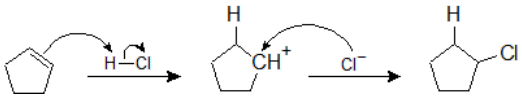
9.20: SOLUTIONS TO ADDITIONAL EXERCISES

ADDITION OF HYDROGEN HALIDES TO ALKENES

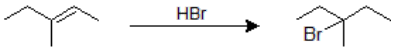
9-1

9-2

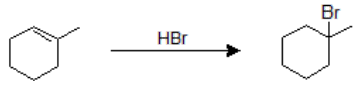


9-3

(a)

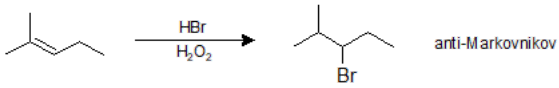


(b)

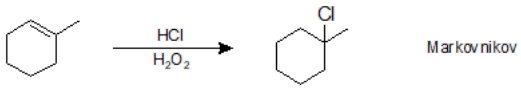


9-4

(a)

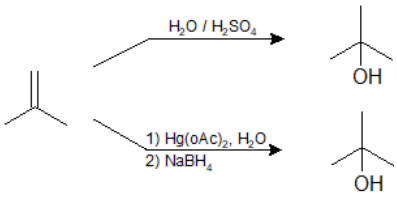


(b)

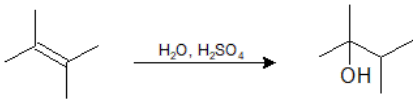


ADDITION OF WATER: HYDRATION OF ALKENES

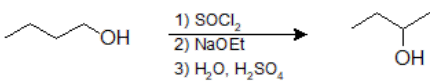
9-5



9-6



9-7



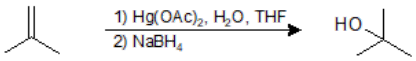
9-8 B.

HYDRATION BY OXYMERCURATION-DEMERCURATION

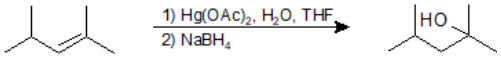
9-9 When an alkene is going through oxymercuration, it proceeds through a three-membered mercurinium ion intermediate. This does not allow for rearrangement as no carbocation is formed. In order to open the intermediate ring, the water molecule will attack the most substituted carbon, thus giving the Markovnikov regioselectivity in the final product.

9-10

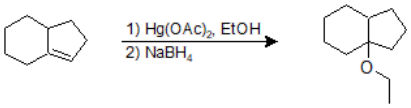
(a)



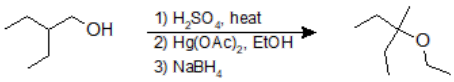
(b)



9-11



9-12

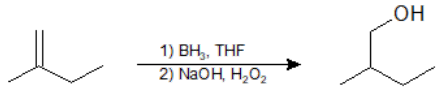


9-13 C.

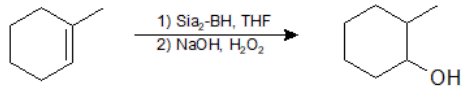
HYDROBORATION OF ALKENES

9-14

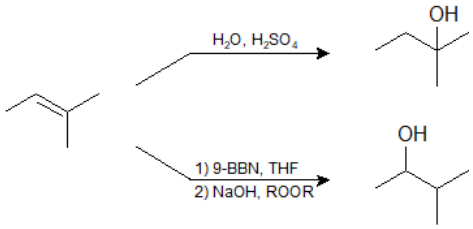
(a)



(b)



9-15

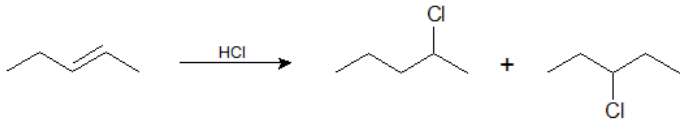


9-16 2-chloro-3-methylbutane

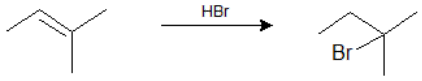
ADDITION OF HALOGENS TO ALKENES

9-17

(a)



(b)



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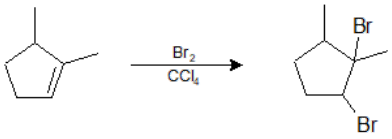


9-19 B.

