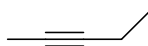


Chemistry 3331  
Organic 2  
Professor Eaton  
Fall 2013

FINAL EXAM

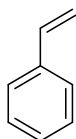
1. (4 pts) Draw the structure of phenol

2. (4 pts) For the alkyne structure drawn below provide the IUPAC name

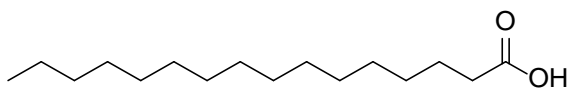


3. (4 pts) Draw the structure of *E*-1,4-hexadiene

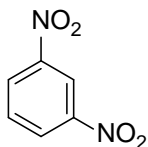
4. (4 pts) For the molecule drawn below provide the common name



5. (4 pts) For the fatty acid drawn below provide the common name

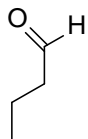


6. (4 pts) Name the aromatic compound drawn below according to IUPAC rules

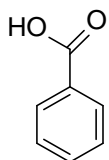


7. (4 pts) Draw the aromatic ketone acetophenone

8. (4 pts) Name the aldehyde compound drawn below according to IUPAC rules

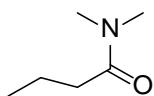


9. (4 pts) Name the compound drawn below according to IUPAC rules

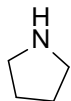


10. (4 pts) Draw the structure of acrylic acid

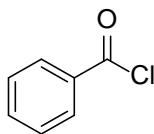
11. (4 pts) Name the compound drawn below according to IUPAC rules



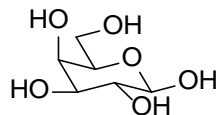
12. (4 pts) Name the compound drawn below as its common name



13. (4 pts) Name the compound drawn below as its common or IUPAC name



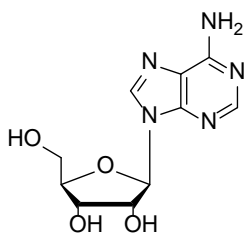
14. (8 pts) Name the sugar drawn below. Is this an aldose or ketose? Is this a furanose or pyranose? Is this the alpha or beta isomer?



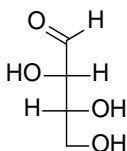
15. (5 pts) Draw the Fischer projection of D-glyceraldehyde

16. (5 pts) Draw the Fischer projection of D-Ribose

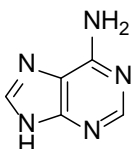
17. (6 pts) Name the structure of the nucleoside. Is this a purine nucleoside?



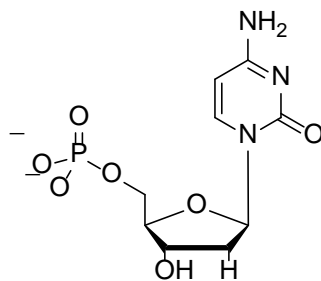
18. (5 pts) Name the compound drawn below as a Fischer projection.



19. (8 pts) Label the nitrogens of the nucleobase drawn below as sp, sp<sup>2</sup> or sp<sup>3</sup>. Using the 4n + 2 rule, is the compound drawn below aromatic?



20. (9 pts) Name the nucleotide drawn below. Is the compound drawn below a purine nucleotide? Is the nucleobase in the syn or anti conformation?



21. (6 pts) Draw the molecular orbital diagram for carboxylate anion, including nodes and electron occupancy, and labeling the HOMO and LUMO.

22. (5 pts) Draw d-alanine as a Fischer projection

23. (10 pts) List six of the nine functional groups present in the 20 common alpha-amino acids.

