

COMPLETE THIS SECTION : Up to TWO POINTS will be removed for incorrect/missing information!

PRINTED **FIRST NAME** _____ PRINTED **LAST NAME** _____

Person on your **LEFT** (or **Empty** or **Aisle**) _____

Person on your **RIGHT** (or **Empty** or **Aisle**) _____

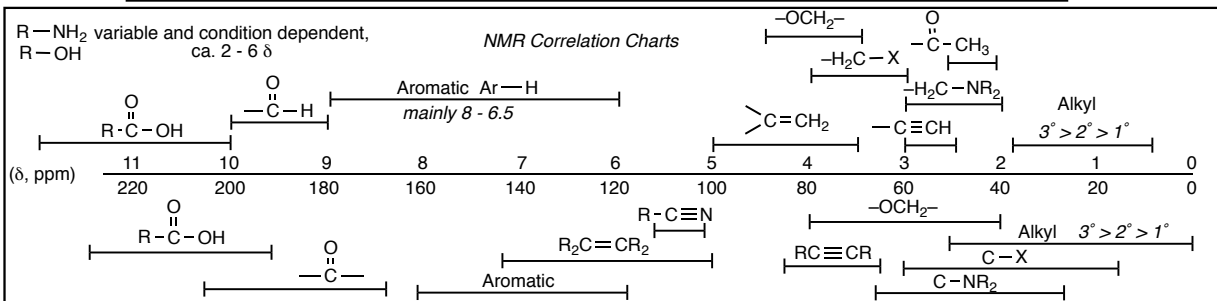
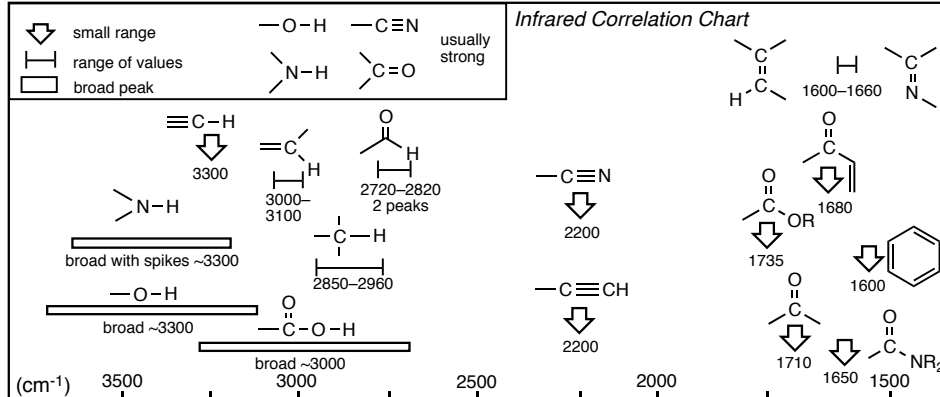
Class you are REGISTERED FOR (onground or hybrid) _____

The room where most students will take the test for your class, i.e. LS A-191 for onground and PS H-152 for hybrid) _____

****YOU ARE NOT ALLOWED TO TAKE SPARE COPIES OF THIS EXAM FROM THE TESTING ROOM****

- PRINT YOUR NAME ON EACH PAGE!
- READ THE DIRECTIONS CAREFULLY!
- USE BLANK PAGES AS SCRATCH PAPER
- work on blank pages will not be graded...
- WRITE CLEARLY!
- MOLECULAR MODELS ARE ALLOWED
- DO NOT USE RED INK
- DON'T CHEAT, USE COMMON SENSE!

