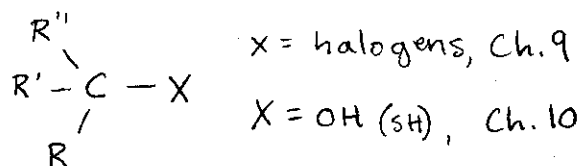


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## Ch. 10 - Alcohols (+ Thiols)

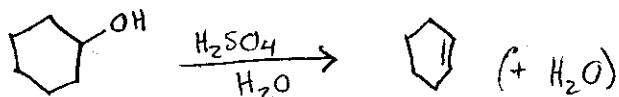
Rec. Problems - 1-21, 23, 26-27, 33, 35-37, 41-46, 52-55, 56c, 57-61

Perspective:



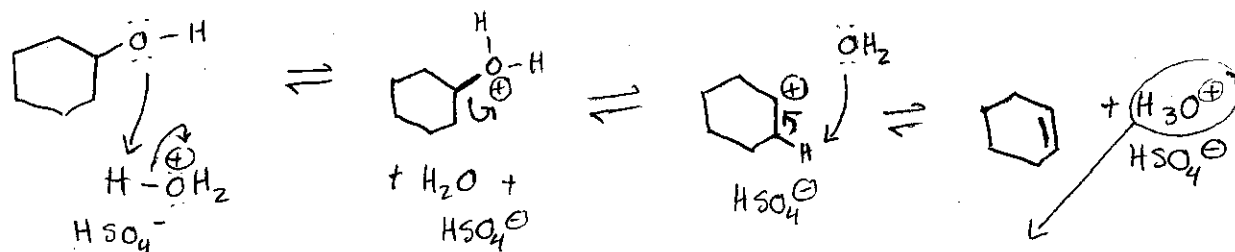
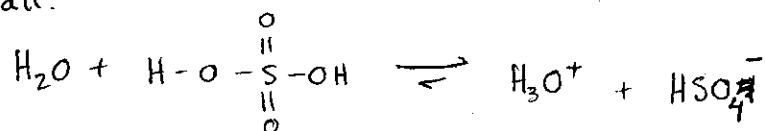
Dehydration of alcohols to form alkenes

Ex:



process catalyzed by the acid ( $\text{H}_2\text{SO}_4$ )

Recall:



regenerated - thus acid is catalytic

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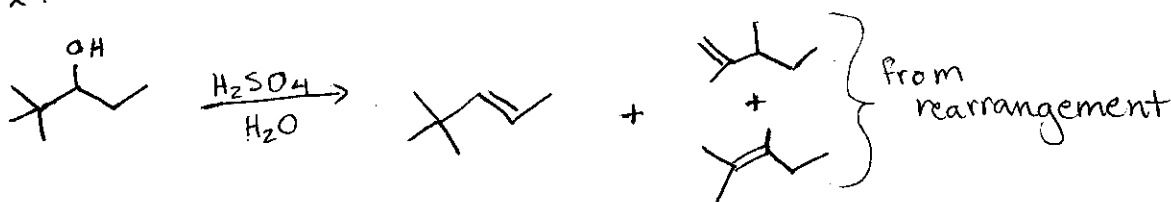
## Observe

- 1) E1 mechanism
- 2) Recall:  $\text{OH}^\ominus$  is not a good LG. This process occurs because  
 $\text{LG} = \text{H}-\text{O}^\oplus\text{H}_2 \rightarrow \text{H}_2\text{O}$
- 3) This process is the reverse of acid-catalyzed hydration of alkenes to generate alcohols. Product "selected" by mass action. Here, perhaps distill off alkene as formed.

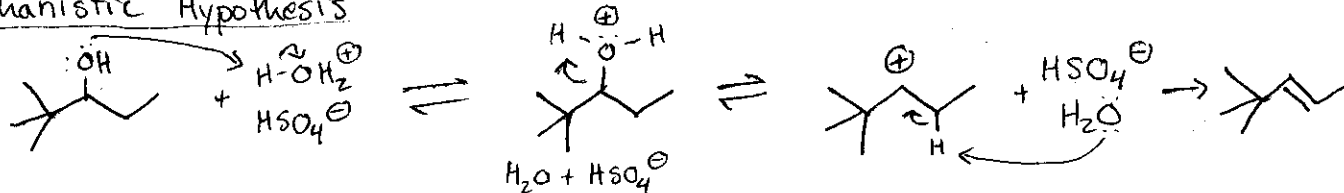
Note: based on our previous knowledge of E1 mechanism +  $\text{C}^\oplus$  stability trends, we recognize...

