

1. Predict the products of the reaction of pent-1-yne with the following reagents.

a) 1 mol of HCl

b) 2 mols of HCl

c) Excess H₂, Ni

d) H₂, Pd/BaSO₄

e) 1 mol of Br₂

f) 2 mols of Br₂

g) Warm, concentrated KMnO₄

h) Na, NH₃

i) NaNH₂

j) H₂SO₄/HgSO₄, H₂O

k) SiH₂BH₃, then H₂O₂, OH⁻

2. Show how you would carry out the following transformations.

a) 2,2-dibromobutane \longrightarrow but-1-yne

b) 2,2-dibromobutane \longrightarrow but-2-yne

c) But-1-yne \longrightarrow oct-3-yne

d) (Trans)-hex-2-ene \longrightarrow hex-2-yne

e) Cyclodecyne \longrightarrow (cis)-cyclodecene

f) Cyclodecyne \longrightarrow (trans)-cyclodecene

g) Hex-1-yne \longrightarrow hexan-2-one ($\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$)

h) Hex-1-yne \longrightarrow hexanal ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$)

i) (Trans)-hex-2-ene \longrightarrow (cis)-hex-2-ene

3. Using cyclooctyne as your starting material, show how you would synthesize the following compounds. Once you have shown how to synthesize one compound, you can use it as a starting material for any later problem.

a) (Cis)-cyclooctene

b) Cyclooctane

c) (Trans)-1,2-dibromocyclooctane

d) Cyclooctanone

e) 1,1-dibromocyclooctane

f) $\text{CHO}(\text{CH}_2)_6\text{CHO}$

g) $\text{COOH}(\text{CH}_2)_6\text{COOH}$

4. Using **hex-1-ene** as your starting material, show how you would synthesize the following compounds. Once you have shown how to synthesize one compound, you can use it as a starting material for any later problem.

a) 1,2-bromohexane

b) Hex-1-yne

c) 2,2-dibromohexane

d) Hex-2-yne

e) Hexan-2-one ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COCH}_3$)

f) Hexanal ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$)

g) Pentanal ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$)

5. Show how you would make the following compounds acetylene and any other reagents.

a) 6-phenylhex-1-en-4-yne

b) (Cis)-1-phenylpent-2-ene

c) (Trans)-1-phenylpent-2-ene

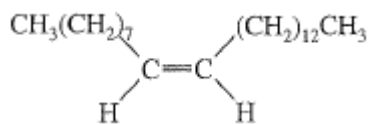
6. Predict the products formed when $\text{CH}_3\text{CH}_2\text{C}\equiv\text{C}^- \text{Na}^+$ reacts with the following compounds:

a) Ethyl bromide

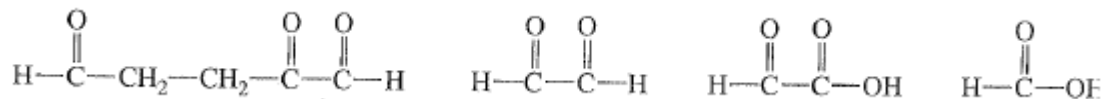
b) t-butylbromide

c) Cyclohexanol

7. Musculure, the sex attractant of the common housefly, is cis-tircos-9-ene. Most synthesis give the trans as the major product. Devise a synthesis for the cis isomer of musculure from acetylene and any other compound of your choice.



8. When treated with catalytic hydrogen an unknown compound X absorbs 5 mols of hydrogen to give n-butylcyclohexane. Treatment of X with an excess of ozone, followed by dimethylsulfide and water, gives the following compounds. Propose a structure for X.



9. Show how you would make the following compounds acetylene and any other compounds containing no more than four carbon atoms.
- Hex-1-yne
 - Hex-2-yne
 - (Cis)-hex-2-ene
 - (Trans)-hex-2-ene
 - 1,1-dibromohexane
 - 2,2-dibromohexane
 - Pentanal ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$)
 - Pentan-2-one ($\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_3$)
 - 3,4-dibromohexane
 - 2-methylhex-3-yn-2-ol