

PRINTED
FIRST NAME _____PRINTED
LAST NAME _____ASU ID or
Posting ID _____Person on your **LEFT** (or Aisle)Person on your **RIGHT** (or Aisle)

- 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!

1 _____/12

2 _____/16

3 _____/32

4 _____/18

5 _____/36

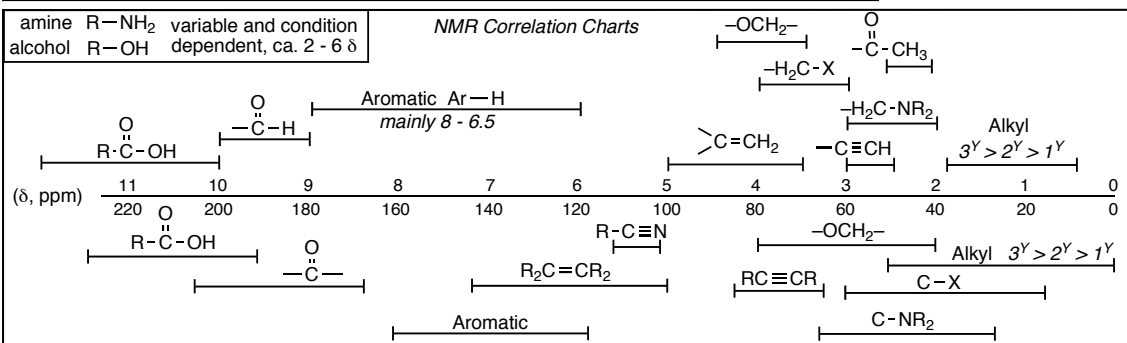
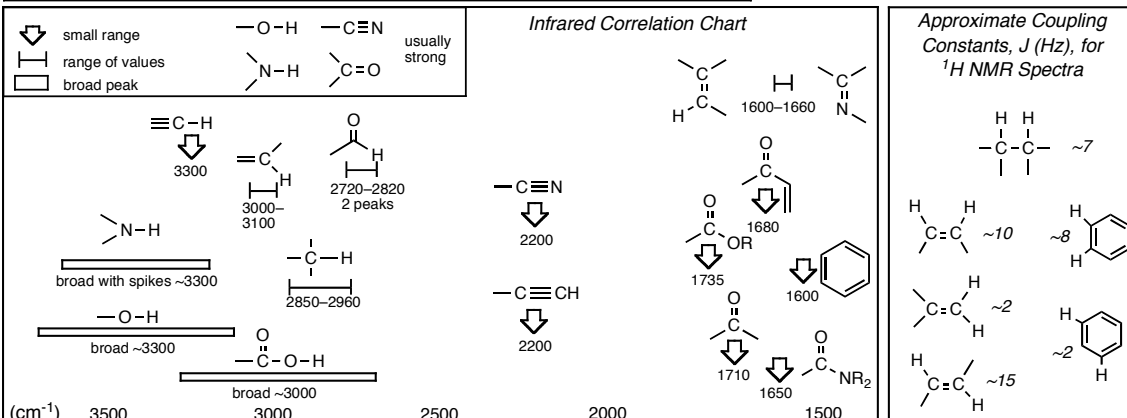
6 _____/36