24. (5 pts) Histidine plays an essential role in many protease enzymes. The role of the histidine in these enzymes is to:

- a. Add as a nucleophile to the amide carbonyl of a protein
- b. Act as a base to abstract the proton from an enzyme active site histidine
- c. Facilitate the addition of an aspartate side chain to cleave a protein
- d. Act as an acid to protonate the covalent catalysis ester intermediate
- e. a. and c.
- f. b. and d
- g. all of the above

25. (5 pts) Mutarotation is:

- a. a spontaneous process that occurs only in ketose sugars
- b. fast in nucleosides
- c. interconversion of hemi-acetal isomers of sugars
- d. part of the Monsanto acetic acid process
- e. all of the above

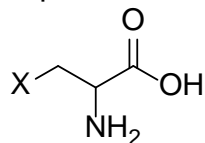
26. (5 points) The ligand on Pd used in the Carboxyamidation reaction is a triphenylphosphine. This ligand is an example of:

- a. pi-donor ligand with sigma acceptor response
- b. Lewis acid ligand
- c. Sigma donor ligand
- d. a and c
- e. a and b

27. (8 pts) The DNA helix can be B-form or A-form depending on the solution. For B-form DNA helix:

- a. The nucleobases are in the syn conformation and the deoxyribose is in the C2'-endo conformation
- b. The nucleobases are in the anti conformation and the deoxyribose is in the C3'-endo conformation
- c. The phosphodiester bond determines the number of nucleobases per helix turn and form of the double helix
- d. All of the above
- e. None of the above

28. (5 pts) For the amino acid drawn below and group as discussed in class, the range of pI values is:



- Approximately 6 when X = isopropyl
- Approximately 8 when X = carboxylic acid
- Of the same order of magnitude as acetic acid when X = H
- All of the above

29. (5 pts) In an electrophilic aromatic substitution reaction:

- The aromatic pi-system is the electrophile
- The aromatic pi-system is the nucleophile
- Both a. and b. are possible
- Only radical intermediates are involved

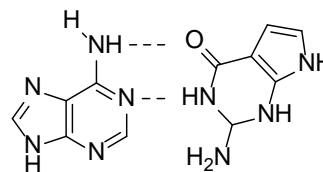
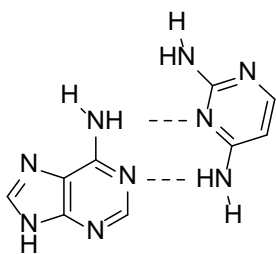
30. (5 pts) Glucose and Fructose can be interconverted by:

- Base catalyzed mutarotation
- Acid catalyzed enolization
- Nucleophilic substitution
- Radical elimination plus addition
- None of the above

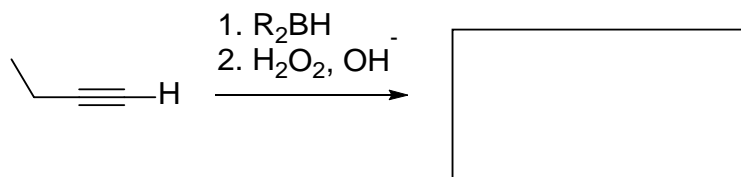
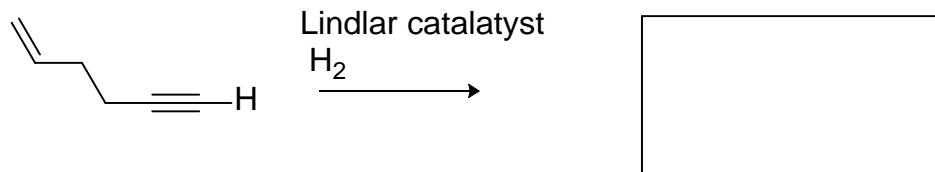
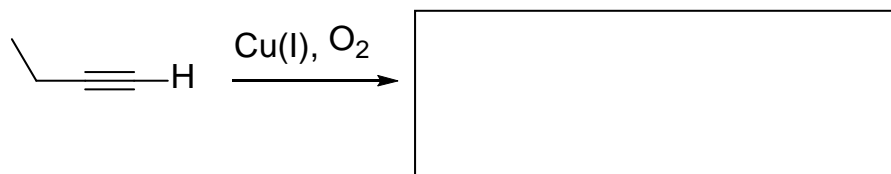
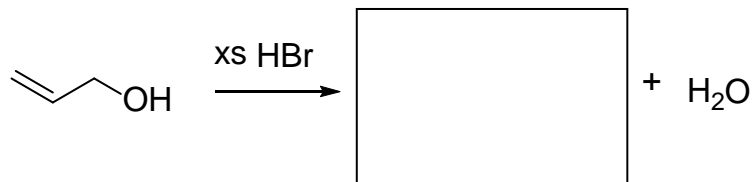
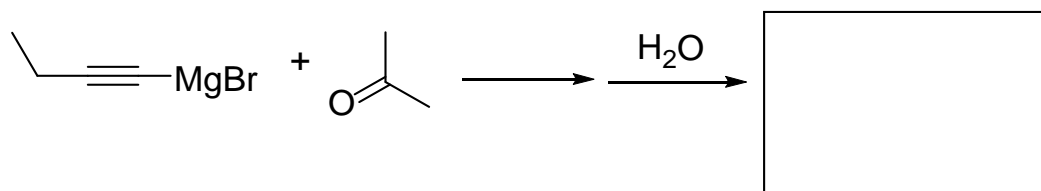
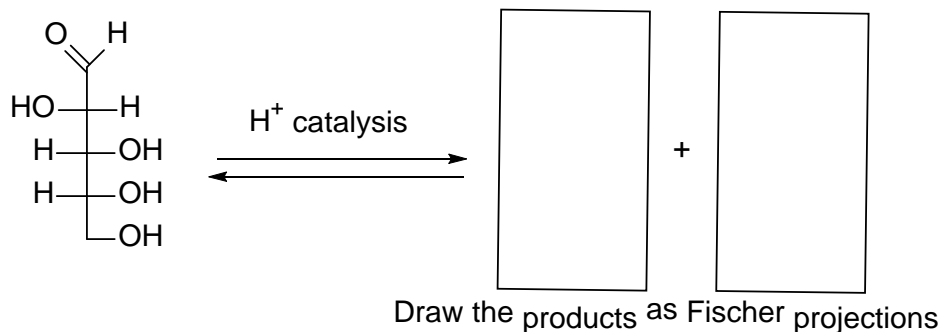
31. (5 pts) The nitrogen in aniline is:

