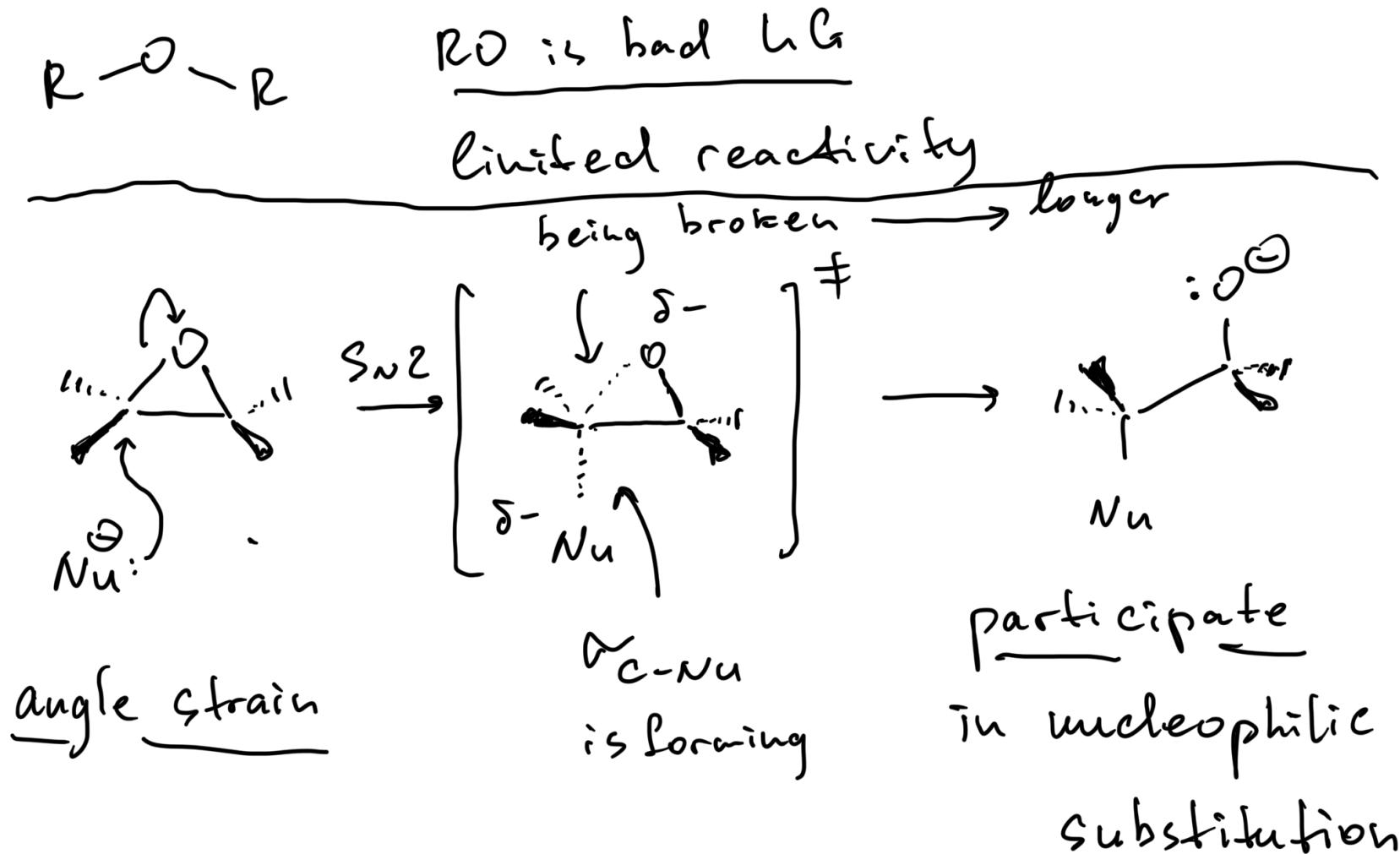
Alcohols, ethers, epoxides: reactions

Converting hydroxy group into a good leaving group and reactions of alcohols



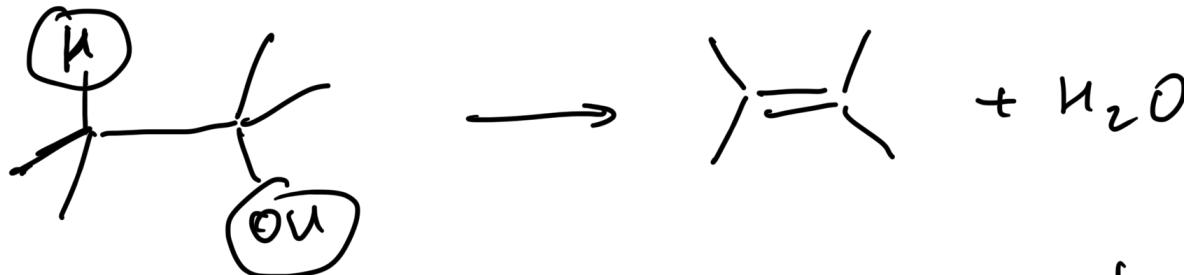
Alcohols, ethers, epoxides: reactions

Juxtaposing ethers and epoxides in nucleophilic displacement reactions

