Problem 7-1-1.

Q: Calculate the "degree of unsaturation" and draw the structures.

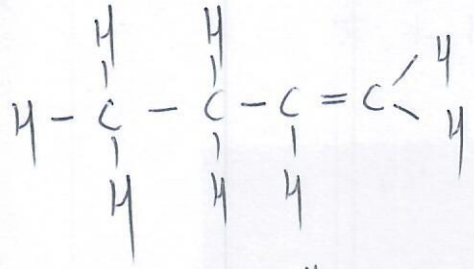
(a) C_4H_8

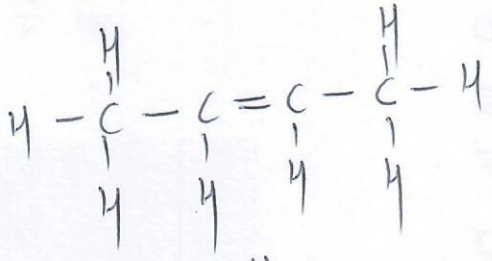
Degree of saturation: $2n+2 = 2\times 4+2 = 10$.

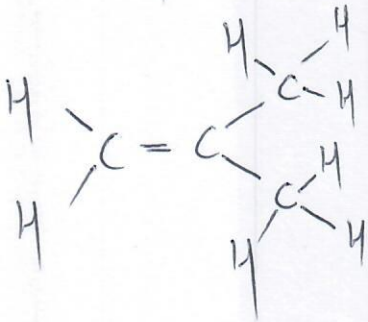
Degree of unsaturation:

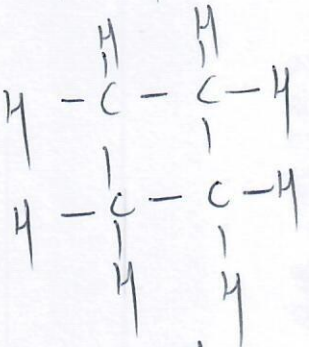
$$\frac{10-8}{2} = 1.$$

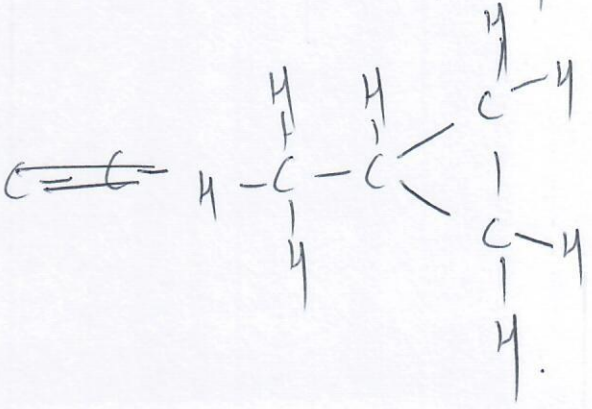
one double bond or cycloalkane.











5 structures.

Problem 7-1-2

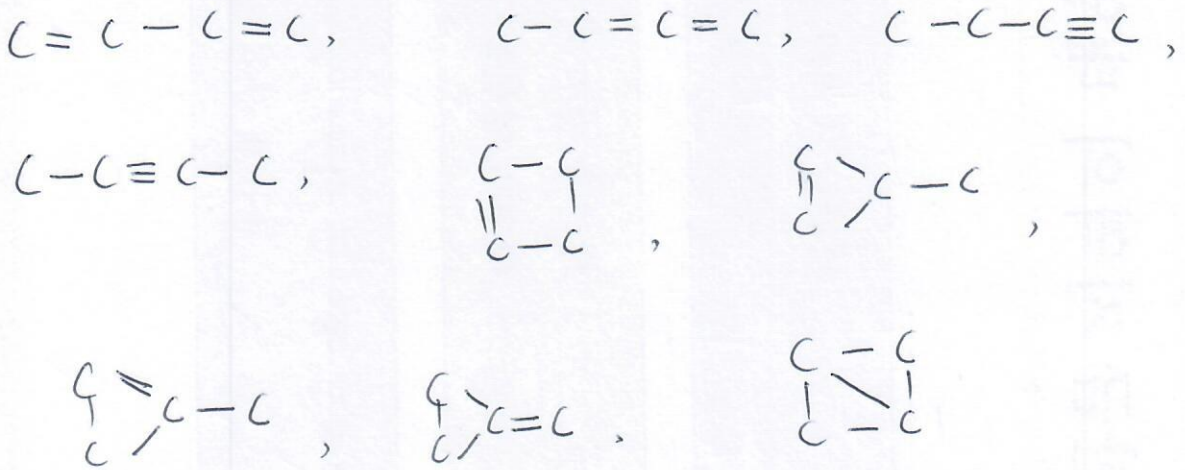
(b) C_4H_6

Degree of saturation: $2n+2 = 2\times4+2 = 10$.

