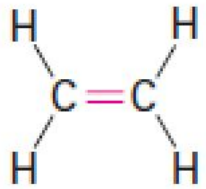
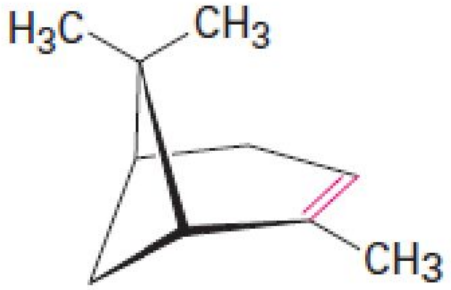
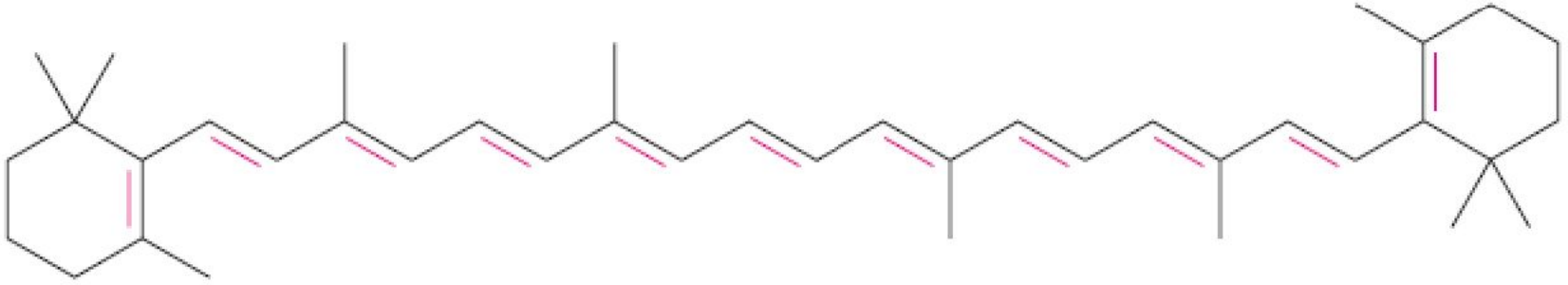
Алкены-1
(строение, изомерия, номенклатура)



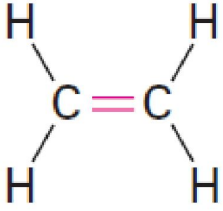
Ethylene

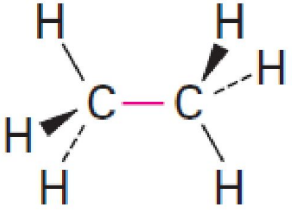


α-Pinene



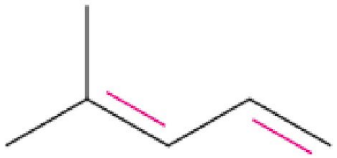
β-Carotene
(orange pigment and vitamin A precursor)



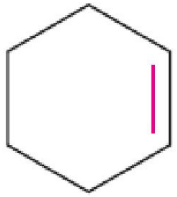


C_nH_{2n}

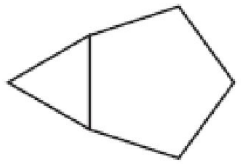
C_6H_{10}



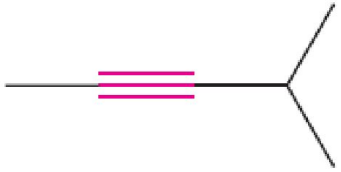
4-Methyl-1,3-pentadiene
(two double bonds)



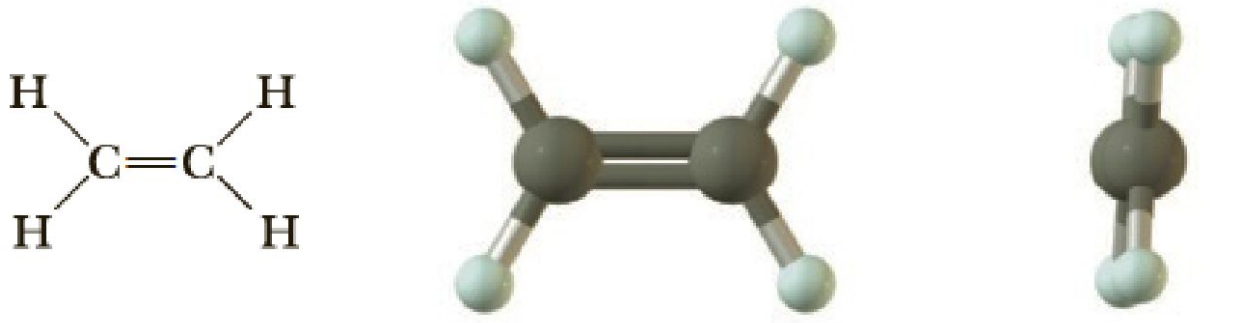
Cyclohexene
(one ring, one double bond)



Bicyclo[3.1.0]hexane
(two rings)



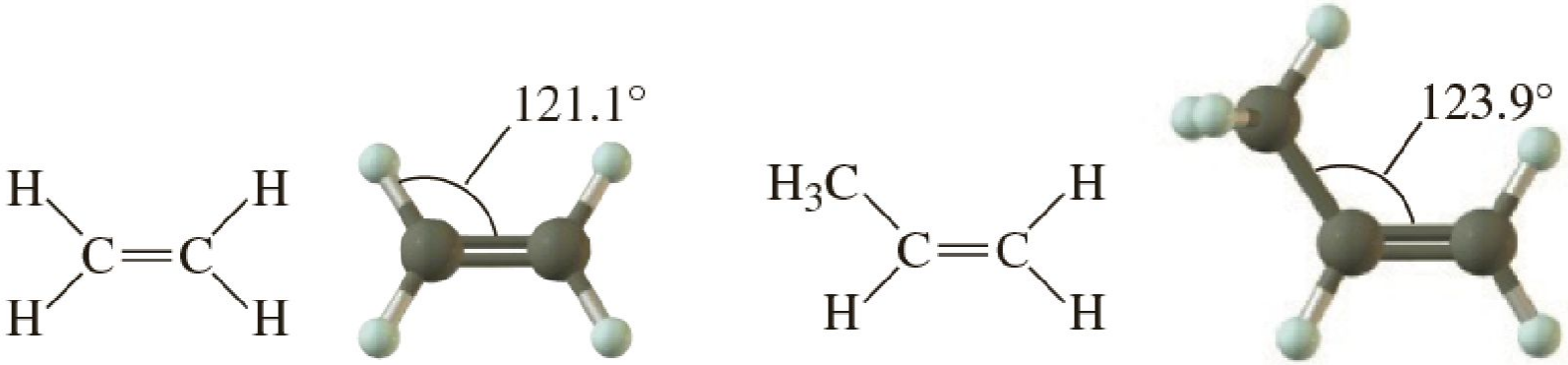
4-Methyl-2-pentyne
(one triple bond)



