How was solid soap obtained from the solution?
A. The water was allowed to evaporate.
B. The solution was cooled and the soap precipitated.
C. An organic solvent was added to the solution.
D. Salt was added to the solution.

Predict the $K_{eq}$ of the following equilibrium.

A. about 1.0
B. much greater than 1.0
C. much less than 1.0

Consider the C=O resonance energies.
A. about 1.0
B. much greater than 1.0
C. much less than 1.0

What is the mechanism of this reaction?
Which of the following reactions would be predicted to occur at a faster rate?

\[
\begin{align*}
\text{A: } & \quad \text{C}=\text{O} + \text{H}_2\text{NCH}_3 \rightarrow \text{C}=\text{O} - \text{CH}_3 \\
\text{B: } & \quad \text{C}=\text{O} + \text{H}_2\text{NCH}_3 \rightarrow \text{C}=\text{O} - \text{CH}_3 
\end{align*}
\]

Choose the answer that has the following C=O groups arranged correctly with respect to increasing reactivity towards nucleophiles.

A i < ii < iii  B i < iii < ii  C ii < i < iii  D ii < iii < i  E iii < i < ii  F iii < ii < i

Summary. Order of C=O reactivity.

Increasing reactivity

Stability of C=O

Leaving group ability

Which of the following reaction path would be predicted to be more reasonable?

\[
\begin{align*}
\text{A: } & \quad \text{C}=\text{O} - \text{CH}_3 + \text{H}_2\text{NCH}_3 \rightarrow \text{C}=\text{O} - \text{CH}_3 \\
\text{B: } & \quad \text{C}=\text{O} - \text{CH}_3 + \text{H}_2\text{NCH}_3 \rightarrow \text{C}=\text{O} - \text{CH}_3 
\end{align*}
\]
Predict the product of the following reaction.

\[
\begin{align*}
\text{HN} & \quad \text{O} \quad \text{O} \\
\text{CH}_3 & \quad \text{OCH}_3 \\
\text{N} & \quad \text{O} \quad \text{O} \\
\text{CH}_3 & \quad \text{OCH}_3
\end{align*}
\]

\[
\begin{align*}
\text{A} & \quad \text{B} & \quad \text{C} & \quad \text{D}
\end{align*}
\]

Which of the following reactions would be expected to occur as shown?

\[
\begin{align*}
1 & \quad \text{Ph} \quad \text{C} \quad \text{NH}_2 & \quad \text{Cl} \\
2 & \quad \text{Ph} \quad \text{C} \quad \text{Cl} & \quad \text{NH}_2 \\
3 & \quad \text{Ph} \quad \text{C} \quad \text{Cl} & \quad \text{OCH}_3 \\
\end{align*}
\]

\[
\begin{align*}
\text{A} & \quad \text{B} & \quad \text{C} & \quad \text{D} & \quad \text{E} & \quad \text{F}
\end{align*}
\]

Draw the mechanism for the hydrolysis of a nitrile to an amide.

\[
\begin{align*}
\text{RCN} & \quad \text{H}^+ \quad \text{H}_2\text{O} \quad \rightarrow \\
\text{RNH}_2 & \quad \text{H}^+ \quad \text{H}_2\text{O}
\end{align*}
\]

Which of the following is not an intermediate in the mechanism?

\[
\begin{align*}
\text{A} & \quad \text{B} & \quad \text{C} & \quad \text{D} & \quad \text{E}
\end{align*}
\]

Give a good mechanism for the acid catalyzed hydrolysis of a nitrile to the amide.

\[
\begin{align*}
\text{RCN} & \quad \text{H}^+ \quad \text{H}_2\text{O} \quad \rightarrow \\
\text{RNH}_2 & \quad \text{H}^+ \quad \text{H}_2\text{O}
\end{align*}
\]

Give the reaction mechanism for hydrolysis of the amide in aqueous acid to the carboxylic acid.

\[
\begin{align*}
\text{RNH}_2 & \quad \text{H}^+ \quad \text{H}_2\text{O} \quad \rightarrow \\
\text{RCO}_2\text{H} & \quad \text{H}^+ \quad \text{H}_2\text{O}
\end{align*}
\]

Continued exposure of the amide to aqueous acid results in hydrolysis to the carboxylic acid.

\[
\begin{align*}
\text{RNH}_2 & \quad \text{H}^+ \quad \text{H}_2\text{O} \quad \rightarrow \\
\text{RCO}_2\text{H} & \quad \text{H}^+ \quad \text{H}_2\text{O}
\end{align*}
\]

Nitriles are reactants for the synthesis of both amides and carboxylic acids.
Choose the structure least likely as an intermediate in the acid catalyzed hydrolysis of the amide to the carboxylic acid.

$\text{RC} - \text{N} \rightarrow \text{H}^+ \rightarrow \text{H}_2\text{O} \rightarrow \text{RC} - \text{N} - \text{O} - \text{H}$

A B C D E

Continued exposure of the amide to aqueous acid results in hydrolysis to the carboxylic acid.

$\text{RC} - \text{N} \rightarrow \text{H}^+ \rightarrow \text{H}_2\text{O} \rightarrow \text{RC} - \text{N} - \text{O} - \text{H}$

$\text{RC} - \text{N} - \text{O} - \text{H}$

$\text{RC} - \text{N} - \text{O} - \text{H}$

$\text{RC} - \text{N} - \text{O} - \text{H}$

$\text{RC} - \text{N} - \text{O} - \text{H}$

$\text{RC} - \text{N} - \text{O} - \text{H}$