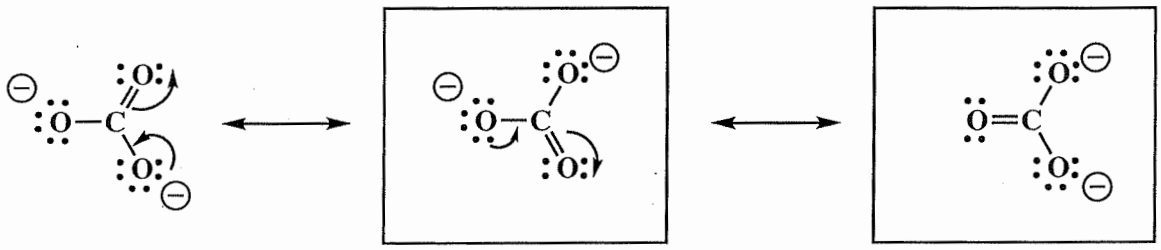
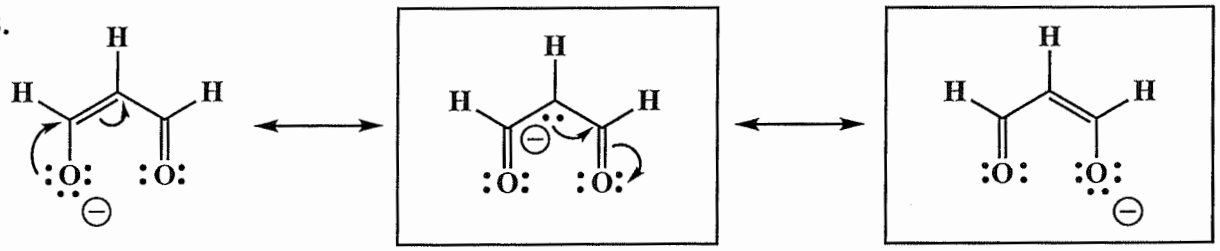
7. (10 pts each) The following molecules are best represented as the hybrid of three contributing structures. **Draw the second and third important contributing structures** in the spaces provided, including all lone pairs and formal charges. **For the two structures on the left in each problem, use arrows to indicate the movement of electrons to give the structures you drew.** There is **no need to draw any circles around any of these contributing strucures**. You might want to read these directions again to make sure you know what we want.

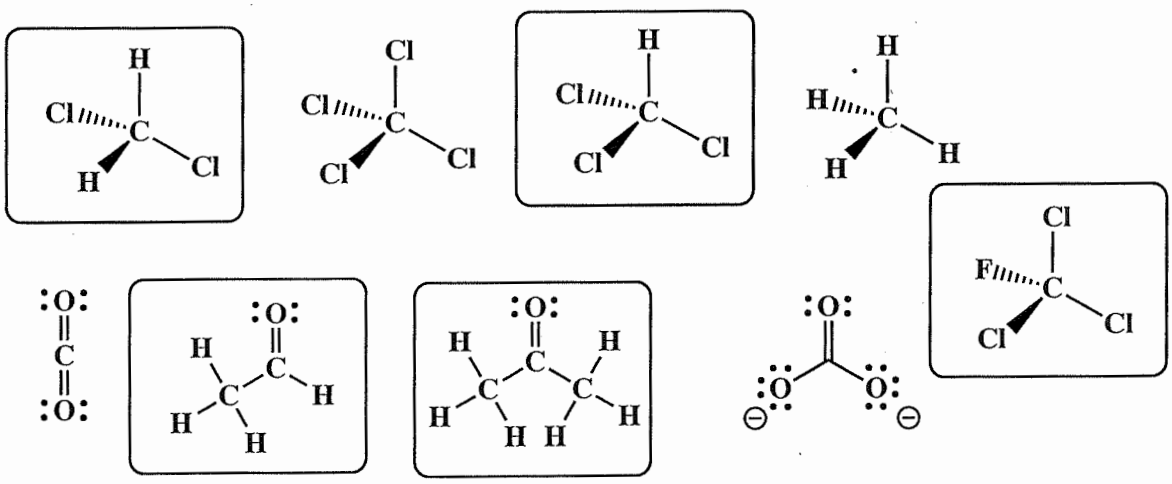
A.



