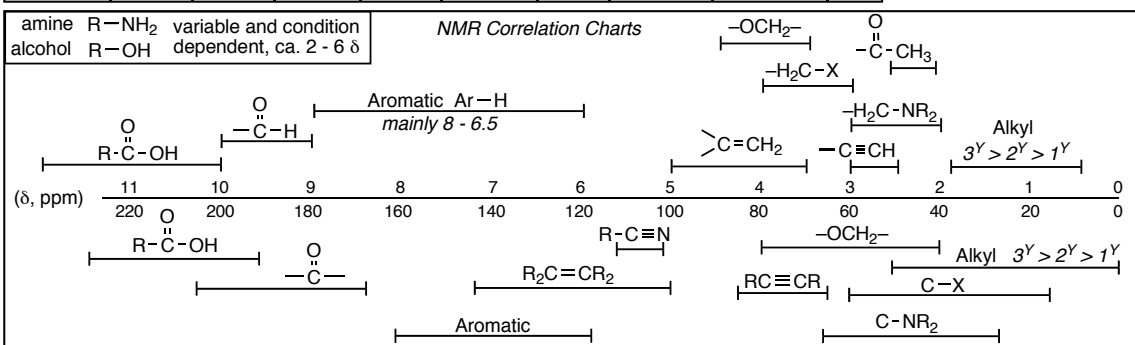
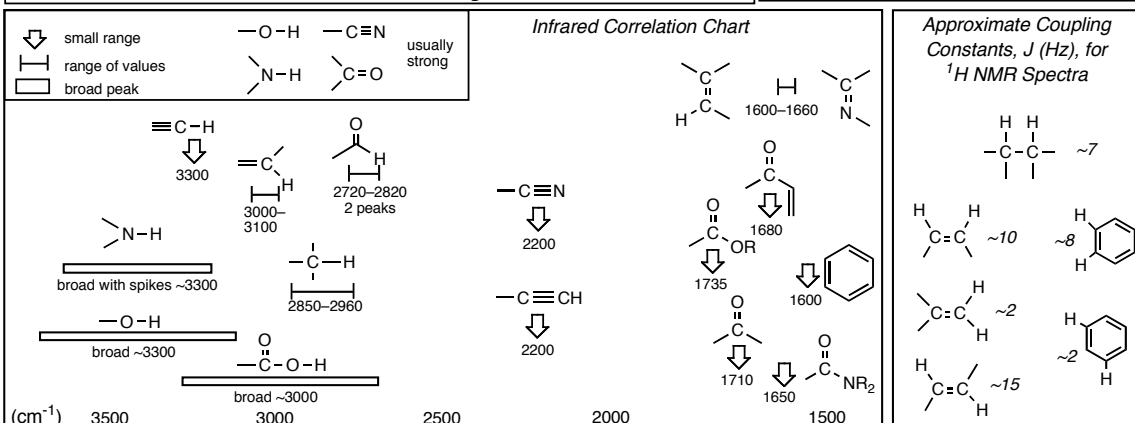


PRINTED
FIRST NAME _____PRINTED
LAST NAME _____ASU ID or
Posting ID _____Person on your **LEFT** (or Aisle)Person on your **RIGHT** (or Aisle)

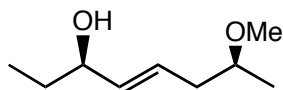
- PRINT YOUR NAME ON EACH PAGE!
- READ THE DIRECTIONS CAREFULLY!
- USE BLANK PAGES AS SCRATCH PAPER
work on blank pages will not be graded...
- WRITE CLEARLY!
- MOLECULAR MODELS ARE ALLOWED
- DO NOT USE RED INK
- DON'T CHEAT, USE COMMON SENSE!

