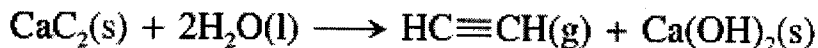


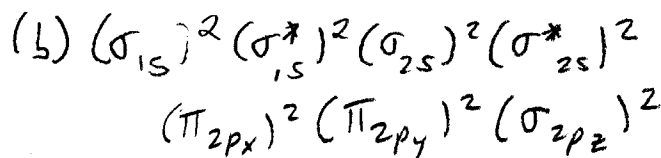
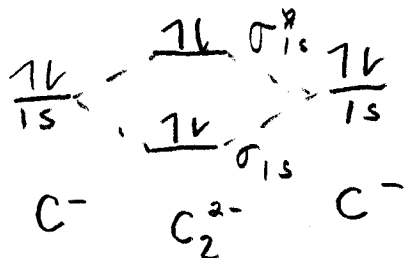
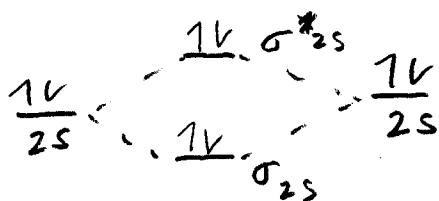
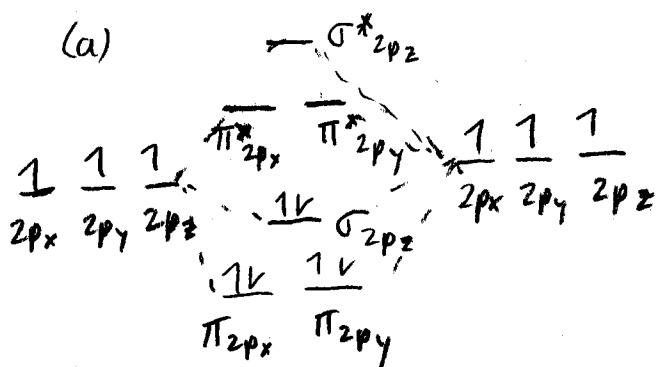
8. (12 points) Problem 10.92 in your text (p. 387).

10.92 Until about 1950, the reaction of calcium carbide with water,



2 pts
per part

was the only industrial method for making acetylene. (a) Draw the molecular orbital energy level diagram for the carbide ion in its ground state. (b) Write the electron configuration of the carbide ion in its ground state. (c) What is the bond order of the carbon-carbon bond in the carbide ion? (d) How many sigma bonds and how many pi bonds are there? (e) How is the bond order of C_2 changed by the addition of two electrons? (f) Is the carbide ion diamagnetic or paramagnetic? (If paramagnetic, how many unpaired electrons are there?)



(c) B.O. = $\frac{1}{2}(10 - 4) = \boxed{3}$

(d) 1 σ bond and 2 π bonds.

(e) B.O. of C_2 increases by 1 upon the addition of 2 e^- 's (since they go into a bonding MO).

(f) C_2^{2-} is diamagnetic