Ethylene
(an alkene)

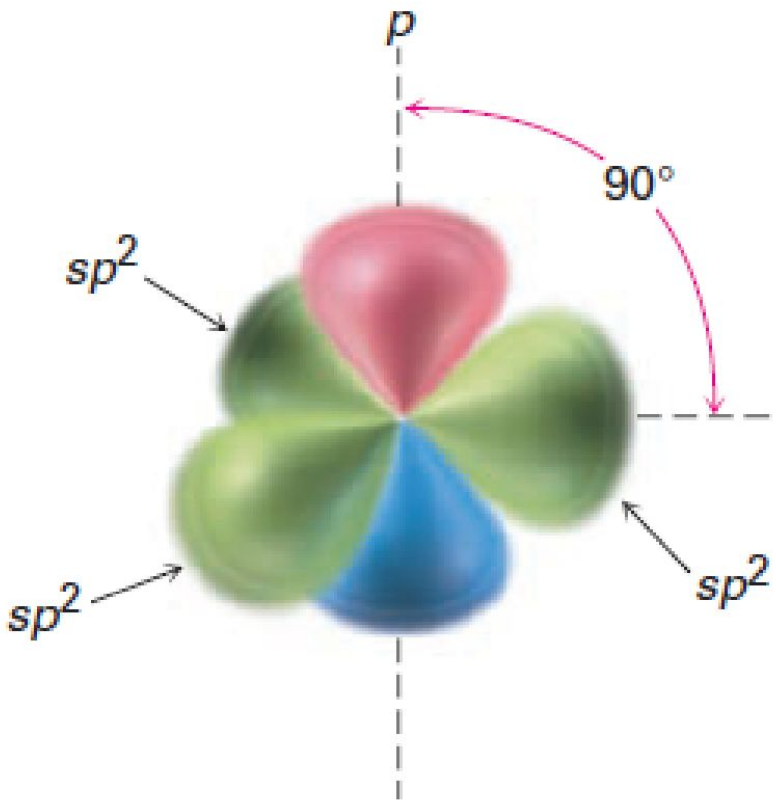
Side view

End view

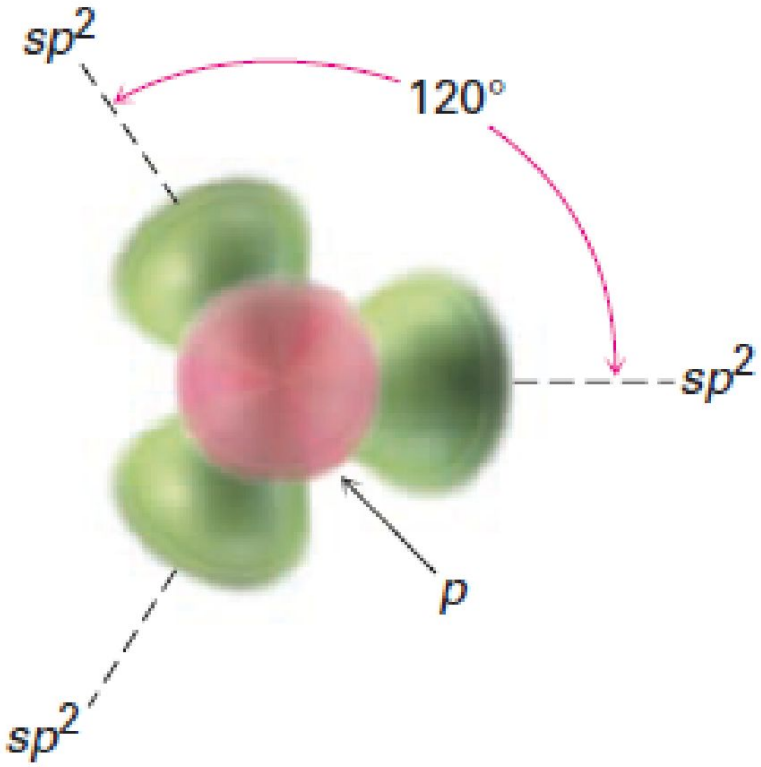


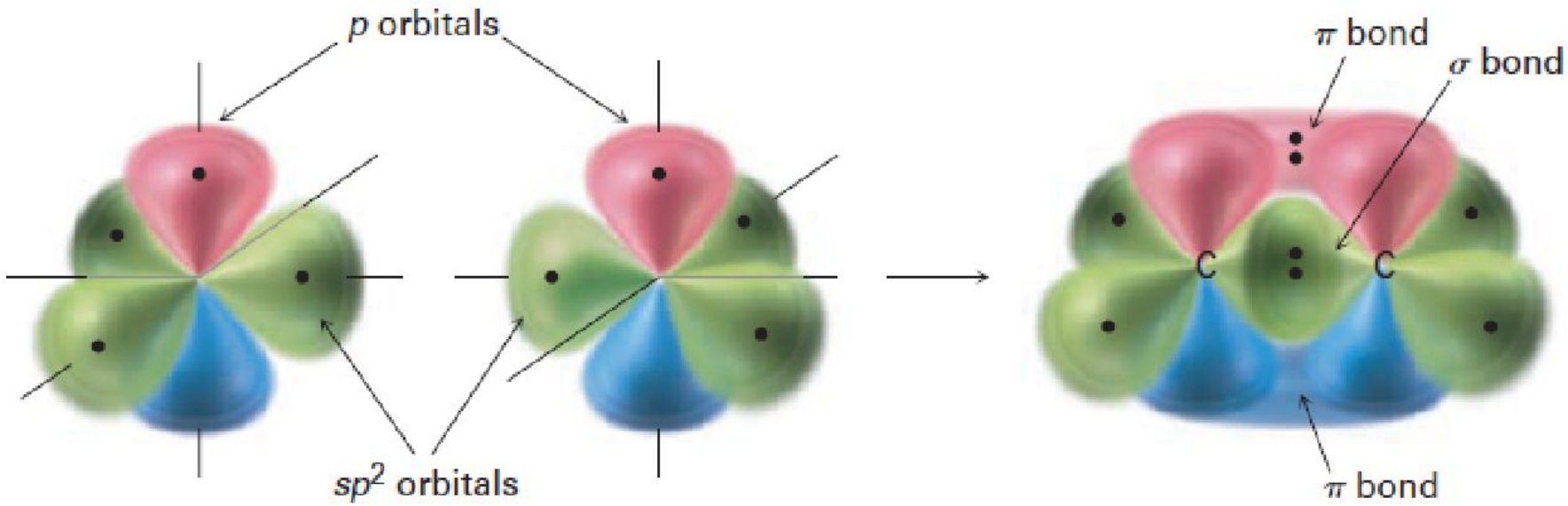
Ethylene

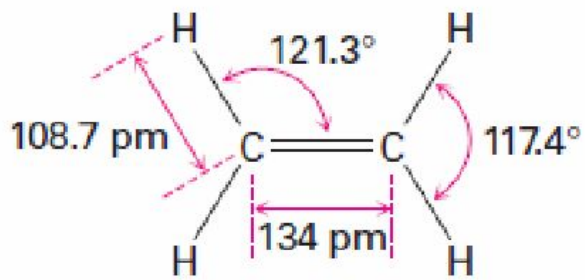
Propene



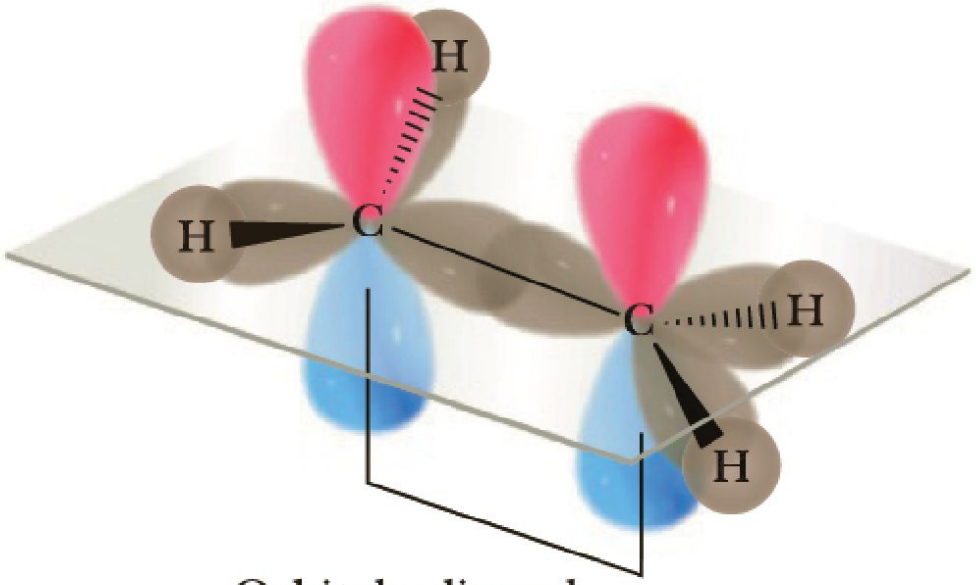
Side view




p orbitals
sp2 orbitals
π bond
σ bond
C
C
π bond
sp2 carbon
sp2 carbon
Carbon–carbon double bond


H
121.3°
H
108.7 pm
C
C
117.4°
134 pm
H
H

