Organic Chemistry I 2016 Fall second mid-term exam

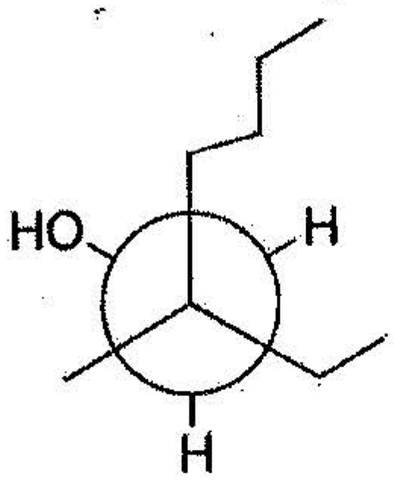
Name_____ Class _____ Student ID_____

(60%) I. SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

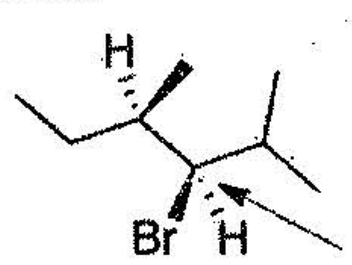
1) Draw the most stable conformation of *trans*-1-*tert*-butyl-3-methylcyclohexane. 1) _____

2) Draw the most stable conformer of cis-1-ethyl-2-methylcyclohexane. 2) _____

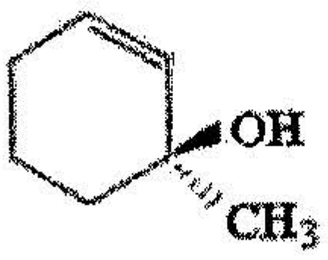
3) Name the following molecule. 3) _____



4) Draw the Newman projection of the following molecule sighting down the indicated bond? 4) _____

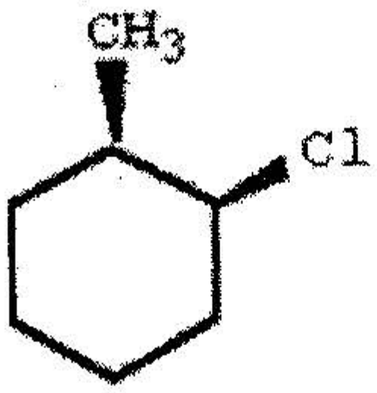


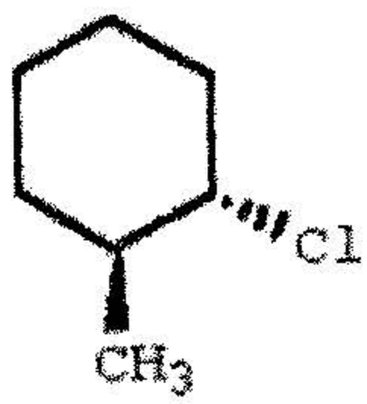
5) Label each asymmetric center in the compound below as *R* or *S*. 5) _____



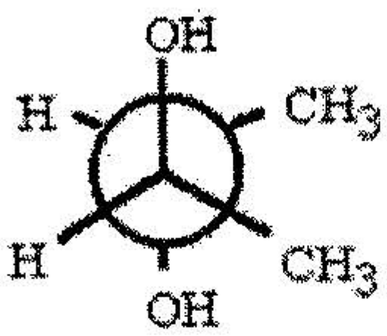
6) Provide a careful structure for (2*R*,3*S*)-2,3-dibromohexane. 6) _____

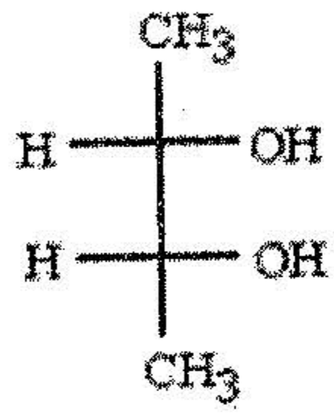
7) Which of the following terms best describes the pair of compounds shown: enantiomers, diastereomers, or the same compound? 7) _____





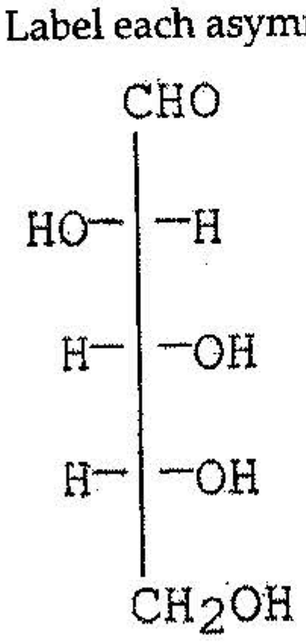
8) Which of the following terms best describes the pair of compounds shown: enantiomers, diastereomers, or the same compound? 8) _____