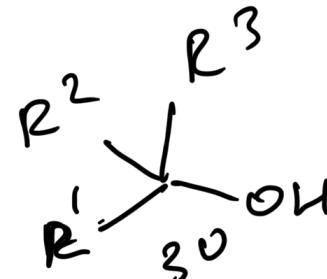
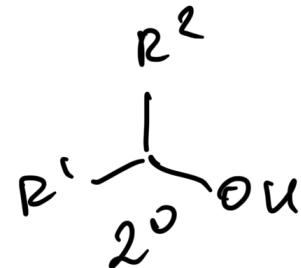


Alcohols: dehydration reactions

Dehydration in the presence of acid, reactivity trend, Zaitsev rule



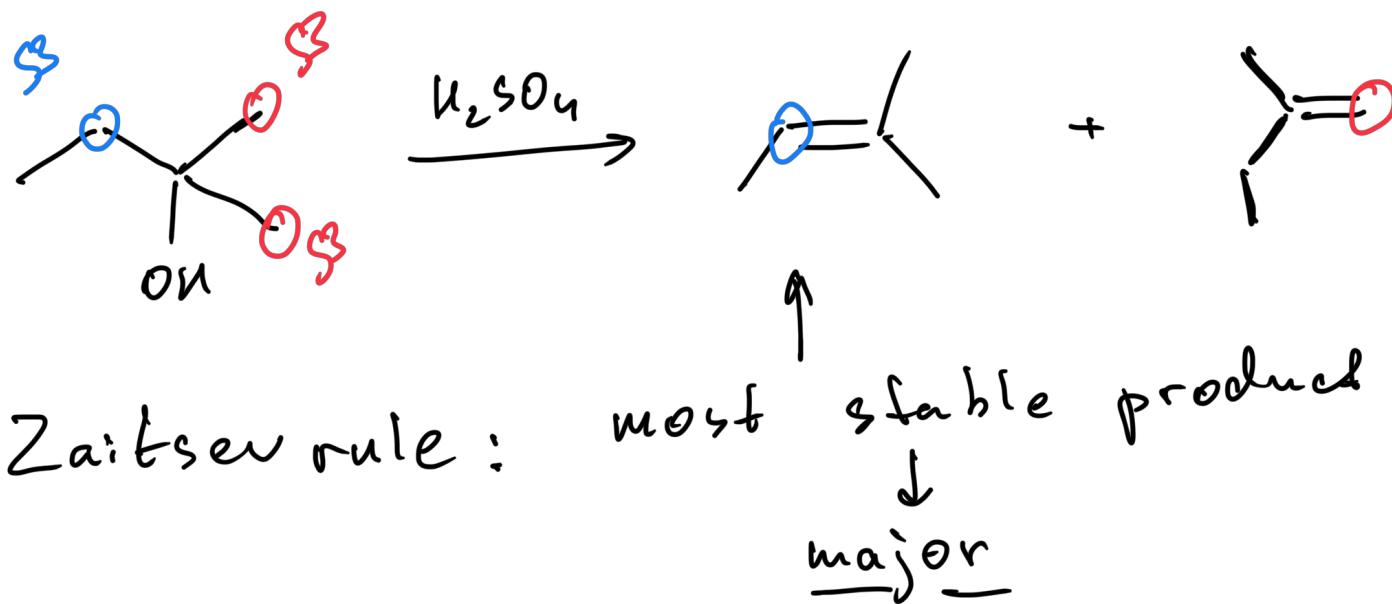
dehydration \rightarrow elimination of water



increasing rate of dehydration

Alcohols: dehydration reactions

Dehydration in the presence of acid, reactivity trend, Zaitsev rule



Alcohols: dehydration reactions

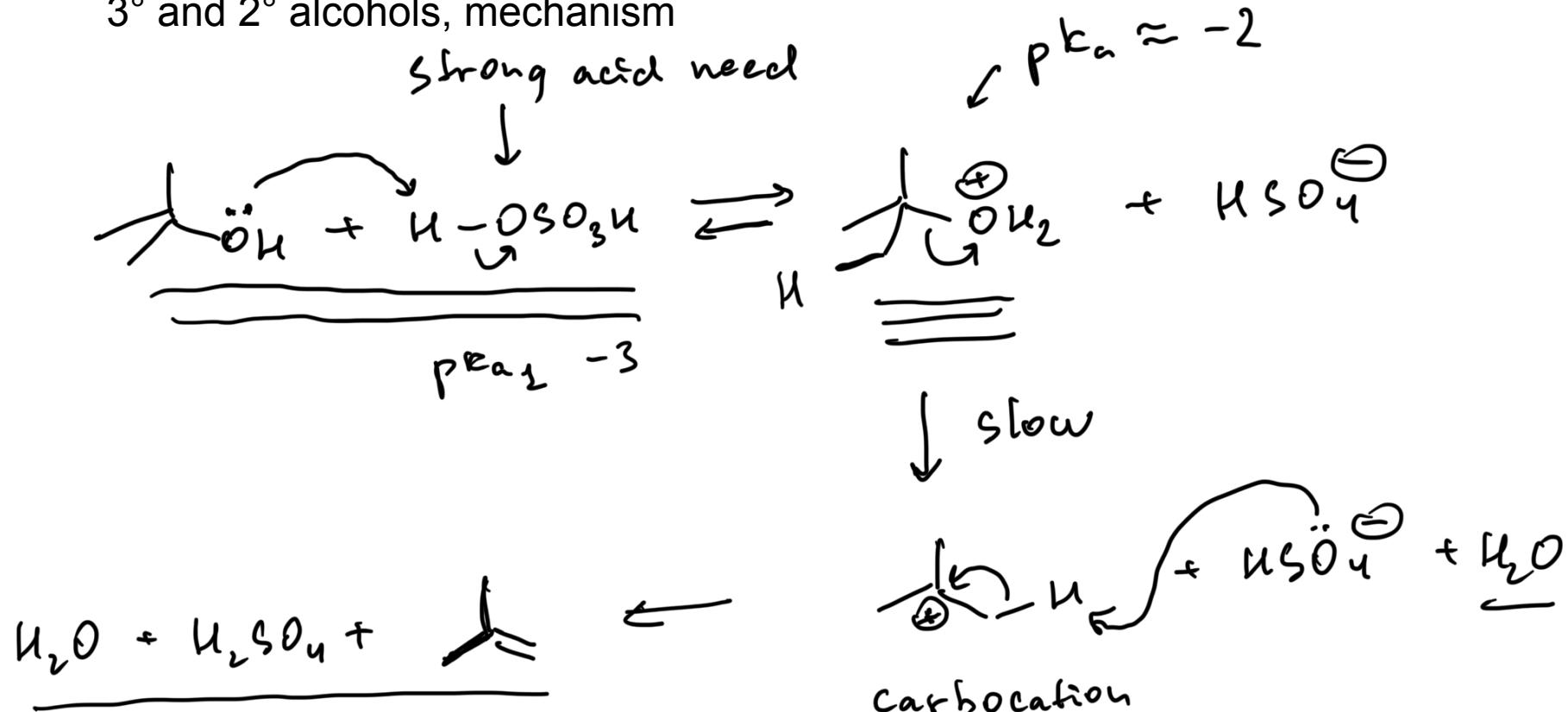
Structure of alcohol determines the mechanism of dehydration

- 2^0 and 3^0 alcohols \rightarrow by E1 mechanism
- 1^0 alcohol \rightarrow by E2 mechanism



