Organic Chemistry II Drill (CHEM2220D) 
Module 8. Sample Problems

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1. (5 points) Draw in all of the alpha hydrogens and circle them.

2. (20 points) Predict the product of each reaction. Indicate chiral centers with an asterisk (*). You may use as many equivalents as you need to complete the reactions. COUNT YOUR CARBONS.
3. (8 points) Propose a synthetic scheme for each transformation. You must show all Reagents needed and EACH synthetic intermediate to receive full credit. COUNT CARBONS.

\[ \text{烯烃} \rightarrow \text{酮} \]

4. (8 points) Propose a synthetic scheme for each transformation. You must show all Reagents needed and EACH synthetic intermediate to receive full credit. COUNT CARBONS.

\[ \text{烯烃} \rightarrow \text{酯} \]

5. (9 points) Propose a mechanism for the intramolecular Claisen condensation. You must include all arrows and intermediates to receive full credit. COUNT CARBONS.

\[ \text{二酯} \rightarrow \text{酯} \]

1. [化学反应]
2. [化学反应]
6. Circle the molecule(s) that can form an enol. (3 pts)

![Molecule Images]

7. List TWO bases that can deprotonate acetone to a synthetically-valuable extent. List ONE base that will NOT deprotonate acetone. (3 pts)

Will deprotonate: 1. 2.  
Will NOT deprotonate:

8. Complete these reactions. There may be more than one important product, or it is possible that no reaction occurs. **Stoichiometry is not given. If you need more than 1 you have it** (20 pts)

(a) 

(b) 

(c) 

(d) 

(e) 

(f)
9. Propose a mechanism for each of these reactions. Be sure to show all intermediates and mechanistic arrows. (8 pts)

a)

\[
\begin{align*}
\text{propose mechanism here}
\end{align*}
\]

b)

\[
\begin{align*}
\text{propose mechanism here}
\end{align*}
\]

10. Propose syntheses of these compounds. (12 pts)

a)

\[
\begin{align*}
\text{propose synthesis here}
\end{align*}
\]

b)

\[
\begin{align*}
\text{propose synthesis here}
\end{align*}
\]
11. Draw a keto-form for the following enol (4 points):

\[
\text{OH}
\]

12. Draw a mechanism for the following reaction, 6 points:

\[
\text{O} \quad \xrightarrow{\text{NaOH}} \quad \text{OH}
\]

13. Draw the \textit{addition} and \textit{condensation} products of the following Aldol reaction (8 points):

\[
\text{O} \quad \xrightarrow{\text{NaOH}} \quad \text{EtOH}
\]

14. Draw the starting material that produces the following Claisen condensation product, 4 points.

\[
? \quad \xrightarrow{\text{NaOEt}} \quad \text{ethanol}
\]
15. Give the structure of the major organic product or products expected from the following reactions. “No reaction” might be an appropriate answer in some cases. Show the stereochemistry of the products if applicable. (5 points each)

a) \[ \text{EtONa} \]

b) \[ \text{NaOEt} \rightarrow \text{Br} \rightarrow \text{H}_3\text{O}^+ \text{ heat} \]

c) \[ \text{KOH} \rightarrow \text{H}_3\text{O}^+ \]

d) \[ \text{1. Br}_2, \text{P} \rightarrow \text{2. H}_2\text{O} \]

16. Propose a mechanism for the following Aldol condensation reaction (8 points):

\[ \text{NaOH} \rightarrow \text{EtOH} \rightarrow \text{O} \rightarrow \text{N} \]
17. Identify and draw the alpha hydrogens in this structure (3 pts.)

18. Draw an aldehyde that has ‘1’ alpha hydrogen (3 pts).

19. Complete these reactions. **Stoichiometry is not given. If you need more than 1 you have it** (24 pts)

(a) 

(b) 

(c) 

(d) 

(e) 

(f)
20. Which base can be used to generate the enolate completely from this compound (3 pts):

![Enolate generation](image1)

21. Propose a mechanism for this reaction. Be sure to show all intermediates and mechanistic arrows. (5 pts)

![Mechanism](image2)

22. Propose syntheses of these compounds from the given starting materials. (6 pts)

![Synthesis](image3)

23. Identify the reagents used or the products formed in the following reaction sequence- (6 pts)

![Reaction sequence](image4)