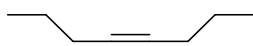


Chemistry 3331  
Organic 2  
Professor Eaton  
Spring 2013

FINAL EXAM

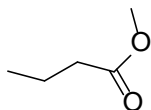
1. (4 pts) Draw the structure of benzoic acid

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

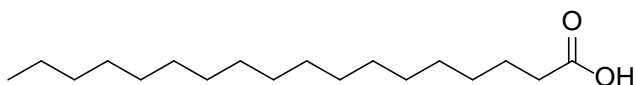


3. (4 pts) Draw the structure of *E,E*-2,4-hexadiene as the *s-trans* conformation

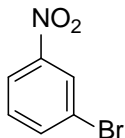
4. (4 pts) For the molecule drawn below provide the IUPAC name



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

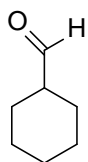


6. (4 pts) Name the aromatic compound drawn below according to IUPAC rules

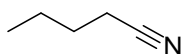


7. (4 pts) Draw the aromatic compound aniline

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 maleic acid

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

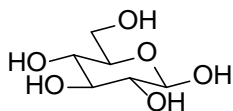
12. (4 pts) Name the compound drawn below as its common name



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?

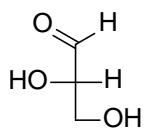


15. (4 pts) Draw the structure of Cellulose

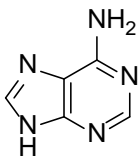
16. (4 pts) Draw the Fischer projection of D-Ribose

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

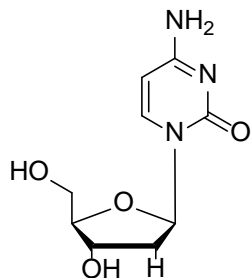
18. (4 pts) Name the compound drawn below as a Fischer projection.



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. (6 pts) Name the nucleoside drawn below. Is the compound drawn below a pyrimidine nucleoside?



21. (8 points) Draw the molecular orbital diagram for allyl cation labeling the HOMO and LUMO. On your drawing mark all carbons that can react to form a bond with a nucleophile. Explain your reasoning for marking the carbons you marked as reactive.

22. (5 pts) Using resonance structures for aniline explain why it is less basic than butanamine

23. (8 pts) When  $\beta$ -D-Glucose undergoes mutarotation what would be the product?

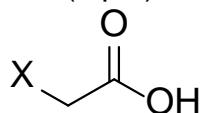
24. (5 points) The ligand on Pd used in the Heck reaction is a triphenylphosphine. This ligand is an example of:

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

25. (8 pts) The DNA helix can be B-form or A-form depending on the solution. For A-form DNA helix:

- The nucleobases are in the syn conformation and the deoxyribose is in the C2'-endo conformation
- The nucleobases are in the anti conformation and the deoxyribose is in the C2'-endo conformation
- The nucleobases are in the anti conformation and the deoxyribose is in the C3'-endo conformation
- The phosphodiester bond determines the number of nucleobases per helix turn and the ribose can be in either the C2'-endo or C3'-endo conformation

26. (5 pts) For the carboxylic acid drawn below the pKa is:



- Approximately 4.7 when X = H
- Approximately 2.7 when X = F
- Of the same order of magnitude as aniline when X = H
- All of the above

27. (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

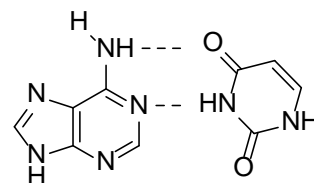
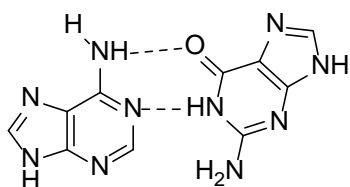
28. (5 pts) Glucose and Fructose can be interconverted by:

