

Chemistry 334

Hour Examination #1

March 8, 2004

Professor Charonnat

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.

Molecular models are allowed for this examination. Calculators are unnecessary and are not allowed.

Name: _____

1. (20 points)

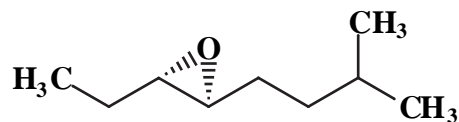
Answer the following two (2) questions precisely, succinctly and with correct grammar.

A. What type of molecular transition does ultraviolet/visible spectroscopy probe?

B. Why is the *s-trans* conformation of a conjugated 1,3-diene unreactive in a Diels-Alder reaction?
Draw structures to illustrate your answer.

2. (10 points)

Use IUPAC rules to write the systematic name of the following epoxide.



Name: _____

3. (25 points)

Circle the number that corresponds to the correct answer for each of the following five (5) questions.

A. Unpaired-electron density resides at:

1. positions 1 and 2 of an allylic radical
2. positions 1 and 3 of an allylic radical
3. positions 2 and 3 of an allylic radical

B. Oxidation of a sulfide with one mole of hydrogen peroxide affords:

1. a sulfoxide
2. a sulfone
3. a thiol

C. The broadband proton-decoupled ^{13}C NMR spectrum of methyl *tert*-butyl ether has:

1. 2 resonances
2. 3 resonances
3. 4 resonances

D. 1,4-Pentadiene is:

1. an isolated diene
2. a conjugated diene
3. a cumulated diene

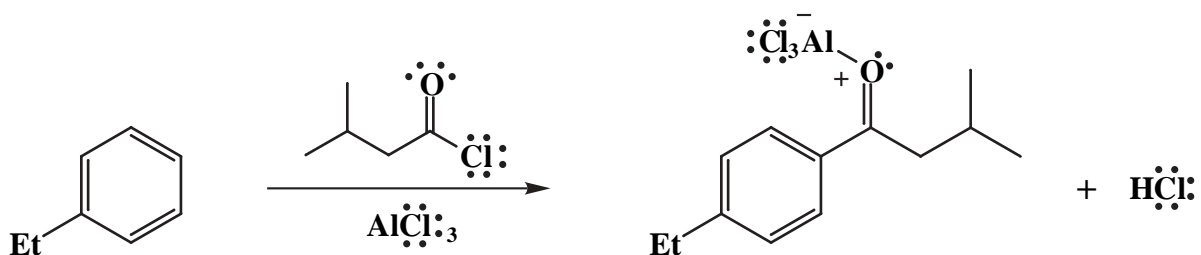
E. The first step in a Birch reduction is the addition of an electron to the aromatic ring.
The intermediate formed in this first step is:

1. aromatic
2. antiaromatic
3. nonaromatic

Name: _____

4. (20 points)

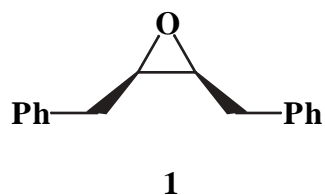
Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show **all** intermediates and denote **all** lone pair electrons, unpaired electrons, formal charges, countercharges and resonance structures where appropriate. (Note: Subsequent aqueous workup generates the corresponding neutral ketone. Do not show this portion of the mechanism.)



Name: _____

5. (25 points)

Design a synthesis of the epoxide **1** from toluene and acetylene. Use any additional inorganic and organic reagents that are necessary. Show all reagents and stable synthetic intermediate compounds. (N.B. Do not draw mechanisms for each synthetic transformation!)



from PhCH_3 and $\text{H}-\text{C}\equiv\text{C}-\text{H}$

Congratulations!

1	/20
2	/10
3	/25
4	/20
5	/25
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Total:	/100