B.



8. (1 pt each) Circle any molecule that has an overall molecular dipole moment.



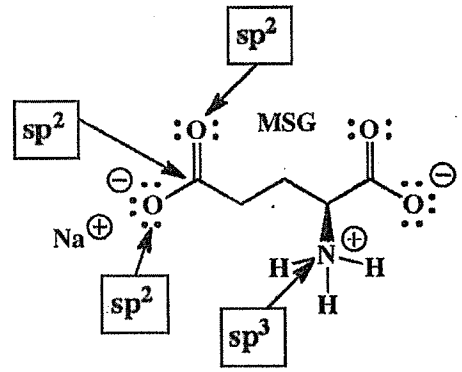
8. (2 pts each) Fill in each blank with the word or words that best completes the sentences.

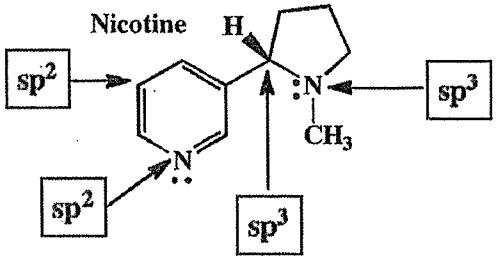
For organic chemistry, it is best to think of ___electrons___ **as waves.**

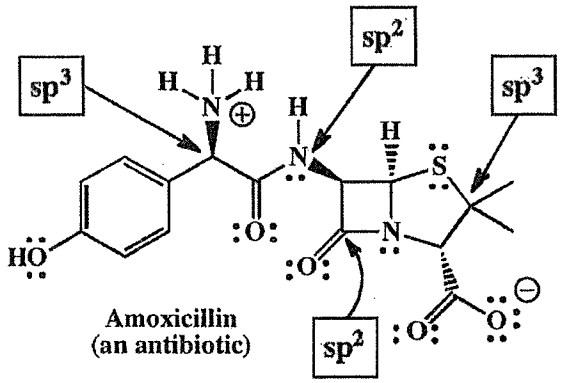
According to the valence bond approach, the atomic orbitals on each atom are combined first to create ___hybridized___ **orbitals, that overlap to create** ___sigma___ **bonds.**

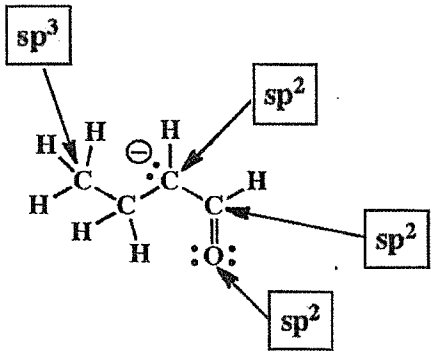
Three (or more) atom "pi-ways" are the situation resonance ___contributing___ **structures are usually trying to describe. For pi bonding and therefore pi delocalization to occur over more then two atoms (i.e. pi-ways), parallel and overlapping** ___2p___ **orbitals are needed on ALL of the adjacent atoms involved. As a result, all of the atoms involved in pi-ways are usually** ___sp^2___ **hybrized, and NEVER** ___sp^3___ **hybridized.**

9. (1 pt each) For the following molecules, write the hybridization state of each atom indicated by the arrow.



