Chemistry 333

Hour Examination #3

November 23, 1998

Name: _____________________________

Be certain that your examination has five (5) 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.
1. (25 points)

For each of the following five (5) questions specify the expected major organic product. If relevant, clearly specify the relative and/or absolute stereochemistry of the product.

A.

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

\[
\text{a.) LiAlH}_4 \\
\text{b.) H}_2\text{O}
\]

B.

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

\[
\text{a.) BH}_3\cdot\text{THF} \\
\text{b.) H}_2\text{O}_2\cdot\text{NaOH}
\]

C.

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

\[
\text{Br}_2
\]

D.

\[
\begin{align*}
\text{CH}_3 & \\
\end{align*}
\]

\[
\text{HBr} \\
\text{ROOR}
\]

E.

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

\[
\text{H}_2\cdot\text{Pd/C}
\]
2. (20 points)

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

A. Why does addition of anhydrous HBr to 3,3-dimethyl-1-butene give 2-bromo-2,3-dimethylbutane, not 3-bromo-2,2-dimethylbutane? Draw appropriate intermediates to illustrate your answer.

B. Why is pyridinium chlorochromate, not Jones reagent, used to oxidize a primary alcohol to the corresponding aldehyde?

3. (10 points)

Use IUPAC nomenclature to write the systematic name of the following alcohol.
4. (20 points)

For each of the following five (5) questions, circle the number that corresponds to the correct answer.

A. Addition of dichlorocarbene to an alkene occurs via:
   1. a radical mechanism
   2. an ionic mechanism
   3. a concerted cycloaddition

B. Reaction of \((R)\)-3-nonanol with phosphorus tribromide affords 3-bromononane with:
   1. inversion of configuration
   2. partial inversion of configuration
   3. retention of configuration

C. Addition of an excess of methylmagnesium bromide to the ester, ethyl acetate, followed by aqueous workup, gives:
   1. a primary alcohol
   2. a secondary alcohol
   3. a tertiary alcohol

D. The oxidation level of a ketone is:
   1. one level higher than the corresponding secondary alcohol
   2. at the same level as the corresponding secondary alcohol
   3. one level lower than the corresponding secondary alcohol

E. Ozonolysis of a trisubstituted alkene, followed by reductive workup, affords:
   1. two aldehydes
   2. an aldehyde and a ketone
   3. two ketones
5. (25 points)

Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates, lone pairs and formal charges. (N.B. Additional unshared electrons on mercury are not shown for graphical clarity.)

Comment briefly why a racemic mixture of the organomercurial product is obtained.

Have a very happy Thanksgiving!