Degree of unsaturation.

$$\frac{10-6}{2} = 2$$

two double bonds
one triple bonds.
one double and one cycloalkane
two cycloalkanes.



9 structures.

problem 7-1-3

(c) C_3H_4

Degree of saturation : $2n+2 = 2\times 3+2 = 8$.

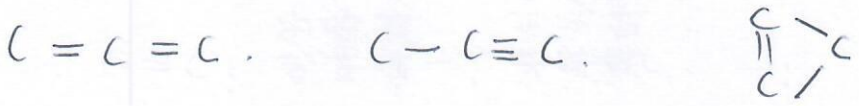
Degree of unsaturation

$$\frac{8-4}{2} = 2$$

two double bonds

one triple bond.

one double bond and one cycloalkane.



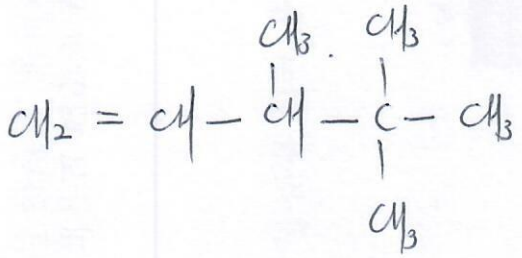
we can't draw the structure with two cycloalkane

3 structures.

Problem 7-4-1.

Q: IUPAC name?

(a)



① Find the parent.

C = C − C − C − C. pentene.

② Number the carbon.

C = C − C − C − C
① ② ③ ④ ⑤

③ Find the substituents.

3- methey, 4-methyl, 4-methey!.

④ write the full name.

3, 4, 4 - Trimethyl pentene.

problem 7-4-2

(b) $CH_3-CH_2-CH=\overset{CH_3}{\overset{|}{C}}-CH_3-CH_3$

① Find the parent.

C – C – C = C – C – C hexene.

② Number the carbon

6 5 4 3 2 1
C – C – C = C – C – C 3 – hexene.
1 2 3 4 5 6

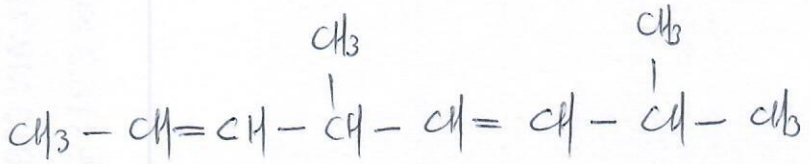
③ Find the substituents.

3 – methyl. is better than 4 – methyl.

④ write the full name

3 – Methyl – 3 – hexene.

problem 7-4-3.

(c) 

① Find the parent.

C–C=C–C–C=C–C–C octadiene.

② Number the carbon.

8 7 6 5 4 3 2 1
C–C=C–C–C=C–C–C
1 2 3 4 5 6 7 8

2.5-octadiene or 3.6-octadiene.

(correct)

③ Find the substituents.

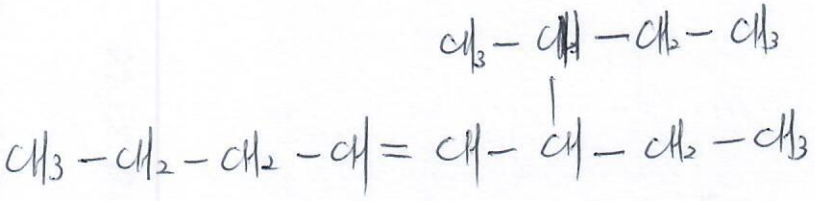
4-methyl, 7-methyl.

④ Write the full name

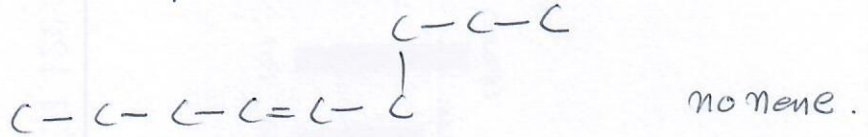
4.7-Dimethyl-2.5-octadiene.

Problem 7-4-4

(d)

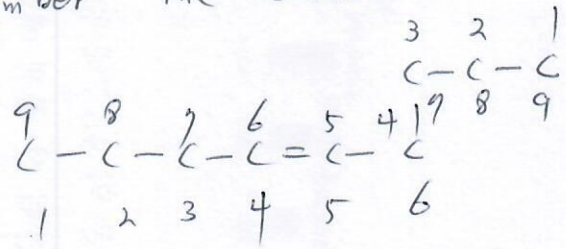


① Find the parent.



nonene.

② Number the carbon.



4 - nonene or 5 - nonene.

correct.

③ Find the substituents.

6 - ethyl, 7 ~~ethyl~~ methyl

④ Write the full name.

