CHEM 2311
E4 practice-ii (answers provided)

1. (32 points) Circle the letter *on the right* which corresponds to the answer to each question. There is only one correct answer for each question.

(i) Which of the following alcohols undergoes the most rapid acid-catalyzed dehydration reaction?

A. $(CH_3)_3CCH_2OH$ **B.** $(CH_3)_3COH$ **C.** $(CH_3)_2CHCH_2OH$ **D.** $(CH_3)_2CHOH$ **A B C D**

(ii) Which of the following is most likely to promote dehydrobromination of 1-bromohexane?

E. $(CH_3)_3CONa$ **F.** CH_3OH **G.** KCl **H.** H_2SO_4 **E F G H**

(iii) Which of the following is *not* true about carbenes?

I. Carbenes lack an octet of valence electrons **J.** Carbenes are cationic
K. Carbenes contain a divalent carbon atom **L.** Carbenes add to alkenes **I J K L**

(iv) Which of the following is the product of the reaction of 1-butene with HBr in the presence of peroxides?

M. 1-pentanol **N.** 1-bromobutane
O. 2-bromobutane **P.** 1-butyne **M N O P**

(v) Which of the following statements describes the product obtained from the reaction of propene with bromine (Br_2)?

Q. single enantiomer **R.** racemic mixture
S. a *meso*-compound **T.** compound with no stereogenic center **Q R S T**

(vi) Which of the following is an intermediate in the acid catalyzed dehydration of a tertiary alcohol to give an alkene?

U. a free radical **V.** a carbanion.
W. a carbene **X.** a carbocation. **U V W X**

(vii) Which of the following is the major product obtained upon reaction of 2-chloro-2-methylbutane with potassium hydroxide in dry ethanol.

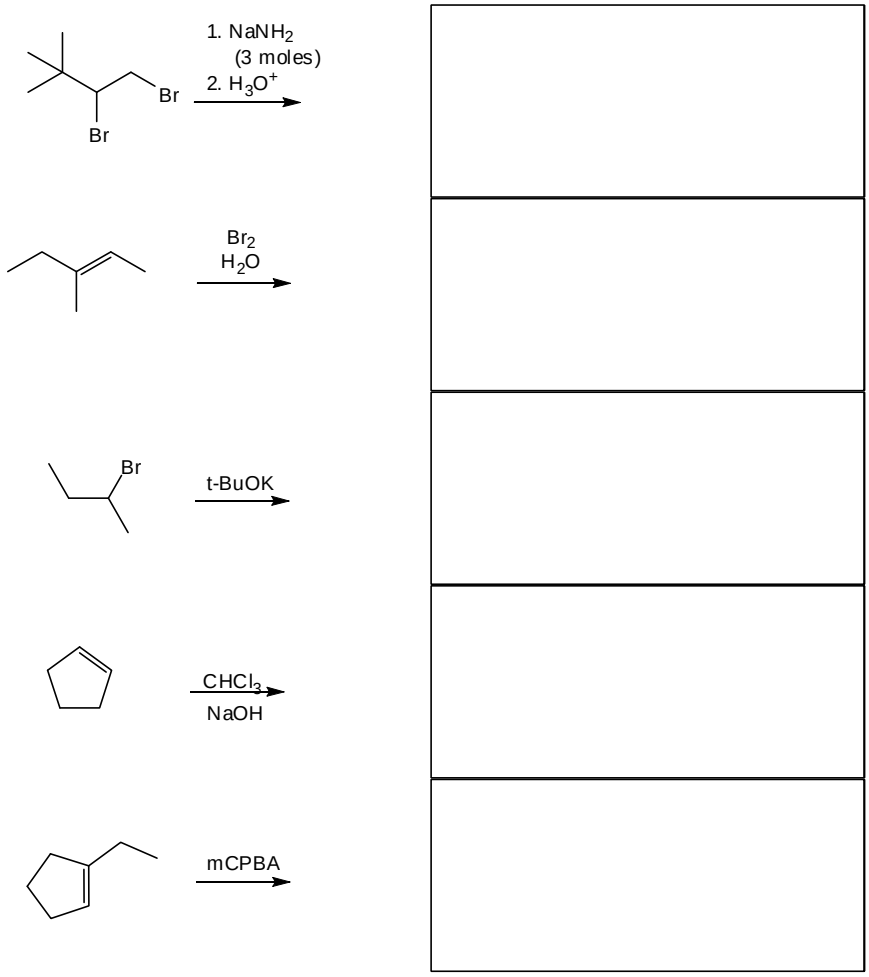
Y. $(CH_3)_2C{=}CHCH_3$ **Z.** $(CH_3)_2COHCH_2CH_3$
AA. $CH_2{=}C(CH_3)CH_2OH$ **BB.** $(CH_3)_2CCH_2OH$ **Y Z AA BB**

