

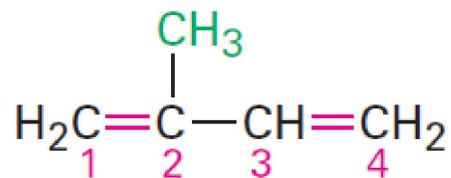
# АЛКАДИЕНЫ

# Алкадиены

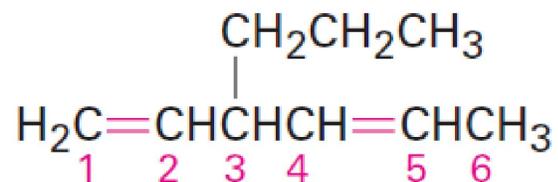
Кумулированн  
ые  
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Сопряженные  
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Изолированные  
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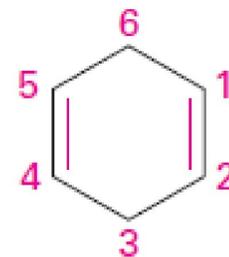


**2-Methyl-1,3-butadiene**



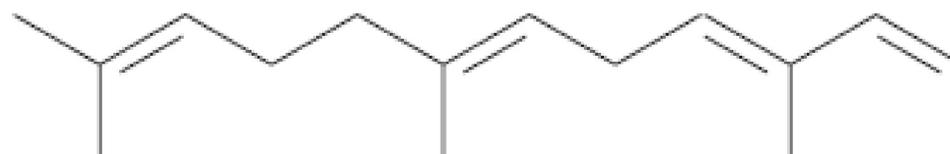
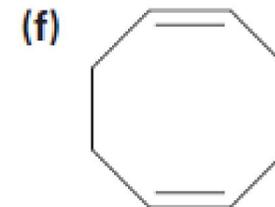
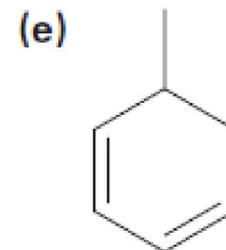
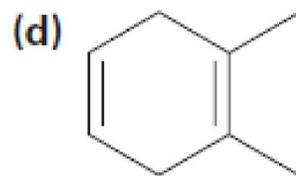
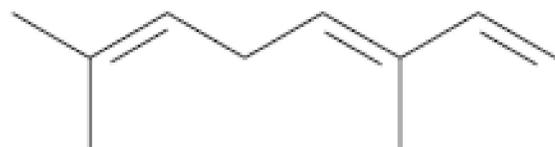
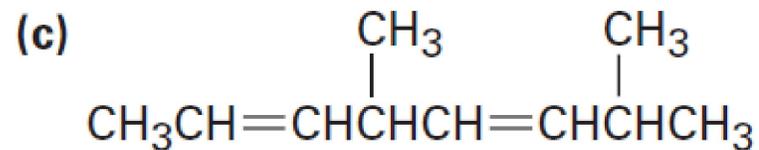
**3-Propyl-1,4-hexadiene**

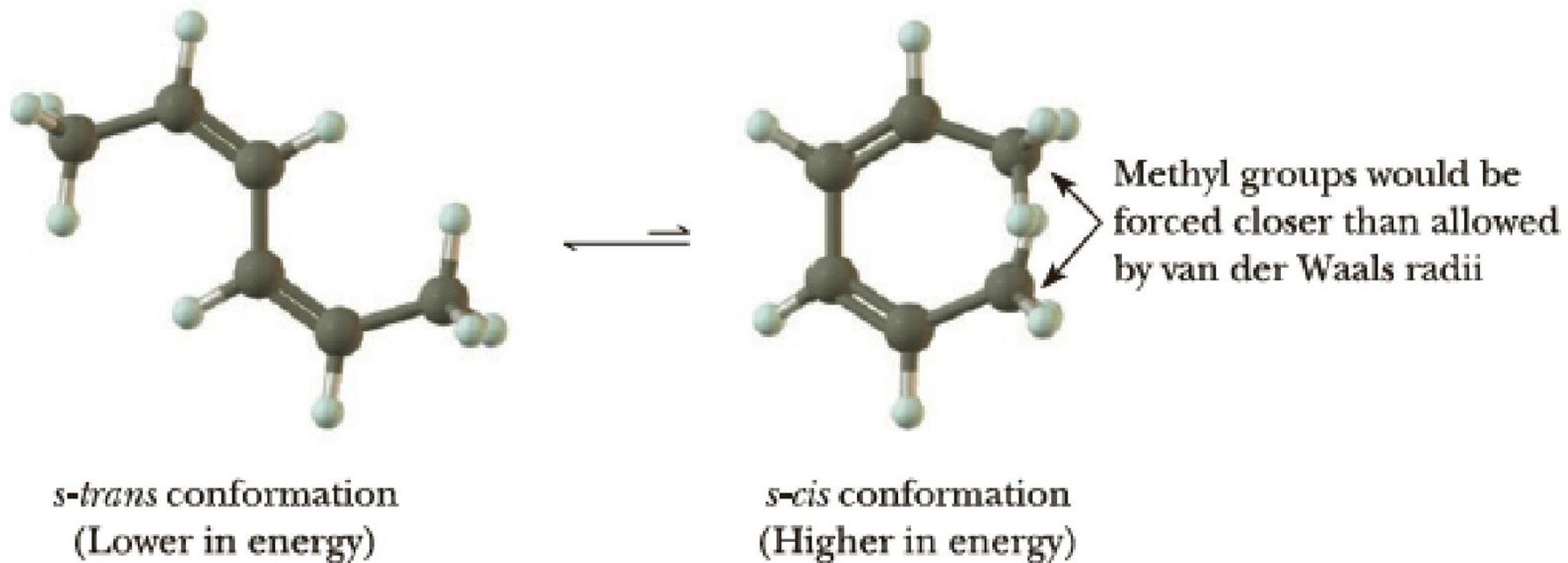
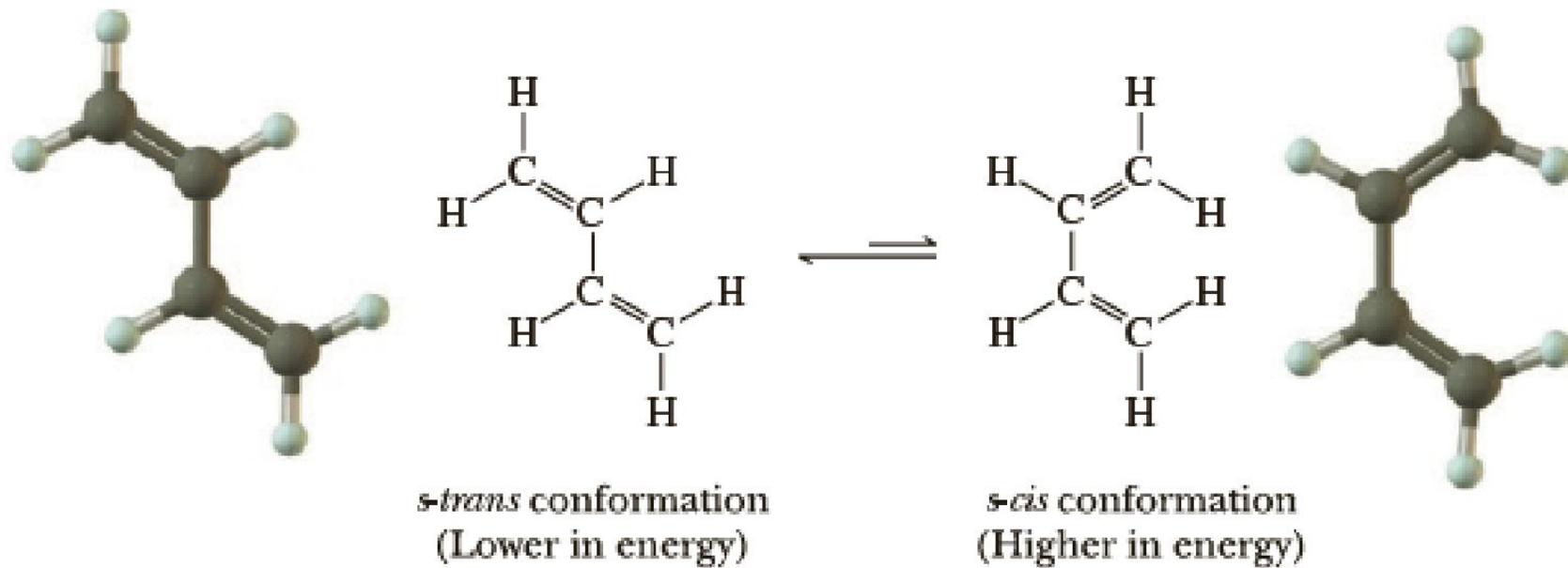
**3-Propylhexa-1,4-diene)**

