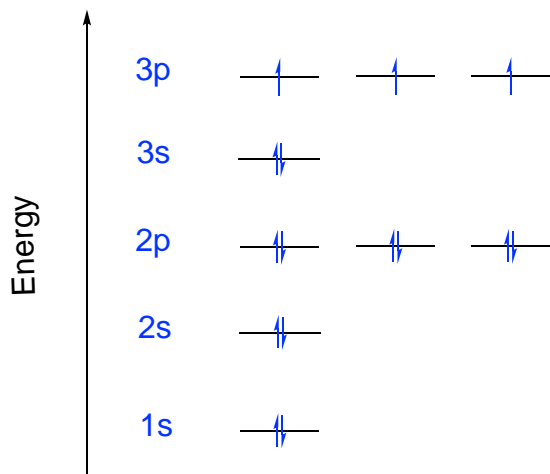
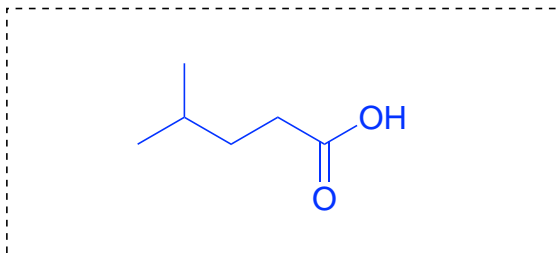
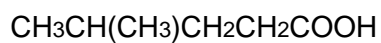
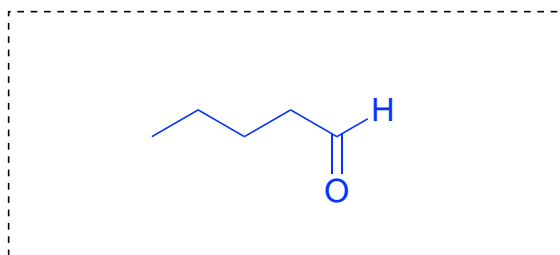
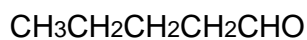
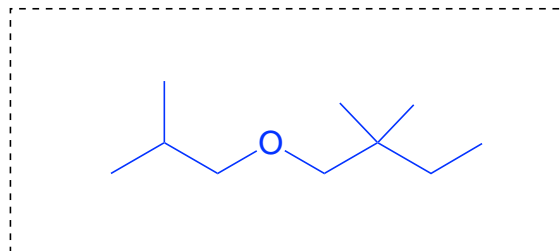


## CEM 251, Problem Set 1: Chapter 1

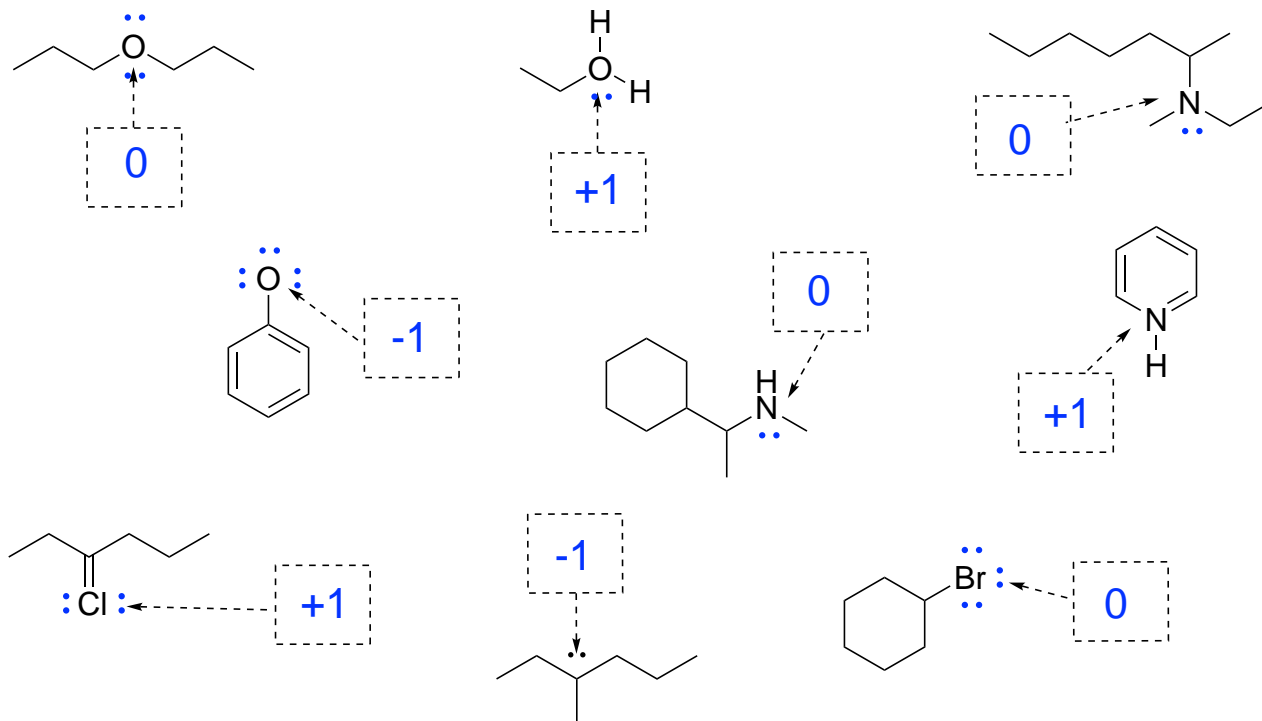
1. Draw the correct electron configuration for phosphorus ( $^{15}\text{P}$ ).