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

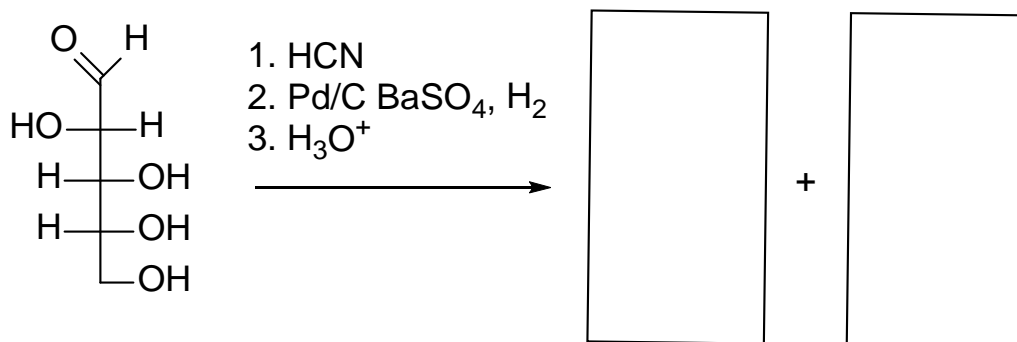
29. (5 pts) The nitrogen in butanamine is:

- a.  $sp^2$  hybridized
- b.  $sp$  hybridized
- c.  $sp^3$  hybridized
- d. None of the above

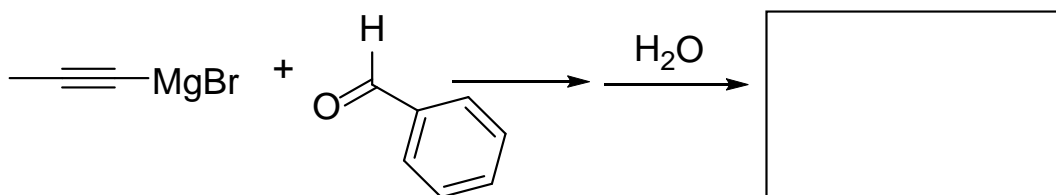
30. (10 pts) For the base pairs drawn below label the nucleobases from the choices A, C, G, or U. For these two hydrogen bonded base pairs explain if they are of the same stability or if one pair is predicted to be more stable.