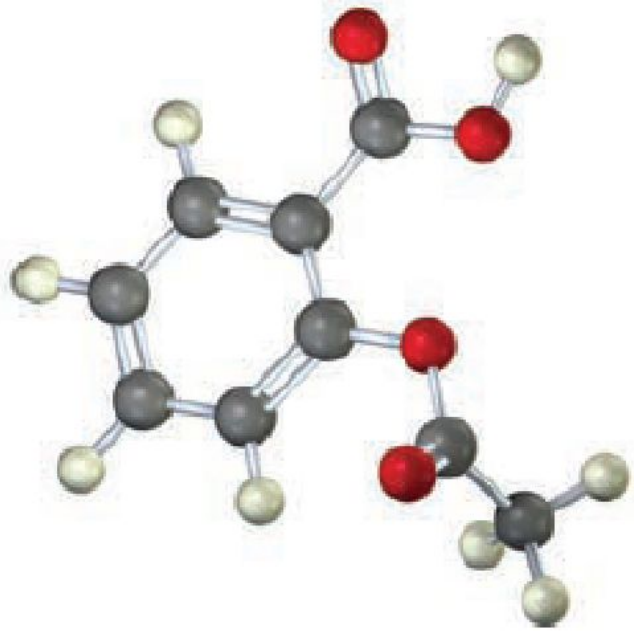
(a)



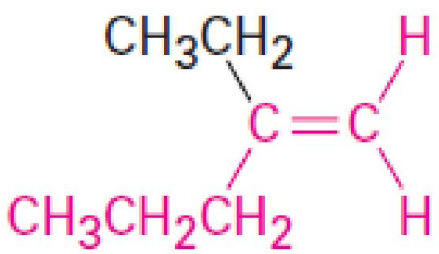
Orbitals aligned.
Good overlap forms
a π bond.

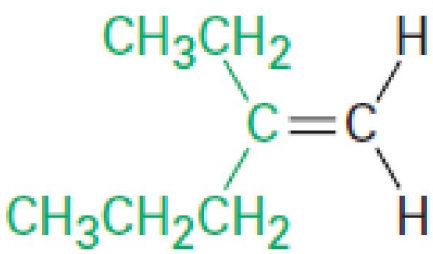
Problem 1.12

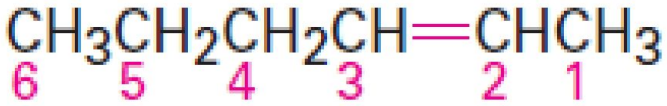
Following is a molecular model of aspirin (acetylsalicylic acid). Identify the hybridization of the orbitals on each carbon atom in aspirin, and tell which atoms have lone pairs of electrons (gray = C, red = O, ivory = H).

