## CHEMISTRY 59-230

## SECOND TEST

## Time: 50 Min

November 13, 2001
NAME: $\qquad$
ID \#: $\qquad$

## LABORATORY DAY:

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READ ALL QUESTIONS CAREFULLY AND ANSWER THE QUESTION ASKED!! Answer all questions on the test paper. One blank sheet at the end can be used for rough work which will not be marked. Only the FIRST answer to any question will be considered. Mechanisms are NOT required unless specifically asked for. Point values for each question are given. There are 8 questions and 4 pages in this test and the available points total 100.

1. Pick a word from the following list (enantiomers, diastereomers, identical) which correctly describes the relationship between the pairs of molecules shown below. [20 points]
(a)

(b)


AND

(c)

(d)


AND


Determine the absolute configuration ( R or S ) of each chiral centre in the RIGHT drawing of question 1(b). Show how you arrived at your answer. [6 points]
3. Draw the COMPLETE MECHANISM of the acid-catalyzed reaction of 1-methylcyclohexene with water. Be sure you indicate which steps are reversible and show any stereochemistry if this is important. ALSO, write an equation for the overall reaction. [10 points]
4. For each of the following reactions, fill in the blank with the structural formula of the required chemical. If stereochemistry is important, make sure your drawings show this. Show any required catalysts over the reaction arrow. [5 points each]
(a)

(b)

(c)

(d)

(e)

(f)

5. Consider the following pairs of reactions and answer the question posed. GIVE A REASON FOR YOUR ANSWER. Brief answers (a few words) are best. [4 points each]
(a)

Which reaction will be more likely to go via a Sn 1 mechanism AND WHY?

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\begin{aligned}
& \mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{Cl}+\mathrm{H}_{2} \mathrm{O} \longrightarrow \mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH} \\
& \mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{Cl}+\mathrm{OH}^{\ominus} \longrightarrow \mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{OH}
\end{aligned}
$$

(b)

Which reaction will be more likely to give an optically active product AND WHY?

(c)

Circle the product that is more likely to be formed and indicate why you chose that one.

6. How many products (including stereoisomers) would you expect from the reaction of 4-methyl-1,3pentadiene assuming that bromine only reacts once (i.e. that the product has 2 bromine atoms and one remaining double bond). Briefly explain your reasoning [6 points]
7. [2 points each] Indicate whether each of the following statements is TRUE [T] or FALSE [F]
(a) bromine and chlorine are both +I substituents
[ ]
(b) the symbol that is used to indicate electronic effects caused by resonance is [R ]
(c) geometric isomers are diastereomers [ ]
(d) 2-methylcyclohexanol will react faster than 1-methylcyclohexanol in a Lucas test [ ]
(e) there are three stereoisomers of butan-2,3-diol
[ ]
8. A molecule $\mathbf{A}$ with the molecular formula $\mathrm{C}_{8} \mathrm{H}_{14}$ discharged the color of a bromine solution and reacted with ozone $\left(\mathrm{O}_{3}\right)$ to give a molecule with the formula $\mathrm{C}_{8} \mathrm{H}_{14} \mathrm{O}_{2}$. Which of the following molecules fits this information for $\mathbf{A}$ ? Explain your choice. [6 points]

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