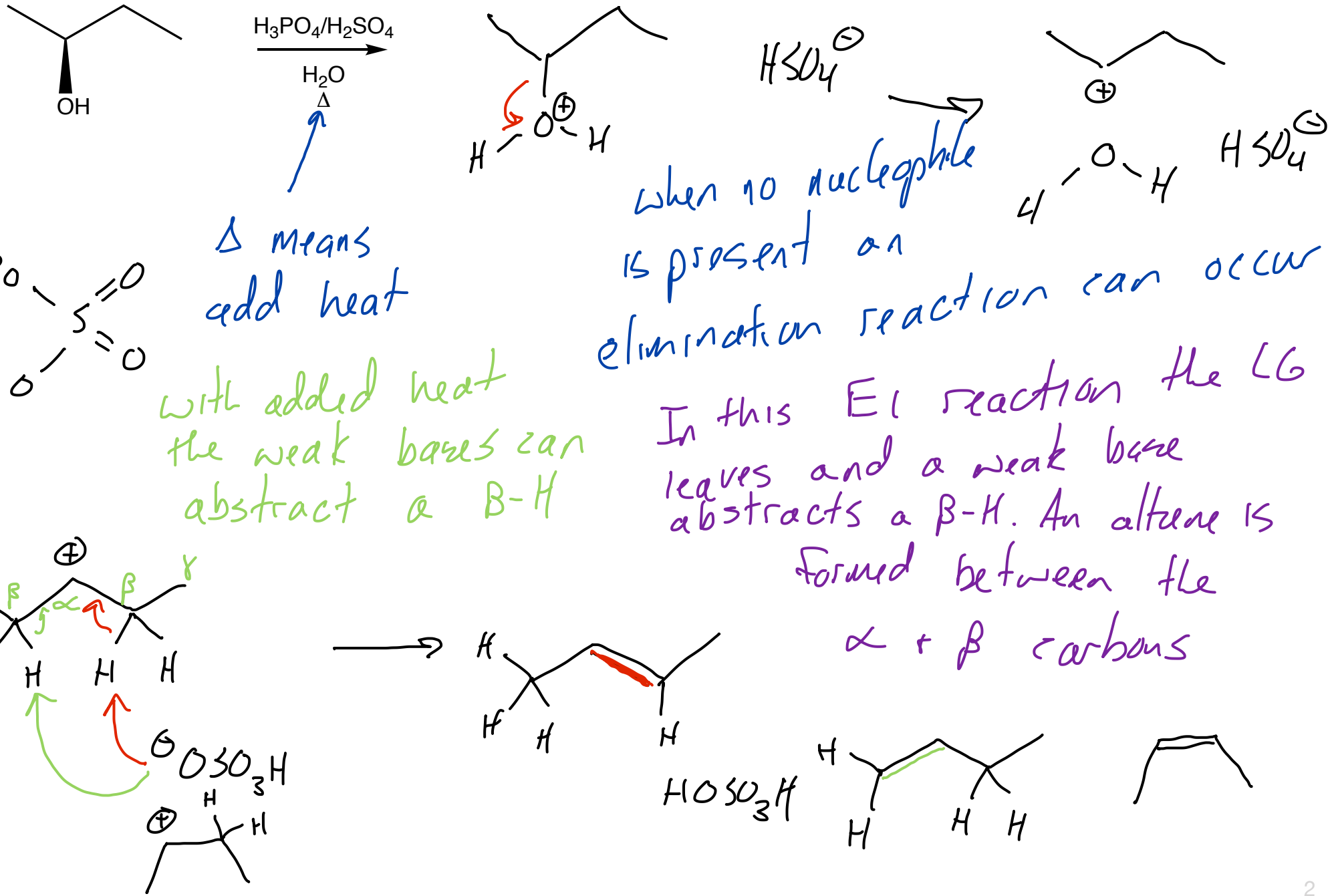
Today

Section 10.4
Elimination Reactions

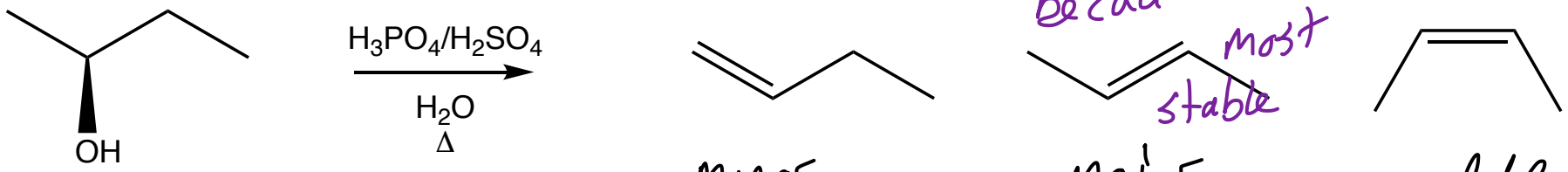
Next Class

Section 13.1
Introduction to Mass Spectrometry

What happens when hydroxyl groups are converted to good leaving groups and no nucleophile is added?



Product Distribution in E1 Reactions — We always get a mixture — Section 10.4

