Chemistry 334

Final Examination

December 17, 2012

Professor Charonnat

Name: _____________________________

Be certain that your examination has eight (8) pages including this one.

Put your name on each page of this examination booklet.

By putting your name on this examination booklet you agree to abide by California State University, Northridge policies of academic honesty and integrity.

Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.
1. (35 points)

Draw the structure of the expected major organic product for each of the following five (5) questions. Specify stereochemistry clearly, if relevant. Place a star next to any chiral product.

A.

\[
\text{Ph} \quad \text{SePh} \quad \xrightarrow{\text{HNO}_3, \text{H}_2\text{SO}_4}
\]

B.

\[
\text{Ph} \quad \text{SePh} \quad \xrightarrow{\text{H}_2\text{O}_2}
\text{(racemic)}
\]

C.

\[
\text{CH}_3 \quad \xrightarrow{\text{trace NaOH}}
\]

D.

\[
\text{H}_3\text{CO} \quad \text{H} \quad \xrightarrow{\text{HCN, cat. KCN}}
\]

E.

\[
\text{H}_3\text{N}^+ \quad \text{CO}_2^- \quad \xrightarrow{\text{PhOCOCl, Et}_3\text{N}}
\]
2. (40 points)

Draw the specific reagent(s) necessary to effect the transformation shown for each of the following four (4) questions. If more than one step is required, be certain to specify each step separately.

A.

\[
\begin{align*}
\text{H}_3\text{C} & \quad \text{CH}_3 \\
\text{CH}_3 \quad \text{OH} & \quad \text{C}_3\text{H}_5\text{CO} \\
\text{CH}_3 & \quad \text{O} \quad \text{C}_3\text{H}_5 \quad \text{CH}_3 \\
\end{align*}
\]

B.

\[
\begin{align*}
\text{H}_3\text{CO} & \quad \text{CH}_3 \\
\text{CH}_3 & \quad \text{O} \\
\end{align*}
\]

(racemic)

C.

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

D.

\[
\begin{align*}
\text{H}_3\text{C} & \quad \text{Br} \\
\text{CH}_3 & \quad \text{CH}_3 \\
\text{CH}_3 & \quad \text{OH} \\
\text{CH}_3 & \quad \text{CH}_3 \\
\end{align*}
\]
3. (50 points)

These questions are unavailable due to copyright considerations.
4. (25 points)

Draw a specific example of each of the following twelve (12) categories.

A. any disulfide:

B. any naturally-occurring unsaturated fatty acid:

C. any nonnucleophilic base:

D. any prostaglandin:

E. any disaccharide:

F. any basic α-amino acid:

G. any γ-amino acid:

H. any condensation copolymer:

I. any organic compound with an odd molecular weight:

J. any triacylglycerol:

K. any steroid:

L. any seco steroid:
5. (20 points)

Answer the following two (2) questions precisely, succinctly, and with correct grammar.

A. What is meant by the term, “nonrepetitive secondary protein structure”? Describe a specific example of such a structure.

B. Why is the following conjugated diene unsuitable for Diels-Alder reactions?

6. (10 points)

The terpene, nepetalactone, is the active component of catnip that attracts cats. Circle the "isoprene" units in this terpene. Label the head (h) and tail (t) of each "isoprene" unit. Finally, state nepetalactone's terpene classification.

nepetalactone
7. (20 points)

Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates, unshared electrons, formal charges and countercharges. Specify reversibility or irreversibility for each primary mechanistic step. Finally, state the mechanistic basis for the observed regiochemical control.

\[
\begin{array}{c}
\text{b.) } \text{H}_3\text{I}^- \\
\end{array}
\]

\[
\begin{array}{c}
\text{a.) } \text{H}_3\text{C}^- \text{N}^- \text{CH}_3 \\
\text{CH}_3 \text{ Li}^+ \\
\end{array}
\]

Congratulations!

1 /35
2 /40
3 /50
4 /25
5 /20
6 /10
7 /20
Total: /200