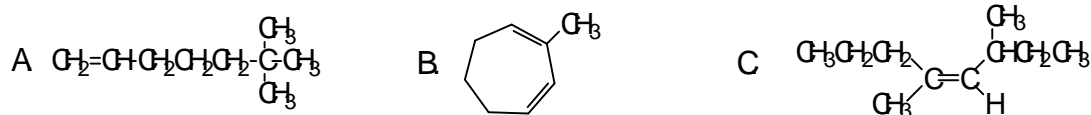


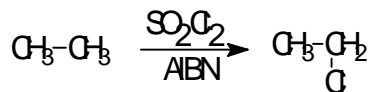
Exam # 2
 Chemistry 2401 – October 28, 2002

(12) I. Name each of the following compounds. In instances where it is relevant you should also include the appropriate stereochemical designation.



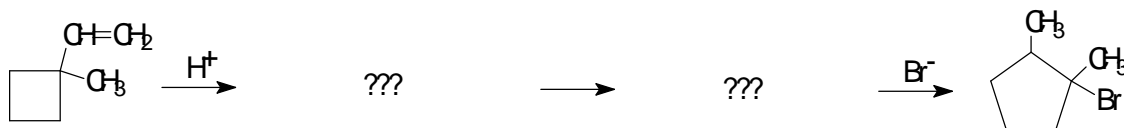
(18) II. Draw structural formulas for each of the following:

A. The free radical intermediate for the reaction shown below.

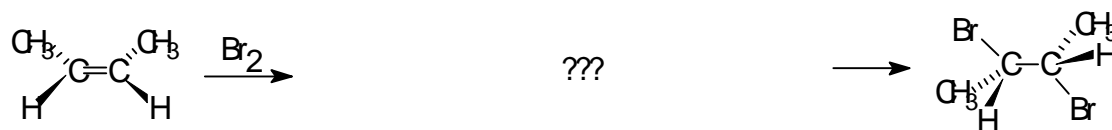


B. E-3-methyl-1,3-hexadiene

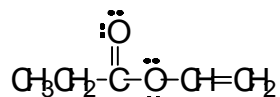
C. The two carbocation intermediates in the reaction shown below:



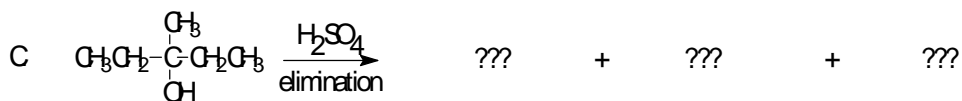
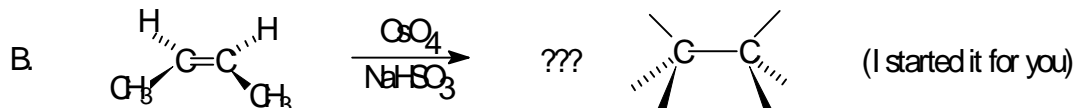
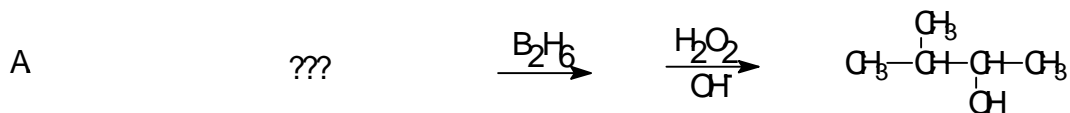
D. The intermediate for the reaction shown below.



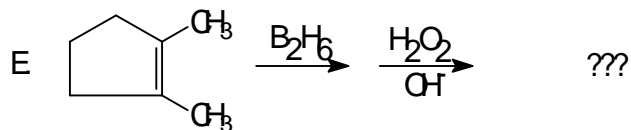
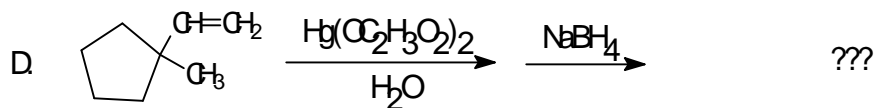
(4) III. Where would a nucleophile attack vinyl propionate (below)? Explain.