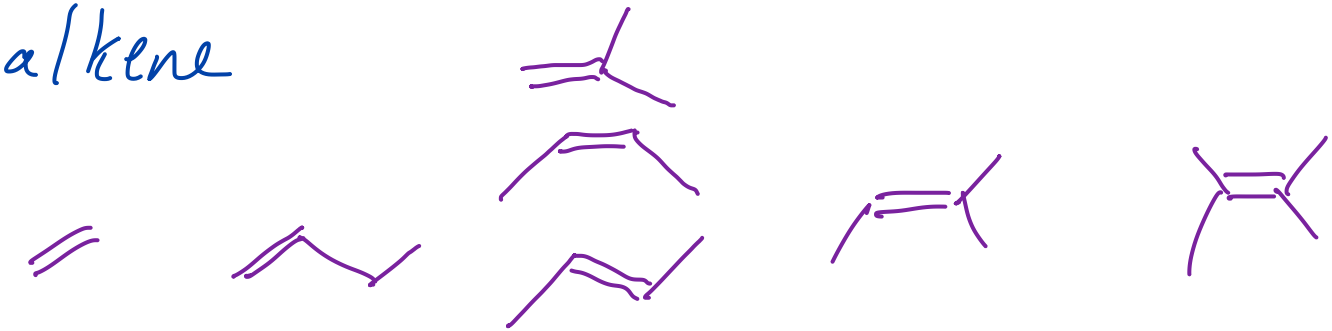


E1 reactions produce a mixture with the most stable alkene being the major product

stability of alkenes is based on e^- delocalization

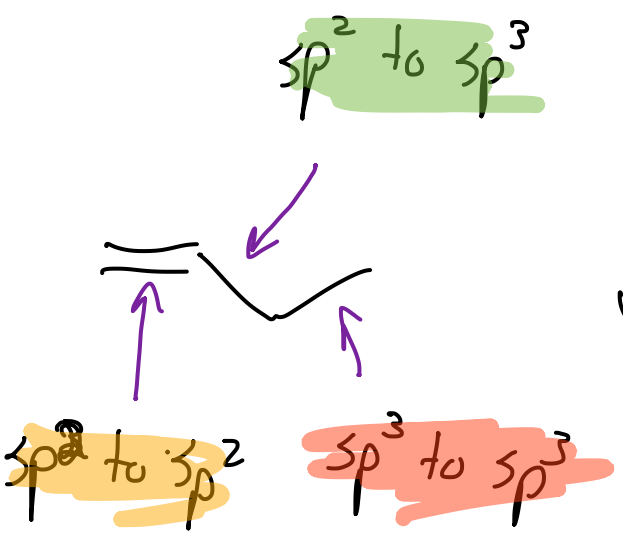
To do e^- delocalization (resonance contributors) at least 3 p orbitals in a row are needed.