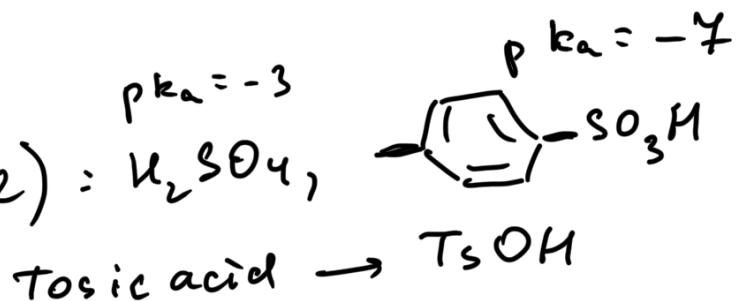
Dehydration reactions: E1 mechanism

3° and 2° alcohols, mechanism



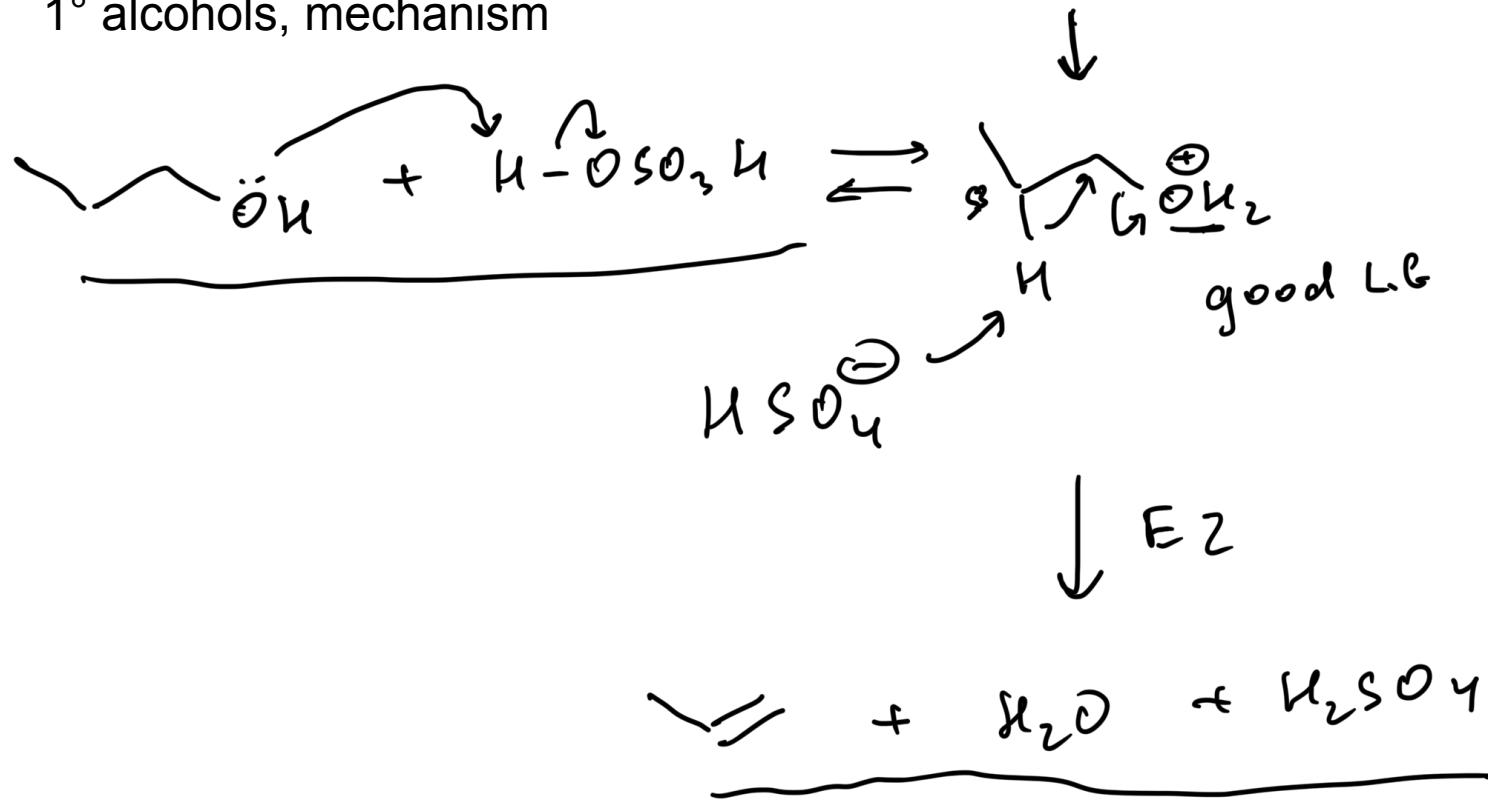
- protonation, then E1

- need a strong acid ($pK_a < -2$): H_2SO_4 ,



Dehydration reactions: E2 mechanism

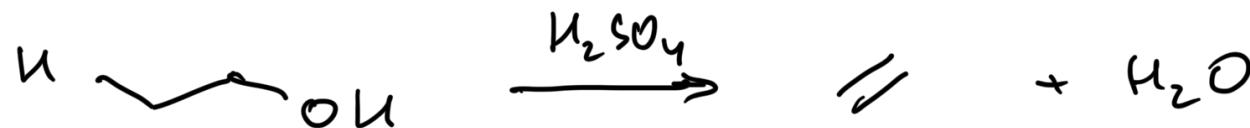
1° alcohols, mechanism



- protonation, then E2

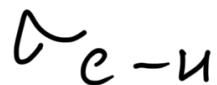
Dehydration reactions: thermodynamics

Entropy and enthalpy of dehydration, Le Châtelier's principle



$\Delta S > 0$ $\Delta H > 0$ endothermic

$$\Delta H^\circ = 38 \text{ kJ/mol}$$



use



Le Chatelier's
principle

\sum bond energies

\sum bond energies

$$803 \text{ kJ/mol}$$

$$465 \text{ kJ/mol}$$

