Enols, Enolates, and More #3: Synthesis Practice

Okay, gang. So if you take a second to look back on what we've done so far, we've covered a lot of ground and learned **a lot** of chemistry. Like I said in some of the recent videos, this is where it's super easy to lose sight of the big picture, get frustrated and overwhelmed, and maybe even want to give up. However, if you've watched the videos and done the worksheets, hopefully that isn't that case.

In my opinion, since we've done so many "big" reactions that involve making carbon-carbon bonds, I wanted to make sure we had a worksheet that helped us both recognize and use these reactions in Synthesis Problems.

- Here are some tips:

1.) **Count your carbons**: I said this back in O Chem 1, and I won't stop saying it now. Now that you have over a semester of organic chemistry under your belt, it's no surprise that synthesis problems virtually always involve sticking carbon-carbon pieces together. Count your carbons in your target molecule and then see how much of each starting material molecule you'll need to complete the synthesis.

2.) We now know a bunch of different reactions that help us make carbon-carbon bonds. Back in O Chem 1, we just had the Grignard Reaction. However, now we have Friedel Crafts Acylation & Alkylation, the Aldol Reaction, the Aldol Condensation, the Michael Addition, and the Robinson Annulation. **To keep everything straight and to not go insane, remember the relationships these reactions will make in their products.**

   a.) **Aldol Reaction**: 1,3-hydroxy carbonyl
   b.) **Aldol Condensation**: Enone
   c.) **Michael Addition**: 1,5-dicarbonyl (or a carbonyl with a new group added 4 positions away)
   d.) **Robinson Annulation**: Formation of a 6-membered ring
   e.) **Friedel Crafts**: Addition of a group to a benzene ring

3.) Work backwards and practice a lot. I know you all got this ☺.

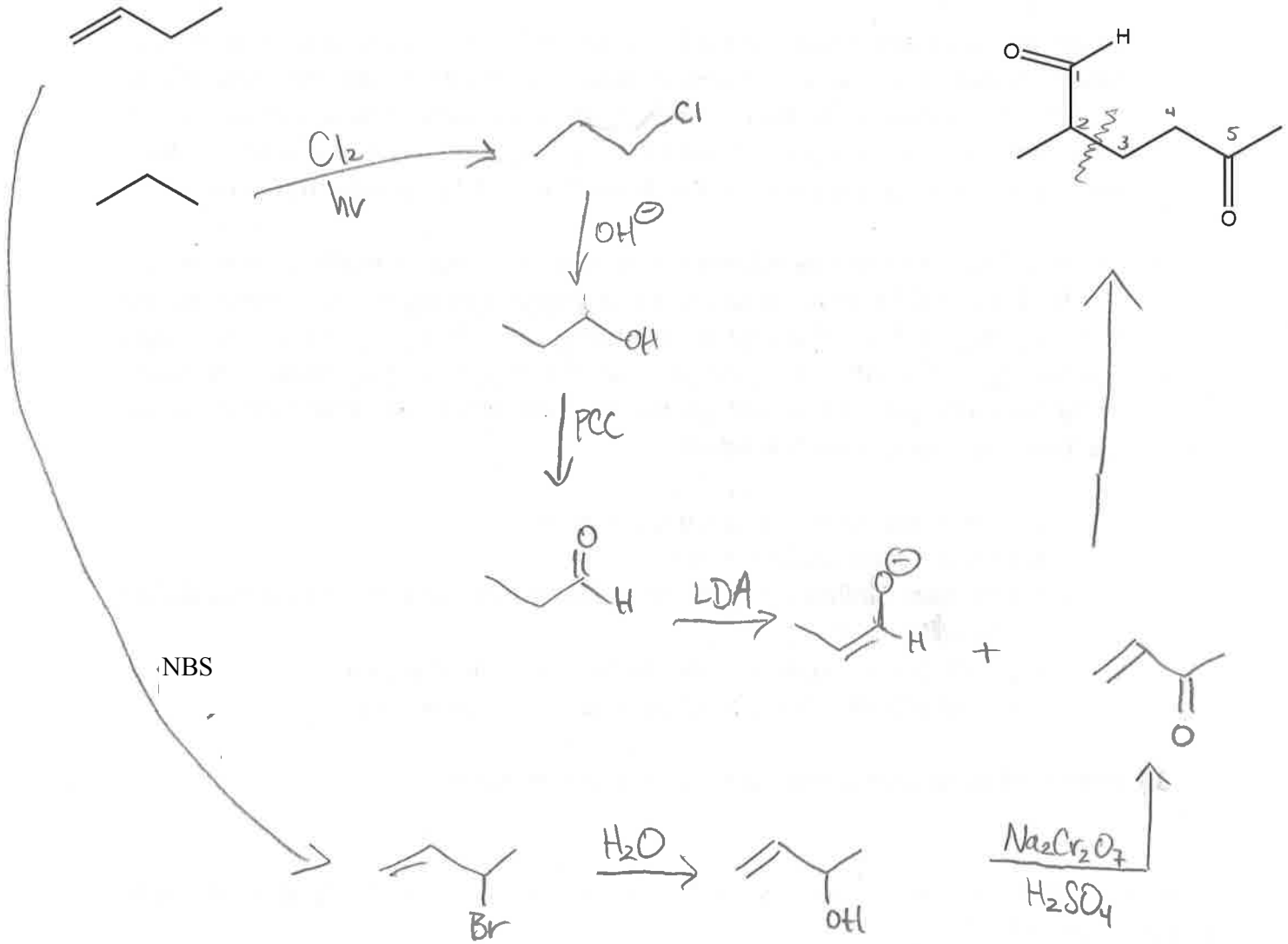
Now get on that next page, and let's synthesize some organic stuff in the most efficient way possible!!!!!!!!!!