In the absence of e^- delocalization, the more substituted the ends of the db are the more stable the alkene

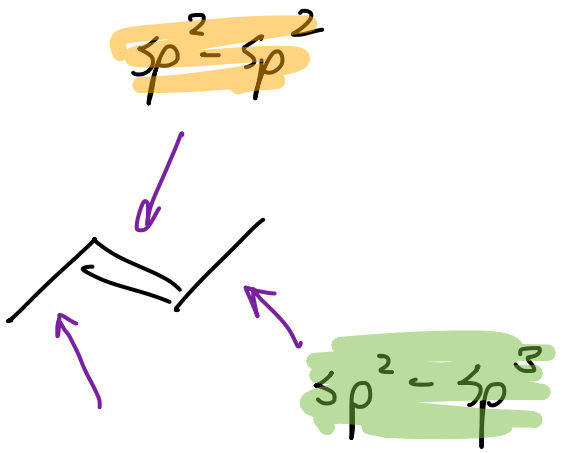


C atoms bonded to ends of db.... more is better

Why? no difference in π bonds



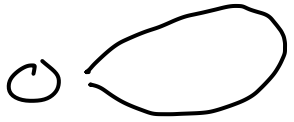
vs



$sp^3 - sp^2$ — stronger than $sp^3 - sp^3$

different

sp^3



75% p
25% s