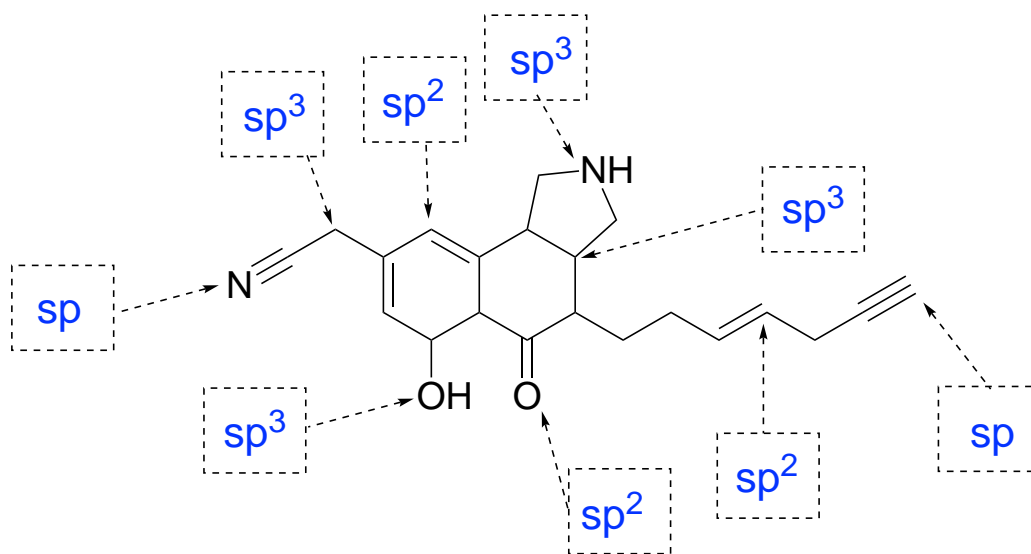
2. Convert the following condensed structures into the corresponding **stick** structure.



3. Calculate the **Formal Charge** for each of the indicated atoms. Make sure you add lone pairs on **heteroatoms**, when appropriate based on the full octet rule, and consider them during your calculations.



4. Indicate the hybridization of each of the indicated atoms in the following molecule.



How many  $\pi$  bonds are there in this molecule?

