

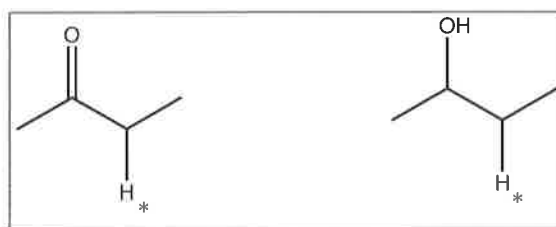
Enols, Enolates, and More #1: Getting Acquainted with Alpha Carbon Chemistry

Alright: We made it through all of those mechanisms and reactions of carbonyls. I hope that, while the material was no doubt challenging, the way we approached everything made it accessible and easy to digest. In my opinion, nothing in O Chem is impossible to understand, but its more so the amount of stuff you have to keep straight/remember that can be soul crushing /: Anyways let's move on to the next topic we're dealing with, and believe it or not, it still has to deal with carbonyls. This, along with the last carbonyl stuff, is the hardest material in O Chem 2 (in my opinion), so stay sharp and keep working hard. The chemistry after this is much easier in comparison.

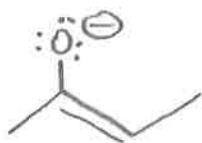
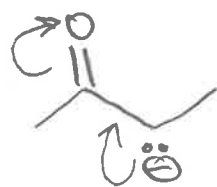
In this worksheet, we are going to cover the fundamental concepts that we're going to use in the reactions/mechanisms to come involving enols and enolates.

1.) Let's start off by exploring the alpha carbon.

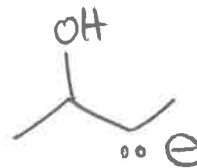
a.) Below, 2 molecules are shown, both with an asterisked Hydrogen explicitly drawn. The molecule on the left's Hydrogen is significantly more acidic than the Hydrogen on the right. With structures, illustrate why this difference in acidity is observed (major throwback to our acid-base days—remember the 5 rules that help us evaluate acids/bases).



* After
proton loss *



* Resonance
Stabilization



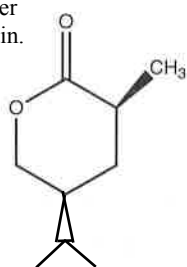
* No
Resonance

1.) (continued)

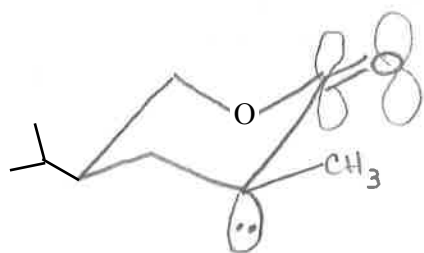
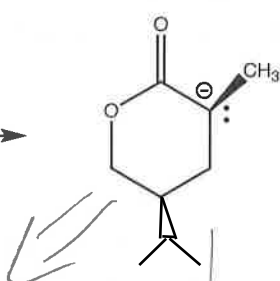
So hopefully you aren't looking ahead before doing part a.), but the alpha carbon is special because when an alpha proton is lost, the resulting lone pair on the alpha carbon can be stabilizing through resonance with the sp^2 carbon and oxygen involved in the carbonyl. However, don't forget about the necessary condition for Alpha-Deprotonation: The resulting lone pair must be in an orbital parallel to the p orbitals of the sp^2 carbon and oxygen (a little conjugation blast-from-the-past, right?).

b.) Alright, knowing all of this, explain why alpha-deprotonation occurs in the reaction on the left, but **not** in the reaction on the right (hint: draw a chair).

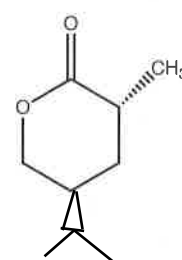
Note: the wedged isopropyl group will need to be equatorial in order to minimize strain.