9-20

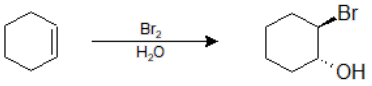
A: HBr, ROOR

B: $NaNH_2$

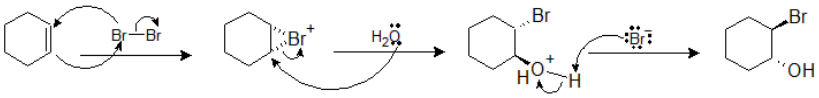
9-21 You do not obtain a mixture of cis- and trans-brominated products from this reaction (only trans products) due to the intermediate the reaction goes through. No carbocation is formed, which would allow the Br- to attack from two possible sides of the carbocation. Instead, a bromonium ion is formed and in order to add the second Br, it needs to attack one side of the bromonium ion intermediate, causing the product to always have a trans configuration.

FORMATION OF HALOHYDRINS

9-22

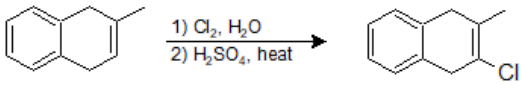


9-23



9-24 Buta-1,3-diene

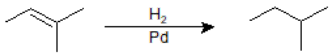
9-25



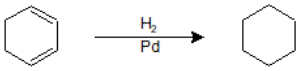
CATALYTIC HYDROGENATION OF ALKENES

9-26

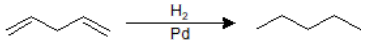
(a)



(b)



(c)



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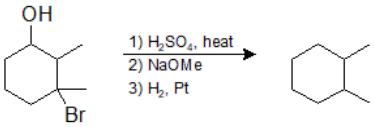

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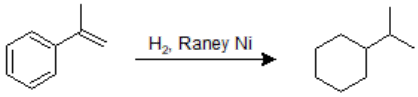

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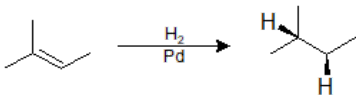
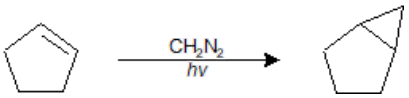


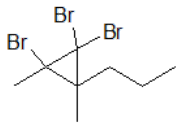
ADDITION OF CARBENES TO ALKENES

9-30



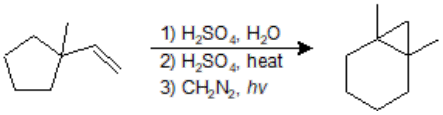
9-31

9-32

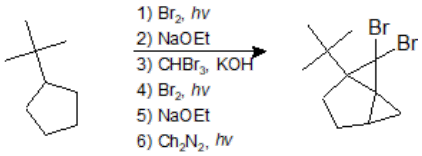


1,1,2-tribromo-2,3-dimethyl-3-propylcyclopropane

9-33

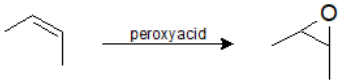


9-34



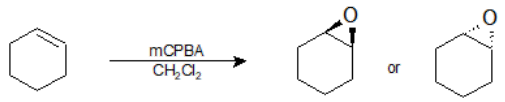
EPOXIDATION OF ALKENES AND ACID-CATALYZED OPENING OF EPOXIDES

9-35

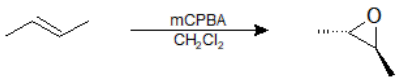


9-36

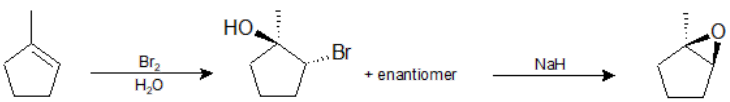
(a)



(b)



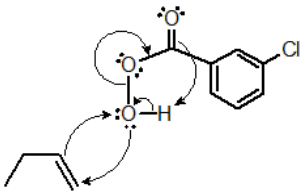
9-37



9-38 C.

