

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

Answer Key

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) _____

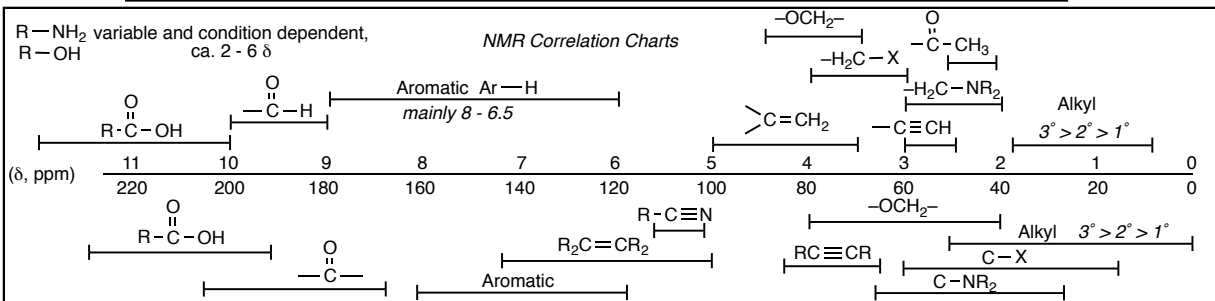
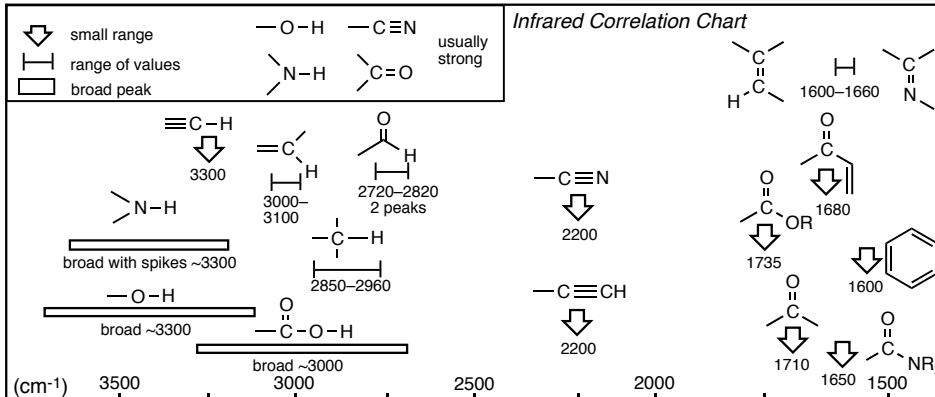
The room where most students will take the test for your class, i.e. LS A-191 for onground and PS H-152 for hybrid) _____

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

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



**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 _____ /14

2 _____ /24

3 _____ /39

4 _____ /24

5 _____ /14

6 _____ /22

7 _____ /38

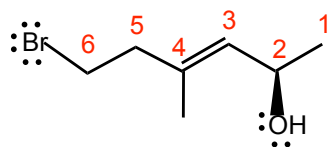
Points Removed for cover errors ____/2

Extra Credit ____/5

Total (incl Extra) _____/175+5

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

Question 1 (14 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.

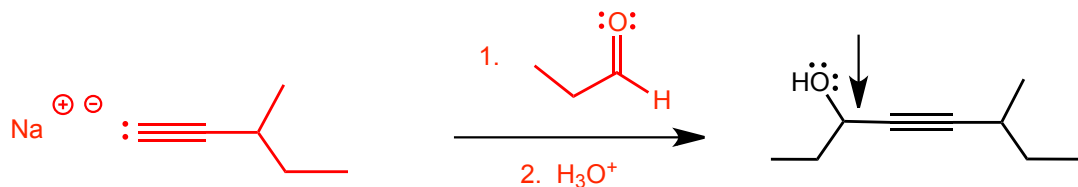
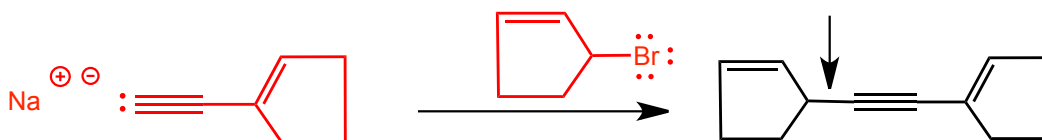


6-bromo-4-methylhex-(3E)-en-(2R)-ol

grading- subtract 2 points
each error, do not
propagate errors

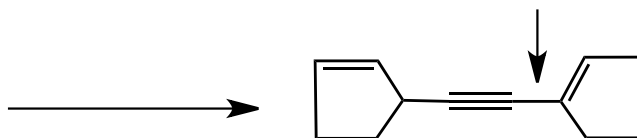
Question 2 (24 pts).

a) For the bonds indicated in the two structures below, give the acetylide anion, the organic structure it reacts with and all other required reagents/conditions to make that bond (you do not have to show how the acetylide anion is made)