(viii) Which of the following represents the order of reactivity of alkenes (i) – (iv) towards electrophilic attack?

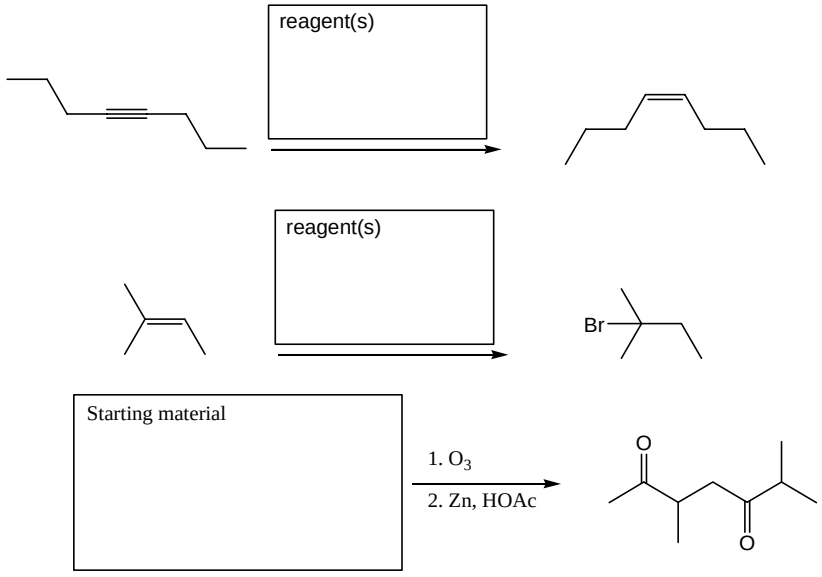
(i) propene, (ii) ethene, (iii) 2-methylpropene, (iv) 2-octene

CC. (i) > (iii) > (iv) > (ii) **DD.** (iii) > (iv) > (i) > (ii)
EE. (iv) > (i) > (iii) > (ii) **FF.** (i) > (iv) > (iii) > (ii) **CC DD EE FF**

