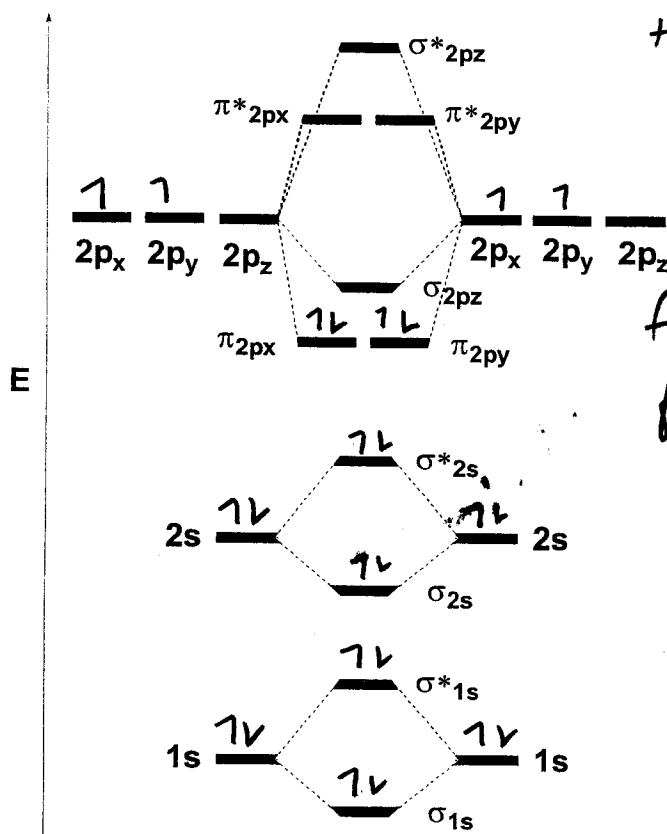


5. While valence bond theory is a simple and powerful tool, molecular orbital theory is better able to treat the properties of novel species.

(a) (4 points) Put electrons into the orbital diagram below to describe dicarbon (C_2).



+1 if wrong #
of e⁻s put in.

full credit
for the rest
of the
problem
if consistent
w/ the e⁻
filling here

- (b) (3 points) Use the above diagram to compute the bond order of C_2 .

$$B.O. = \frac{1}{2} (8 - 4) = \boxed{2}$$

+1 if 1 instead of 2

- (c) (4 points) Which picture on the overhead projector corresponds to C_2 's highest energy occupied molecular orbital (that is, the highest orbital with one or more electrons)?

(i)

(ii)

(iii)

(iv)

(Circle the correct answer. You do not need to justify your answer.)

- (d) (3 points) Is the cation C_2^{2+} **paramagnetic** or **diamagnetic**? (Circle your answer.)

(Your answer need not be justified beyond what you have done in part (a).)