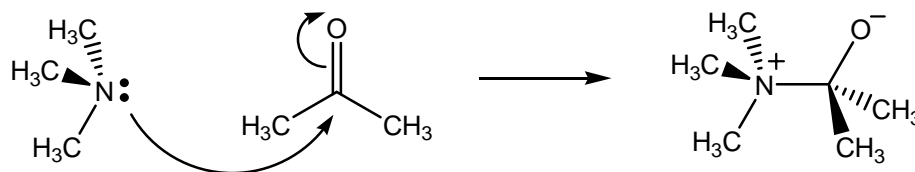
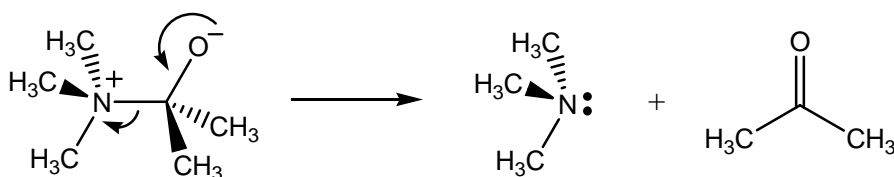


## Workshop 1 Solutions

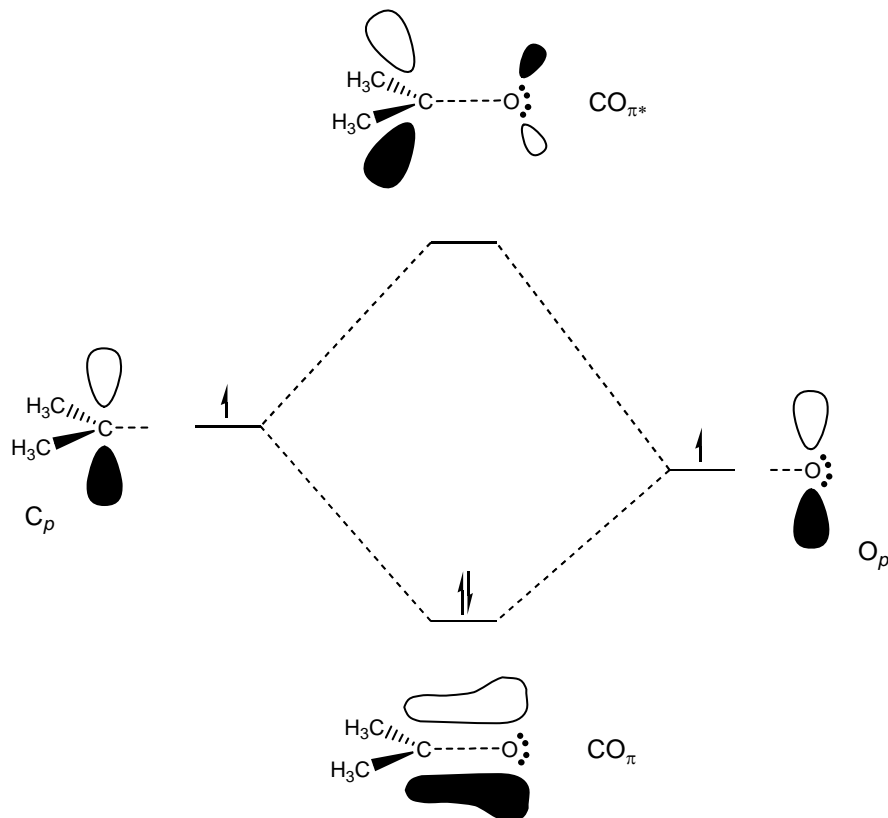
- a. The nitrogen has a lone pair on it that I didn't draw in the reaction. This is what is doing the attacking:



In reverse...



- b.



Some things to note:

- You start with two orbitals, so you should end with two orbitals.
- The oxygen orbital is lower in energy than the carbon orbital, because oxygen is more electronegative. So, electrons in an oxygen orbital are more stable than they would be in a carbon orbital.
- The  $\text{CO}_\pi$  orbital has most of its electron density *between* the two atoms; the  $\text{CO}_\pi^*$  orbital has most of its density *outside* the two atoms. (The  $\text{CO}_\pi^*$  orbital is also antisymmetric—but that's not really important to this question.)
- The lower-energy,  $\text{CO}_\pi$  bonding orbital is closer to the  $\text{O}_p$  parent, so it has more  $\text{O}_p$  character. The  $\text{CO}_\pi^*$  antibonding orbital is closer to the  $\text{C}_p$  parent, so it has more  $\text{C}_p$  character.

c.

