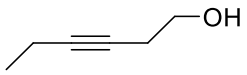
Student Name_____

ID# _____

Chemistry 3331 **EXAM 1**
Organic 2
Professor Eaton
Spring 2015

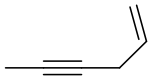
1. (2 pts) Draw the structure of 3-pentyne. Is this the correct IUPAC name?

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

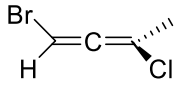


3. (3 pts) Draw the structure of *Z*-1,3-pentadiene.

4. (3 pts) For the conjugated molecule drawn below, provide the IUPAC name.



5. (3 pts) Name the allene drawn below, including any stereochemical designation according to IUPAC if applicable.



6. (2 pts) Draw s-trans 1,3-butadiene.

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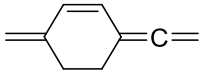
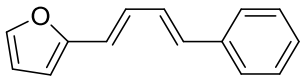
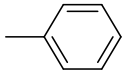
7. (3 pts) For the pi-system drawn below label the carbons as to their hybridization (sp, sp2, sp3). Are the pi-bonds of this molecule in conjugation from one end to the other?



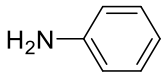
8. (3 pts) For the molecule drawn below, label the carbons as to their hybridization (sp, sp2, sp3). Are the electrons in the pi-system delocalized over all non-hydrogen atoms in this molecule?



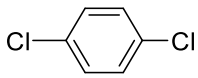
9. (2 pts) For the molecule drawn below, what is the common name?



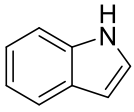
10. (2 pts) For the molecule drawn below, what is the common name?



11. (4 pts) For the molecule drawn below, provide the common name as (eg. ortho, meta, para) and as an IUPAC convention.



12. (4 pts) For the molecule drawn below, assume that the structure is planar and use the 4n+2 rule to predict if it is aromatic. What is n for this molecule? Explain your answer in one or two sentences.



13. (7 pts) Draw the MO diagram of butadiene and show the phases as they change from lowest to highest energy orbital. Show the electron occupancy for each orbital and label the HOMO and LUMO in your drawing.

14. (2 points) For benzene the structure is comprised of:
    a) alternating single and double bonds
    b) a combination of sp and sp2 hybridization at carbon
    c) all carbons being sp2 hybridized
    d) all carbon-carbon bond lengths being the same
    e) a and b
    f) c and d

15. (2 points) The pi-systems of Benzene:
    a) has super hypersonic resonance
    b) is defined with greater nodal planes in the pi-system compared to hexatriene
    c) has degenerate energy in the HOMO orbital making it more stable than hexatriene
    d) none of the above

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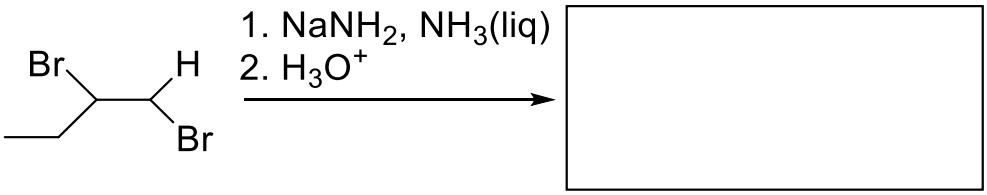
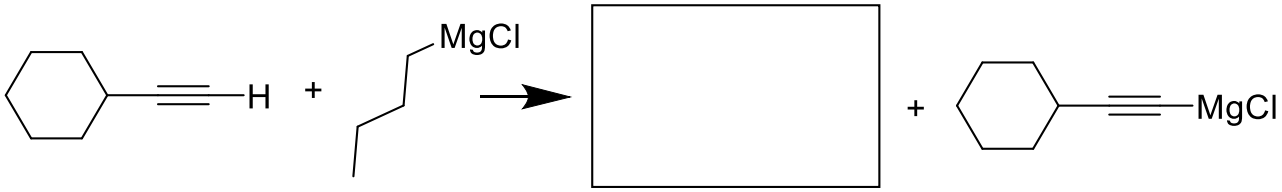
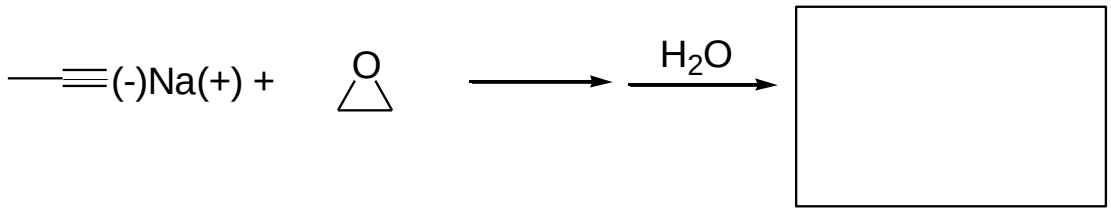
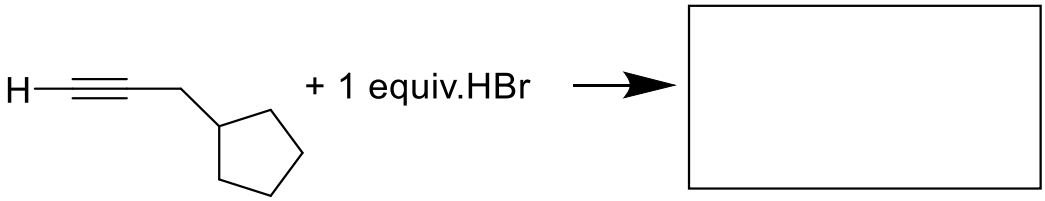
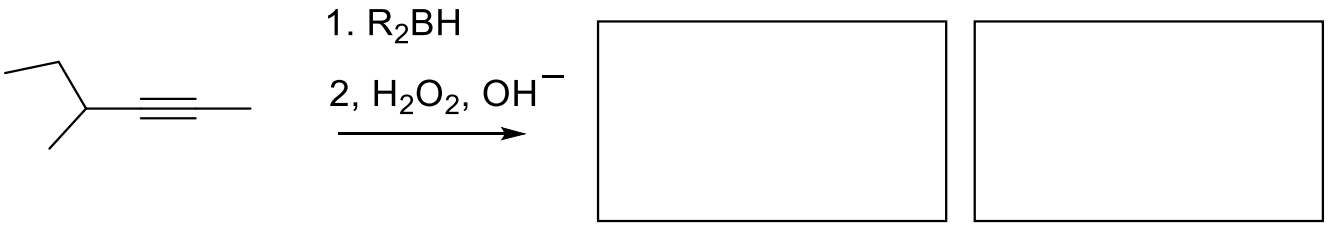
16. (48 pts) for the reactions shown below fill in the box to complete the chemical equation

