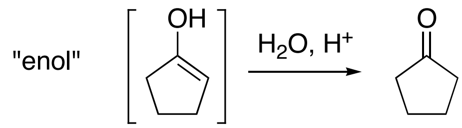
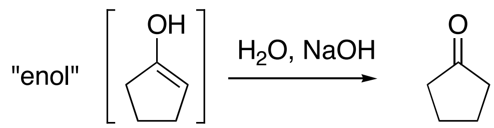
Chem 360 Jasperse Quiz 18-B Due: Name:
Ch. 18b Aldehydes and Ketones. Reactions, Mechanisms

Note: Anything inside of brackets [ ] represents something that isn't or can't be isolated. Often something in brackets is an intermediate on the way to something else, and something which forms very briefly but is then carried on to product or returns back to starting material. Often something in brackets is something that never builds up, but is only present in a small equilibrium concentration.

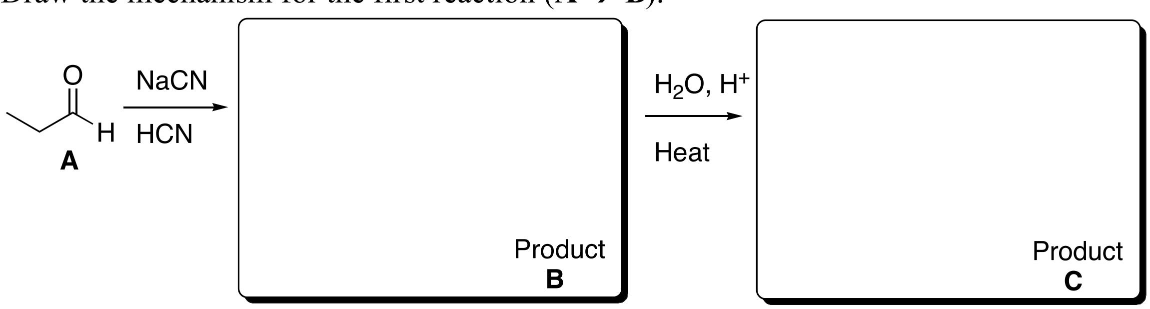
1. Draw the mechanism for acid-catalyzed hydrolysis of the following enol.



2. Draw the mechanism for base-catalyzed hydrolysis of the following enol.



3. Shown below is an example of the reaction for adding nitriles to carbonyl compounds, to make the stable, isolable product **B**. Draw the product **B** for the reaction shown.
4. Acidic hydrolysis of the nitrile **B** leads to a new product **C**. Draw the product **C** for the reaction shown.
5. Draw the mechanism for the first reaction (**A** → **B**).

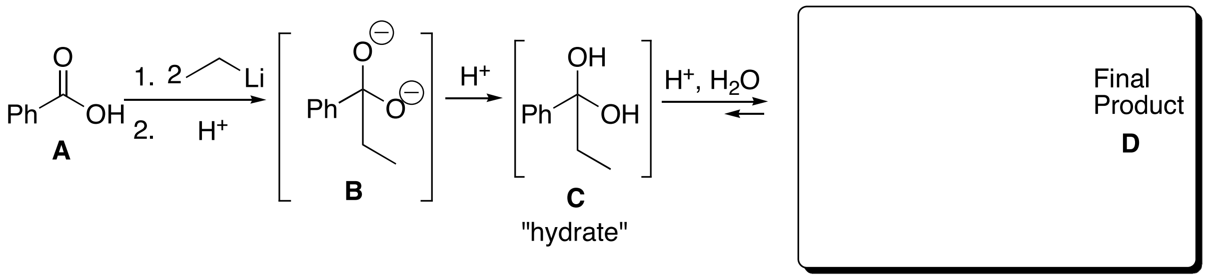


A → B

6. Shown below is an example of the reaction for adding organolithium carbanions to carbonyl compounds, followed by acid hydrolysis. Draw the final product **D** for the reaction shown.

7. Draw the mechanism for the elimination phase of the reaction (**C** → **D**).

8. Fact: The conversion from **C** → **D** strongly favors the carbonyl product **D**. But **C** and **D** are actually in equilibrium, with a small equilibrium quantity of **C** present (in the presence of acid and water). Problem: Draw the mechanism for the addition reaction **D** → **C**.

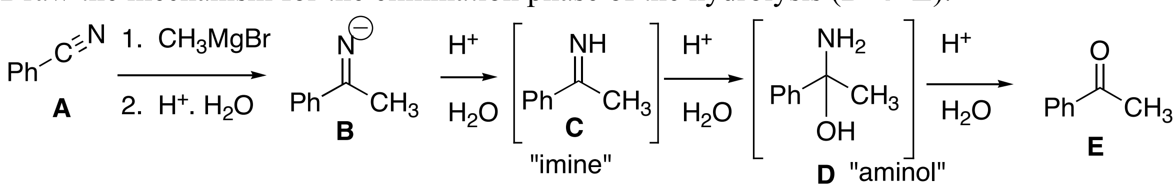


(**C** → **D**)

D → **C**

9. Shown below is an example of the reaction for making a ketone from a nitrile using Grignard addition followed by an aqueous acid workup/hydrolysis. Draw the mechanism for the addition phase of the hydrolysis (**C** → **D**).