8

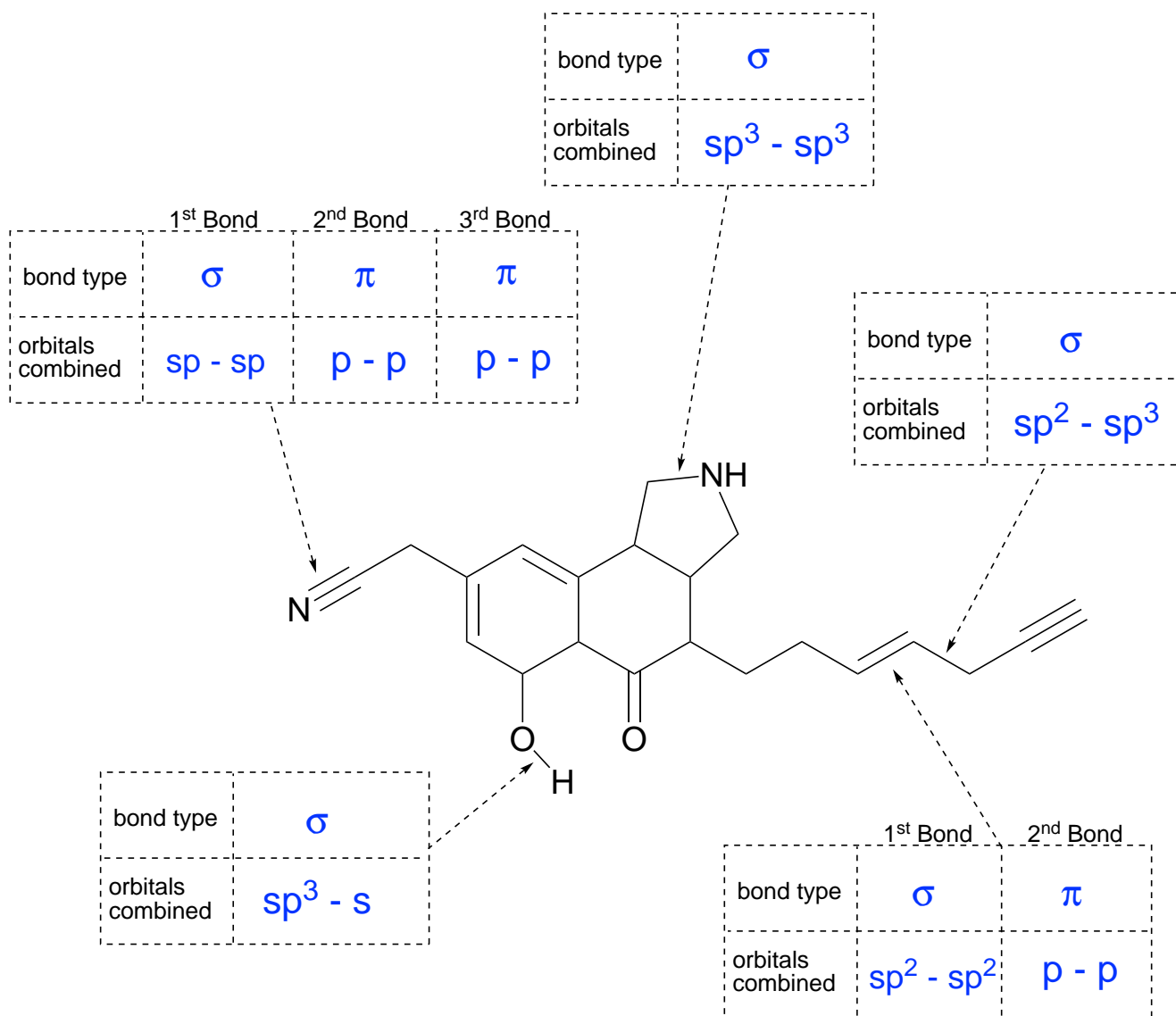
How many  $\pi$  electrons are there in this molecule?

