Hey guys! I hope everyone enjoyed your Fall Break! If you have any questions or need study tips, please do not hesitate to reach out to me at Megan_Hudson2@baylor.edu!

In-person group tutoring sessions will take place **every Thursday from 5:15 - 6:15 pm in Sid Rich Rm. 75**! In these sessions I will provide practice problems and be available for specific questions. To reserve a spot, go to [https://baylor.edu/tutoring](https://baylor.edu/tutoring). I hope to see you there!

**Key Words:** Electrophile, Nucleophile, Carbonyl, Aldehydes, Ketones

### TOPIC OF THE WEEK: REVIEW OF AROMATIC SUBSTITUTIONS

<table>
<thead>
<tr>
<th>Type of Reaction</th>
<th>Reagents</th>
<th>3 Criteria for $S_{N}Ar$ met? (Refer to Highlight #2 in Week 9 Resource for review)</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrophilic Aromatic Substitution (EAS)</td>
<td>Electrophilic</td>
<td>N/A</td>
<td><img src="image" alt="Mechanism Diagram" /></td>
</tr>
</tbody>
</table>

![Mechanism Diagram](image)
<table>
<thead>
<tr>
<th>Nucleophilic Aromatic Substitution (SNAr)</th>
<th>Nucleophilic</th>
<th>Yes</th>
</tr>
</thead>
</table>

**HIGHLIGHT #1: ELIMINATION- ADDITION OR BENZYNE REACTION**

In the Elimination-Addition Reaction, a Benzyne intermediate is formed. After deprotonation occurs and the benzyne is created, a nucleophilic attack can occur at either end of the triple bond with equal likelihood to produce the final product.
Nomenclature of Aldehydes and Ketones:
1. Identify and name the parent chain or ring
2. Identify and name all substituents
3. Assign a locant to each substituent (remember to assign lowest possible numbers to important functional groups)
4. Assemble substituents alphabetically

- **-al** is indicative of an aldehyde group

- A cyclic compound with an aldehyde immediately adjacent to the ring (formyl group) is called a carbaldehyde

- **-one** is indicative of a ketone group
THINGS YOU MAY STRUGGLE WITH:
1. Be sure you are comfortable with each of the 3 types of aromatic substitution reactions. I recommend reviewing the mechanisms listed above in the topic of the week and the practice problems listed below. Both Dr. Hodson and Dr. Zinke went into great detail in this chapter of the intermediates and mechanisms so that’s a good indicator that they are important to know!

2. DO NOT BRUSH OFF NOMENCLATURE! Being familiar with the common names and the IUPAC system of naming aldehydes/ ketones as it is important and necessary for solving synthesis problems (which will be covered next week).

PRACTICE PROBLEMS:

1. Why are carbonyls (like aldehydes and ketones) so reactive?

2. Draw the structure for (R) - 3 - Hydroxy heptanal

3. Draw the most likely mechanisms for the following transformations:

(a) 
\[
\begin{align*}
\text{Br} & \quad \text{N} \quad \text{O}_2 \\
& \quad \text{N} \quad \text{O}_2 \\
& \quad \text{N} \quad \text{O}_2 \\
& \quad \text{N} \quad \text{O}_2 \\
& \quad \text{N} \quad \text{O}_2 \\
\end{align*}
\]

(b) 
\[
\begin{align*}
& \quad \text{I} \\
& \quad \text{I} \\
& \quad \text{I} \\
& \quad \text{I} \\
& \quad \text{I} \\
\end{align*}
\]
ANSWERS TO PRACTICE PROBLEMS:

1. Why are carbonyls (like aldehydes and ketones) so reactive?

It's because carbonyls have a dipole moment due to resonance participation.

\[
\begin{array}{c}
\text{C} = \text{O} \\
\end{array}
\]

2. Draw the structure for (R)-3-Hydroxy heptanal.

3. Draw the most likely mechanisms for the following transformations:

(a) \[
\begin{array}{c}
\text{Br} \\
\text{1) NaOH, 350\degree} \\
\text{2) H}_2\text{O} \\
\end{array}
\]

Reagent is OH\(^{-}\), meaning it's a strong nucleophile and base, but S_NAr criteria is not met so mechanism is elimination/Br\(^{-}\).

(b) \[
\begin{array}{c}
\text{Ar} \\
\text{1) NaNH}_2 \\
\text{2) H}_2\text{O} \rightarrow \\
\text{ArNH}_2 \\
\end{array}
\]

\(\text{NaNH}_2\) is a powerful nucleophile and both criteria for S_NAr are met (L.G. is para to Nitro group) so it's an S_NAr.