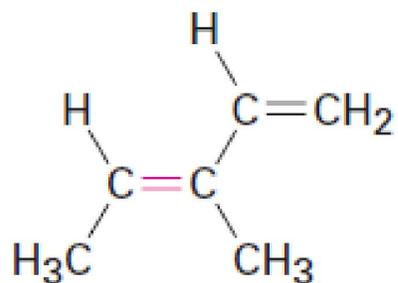


**1,4-Cyclohexadiene**

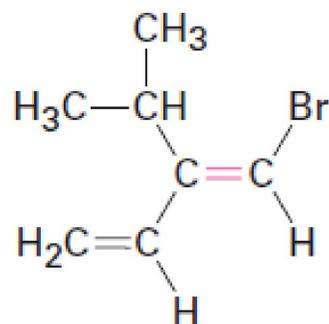
**(New: Cyclohexa-1,4-diene)**



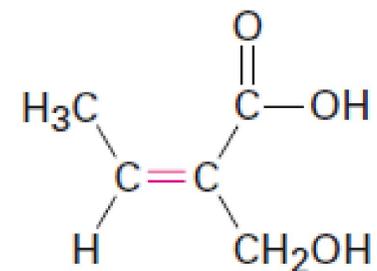




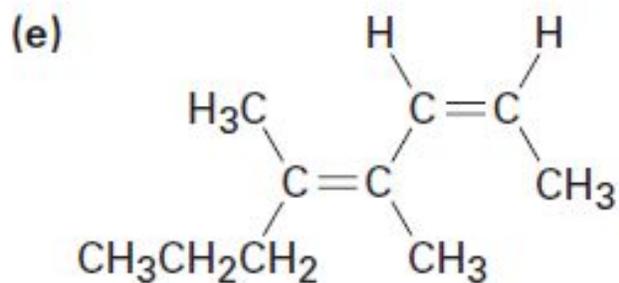
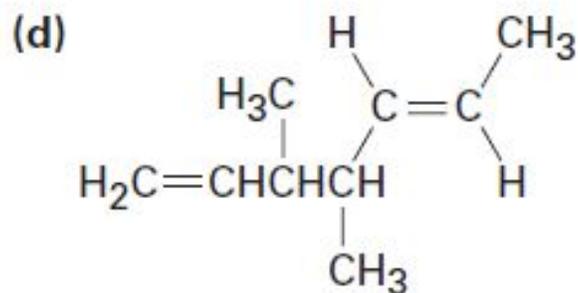
**(E)-3-Methyl-1,3-pentadiene**

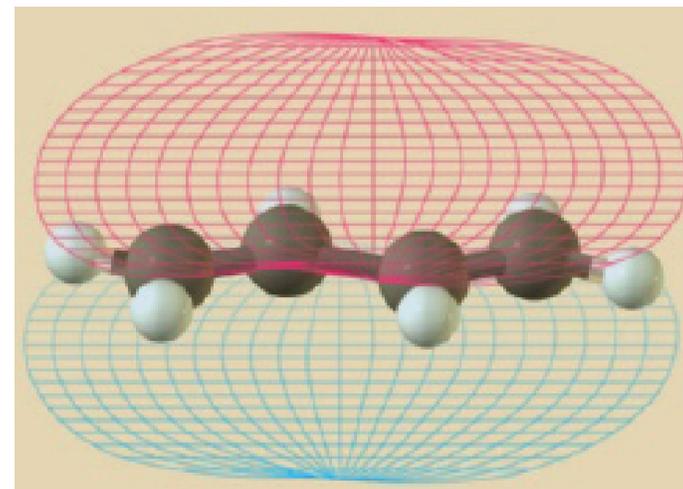
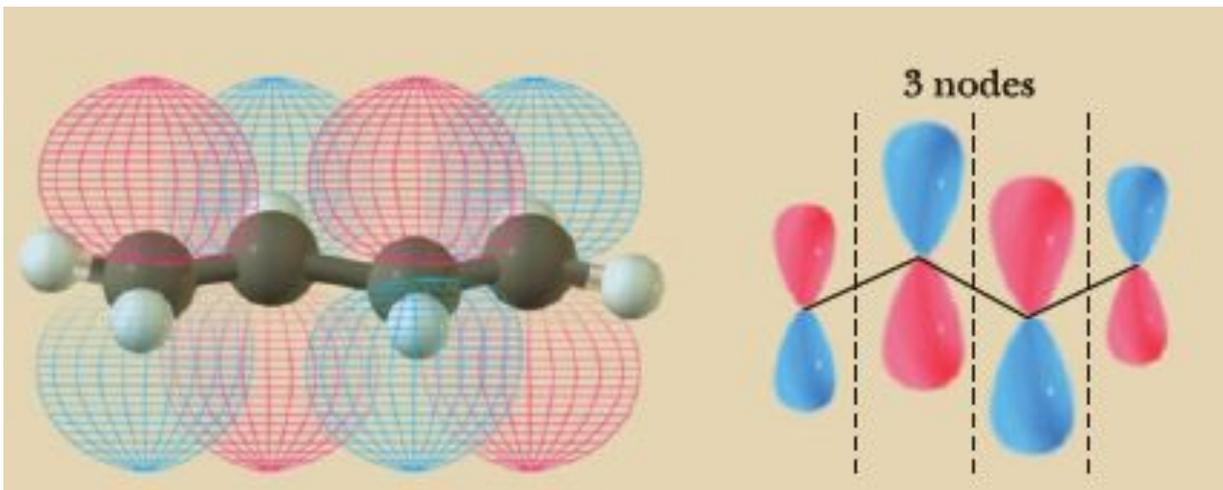


**(E)-1-Bromo-2-isopropyl-1,3-butadiene**

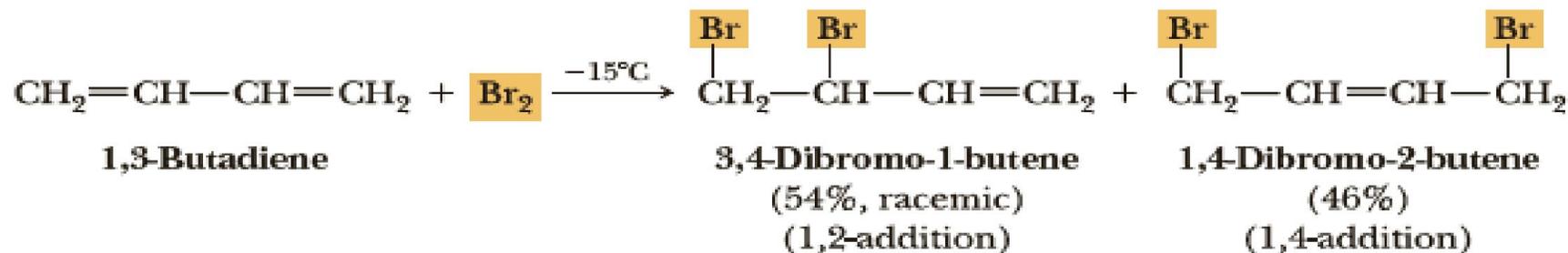
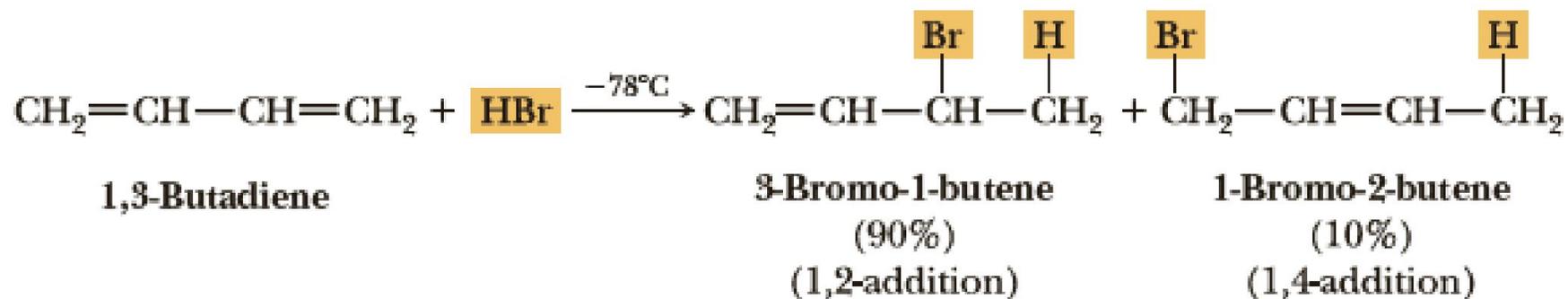


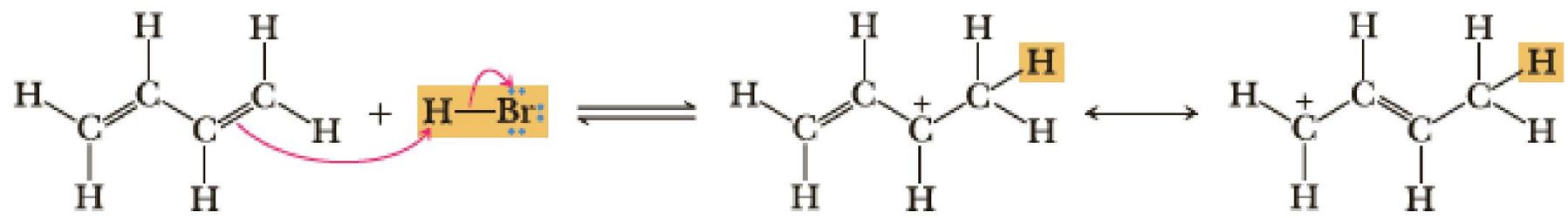
**(Z)-2-Hydroxymethyl-2-butenoic acid**



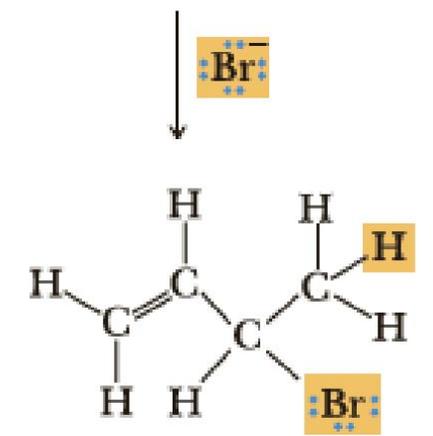
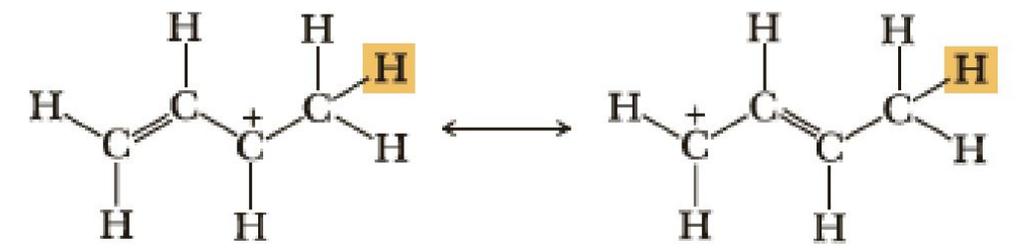


