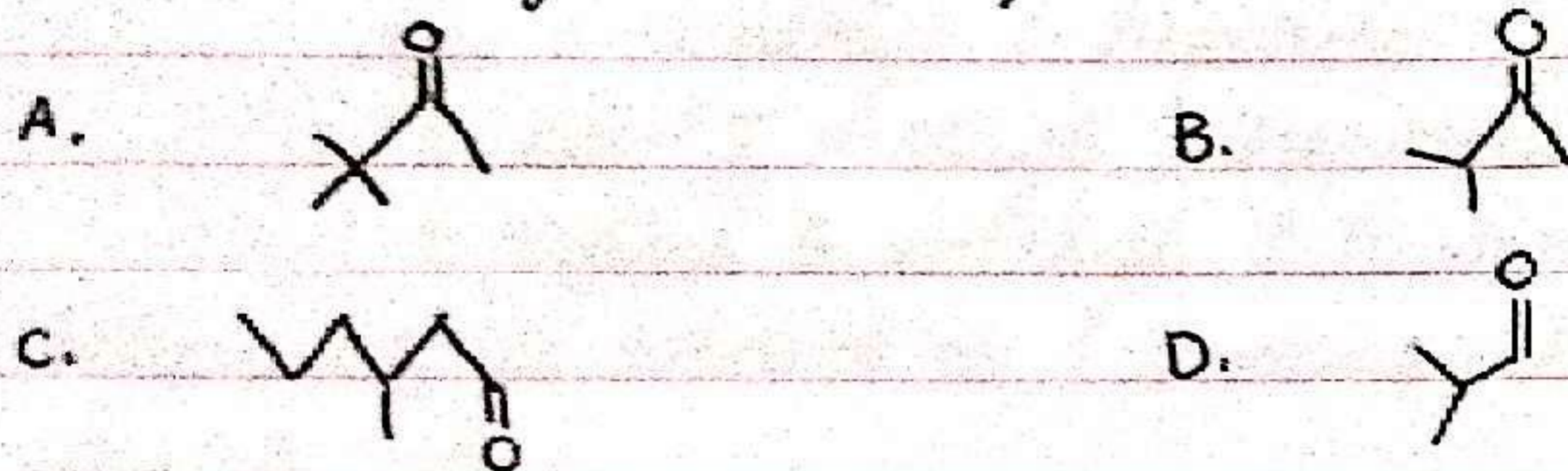


1) What's the major product of the addition of water to 1-methylcyclopentene using hydroboration-oxidation?

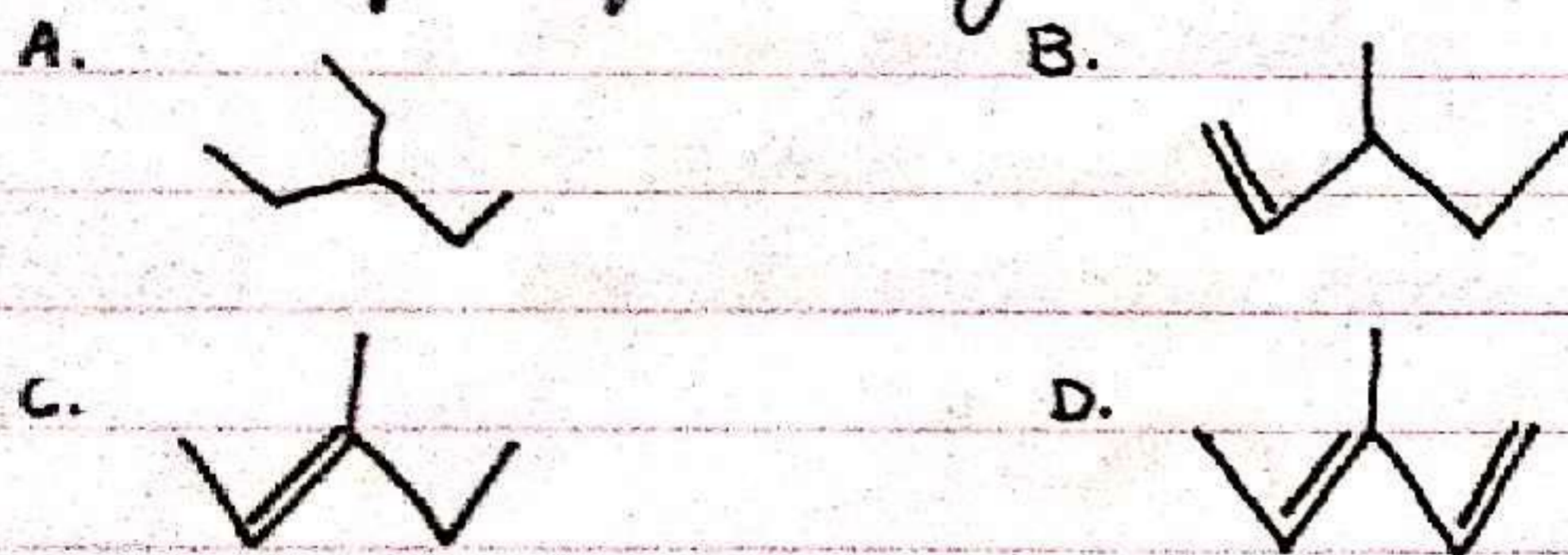
- A. cis-2-methylcyclopentanol (racemic mixture)
- B. trans-2-methylcyclopentanol (racemic mixture)**
- C. Both A & B