1.) Provide an efficient organic synthesis of the following target molecule depicted below. You may only use the organic reactants given as your source of carbon. You can use any inorganic reagents you may need. 1,5 - dicarbonyl ⇒ Michael Addition

(7)

(4) + (3)

(7)

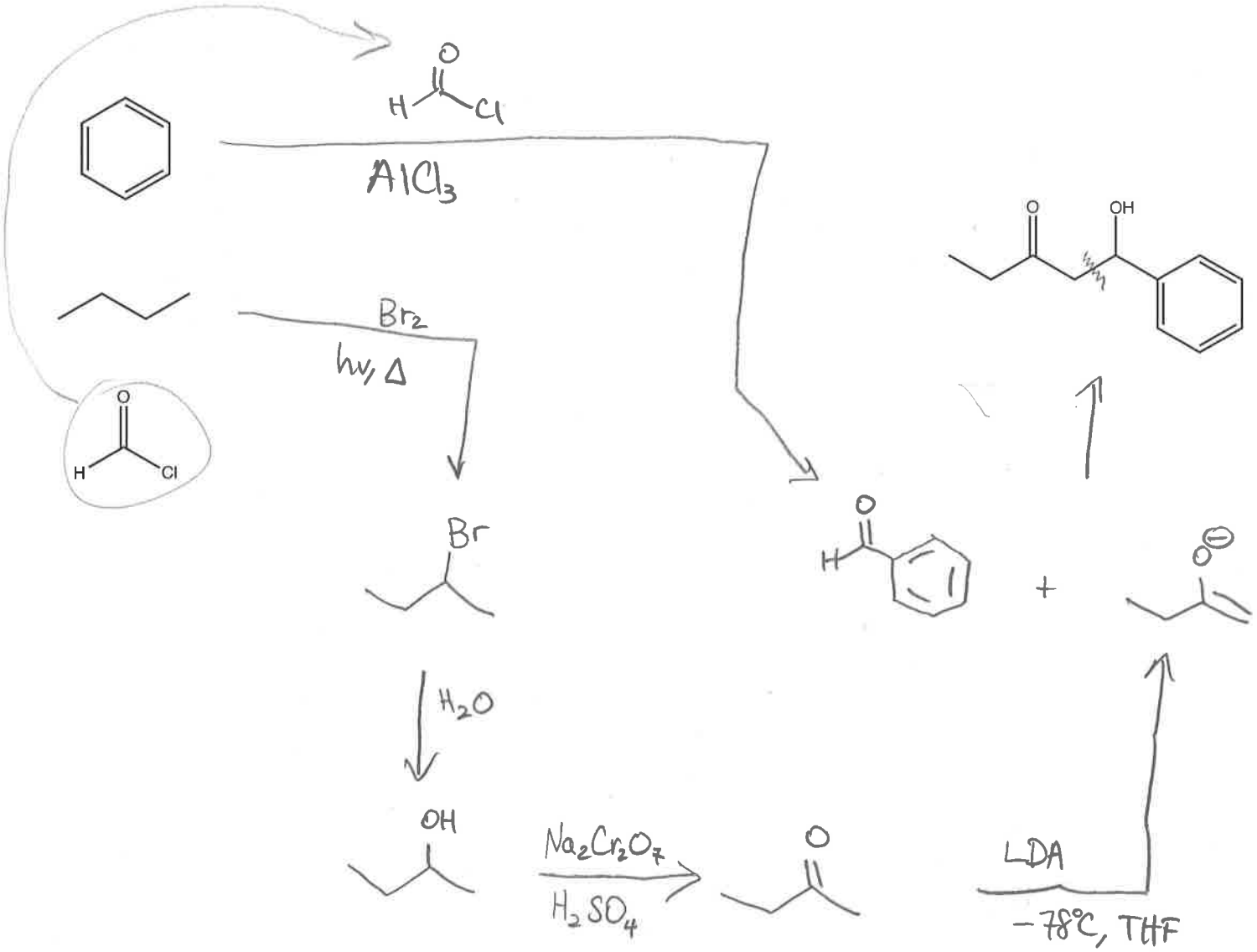


Good yield of bromination due to allylic radical

2.) Provide an efficient organic synthesis of the following target molecule depicted below. You may only use the organic reactants given as your source of carbon. You can use any inorganic reagents you may need.

