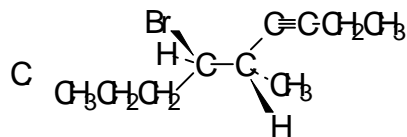
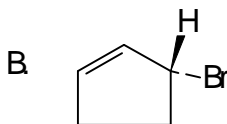
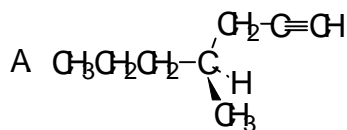


Exam # 4
November 21, 2001 – Chemistry 2401

(9) I. Name each of the following. The name should include a stereochemical designation in each case.



(18) II. Draw structural formulas for each of the following. Show 3-D where indicated.

A. trans,trans-3,5-heptadien-1-yne

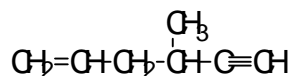
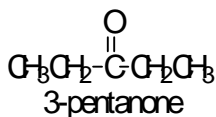
B. an erythro isomer of 2,3-dibromohexane - designate its stereochemistry (like 2-R,3-S)

C. Draw the enantiomer of the compound you drew in part B. Identify its stereochemistry.

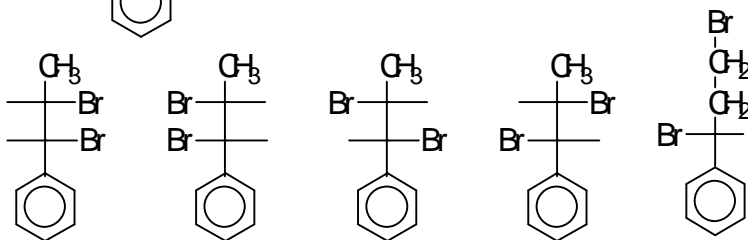
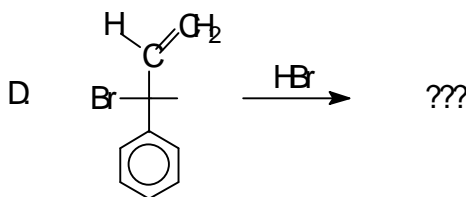
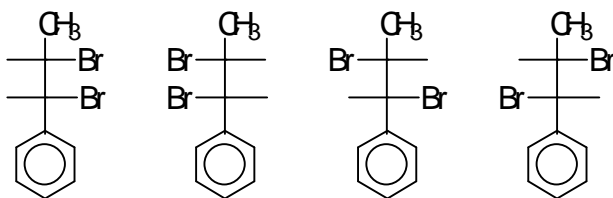
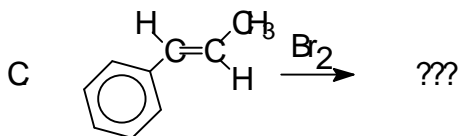
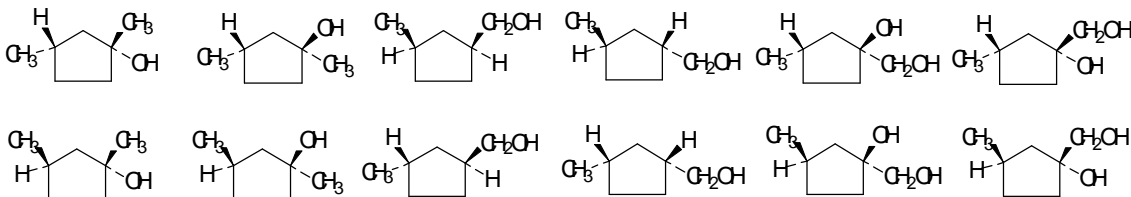
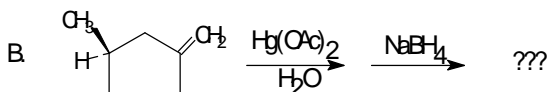
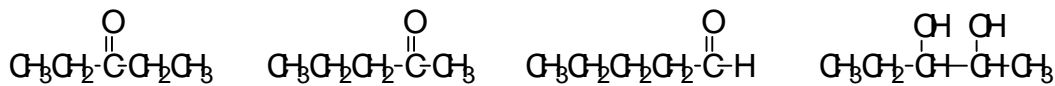
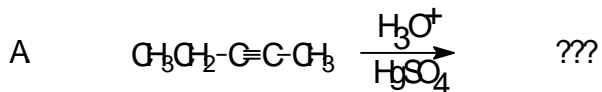
D. Now draw a diastereomer of the compound in B and designate its stereochemistry.