2) Which of the following aldehydes/ketones can be synthesized by the addition of  $H_2O$  through hydroboration-oxidation of an alkyne?



**(d) C only**

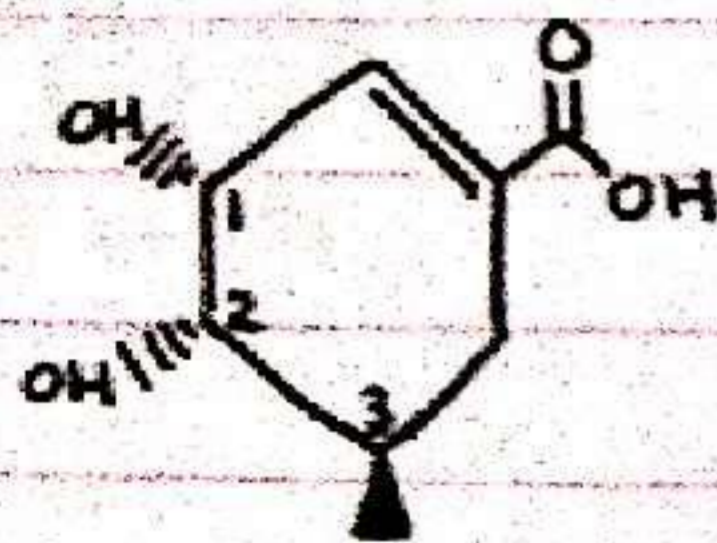
3) Which of the following molecules is chiral?



**(B) only B**

**B) only B**

4) For shikimic acid below, assign absolute configuration (R/S) for each asymmetric carbon 1, 2, 3 respectively!

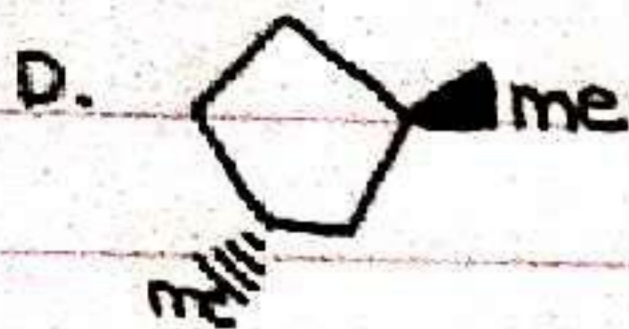
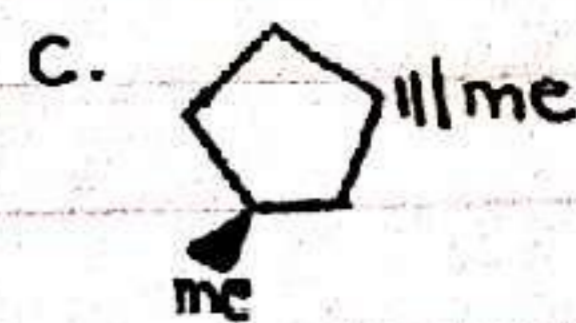
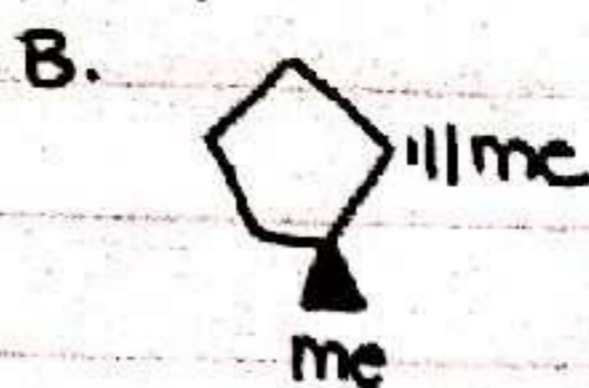


**(B) RSR**

5) How many diastereomers are formed upon the addition of  $Br_2$  in  $H_2O$  to R-1,5-dimethylcyclohexene.