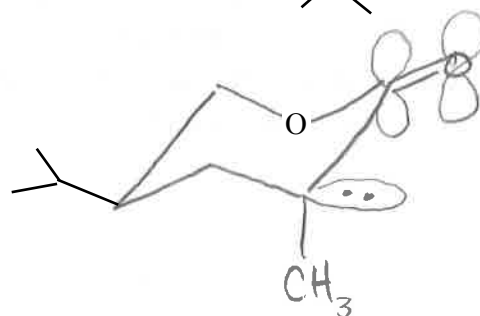
LDA



Electrons
are parallel to
the p orbitals
of the carbonyl
C and O.



LDA

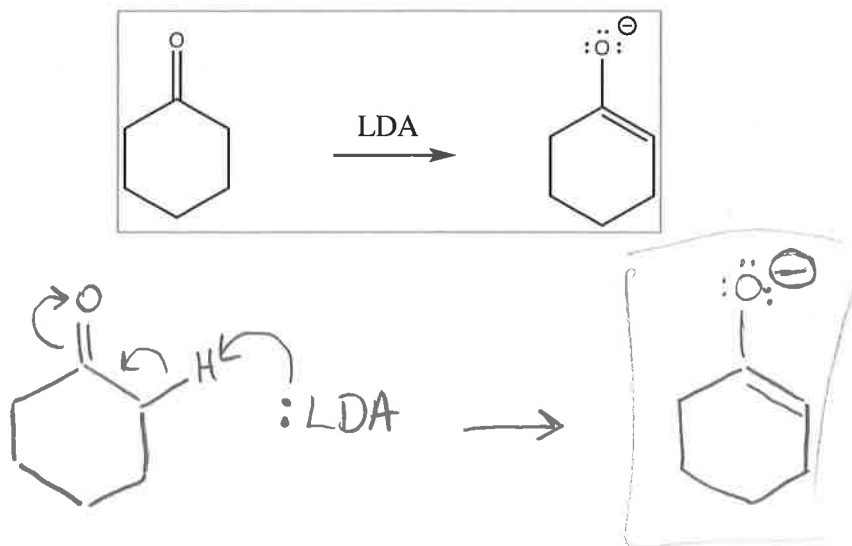


Would be chair

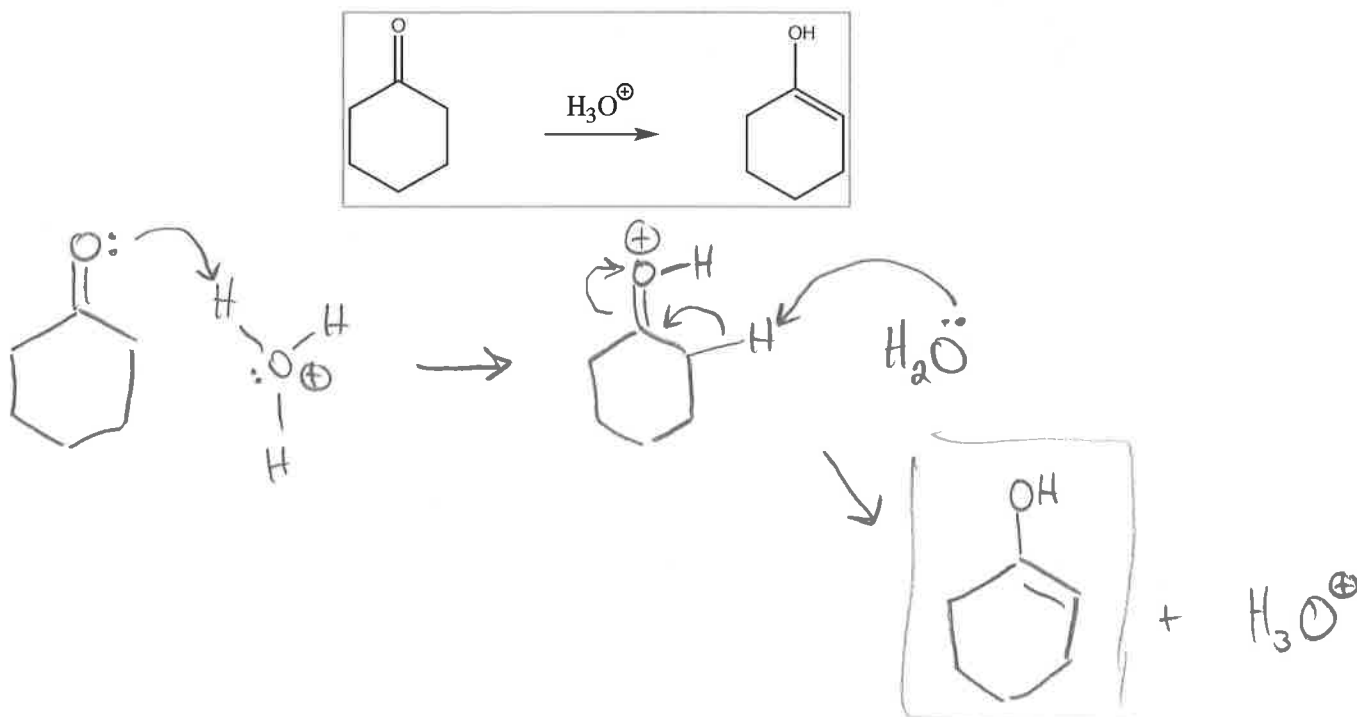
Electrons are perpendicular—
NO Conjugation = NO alpha-deprotonation