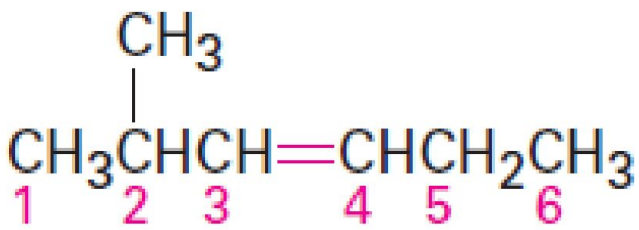


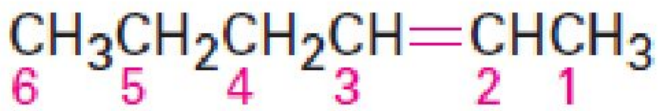
Aspirin
(acetylsalicylic acid)



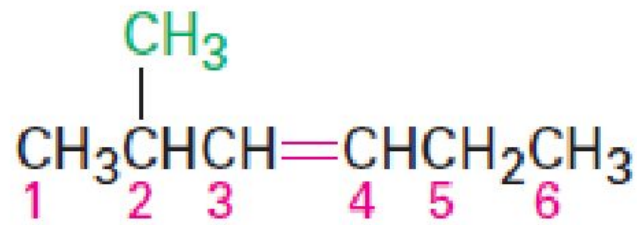




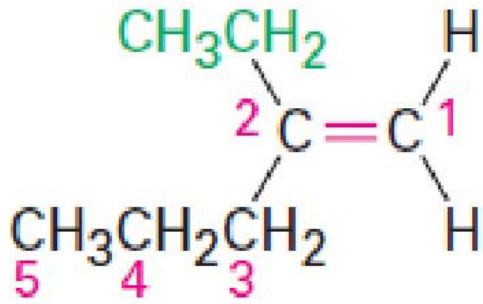




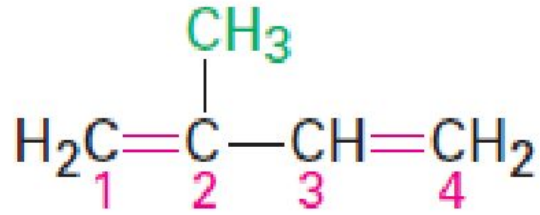
2-Hexene



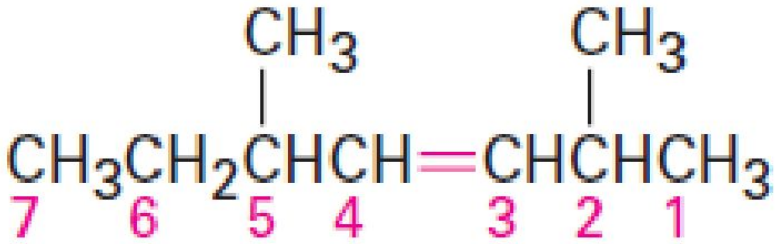
2-Methyl-3-hexene



2-Ethyl-1-pentene

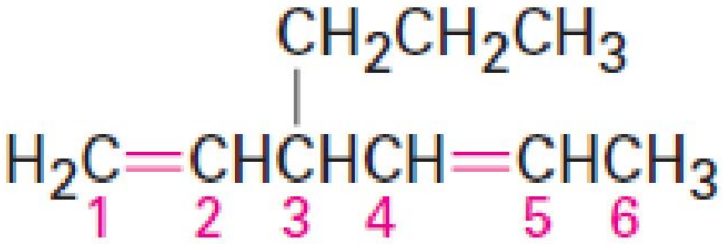


2-Methyl-1,3-butadiene



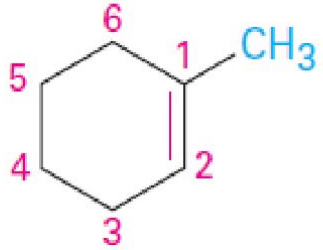
2,5-Dimethyl-3-heptene

2,5-Dimethylhept-3-ene

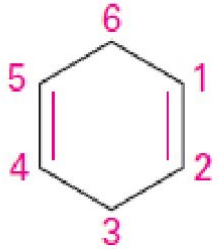


3-Propyl-1,4-hexadiene

3-Propylhexa-1,4-diene)

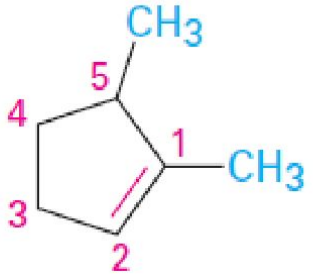


1-Methylcyclohexene



1,4-Cyclohexadiene

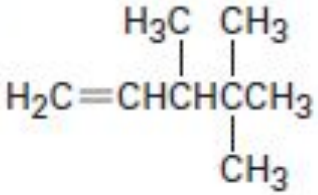
(New: Cyclohexa-1,4-diene)



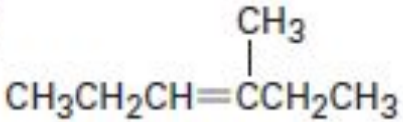
1,5-Dimethylcyclopentene

Give IUPAC names for the following compounds:

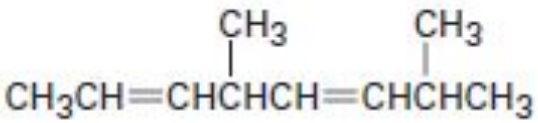
(a)



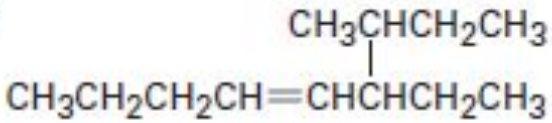
(b)



(c)

