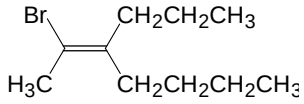
CHEM 2311
E4 practice-i (answers provided)

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) What is the correct systematic name for the following compound?



A. *E*-2-bromo-3-propyl-2-heptene **B.** *E*-2-bromo-3-butyl-2-hexene
C. *Z*-2-bromo-3-propyl-2-heptene **D.** *Z*-2-bromo-3-butyl-2-hexene

A B C D

(ii) What is the major organic product from the reaction of *trans*-2-bromo-1-methyl-cyclohexane with sodium ethoxide (ethanol solvent) at 80 °C?

E. 1-methylcyclohexene **F.** 2-methylcyclohexene
G. 3-methylcyclohexene **H.** *cis*-1-ethoxy-2-methylcyclohexene

E F G H

(iii) What is the major product of the reaction of 1,2-dibromobutane with zinc metal

I. 1-butyne **J.** 1-butene **K.** 2-butyne **L.** 1-butanol

I J K L

(iv) Arrange the following compounds in order of *decreasing reactivity* to dehydration upon treatment with hot concentrated sulfuric acid.

i. methanol ii. 1-propanol iii. 2-propanol iv. 2-methyl-2-propanol

M. ii>iii>i>iv **N.** i>ii>iii>iv **O.** iv>i>ii>iii **P.** iv>iii>ii>I

M N O P

(v) Which of the following is the major product obtained by the reaction of 1-butyne with two molar equivalents of hydrogen bromide?

Q. 1,1-dibromobutane **R.** 1,2-dibromobutane
S. 2,2-dibromobutane **T.** 2-bromo-1-butene

Q R S T

(vi) When propene is treated with hydrogen chloride in ethanol, very little 2-chloropropane is obtained. What is the major organic product? *Use your understanding of mechanisms to predict an alternative product.*

U. 1-chloropropane **V.** ethyl propyl ether
W. 2,3-dichloropropane **X.** ethyl isopropyl ether

U V W X

(vii) Arrange the following in order of *increasing reactivity* for addition to the double bond of alkenes.