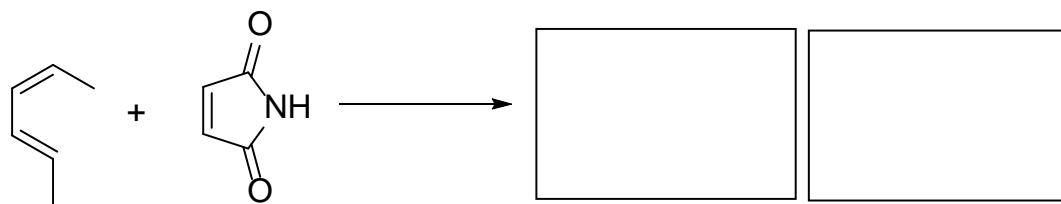
- Sp<sup>2</sup> hybridized
- Sp hybridized
- Sp<sup>3</sup> hybridized
- None of the above

32. (8 pts) For the base pairs drawn below label the nucleobases from the choices A, C, G, or U. For these two hydrogen bonded base pairs explain if they are of the same stability or if one pair is predicted to be more stable.

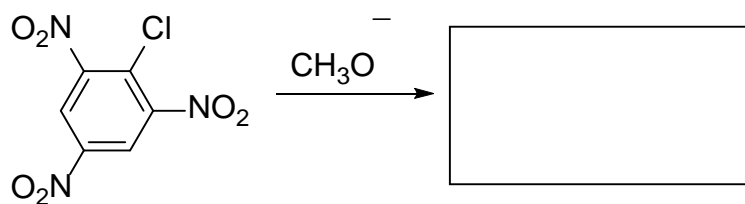
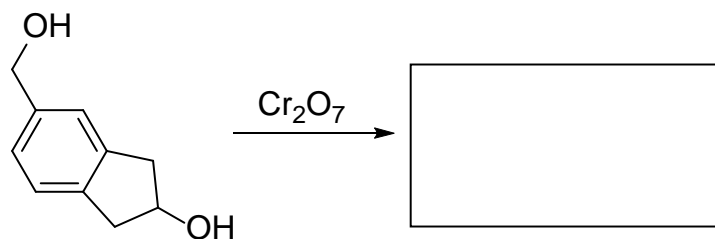
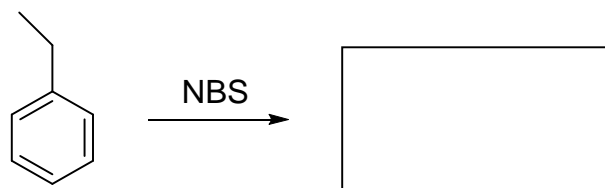


33. (125 pts, 3 points per box) for the reactions shown below fill in the box to complete the chemical equation. In equations where there are inorganic by-products you can ignore these in your answer.

