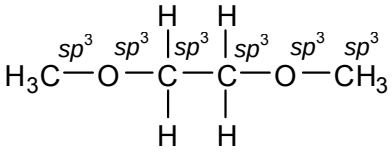
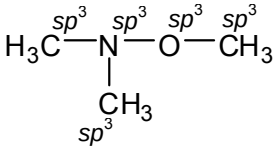
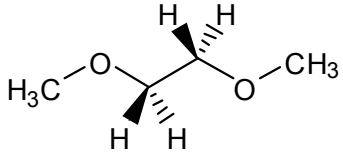
Chemistry 2301

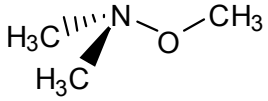
Workshop 3 Solutions
Hybridization and Molecular Shape

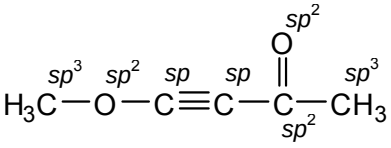
1.

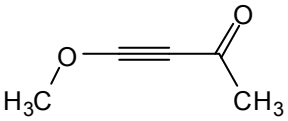




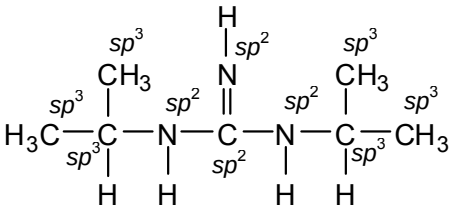


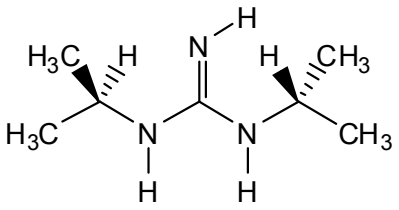






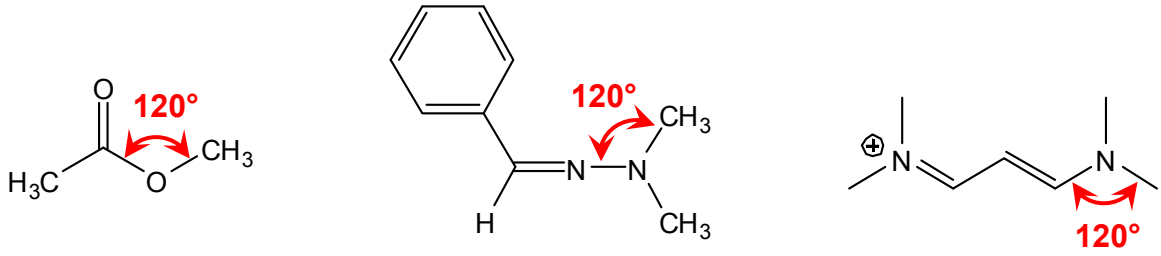
Why sp^2 at the leftmost oxygen? It would nominally be sp^3, but it has lone pairs that are adjacent to the central triple bond. As a result, the O atom re-hybridizes sp^2, and puts a lone pair in a *p* orbital (so it can interact with the C≡C π bond). This is the exception that we talked about in class: whenever a center looks sp^3, but is adjacent to a multiple bond, it re-hybridizes to sp^2.





The two bottom nitrogens would nominally be sp^3, but they have lone pairs that are adjacent to the central double bond. As a result, the bottom N atoms re-hybridize sp^2, and their lone pairs are placed in *p* orbitals (so they can interact with the C=N π bond).

2.



Just like on the previous page, all of these centers look like they would be sp^3, but they are all adjacent to multiple bonds, so they all re-hybridize sp^2.