

Problem Set 1

Out: October 8, 1999

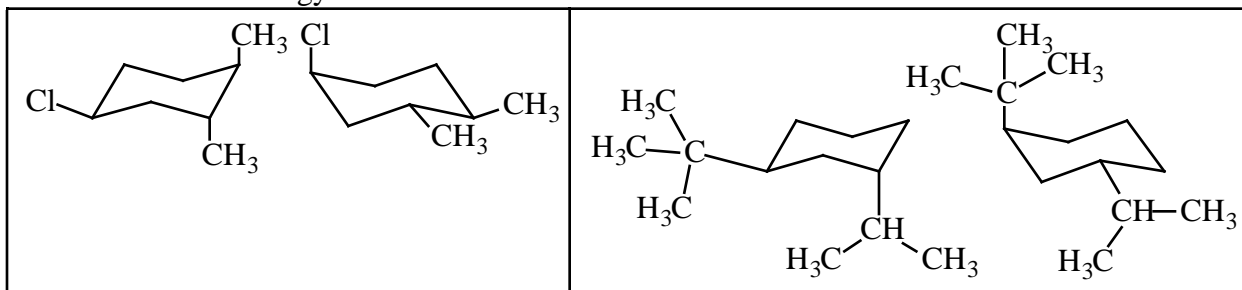
Due Back: **October 18, 1999**

Chemistry 221, 1999

Answers to the following problems should be written, in order and labeled, on 8 1/2 x 11 inch paper. Answers written on the problem set itself will not be graded.

Section A

- For each of the two pairs of conformers below:
 - Recopy the two chair forms shown below.
 - Identify the more stable of the two.
 - Give the energy difference between the two. Show calculations.

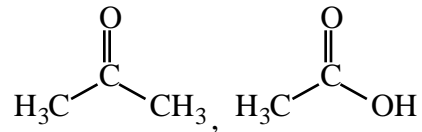


- Draw both chair forms of both isomers of 1-ethyl-3-methylcyclohexane. [You should end up with 4 structures]
 - Calculate the energy difference between the different chair forms for each isomer.
 - Does it appear that one isomer is more stable than the other (taking into account either or both of the chair forms for each isomer)? If so, which, and why?

Section B

- From the list of 10 compounds below:
 - Show reactions for all combinations which will give a favorable ($K_{eq} > 1$) Brønsted acid/base reaction.
 - Calculate the approximate K_{eq} for each reaction you write.
 - Label the acid, base, conjugate acid and conjugate base in each reaction you write (you may wish to set this up as a table, with the columns labeled).

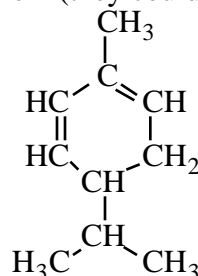
H₂O, NH₃, NaOH, NaNH₂, CH₄, Na⁺ -CH₃, H₃O⁺ Cl⁻, CH₃OH,



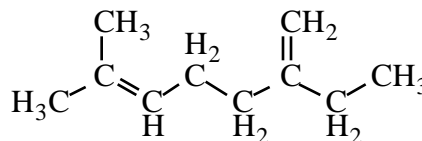
Section C

1. Provide IUPAC names for the following compounds. Also, redraw these, and show the isoprene units in them (they could be terpenes).

a.¹



b.



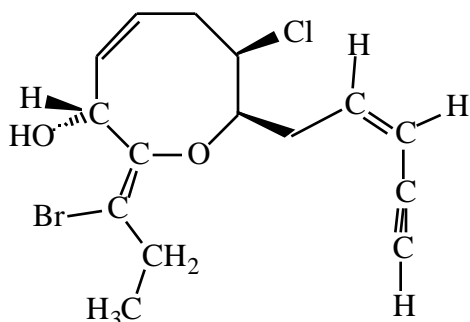
2. Draw a clear representation of the following compounds:

a. 2,6-dimethyl-5-ethyl-5-propyl-1,3-nonadiene

b. 1-cyclopropyl-3-methylcyclohexene

Section D

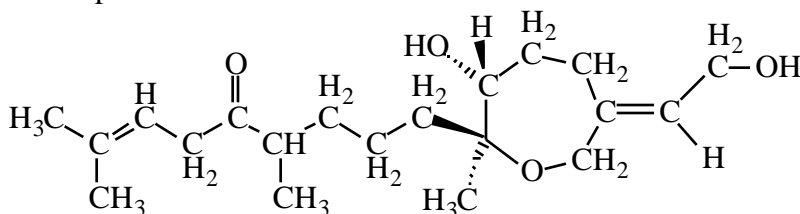
1. Redraw this molecule and show the configuration of each of the double bonds in this molecule. Use E, Z or NA (Not Applicable).



Chondrial

Anti-viral compound from red algae

2. How many *cis-trans* isomers are possible in the fertility-regulating compound zoapatanol? Be sure to count all kinds of cis and trans.



Section E

1. Choose a group of 2-4 members, and choose a molecule from the examples provided, or by mutual agreement with the instructor. Schedule an appointment for a 15-20 minute time with the instructor. Study the molecule carefully, and come to the appointment ready to answer questions about the bonding, conformational analysis, possible isomers, or other structural questions that may come up.

¹-Phellandrene. From essential oils of Eucalyptus and from oil of bitter fennel.