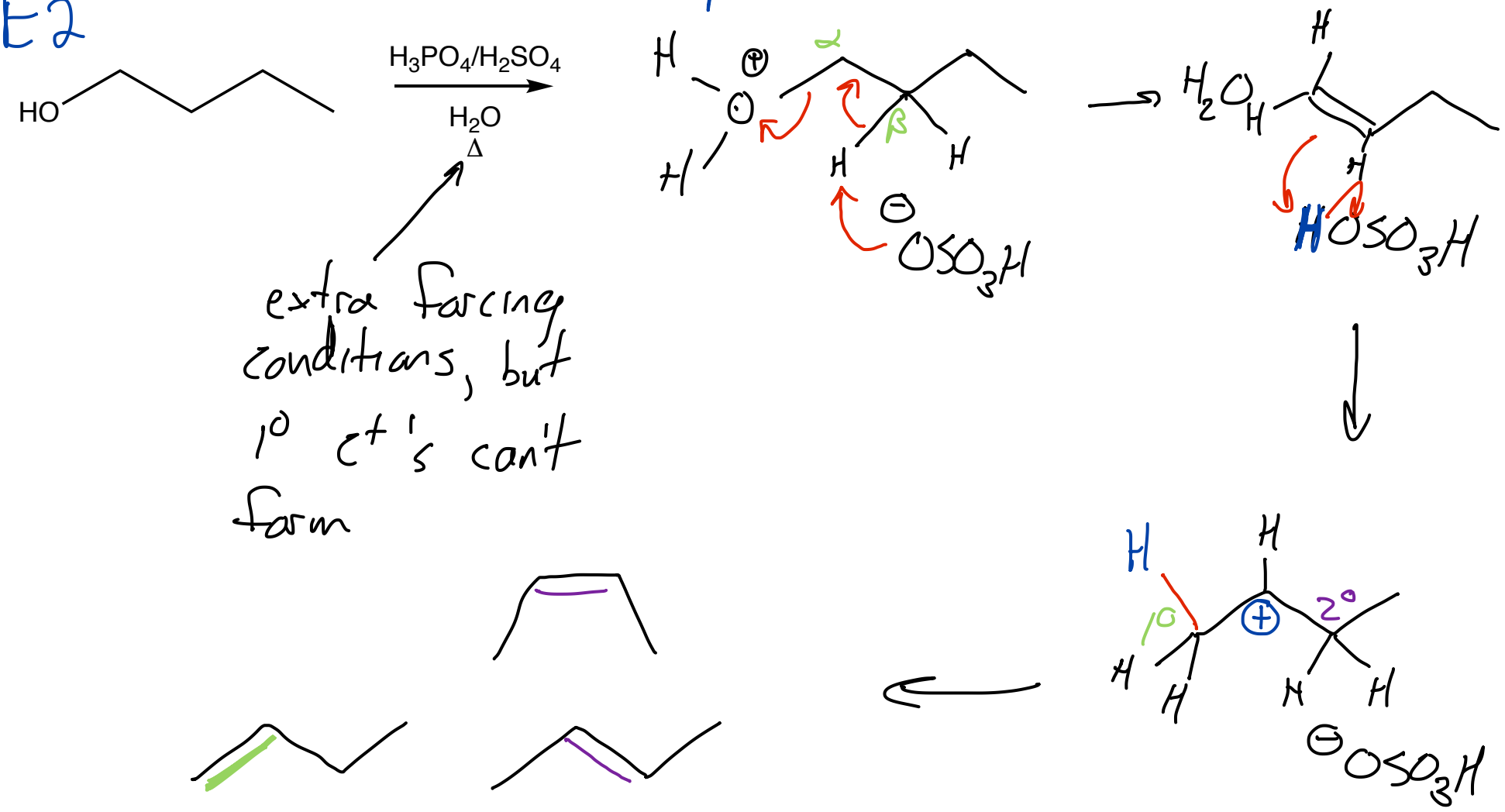
sp^2

67% p
33% s

e⁻'s get closer to nucleus

No C^+ so we need to wait for a base to react with our protonated alcohol

E2

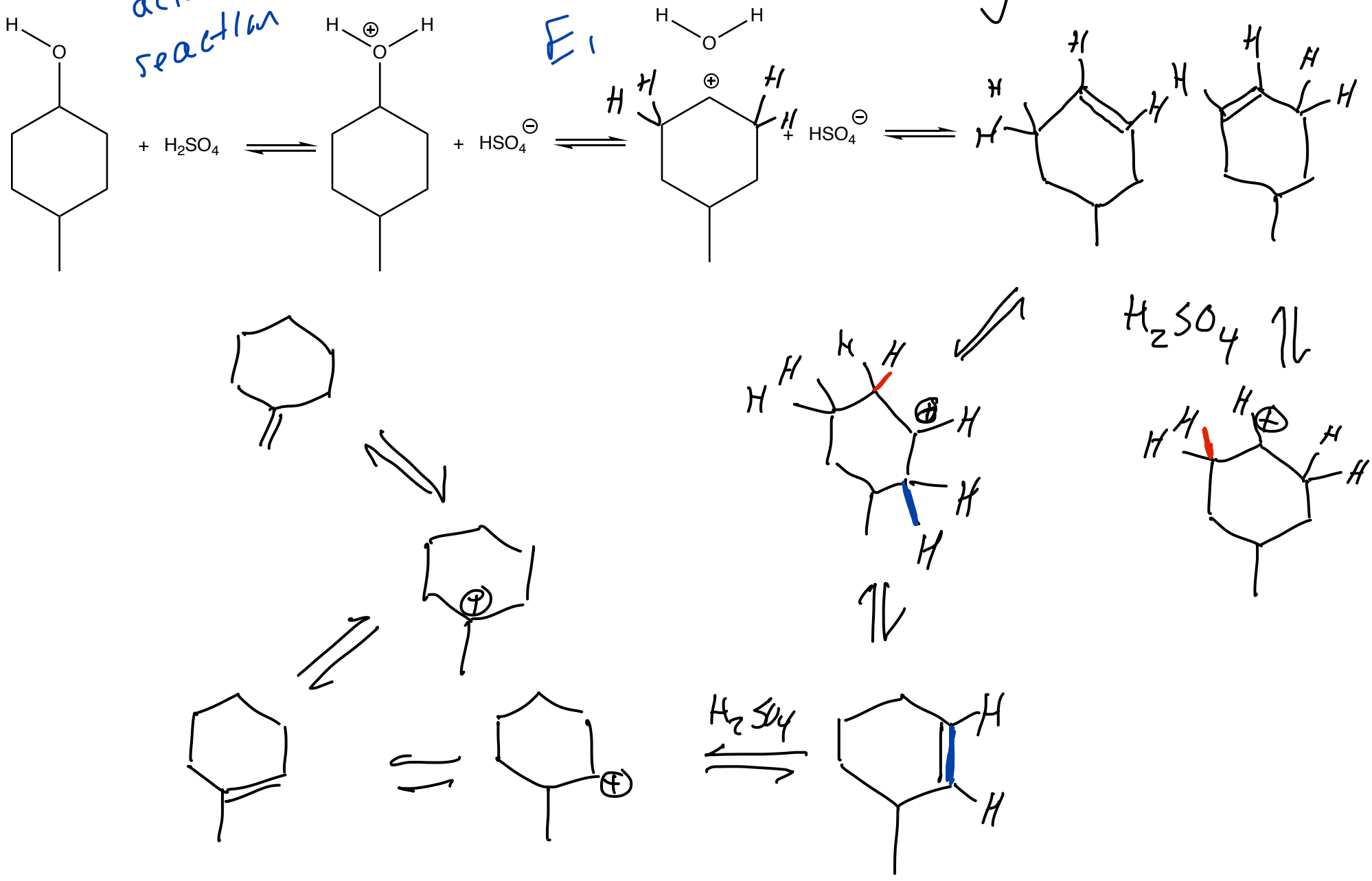


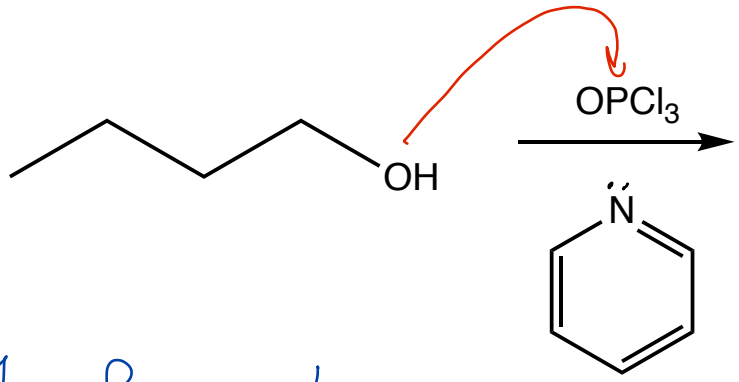
As long as the alkene is in solution with the H^+ it will continue to react and make more $C^{\oplus}$ and produce all possible alkenes.