- 1)  $3^\circ$  alcohols more reactive than  $2^\circ$ ,  $1^\circ$  do not react in this way
- 2) Rearrangements can occur (@ carbocation stage)

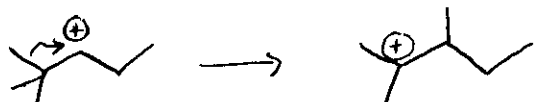
Ex:



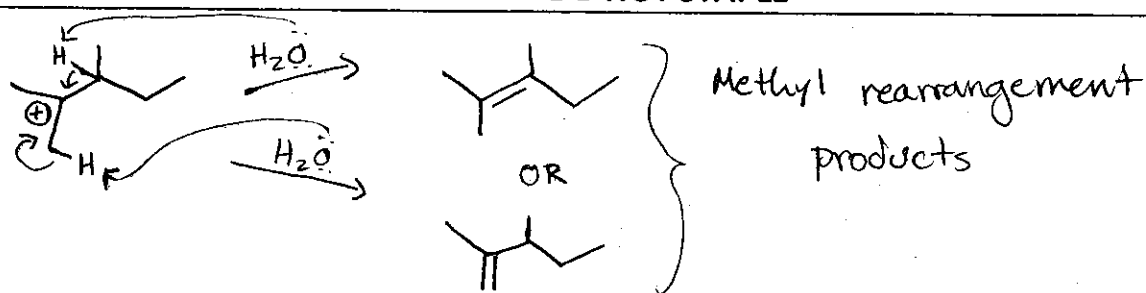
## Mechanistic Hypothesis



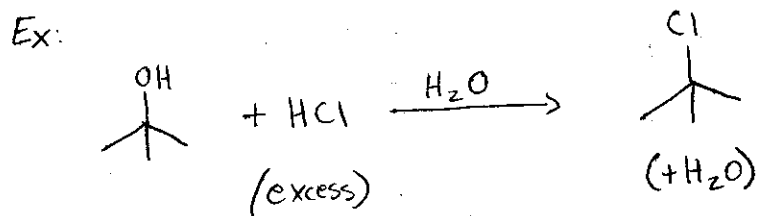
OR:



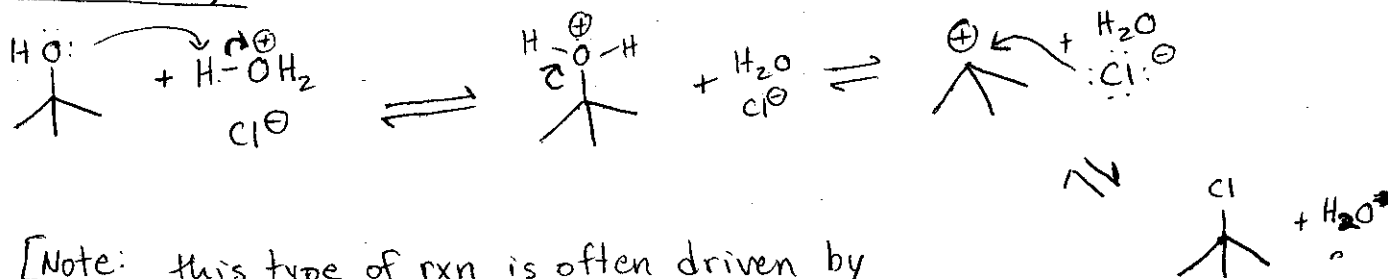
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If use HCl, HBr, or HI - observe substitution rather than elimination



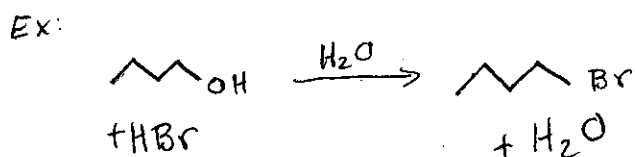
Mech (S<sub>N</sub>1):



[Note: this type of rxn is often driven by product immiscibility w/ H<sub>2</sub>O.]