7 _____/25

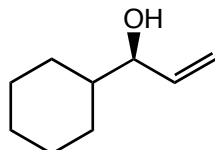
Extra Credit _____/5

Total (incl Extra) _____/175+5

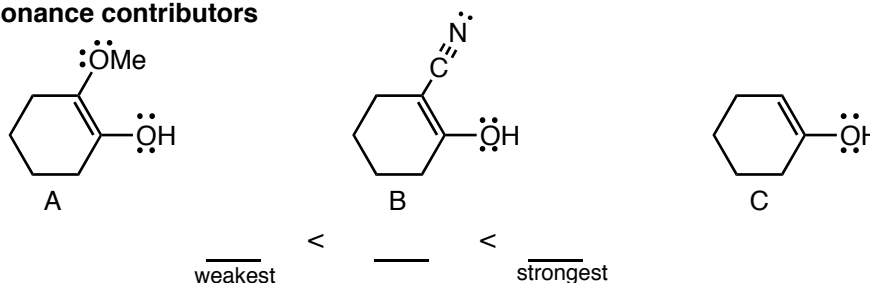
H Li Be Na Mg K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe Cs Ba Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn	He Ne Ar Kr Xe Rn																				
B C N O F Al Si P S Cl	Interaction Energies, kcal/mol																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Eclipsing</th> <th colspan="2">Gauche</th> </tr> </thead> <tbody> <tr> <td>H/H</td> <td>-1.0</td> <td>Me/Me</td> <td>-0.9</td> </tr> <tr> <td>H/Me</td> <td>-1.4</td> <td>Et/Me</td> <td>-0.95</td> </tr> <tr> <td>Me/Me</td> <td>-2.6</td> <td>i-Pr/Me</td> <td>-1.1</td> </tr> <tr> <td>Me/Et</td> <td>-2.9</td> <td>t-Bu/Me</td> <td>-2.7</td> </tr> </tbody> </table>	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	Me/Et	-2.9	t-Bu/Me	-2.7
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Question 1 (12 pts.) Give an unambiguous IUPAC or common name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



Question 2 (16 pts). Rank the following enols in order of INCREASING Bronsted acidity, give a BRIEF explanation (ignore keto isomers). **Your explanation must include drawings of any relevant resonance contributors**



5 pts Extra Credit. An enediyne of the kind shown has been found to crosslink which biological molecule?



DNA

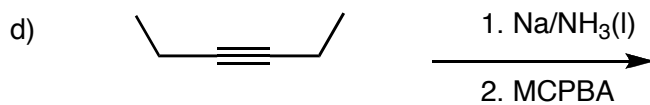
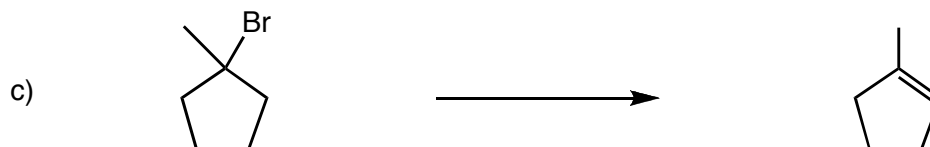
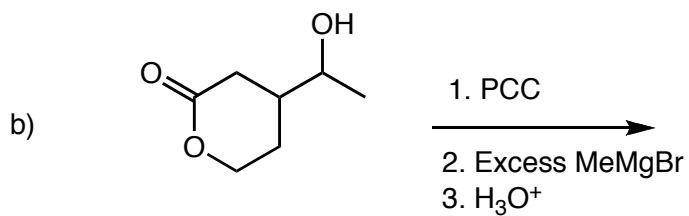
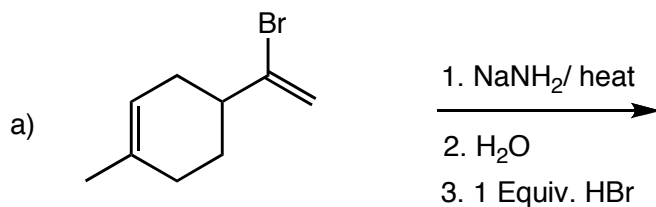
proteins