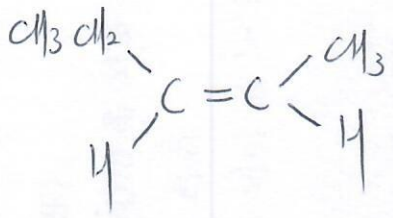
~~6 - Ethyl - 4 - nonene~~.

6 - Ethyl - 7 - methyl - 4 - nonene.

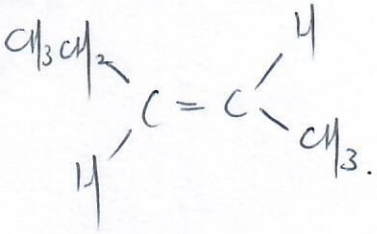
Problem 7-9

(a), (b), and (d) have no cis-trans isomers.

(c) $CH_3CH_2-CH=CH-CH_3$

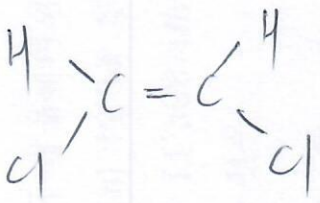


cis-2-pentene

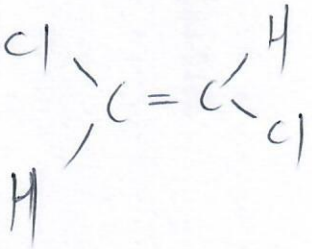


trans-2-pentene.

(e) $ClCH=CHCl$

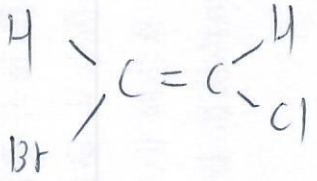


cis-1,2-dichloroethene

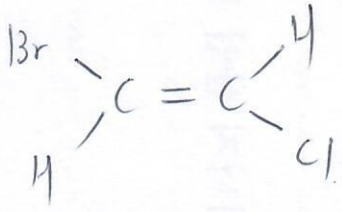


trans-1,2-dichloroethene.

(f) $BrCH=CHCl$.



cis-1-bromo-2-chloroethene



trans-1-bromo-2-chloroethene.

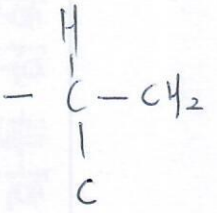
Problem 7-11.

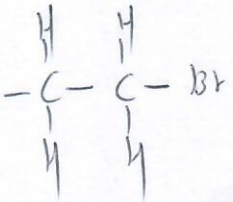
(a) $-H < -CH_3$.

(b) $-Cl > -CH_2Cl$

(c) $-CH=CH_2 > -CH_2-CH_2-Br$.

↓ assumed ↓



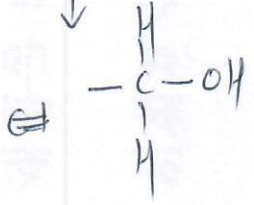


C has two carbons. C has one carbon.

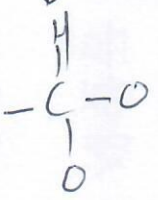
(d) $-NH-CH_3 < -O-CH_3$

(e) $-CH_2-OH < -CH=O$.

↓ ⇌



↓ assumed

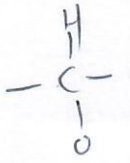


C has two oxygens.

C has one oxygen

(f) $-CH_2-O-CH_3 < -CH=O$

↓ assumed



(two oxygens)

problem 7-12.

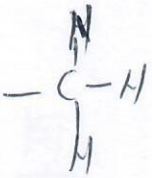
(a) $-Cl > -OH > -CH_3 > -H$

(b) $-CH_2OH > -CH=CH_2 > -CH_2-CH_3 > -CH_3$

(c) $-CO_2H > -CH_2OH > \underline{-CN} > -CH_2NH_2$

$-C\equiv N$

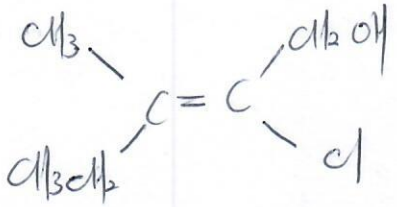
↓ assumed



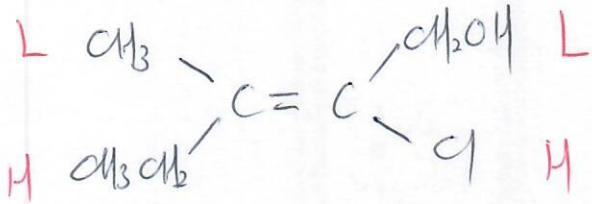
(d) $-CH_2-O-CH_3 > -CN > -C\equiv CH > -CH_2CH_3$.

Problem 7-13.

