Chemistry 334

Final Examination

December 14, 2009

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. (50 points)

Draw the structure of the expected major organic product for each of the following ten (10) questions. Specify stereochemistry clearly, if relevant.

A.

\[
\text{H}_3\text{C} \underset{\text{CHO}}{\xrightarrow{\Delta}} \]

B.

\[
\xrightarrow{\text{a.) (H}_3\text{C)}_2\text{CuLi}} \quad \xrightarrow{\text{b.) H}_2\text{O}}
\]

C.

\[
\xrightarrow{\text{a.) NaOCH}_3} \quad \xrightarrow{\text{b.) aq. HCl}}
\]

D.

\[
\xrightarrow{\text{SOCl}_2}
\]

E.

\[
\xrightarrow{(\text{H}_3\text{C)}_2\text{CuLi}}
\]
1. (continued)

F. 

\[
\text{H}_2\text{O}_2
\]

G. 

\[
m-\text{CPBA}
\]

H. 

\[
aq. \text{NaOH} \quad \Delta
\]

I. 

\[
\text{K}_2\text{CO}_3
\]

J. 

\[
\text{Ph}_3\text{PCHCO}_2\text{CH}_3
\]
2. (40 points)

Draw the specific reagent(s) necessary to effect the transformation shown for each of the following three (3) questions. If more than one step is required, be certain to specify each step separately.

A.

\[
\text{H}_3\text{C} - \text{C} - \text{H}_3 \quad \text{H}_3\text{C} - \text{C} - \text{H}_3 \quad \text{N} - \text{CH}_3 \quad \text{H}_3\text{C} - \text{C} - \text{H}_3
\]

B.

\[
\text{H}_3\text{C} - \text{CH}_3 \quad \text{CH}_3 \quad \text{O} - \text{CH}_3 \quad \text{H}_3\text{C} - \text{C} - \text{H}_3
\]

C.

\[
\text{H}_3\text{C} - \text{O} - \text{CH}_3 \quad \text{H}_3\text{C} - \text{O} - \text{CH}_3 \quad \text{H}_3\text{C} - \text{O} - \text{CH}_3
\]
3. (25 points)

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

A. any radical anion:

B. any reagent with a nonnucleophilic nitrogen:

C. any furanose:

D. any α-1,6’ glycoside:

E. any naturally-occurring unsaturated fatty acid:

F. any naturally-occurring wax:

G. any alternating copolymer:

H. any addition homopolymer:

I. any polymer that can be formed by an anionic mechanism:

J. any polymer that can be formed by a cationic mechanism:

K. any essential α-amino acid:

L. any γ-amino acid:
4. (35 points)

Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all unshared electrons, formal charges and countercharges where appropriate. (Note: HZ is a weak acid.) Finally, state briefly why the observed product is as shown, not the tautomer 1.

![Mechanism diagram]
5. (25 points)
Circled the letter that corresponds to the correct answer for each of the following five (5) questions.

These questions are unavailable due to copyright considerations.
6. (10 points)

Use IUPAC nomenclature to write the systematic name of the following carbohydrate.

```
H
H
HO
CH₂OH
```

7. (15 points)

Circle the "isoprene" units in the terpene, menthol. Label the head (h) and tail (t) of each "isoprene" unit clearly. Finally, state menthol’s terpene classification.

```
\text{CH₃}
\text{OH}
\text{H₃C}\text{CH₃}
menthol
```

Congratulations!

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