



Problem Set 7.2: Alkenes and Alkynes

Bonding in Alkenes

The alkenes (general formula, C_nH_{2n}) contain two less hydrogen atoms than the alkanes with the same number of carbon atoms. Since each carbon must have four covalent bonds, the lower H-to-C ratio necessitates that a double bond be placed between one pair of carbon atoms. Because of the presence of a double bond, the term *unsaturated* is applied to the compounds in this series. Each carbon atom that is part of the double bond in an alkene is bonded to two other atoms (in a trigonal planar arrangement). For example, the bonding in the simplest alkene, C_2H_4 , can be represented as follows:



The above molecule is called ethene (also called ethylene). Why is it impossible to have methene?

Other Examples:



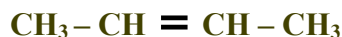
propene



methylpropene (no number needed!)



1-butene



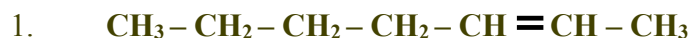
2-butene



SAME! Think about the end to start counting from.

Exercise:

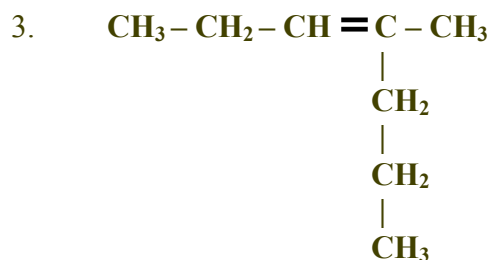
Name each of the following compounds.



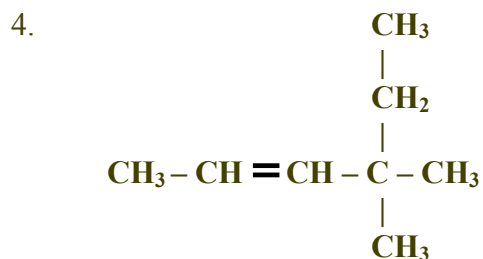
2-heptene



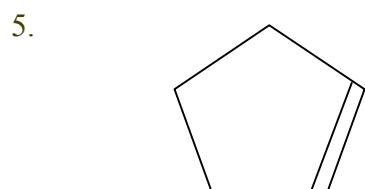
4-methyl-2-pentene



4-methyl-3-heptene



4,4-dimethyl-2-hexene



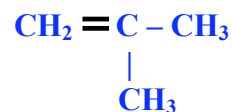
cyclopentene

Write a structural formula for each of the following compounds.

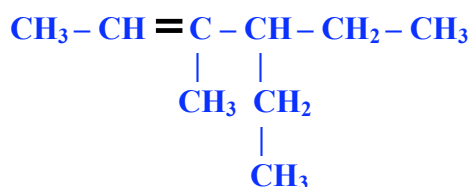
6. 3-octene



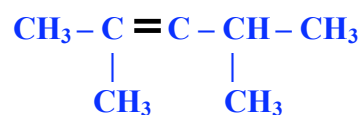
7. methylpropene



8. 3-methyl-4-ethyl-2-hexene



9. 2,4-dimethyl-2-pentene



10. Draw structural formula and name five noncyclic isomeric forms of C_5H_{10} .

I'll just state names here for space reasons.

1-pentene

2-pentene

2-methyl-1-butene

3-methyl-1-butene

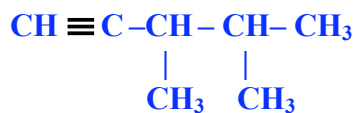
2-methyl-2-butene

Write a structural formula for each of the following compounds.

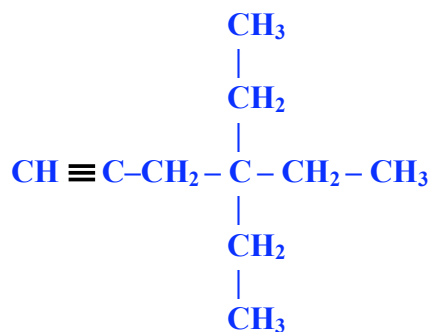
4. 3-nonyne



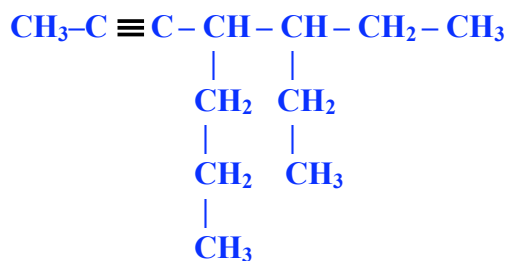
5. 3,4-dimethyl-1-pentyne



6. 4,4-diethyl-1-hexyne



7. 5-ethyl-4-propyl-2-heptyne



8. Draw structural formula and name three noncyclic isomeric forms of C_5H_8 .

I'll just state names here.

1-pentyne

2-pentyne

3-methyl-1-butyne