**(a) 2**

6) Which is a meso compound?



**E only**

7) Which alkene will yield the smallest amount of heat upon hydrogenation?

A. 3-methyl 1-heptene

**B. 3-methyl 2-heptene**

C. cis 5-methyl 3-heptene

D. trans 5-methyl 3-heptene

8) When  $\text{Cl}_2$  is added to 1-butene, the product 1,2-dichlorobutane forms as a

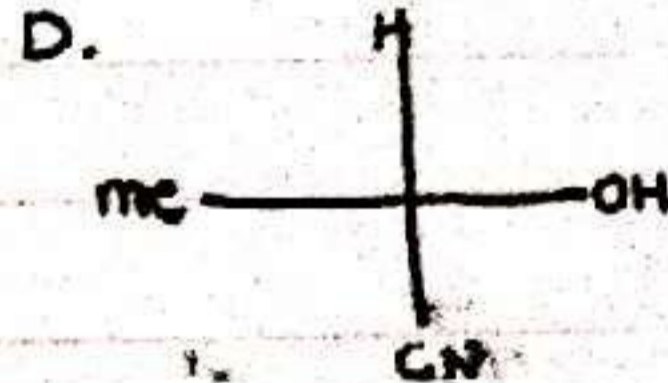
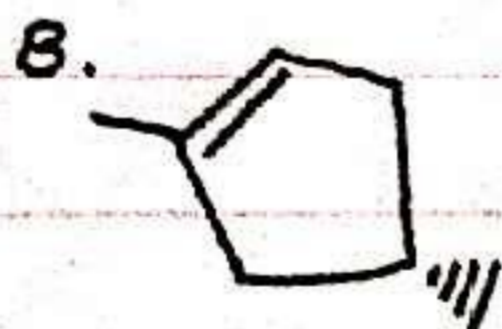
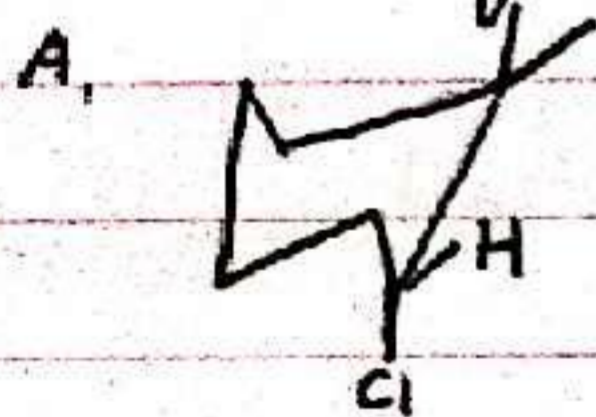
A. Pure enantiomer

B. Achiral

C. Meso compound

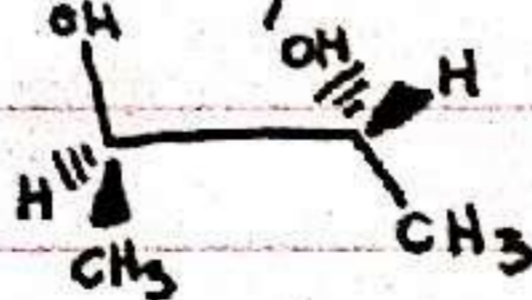
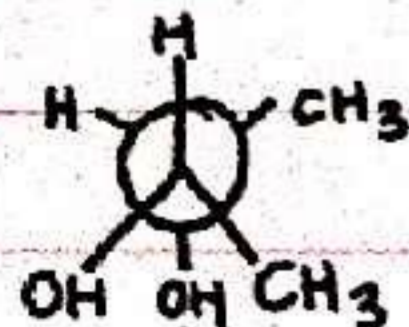
**D. Racemic mixture**

9) Which of the structures has an S configuration?



**C. only B**

10) What is the relationship between the following molecules?