fatty acids

steroids

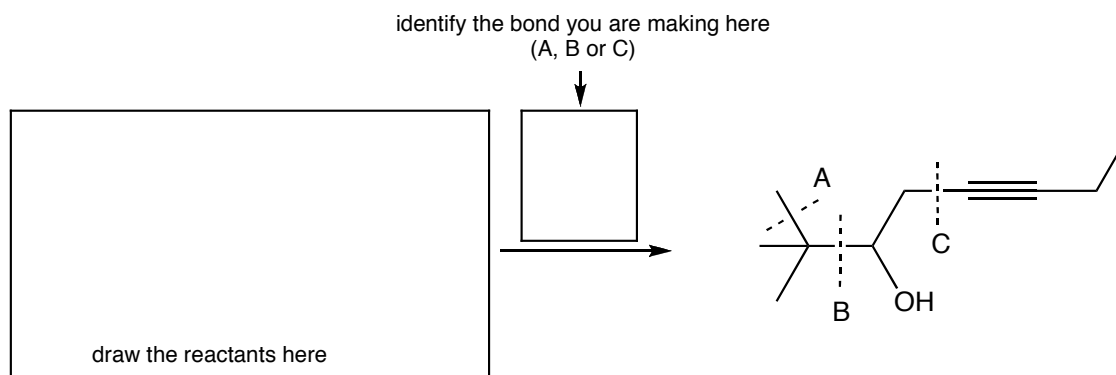
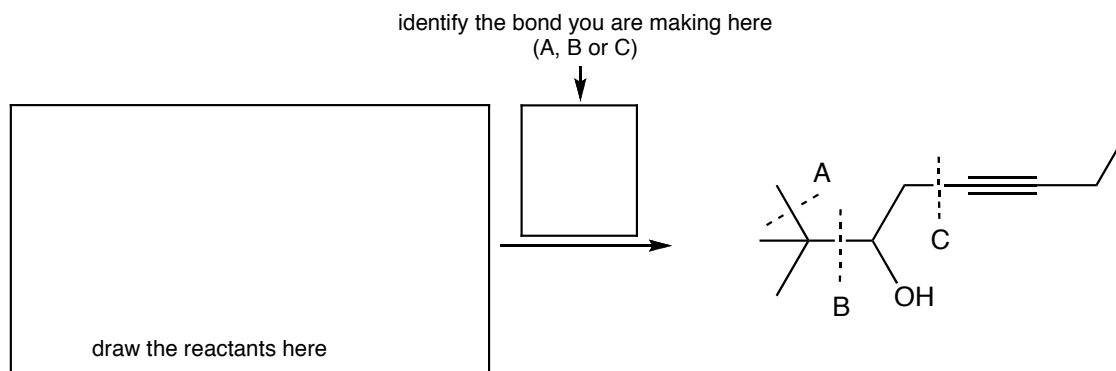
Question 3 (32 pts.)

Provide the missing **major organic product**, the **reagents and conditions**, or the **reactant** for the following reactions, as appropriate. Ignore stereochemistry.

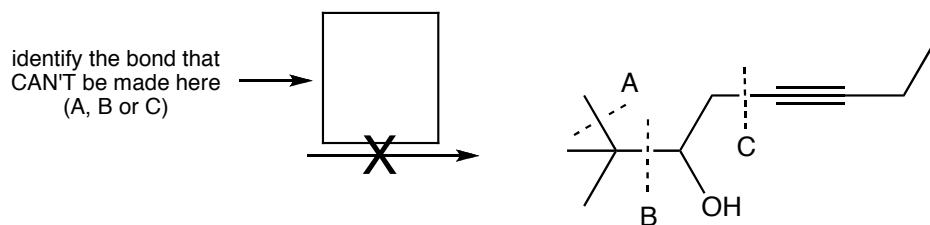


Question 4 (18 pts.) For the bonds labelled A, B and C in the structure provided:

a) Identify the TWO bonds that CAN be made using either a Grignard or an acetylide reaction. In each case, **draw the structure of the the acetylide anion or the Grignard reagent AND the other structure it would react with. Do not include any acid workup hydrolysis steps, assume that they will be included as required.**



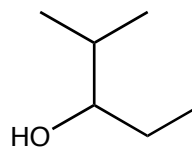
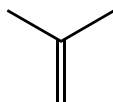
b) Identify **ONE** bond that can NOT be made using an acetylide or Grignard reaction, and give the reason why.