(a)

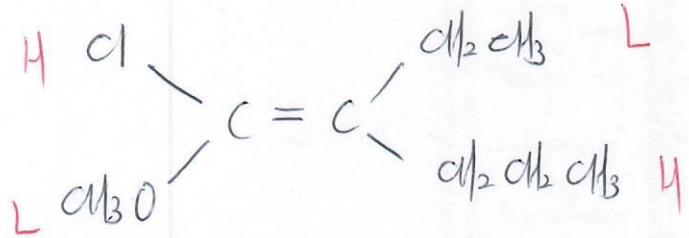


Left $-CH_3CH_2 > -CH_3$ Right $-Cl > CH_2OH$



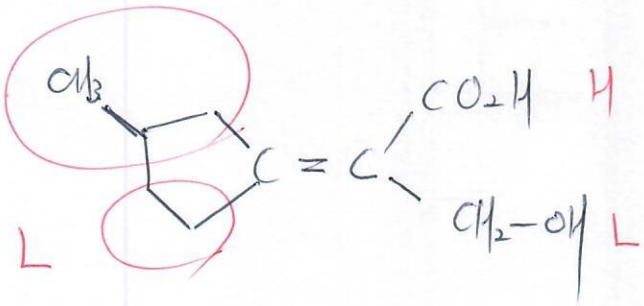
Z configuration.

(b)



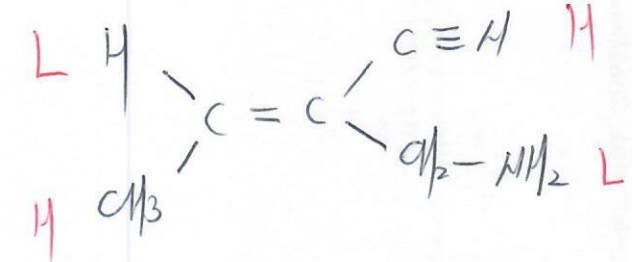
E configuration.

(c)



Z configuration.

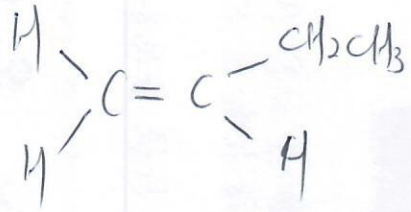
(d)



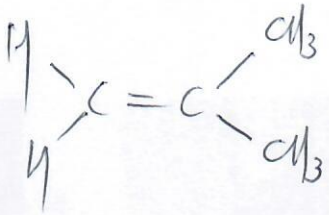
E configuration.

Problem 7-15

(a)



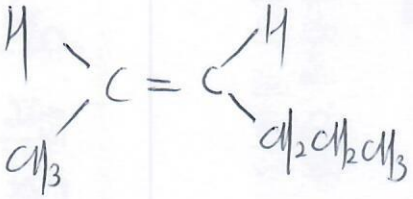
Mono substituent



Di substituents

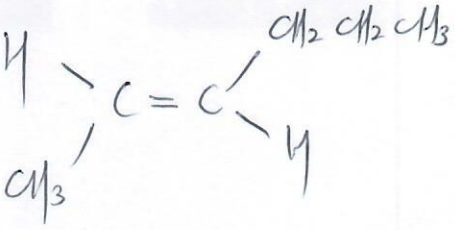
stable.

(b)



~~Strain~~

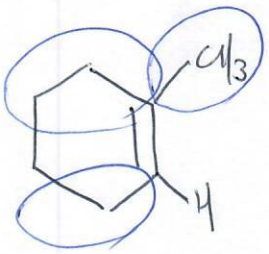
steric strain



no steric strain

stable.

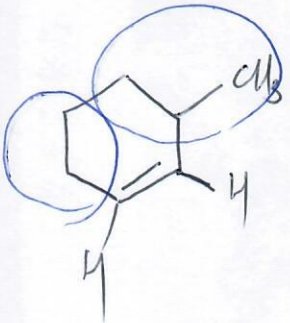
(c)



~~Trisubst~~

Trisubstituents

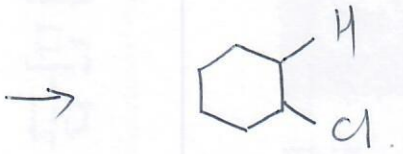
stable.



Disubstituents.

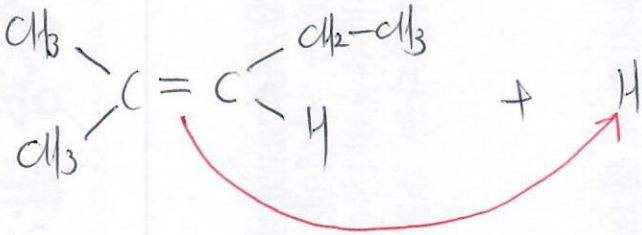
Problem 7-16 -1

(a)

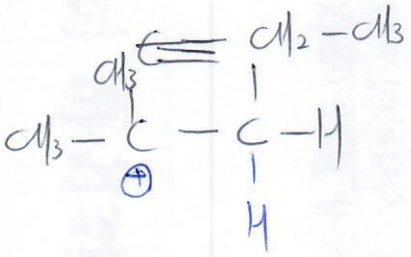


Chlorocyclohexane.

