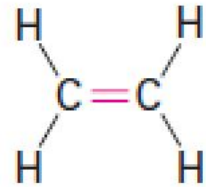
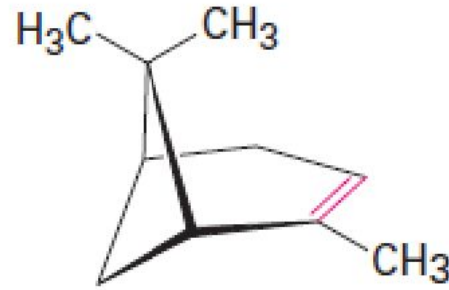


# **Алкены-1**

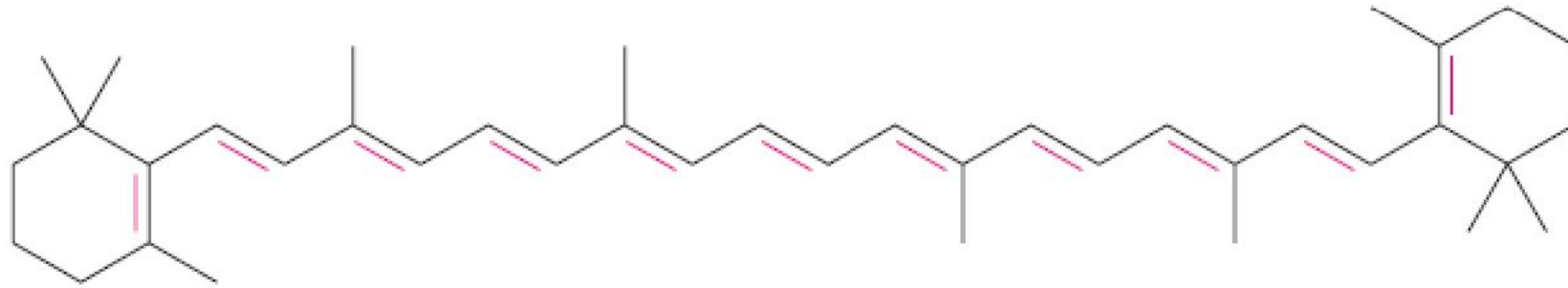
**(строение, изомерия,  
номенклатура)**



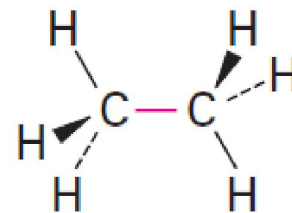
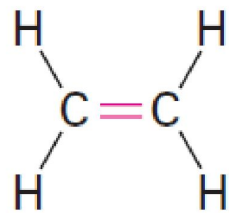
Ethylene

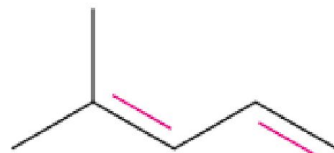
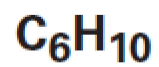
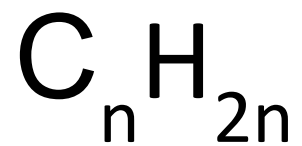


$\alpha$ -Pinene

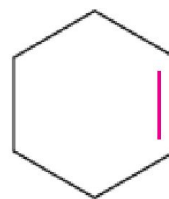


$\beta$ -Carotene  
(orange pigment and vitamin A precursor)

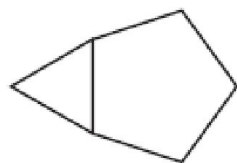




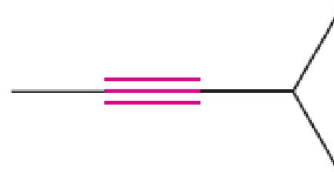
**4-Methyl-1,3-pentadiene**  
(two double bonds)



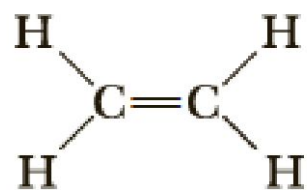
**Cyclohexene**  
(one ring, one double bond)



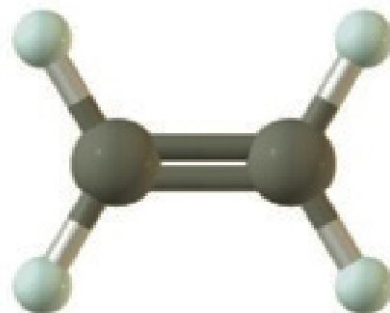
**Bicyclo[3.1.0]hexane**  
(two rings)



**4-Methyl-2-pentyne**  
(one triple bond)



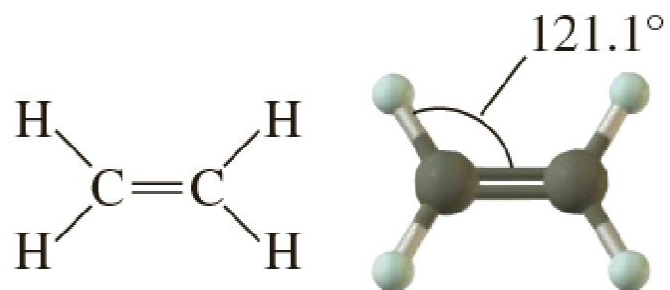
**Ethylene**  
(an alkene)