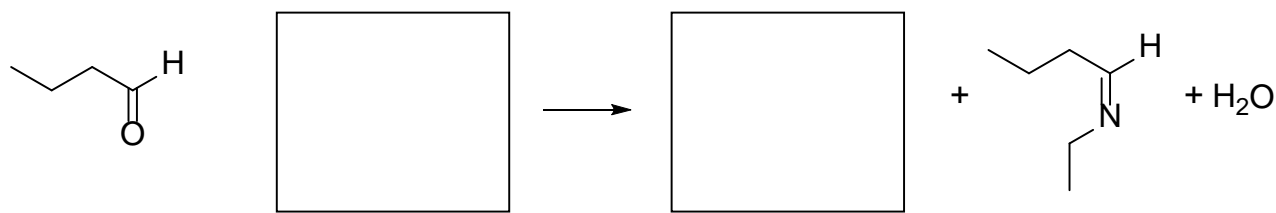
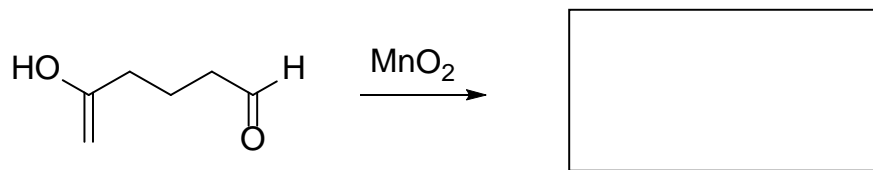
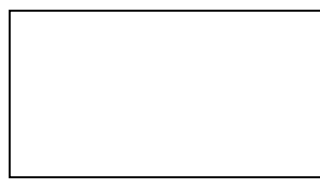
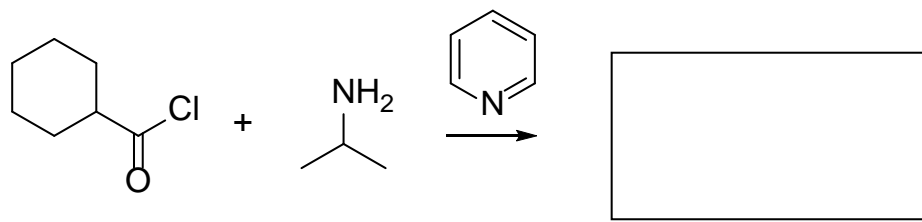
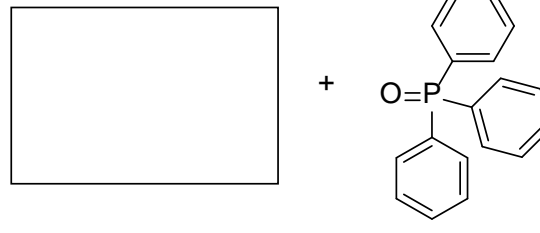
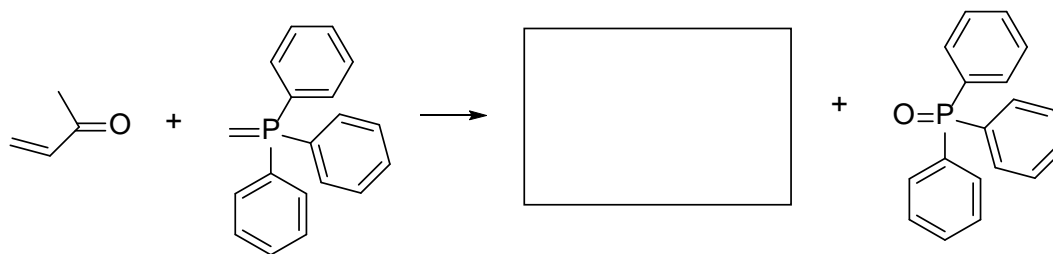
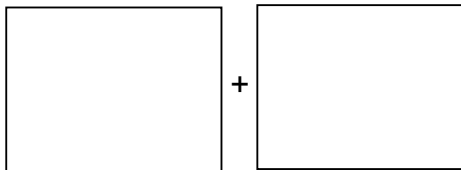
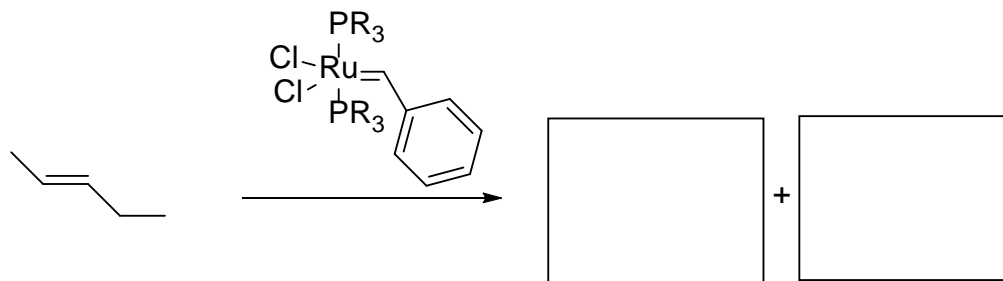
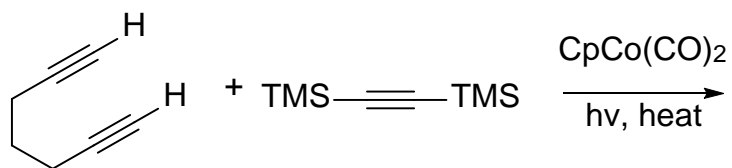