## 1,2-Addition and 1,4-Addition

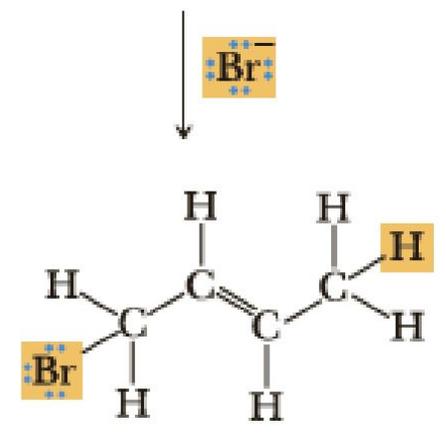




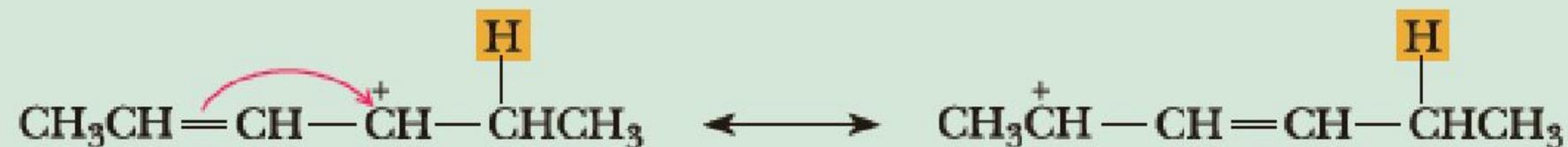
Allylic carbocation stabilized by resonance



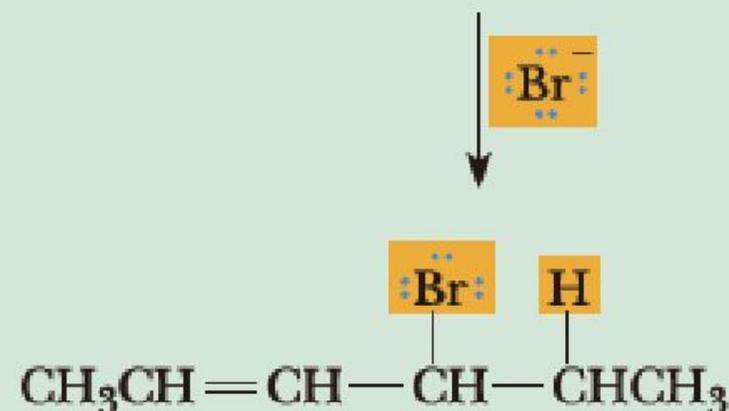
(1,2-addition, racemic)



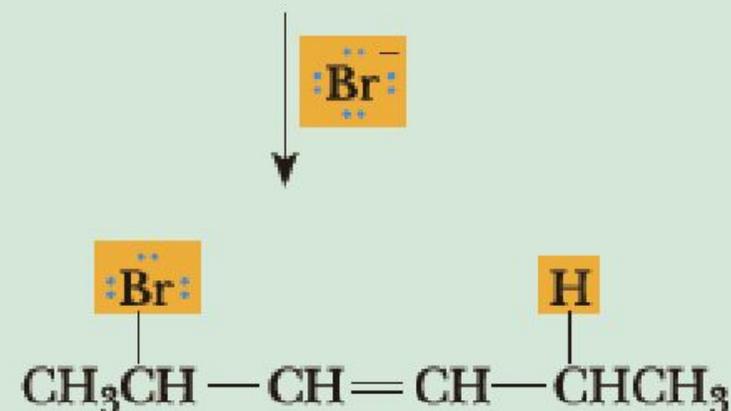
(1,4-addition)



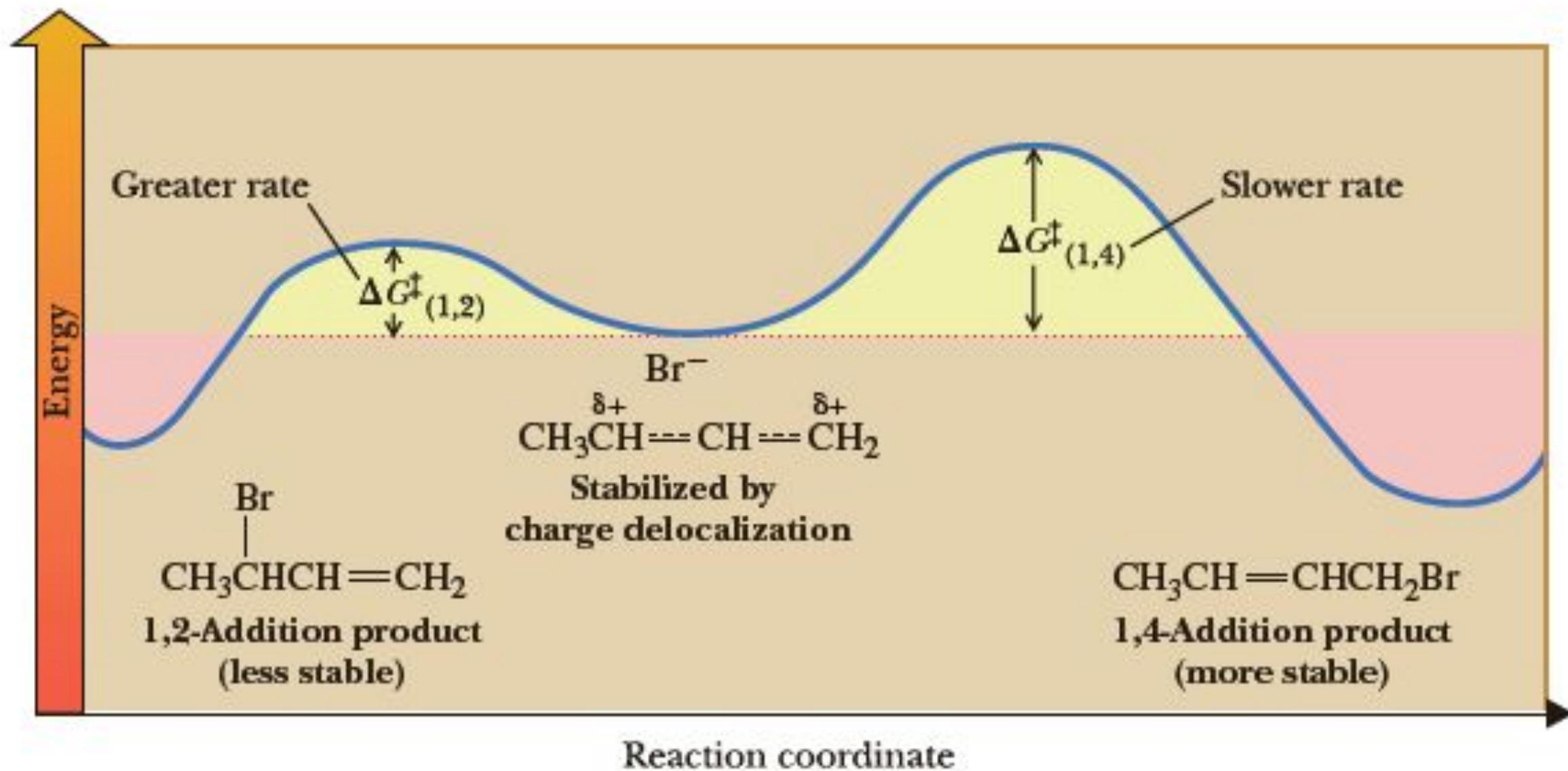
A 2° allylic carbocation stabilized by charge delocalization

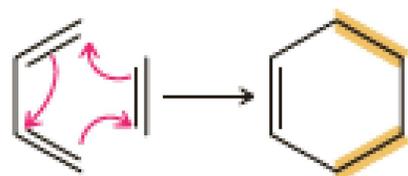
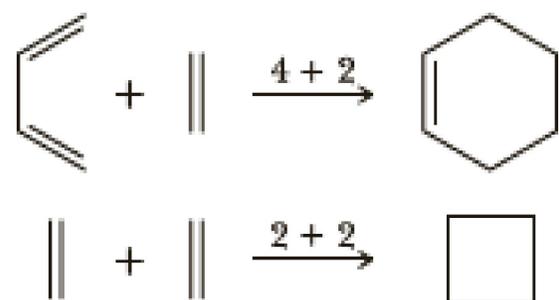