1,3-hydroxy carbonyl ⇒ Aldol Rxn

"Big Step"

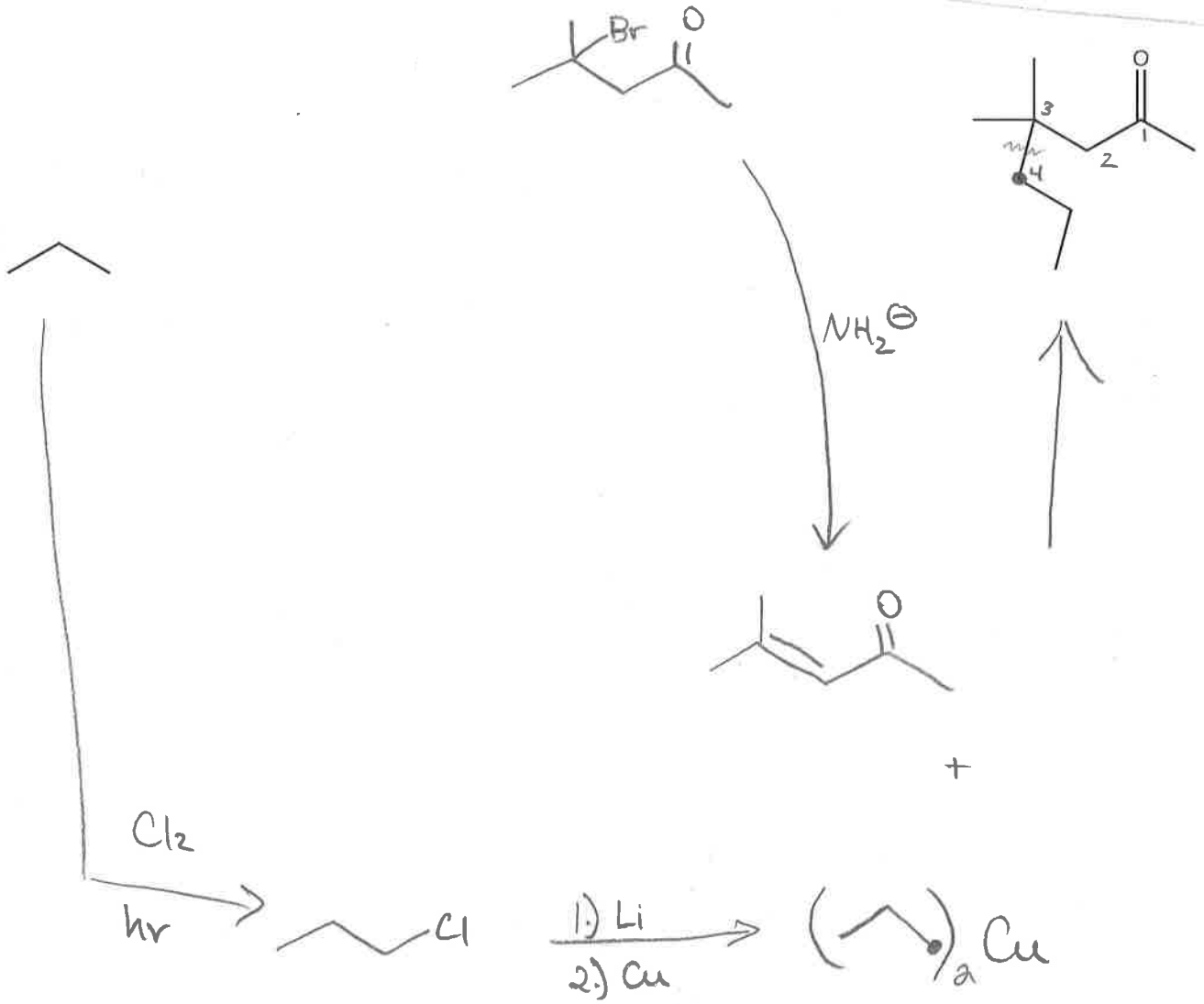


* Need least Substituted enolate *

3.) Provide an efficient organic synthesis of the following target molecule depicted below. You may only use the organic reactants given as your source of carbon. You can use any inorganic reagents you may need.