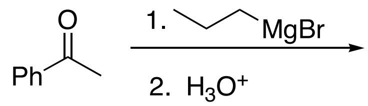
10. Draw the mechanism for the elimination phase of the hydrolysis (**D** → **E**).



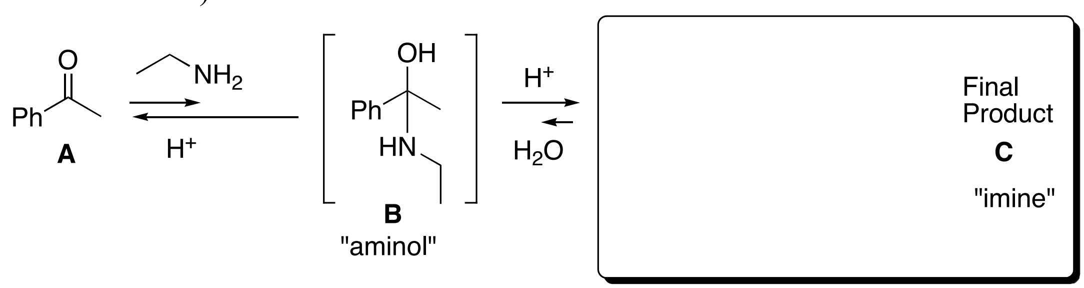
C → **D**

D → **E**

11. Draw the product for the reaction shown.
12. Draw the mechanism for formation of the product.



13. Shown below is an example of the reaction for reacting aldehydes or ketones with ZNH_2 compounds. Draw the final product **C** for the reaction shown.
14. Draw the mechanism for the addition phase of the reaction (**A** → **B**).
15. Draw the mechanism for the elimination phase of the reaction (**B** → **C**).
16. Fact: The conversion from **B** → **C** strongly favors the final product **D**. But **C** and **B** are actually in equilibrium, with a small equilibrium quantity of **B** present (in the presence of acid and water). Problem: Draw the mechanism for the addition reaction **C** → **B**.
17. Fact: The conversion from **A** → **B** strongly favors the carbonyl reactant **A**. But **A** and **B** are actually in equilibrium, with a small equilibrium quantity of **B** present (in the presence of acid and amine). Problem: Draw the mechanism for the elimination reaction **B** → **A**.



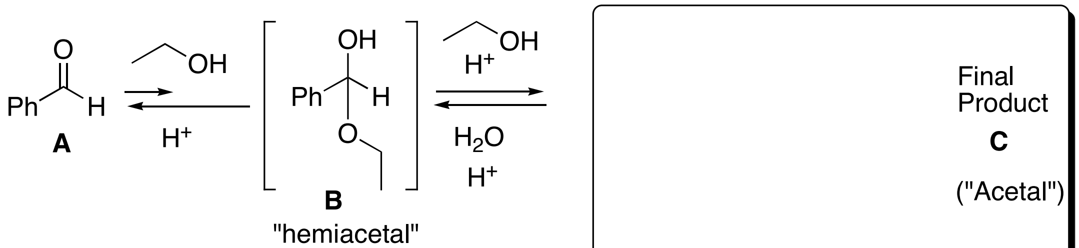
A → B

B → C

C → B

B → A

18. Shown below is an example of the reaction for reacting aldehydes or ketones with alcohols. Draw the final product **C** for the reaction shown.
19. Draw the mechanism for the addition phase of the reaction (**A** → **B**).
20. Draw the mechanism for the substitution phase of the reaction (**B** → **C**).
21. Draw the mechanism for the reverse substitution phase of the reaction (**C** → **B**).
22. Draw the mechanism for the elimination reaction **B** → **A**.
Fact: **B** is in two equilibria, an unfavorable one with **A** (carbonyl strongly favored), and a solvent dependent one with acetal **C**. In excess alcohol, things end up at **C**; in water they go back to **A**.



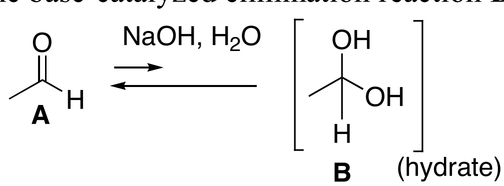
A → B

B → C

C → B

B → A

23. Shown below is base-catalyzed addition of water to form a hydrate. Draw the mechanism for the addition phase of the reaction (**A** → **B**).
24. Draw the mechanism for the base-catalyzed elimination reaction **B** → **A**.



A → B

B → A