(b)

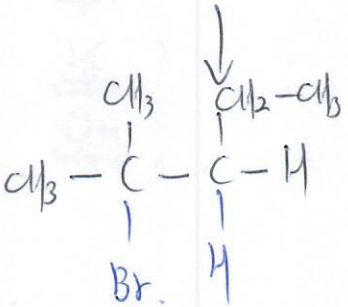


↓ case I



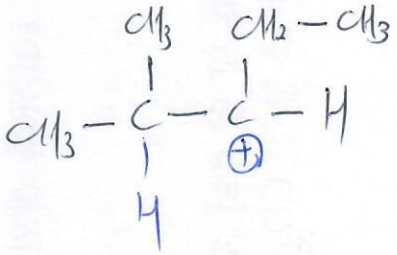
Tertiary (3°) Carbocation

stable



2-Bromo-2-methylpentane

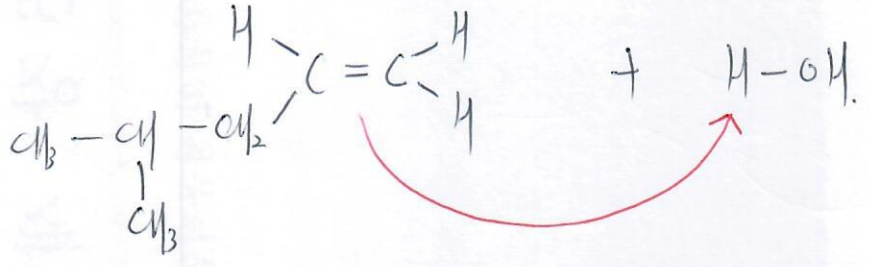
↓ case II.



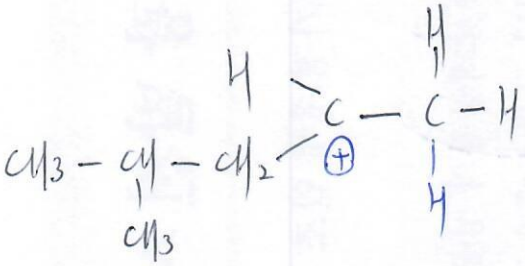
~~Sec~~ Secondary (2°) carbocation.

Problem 7-16-2

(c)



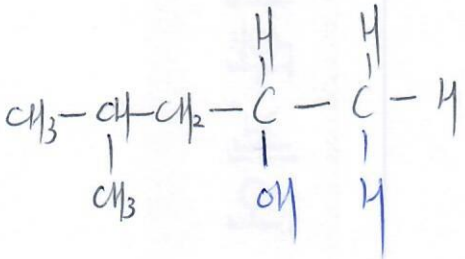
↓ case I



Secondary carbocation (2°)

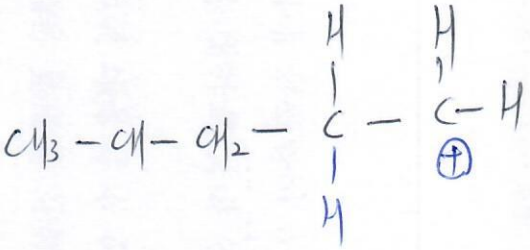
stable

↓ + OH^-



2-Methyl-2-pentanol.

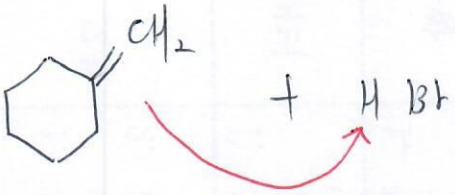
↓ case II.

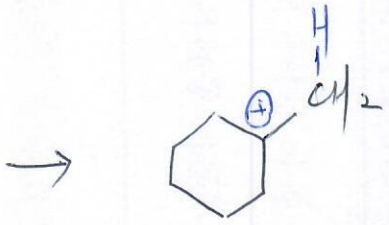


Primary Carbocation (1°)

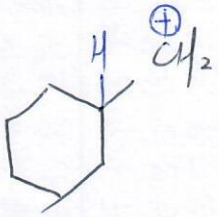
Problem 7-16-3

(d)





