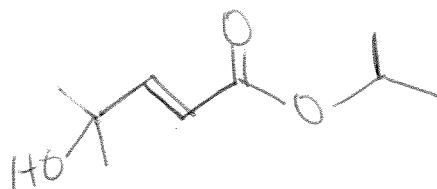
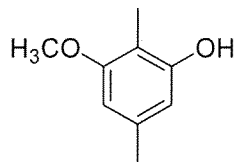


Sample midterm 1 CHM2120B/C 2011

1. Name or draw the structure of the following molecules, as appropriate.
a. (*E*) isopropyl 4-hydroxy-4-methylpent-2-enoate



b.



2,5-dimethyl-3-methoxy phenol
or

2,5-dimethyl-3-hydroxy anisol

2.

- a. Identify whether each of the following molecules is aromatic, or non-aromatic.
b. Justify your response.

i.



Aromatic.

① ring ✓

② p orbitals at each carbon ✓

S- has a p orbital @ $2e^-$
if it is sp^2 hybridized

③ $4e^-$ from π bonds
 $2e^-$ from sulfur p orbital

$6e^- \Rightarrow$ aromatic

ii. Not aromatic



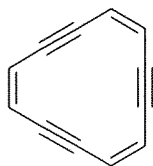
(1) ring ✓

(2) p orbitals at all carbons ✓

Carbon with anion can be sp^2 hybridized with the lp in a p orbital

(3) $2 \pi e^-$
 $2 lp e^-$ in p $\Rightarrow 4e^-$ not aromatic

iii.



(1) ring ✓

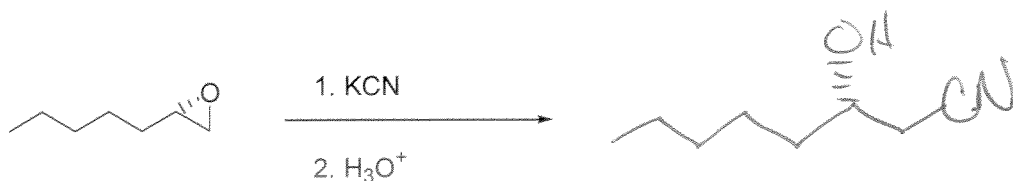
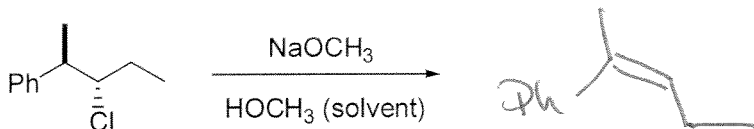
(2) p orbital at all C from double & triple bonds ✓

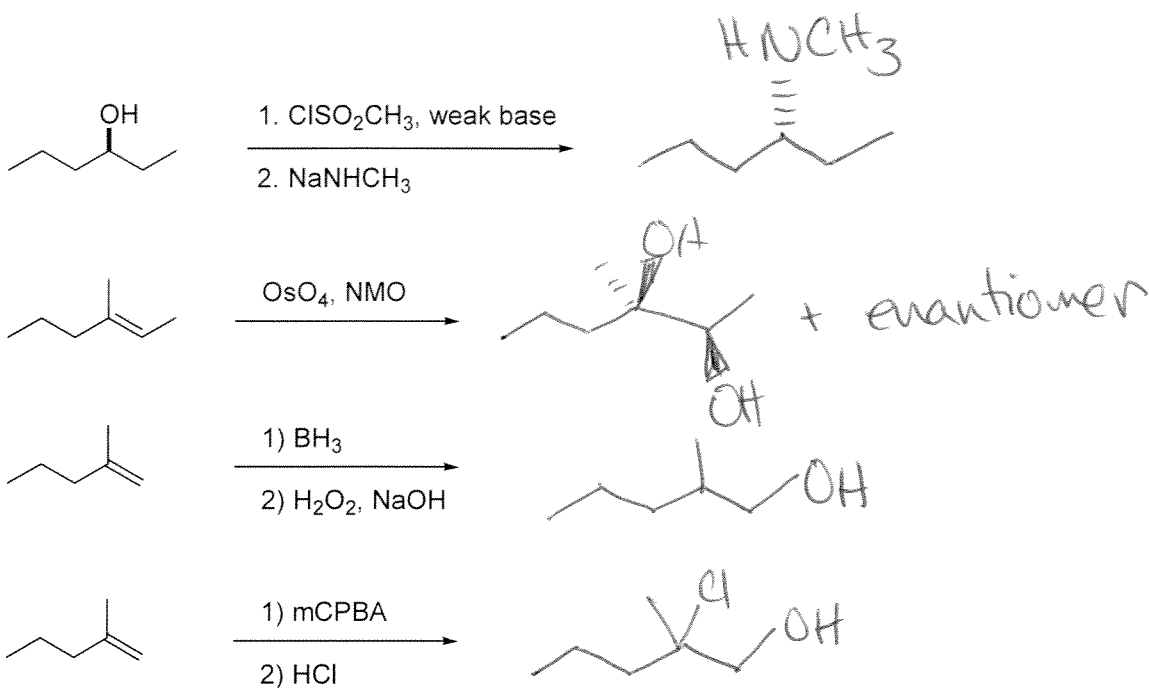
(3) $6e^-$ from double bonds
 $6e^-$ from alkyne (only from one plane though)