9) Draw the stereoisomers of 1,3-dichlorocyclopentane. 9) _____

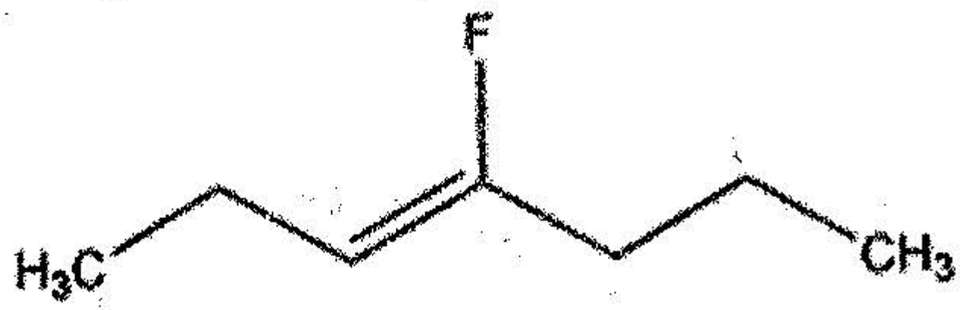
10) Label each asymmetrical carbon in the compound below as *R* or *S*. 10) _____



11) Provide an acceptable name for the following compound. 11) _____

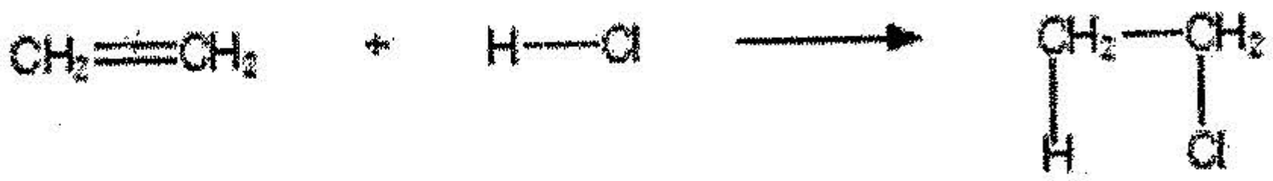
12) Draw (*E*)-2-methyl-3-hexen-1-ol. 12) _____

13) Provide the systematic name of the compound shown below. Make sure to include the *E* or *Z* designator if necessary. 13) _____



14) Draw all the possible constitutional isomers of C_4H_8. 14) _____

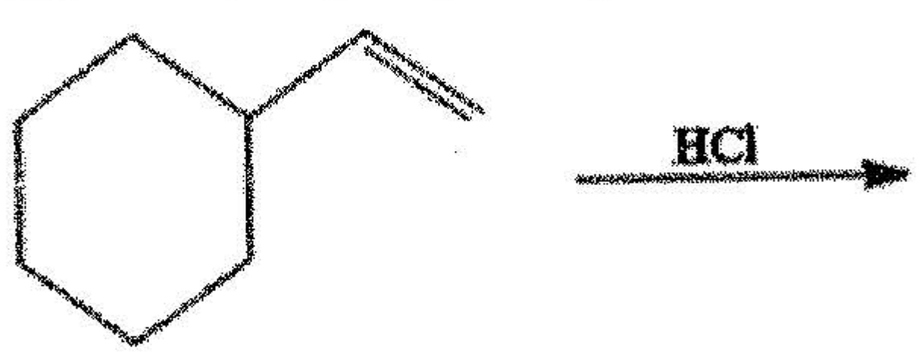
15) Calculate the enthalpy for the following reaction. 15) _____



