

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 _____/10

2 _____/17

3 _____/39

4 _____/21

5 _____/12

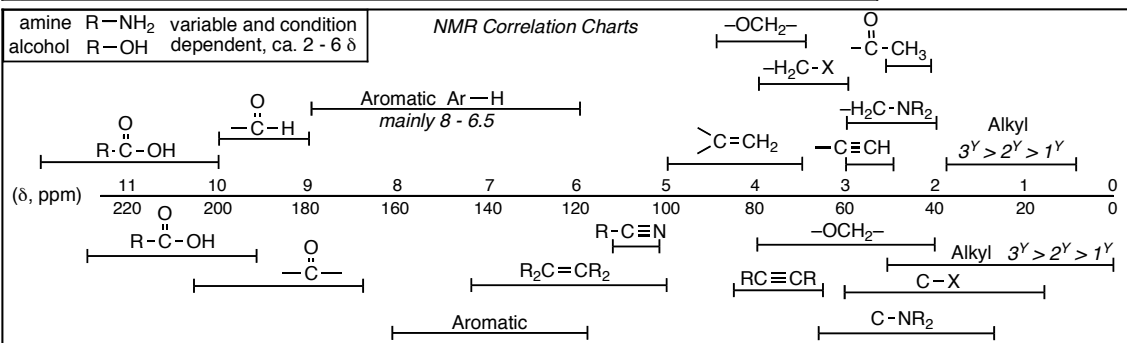
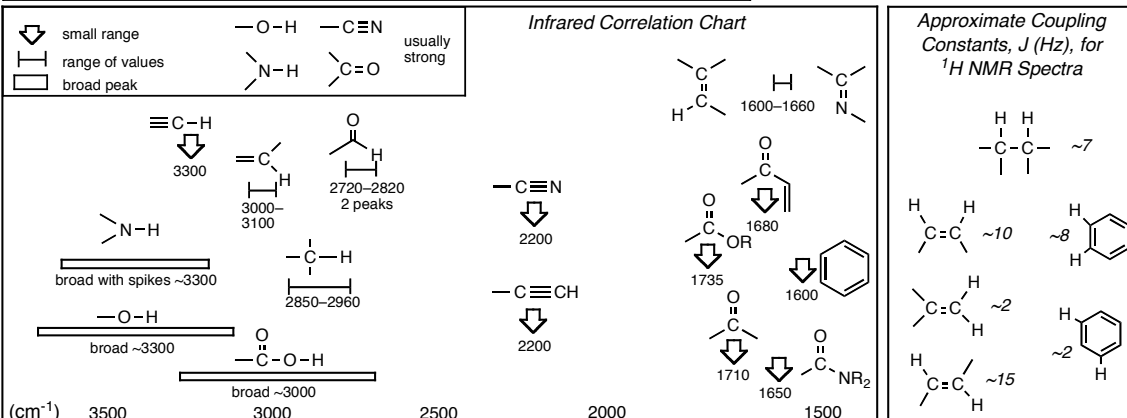
6 _____/40

7 _____/36

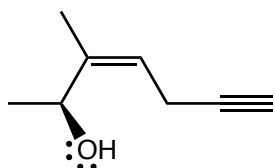
Extra Credit _____/5

Total (incl Extra) _____/175+5

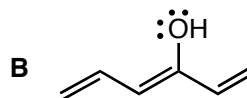
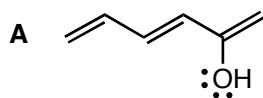
H Li Be Na Mg K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe Cs Ba Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn	He B C N O F Ne Al Si P S Cl Ar Kr Xe Rn	Interaction Energies, kcal/mol <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Eclipsing</th> <th style="text-align: center;">Gauche</th> </tr> </thead> <tbody> <tr> <td>H/H</td> <td style="text-align: center;">-1.0</td> <td style="text-align: center;">Me/Me -0.9</td> </tr> <tr> <td>H/Me</td> <td style="text-align: center;">-1.4</td> <td style="text-align: center;">Et/Me -0.95</td> </tr> <tr> <td>Me/Me</td> <td style="text-align: center;">-2.6</td> <td style="text-align: center;">i-Pr/Me -1.1</td> </tr> <tr> <td>Me/Et</td> <td style="text-align: center;">-2.9</td> <td style="text-align: center;">t-Bu/Me -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 (10 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.