H	He	Interaction Energies, kcal/mol	
Li Be	B C N O F Ne	Eclipsing	Gauche
Na Mg	Al Si P S Cl Ar	H/H -1.0	Me/Me -0.9
K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn	Ga Ge As Se Br Kr	H/Me -1.4	Et/Me -0.95
Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd	In Sn Sb Te I Xe	Me/Me -2.6	i-Pr/Me -1.1
Cs Ba Lu Hf Ta W Re Os Ir Pt Au Hg	Tl Pb Bi Po At Rn	Et/Et -3.1	t-Bu/Me -2.7



**YOU MUST COMPLETE THIS PAGE WITH YOUR NAME
(EVEN THOUGH YOU ALREADY DID THIS ON THE COVER PAGE)
AND ALSO GIVE YOUR ASU OR POSTING ID NUMBER
WE NEED THIS NUMBER BECAUSE YOU WOULDN'T BELIEVE THE NUMBER OF
STUDENTS WHOSE NAMES WE CAN'T READ!**

PRINTED
FIRST NAME _____ *PRINTED*
LAST NAME _____ *ASU ID or*
Posting ID _____

Points by question

1 _____ / 11
2 _____ / 24
3 _____ / 18
4 _____ / 18
5 _____ / 32
6 _____ / 30
7 _____ / 20
8 _____ / 22

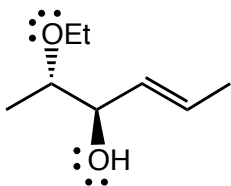
Points Removed for cover errors ____ / 2

Extra Credit ____ / 5

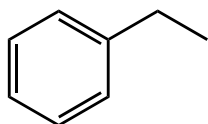
Total (incl Extra) _____ / 175+5

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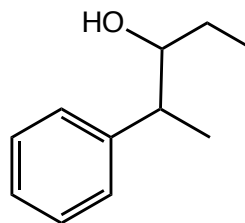
Question 1 (11 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



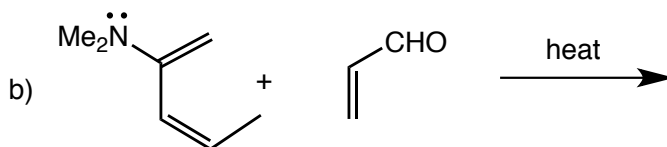
Question 2 (24 pts.) Show how you would make the target compound on the right from the starting compound on the left. Show reagents and conditions where appropriate, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms. Ignore stereochemistry.



(ignore stereochemistry)



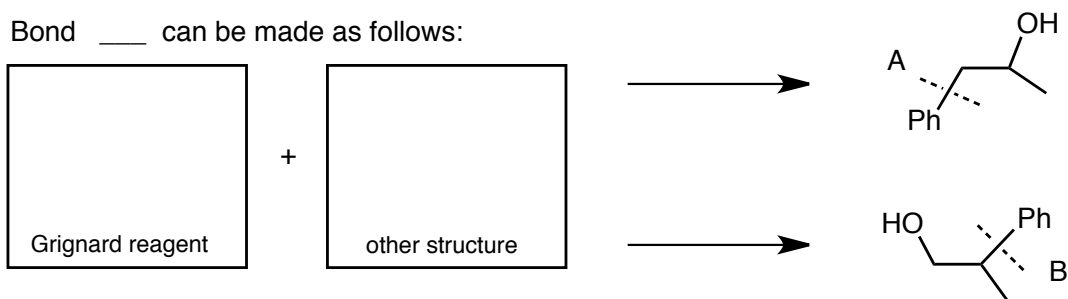
Question 3 (18 pts) Give the major organic products of the following reactions, indicate the stereochemistry using wedged/dashed bonds as appropriate and be sure to indicate the presence of any racemic mixtures.



Question 4 (18 pts.) For the following structure:

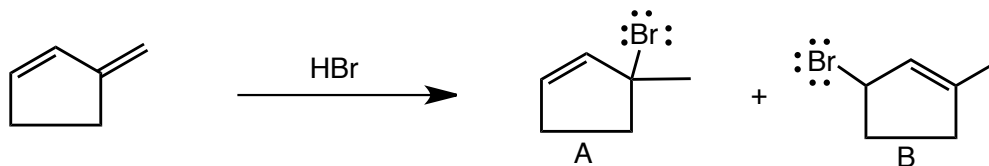
- Decide which of the bonds A and B it is possible to make in a Grignard reaction
- Indicate which bond you can make in a Grignard reaction, A or B, and give the Grignard reagent and the structure it would react with in the provided boxes (you can ignore the H_3O^+ acid workup step)
- Briefly state why the other bond (A or B) cannot be made.

