

ORGANIC CHEMISTRY 30A

(Prof. Yves Rubin)

UCLA, FALL 2003

MIDTERM EXAM I

On my honor, I have neither given nor received any aid on this exam
(Please, use ink for this first page!):

Signature

I. D. Number

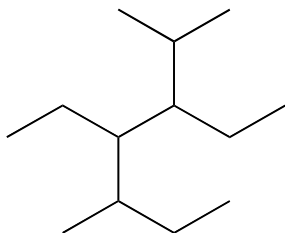
Full Name (**Please Print !**)

| Question | Points |
|----------|--------|
| 1 (25) | |
| 2 (20) | |
| 3 (25) | |
| 4 (30) | |

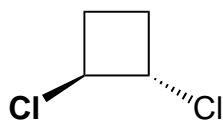
Total (100)

=====

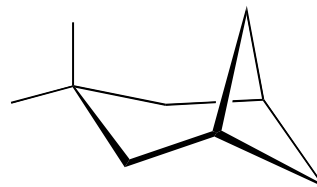
1. a) (12 points) Give the IUPAC name for each of the following compounds (Note: you **don't** need to give absolute configurations in this part of the problem):



A



B



C

Compound **A**:

Compound **B**:

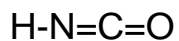
Compound **C**:

2. (8 points) Give the correct structure of the following two compounds:

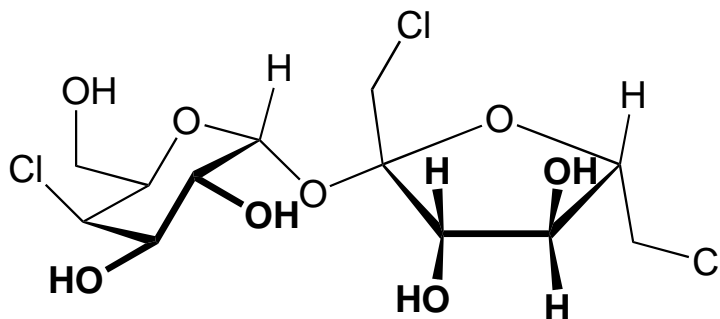
(*R*)-6-chlorobicyclo[3.2.0]heptane

(1*R*,2*S*)-1-chloro-2-ethylcyclohexane

2. (5 points) Draw all the bonding and lone-pair orbitals in the following compound:



2. a) (20 points) Give the absolute configuration of all stereocenters in the following compound:



Sucralose (Splenda)

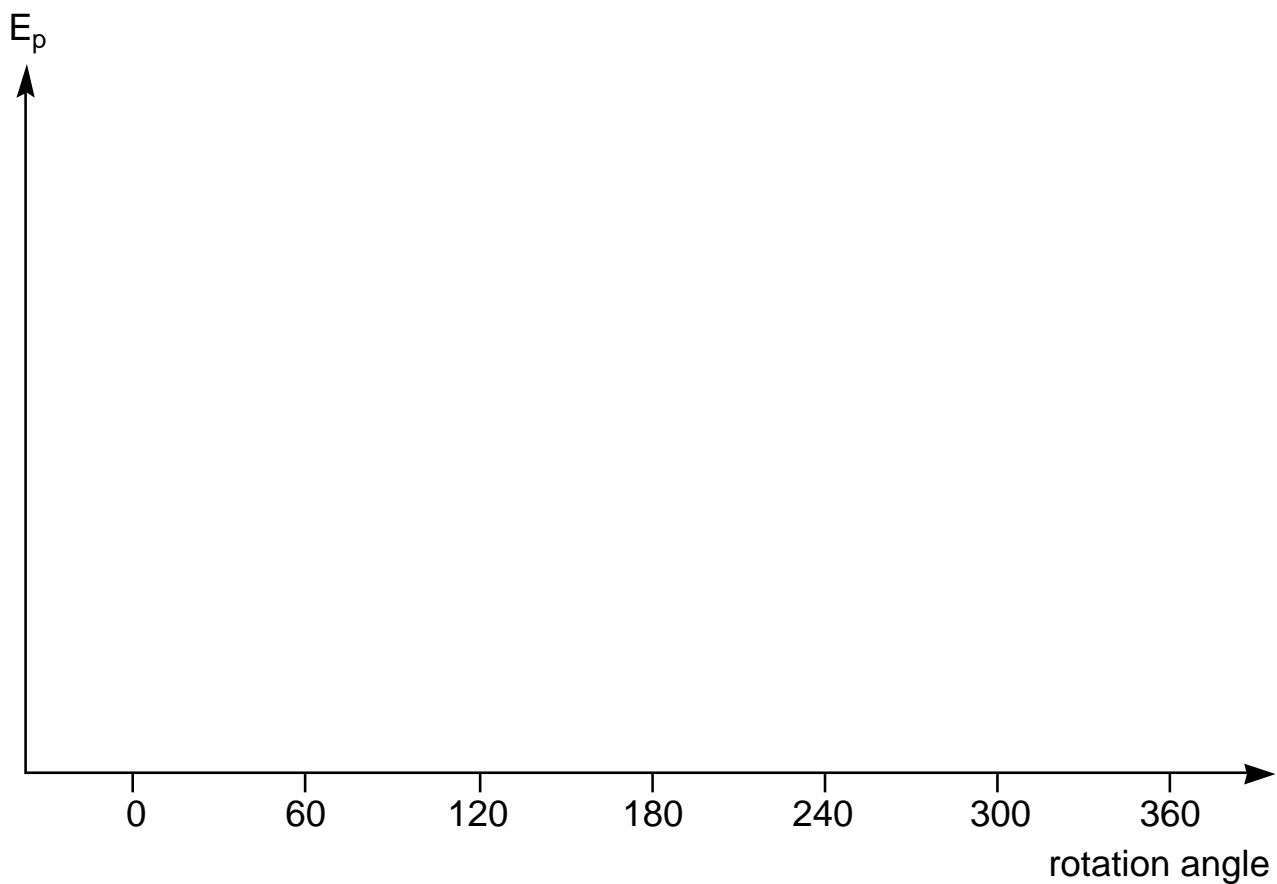
(redraw flat if it helps!)