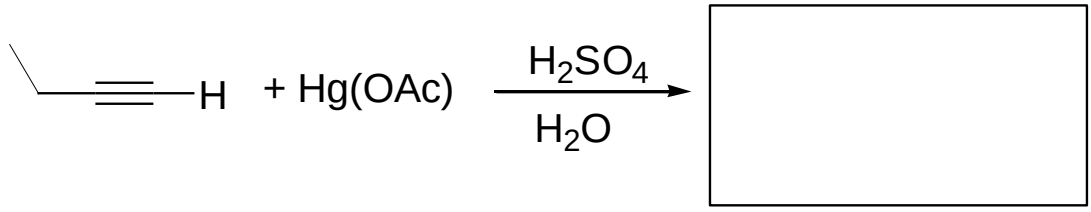












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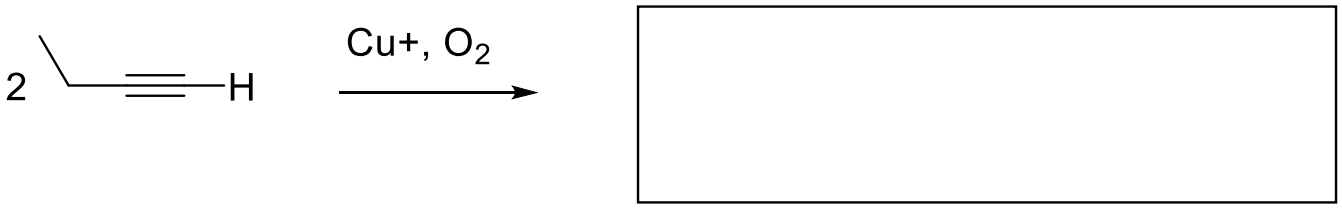

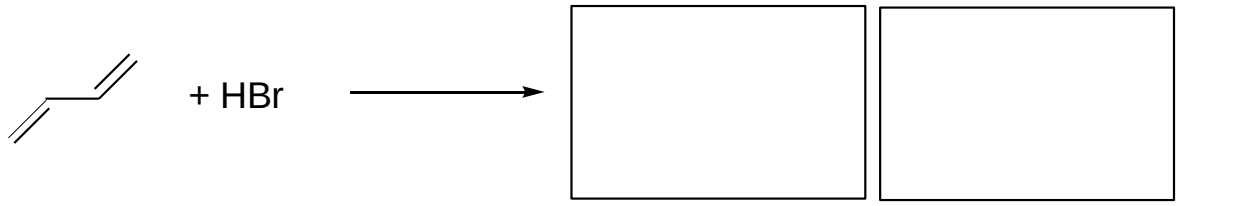

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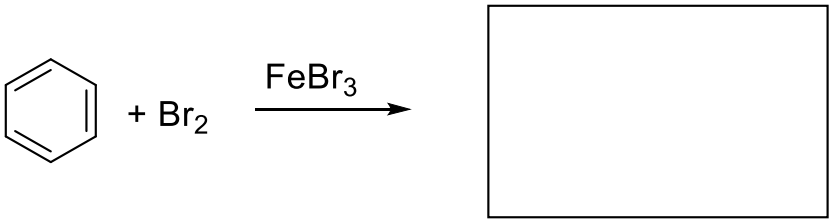

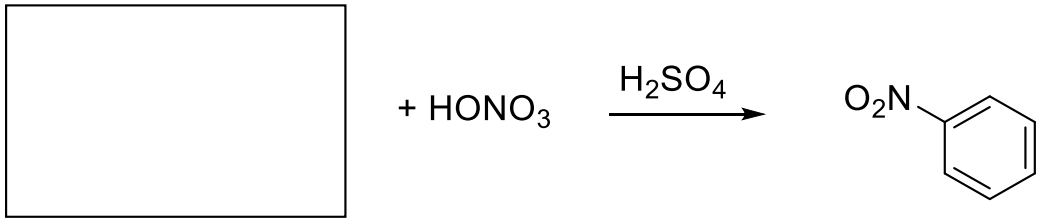

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17. (8 points) For the Diels-Alder reaction drawn below, please draw all products from the reaction clearly indicating stereochemistry. Assume NO regio-control of this reaction. If possible, label the products as coming from an endo or exo transition-state. If it is not possible to label as coming from an endo or exo transition-state, label the molecule as ambiguous with regard to the transition-state. For any molecules that have enantiomers, label clearly those molecules that form pairs of enantiomers.