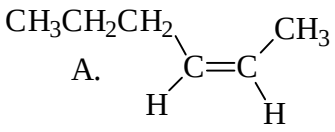
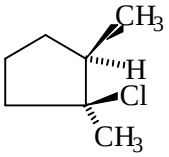
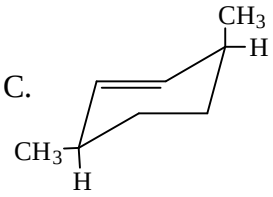
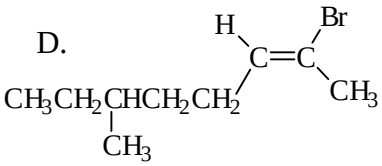
Exam # 2
Chemistry 2401 – October 24, 2003

(16) I. Name each of the following. In each case include the stereochemical designation.

A. 

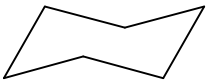
B. 

C. 

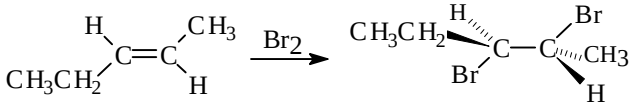
D. 

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

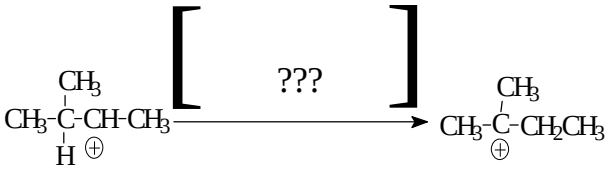
A. The lower energy conformation of *trans*-1-bromo-3-isopropylcyclohexane



B. The intermediate for the reaction shown below.



C. The transition state for the reaction step shown below:



D. Z-4-methyl-1,3-octadiene

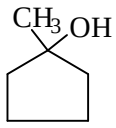
(6) III. If 2.35 mmoles of a compound with a molecular formula of $C_{12}H_{20}O_2$ reacts with 4.75 mmoles of H_2, then

_____ A. How many degrees of unsaturation does it possess?

_____ B. How many double bonds does it contain?

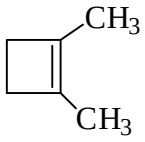
_____ C. How many rings does it have?

(40) IV. Complete each of the following reactions by drawing a structural formula for the product. If more than one product is formed, draw the structure of only the one formed in largest amount. In cases where it is appropriate your structure should display the proper stereochemistry of the product.

A. 

$\xrightarrow[H_2SO_4]{H_2O}$???

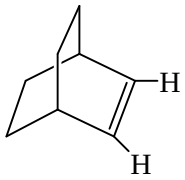
B. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3 \xrightarrow[\text{ethanol}]{KOH}$???

C. 

$\xrightarrow[Pt]{H_2}$???

D. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}=CH-CH_3 \xrightarrow{HBr}$???

E. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH=CH_2 \xrightarrow{HBr}$???

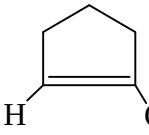
F. 

$\xrightarrow[CH_2Cl_2]{Br_2}$???

G. $CH_3CH_2CH_2-CH=CH_2 \xrightarrow[H_2O,\ DMSO]{Br_2}$???

H. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH=CH_2 \xrightarrow[Hg(C_2H_3O_2)_2]{H_2O} \xrightarrow{NaBH_4}$???

I. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH=CH_2 \xrightarrow{B_2H_6} \xrightarrow[OH^-]{H_2O_2}$???

J. 

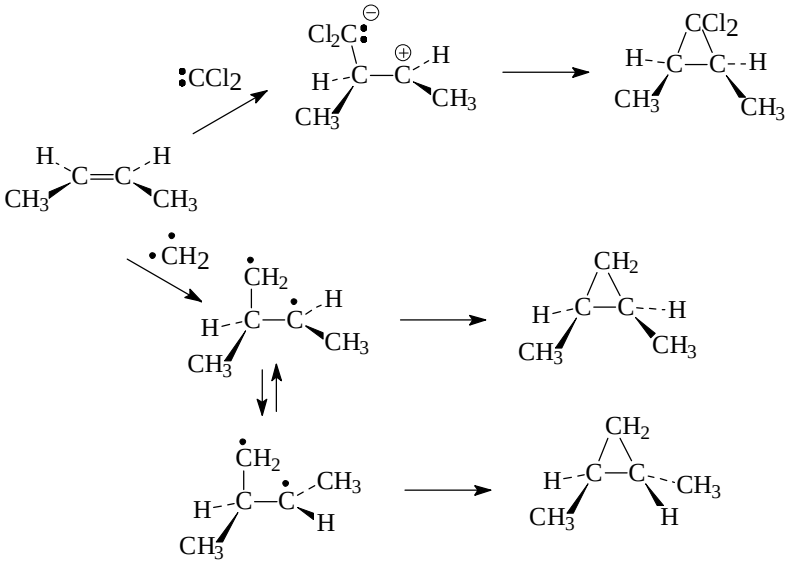
$\xrightarrow{B_2H_6} \xrightarrow[OH^-]{H_2O_2}$???

(4) V. You have been given a solid compound to identify and have been told that it is either compound A or compound B, bottles of which are both in the storeroom. Explain how you would use mixture melting points to tell whether the unknown solid is either A or B.

(4) VI. What role does DMSO play in the reaction shown below.

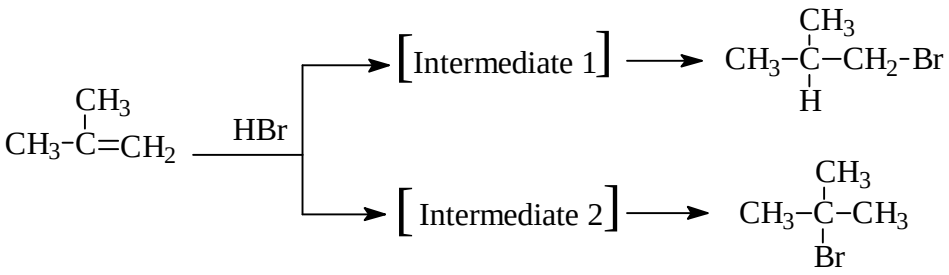
G. $CH_3CH_2CH_2{\cdot}CH{=}CH_2 \xrightarrow[H_2O,\ DMSO]{Br_2} CH_3CH_2CH_2{-}\underset{OH}{CH}{-}\underset{Br}{CH_2}$

(4) VII. Below is the slide that I used Wednesday during the discussion of the use of carbenes to form cyclopropane rings. Use it to explain why the use of a singlet carbene like dichlorocarbene produces only one stereoisomer that retains the configuration of the original alkene while the use of a triplet methylene results in the formation of both possible stereoisomers.



(4) IX. Your best friend brings you a sample of a chemical and asks you to test it to see if it contains any double bonds. You take the sample to the organic lab, place some in a small test tube, and add a solution of Br_2/CCl_4 to it. Explain what you expect to see and how you will interpret the results to your friend who wants to know how the test works.

(10) X. Isobutylene can potential add HBr in the two ways shown below:



1) Draw structural formulas for the two intermediates.

Intermediate 1 Intermediate 2

2) Only one of the products is actually formed; circle it.
3) Now explain why that product is the only one formed.