These type of reactions are catalyzed by both acid and base. What is the mechanism of the acid catalyzed reaction?

more reactive C=O

\[ \text{H}^+ + \text{H} \rightarrow \text{H}^+ + \text{H} \]

What is the first intermediate in this mechanism?

A  B  C

These type of reactions are catalyzed by both acid and base. What is the mechanism of the acid catalyzed reaction?

more reactive C=O

\[ \text{H}^+ + \text{H} \rightarrow \text{H}^+ + \text{H} \]

What is the first intermediate in this mechanism?

A  B  C

What is the mechanism of the base catalyzed reaction?

What is the first step?

There are two forms of formaldehyde in water, the carbonyl compound and its hydrate.

formaldehyde

In water the hydrate is the dominant form.

\[ K_{eq} \]

Would the \( K_{eq} \) of acetaldehyde be (A) larger or (B) smaller or (C) the same as formaldehyde?

\[ \text{formaldehyde} \quad 2000 \]

What is the best reason why acetaldehyde is less hydrated than formaldehyde?

A. The methyl group stabilizes the hydrated form.
B. The methyl group stabilizes the C=O group.
C. Formaldehyde is not soluble in water.
D. Acetaldehyde is not soluble in water.
Would the $K_{eq}$ of acetaldehyde be (A) larger or (B) smaller or (C) the same as acetone?

\[
\text{acetaldehyde} + \text{H}_2\text{O} \rightleftharpoons \text{acetoxy hydrate} \quad K_{eq} = 1.3
\]

\[
\text{acetone} \rightleftharpoons \text{hydroxy hydrate} \quad K_{eq} = 0.002
\]

Would the $K_{eq}$ of acetaldehyde be (A) larger or (B) smaller than trichloroacetaldehyde?

\[
\text{acetaldehyde} + \text{H}_2\text{O} \rightleftharpoons \text{chloroacetoxy hydrate} \quad K_{eq} = 1.3
\]

\[
\text{trichloroacetaldehyde} \rightleftharpoons \text{chloroacetoxy hydrate} \quad K_{eq} = 2000
\]

Do alcohols react with carbonyl compounds? Which compound is behaving as the acid? Which arrow is correct?

Which of the following is an intermediate on going from the hemiacetal to the acetal?
What are acetals and hemiacetals?

Predict the product of the reaction of water with cyclohexanone in the presence of an acid catalyst.

What is the major product of the following reaction?

What is the mechanism of the following reaction?

Choose the structure that is an intermediate in the following reaction?
How many acetals and hemiacetals are present in the carbohydrate lactose?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetal</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>hemiacetal</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Acetals and ketals can be used to protect carbonyl groups.

How could the following transformation be accomplished?

How could the following transformation be accomplished?

How could the following transformation be accomplished?