1 nomenclature /10.....9 peri 2 /17.....
 2 exotherm /15.....10 mxn /25.....
 3 aromatic /12.....
 4 res/LUMO /18.....
 5 retroD/A /8.....
 6 reactions /32.....
 7 retrosyn /25.....
 8 peri 1 /18.....
 Extra Credit /5 Total (incl Extra) /180+5

H														He														Interaction Energies, kcal/mol	
Li	Be													B	C	N	O	F	Ne										
Na	Mg													Al	Si	P	S	Cl	Ar	Eclipsing									
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	H/H	-1.0	Me/Me	-0.9								
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	H/Me	-1.4	Et/Me	-0.95								
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	Me/Me	-2.6	i-Pr/Me	-1.1								
																		Me/Et	-2.9	t-Bu/Me	-2.7								

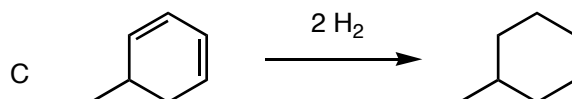
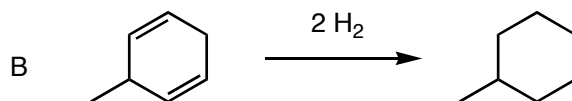
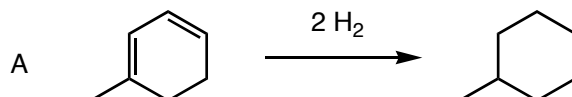


Question 1 (10 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.



(7S)-methoxyoct-(4E)-en-(3R)-ol

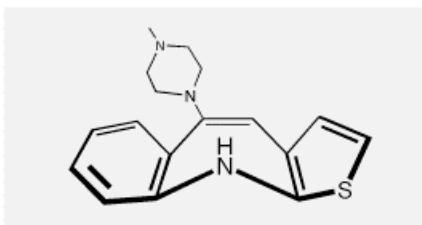
Question 2 (15 pts) Rank the following reactions, A, B and C, in order of INCREASING exothermicity. Give a BRIEF explanation



A < C < B
lowest < < highest
exothermicity < < exothermicity

A and C are conjugated, electrons are lower in energy, the reactants in A and C start lower in energy, thus less exothermic than B, the diene is more substituted in A compared to C, diene A is thus more stable, lower in energy, reaction A is least exothermic

Extra Credit Question (5 pts.) this anti-psychotic drug is non-planar to avoid being.....



Resonance Stabilized

Anti-aromatic

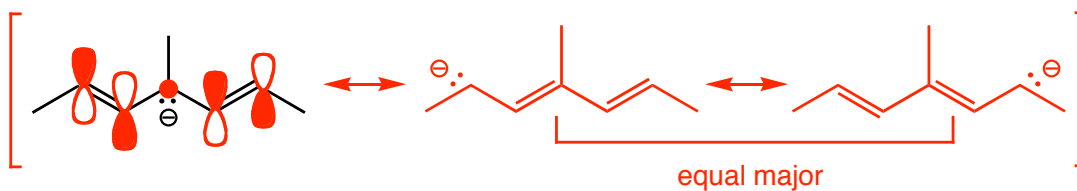
Aromatic

Conjugated

Question 3 (12 pts) Label the following structures as aromatic, non-aromatic or anti-aromatic, assume that they are flat.