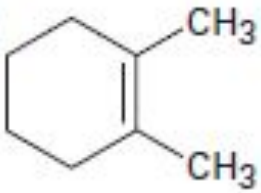


(d)

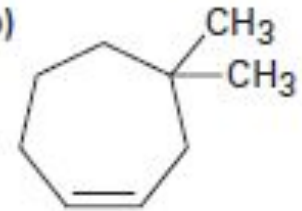


Name the following cycloalkenes:

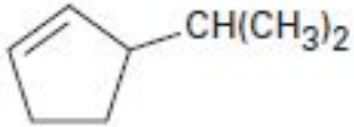
(a)



(b)



(c)



Draw structures corresponding to the following IUPAC names:

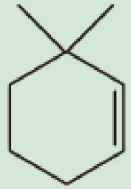
(a) 2-Methyl-1,5-hexadiene

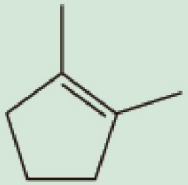
(b) 3-Ethyl-2,2-dimethyl-3-heptene

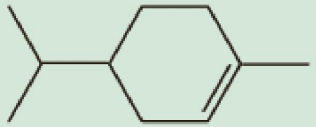
(c) 2,3,3-Trimethyl-1,4,6-octatriene

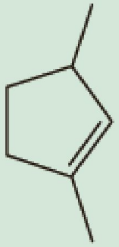
(d) 3,4-Diisopropyl-2,5-dimethyl-3-hexene

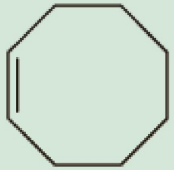
Write the IUPAC name of each cycloalkene.

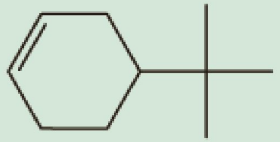
(a) 

(b) 

(c) 

(a) 

(b) 

(c) 

$CH_2{=}CH_2$	$CH_3CH{=}CH_2$	$CH_3C(CH_3){=}CH_2$
Ethene **Ethylene**	**Propene** **Propylene**	**2-Methylpropene** **Isobutylene**

Methylene

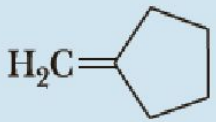
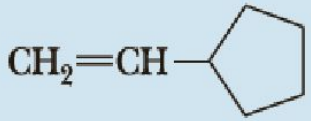
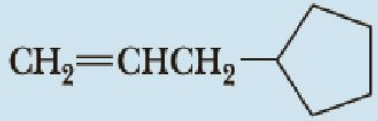
A $CH_2{=}$ group.

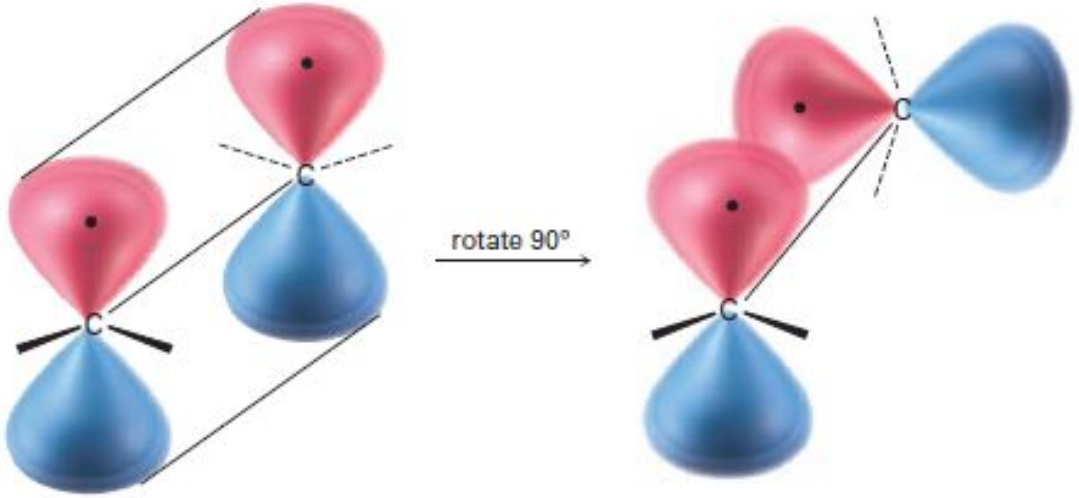
Vinyl

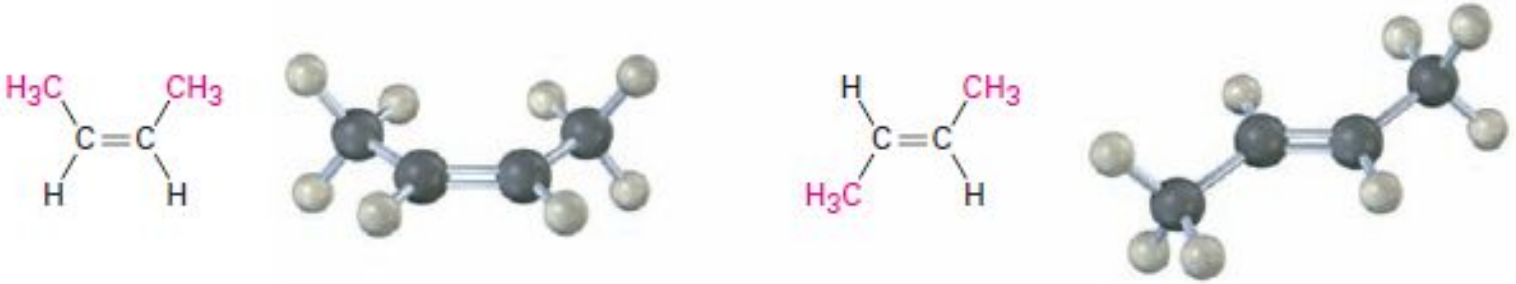
A $CH_2{=}CH{-}$ group.

Allyl

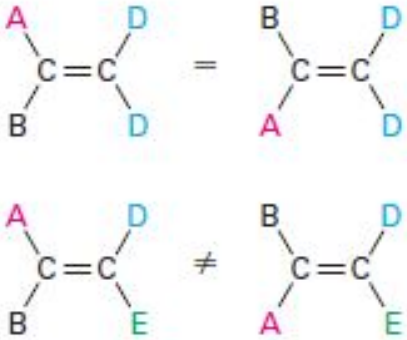
A $CH_2{=}CHCH_2{-}$ group.