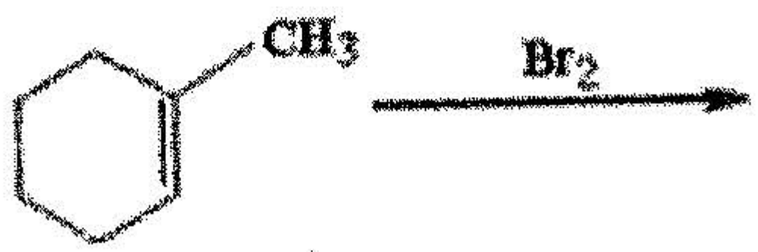
DH
$CH_2=CH_2$, 62 kcal/mole

H-Cl, 103 kcal/mole
CH_3CH_2-H, 101 kcal/mole
CH_3CH_2-Cl, 85 kcal/mole

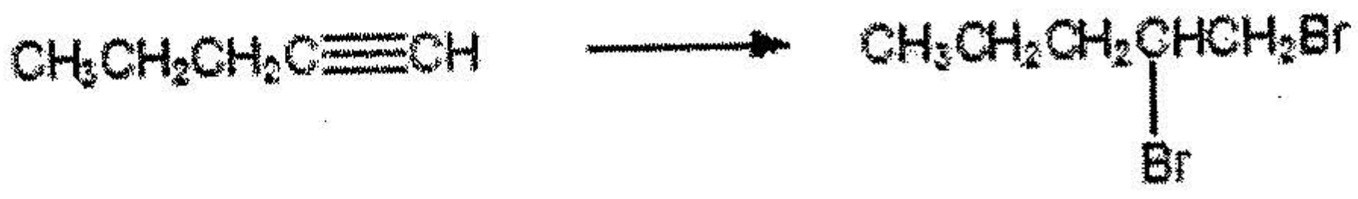
16) Draw the major organic product generated in the reaction below. 16) _____



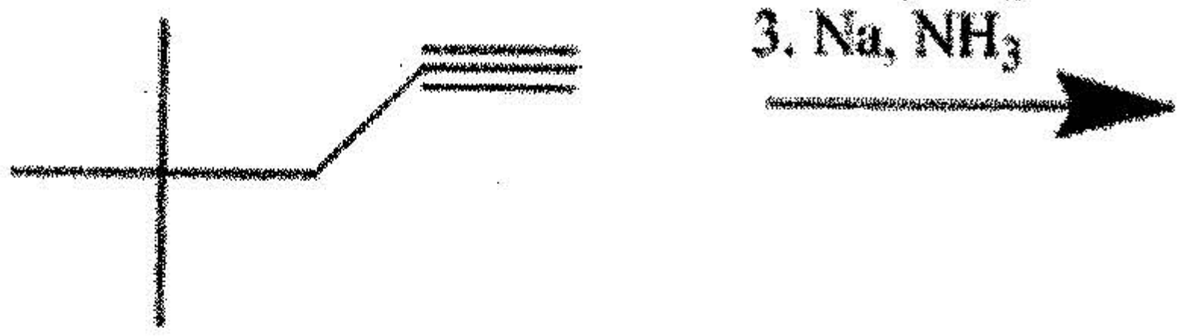
17) Complete the following reaction and provide a detailed, step-by-step mechanism for the process. 17) _____



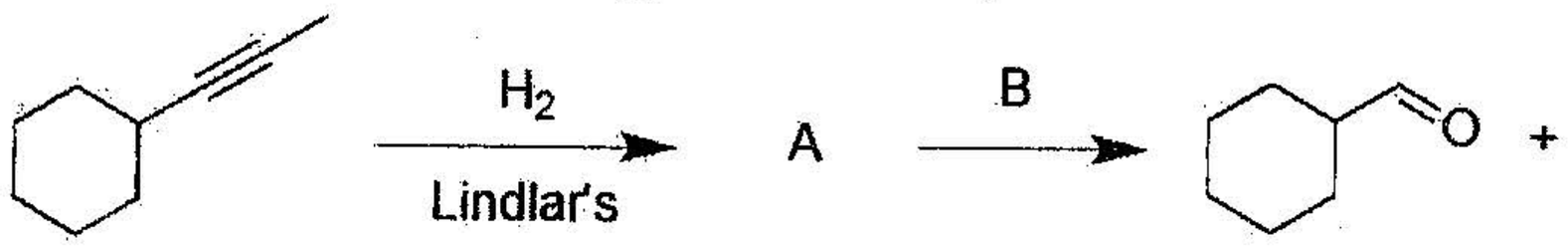
18) Give the reagents for the following reaction. 18) _____



19) Provide the major organic product of the following reaction sequence. 19) _____



20) What is the structure of the missing product A and reagent B of this reaction? 20) _____



10% (II) For 2-chloro-3-hexanol:

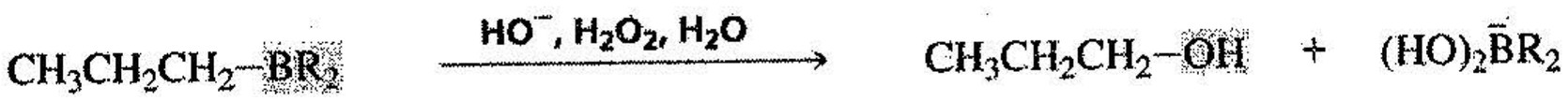
(1) Draw the structure of all the possible stereoisomers with Fischer Projection and Perspective Formulas (showing both eclipsed and staggered conformations).

