

Accelerated General Chemistry
Problem Set 5—Part 2
Due Wednesday, October 21, 2009 (at 4:00 p.m.)
Total Points on This Assignment = 58

1. (8 points) Atkins and Jones Exercise 3.20. You do not need to justify your classification of polar vs. non-polar beyond drawing the correct Lewis structure. Be sure to draw all valence electrons.
2. (11 points) Exercise 3.50. You are required to draw a molecular orbital energy level diagram only for B_2 . You may mentally subtract or add electrons as necessary to treat B_2^- and B_2^+ .
3. (12 points) Exercise 3.52. Note that MO energy level diagrams are not required here.
4. (4 points) Exercise 3.56 (a) and (c); skip part (b). Note that MO energy level diagrams are not required here.
5. (10 points) Exercise 3.62. Justify your answers by writing either the MO energy level diagram or the MO electron configuration for each species.
6. (4 points) The bond dissociation energy of C_2 is (in old-fashioned units) $144 \text{ kcal mol}^{-1}$, where $1 \text{ kcal} = 4.184 \text{ kJ}$. Predict the shortest wavenumber of light (in cm^{-1}) that will complete break apart the C_2 molecule into C atoms.
7. (9 points) Exercise 3.80. Explain your reasoning in parts (a) and (c). Also, as part of your work on this problem, you must draw an orbital energy level diagram that correctly shows the relative energies of the 1s orbitals on H and He.

You should also work on Atkins and Jones Exercise 3.101, and then check the answer in the back of the book. (You will not turn this problem in for grading—what fun is it for your grader if everyone gets a problem right?)