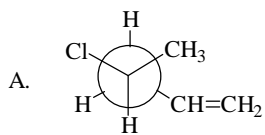
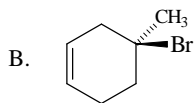


Exam # 4
Chemistry 2401 – November 30, 2005

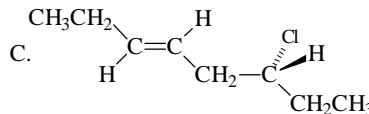
(12) I. Name each of the following including designations of stereochemistry.



R-4-chloro-1-pentene



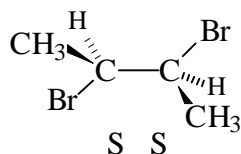
S-4-bromo-4-methylcyclohexene



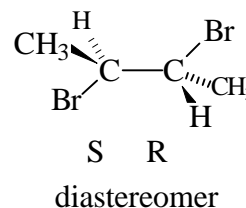
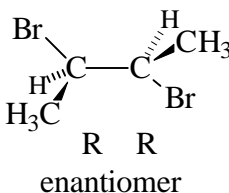
R-trans-6-chloro-3-octene

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

A. The enantiomer of



B. A diastereomer of the same compound

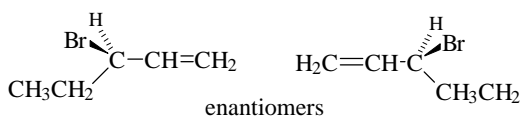


C. Now designate the stereochemistry of each of the isomers shown above, both the one I drew and the ones you drew.

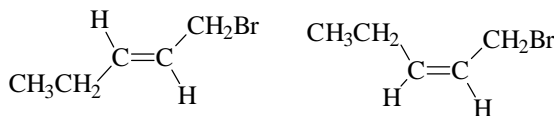
D. Draw resonance structures for the radical intermediate in the reaction shown below.



When the product mixture from the reaction above was injected into a gas chromatograph, three peaks were eluted. The first peak actually consisted of two stereoisomers while the next two peaks contained only one stereoisomer each. Draw structural formulas for these products.



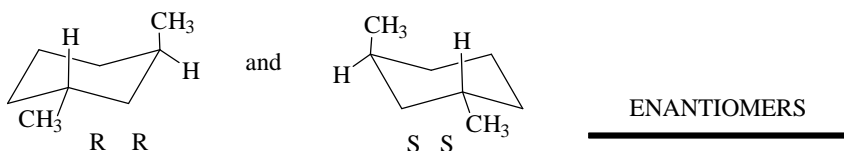
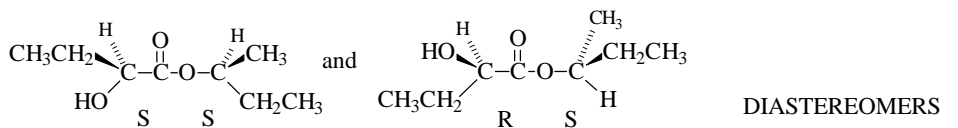
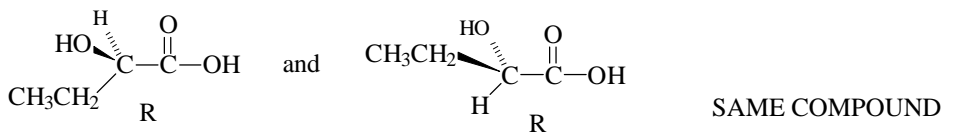
Peak # 1



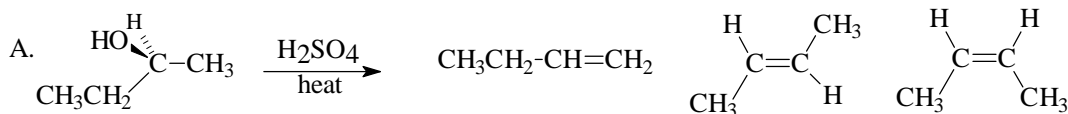
Peaks 2 and 3

If you isolated the substances present in each of these three peaks as they eluted from the gas chromatogram, how many of them would be optically active? NONE

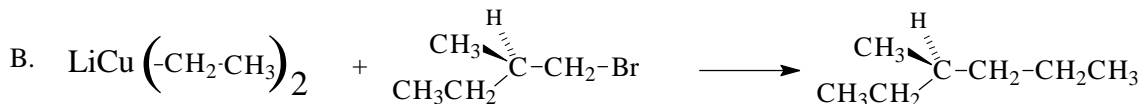
(9) III. Identify each of the pairs of compounds as being enantiomers, diastereomers, or the same compound.



