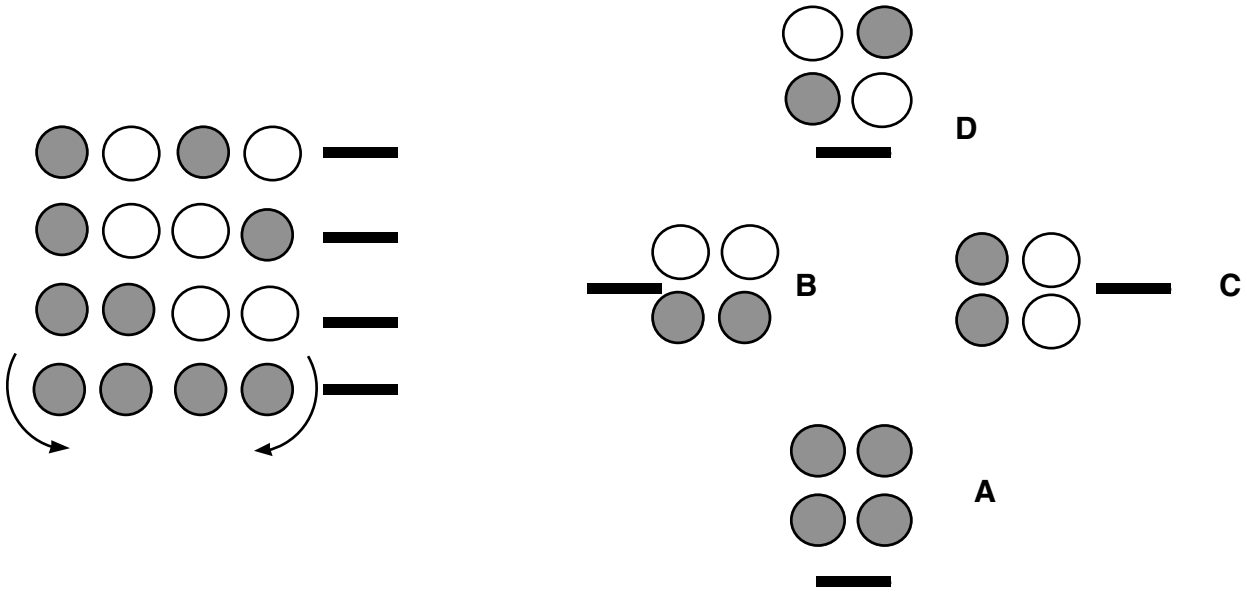
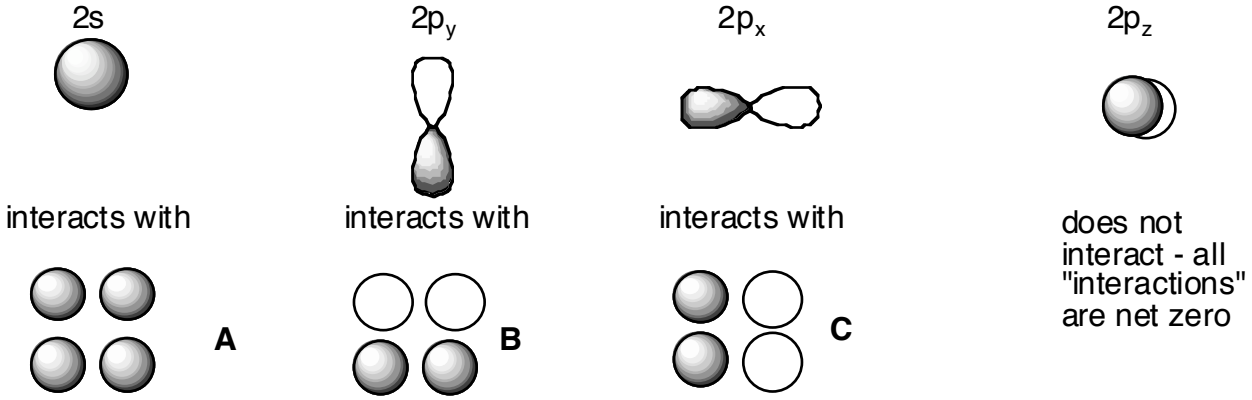
Answers to Problem 7, Chemistry 301X - 2006

(a) Just bend the MOs of the linear compound to produce **A**--> **D**, the MO's of square H_4. They can be ordered in energy by counting nodes.