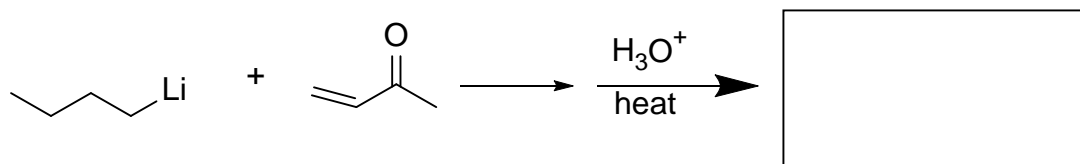
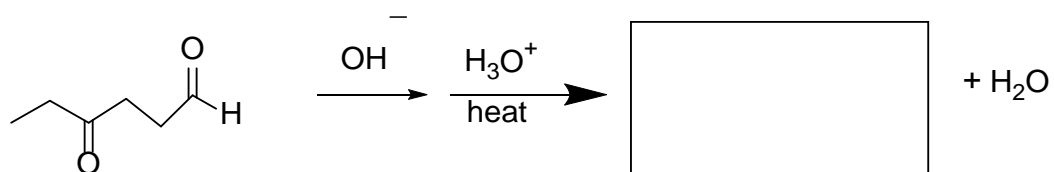
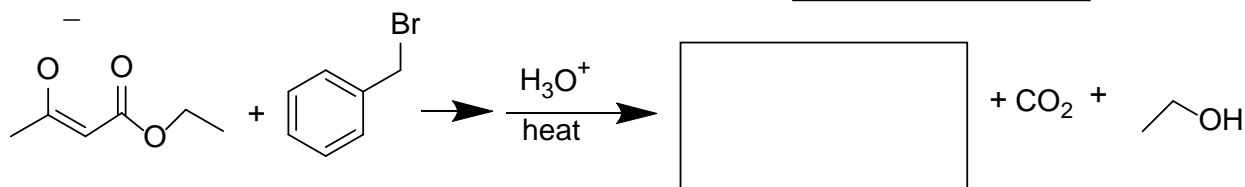
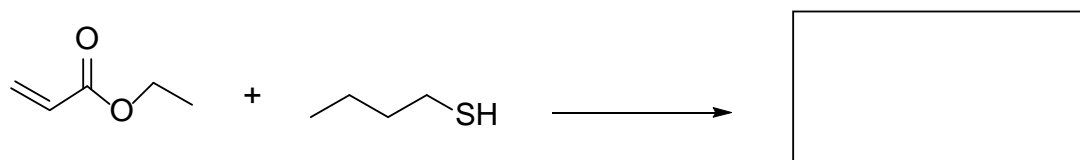
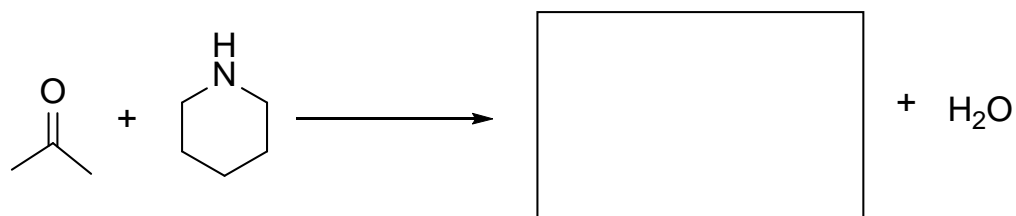
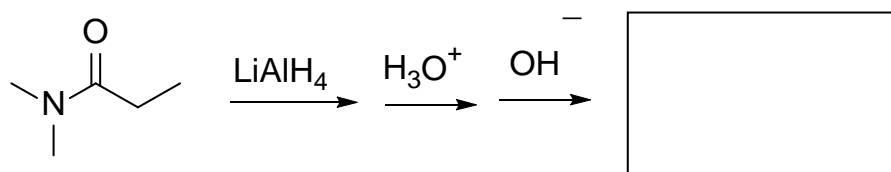
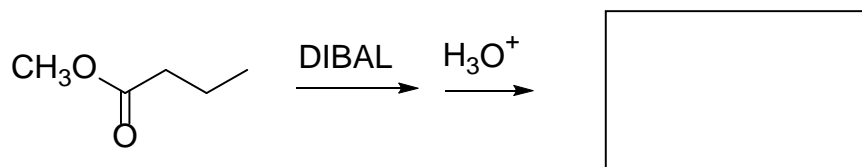
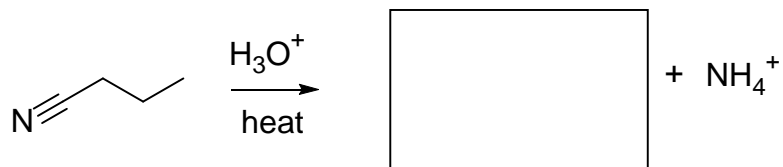