Bond ____ can be made as follows:



The problem with making bond ____ is:

Question 5 (32 pts.) For the following reaction, give a full curved-arrow pushing mechanism for formation of BOTH products and **indicate the Lewis acid and base at each step (LA or LB) and whether they are also Bronsted acids and bases (BA or BB). Include all reasonable resonance contributors for any intermediates AND INDICATE THE MAJOR RESONANCE CONTRIBUTOR IF APPROPRIATE!!**



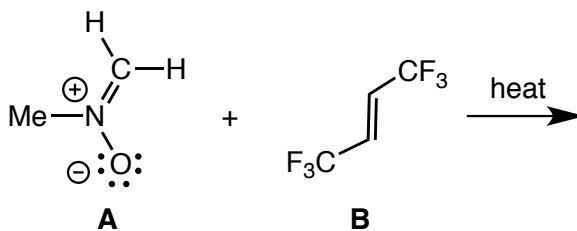
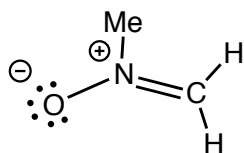
number of steps in the mechanism for product A _____

number of steps in the mechanism for product B _____

b) Indicate which product, A or B, would be formed under thermodynamically controlled conditions and which would be formed under kinetically controlled conditions and give a BRIEF explanation of the role of temperature in determining kinetic and thermodynamic control

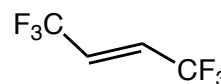
Question 6 (30 pts)

a) Give the curved arrow-pushing and the allowed product for the following cycloaddition reaction. Be sure to completely describe the stereochemistry in the product.

b) ON TOP of the structures as indicated, draw the requested F.M.O.s and give the total number of π -molecular orbitals and electrons associated with the π -system for each structure.

total # of π -M.O.s
for this structure = _____

total # of electrons in the π -
system for this structure = _____



total # of π -M.O.s
for this structure = _____

total # of electrons in the π -
system for this structure = _____

c) Is the ALLOWED reaction suprafacial or antarafacial with respect to reactant A?

d) Is the ALLOWED reaction suprafacial or antarafacial with respect to reactant B?

Extra Credit (5 pts) Which of the following chemical properties enables the pharmacological activity of the drug olanzapine?

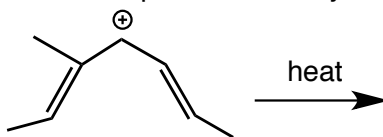
aromatic

non-aromatic

anti-aromatic

Question 7 (20 pts)

a) Give the curved arrow-pushing and the allowed product for the following electrocyclic ring closure reaction, indicate the stereochemistry using wedged/dashed bonds as appropriate and be sure to indicate the presence of any racemic mixtures.

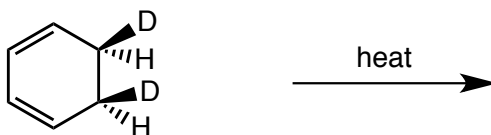


b) ON TOP OF THE STRUCTURE, draw the HOMO of the reactant cation

c) To form YOUR ALLOWED product, did the reaction proceed via a conrotatory or a disrotatory ring closure? _____

Question 8 (22 pts). For the following electrocyclic ring-opening reaction

a) Give the product, including stereochemistry and draw the curved arrow-pushing that describes bond making/breaking



b) give the number of electrons involved in the reaction _____

c) For the number of electrons you gave in the answer to b) above, would that many electrons in a **Huckel** loop be aromatic, nonaromatic or antiaromatic? _____

d) For the number of electrons you gave in the answer to b) above, would that many electrons in a **Mobius** loop be aromatic, nonaromatic or antiaromatic? _____

e) State whether the allowed reaction would proceed via a Huckel or a Mobius transition state _____

f) State whether the allowed reaction is conrotatory or disrotatory _____

e) Is the transition state for the allowed reaction, aromatic, nonaromatic or anti-aromatic? _____