Y. HI < HBr < HCl < HF **Z.** HF < HBr < HCl < HI
AA. HF < HCl < HBr < HI **BB.** HCl < HBr < HI < HF

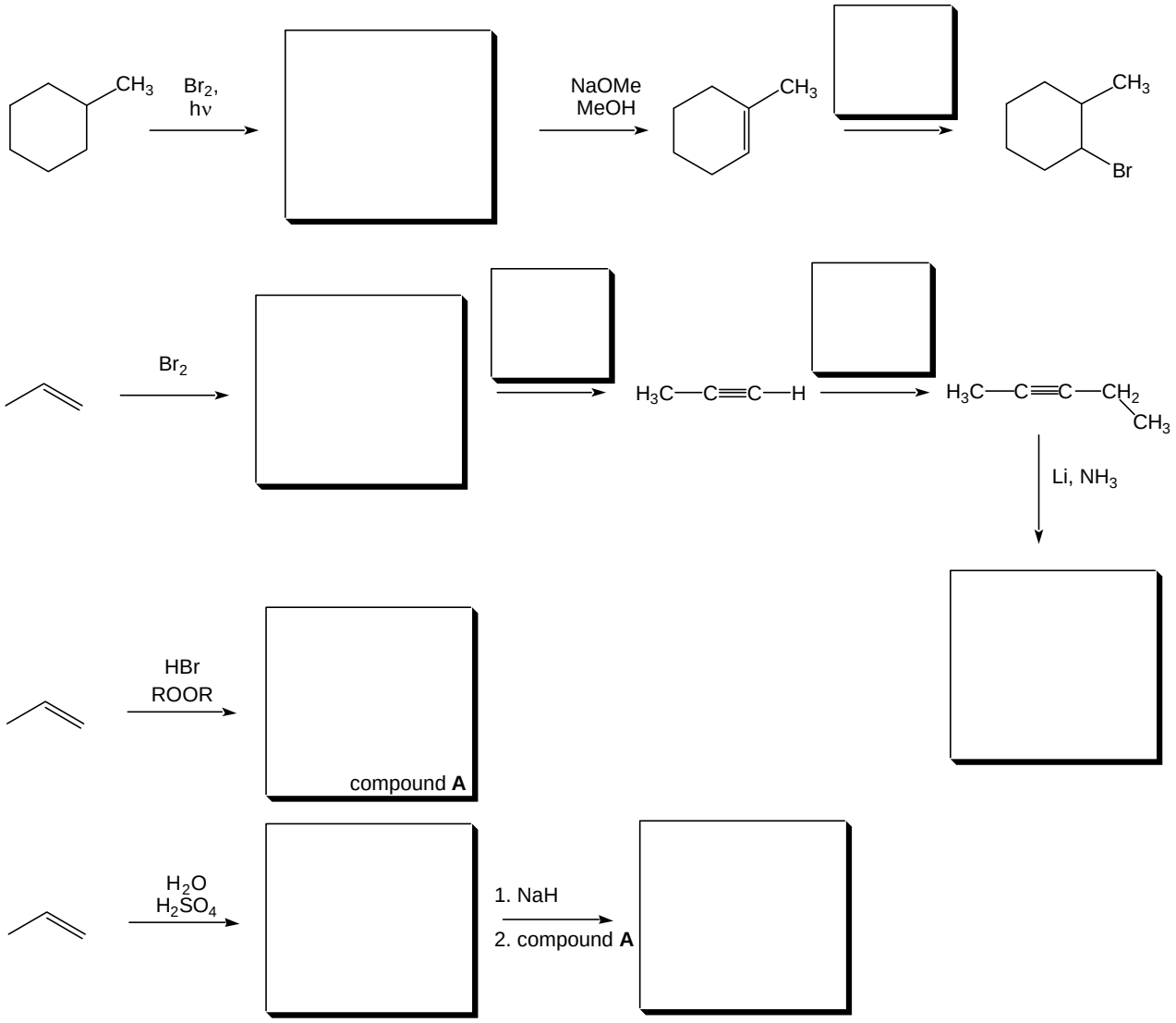
Y Z AA BB

(viii) A fragrant compound (**A**) isolated from a flowering plant has the formula $C_{15}H_{24}$. When treated with excess hydrogen and platinum metal, it gives a compound with formula $C_{15}H_{28}$. How many double bonds and/or rings does **A** contain?

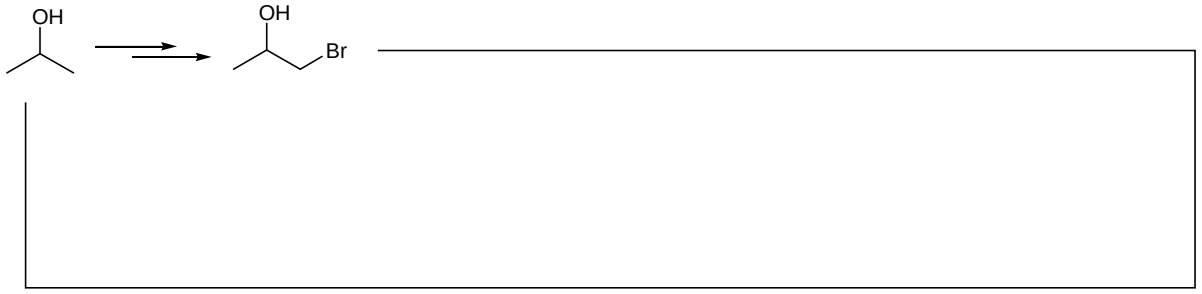
CC. one double bond, two rings **DD.** two double bonds, one ring
EE. two double bonds, two rings **FF.** three double bond, one ring

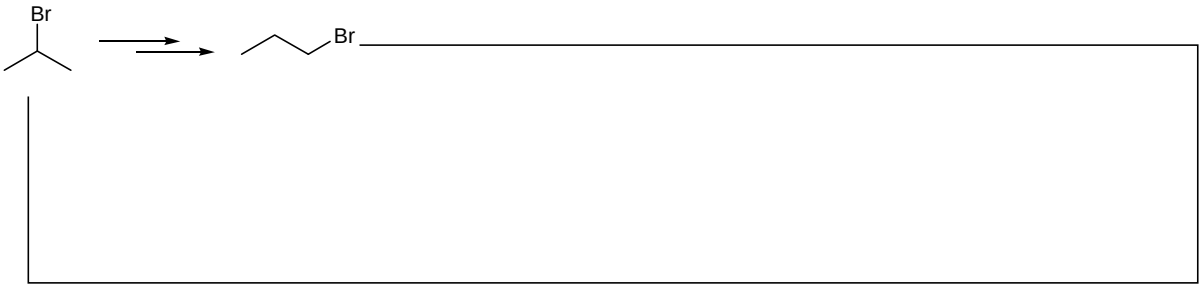
CC DD EE FF

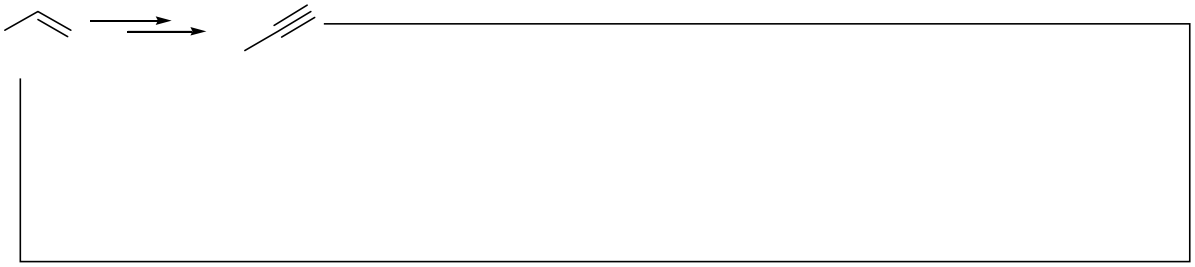
2. Provide the structures and reagents to complete the following reaction schemes.



3. (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?*







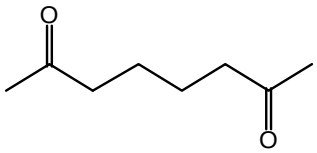
4. (12 points) Compound **W**, C_8H_{14}, undergoes reaction with excess bromine to form compound **X**, $C_8H_{14}Br_2$. Reaction of **W** with ozone, followed by Zn/HOAc affords compound **Z**.

(a) What is the value of SODAR for **W**? _____

(b) What is the structure of compound **W**?

(c) What is the structure of compound **X**?

Z:



W:

X: