

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****

- | | |
|--|--|
| <ul style="list-style-type: none"> • PRINT YOUR NAME ON EACH PAGE! • READ THE DIRECTIONS CAREFULLY! • USE BLANK PAGES AS SCRATCH PAPER work on blank pages will not be graded... | <ul style="list-style-type: none"> • WRITE CLEARLY! • MOLECULAR MODELS ARE ALLOWED • DO NOT USE RED INK • DON'T CHEAT, USE COMMON SENSE! |
|--|--|

H																			He
Li	Be										B	C	N	O	F				Ne
Na	Mg										Al	Si	P	S	Cl				Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br			Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I			Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At			Rn

	Eclipsing		Gauche
H/H	-1.0	Me/Me	-0.9
H/Me	-1.4	Et/Me	-0.95
Me/Me	-2.6	i-Pr/Me	-1.1
Et/Et	-3.1	t-Bu/Me	-2.7

▾ small range
 ▭ range of values
 ▭ broad peak

—O—H —C≡N
 >N—H >C=O usually strong

Infrared Correlation Chart

**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 _____ / **12**

2 _____ / **22**

3 _____ / **36**

4 _____ / **20**

5 _____ / **20**

6 _____ / **14**

7 _____ / **18**

8 _____ / **33**

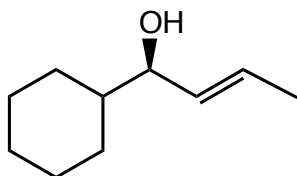
Points Removed for cover errors _____ / **2**

Extra Credit _____ / **5**

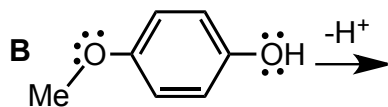
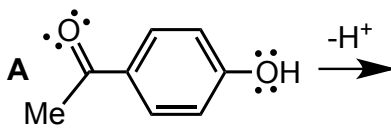
Total (incl Extra) _____ / **175+5**

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Question 1 (12 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



Question 2 (22 pts.) Which is the stronger Brønsted acid, **A** or **B**? Give a BRIEF explanation that includes drawings of ALL IMPORTANT resonance contributors of the conjugate base anions. Your explanation MUST include the following terms: "electron donating", "electron withdrawing", "resonance" "inductive effect", and also mentions BASE STRENGTH.

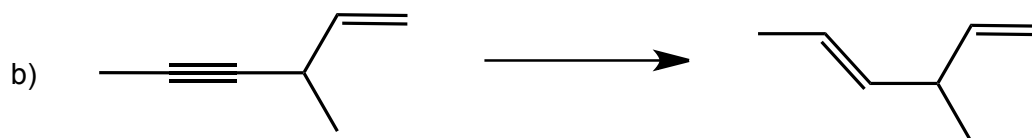
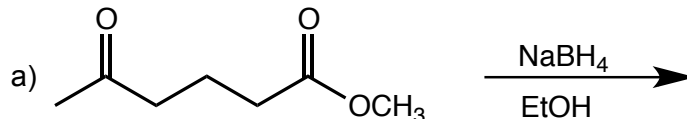


Question 3 (part one, 18 pts.) For each reaction

1) Provide the missing **major organic product** or **reagents/conditions** as appropriate, be sure to indicate any racemic mixtures

2) **State** whether each reaction is an Addition, Elimination, Substitution or Rearrangement

3) **State** whether each reaction is Reduction, Oxidation or Neither

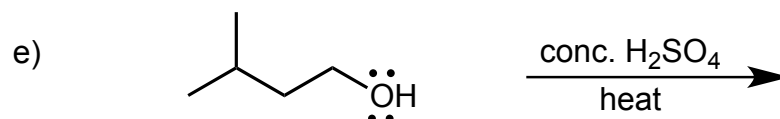
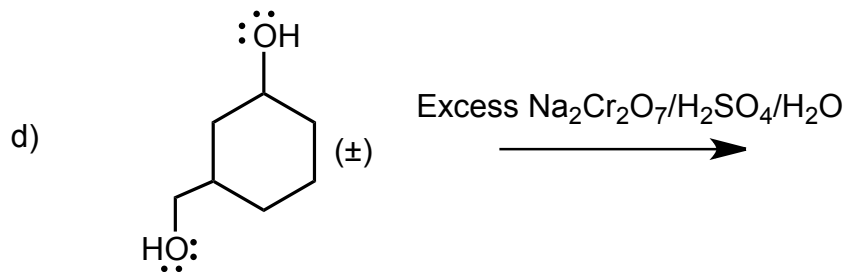
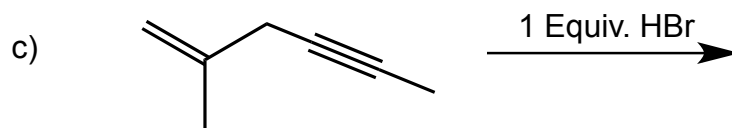


Question 3 (part two, 18 pts.) For each reaction:

Provide the missing **major organic product** or **reagents/conditions** as appropriate

DO NOT state whether each reaction is an Addition, Elimination, Substitution or Rearrangement

DO NOT state whether each reaction is Reduction, Oxidation or Neither



5 pts Extra Credit. Which functional group can be polymerized to form an organic metal?

alcohol

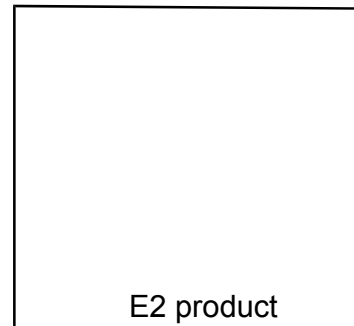
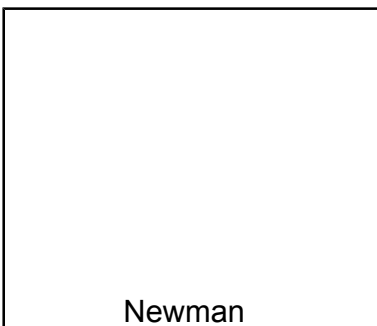
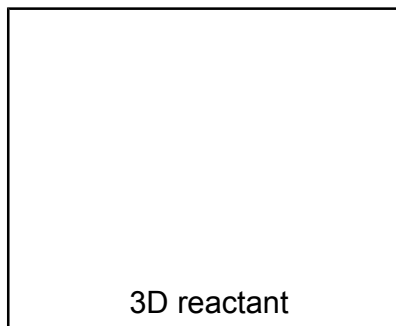
alkene

alkyne

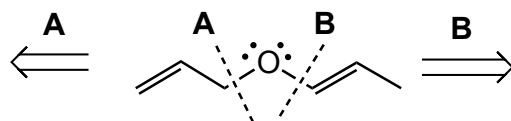
epoxide

Question 4 (20 pts) For (3R)-bromo-(4S)-methylhexane:

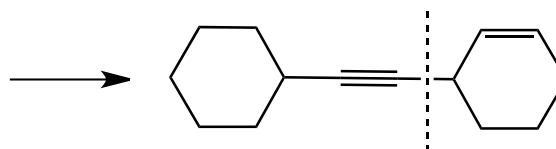
- a) Draw a line-angle **OR** 3-D/sawhorse structure for this molecule
 b) Draw a Newman projection for the conformation that can undergo E2 elimination, **looking FROM carbon 3 TO carbon 4.**
 c) Give the E2 elimination product



Question 5 (20 pts.) For EACH of the two indicated bonds **A** and **B**, perform retrosynthetic analysis and draw the best synthons. Only one of these bonds can actually be made, indicate which one, give the actual reactants/synthetic equivalents you would use to make that bond, give the curved arrow pushing showing bond formation and BRIEFLY explain why the other bond can not be made



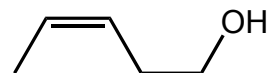
Question 6 (14 pts). Perform retrosynthetic analysis for the bond indicated by the dashed line in the target structure below, generate the best synthons and also the synthetic equivalents. Give the curved arrow pushing for the synthetic equivalents that give the target structure and label the synthetic equivalents as Lewis acid (LA) and Lewis base (LB) as appropriate.



synthetic equivalents

synthons

Question 7 (18 pts.) Show how you would synthesize the target structure on the right from the starting structure on the left. Show reagents and conditions, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.



Question 8 (33 pts). Give a curved arrow pushing mechanisms for the following two reactions.

- 1) Add non-bonding electrons and C-H bonds to the line-angle structures as required.
- 2) Indicate the Lewis acid/Lewis base (**LA**, **LB**) at each INTERMOLECULAR step as appropriate, and whether they are also Brønsted acids/bases (**LA/BA**, **LB/BB**)
- 3) Include ALL IMPORTANT **RESONANCE CONTRIBUTORS** for intermediates
- 4) GIVE THE **NUMBER OF STEPS** IN YOUR MECHANISMS