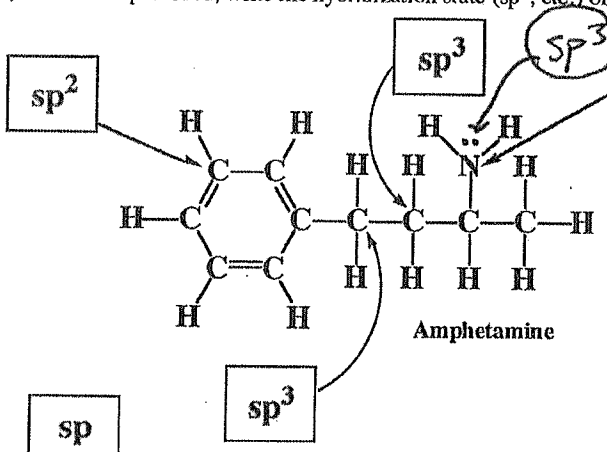




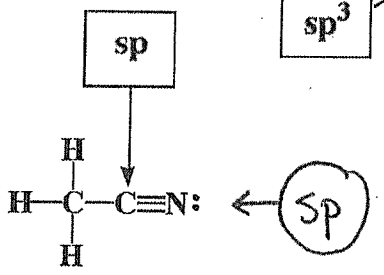


Signature_____ Pg 7 _____(13)

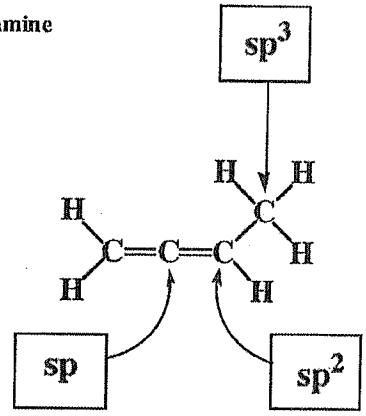
8. (13 pts) In the box provided, write the hybridization state (sp^3, etc.) of the atom indicated by the arrow.

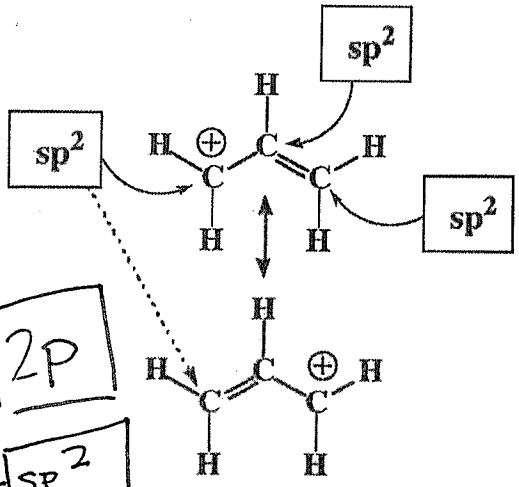


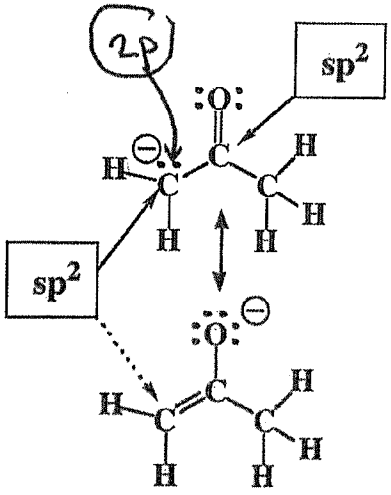
Amphetamine

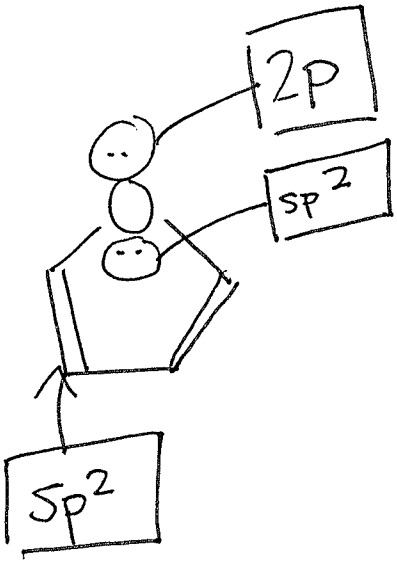


Acetonitrile (a solvent)