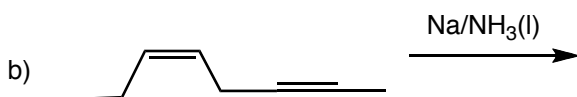
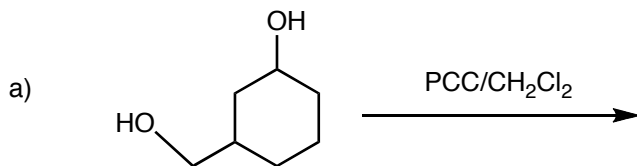


Question 2 (17 pts). Which is the stronger Bronsted acid, A or B (ignore keto-tautomers). Give a BRIEF explanation and support your assignment using appropriate drawings of the conjugate base anions



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

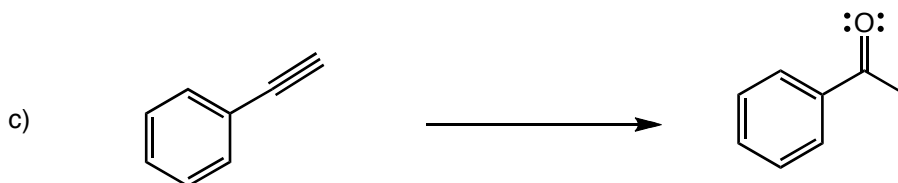
- 1) Provide the missing **major organic product, ignore stereochemistry at asymmetric centers**
- 2) **State** whether each reaction is an Addition, Eimination, Substitution or Rearrangement
- 3) **State** whether each reaction is Reduction, Oxidation or Neither



Question 3 (second part, 7 pts.) Provide the missing **reagents/conditions**

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

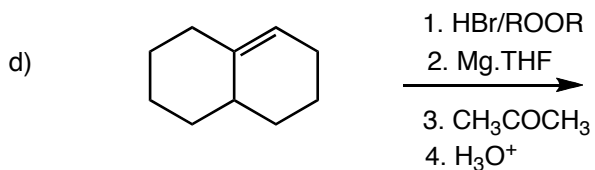
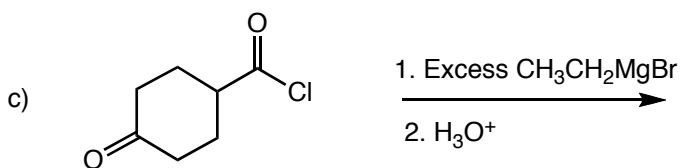
DO NOT STATE whether each reaction is reduction/oxidation/neither



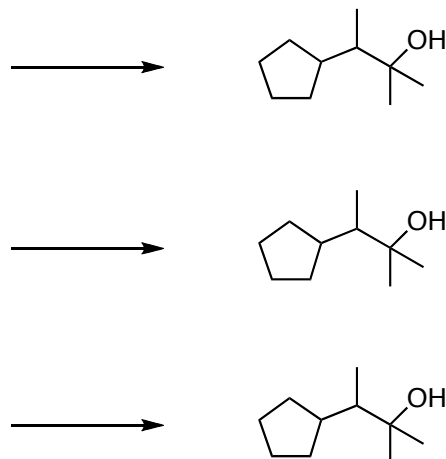
Question 3 (third part, 14 pts.) Give the major organic product of the following reactions

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

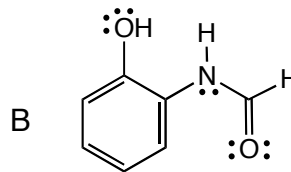
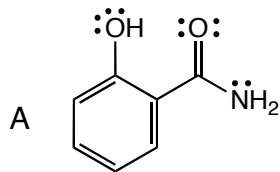
DO NOT STATE whether each reaction is reduction/oxidation/neither



Question 4 (21 pts.) Several of the C-C bonds in the provided structure can be made in a Grignard reaction. Provide the structure of the Grignard reagent AND the structure it would react with (assume an acid workup step. i.e. do not include the H_3O^+), and **indicate CLEARLY the C-C bond you are making in each reaction.**



Question 5 (12 pts). Which is the stronger Bronsted acid, A or B? Give a BRIEF explanation that includes a discussion of both the inductive and the resonance substituent effects. You do NOT need to draw any chemical structures or include any curved arrow-pushing unless you would like to, all points are for the explanation, words are sufficient to answer this question.



5 pts Extra Credit. The "slime" and "silly putty" polymers that are made by combining starch and white glue and similar compounds are held together by what kind of bonds? (circle one)

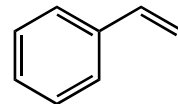
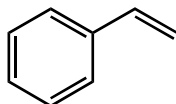
hydrogen-bonds

 π -bonds σ -bonds

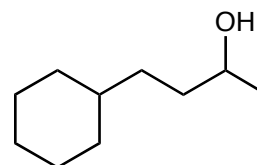
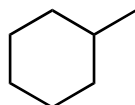
multiple-bonds

Question 6 (40 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 7 (36 pts). **READ THIS QUESTION CAREFULLY!**For **EACH** reaction, give a complete curved arrow pushing mechanism, and...

- 1) Show **ALL** important resonance contributors for all 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).

