This homework assignment is due at the beginning of class on Tuesday, April 8, 2010. You may use your textbook and class notes in answering these questions but should not discuss these questions with anyone else. You may simply write the answers on these pages or you may securely attach additional pages. Please write clearly. Unintelligible answers will not be considered.
1. (5 pts) Provide an IUPAC name for the following compounds.

\[ \text{N-ethylisopropylamine} \quad \text{2-methyl-5-methoxy aniline} \]

Draw the correct structure for the following molecule

2-methyl-1, 3-cyclohexadione

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2. (5 pts) Provide the structure for the product of the self-condensation (aldol) of acetone. The carbon NMR contains 6 distinct peaks with one at 196 ppm. The \(^1\)H NMR contains 4 singlets (no other peaks) in a relative ratio of 3:3:3:1. The strongest IR peak is at 1690 cm\(^{-1}\).
3. (5 pts) The following compound has two different types of protons and the pKa of each is given.

\[
\begin{align*}
&\text{pKa} = 10 \\
&\text{pKa} = 24
\end{align*}
\]

Show which protons would be removed by NaOH (pKa H$_2$O = 15.7).

\[
\text{pKa} = 10 \ 	ext{protons removed}
\]

Show which protons would be removed by LDA (pKa diisopropylamine = 35).

\[
\text{both pKa} = 10 \ 	ext{protons removed}
\]

Would triethylamine be a strong enough base to remove either or both types of protons? (pKa (CH$_3$)$_3$NH$^+$ = 10.6).

\[
\text{No - not completely}
\]

4. (5 pts) Provide the product or products for the following reactions.

\[
\begin{align*}
\text{CH}_3\text{O} & \quad \text{CH}_3\text{O} - \text{CH}_3 \quad 1) \text{CH}_3\text{O} / \text{CH}_3\text{OH} \\
\text{Br}_2 & \quad \text{HOAc} \quad 2) \text{H}^+ / \text{H}_2\text{O}
\end{align*}
\]
5. (5 pts) Fill in the needed reagents for the following sequence (a double alkylation of diethyl malonate).

\[
\text{diethyl malonate} \xrightarrow{\text{Na}^+ \cdot \text{OEt}} \text{EtO} - \text{C} = \text{OEt} \xrightarrow{\text{Br}} \text{EtO} - \text{C} = \text{OEt} \xrightarrow{\text{Na}^+ \cdot \text{OEt}} \text{EtO} - \text{C} = \text{OEt} \rightarrow \text{EtO} - \text{C} = \text{OEt}
\]

Draw the structure of the final product after treatment with NaOH/H₂O, followed by HCl and heating (decarboxylation).