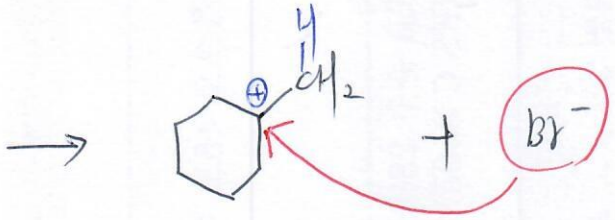
or

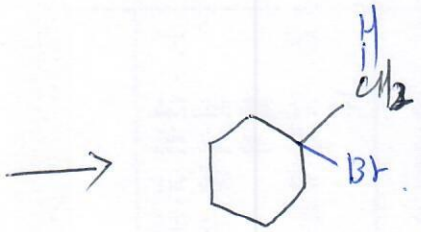


3° carbocation

stable

2° carbocation

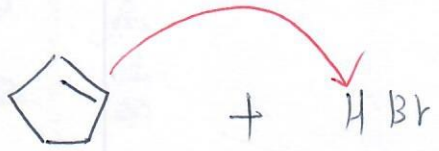




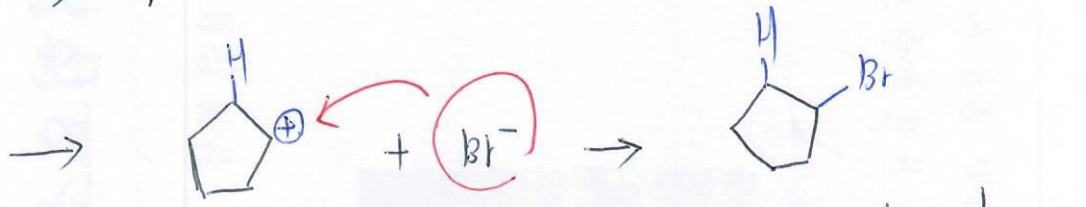
1-Bromo-1-methylcyclohexane

problem 7-17.-1.

(a)

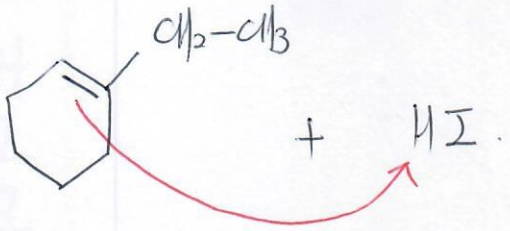


Cyclopentene

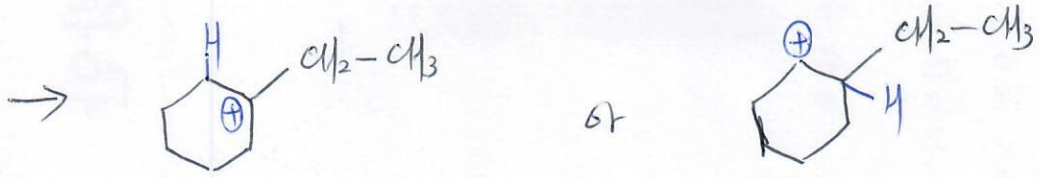


Bromo cyclopentane.

(b)



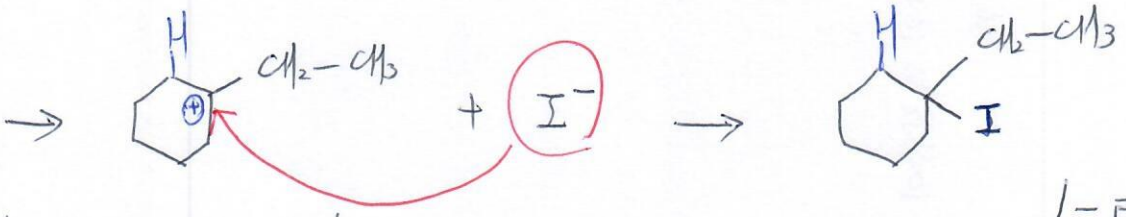
1-Ethylcyclohexene



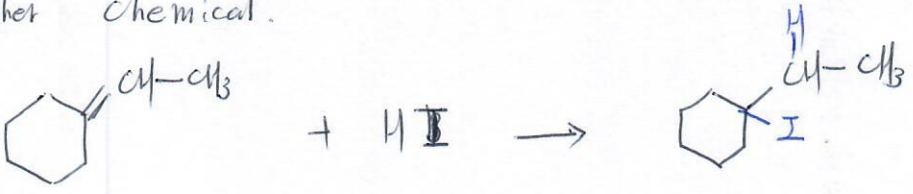
3° carbocation stable

or

2° carbocation



Another chemical.