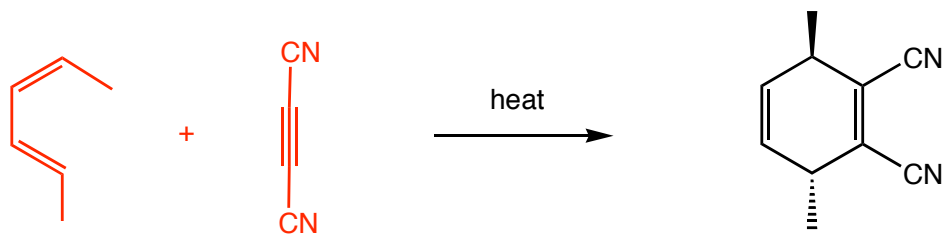


Question 4 (18 pts) For the following structure

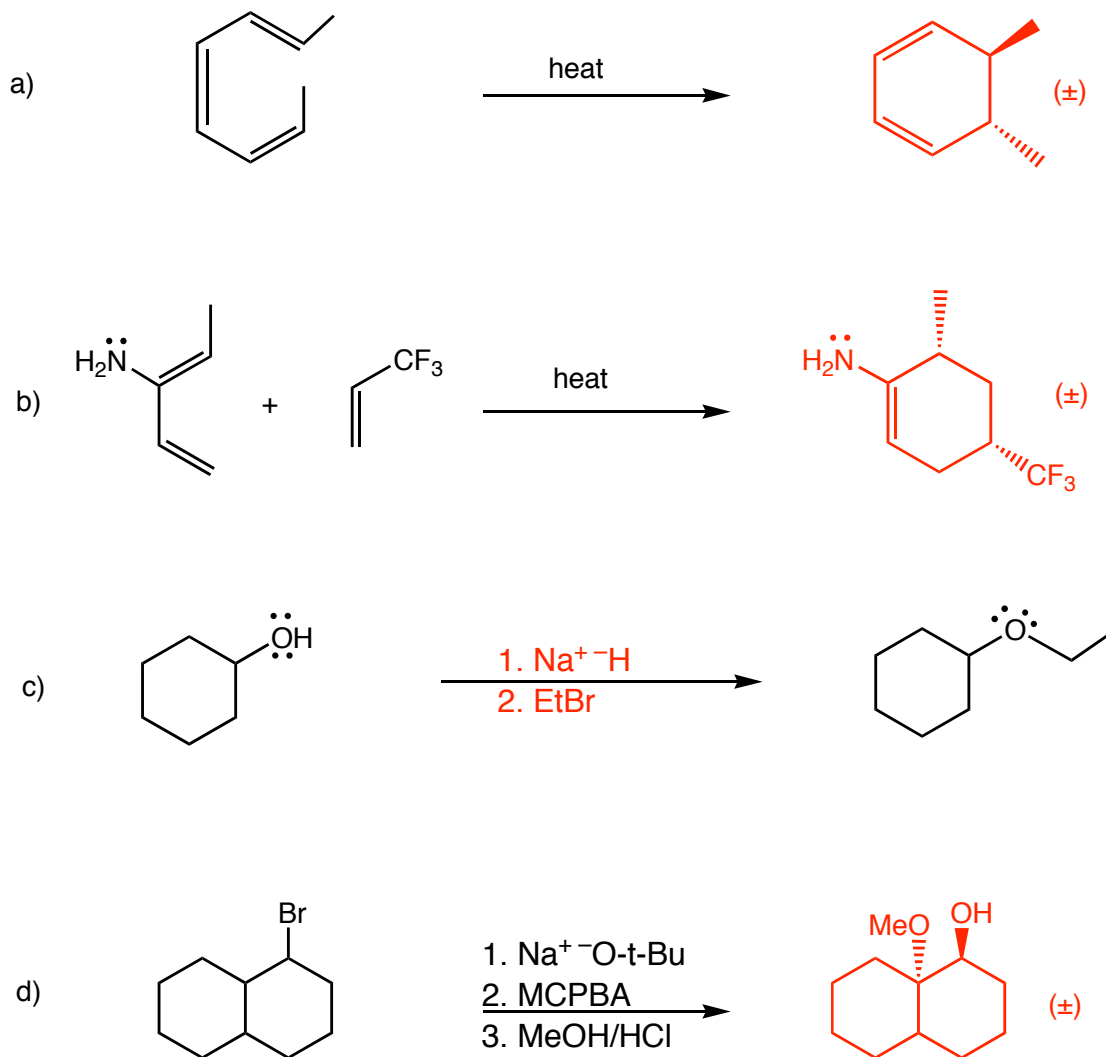


- draw the LUMO ON TOP OF THE MOLECULE
- give all other reasonable resonance contributors
- indicate the major resonance contributor(s)