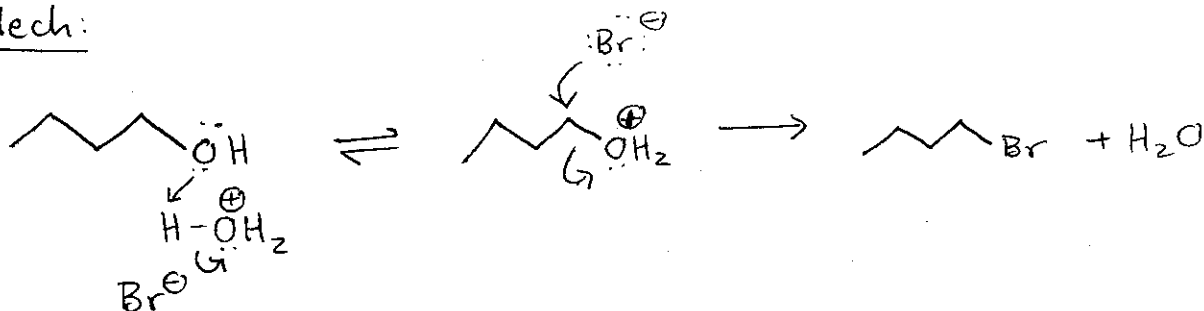
What about 1° alcohols?

S<sub>N</sub>2 via protonation



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Mech:

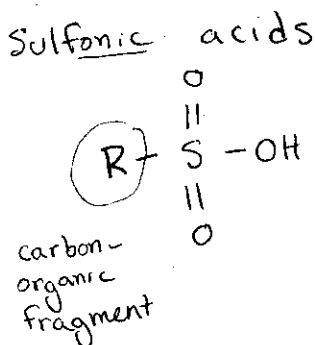
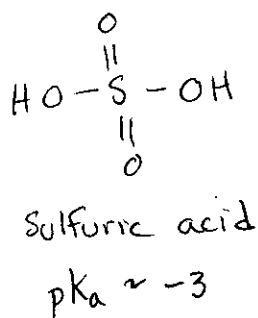


Problem: strong acid necessary for hydroxyl protonation can cause undesired reactions in complex SM.  
 $\therefore$  Need method for converting

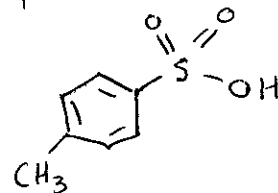
$\text{fOH} \rightarrow \text{fLG}$  w/o strong acid

Conversion of alcohols to sulfonate esters (good LGs)

Background:

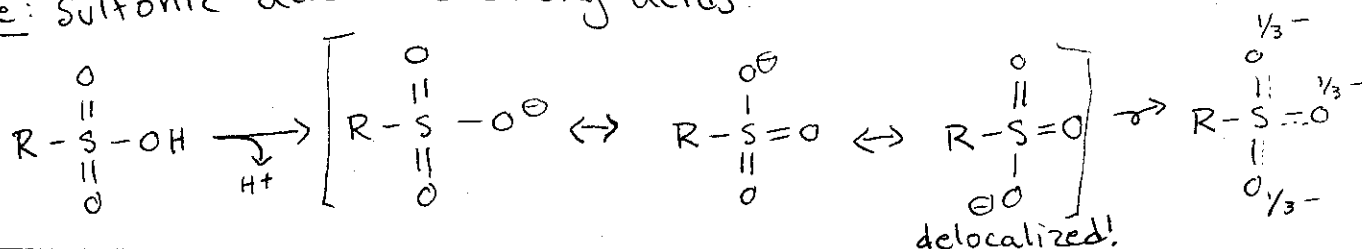


Specific example:



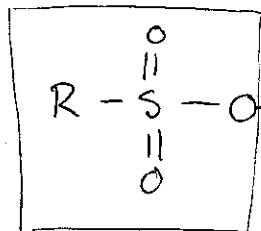
p-Toluenesulfonic acid  
 (pTsOH or TsOH)

Note: Sulfonic acids are strong acids:



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## Sulfonate Ester



↓  
another  
organic  
fragment

Very good LG  
as anion -  
very stabilized

Specific Ex:

excellent  $\text{S}_{\text{N}}2$  substrate