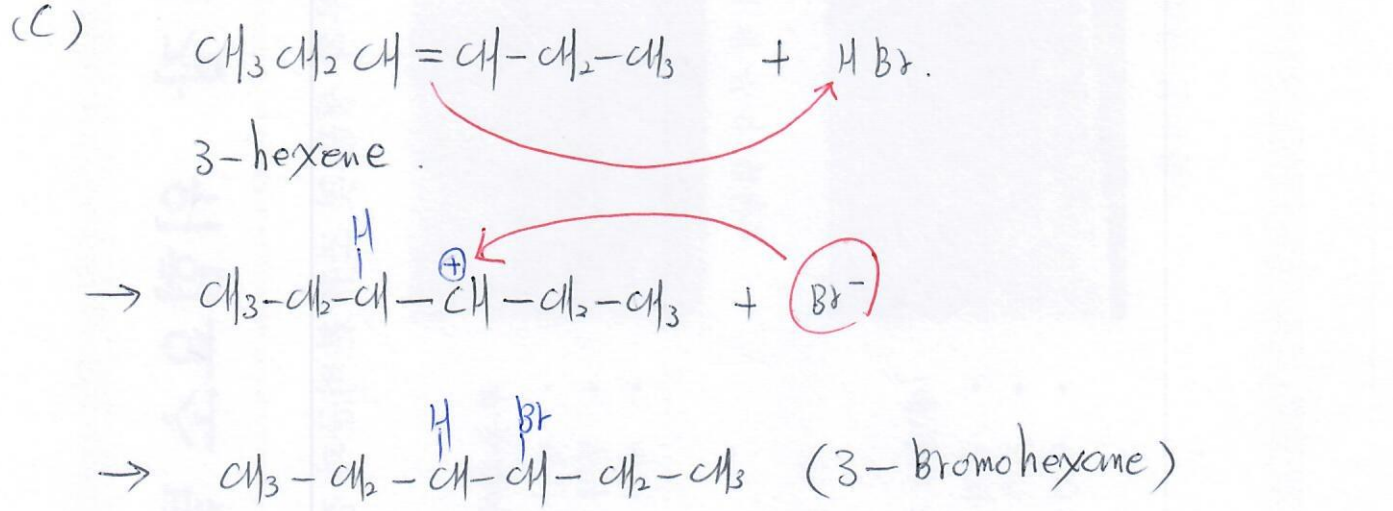


Ethylidenecyclohexane

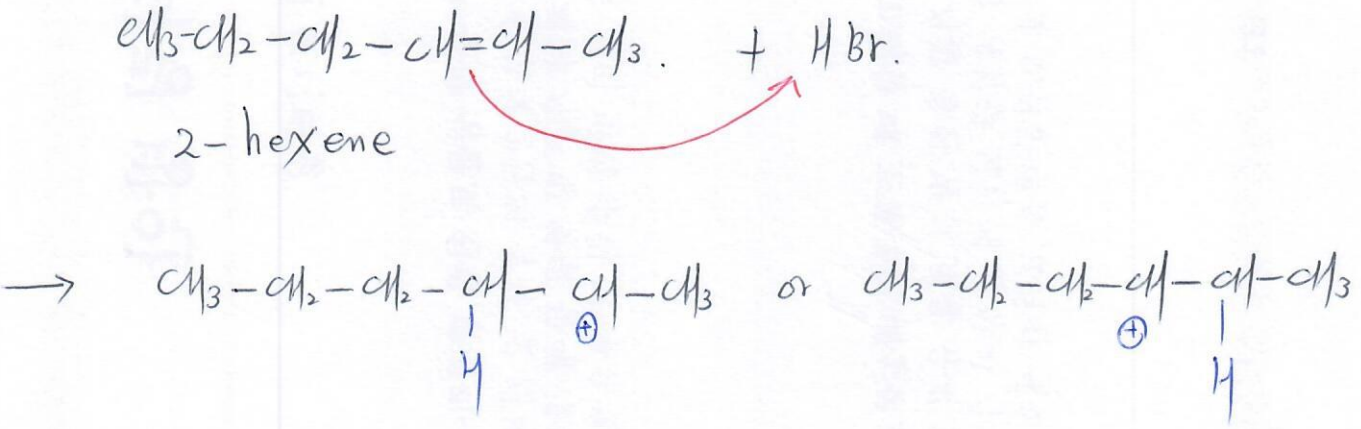
1-Ethyl ~~1-Iodo~~ -1-Iodocyclo-hexane.

Problem ~~17~~ 7-17-2

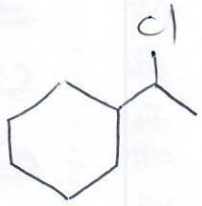
(C)

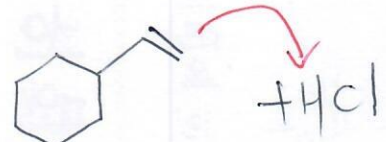


Another chemical.

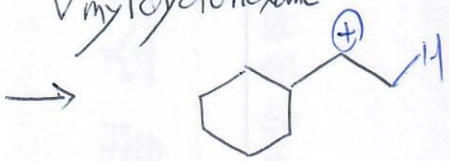


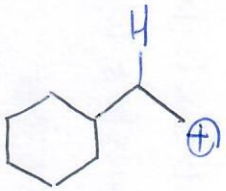
Problem 7-17-3

(d)  (?)