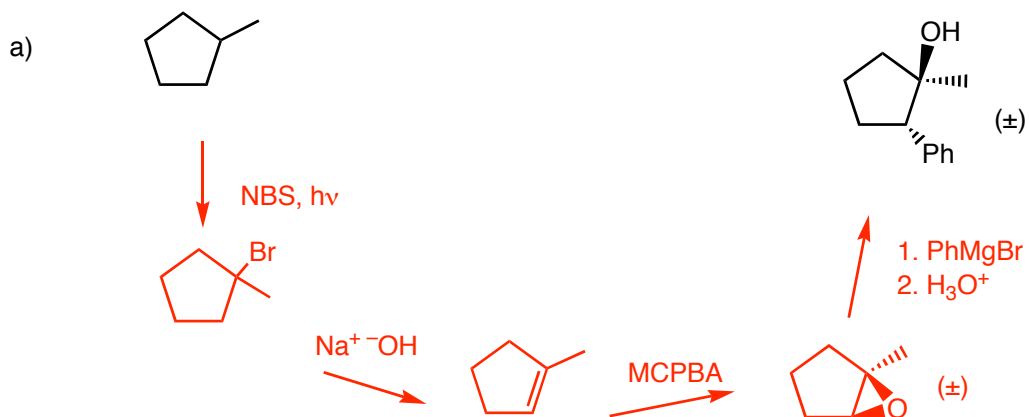
Question 5 (8 pts) Give the diene and dienophile that react to give the provided structure in a Diels-Alder reaction



Question 6 (32 pts.) For the following reactions, provide the missing **REACTANT** or **REACTANTS**, the **REAGENT** or the **MAJOR REACTION PRODUCT**. Indicate stereochemistry where appropriate.

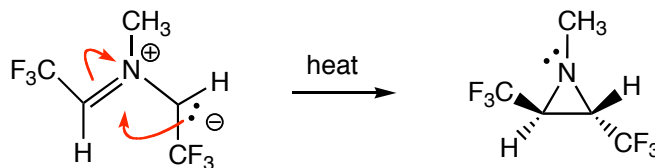


Question 7 (25 pts.) Show how you would make the target compounds on the right from the starting compounds on the left. Show reagents and conditions where appropriate, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.

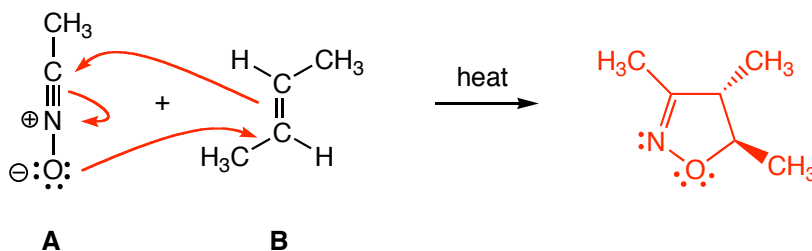


Question 8 (18 pts)

a) Give the curved arrow-pushing to account for the following electrocyclic ring closure