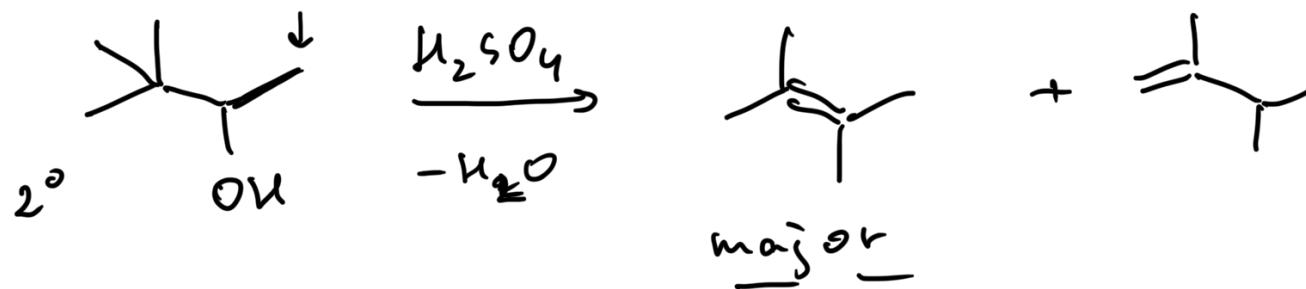
↑
broken

↑
form

remove
albene or H_2O

Dehydration reactions: carbocationic rearrangements

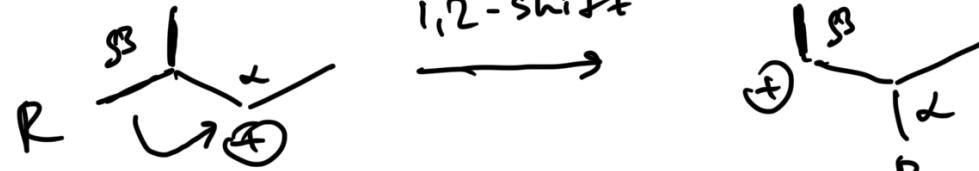
1,2-hydride and 1,2-alkyl shifts, formation of more stable carbocation



carbocations

can lead

1,2-shifts



δ_{C-R}

$R = \text{alkyl}$
1,2-alkyl shift

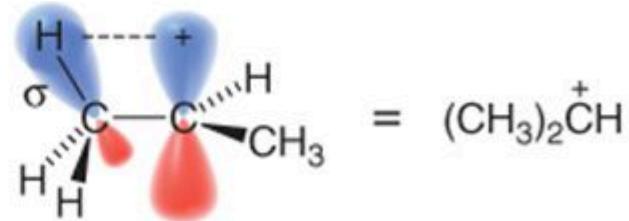
$R = H$
1,2-hydride shift

Dehydration reactions: carbocationic rearrangements

1,2-hydride and 1,2-alkyl shifts, formation of more stable carbocation

- 1,2-shifts

convert less stable
carbocation to more stable one



Dehydration reactions: carbocationic rearrangements

1,2-hydride and 1,2-alkyl shifts, formation of more stable carbocation