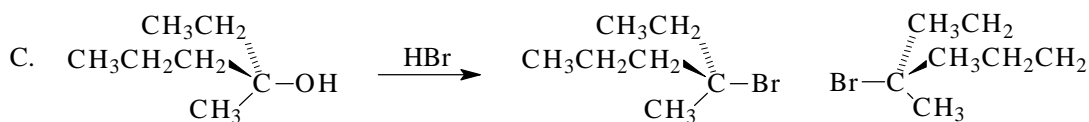
(22) IV. Complete each of the following reactions by providing structural formulas for all stereoisomers produced.



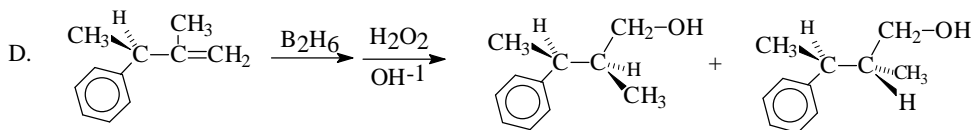
This was a prelab question for the dehydration lab



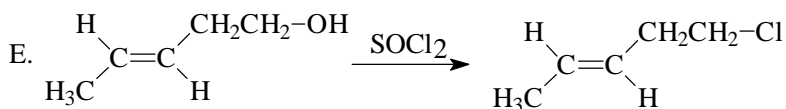
Since the chiral center is not involved the stereochemistry is retained.



The bromide ion attacks the planar carbocation equally well from either side.

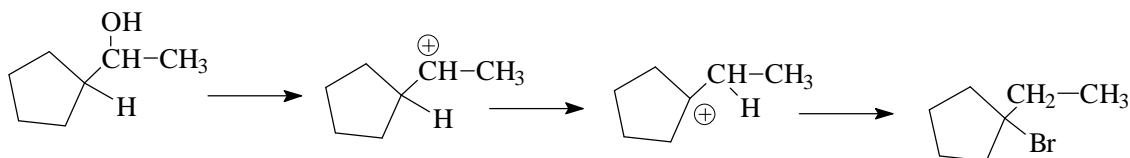


The original stereochemistry is retained, but the new chiral center can be either R or S.



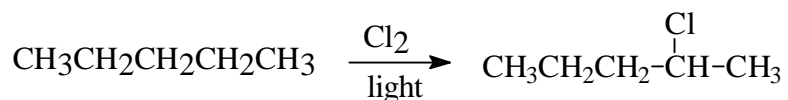
(9) V. Explain briefly each of the following.

A. PBr_3 is the reagent preferred to accomplish the following transformation rather than using a concentrated solution of HBr .



The intermediate carbocation formed by reaction with HBr will rearrange to produce an undesired product. PBr_3 does not produce a carbocation so no rearrangement is observed.

B. The reaction shown below is a poor way to make 2-chloropentane.



There are three types of hydrogen atom that may be removed by a chlorine radical which means that three different products are possible. A mixture of all of these will actually be formed.

C. *tert*-Butyl alcohol reacts completely with Lucas reagent in only seconds, but the reaction of *n*-butyl alcohol has hardly occurred at all even after an hour has elapsed.

This is a carbocation ($\text{S}_{\text{N}}1$) reaction and formation of the carbocation is the rate determining step. Therefore, the lower energy tertiary carbocation will be formed faster from *tert*-butyl alcohol than the primary carbocation is formed from *n*-butyl alcohol.