Carbon piece added 4 positions away from Carbonyl ⇒ Michael Addition with cuprate

* Need small base to get most substituted double bond for elimination *



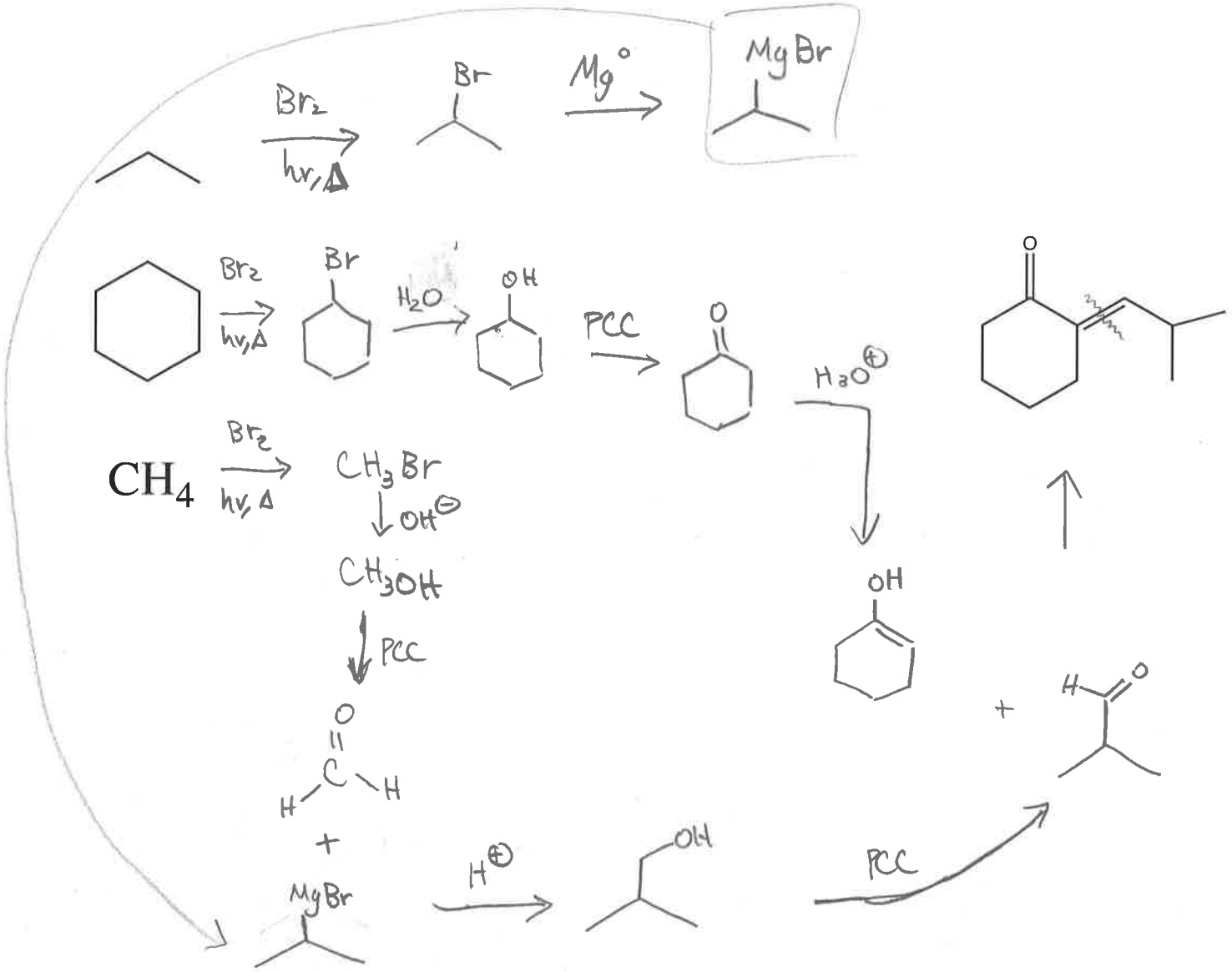
4.) Provide an efficient organic synthesis of the following target molecule depicted below. You may only use the organic reactants given as your source of carbon. You can use any inorganic reagents you may need.

Enone in product ⇒ Aldol Condensation

- Basic environment w/ enolate + Δ

(OR)

- Acidic environment w/ enol



(Grignard)

5.) Provide an efficient organic synthesis of the following target molecule depicted below. You may only use the organic reactants given as your source of carbon. You can use any inorganic reagents you may need.

(2) 1,3-hydroxy Carbonyl ⇒ Two Aldol Rxn

(8) (8)