2.) Okay, I just wanted to make those 2 points regarding alpha-deprotonation and have you guys see them. Alrighty, so we know from the last video that through deprotonating the alpha carbon, we can make enol and enolate functional groups (enols in acidic environments, enolates in basic environments).

a.) If you would be so kind, draw the mechanism of the enolate formation shown below.

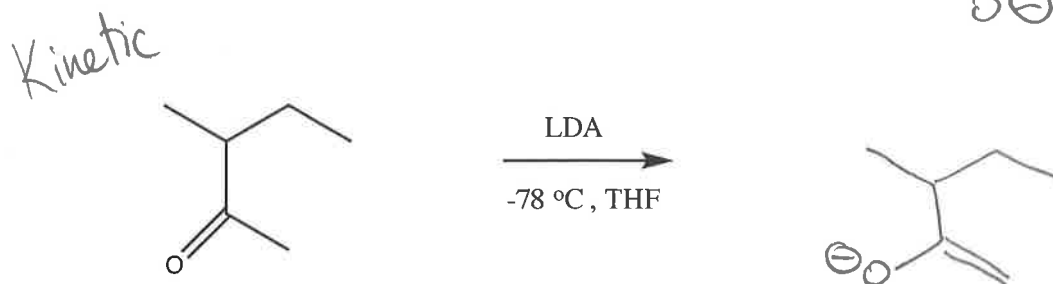
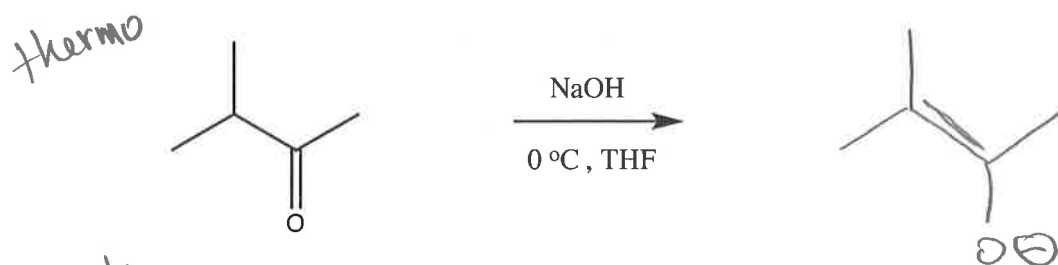
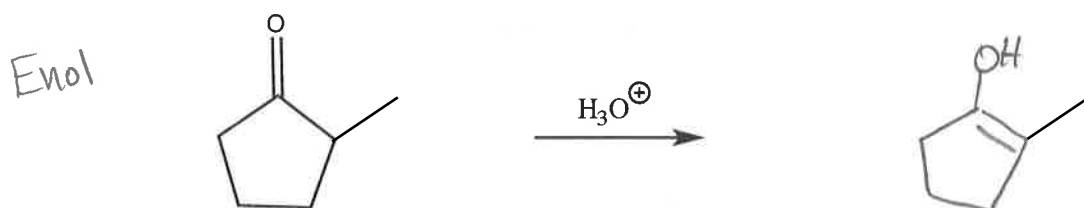
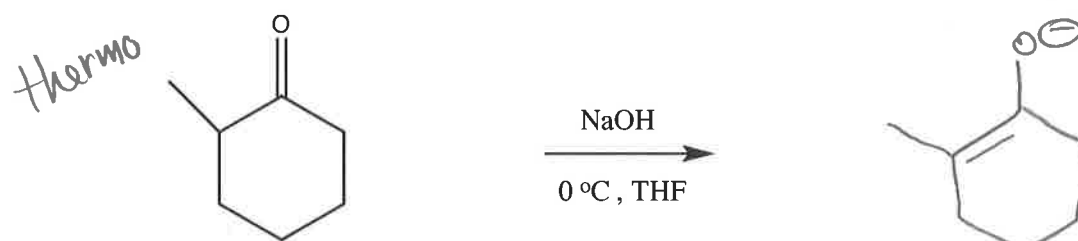
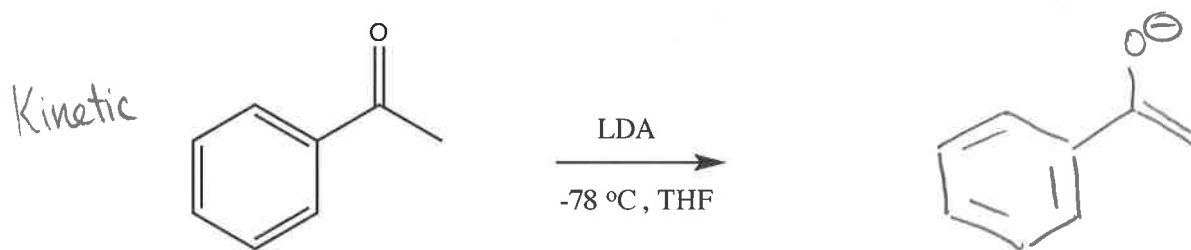