A Potential Problem with H^+ Initiated Elimination Reactions

Section 10.4

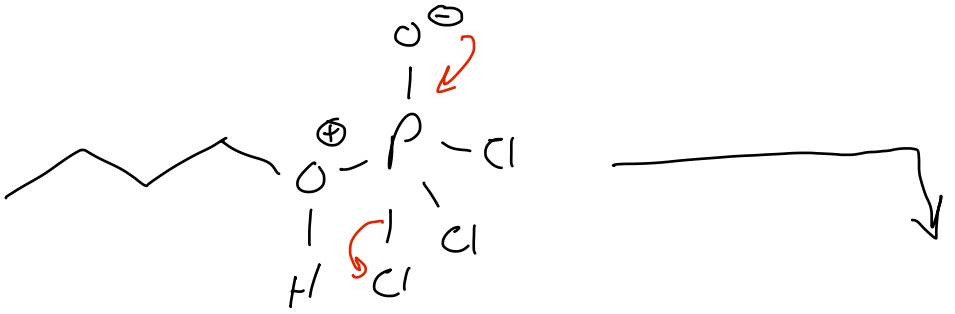
C^+'s can form in many locations



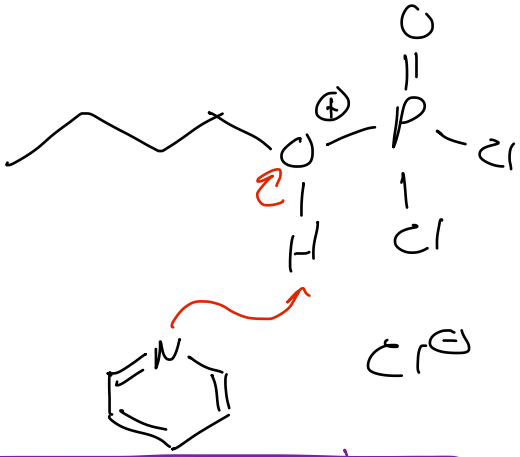


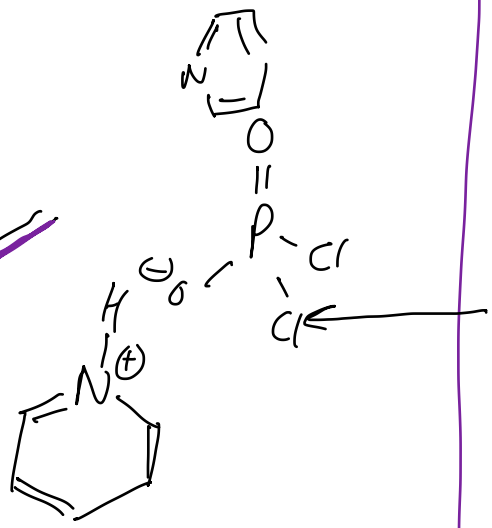
pyridine

The P is a Lewis acid because of the eneg atoms bonded to it

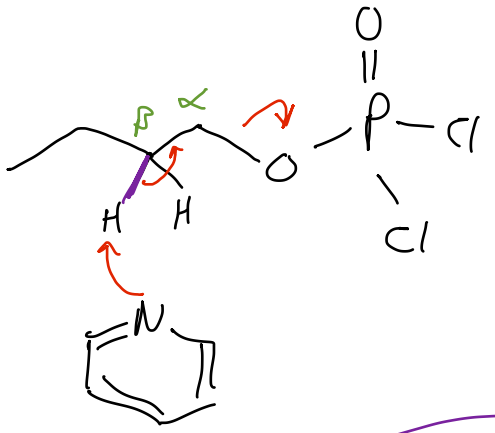


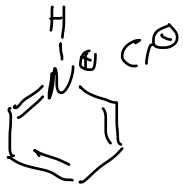
The $OPCl_3$ creates a more basic environment than the PCl_3



