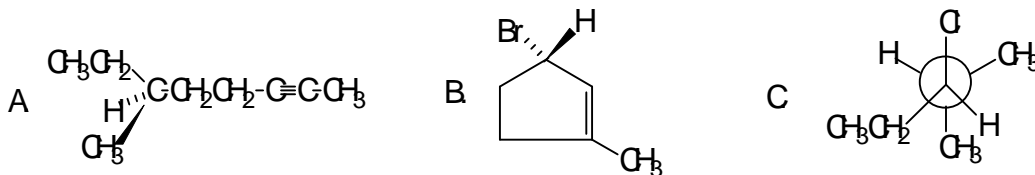


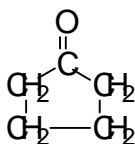
Exam # 3  
 Chemistry 2401 – November 22, 2002

(12) I. Provide appropriate names for each of the following. Include stereochemical designations in each case.

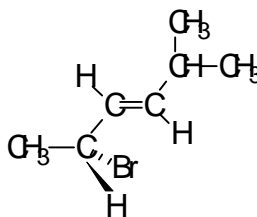


(20) II. Draw structural formulas for each of the following.

A. The enol tautomer of cyclopentanone  
 The keto form is drawn below.

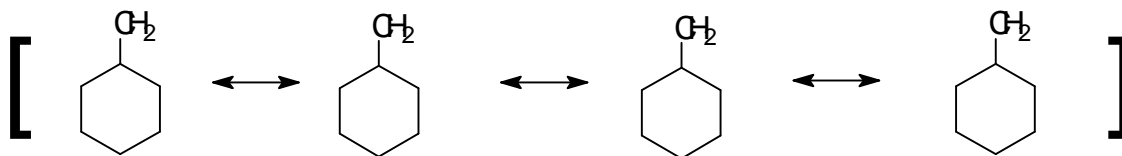
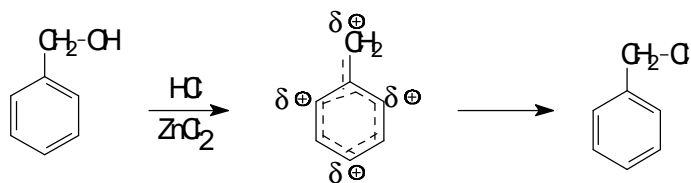


B. Below is R-trans-2-bromo-5-methyl-3-hexene. You draw the S-cis isomer.

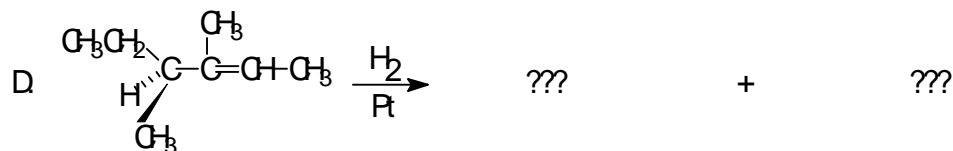
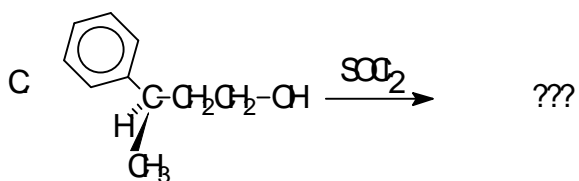
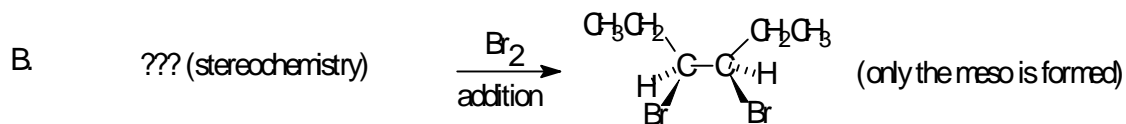
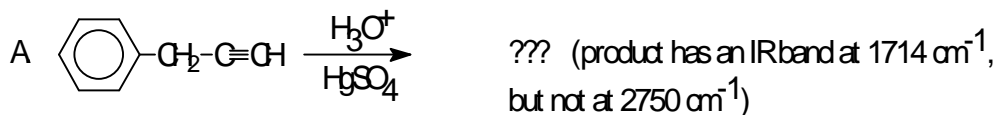


C. Draw two resonance structures for the free radical intermediate produced when 1-pentene undergoes allylic bromination with N-bromosuccinimide (NBS).