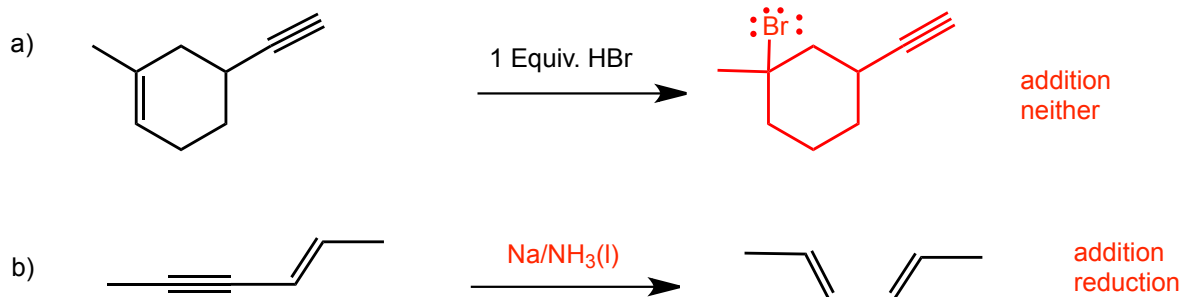
b) The bond indicated in the structure below can NOT be made in an acetylide reaction. Briefly explain why (1 - 2 sentences maximum!).

bond can NOT be made because it is not possible to do an SN2 reaction at an sp² hybridized carbon atom



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

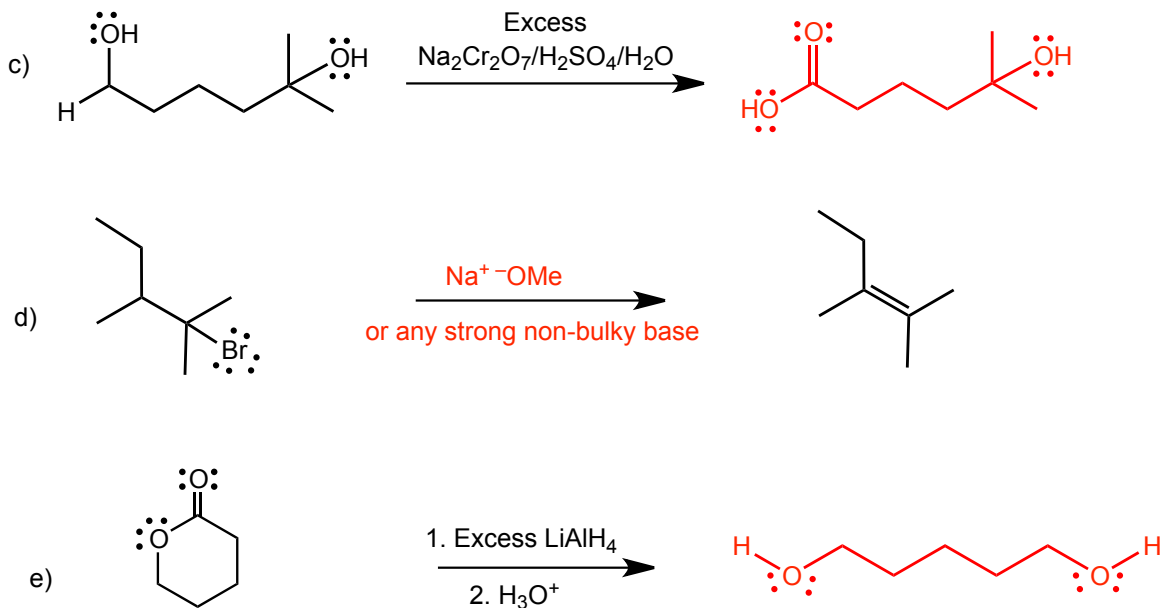
- 1) Provide the missing **major organic product** or **reagents/conditions** as appropriate
- 2) **State** whether each reaction is an Addition, Elimination, Substitution or Rearrangement
- 3) **State** whether each reaction is Reduction, Oxidation or Neither



Question 3 (second part, 21 pts.) Give the **major organic product** or **reagents/conditions** for the following reactions

DO NOT STATE whether the reaction is Addition/Elimination/Substitution/Rearrangement

DO NOT STATE whether each reaction is reduction/oxidation/neither



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

alcohol

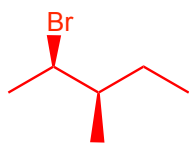
alkene

alkyne

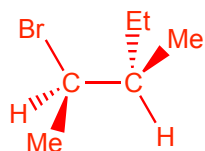
epoxide

from "O-Chem in Real Life" page : organic metals, week #2

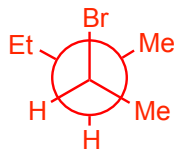
Question 4 (24 pts.) For (2R)-bromo-(3R)-methylpentane, draw a Lewis structure with wedged/dashed bonds with proper stereochemistry, draw a 3D/sawhorse structure AND a Newman projection **of the conformation that would undergo E2 elimination**, AND give the alkene that would be formed in an E2 elimination reaction, you do not need to show the lowest energy conformation.