Alkenyl Group	IUPAC Name	Common Name	Example	IUPAC Name (Common Name)
$CH_2{=}$	Methylidene	Methylene		Methylidenecyclopentane (Methylenecyclopentane)
$CH_2{=}CH{-}$	Ethenyl	Vinyl		Ethenylcyclopentane (Vinylcyclopentane)
$CH_2{=}CHCH_2{-}$	2-Propenyl	Allyl		2-Propenylcyclopentane (Allylcyclopentane)



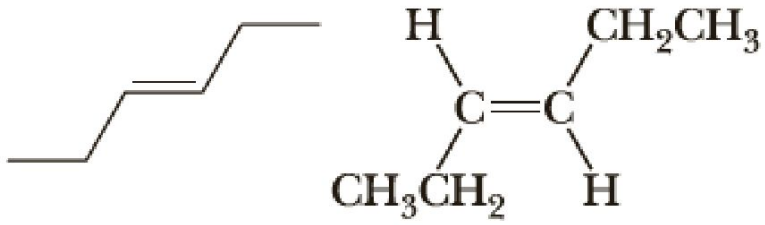


***cis*-2-Butene** ***trans*-2-Butene**

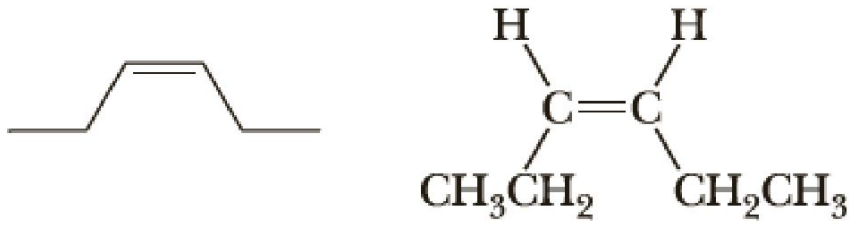


These two compounds are identical; they are not cis–trans isomers.

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



***trans*-3-Hexene**



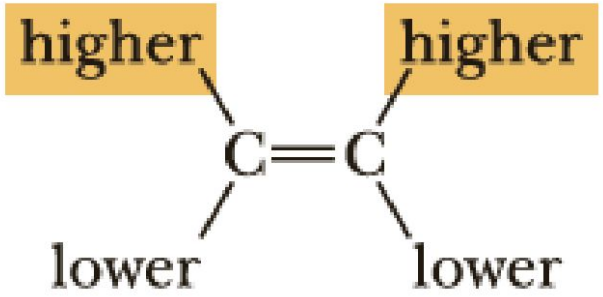
***cis*-3-Hexene**

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.

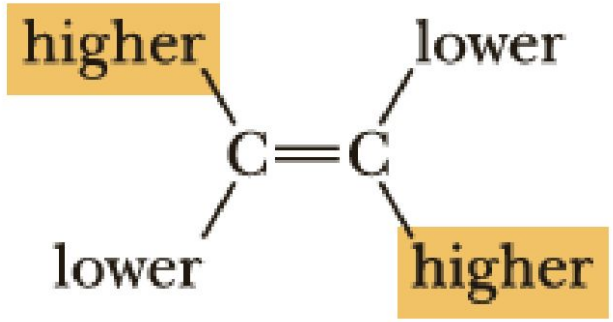
(a) $CH_3CH{=}CH_2$ **(b)** $(CH_3)_2C{=}CHCH_3$

(c) $CH_3CH_2CH{=}CHCH_3$ **(d)** $(CH_3)_2C{=}C(CH_3)CH_2CH_3$

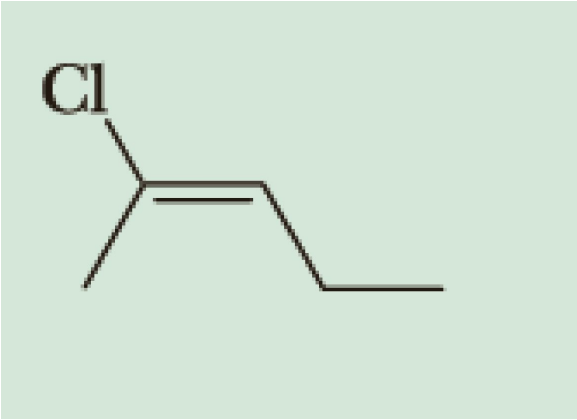
(e) $ClCH{=}CHCl$ **(f)** $BrCH{=}CHCl$

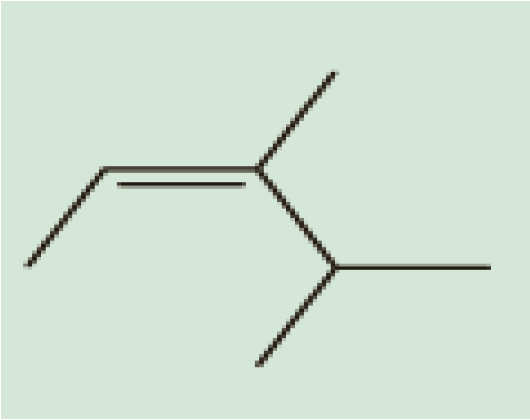


Z (*zusammen*)



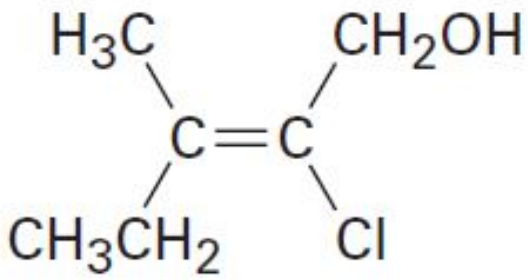
E (*entgegen*)