$12e^-$ not aromatic

$(4n+2)e^-$ | $2e^-, 6e^-, 10e^-, 14e^- = \text{aromatic}$

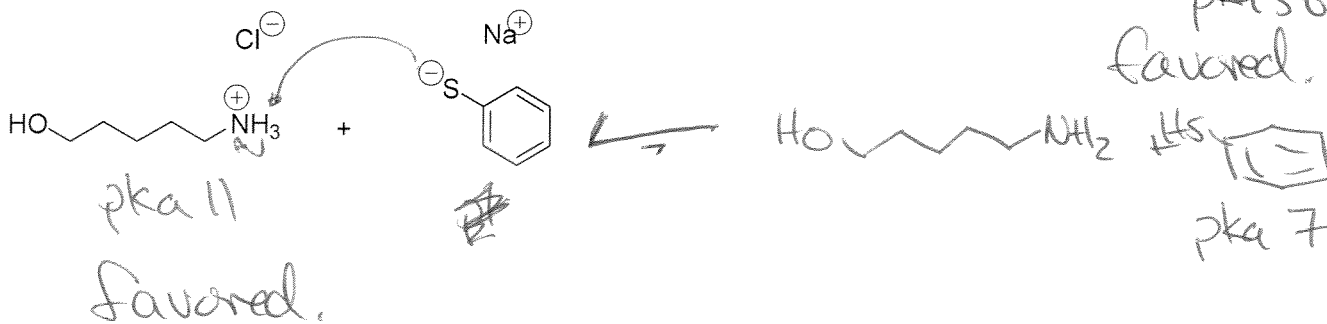
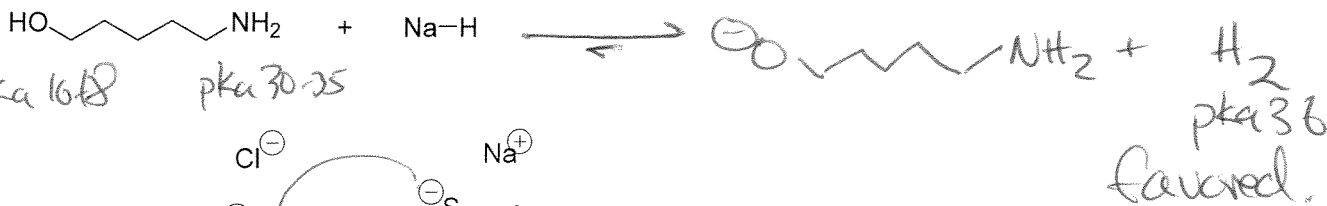
3. Give the major organic product of each of the following reactions.





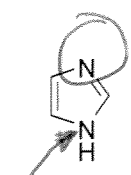
4.

- Draw the mechanism and products for the following reactions.
- Will the reactions favour starting materials or products?
- Justify your choices in part b.



side with the acid with the highest pKa is favored.

5. Circle the most basic atom in imidazole and explain your choice.



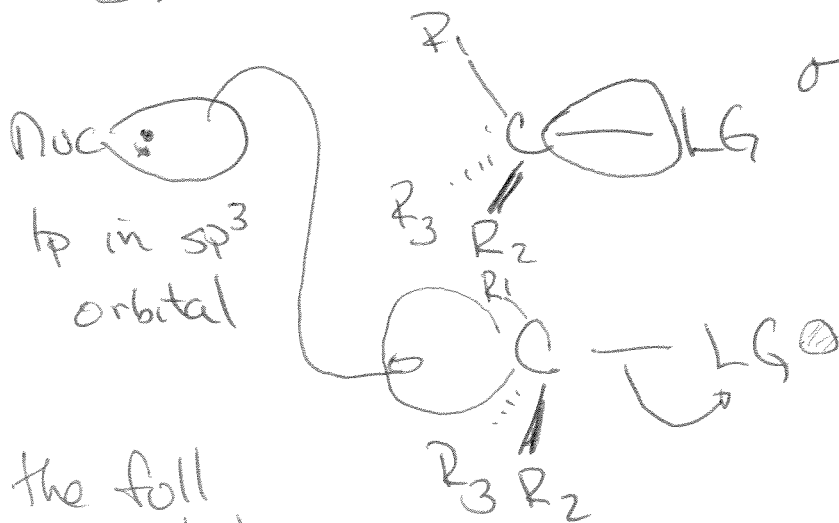
- this compound is aromatic
 - 4e from π bonds.
 - 2e from lone pair in π system = 6e⁻ aromatic

- the Nitrogen involved in making this system aromatic can not use its lp as a base as it is occupied in making the system aromatic.