9-39 A.

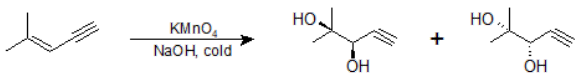
9-40



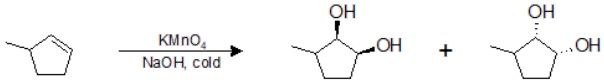
SYN DIHYDROXYLATION OF ALKENES

9-41

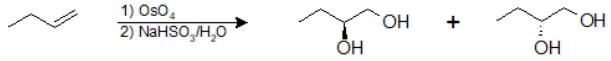
(a)



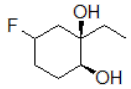
(b)



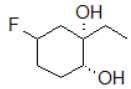
(c)



9-42

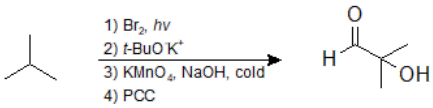


(1*R*,2*S*)-1-ethyl-5-fluorocyclohexane-1,2-diol

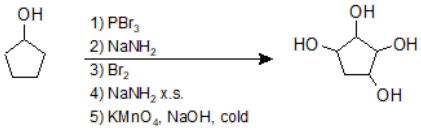


(1*S*,2*R*)-1-ethyl-5-fluorocyclohexane-1,2-diol

9-43



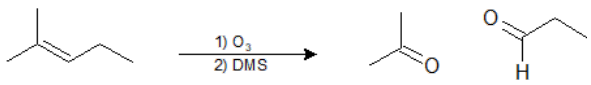
9-44



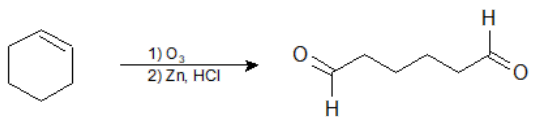
OXIDATIVE CLEAVAGE OF ALKENES

9-45

(a)

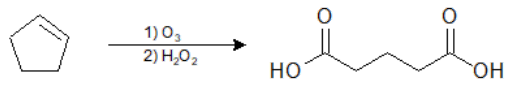


(b)

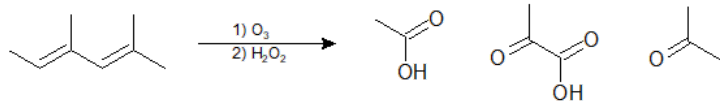


9-46

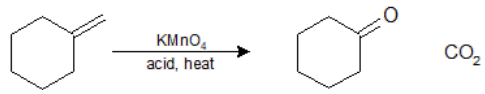
(a)



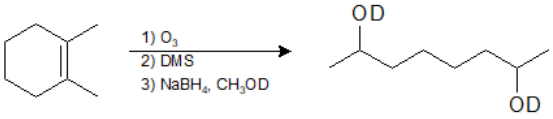
(b)



(c)

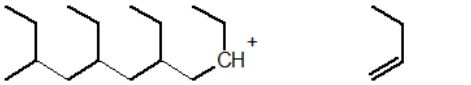


9-47



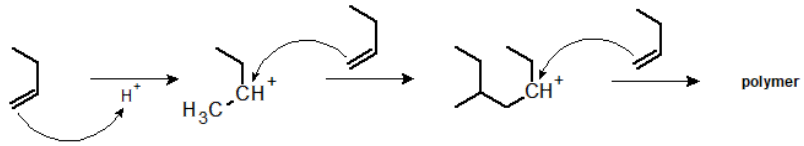
POLYMERIZATION OF ALKENES

9-48



monomer = but-1-ene

9-49



9-50