Sucralose (Splenda) is a compound 600 times sweeter than normal sugar (Aspartame, "Nutrasweet" is 300x sweeter but has a metallic aftertaste). It is the result of one of the strangest "accidental discovery" story of all artificial sweeteners. Tate & Lyle, a British sugar company, was looking for ways to use sugar as a chemical intermediate. In collaboration with Prof. Leslie Hough's laboratory at King's College in London, halogenated sugars were being synthesized and tested. A foreign graduate student, Shashikant Phadnis, misunderstood a request for "testing" a chlorinated sugar as a request for "tasting," leading to the discovery that many chlorinated sugars are sweet with potencies some hundreds or thousands of times as great as sucrose.

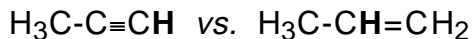
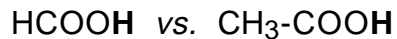
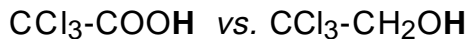
As an aside, I looked into this molecule after I tasted an "all-natural" peach iced tea yesterday morning, and was surprised by its strange sweet taste (I still can't stand those artificial sweeteners...)

3. a) (25 points) **READ!** On the potential energy/rotation angle diagram below, draw all possible conformations of 1,1,2,2-tetrachloroethane considering the rotation of the C-C bond by using Newman projections. Start by drawing the rotamer with the lowest energy at the 0° mark and turn the front carbon by 60° increments *clockwise*. Indicate the *relative energy levels* of the conformations with short bold lines, and connect those levels having the same energy with a curve. Label the rotamers that have the maximum or minimum energies.

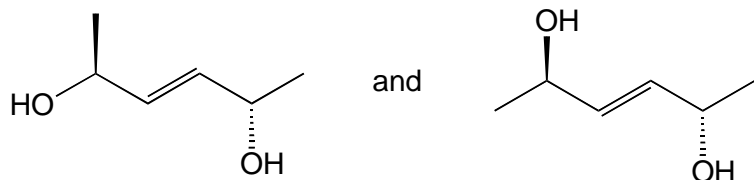
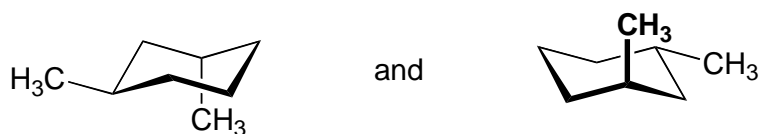
1,1,2,2-tetrachloroethane conformers:



4. (10 points) Circle the compound in each of the following pairs that is **most acidic** and provide a keyword to explain why:



3. a) (10 points) What is the stereoisomeric relationship between the following pairs ?:



c) (10 points) Show the product resulting from mixing the two compounds in each equation:

i)



ii)