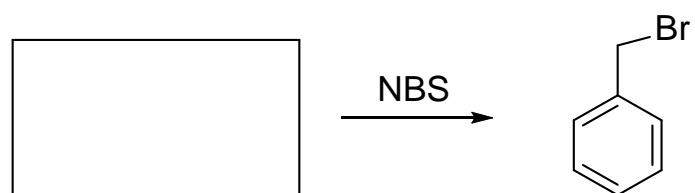
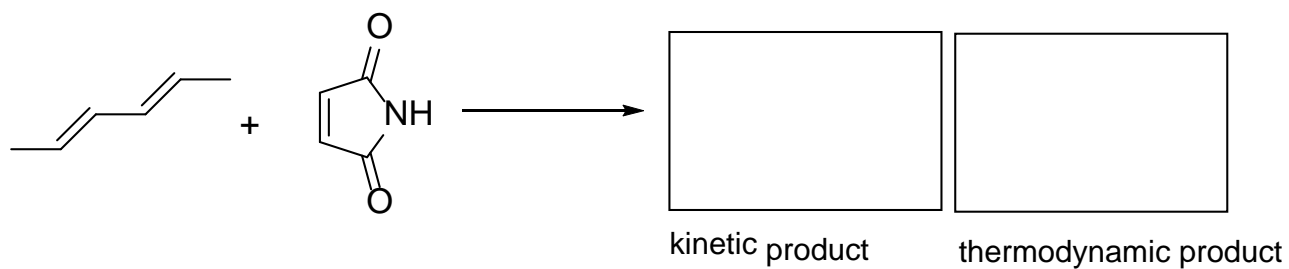
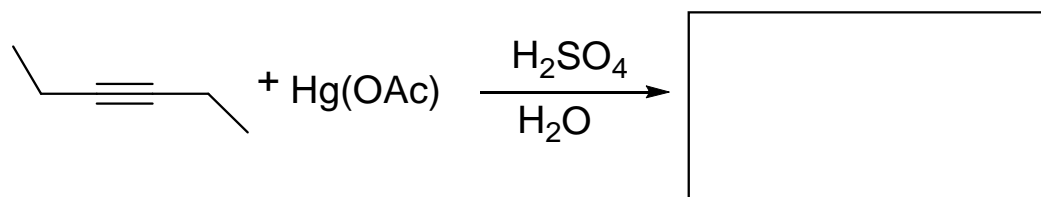
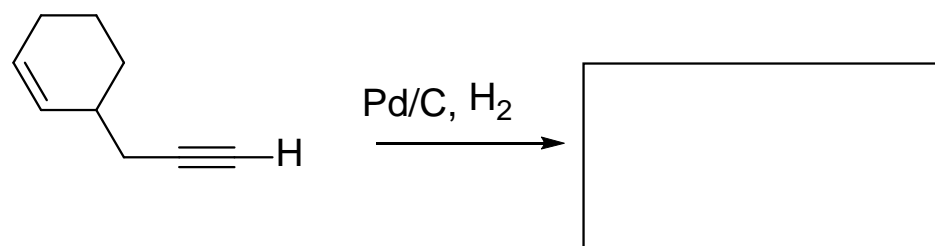
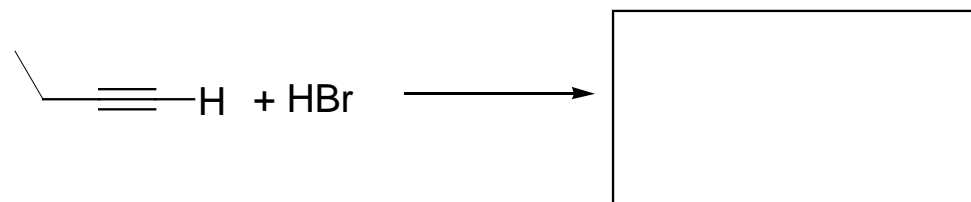
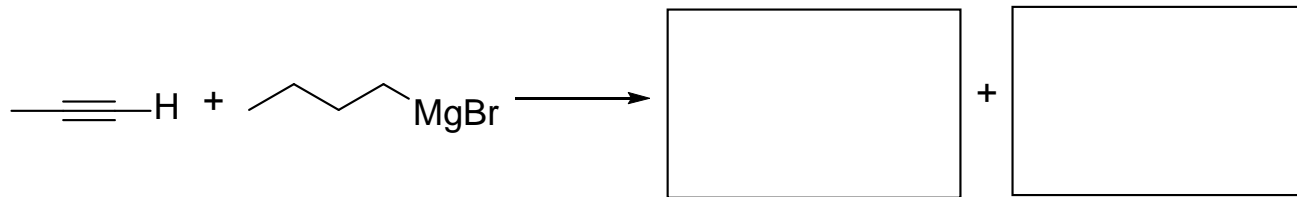


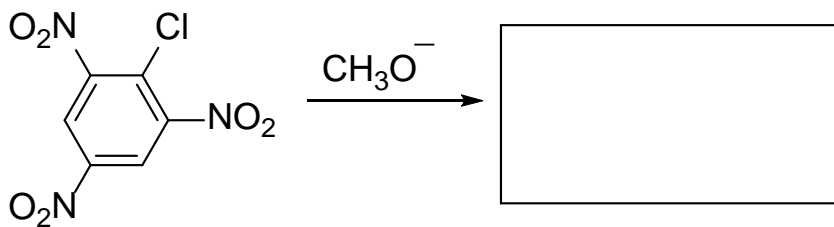
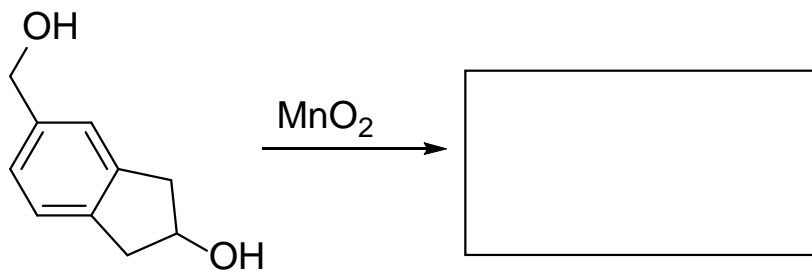
31. (144 pts) For the reactions shown below fill in the box to complete the chemical equation. In equations where there are inorganic by-products you can ignore these in your answer.



Draw the products as Fischer projections







Both are substituted benzenes