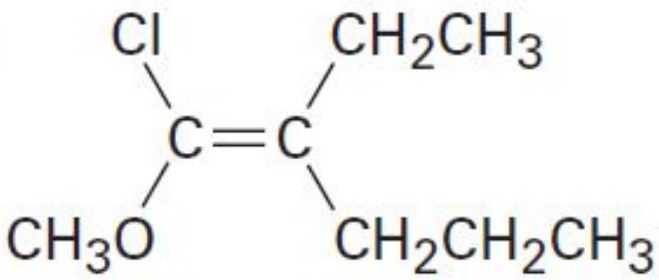


Assign *E* or *Z* configuration to the following alkenes:

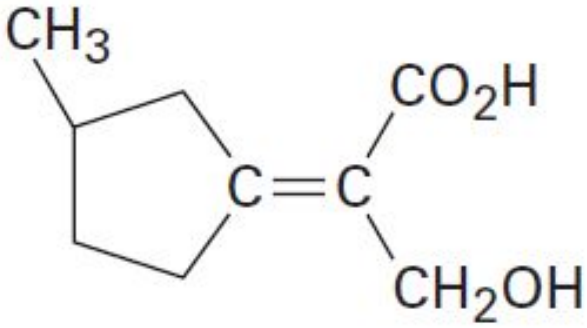
(a)



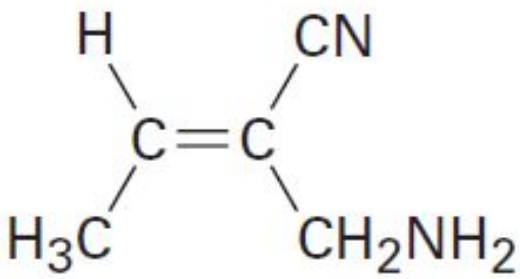
(b)



(c)

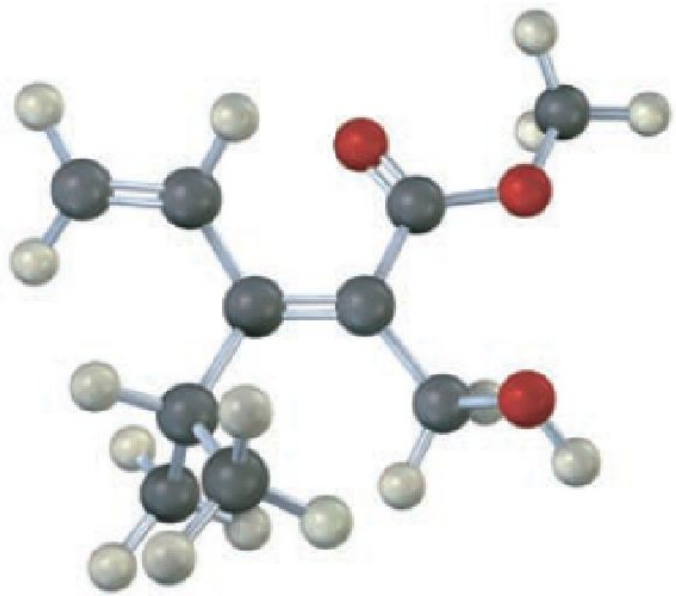


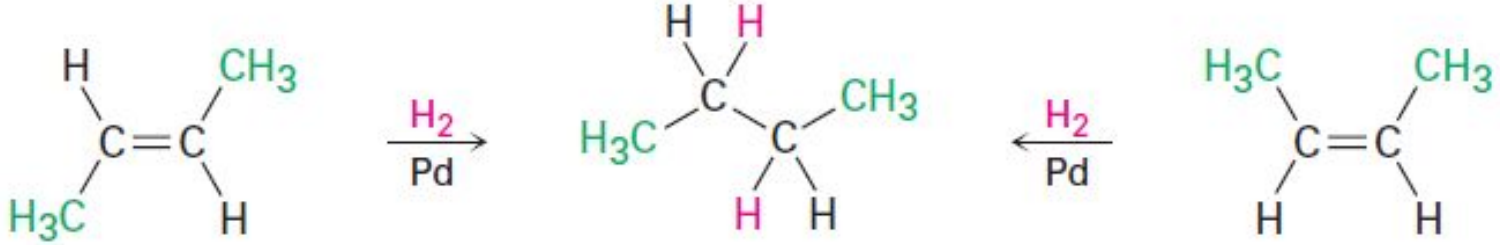
(d)