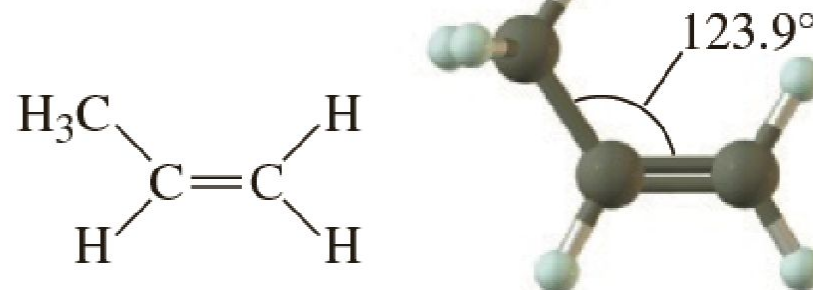
Side view



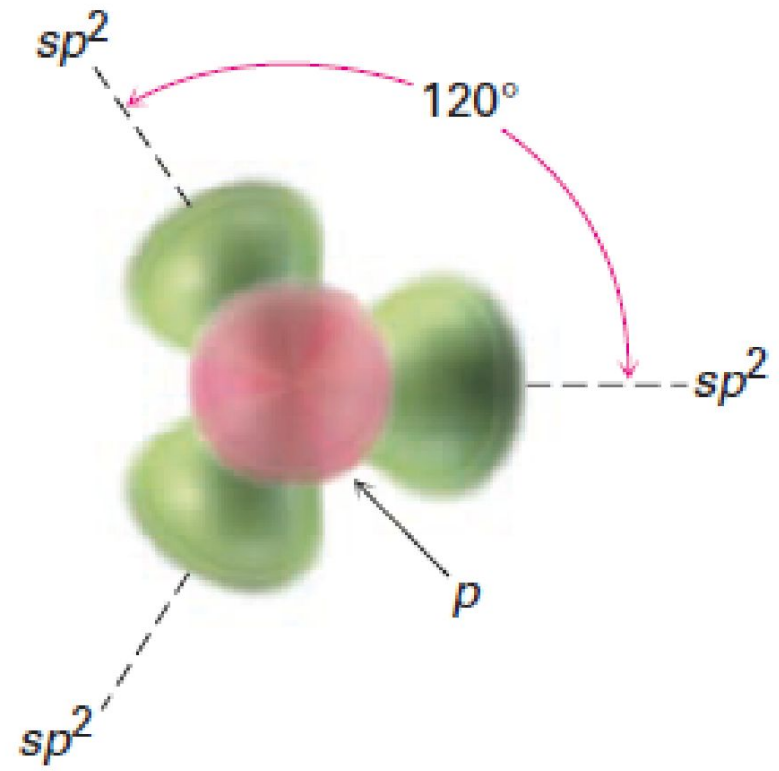
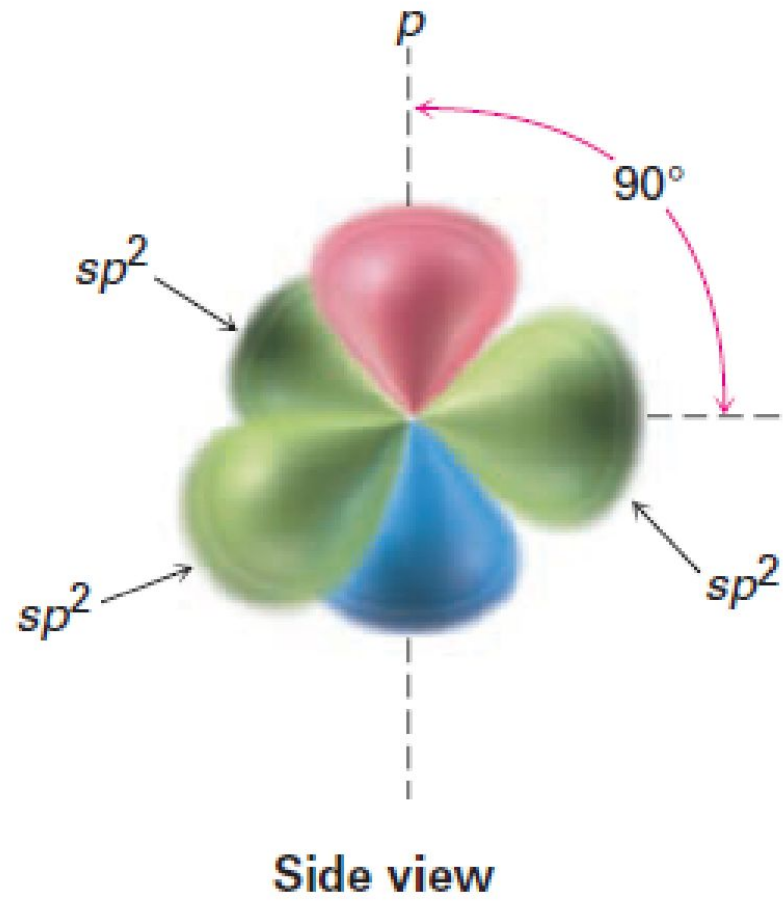
End view

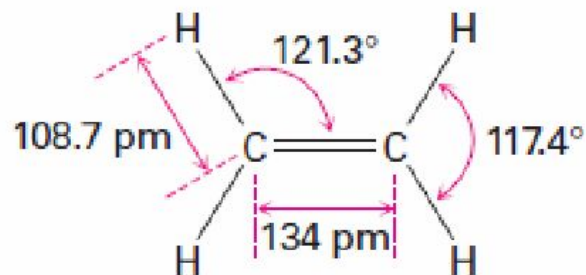
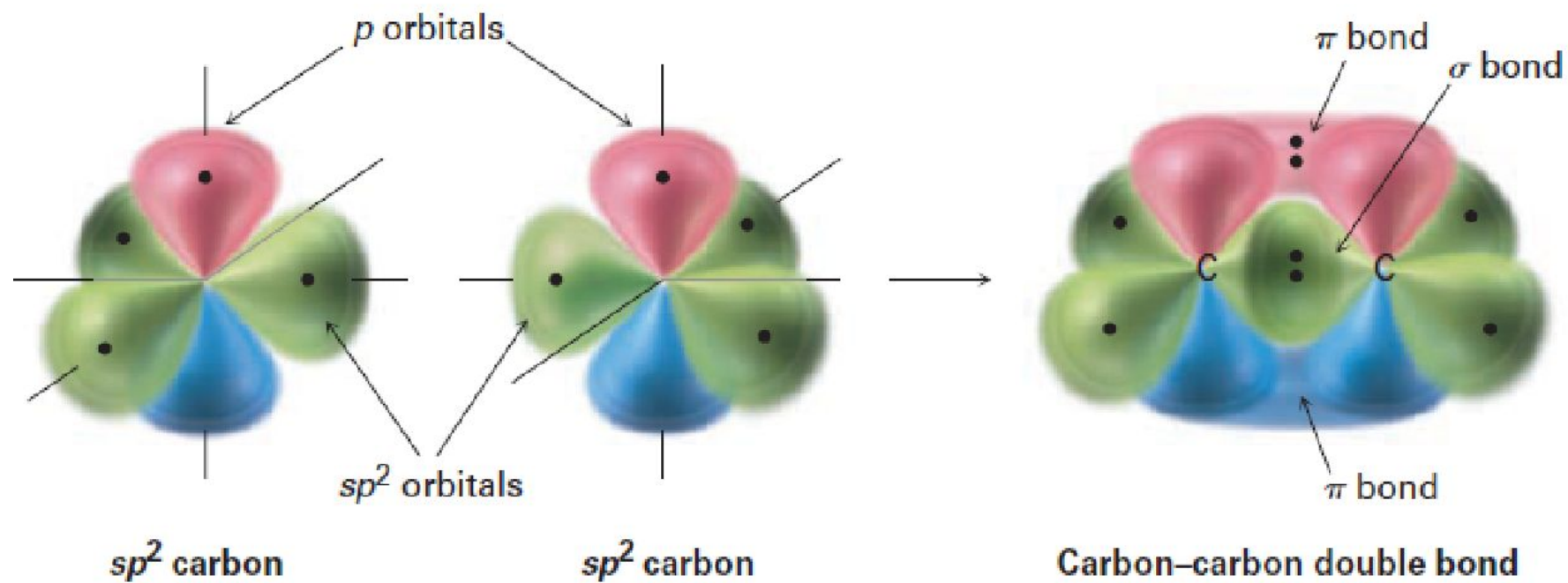


**Ethylene**

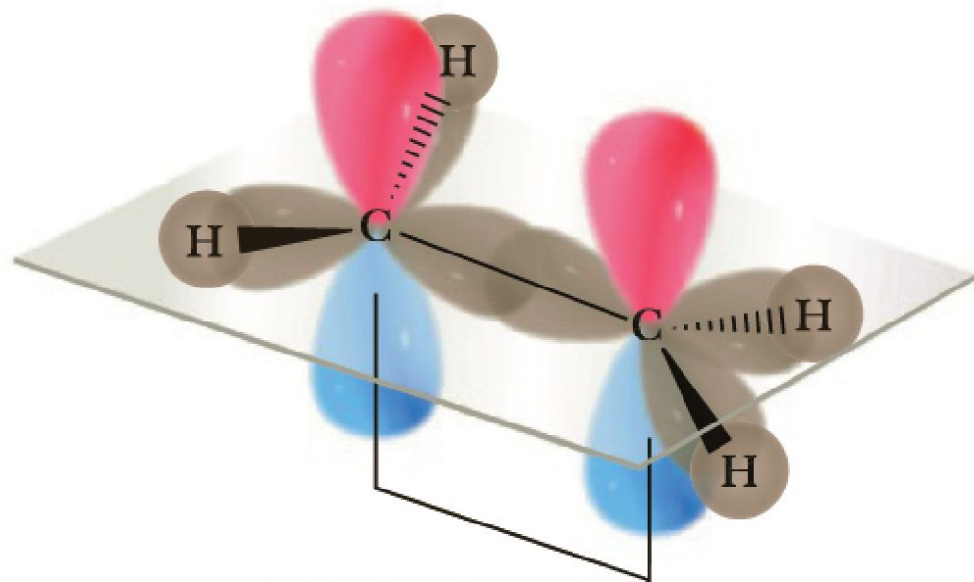


**Propene**





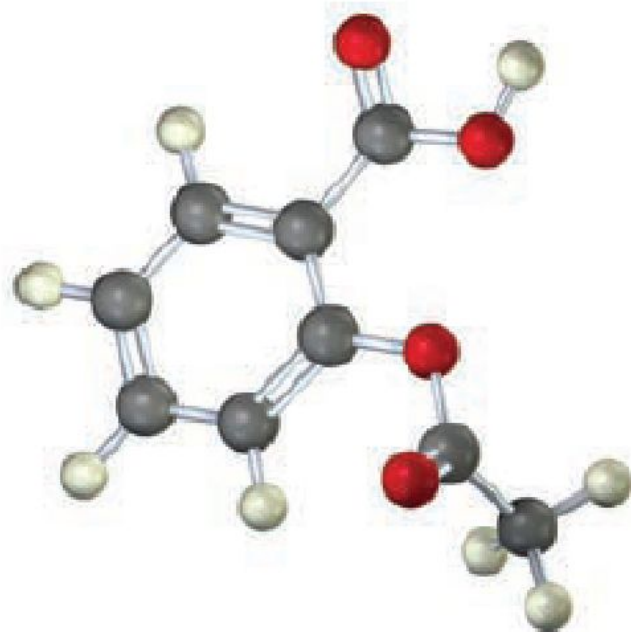
(a)



Orbitals aligned.  
Good overlap forms  
a  $\pi$  bond.

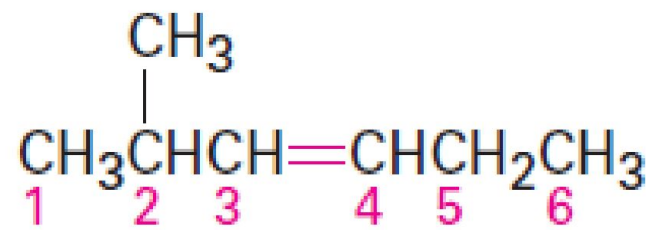
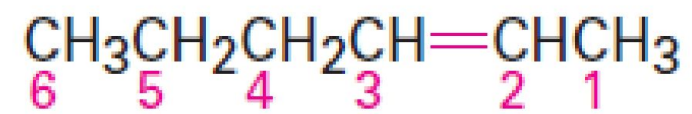
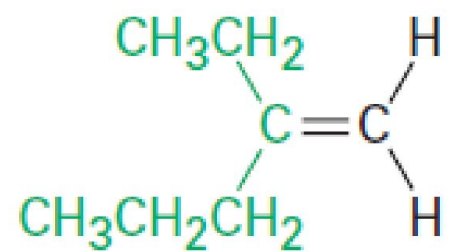
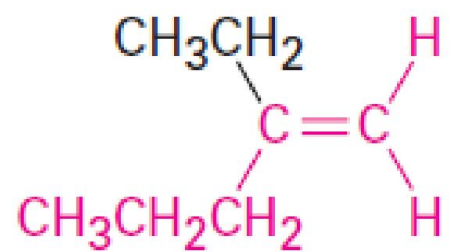
**Problem 1.12**

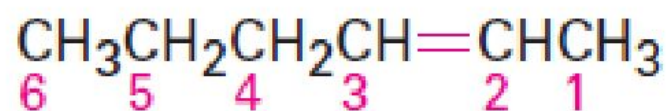
Following is a molecular model of aspirin (acetylsalicylic acid). Identify the hybridization of the orbitals on each carbon atom in aspirin, and tell which atoms have lone pairs of electrons (gray = C, red = O, ivory = H).



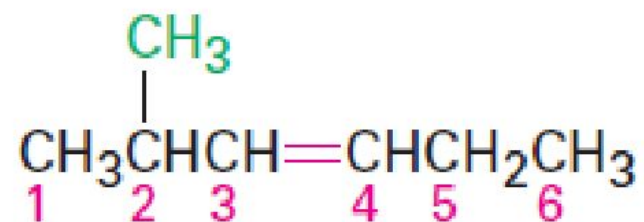
**Aspirin  
(acetylsalicylic acid)**



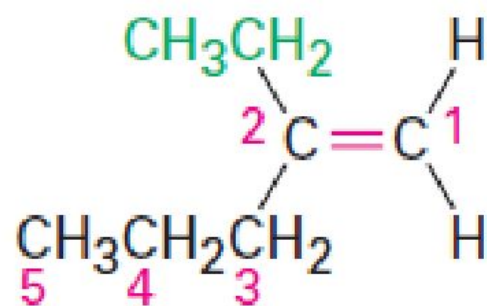




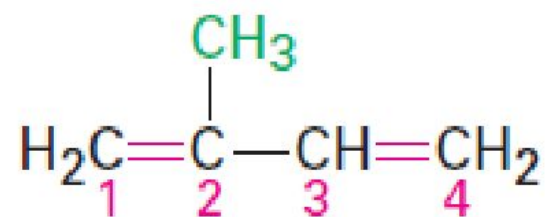
**2-Hexene**



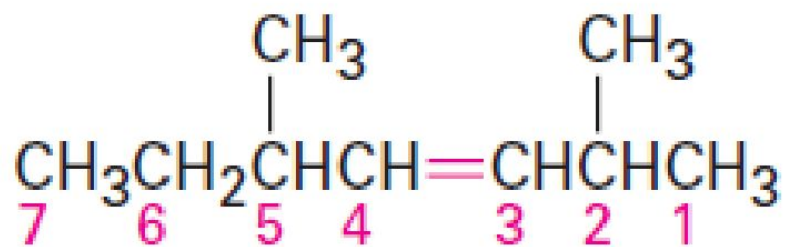
**2-Methyl-3-hexene**



**2-Ethyl-1-pentene**

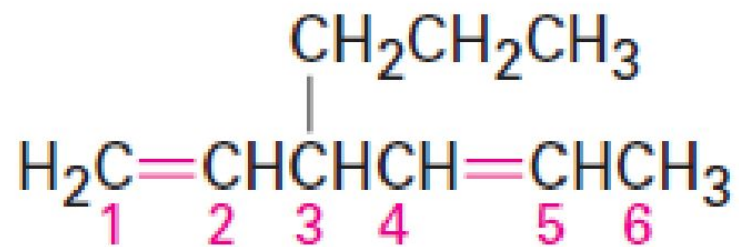


**2-Methyl-1,3-butadiene**



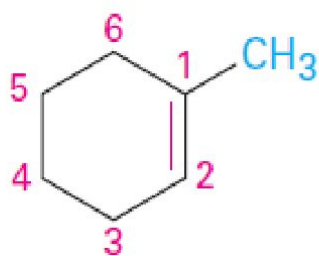
**2,5-Dimethyl-3-heptene**

**2,5-Dimethylhept-3-ene**

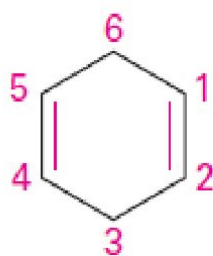


**3-Propyl-1,4-hexadiene**

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

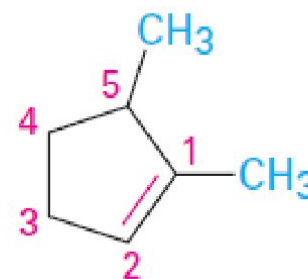


**1-Methylcyclohexene**



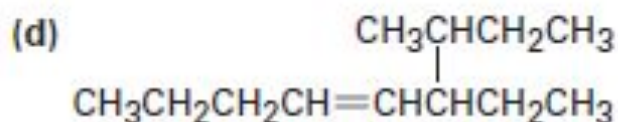
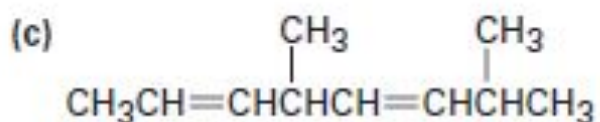
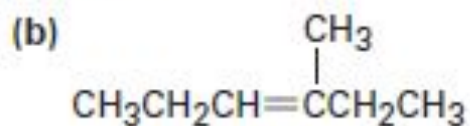
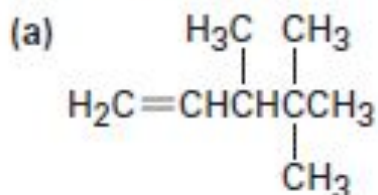
**1,4-Cyclohexadiene**

(New: Cyclohexa-1,4-diene)

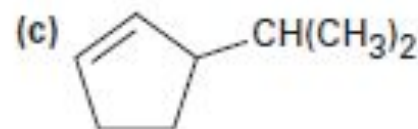
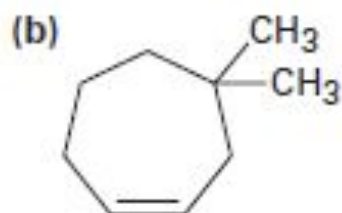
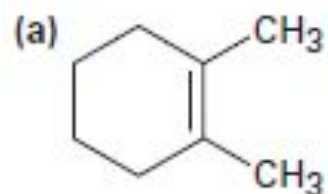


**1,5-Dimethylcyclopentene**

Give IUPAC names for the following compounds:



Name the following cycloalkenes:



Draw structures corresponding to the following IUPAC names:

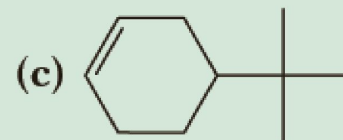
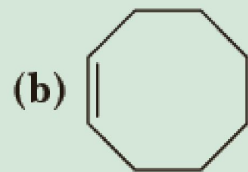
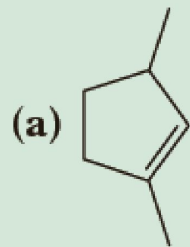
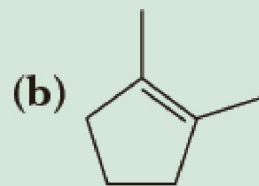
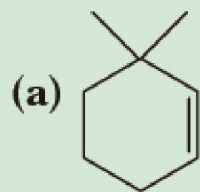
(a) 2-Methyl-1,5-hexadiene

(b) 3-Ethyl-2,2-dimethyl-3-heptene

(c) 2,3,3-Trimethyl-1,4,6-octatriene

(d) 3,4-Diisopropyl-2,5-dimethyl-3-hexene

Write the IUPAC name of each cycloalkene.

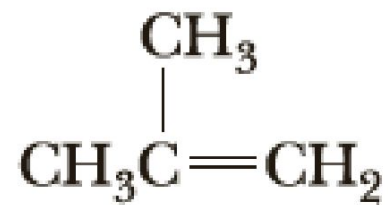




**Ethene**  
**Ethylene**



**Propene**  
**Propylene**



**2-Methylpropene**  
**Isobutylene**

### **Methylene**

---

A  $\text{CH}_2=$  group.

### **Vinyl**

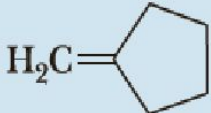
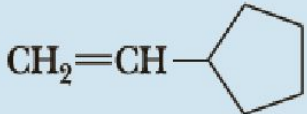
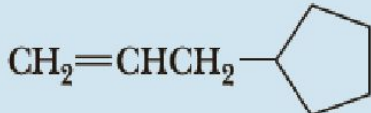
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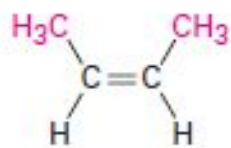
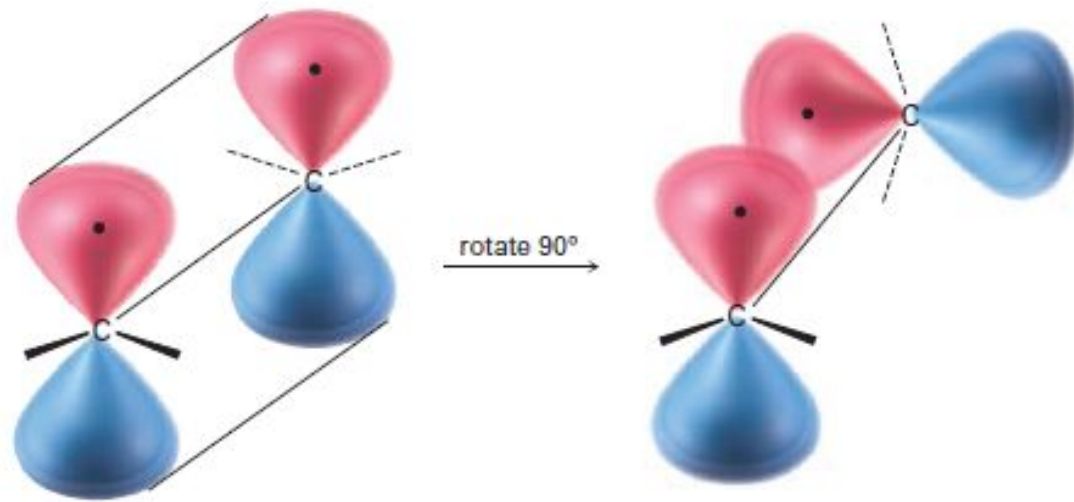
A  $\text{CH}_2=\text{CH}-$  group.

### **Allyl**

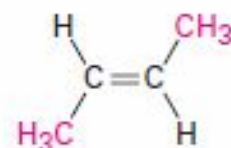
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A  $\text{CH}_2=\text{CHCH}_2-$  group.

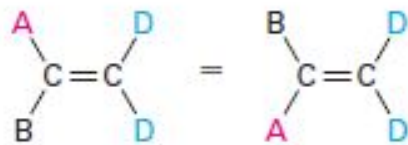
Alkenyl Group	IUPAC Name	Common Name	Example	IUPAC Name (Common Name)
$\text{CH}_2=$	Methyldene	Methylene	$\text{H}_2\text{C}=\text{C}_5\text{H}_9$ 	Methyldenecyclopentane (Methylenecyclopentane)
$\text{CH}_2=\text{CH}-$	Ethenyl	Vinyl	$\text{CH}_2=\text{CH}-\text{C}_5\text{H}_9$ 	Ethenylcyclopentane (Vinylcyclopentane)
$\text{CH}_2=\text{CHCH}_2-$	2-Propenyl	Allyl	$\text{CH}_2=\text{CHCH}_2-\text{C}_5\text{H}_9$ 	2-Propenylcyclopentane (Allylcyclopentane)



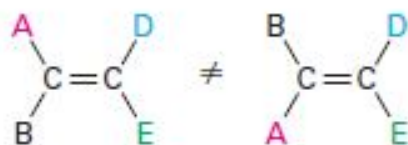
*cis*-2-Butene



*trans*-2-Butene

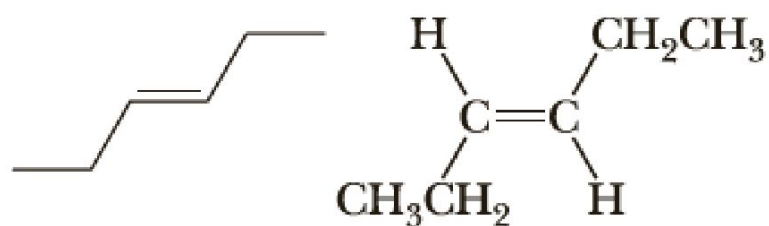


These two compounds are identical; they are not cis-trans isomers.

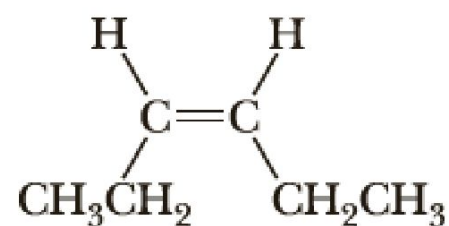


These two compounds are not identical; they are cis-trans isomers.



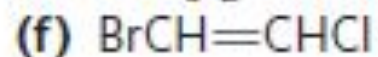
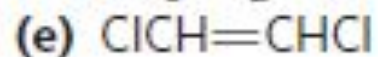
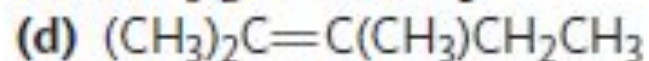
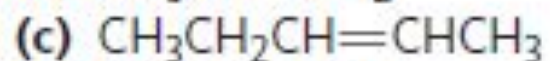
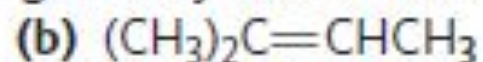
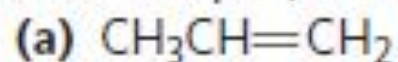


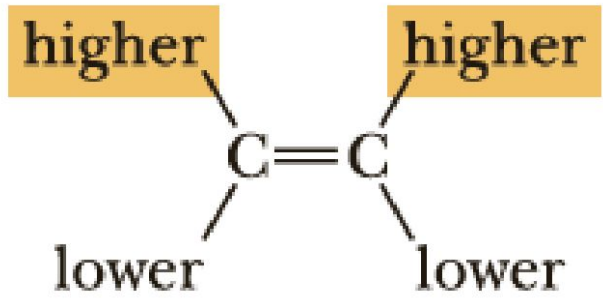
*trans*-3-Hexene



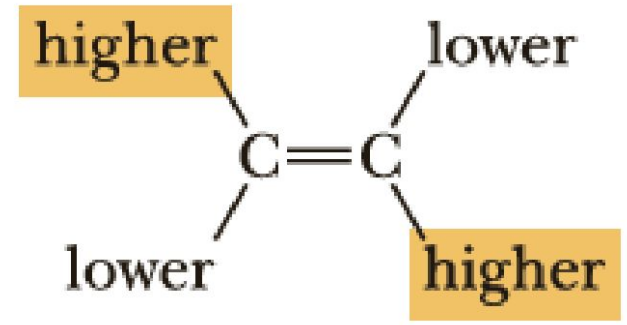
*cis*-3-Hexene

Which of the following compounds can exist as pairs of cis-trans isomers? Draw each cis-trans pair, and indicate the geometry of each isomer.

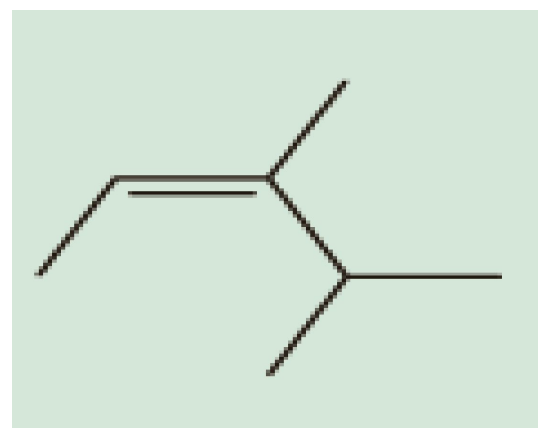
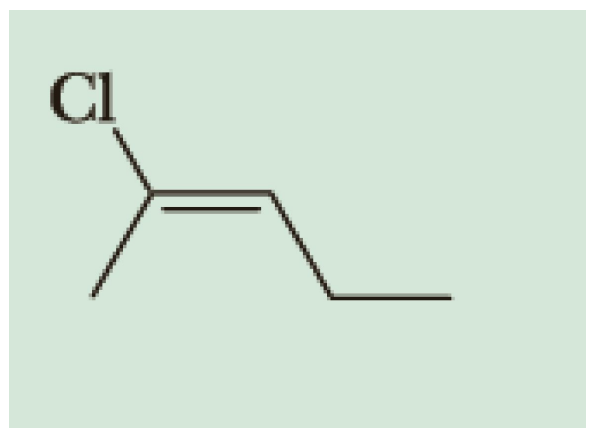




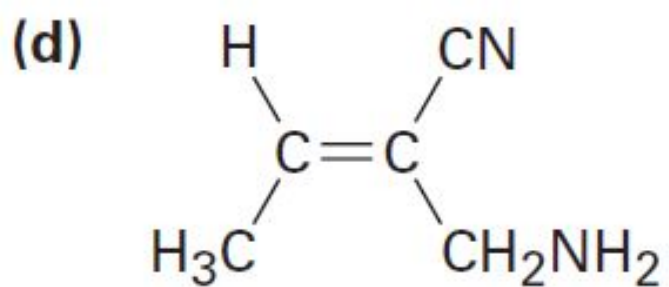
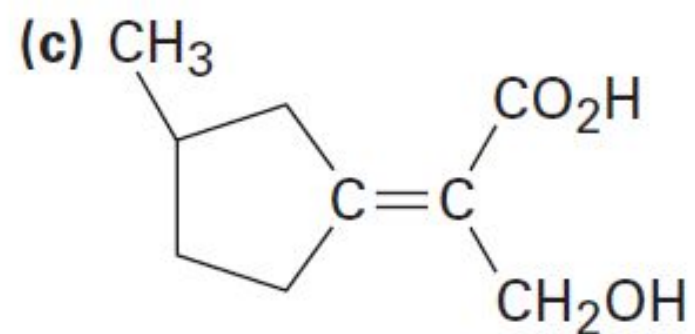
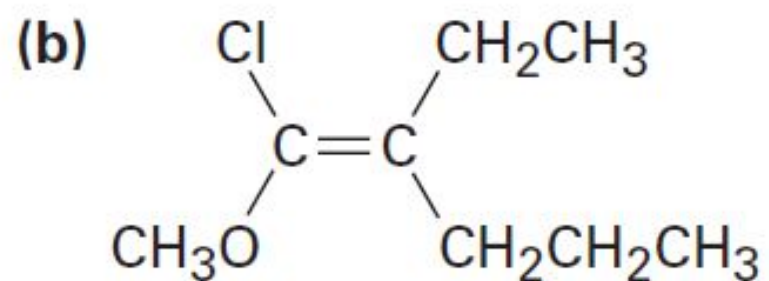
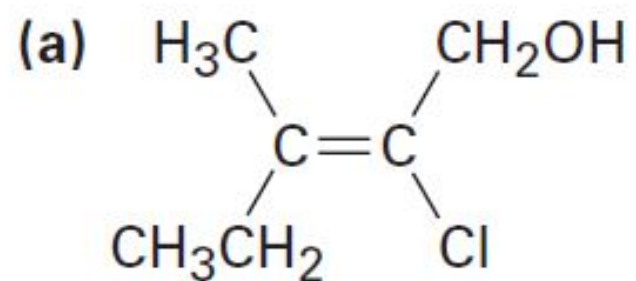
*Z (zusammen)*



*E (entgegen)*

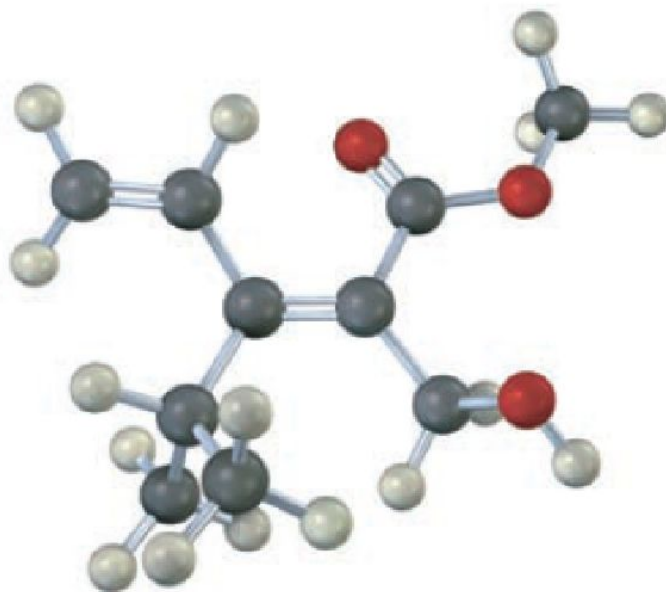


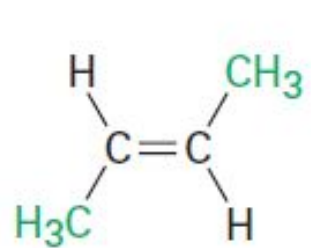
Assign *E* or *Z* configuration to the following alkenes:



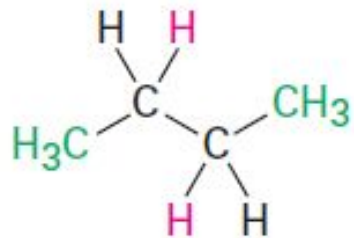
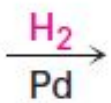
**Problem 7.14**

Assign stereochemistry (*E* or *Z*) to the double bond in the following compound, and convert the drawing into a skeletal structure (red = O):

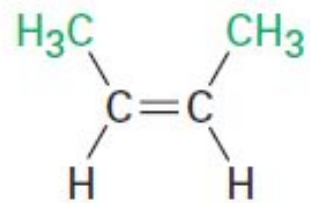
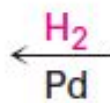




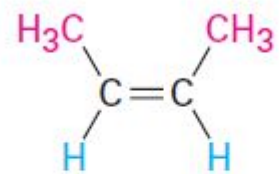
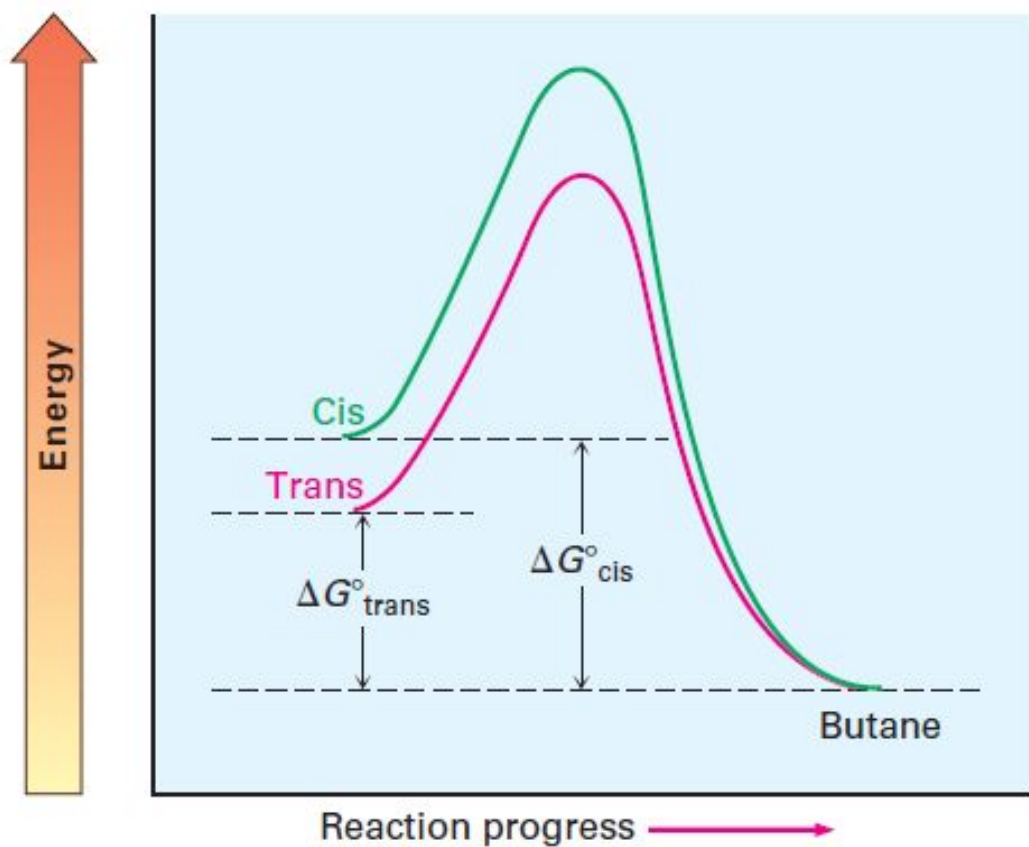
*trans*-2-Butene



Butane

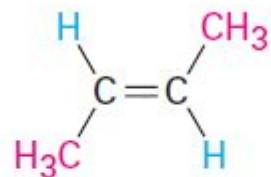


*cis*-2-Butene



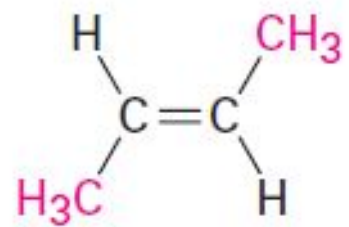
Cis isomer

$$\Delta H^\circ_{\text{hydrog}} = -120 \text{ kJ/mol}$$

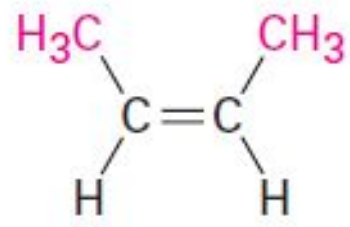
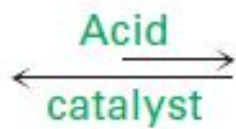


Trans isomer

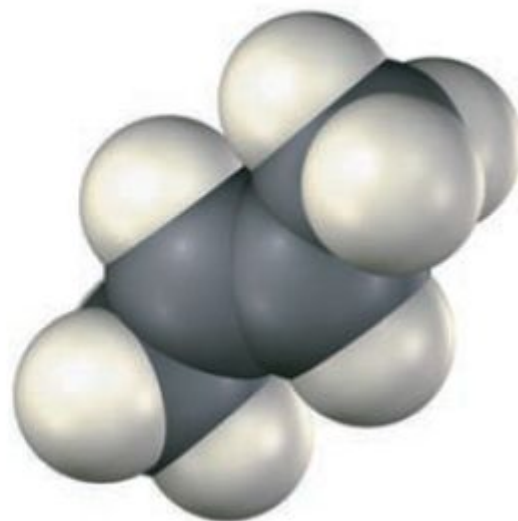
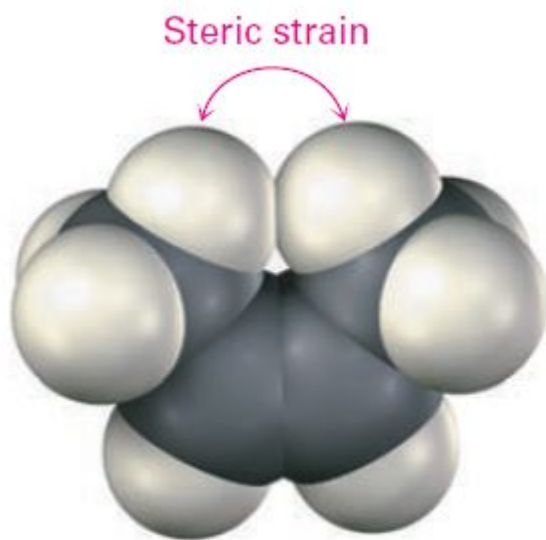
$$\Delta H^\circ_{\text{hydrog}} = -116 \text{ kJ/mol}$$



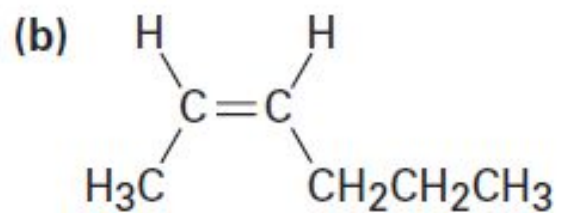
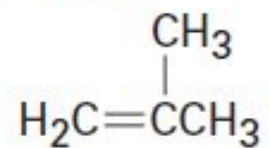
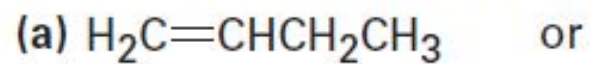
**Trans (76%)**



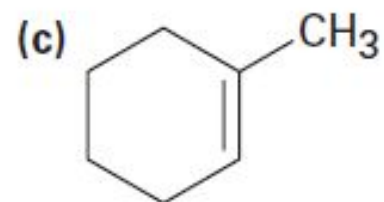
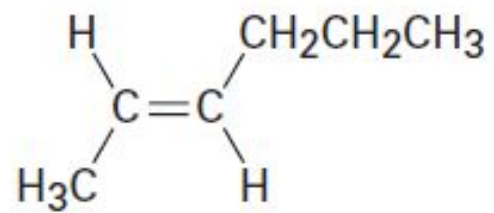
**Cis (24%)**



Name the following alkenes, and tell which compound in each pair is more stable:



or



or