**4-Bromo-2-hexene**  
(1,2-addition, racemic)

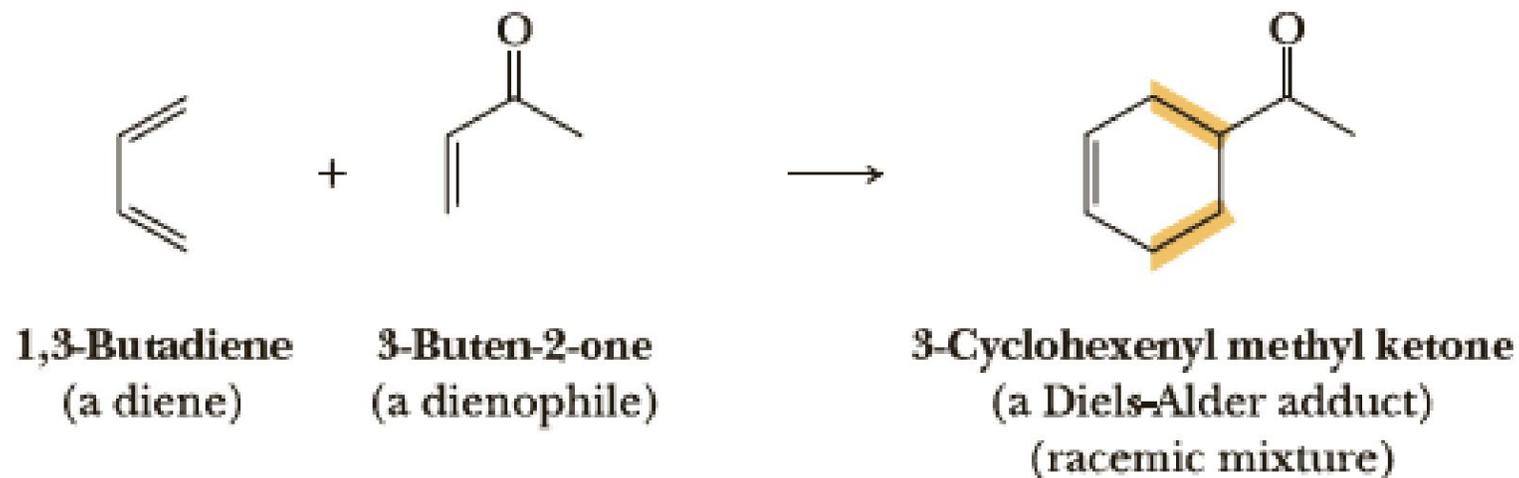


**2-Bromo-3-hexene**  
(1,4-addition, racemic)

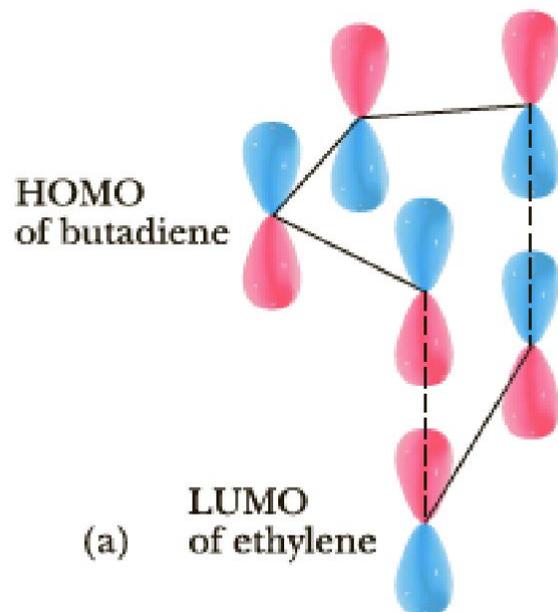




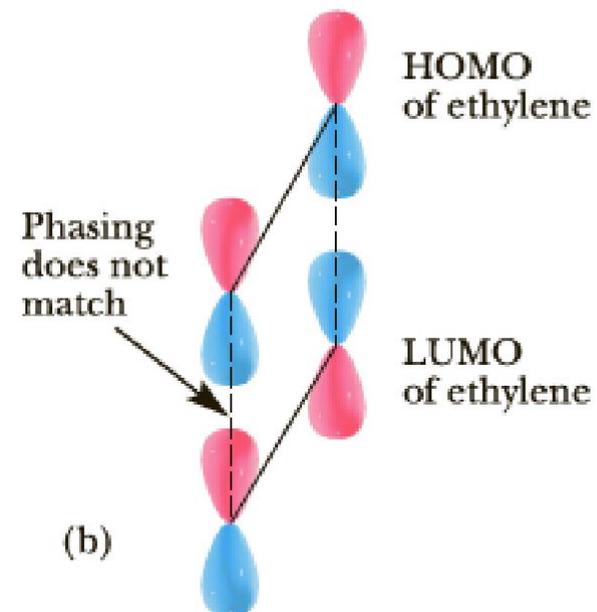
Diels-Alder reaction

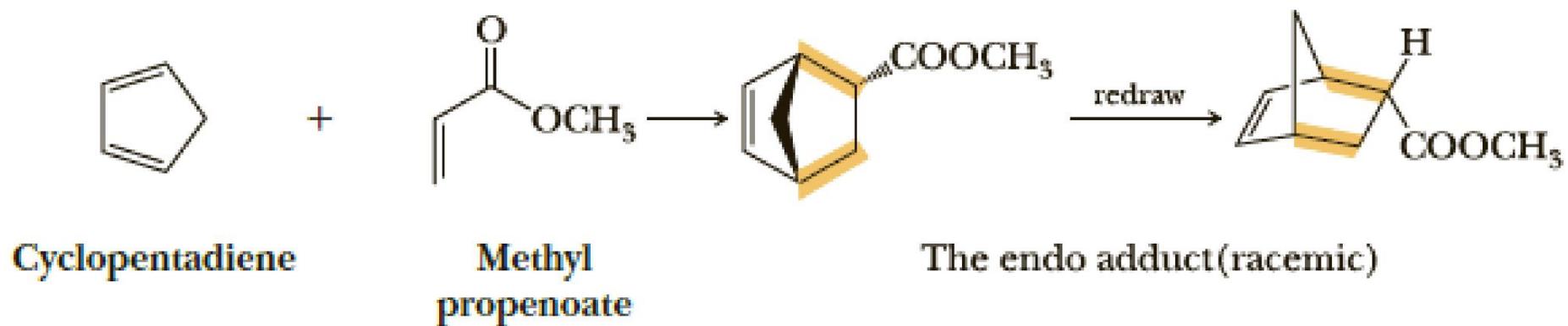
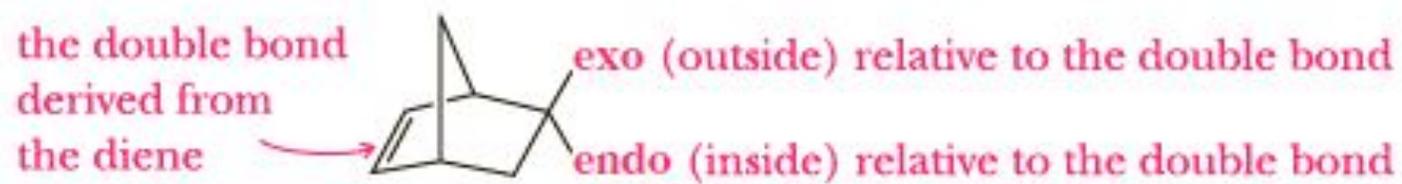
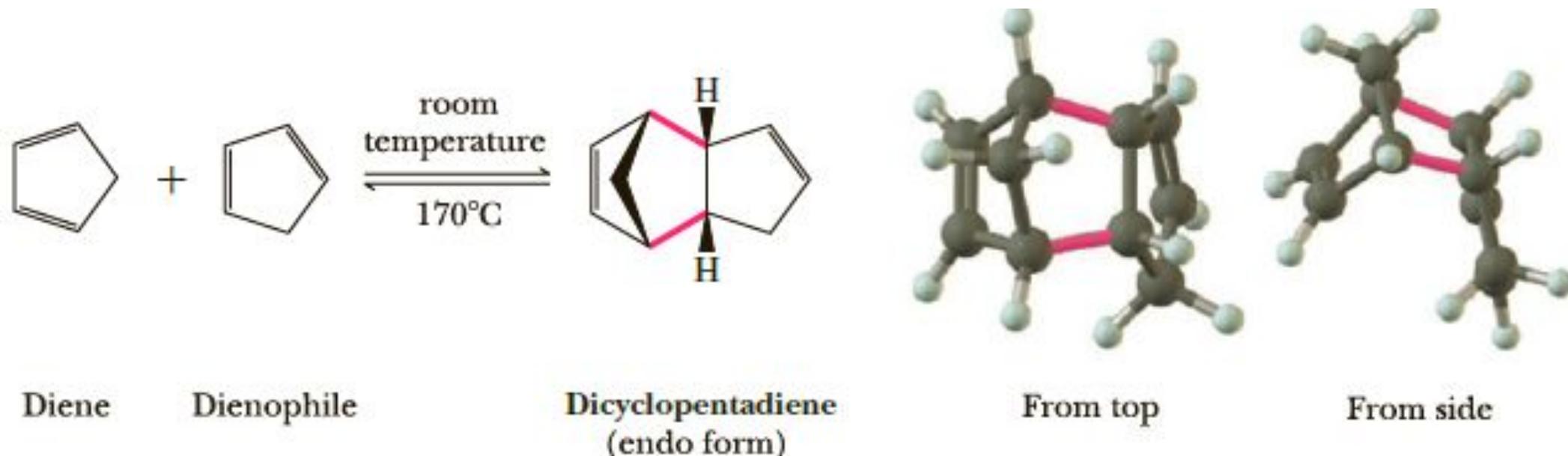


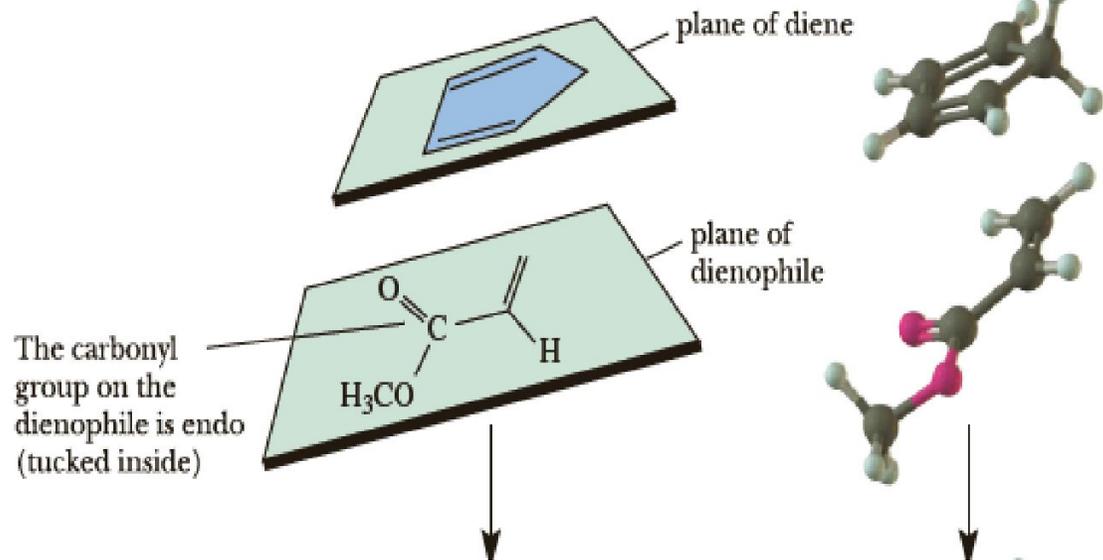
Reaction is "allowed"



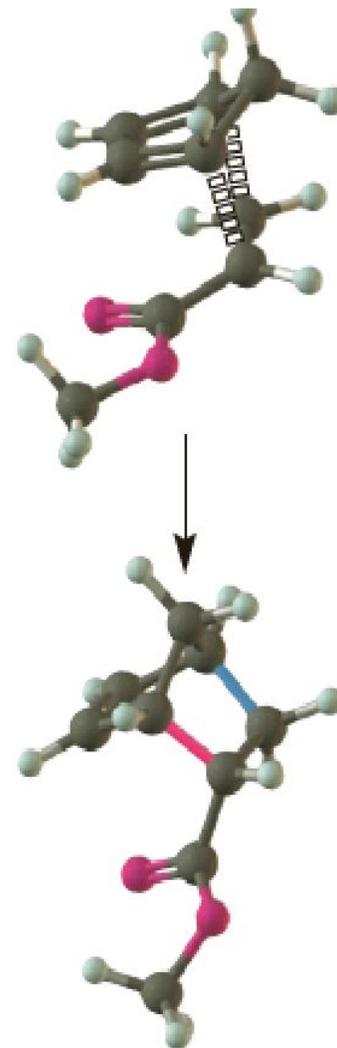
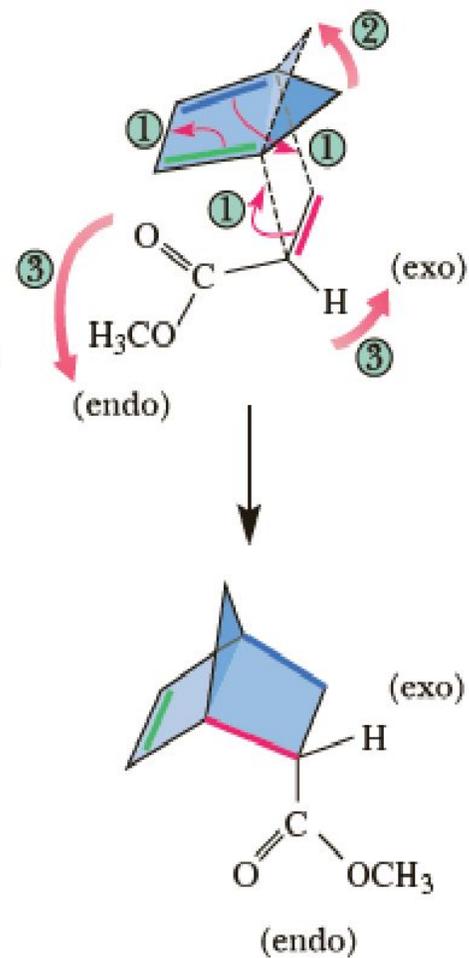
Reaction is "forbidden"

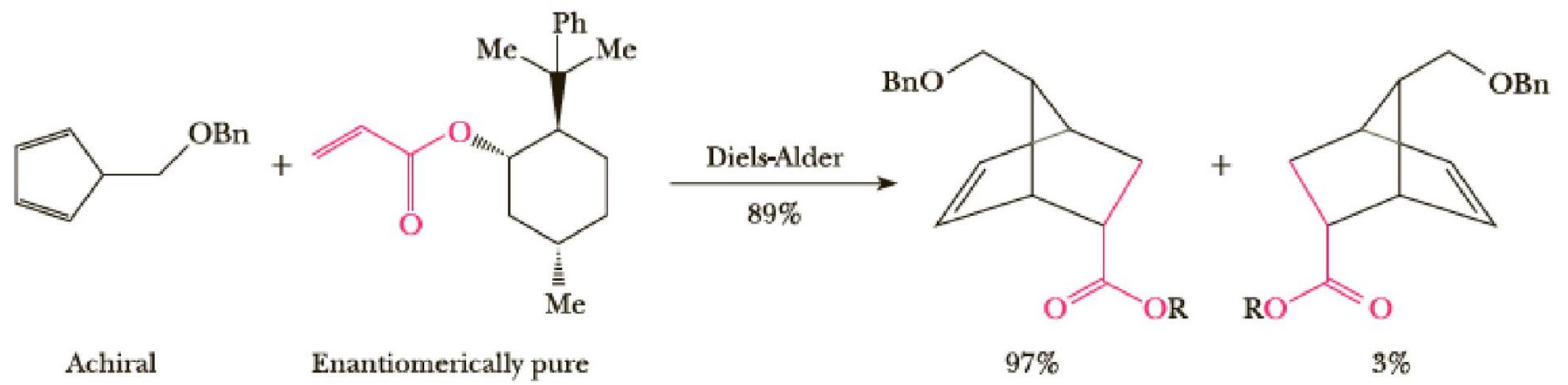
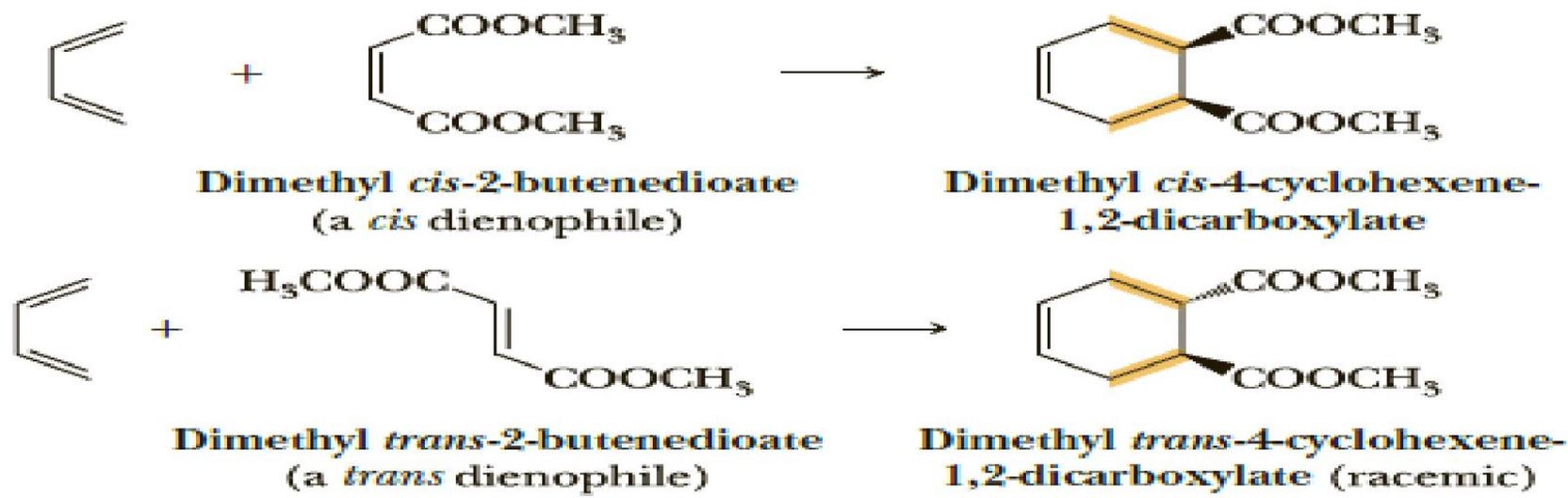


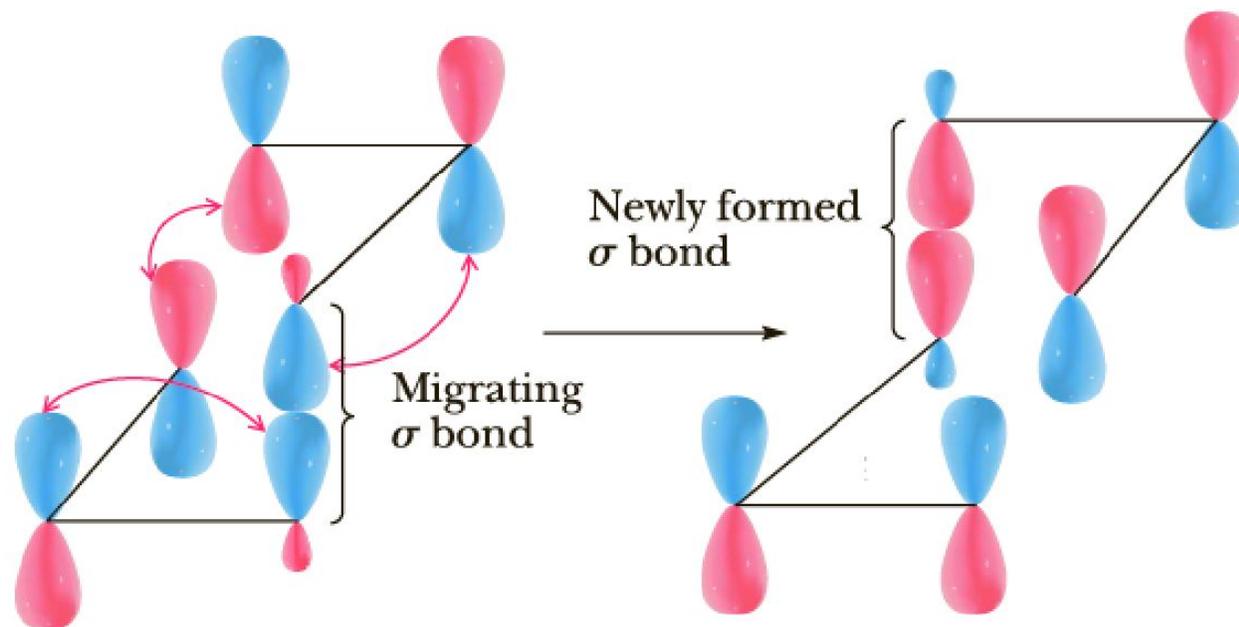


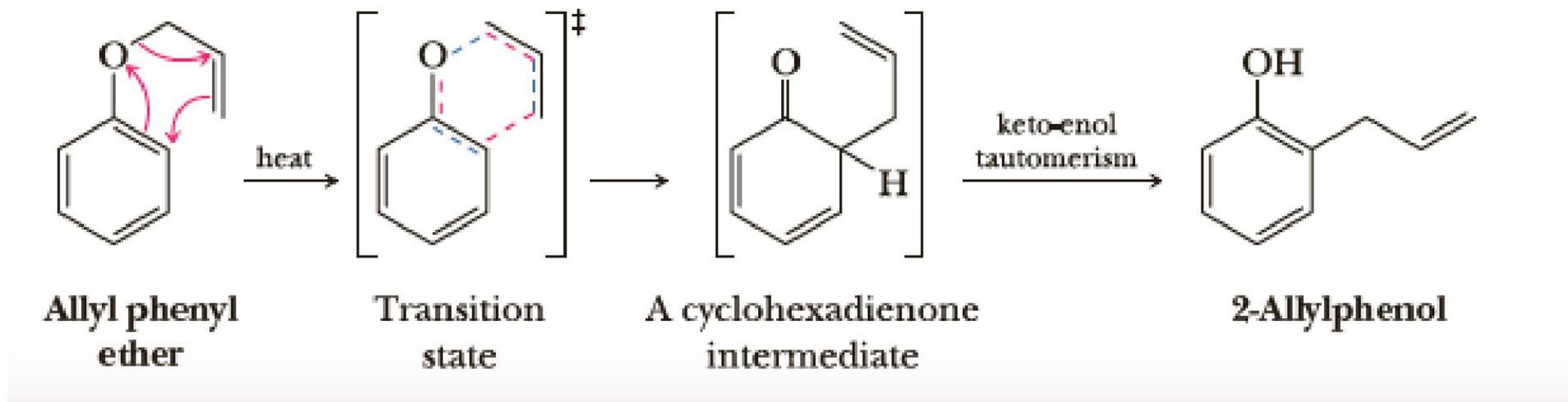
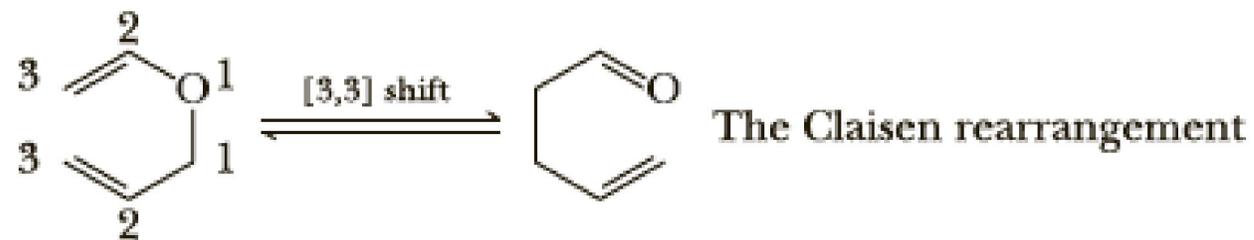


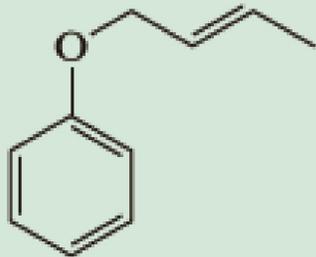
- ① New bonds form
- ② Envelope flap moves up
- ③ H moves to exo position;  $-\text{CO}_2\text{CH}_3$  moves to endo position



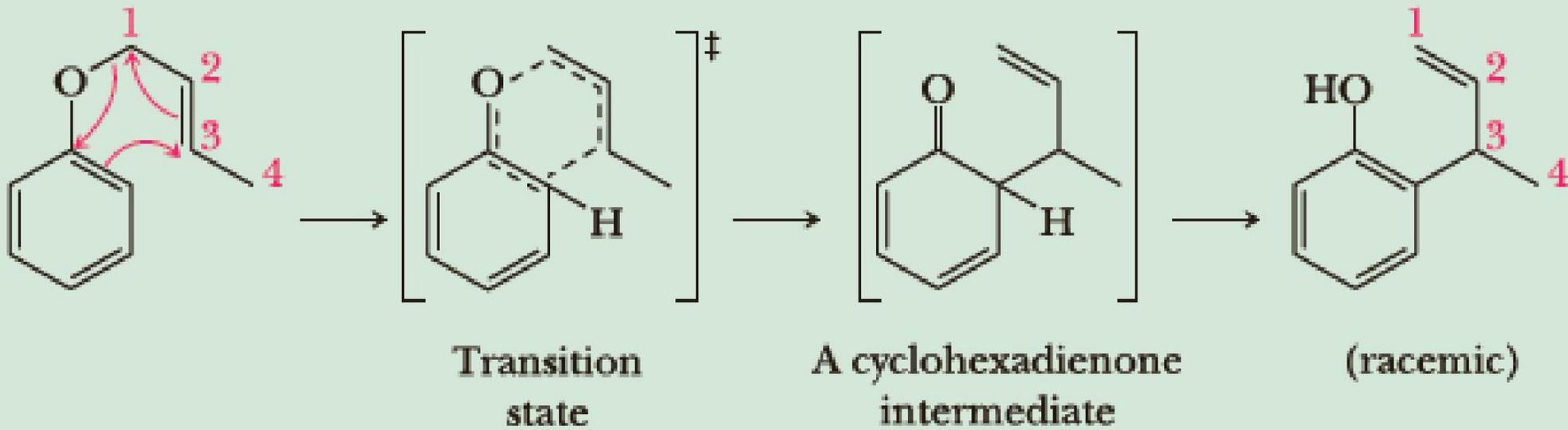


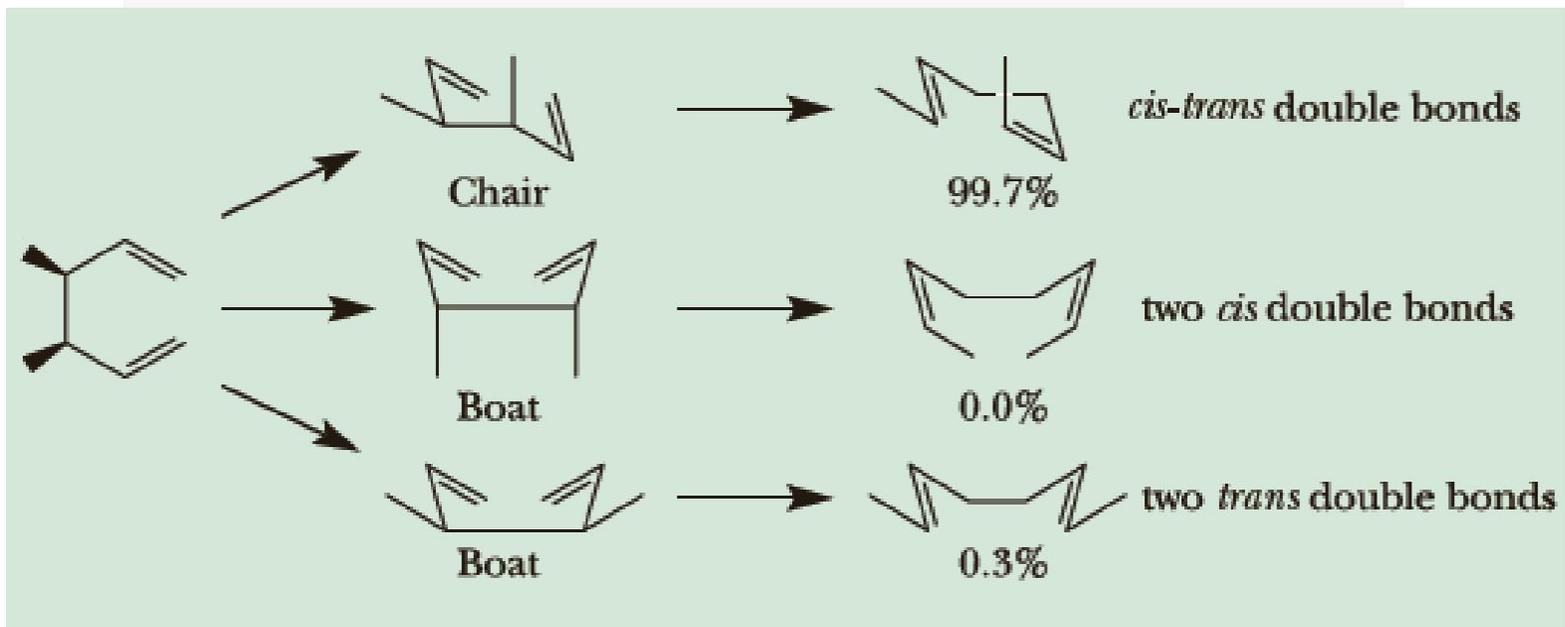
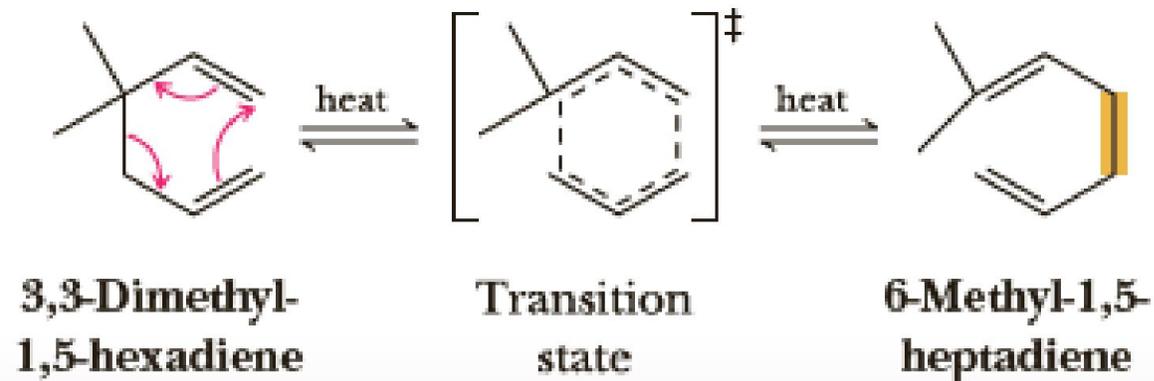
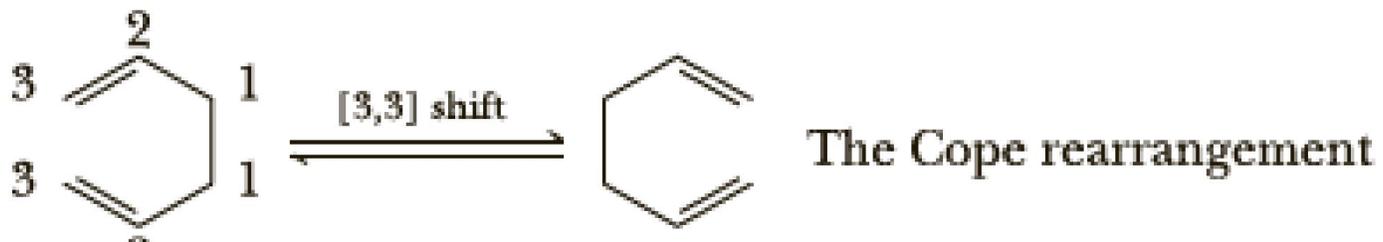


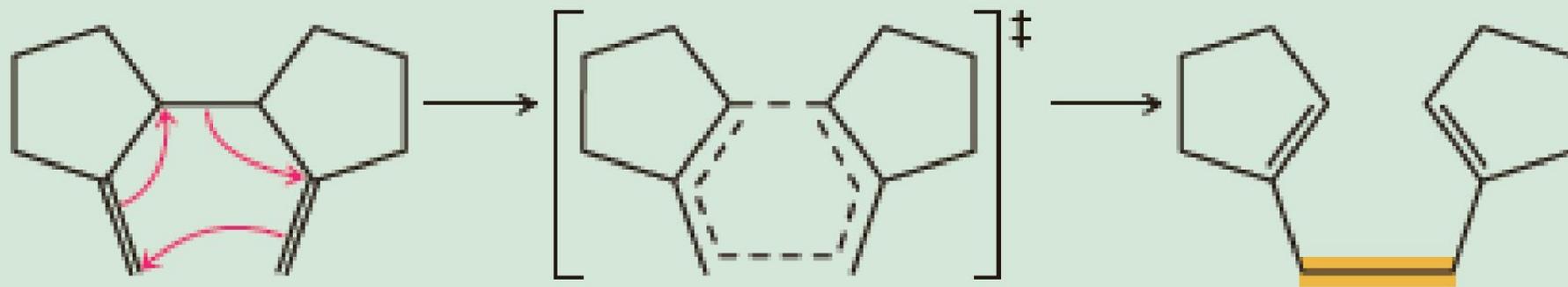
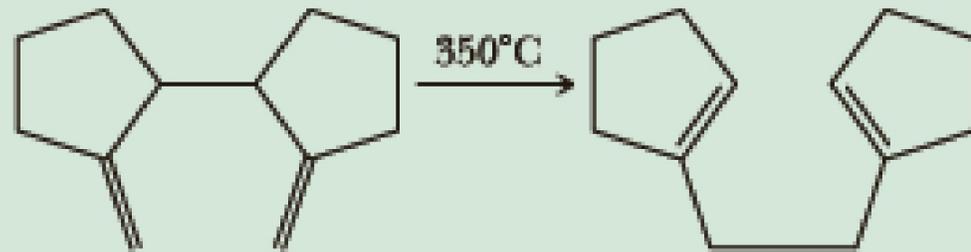




*trans*-2-Butenyl phenyl ether



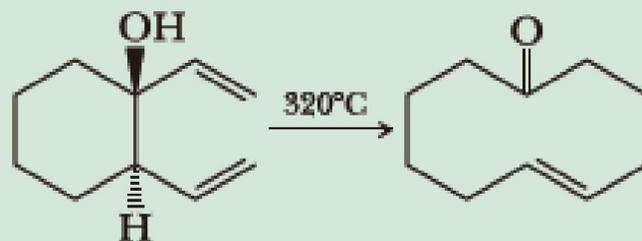




Transition state

### Problem 20.11

Propose a mechanism for the following Cope rearrangement.

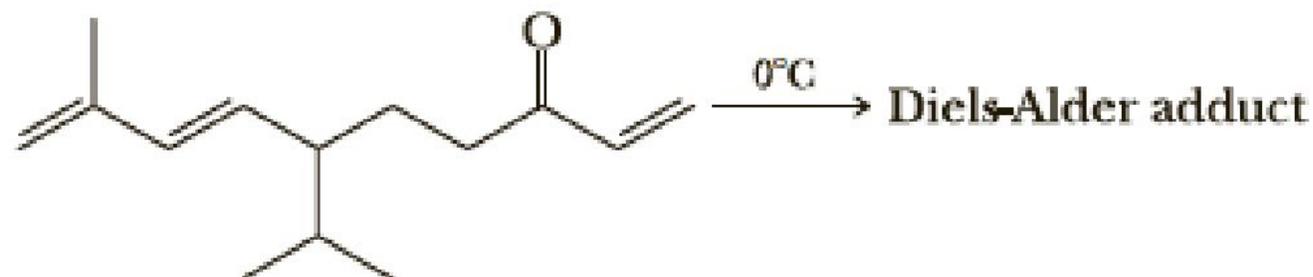




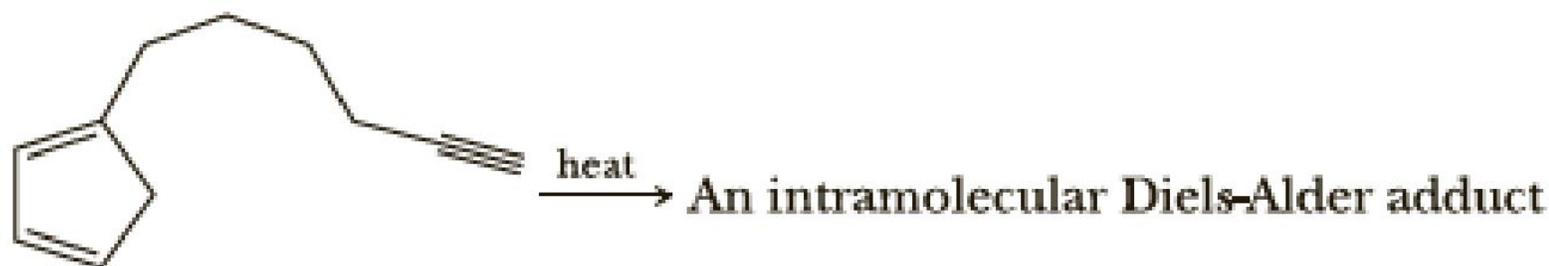
**20.34** The following triene undergoes an intramolecular Diels-Alder reaction to give the product shown. Show how the carbon skeleton of the triene must be coiled to give this product and show by curved arrows the redistribution of electron pairs that takes place to give the product.



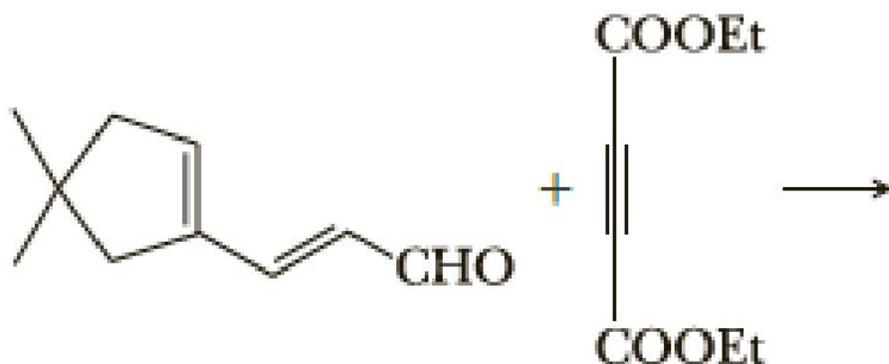
**20.35** The following triene undergoes an intramolecular Diels-Alder reaction to give a bicyclic product. Propose a structural formula for the product. Account for the observation that the Diels-Alder reaction given in this problem takes place under milder conditions (at lower temperature) than the analogous Diels-Alder reaction shown in Problem 20.34.

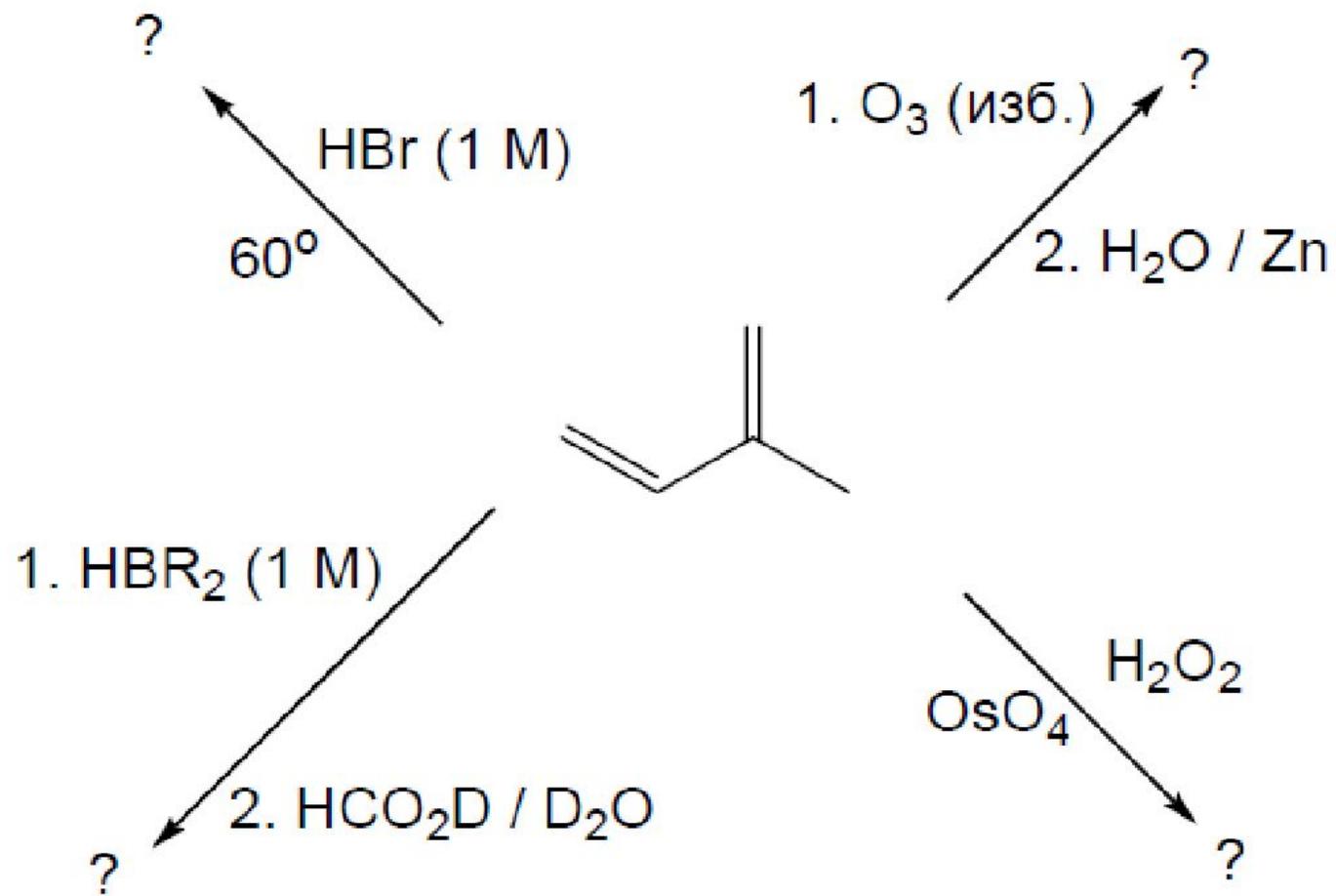


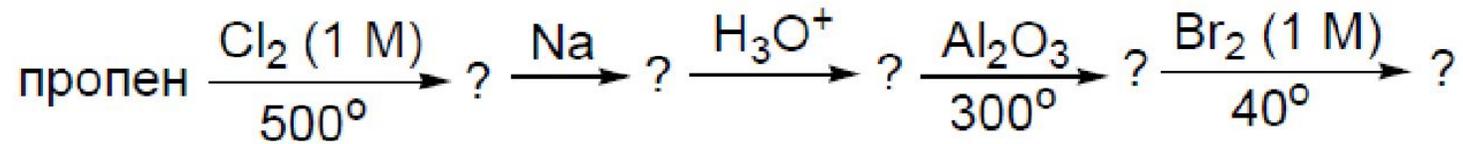
**20.36** The following compound undergoes an intramolecular Diels-Alder reaction to give a tricyclic product. Propose a structural formula for the product.



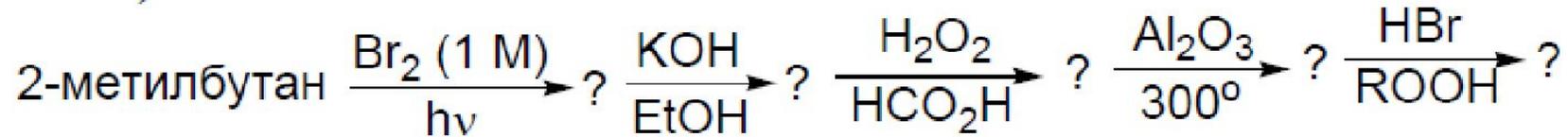
**20.37** Draw a structural formula for the product of this Diels-Alder reaction, including the stereochemistry of the product.



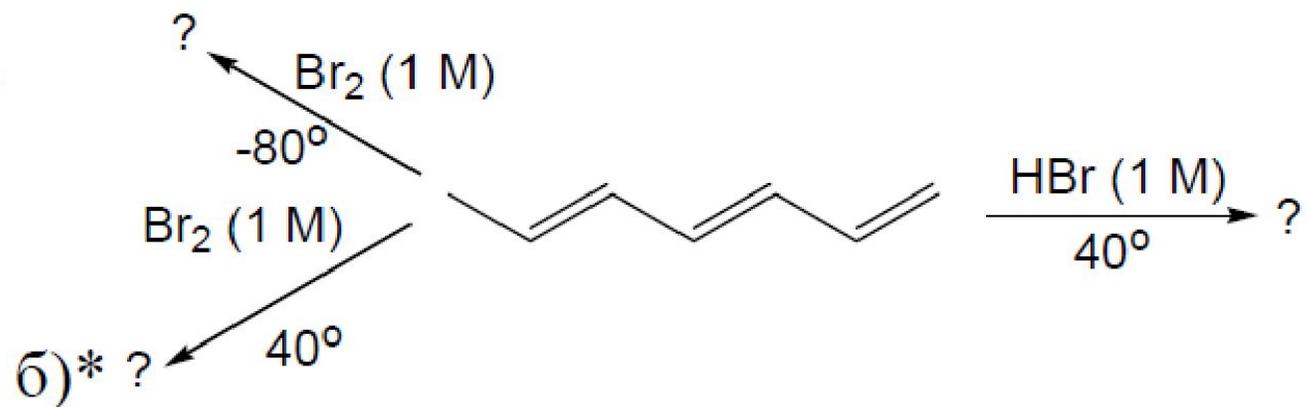
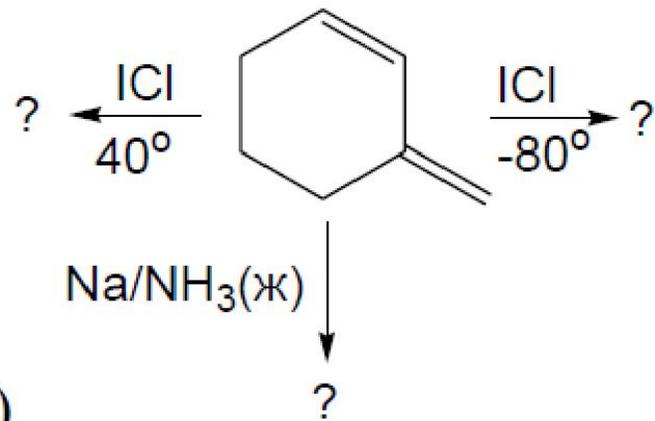
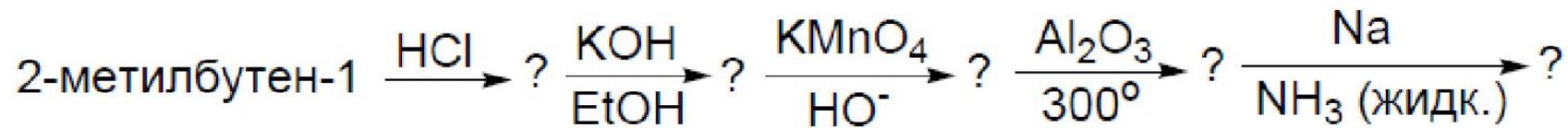




б)



в)



а)

б)\*