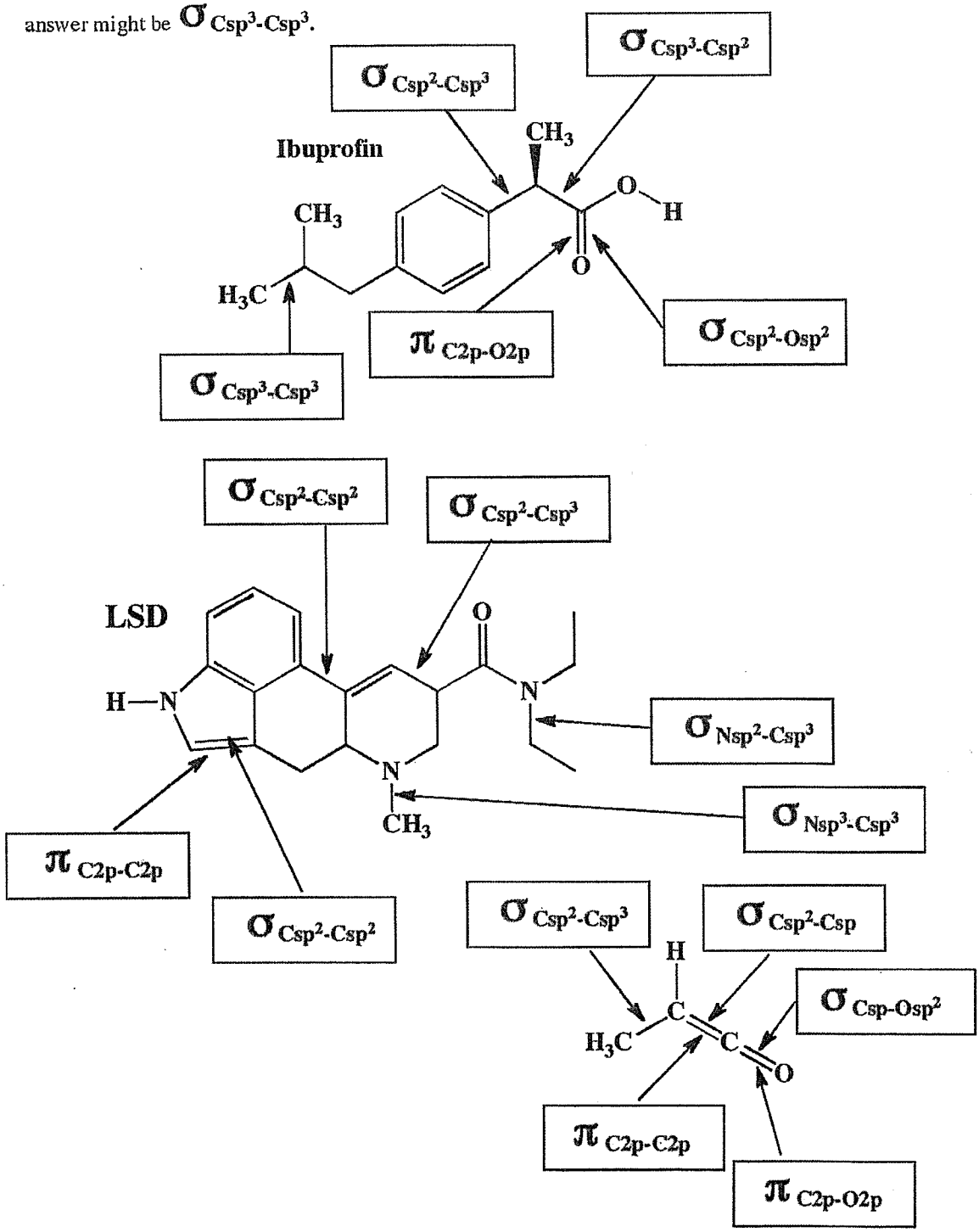




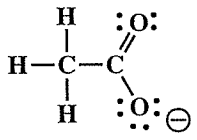


In the circles, write the type of orbital (sp^3, 2p, etc.) where the lone pair resides, indicated

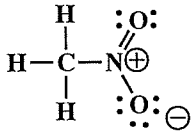
10. (2 pts each) Describe each bond indicated with an arrow as the overlap of orbitals. For example, an answer might be $\sigma_{Csp^3\text{-}Csp^3}$.



