CHE 232  Section 001  Organic Chemistry
Final Exam   December 15, 2003

Name__________________________                Student ID No._____________________

You are allowed to have scratch paper and a simple model set. You do not need a calculator.

Read each question carefully so that you answer properly.

Make sure answers are clear.

In indicated problems, there are possibilities for extra credit upon answering more than is required.

Read through the whole exam before starting. Do what you do best first.

Do not second-guess yourself.
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1. (10 pts) Explain briefly why the reaction on the left proceeds rapidly, but the one on the right does not.

\[
\begin{align*}
\text{NH}_2\text{Cl} + \text{NaOH} + \text{H}_2\text{O} &\rightarrow \text{NH}_2\text{NH}_3^+ \\
\text{NH}_2\text{Cl} + \text{NaOH} + \text{H}_2\text{O} &\rightarrow \text{Essentially no reaction}
\end{align*}
\]

2. (10 pts) Recall how Hofmann elimination is different than what is normally expected in an elimination. What then is the carbon-carbon double bond-containing product from the reaction below?

\[
\begin{align*}
\text{N}^+ \text{I}_- &\rightarrow 1. \text{AgOH} \\
\text{N}^- &\rightarrow 2. \Delta
\end{align*}
\]

3. (10 pts) Explain briefly why you would not try to make an enolate from amide “A”, but you might from “B”.

\[
\begin{align*}
\text{A} &\rightarrow \text{O} \text{NH}_2 \\
\text{B} &\rightarrow \text{O} \text{N}^-
\end{align*}
\]

4. (20 pts) Choose which compounds are aromatic and complete Frost’s circle on them.

\[
\begin{align*}
\text{Frost’s circle}
\end{align*}
\]

5. (10 pts) Circle the nitrogen atom in each compound which would be protonated first.

\[
\begin{align*}
\text{Frost’s circle}
\end{align*}
\]
6. (10 pts) List 3 unexpected features of a reaction which might indicate that there might have been a neighboring group effect (NGE).

A.

B.

C.

7. (10 pts) Within each box, choose which bold proton is the most acidic (circle it). Think resonance (spread the unhappiness).

8. (20 pts) Provide a full mechanism to explain why product “A” is favored in the nucleophilic attack on the pyridine below. Be sure to include resonance structures and indicate the most important one and briefly state in words why that one is favorable.
9. (50 pts) Draw the product. Assume workup to get neutral products. *Extra credit for more than 10 correct.*
10. (30 pts) Provide full mechanisms for the following transformations. *Extra credit for doing more than 3.*
Mechanisms (continued)

Two new alcohols
Keep up with stereochemistry
11. (20 pts) Provide a reasonable synthesis, including all reagents, to get the product from the indicated starting material. *Extra credit for doing more than one.*

\[
\text{O} \quad \text{N} \\
\text{O} \quad \text{N} \\
\text{N} \quad \text{O} \\
\text{O} \quad \text{Me}
\]

You may not add more than one carbon at a time.

\[
\text{C} \quad \text{N} \\
\text{O} \quad \text{N} \\
\text{O} \quad \text{C} \quad \text{O} \\
\text{Me}
\]

You may not add more than one carbon at a time.