WEEK 9 REVIEW SESSION

SAFETY

1. SAFETY HAZARDS: What primary safety precaution / concern is associated with Dichloromethane? See "Hazards Identification" section on SDS here.
   a. Carcinogen
   b. Flammable & Carcinogen
   c. Skin Corrosion
   d. Skin Irritation
   e. Carcinogen & Skin Irritation
THEORY + MECHANISMS

1. **ALDOL CONDENSATION**: (Organic Chemistry 4th Edition) Draw the product formed from an aldol reaction with the given starting material(s) using – OH, H₂O.

\[
\begin{align*}
\text{CH₃CH₂CH₂CHO} + \text{HCHO} & \rightarrow \text{Product} \\
\end{align*}
\]
2. ELECTROPHILIC AROMATIC SUBSTITUTION: Which of the following mechanisms is drawn correctly? Remember to check arrows, formal charges, and intermediates (if any).
LAB TECHNIQUES

1. **EXTRACTION:** (Week 6 In Lab) You have completed an extraction using water and diethyl ether as your solvents. You have just finished drying the organic layer and are currently decanting it into a tared vial. After this, you expect to evaporate the ether away using a cool air stream.
   a. Which layer was the organic layer? Which was the aqueous layer? How can you test this?
   b. What data should you have recorded?

2. **MELTING RANGE:** A 51LC student is running an Electrophilic Aromatic Substitution (EAS) reaction. Aniline is subjected to bromination conditions in the presence of pyridinium bromide and glacial acetic acid. Filtration and melting point are used to determine the unknown product’s identity. After three repetitions of the same reaction, the student collects the following melting ranges: 122.3-123.9 °C, 127.1-129.5 °C, and 121.9-135.5 °C. The student concludes the product must be 2,6-dibromoaniline (Literature value = 87°C). Is this correct? Why or Why not?
3. **TLC + RF VALUES:** This is your first TLC plate after eluting with 2% ethyl acetate/hexanes. What should you do?

![TLC Plate Image]

4. **DISTILLATION:** Which of the following statements are true about steam distillation for the isolation of eugenol from clove oil?
   a. We use water in steam distillation because water has a higher vapor pressure than the organic compounds we are trying to isolate.
   b. We use steam distillation to isolate some organic compounds because they have high boiling points.
   c. If we tried to heat the organic compounds or the plant material they come from to the boiling points of the organic compounds, they would probably decompose.
   d. For steam distillation to work, the compound(s) we are trying to isolate must be insoluble in water.
   e. None of the above.
   f. All of the above.
5. \(^1\text{H MNR SPECTROSCOPY:}\) Which is the structure of the compound that produced the \(^1\text{H NMR}\) spectrum shown below?

The molecular formula of the structure is \(\text{C}_{10}\text{H}_{12}\text{O}_3\).
CALCULATIONS

1. **THEORETICAL + PERCENT YIELD**: For the reaction shown below, 424 mg of benzaldehyde, 119 mg of acetone, and excess sodium hydroxide are used to obtain 234 mg of dibenzalacetone. What is the percent yield of dibenzalacetone?

[Chemical structure image]

benzaldehyde MW = 106 g/mol; acetone MW = 58.0 g/mol; sodium hydroxide MW = 40.0 g/mol; dibenzalacetone MW = 234 mg/mol
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2. STOICHIOMETRY: Fill in all the missing quantities from the chart below.

![Stoichiometry Reaction Diagram]

<table>
<thead>
<tr>
<th>compound</th>
<th>alkene</th>
<th>HBr</th>
<th>product</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM</td>
<td>232.41 g/mol</td>
<td>80.91 g/mol</td>
<td>475.15 g/mol</td>
</tr>
<tr>
<td>Density or conc.</td>
<td>NA</td>
<td>5.2 M</td>
<td>NA</td>
</tr>
<tr>
<td>mmol</td>
<td>6.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>amount</td>
<td>539 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual yield</td>
<td>NA</td>
<td>NA</td>
<td>733 mg</td>
</tr>
</tbody>
</table>

3. RF VALUES: You are given two spots, A and B along with their Rf. The solvent is nonpolar. Determine which compound is more nonpolar.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>Solvent Front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rf = 0.63</td>
<td>Rf = 0.88</td>
<td>5.2 cm</td>
</tr>
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</table>