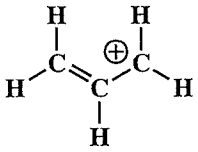
19. (12 pts) The following three structures have delocalized pi systems that can best be described by the molecular orbital approach based on the overlap of three 2p orbitals. At the bottom of the page are three different molecular orbital diagrams, labeled as "A", "B",and "C". Underneath the structures in the boxes, write the letter ("A", "B", "C"or "D, none of the above") that most accurately describes that molecule's delocallized pi system.



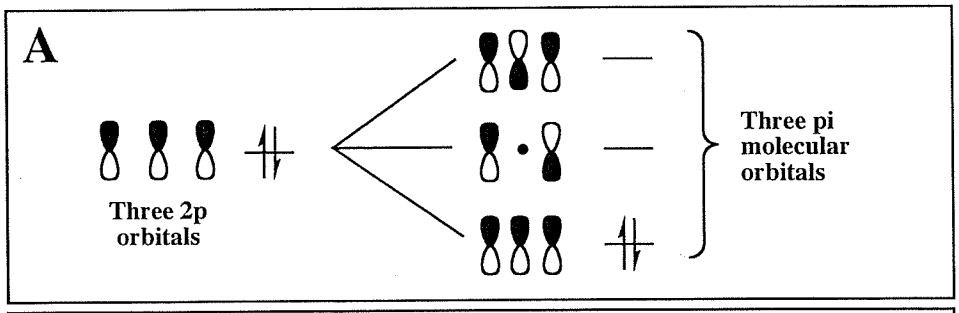
B

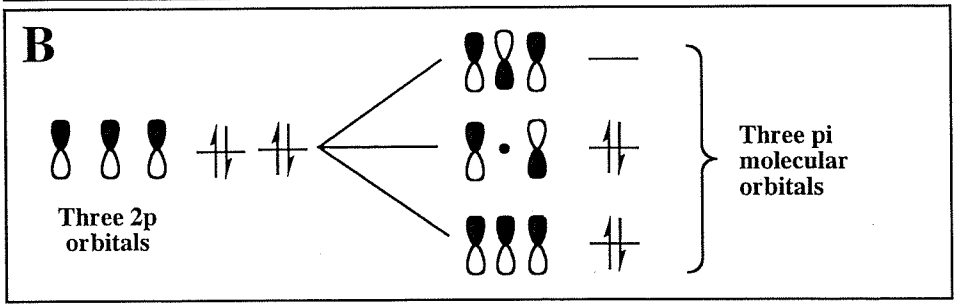


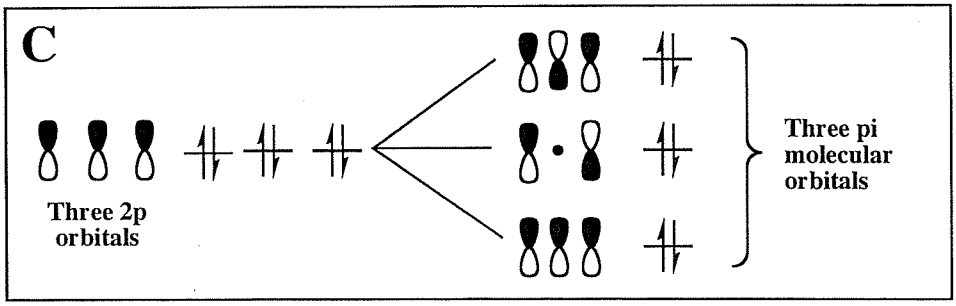
B



A







D None of the above