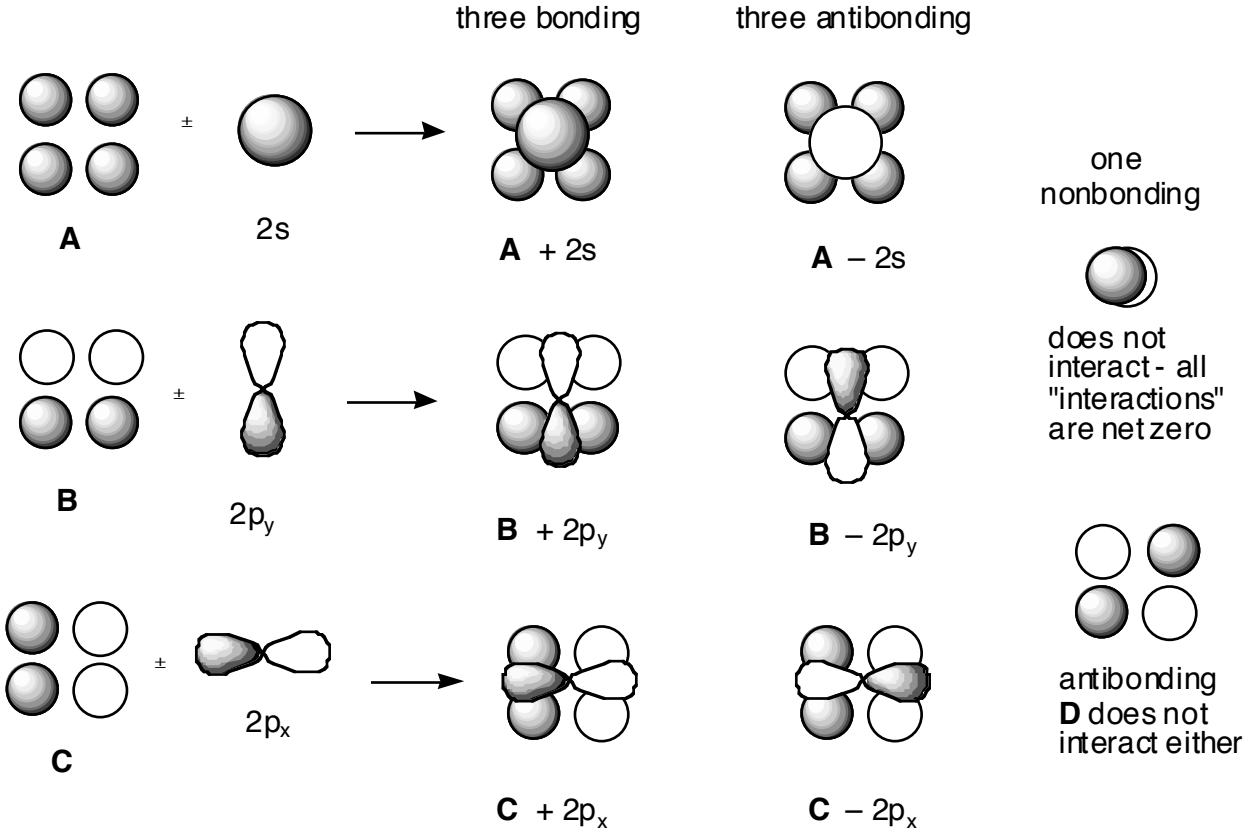


(b)

Atomic Orbitals of Carbon



(c) There will be eight MO's for planar methane.



(d,e) just count nodes. **A** + 2s has none, **B** + $2p_X$ and **C** + $2p_Y$ have one each and will be at the same energy. The nonbonding orbital must lie above **B** +$2p_X$ and **C** + $2p_Y$. There are eight electrons (four from the four hydrogens and four from carbon) and they will go in to the orbitals as shown.