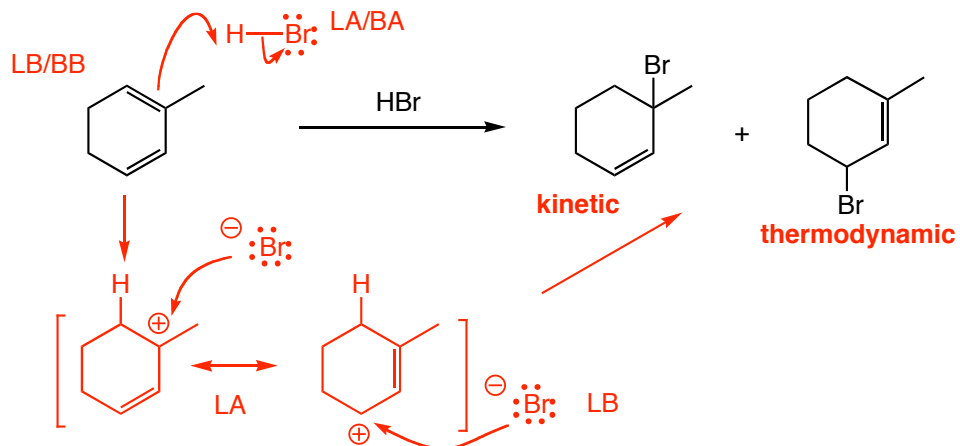
b) **FOR THE REACTION SHOWN**, how many electrons are involved in the transition state? 4c) **For the number of electrons that you counted**, would a thermally allowed reaction proceed via a Hückel or Möbius transition state? Möbius for 4, Hückel for 2 etcd) **For the number of electrons that you counted**, would a thermally allowed reaction proceed via conrotatory or disrotatory ring closure? conrotatory for 4, dis for 2 etce) **FOR THE REACTION SHOWN**, does the reaction proceed via conrotatory or disrotatory ring closure? disrotatoryf) Is **THE PRODUCT OF THE REACTION SHOWN** allowed or forbidden? Forbidden

Question 9 (17 pts.) Give the curved arrow-pushing and the ALLOWED product of the following cycloaddition reaction

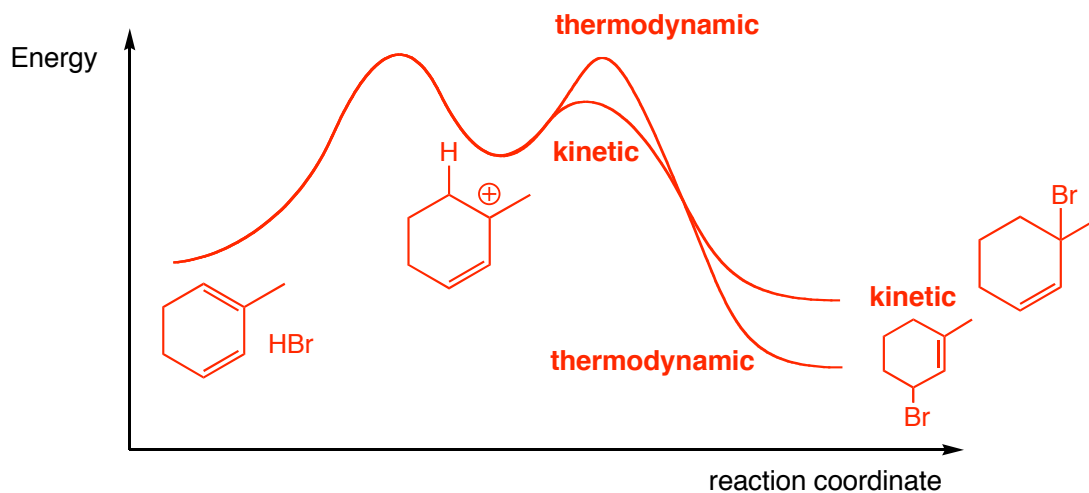
Draw the HOMO of the reactant
A
(not on top of the structure)Draw the LUMO of the reactant **B**
(not on top of the structure)

Question 10 (25 pts.)

- a) Give a mechanism for the following reaction that shows how BOTH products are formed
 b) Indicate the Lewis acid and base at each step (LA or LB) and whether they are also Bronsted acids/bases (BA, BB)
 c) Draw all reasonable resonance contributors for any intermediates
 d) Identify the product that would be formed under **kinetically controlled conditions** and the product that would be formed under **thermodynamically controlled conditions**.



- b) Draw a SINGLE reaction energy diagram that shows formation of both of the above products, clearly indicate which curve corresponds to which reaction on your diagram



- c) Is the thermodynamically controlled product more likely to be formed at high temperature, or a low temperature. Give a BRIEF explanation

at high temperatures the reactions will be reversible, which will allow the thermodynamically controlled product to be formed