E. the enol tautomer of 3-pentanone

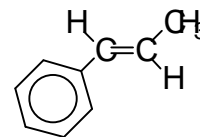
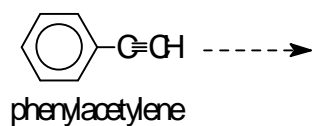
F. The conjugate base of the compound shown below.



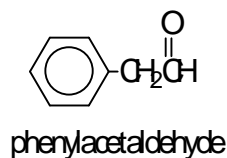
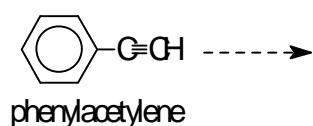
(16) III. Here are some reactions. What I've done is provided structures of some potential products. Your job is to **circle** the structure of any compound that is produced by the reaction. There may be more than one product formed by some of the reactions. In that case circle all that are produced.



(8) IV. Propose a sequence of reactions by which you could synthesize the compound in III C from phenylacetylene.



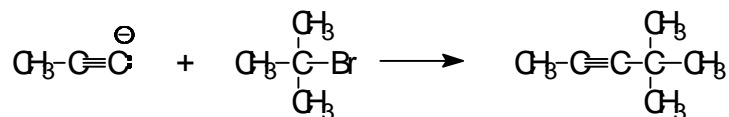
B. How would you make phenylacetaldehyde from phenylacetylene?



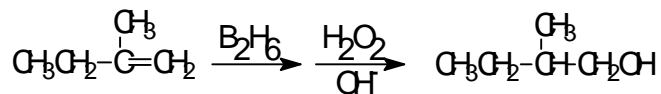
(4) V. The synthesis you proposed in question IVA should have begun by reacting phenylacetylene with NaNH_2 in liquid ammonia which acts as a base. Why wouldn't you use the much more convenient base, $\text{NaOCH}_2\text{CH}_3$ in ethanol (HOCH_2CH_3) for this reaction?

(4) VI. Suppose a stranger approaches you on the street and offers to sell you a liter of cyclopentyne at what sounds like a really good price. Should you buy? Explain.

(4) VII. A friend asks you to invest in a plant that he proposes to build in which he will manufacture 4,4-dimethyl-2-pentyne by the method shown below for sale to an alkyne wholesaler in Memphis. Should you invest? Explain.



(4) VIII. A major flavor ingredient in beer, the chiral molecule 2-methyl-1-butanol, can be synthesized from 2-methyl-1-butene using the chemistry shown below.



The 2-methyl-1-butanol isolated from beer is optically active, but the 2-methyl-1-butanol synthesized from 2-methyl-1-butene is optically inactive. What is the difference in the two samples of the alcohol?

(8) IX. The optically active 2-methyl-1-butanol that is isolated from beer is levorotatory, $[\alpha] = -5.8^\circ$ and has an S configuration. When this alcohol is reacted with thionyl chloride and pyridine, the OH is replaced with a Cl yielding optically active 1-chloro-2-methylbutane that is dextrorotatory, $[\alpha] = +1.64^\circ$.

A. Draw a structural formula for the levorotatory 2-methyl-1-butanol.

B. Draw a structural formula for the dextrorotatory 1-chloro-2-methylbutane.

(6) X. If you take the (+) 1-chloro-2-methylbutane that you made in IX and carry out a free radical chlorination (SO_2Cl_2 / AIBN), one of the products that you obtain is 1,2-dichloro-2-methylbutane. Even though the starting material was optically active this product turns out to be a racemic mixture. Write a chemical equation for the reaction and explain this stereochemical result in light of the mechanism of this reaction.