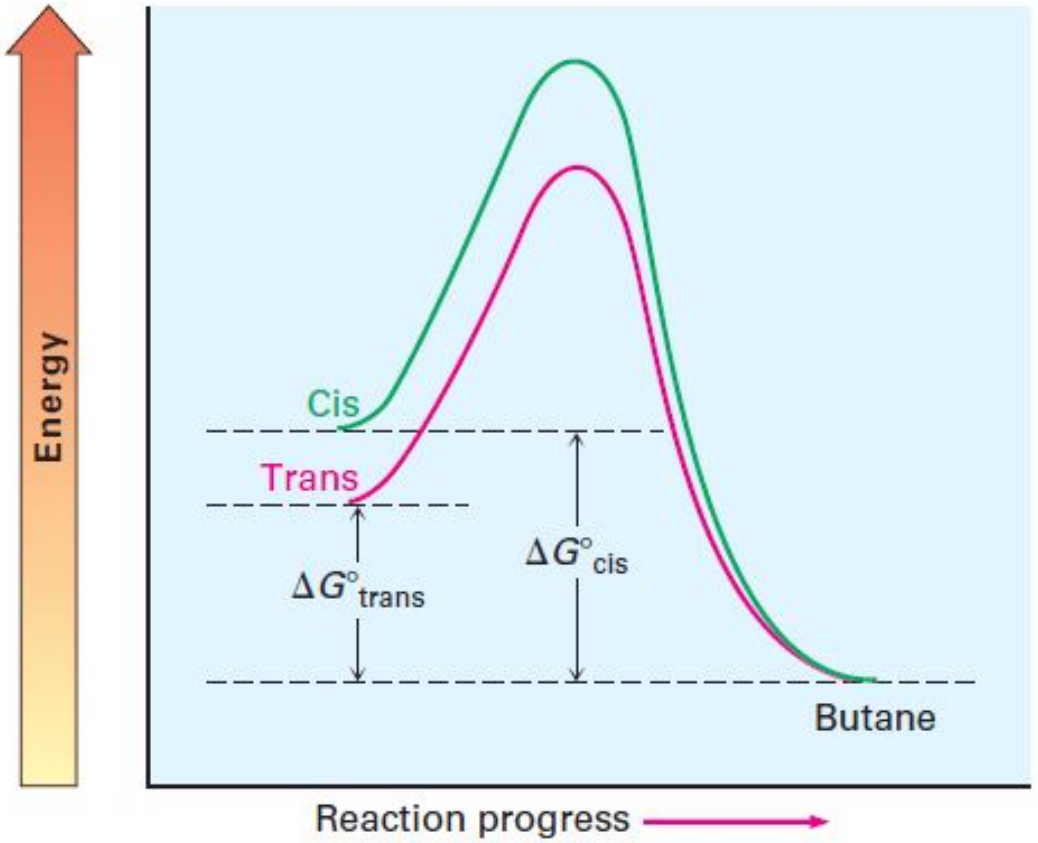
Problem 7.14

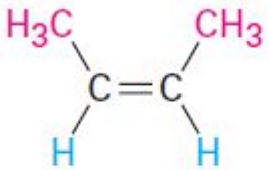
Assign stereochemistry (*E* or *Z*) to the double bond in the following compound, and convert the drawing into a skeletal structure (red = O):



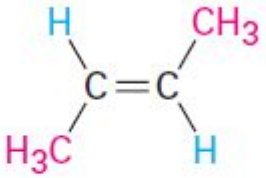


***trans*-2-Butene** **Butane** ***cis*-2-Butene**

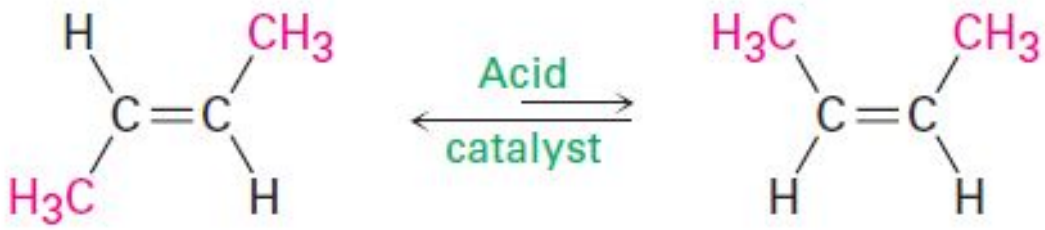




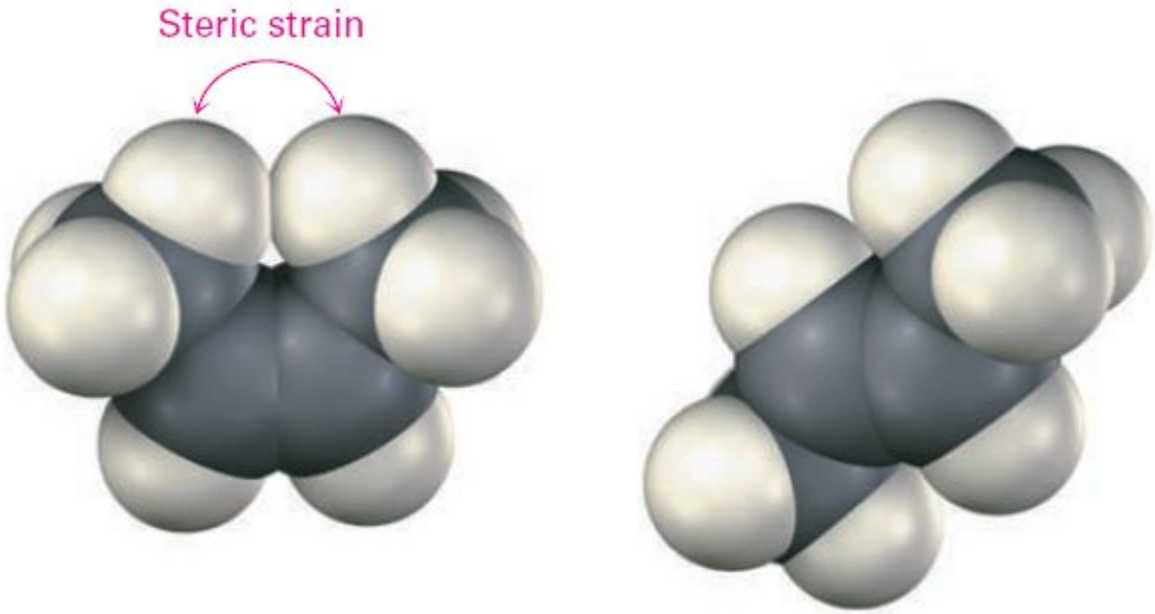
Cis isomer
$\Delta H°_{hydrog} = -120$ kJ/mol



Trans isomer
$\Delta H°_{hydrog} = -116$ kJ/mol



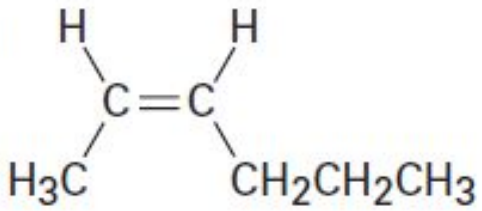
Trans (76%) **Cis (24%)**



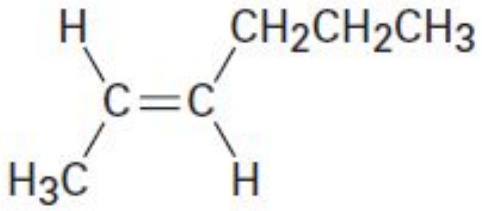
Name the following alkenes, and tell which compound in each pair is more stable:

(a) $H_2C{=}CHCH_2CH_3$ or $H_2C{=}C(CH_3)CH_3$

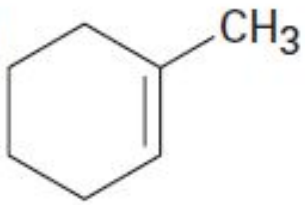
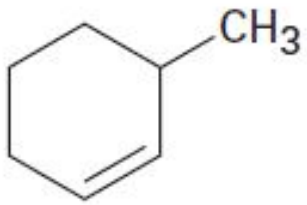
(b)



or



(c)



or