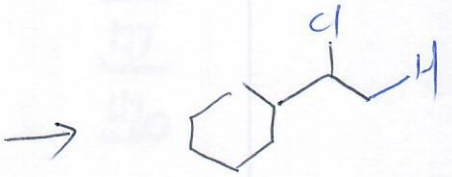
vinylcyclohexane



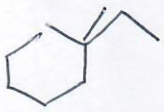
or 

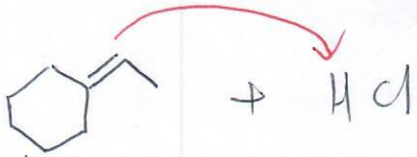
2° carbocation (stable)

1° carbocation.

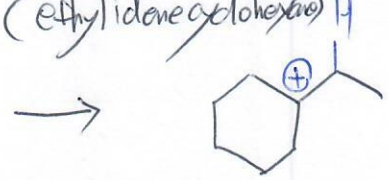


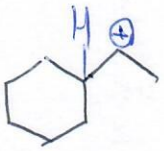
(1-chloroethylcyclohexane)

How about  ?



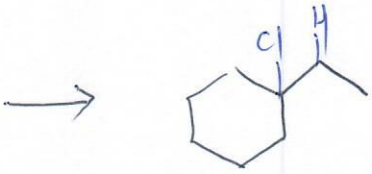
(ethylidenecyclohexane)



or 

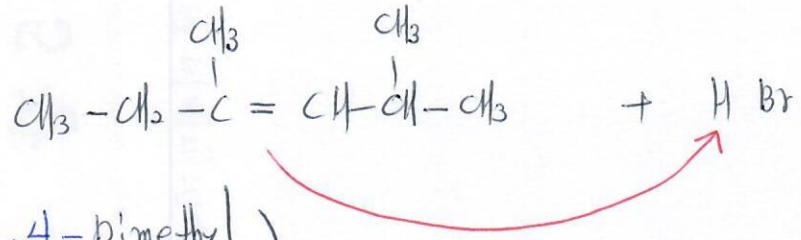
3° carbocation (stable)

2° carbocation

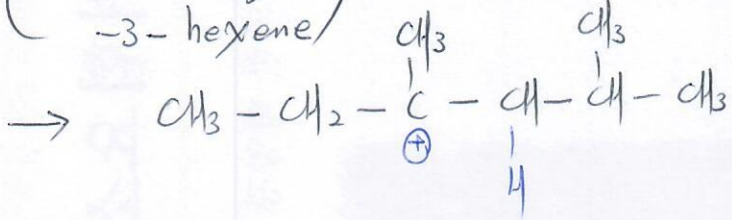


Problem 7-18.

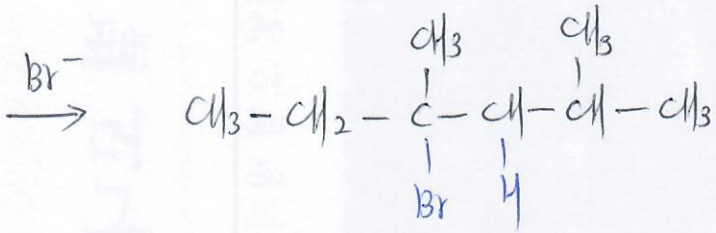
(a)



(2,4-dimethyl-3-hexene)

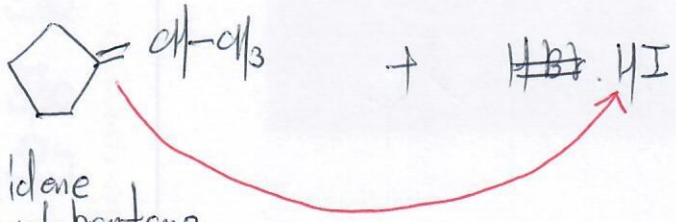


3° carbocation Intermediate.

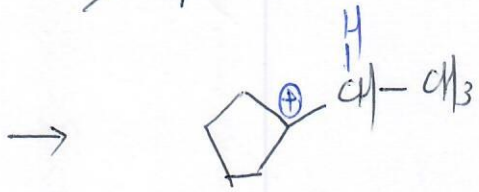


(4-Bromo-2,4-dimethyl hexane)

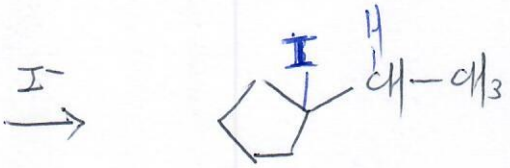
(b)



ethylidene cyclopentane



3° carbocation Intermediate



1-Ethyl-1-iodocyclopentane.