Chemistry 334

Examination #1

September 29, 2014 Professor Charonnat

Name: _____

Be certain that your examination has six (6) 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.

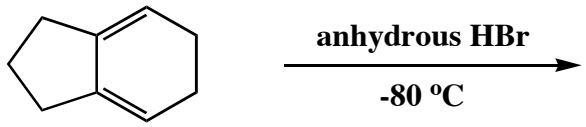
Molecular models are allowed for this examination. All electronic devices, including calculators,
are unnecessary and are not allowed.

Name: _____

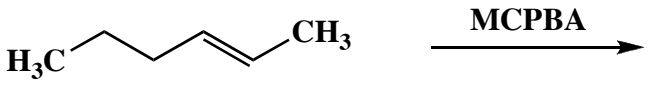
1. (25 points)

Draw the structure of the expected major organic product for each of the following five (5) questions. Specify stereochemistry clearly, if relevant.

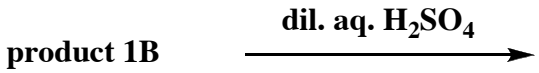
A.



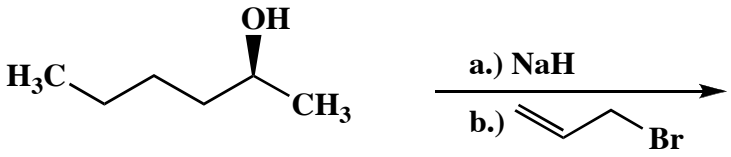
B.



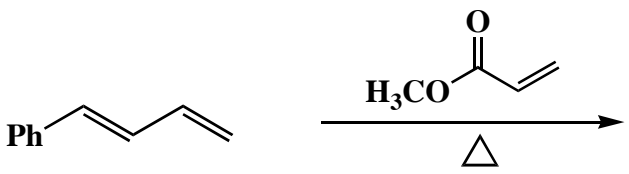
C.



D.



E.

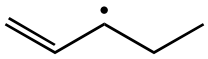


Name: _____

2. (25 points)

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

A. The highest-occupied molecular orbital (HOMO) of the following radical is

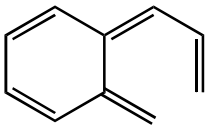


1. π_2
2. π_3
3. π_5

B. For a given compound that possesses a UV chromophore, its molar absorptivity is

1. identical at all wavelengths
2. variable at different wavelengths, and always has a solitary maximum
3. variable at different wavelengths, and can have multiple maxima

C. The following compound is



1. nonaromatic
2. aromatic
3. antiaromatic

D. The reaction of an achiral, unsymmetrical sulfide with an equimolar amount of hydrogen peroxide affords

1. a sulfone
2. an optically active sulfoxide
3. a racemic sulfoxide

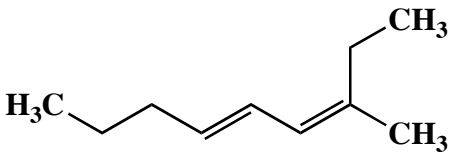
E. The Birch reduction of anisole derivatives occurs via a mechanism that includes

1. radical intermediates
2. carbocation intermediates
3. carbene intermediates

Name: _____

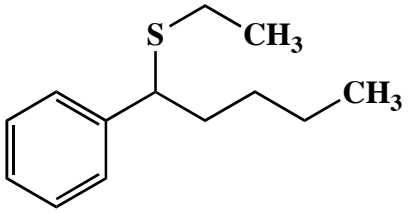
3. (10 points)

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



4. (20 points)

Draw the specific reagents necessary to synthesize the following sulfide from benzene and any other organic compounds that contain five or fewer carbons. Distinguish individual steps clearly and draw each stable synthetic intermediate compound (i.e., the major organic product of each reaction). Do **not** draw mechanisms. Finally, explain why the target is racemic. In particular, state which reactions in your synthesis yield racemic products and why those outcomes are expected.

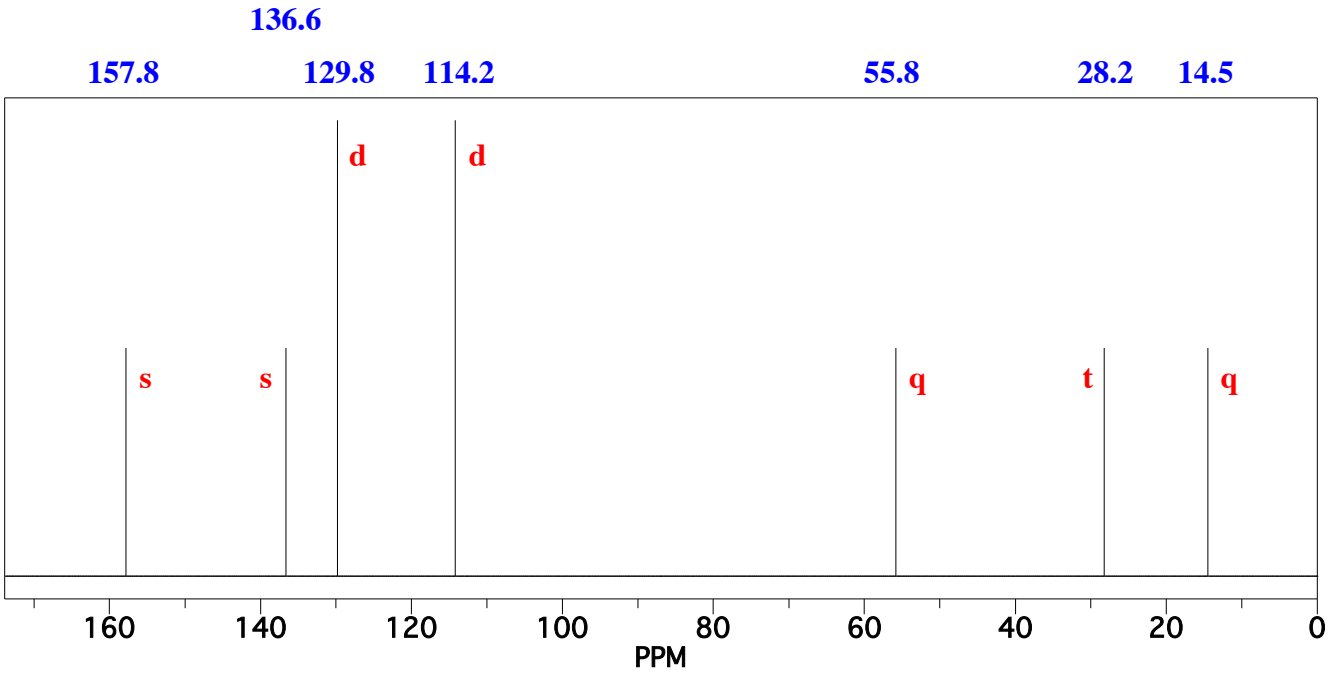


(racemic)

Name: _____

5. (20 points)

The broadband proton-decoupled ^{13}C NMR spectrum of an unknown organic compound ($C_9H_{12}O$) is shown below. The labels next to each of the resonances signify the multiplicities observed in the corresponding off-resonance proton-decoupled ^{13}C NMR spectrum (s = singlet, d = doublet, t = triplet, q = quartet). Use the spectroscopic data to determine the structure of this compound. Make clear assignments of all resonances to explain your reasoning. (A ^{13}C NMR correlation table is included separately.)



Name: _____

5. (continued)

^{13}C NMR assignments:

chemical shift (ppm)	assignment	explanation of multiplicity
157.8		
136.6		
129.8		
114.2		
55.8		
28.2		
14.5		

Congratulations!

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