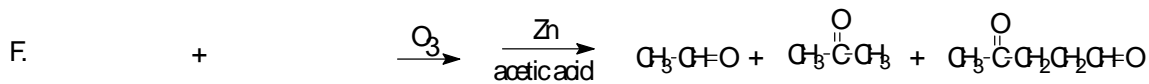
(28) IV. Complete each of the following chemical equations by providing the structural formula of the missing reactant or product.



The gas chromatogram of the product mixture contains three peaks.
The ^{13}C NMR spectra of two of the products are almost identical



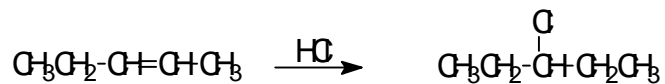
???



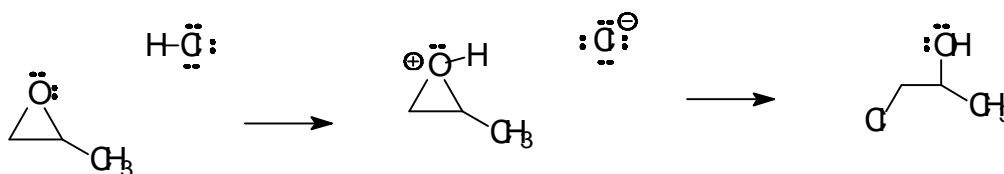
(There are two possible right answers. Draw them both)

???

(5) V. The addition of HCl to 2-pentene (shown below) is not a good way to synthesize 3-chloropentane. Explain why this is so. (Be very specific)



(5) VI. Add curved arrows showing the flow of electrons for the reaction sequence below.

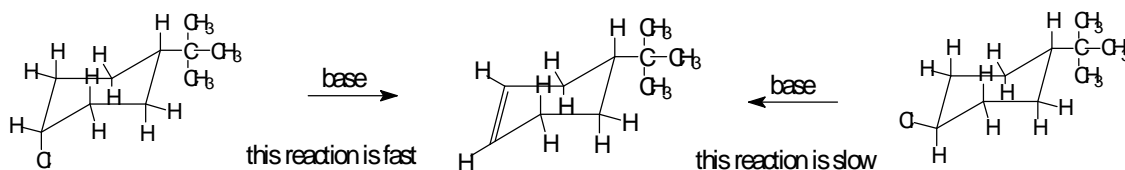


(6) VII. Calculate the number of degrees of unsaturation in compounds with the following molecular formulas.

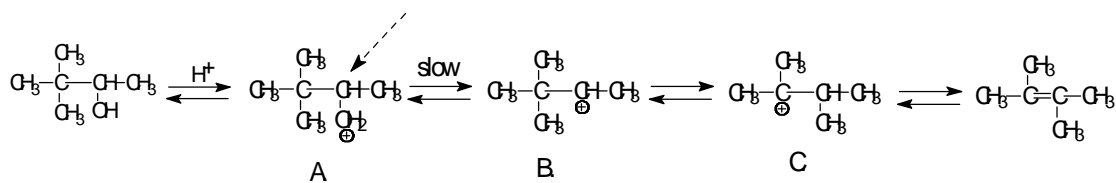


(5) IX. A friend of yours has a can of paint thinner and has been wondering if there are compounds in this product that contain carbon-carbon double bonds. Knowing that you are enrolled in a course in organic chemistry, he asks you to perform a simple chemical test (in a test tube) to determine this. Describe the test you would perform and explain to your friend how it works in terms that he would understand.

(4) X. Cis-1-chloro-4-tert-butylcyclohexane undergoes E2 dehydrohalogenation much faster than does trans-1-chloro-4-tert-butylcyclohexane. Explain.



(12) VIII. Sketch (as accurately as you can) a reaction coordinate diagram for the dehydration reaction shown below. Your diagram should accurately reflect relative energy contents.



B. Indicate on your diagram the location of intermediates A, B, and C

C. The carbon atom in intermediate A with the arrow pointing toward it is sp^3 hybridized (109° bond angle), but changes to sp^2 hybridized (120° bond angle) in intermediate B. In the transition state between A and B will this bond angle be closer to 109° or to 120° . Explain how you know.