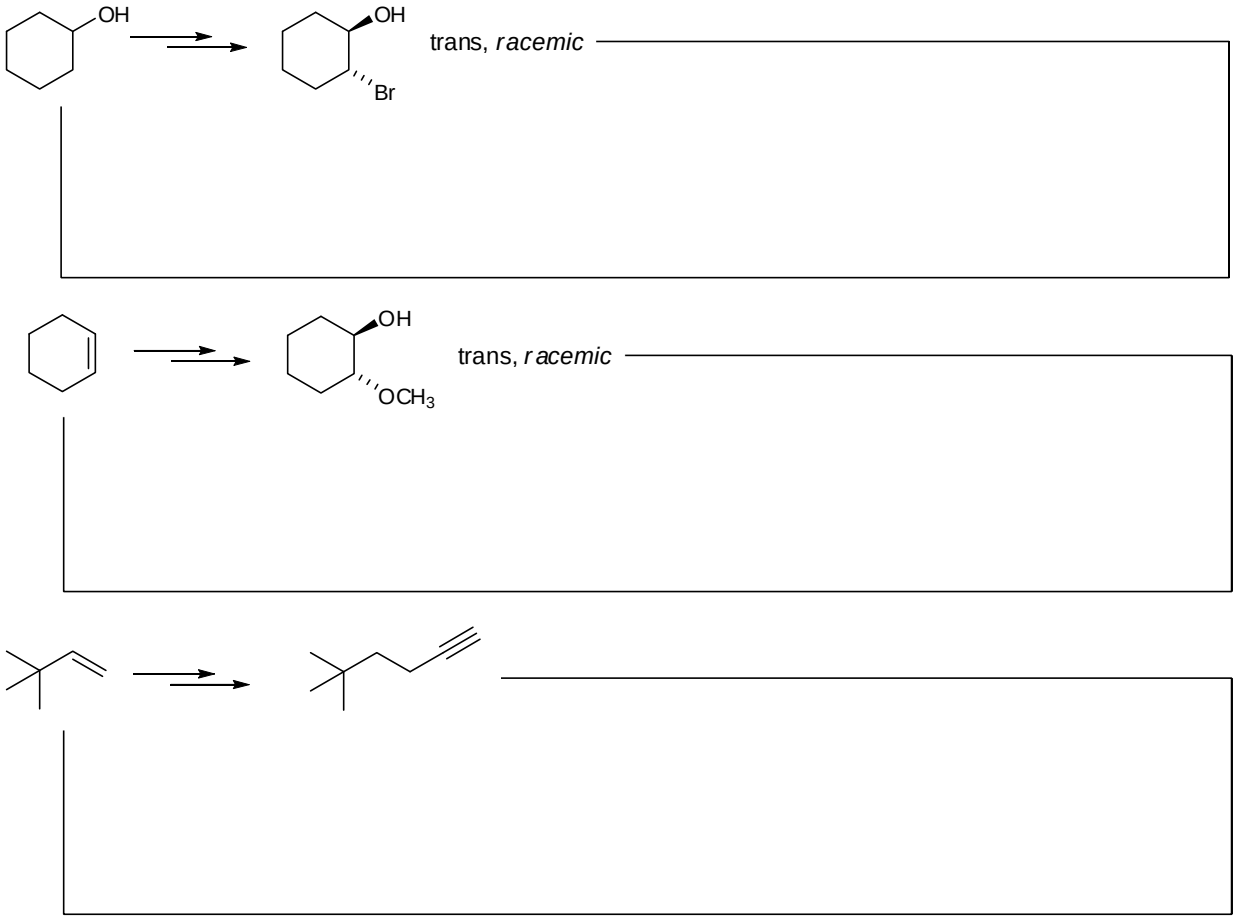
2. (25 points). Give answers for each part of the question in the space provided. Provide the ***major*** organic product of the following reaction. Indicate the stereochemistry wherever appropriate (draw a single enantiomer or pair of enantiomers as appropriate for each reaction).



3. (15 points) Provide the reagent for the first two reactions, and staring material for the third reaction, shown blow.



4. (20 points) The following transformations *cannot* be performed in a single step. Provide sequences of reactions, showing reagents and isolated synthetic intermediates, to achieve each transformation. *PROBLEM SOLVING HINTS: Each of these transformations requires 2-3 steps. Approach this type of problem by asking yourself what the final product can, in fact, be made from. Can this compound be prepared from the given starting material?*



5. (8 points) Double dehydrohalogenation of vicinal dihalides usually gives an alkyne. However, treatment of 1,2-dibromocyclohexane with an excess of $NaNH_2$ does not give cyclohexyne. Which product (C_6H_8) is formed instead? Why is cyclohexyne not formed?

Actual product	Explanation