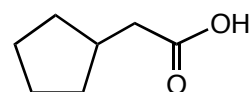
this bond can NOT be made because.....

Question 5 (36 pts.) Show how you would synthesize the target compounds on the right from the starting compounds on the left. Show reagents and conditions, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.

a)



b)

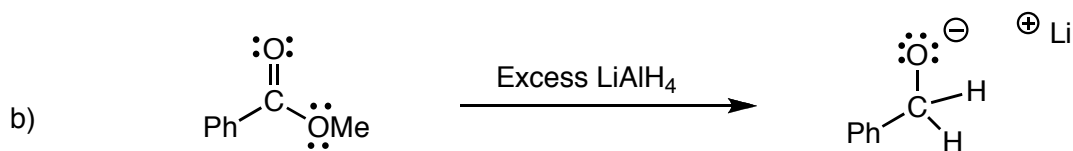
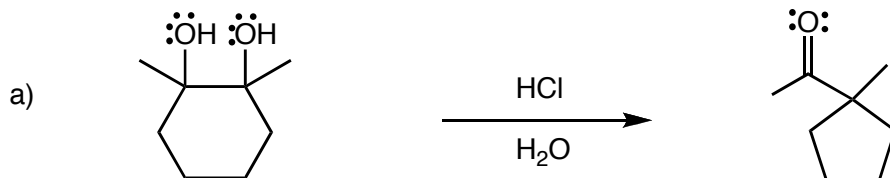


Question 6 (36 pts). **READ THIS QUESTION CAREFULLY!!** For **EACH** reaction, give a complete arrow pushing mechanism, and...

1) Show **ALL** important resonance structures of any intermediates.

2) Add non-bonding electrons and C-H bonds to the line-angle structures as required.

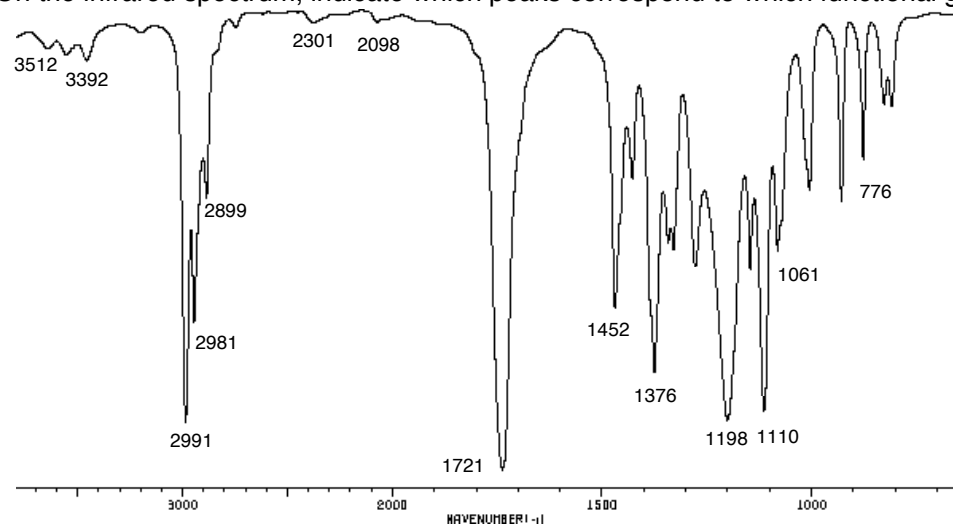
3) Indicate the Lewis acid/Lewis base (LA, LB) at each step as appropriate, and whether they are also Brønsted acids/bases (LA/BA, LB, BB).



Question 15 (25 pts) Provided are spectra for a compound with molecular formula $C_6H_{12}O_2$

a) Give the degrees of unsaturation _____

b) On the infrared spectrum, indicate which peaks correspond to which functional groups



c) draw the structure and clearly indicate which hydrogens correspond to which signals **in the proton nmr spectrum (only)**