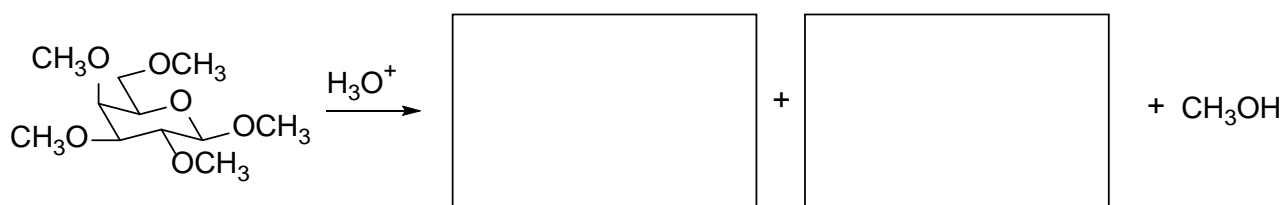
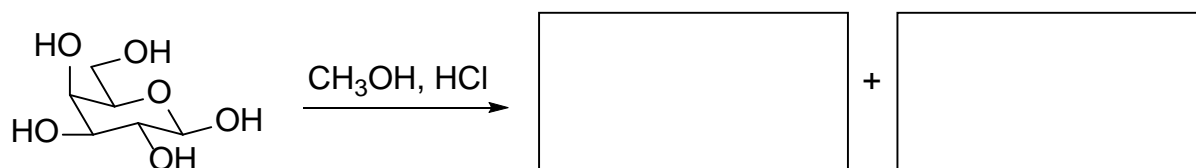
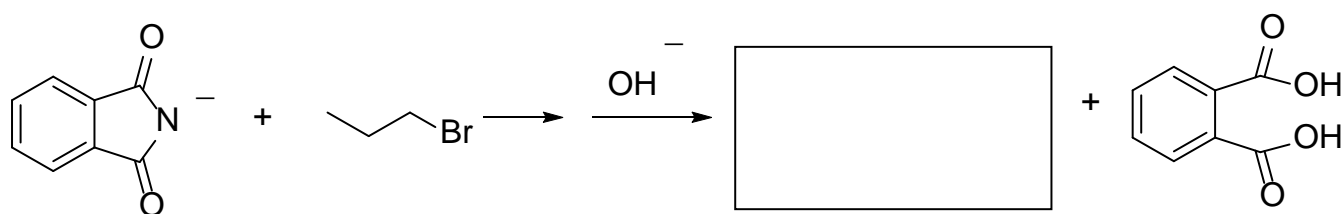
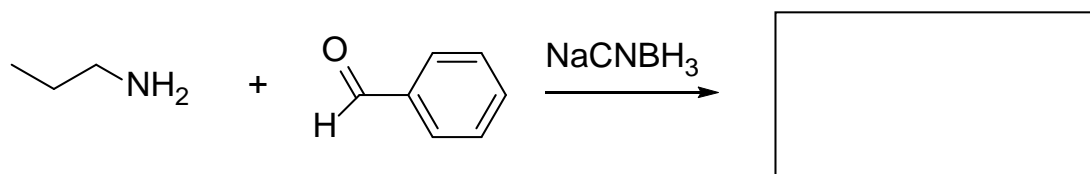
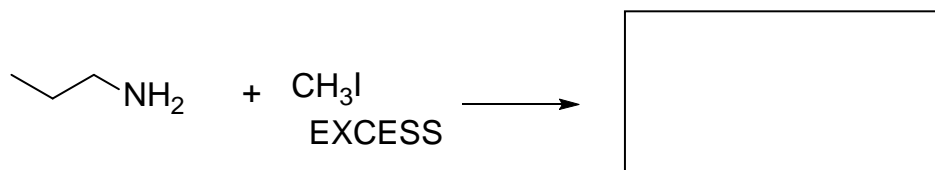
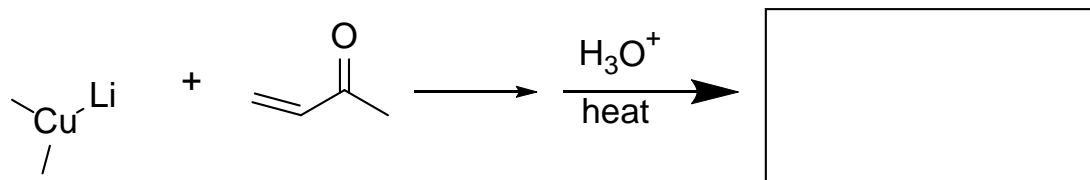
(2 pts) Can you label the products as coming from the endo and exo transition states?