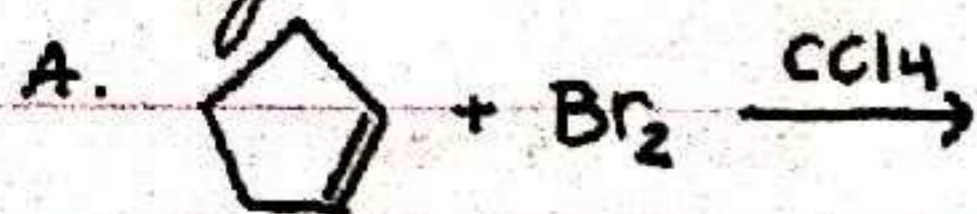
A. identical

B. enantiomers

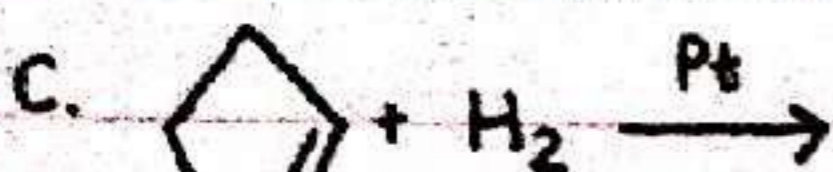
**C. diastereomers**

D. constitutional isomers

11) Which yields a meso compound?



**B. only B**



12) What is the major product of the reaction knowing that intramolecular reactions are kinetically favored?



13) In the reduction of alkynes using  $\text{Na}$  and  $\text{NH}_3(l)$ , which is not an intermediate in the commonly accepted mechanism?

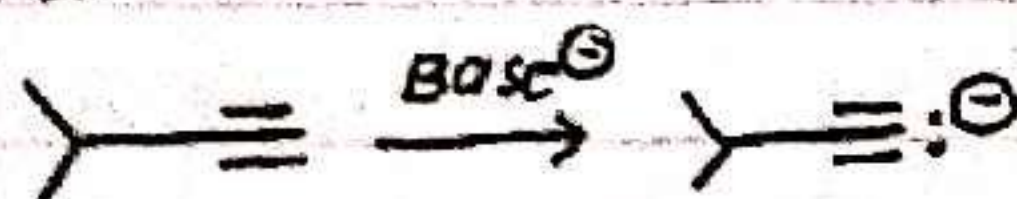
(d) vinyl cation

14) Which is not a suitable solvent for this reaction?



(a)  $\text{H}_2\text{O}$

15) Which of the bases will remove acidic  $\text{p}^{\text{H}}$  of the terminal alkyne?



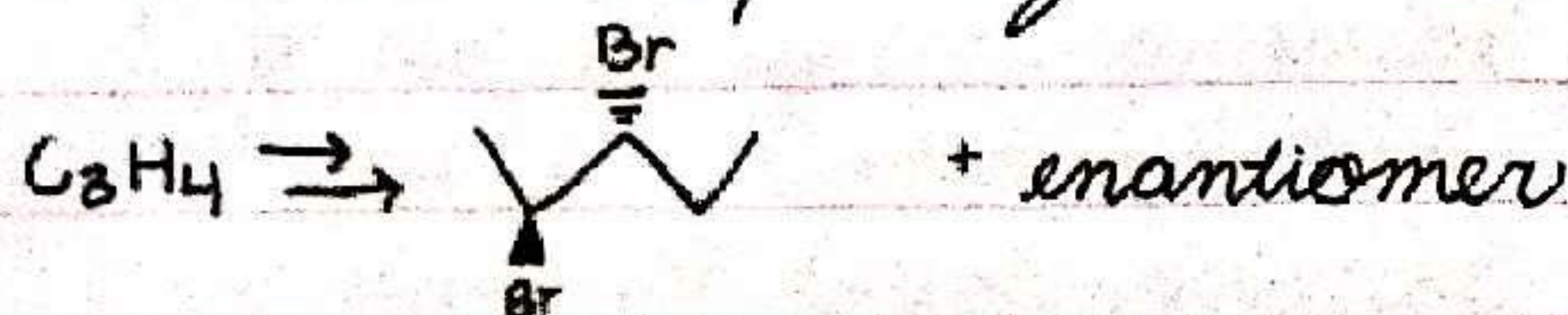
(a)  $\text{CH}_3\text{CH}_2\text{Li}$

b.  $\text{X}^{\ominus}\text{OK}$

c.  $\text{CH}_3\text{COONa}$

d.  $\text{NaOH}$

16) How would one synthesize this?