6. Use orbital to show why backside attack occurs in S_N2 reactions and why the proton and leaving group must be antiperiplanar in an E2 reaction.

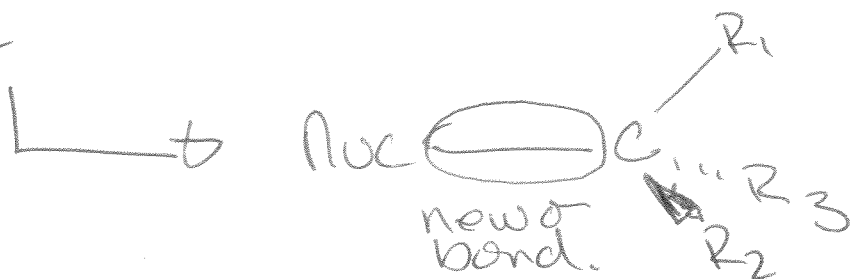
sp²

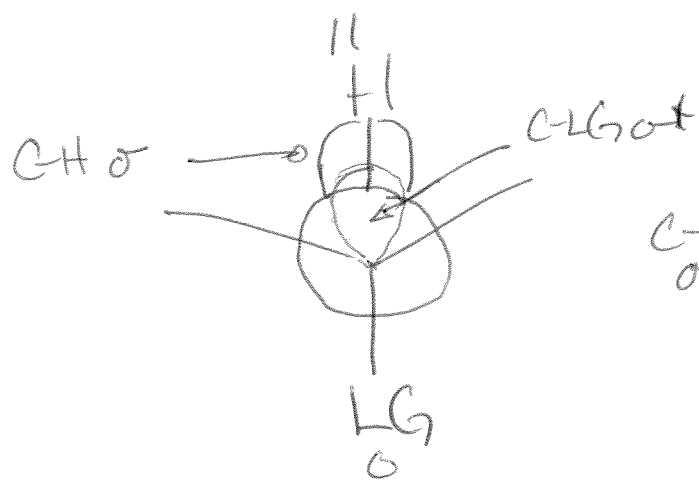
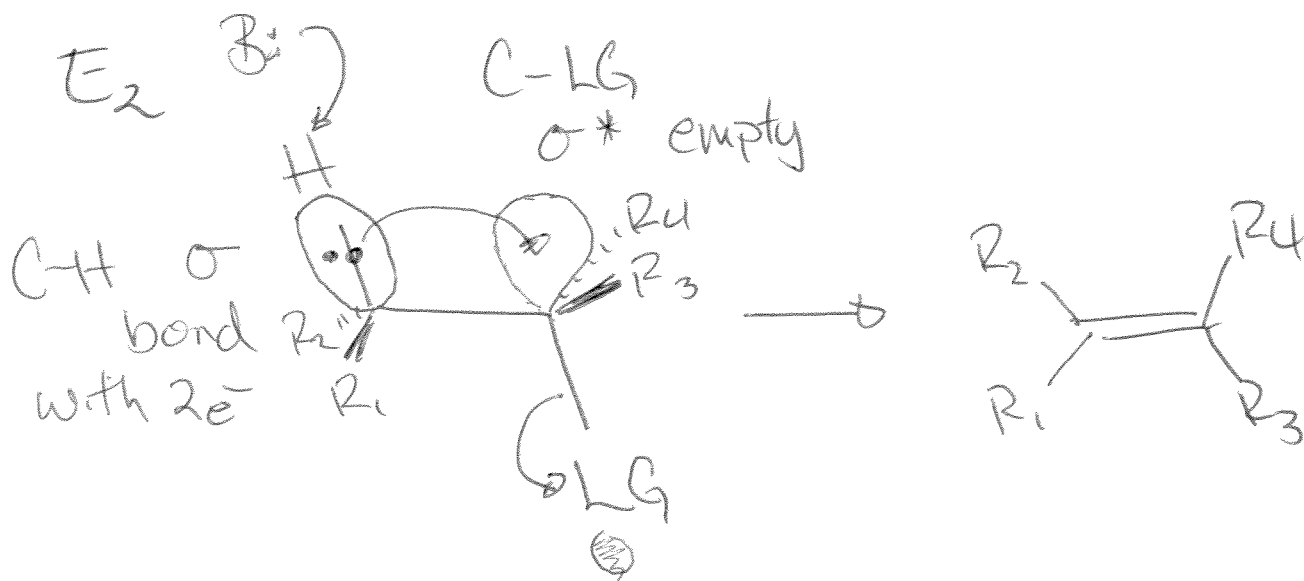
bonds are made up of bonding & antibonding orbitals



σ bond orbital
 σ^* orbital (antibonding orbital)

the full nuc orbital donates to the empty C-LG σ^* orbital





C-H σ : C-LG σ^* only overlap in the anti-periplanar configuration.

7. Provide the reagents for these two transformations. Note they may each be more than 1 step.