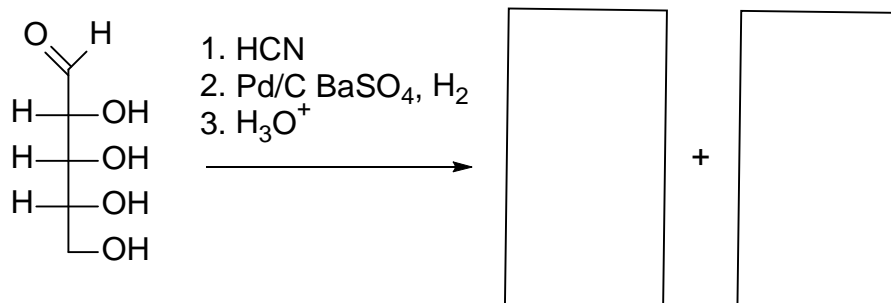
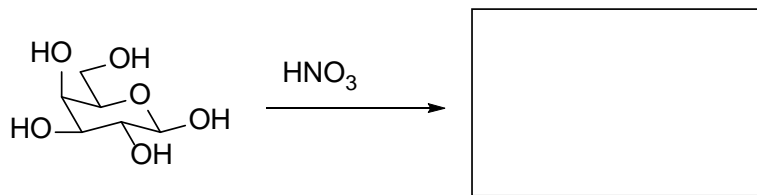












Draw the products as Fischer projections

34. (5 pts) For the terpene alcohol drawn below identify the isoprene units by outlining the carbons in each unit and classify the terpene as a mono, di, etc.