(2) Assign the configuration of all chiral centers with R or S.

(3) Give the complete IUPAC name for each stereoisomers.

(4) Indicate the relationship among the structures, indicating which are the threo or erythro enantiomer, and diastereoisomer pairs.

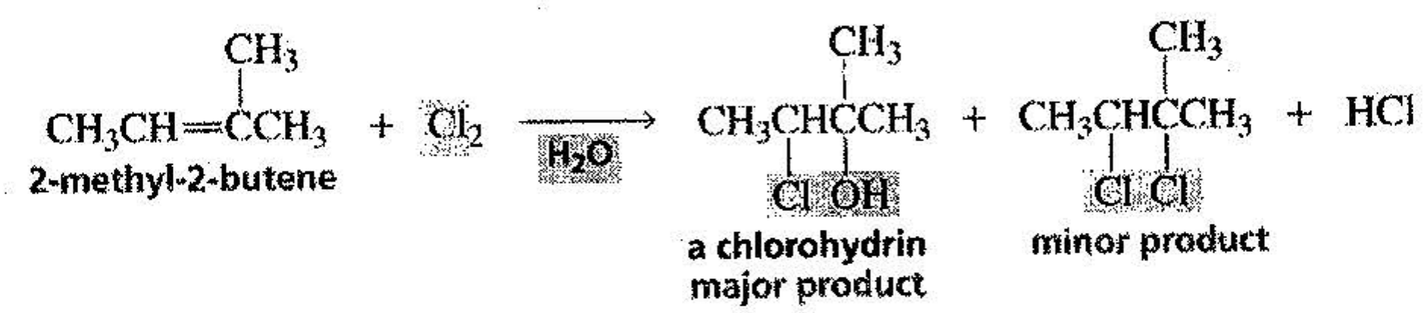
6% (III) Propose a detailed **mechanism** for the following reaction:



4% (IV) Draw the structure for the following compounds:

(5*E*)-4-ethynylocta-5,7-dien-2-yn-1-ol

4% (V) Propose a detailed **mechanism** for the following reaction.

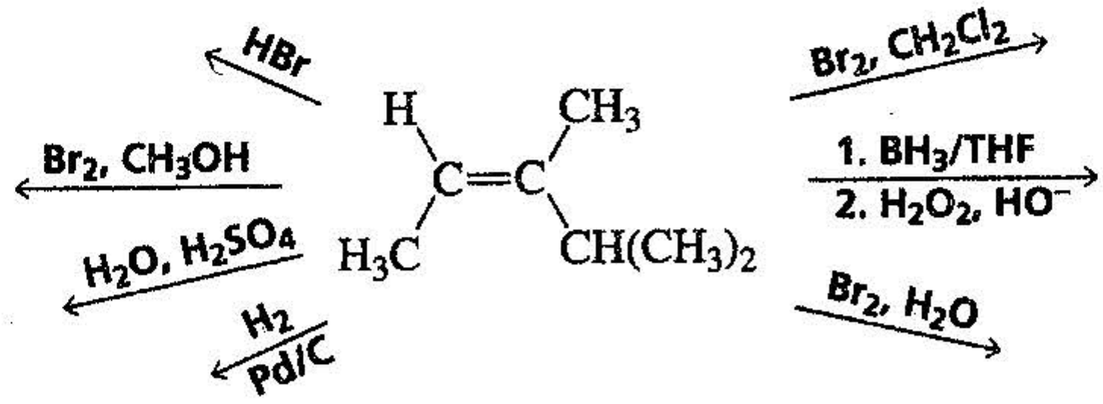


6% (VI) Explain the following terminology and give an example:

(a) Endergonic reaction (b) Exothermic reaction

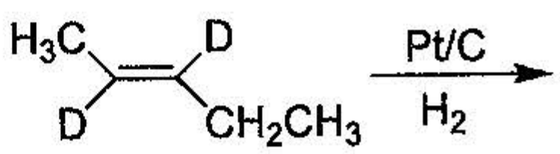
(c) Entropic reaction

14% (VII) Draw the products of the following reactions including their configurations:

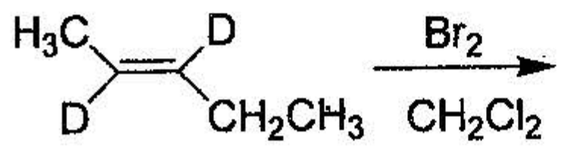


8% (VIII) Draw the major products for the following reactions. Clearly specify their **configurations (stereochemistry)** with either Fischer Projection or Perspective Projection.

(a)



(b)



8% (IX) What reagents could be used to carry out the following syntheses?