1. The two \( sp^3 \)-hybridized, pyramidal amines shown below are nonsuperimposable mirror images, but an “optically active” ethylmethyamine does not exist. Explain.

\[
\begin{align*}
\text{H}_3\text{C}-\text{CH}_2\text{C} & \quad \text{mirror} \\
\text{H}_3\text{C}-\text{CH}_2\text{CH}_3 &
\end{align*}
\]

2. Draw the product that is formed when compound 1 is treated with one equivalent of HCl. Justify your answer.

\[
\begin{align*}
\text{H}_3\text{C}-\text{CH}_2\text{C} \quad \text{HCl} \\
\text{H}_3\text{C}-\text{CH}_2\text{CH}_3 &
\end{align*}
\]

3. Lidocaine (Xylocaine) is used as a local anesthetic. Provide an efficient synthetic route to lidocaine from the 2,6-dimethylaniline and any other organic or inorganic reagents.

\[
\begin{align*}
\text{H}_2\text{N} \quad ? \\
\text{Et}_2\text{N} \quad \text{O} \quad \text{N} \\
\text{H} &
\end{align*}
\]

4. Which compound of each of the following pairs is expected to be more basic?

(a) \[
\begin{align*}
\text{N} & \quad \text{H} \\
\text{H}_2\text{N} \quad \text{vs.} \quad \text{H}_2\text{N} \\
\end{align*}
\]

(b) \[
\begin{align*}
\text{H}_2\text{N} & \quad \text{vs.} \quad \text{H}_2\text{N} \\
\text{O} \quad \text{vs.} \quad \text{NH}_2
\end{align*}
\]
5. Inorganic nitrites (NO$_2^-$) are commonly used food preservatives. Their ability to diazotize (change R-NH$_2$ to R-N$_2$) free amino functions – like those in the nucleic acid residues of DNA – has been suggested as a cause for mutagenesis. Diazotization may occur under the acidic conditions of the stomach. Show how the cytidine residue below can be changed into a uridine residue in the presence of NO$_2^-$, acid, and water (i.e., “stomach conditions”).

![Diagram showing the transformation of cytidine to uridine](image)

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**Week #14 – Reading and Problems**

Chemistry 3231
December 5, 2001

**Reading**

Chapter 20:  Introduction, 20.2-20.4, 20.5a,b,d, 20.6a,c
Chapter 25:  Introduction, 25.1a-c, 25.3a,c

**Problems**

Chapter 20:  3, 6, 8*, 10*, 13, 34, 40, 41A-C, 43A-C
Chapter 25:  3, 5*, 6*, 17, 24*, 29
* Good problems to do

**Announcements**

1. Syllabus update: We are not (obviously) going to cover all the topics on the syllabus. We should get through amines, and a little bit of amino acids (hopefully!) – parts of Chapters 20 and 25.

2. My schedule for the next couple of weeks:
   * **Office hours** at 1-3 pm on the following days – Wed., 12/5; Mon., 12/10 (Alt. 806)
   * **Review session** at 10-11 am on Wed., 12/12 (Alt. 202)
   * **Individual appointments** at 1-5 pm on Wed., 12/12 (Alt. 705)

3. If you wish to schedule an appointment with me, please do it soon. My schedule is getting booked rather quickly. I apologize in advance for those students with whom I will not be able to meet, as there is not enough time to accommodate everyone.

4. CONGRATULATIONS on getting to the last problem set of the semester!!! ☺