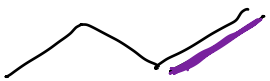


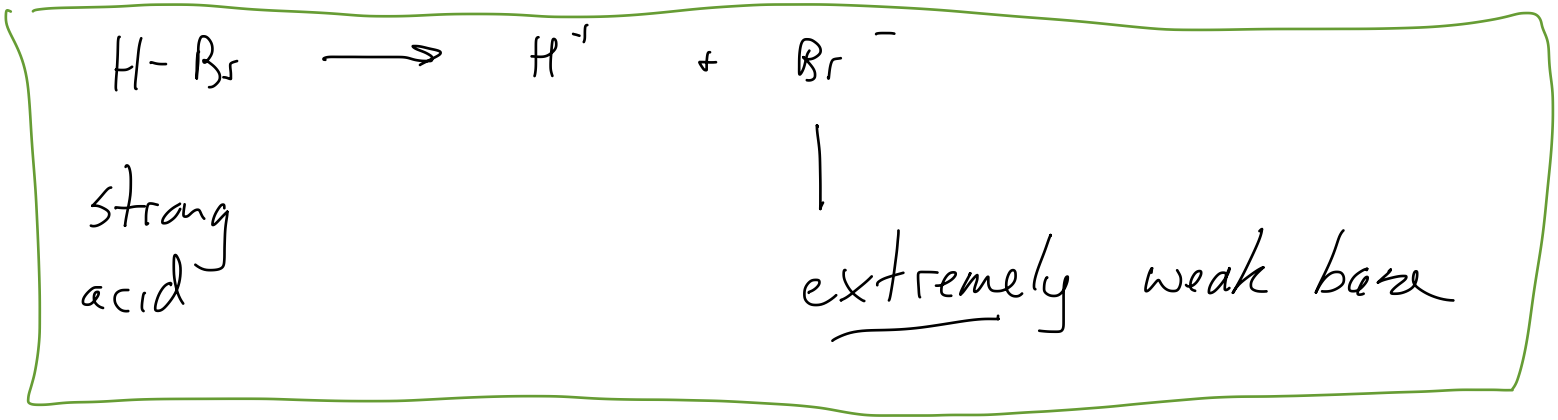
E2 reaction

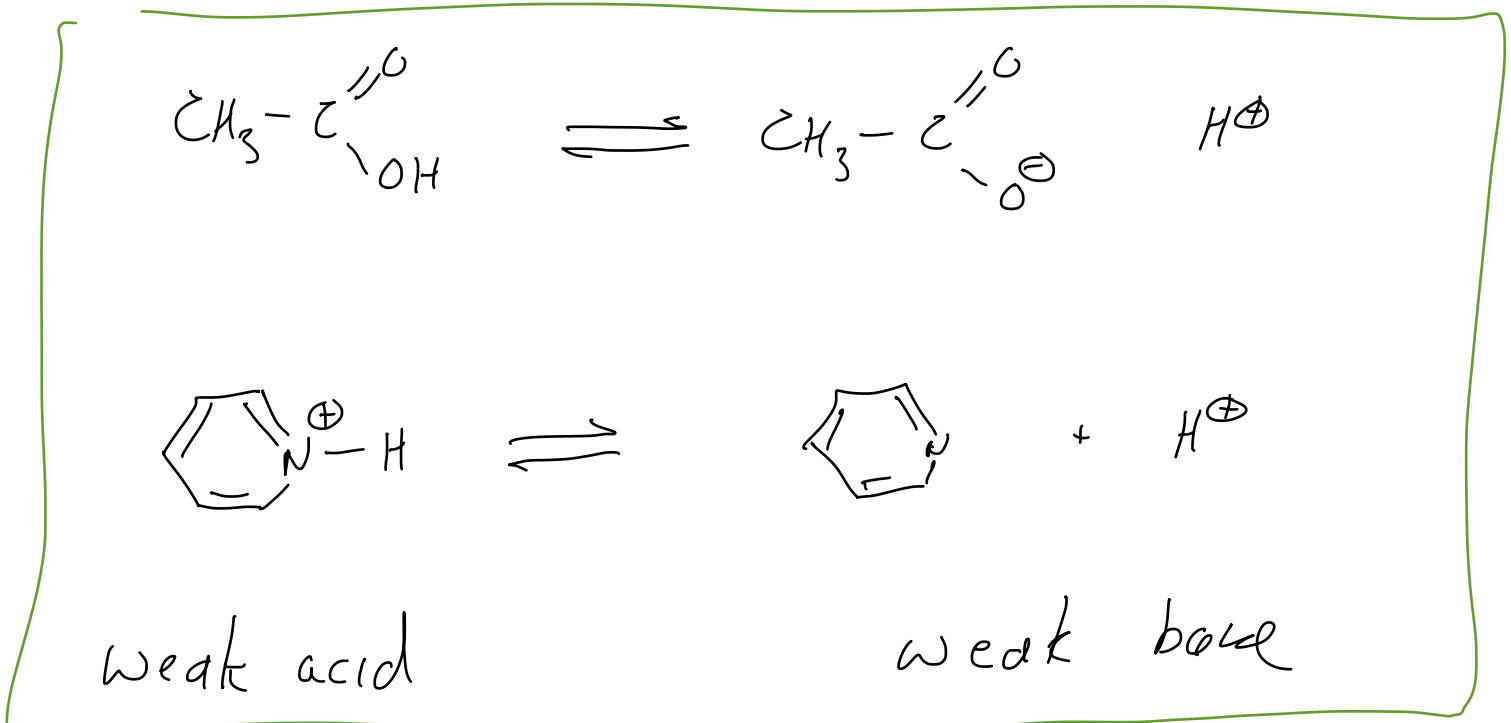


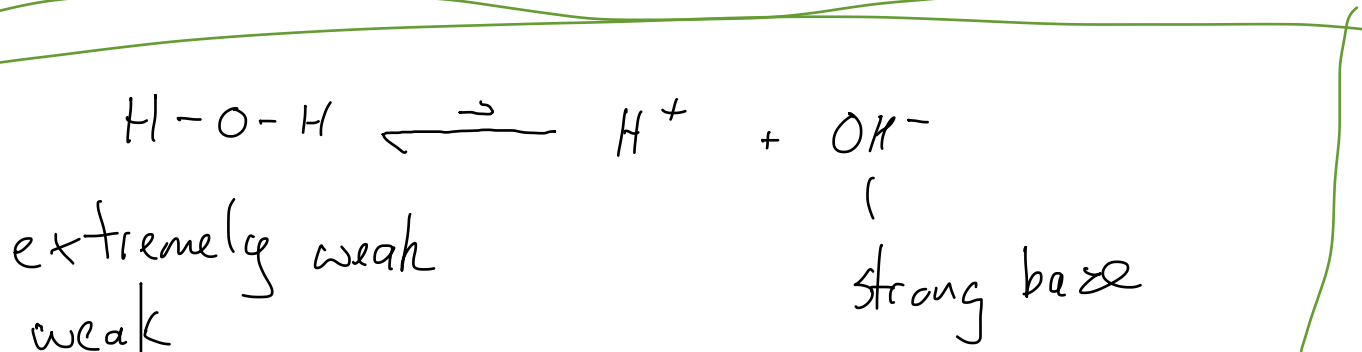


and nothing else since no H^+ is present

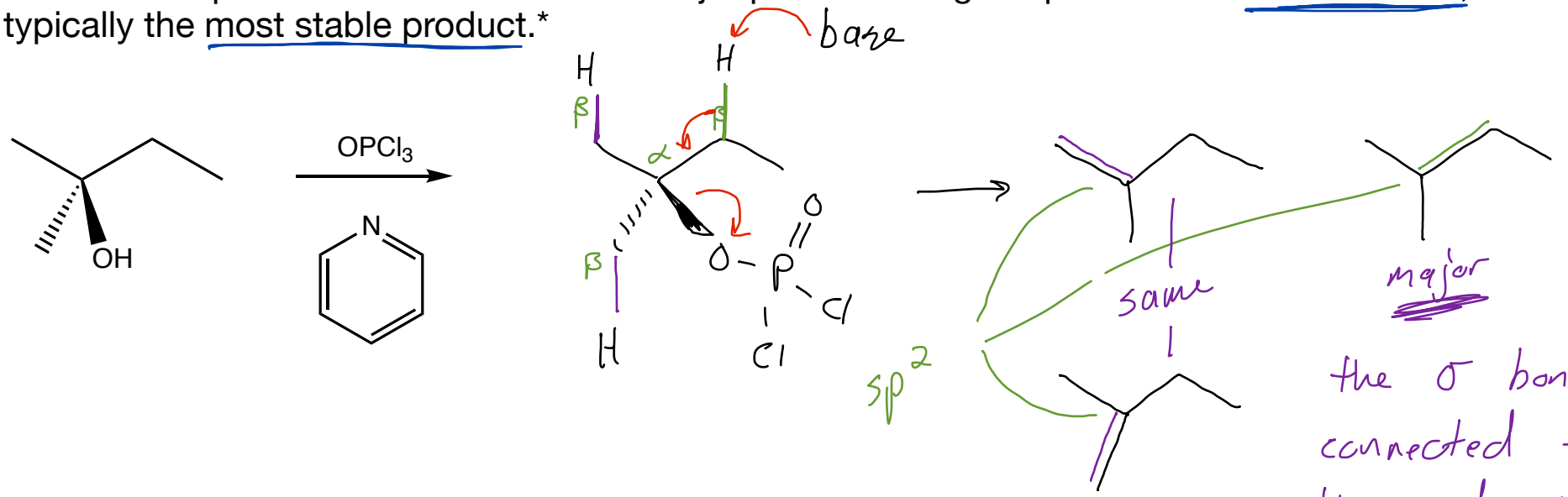



H- Br
H+
+
Br -
strong acid
extremely weak base


CH3- C
OH
O
O
H⊕
N⊕- H
+
H⊕
weak acid
weak base


H-O-H
H+
+
OH-
extremely weak
weak
strong base

E2 reactions produce a mixture with the major product being the product that forms fastest, which is typically the most stable product.*



the σ bonds connected to the ends of the db all have to be in the same plane

Steps we follow $2s \times 2p_x \times 2p_y \Rightarrow sp^2_{xy}$

Find α-C

Find β-H's on β-C's

remove LG

remove β-H

draw π bond from β-C to α-C

Check drawings! redraw as necessary

When amine or fluoride leaving groups, or large bases are used the more stable alkene is often not produced the fastest and will not be the major product.