b.) Okay, same reactant, different environment (acidic now). Draw the mechanism for the enol formation below.

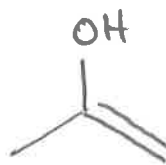
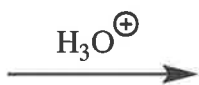
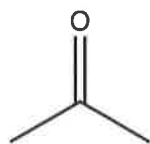


3.) Okay, okay. Now that you've drawn the mechanism for enolate and enol formation, I'm going to give you a slew of enol/enolate formation problems to have you practice. The reactions we'll be doing in the near future will be **immensely** easier if you can look at a carbonyl in a molecule and quickly picture what the enolate/enol form would look like, so let's get after it ☺.

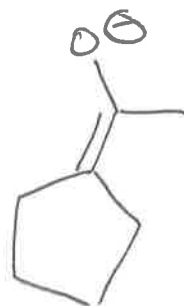
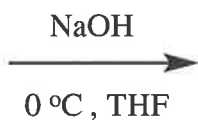
**Remember the discussion we had regarding Kinetic versus Thermodynamic enolates and the conditions necessary for each. Kinetic enolates make the least substituted double bond, while Thermodynamic ones make the more substituted double bond.



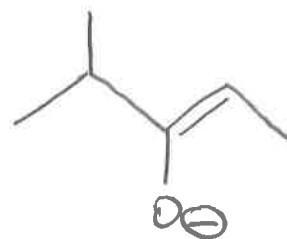
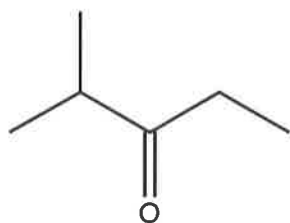
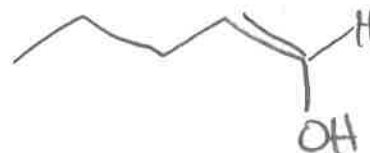
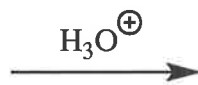
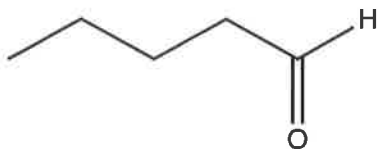
Enol



thermo



Enol



Kinetic