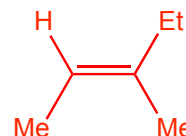
Lewis
structure



3D/sawhorse
structure



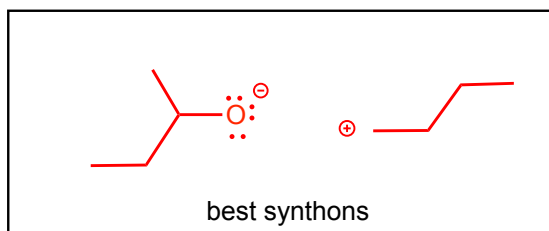
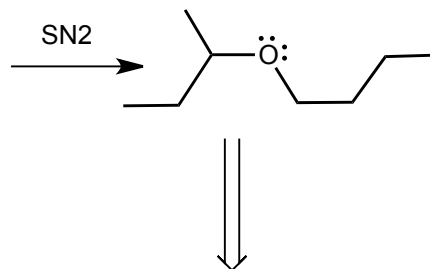
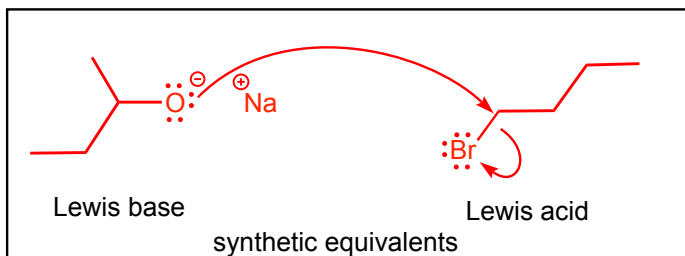
Newman
projection



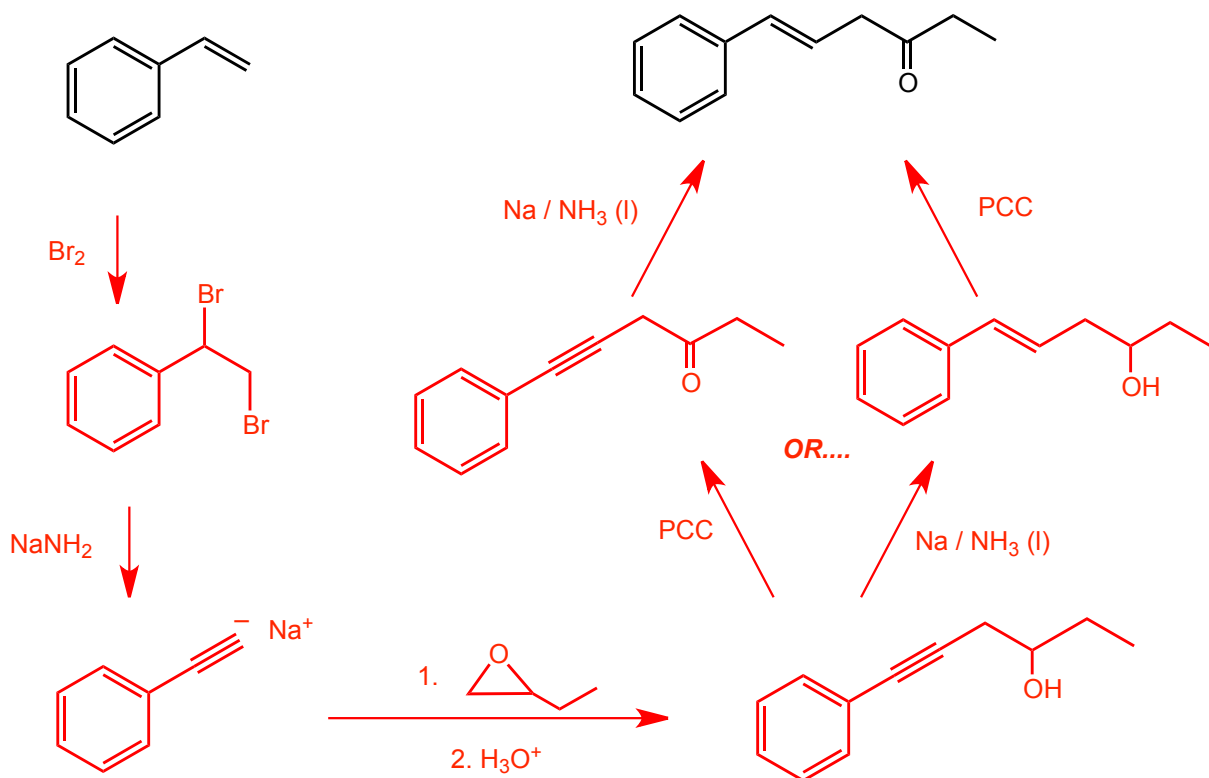
alkene product

Question 5 (14 pts). For synthesis of the structure below

- 1) decide which would be the best bond to make in an SN2 reaction
- 2) perform retrosynthetic analysis on the bond you want to make and give the synthons
- 3) give the synthetic equivalents to perform the SN2 reaction, assign each one as a Lewis acid or Lewis base, and give the curved arrow pushing showing bond formation



Question 6 (22 pts.) Show how you would synthesize the target compound on the right from the starting compound on the left. Show reagents and conditions, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.



Question 7 (38 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