(d) 1.  $\text{NaNH}_2$ , mineral oil, heat

2.  $\text{EtCl}$ , DMF

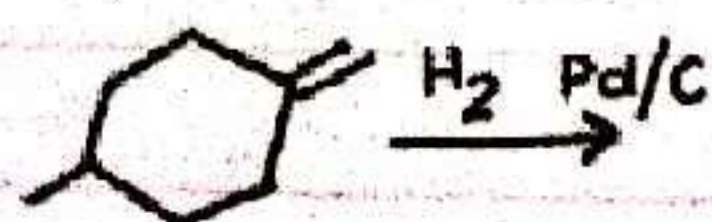
3.  $\text{Na}$ ,  $\text{EtNH}_2$

4.  $\text{NH}_4\text{Cl}$

5.  $\text{Br}_2$ ,  $\text{CCl}_4$

17) THROWN OUT

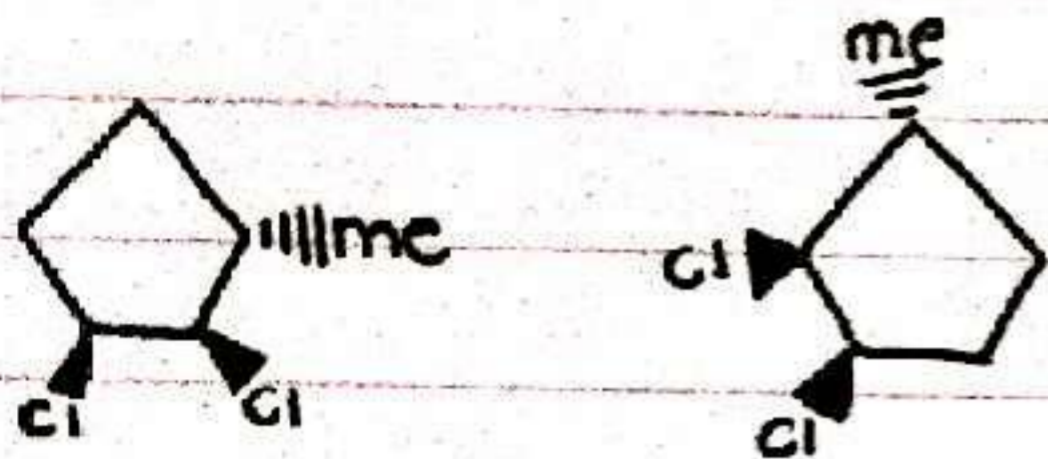
18) The products of the reaction is/are



(c) both cis & trans 1,4-dimethylcyclohexane

19) Which species acts as a nucleophile in acid catalyzed addition of  $H_2O$  to an alkene?  
(d)  $H_2O$

20) What is the relationship between the two molecules?

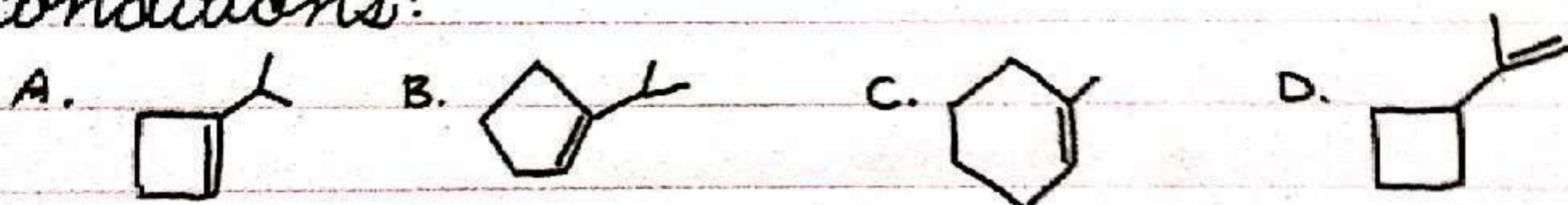


(b) enantiomers

21) Cyclohexene reacts with  $Br_2$  to yield 1,2-dibromocyclohexane. Molecules of the product would:

(d) a racemic mixture and in their most stable conformation they would have both Br atoms equatorial.

22) Which alkenes would not yield a five member-ring alcohol upon the addition of  $H_2O$  under acid catalyzed conditions?



(b) both A and C.

23. Which of these diols exists as a pair of enantiomers?

a. cis 1,4 cyclohexanediol

b. cis 1,3 cyclohexanediol

c. trans 1,4 cyclohexanediol

(d) trans 1,3 cyclohexanediol