16

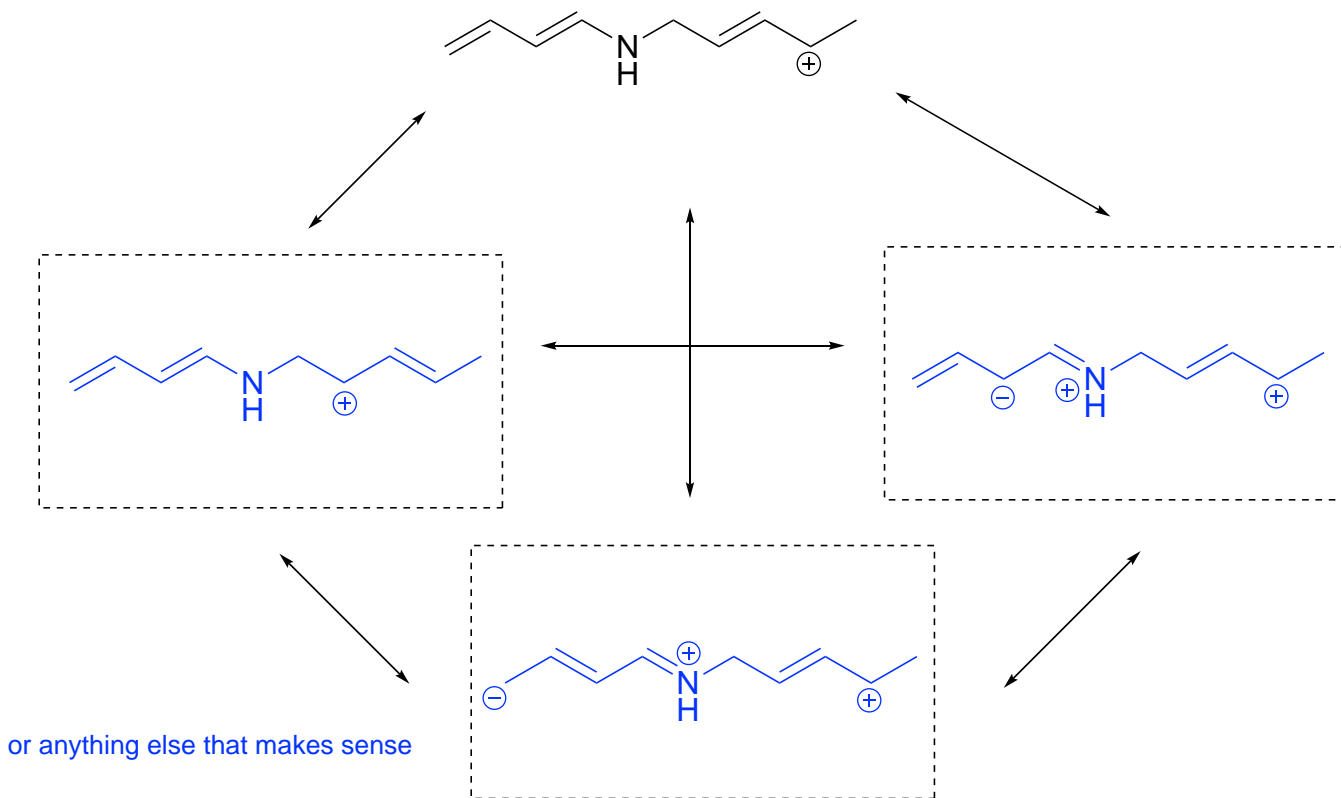
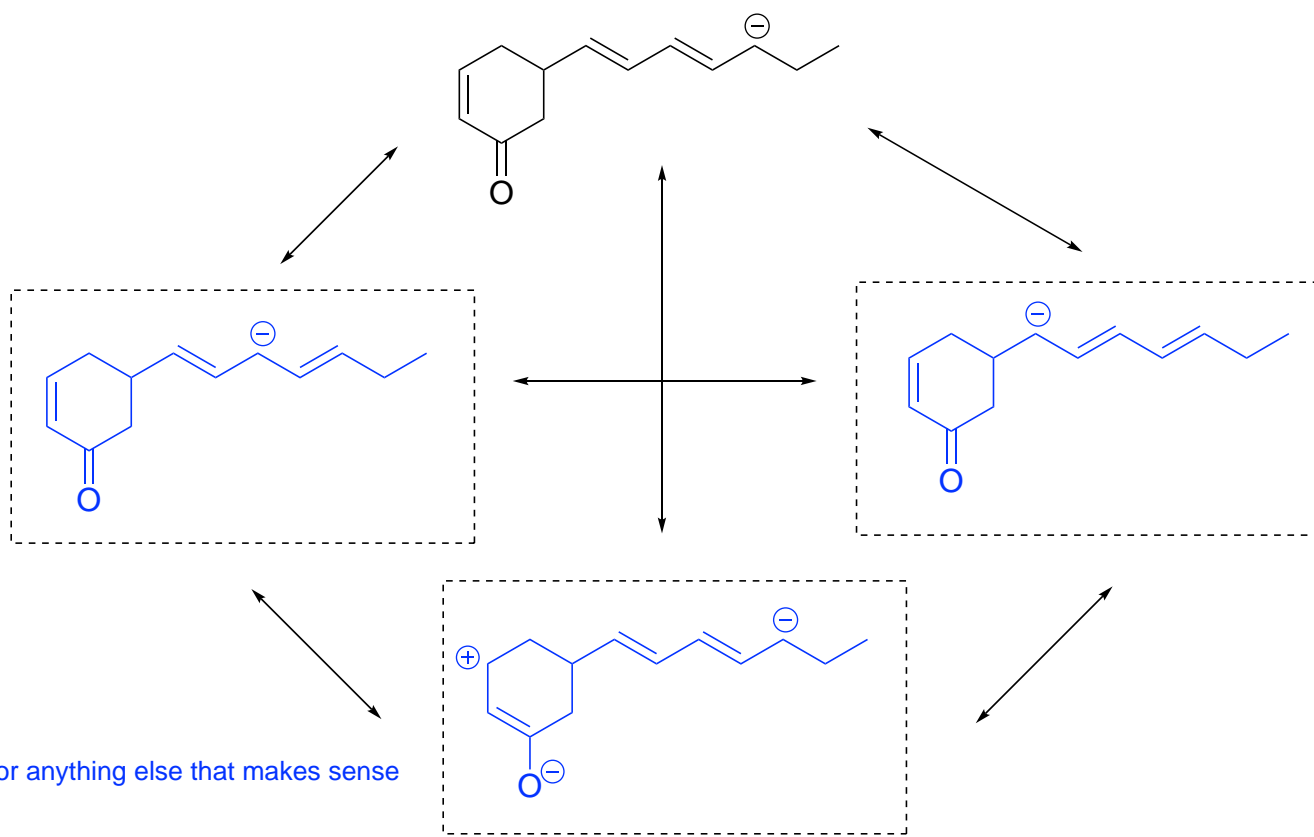
5. Answer the following questions regarding the indicated bonds:

a. What is the bond type ( $\sigma$  or  $\pi$  bond)?

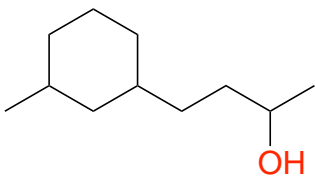
b. What orbitals from each atoms are combined to form the bond?



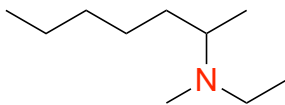
6. Draw 3 valid resonance structures for each of the following compounds.



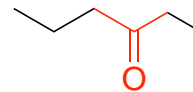
7. Identify the functional groups highlighted in these molecules:



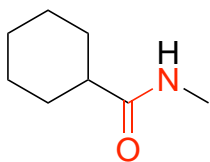
Alcohol



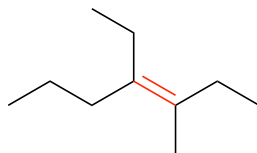
Amine



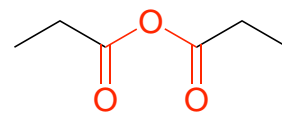
Ketone



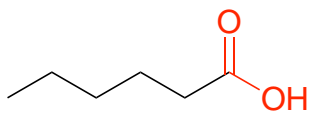
Amide



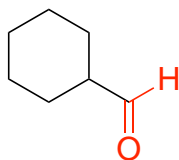
Alkene



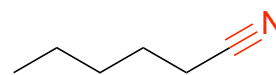
Anhydride



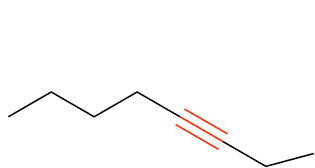
Carboxylic Acid



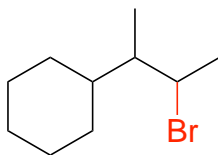
Aldehyde



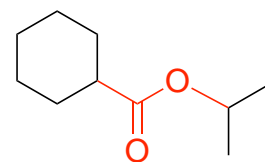
Nitrile (Cyanide)



Alkyne



Alkyl Halide  
(Haloalkane)



Ester