

1) Classify the following dienes and polyenes as isolated, conjugated, cumulated or some combination of these classifications.

a) 1,5-cyclooctadiene

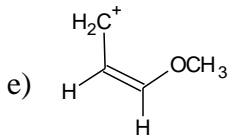
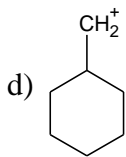
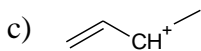
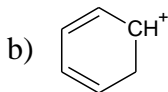
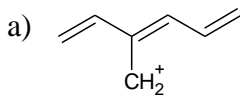
b) 1,3-cyclooctadiene

c) 1,2-cyclodecadiene

d) 1,3,6-cyclooctatriene

e) 1,3,5-cyclohexatriene (benzene)

2) Draw the important resonance contributors for the following cations, anions and radical.



3) Predict the products of the following reactions:

a) pentadiene + HCl

b) 2-methyl-2-butene + NBS, light

c) 1-pentene  $\xrightarrow{\text{NBS, light}}$   $\xrightarrow{\text{tBuO}^-}$

d) 1,3-butadiene + bromine water