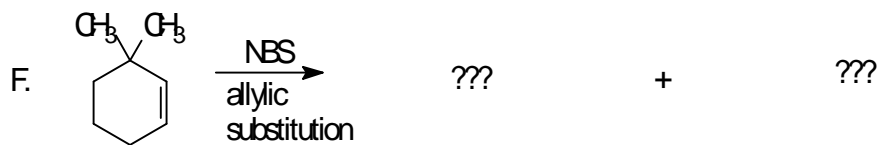
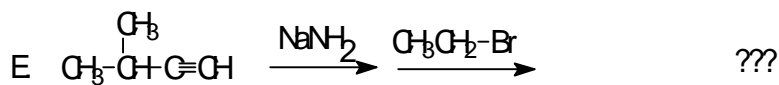
D. Below I have represented the carbocation intermediate that is produced when benzyl alcohol reacts with Lucas reagent. You draw the four Lewis structures required to adequately represent this carbocation by resonance. [Template provided]



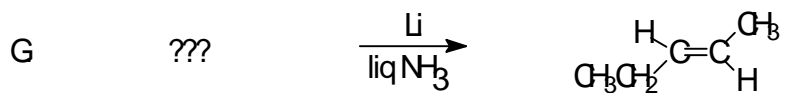
(32) III. Draw structural formulas for the missing reactants or products in the equations below. Include stereochemistry where that is appropriate.



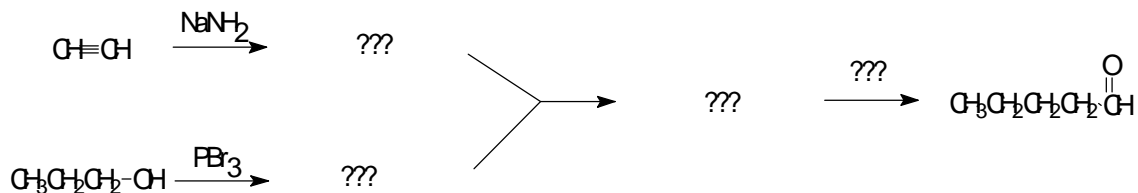
Designate the absolute configuration (R&S) for each chiral center in the two product molecules.



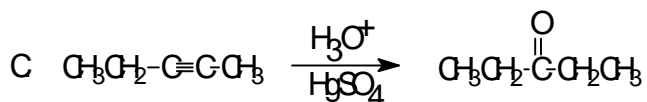
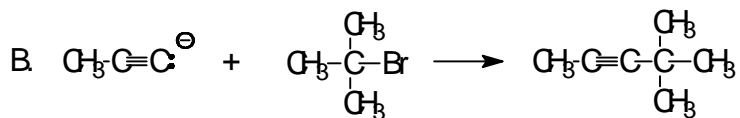
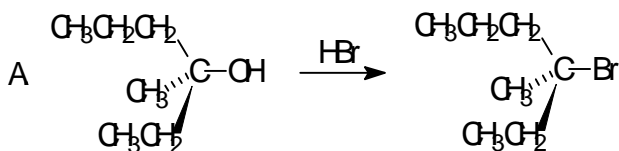
Two peaks are observed in the gas chromatogram of the product mixture.



(8) IV. We want to synthesize pentanal starting with acetylene and 1-propanol. I've laid out a template for the process. You fill in the details.



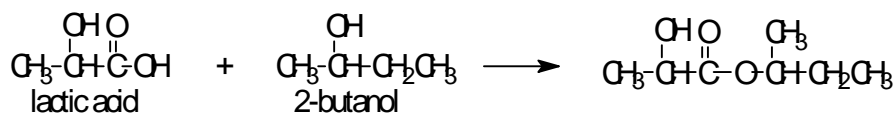
(12) V. The equations I have shown below look good, but for various reasons are not very good ways to accomplish the conversion shown. In each case tell me what the problem is and what you really get instead of a pure sample of the compound shown. Demonstrate that you know exactly what you are talking about by being very specific. (don't BS)



(4) VI. You find yourself at a party in the company of a group of organic chemistry (sure they do). In an effort to fit in, you tell them that you remember synthesizing cyclopentyne as an undergraduate chemistry student. Suddenly they all look at you like you are crazy and they move away to regroup in another part of the room. What did you say wrong?

(4) VII. Not to be dismayed you strike up a conversation with a sales representative from an organic chemical company. You just let it drop that you might be in the market to buy 100 grams of R-3-chloropentane and ask him what the price might be. He looks at you funny and indicates that he doesn't think that he can provide it. How did you foul up this time?

(4) VIII. Alcohols react with acids to produce esters. That process is illustrated below with the reaction of lactic acid with 2-butanol.



Noting that lactic acid and 2-butanol are both chiral, draw structural formulas for the two products formed by the reaction of ( $\pm$ ) lactic acid with S-2-butanol.

(6) IX. Match the approximate  $\text{pK}_a$  values 5, 16, 25, 35, 45, 60 with the structures below:

