These are the homework exercises to accompany the Textmap for McMurry's Organic Chemistry textbook.

9.0 Unit Preview

9.1 Naming Alkynes

9.1 Exercises

Questions

Q9.1.1

Name the following compounds:

A)  

B)  

C)  

D)  

Q9.1.2

How many isomers are possible for C₅H₈? Draw them.

Q9.1.3

Draw the following compounds:

A) 4,4-dimethyl-2-pentyne

B) 3-octyne

C) 3-methyl-1-hexyne
Q9.1.4

Do alkynes show cis-trans isomerism? Explain.

Solutions

S9.1.1

A – 3,6-diethyl-4-octyne
B – 3-methylbutyne
C – 4-ethyl-2-heptyne
D – cyclodecyne

S9.1.2

2 possible isomers

S9.1.3

A) 
B) 
C) 
D) 

S9.1.4

No. A triply bonded carbon atom can form only one other bond and has linear electron geometry so there are no "sides". Allkenes have two groups attached to each inyl carbon with a trigonal planar electron geometry that creates the possibility of cis-trans isomerism.
9.2 Preparation of Alkynes: Elimination Reactions of Dihalides

9.3 Reactions of Alkynes: Addition of HX and X2X2

9.4 Hydration of Alkynes

9.4 Exercises

Questions

Q9.4.1

What alkyne would you start with to gain the following products, in an oxidation reaction? Keep in mind resonance.

A

\[
\text{\includegraphics[width=0.3\textwidth]{alkyne.png}}
\]

B

\[
\text{\includegraphics[width=0.3\textwidth]{alkyne.png}}
\]

Q9.4.2

Propose a reaction scheme for the following compound starting from the alkyne and showing required reagents and intermediates.

\[
\text{\includegraphics[width=0.3\textwidth]{alkyne.png}}
\]

Solutions

S9.4.1
9.5 Reduction of Alkynes

9.5 Exercises

Questions

Q9.5.1

Usng any alkyne how would you prepare the following compounds:

pentane, trans-4-methyl-2-pentene, cis-4-methyl-2-pentene.
**9.6 Oxidative Cleavage of Alkynes**

**9.7 Alkyne Acidity: Formation of Acetylide Anions**

**9.7 Exercises**

**Questions**

**Q9.7.1**

If OH\(^-\) has a pKa of 14.00 in water, what pKa be required to deprotonate OH\(^-\)?

**Solutions**

**S9.7.1**

Need a stronger base, or a compound with a pKa > 14.00 to deprotonate.

**9.8 Alkylation of Acetylide Anions**

**9.8 Exercises**
Questions

Q9.8.1

Give the possible reactants for the following formations:

Q9.8.2

Propose a synthetic route to produce 2-pentene from propyne and an alkyl halide.

Solutions

S9.8.1

S9.8.2
9.9 An Introduction to Organic Synthesis

9.9 Exercises

Questions

Q9.9.1

Starting at 3-hexyne predict synthetic routes to achieve:

A – trans-3-hexene

B – 3,4-dibromohexane

C – 3-hexanol

Q9.9.2

Starting with acetylene and any alkyl halides propose a synthesis to make (a) pentanal and (b) hexane.

Solutions

S9.9.1

\[
\begin{align*}
\text{Br} & \quad \text{Br} \\
\text{Br} & \\
\text{H}_2 & \quad \text{Lindlar} \\
\text{H}_2 & \quad \text{SO}_4^- \\
\text{H}_2O & \\
\text{OH} & \\
\end{align*}
\]

S9.9.2