Chem 155 Homework #9 Due at the start of class on **Fri. March 11**
Reading: Finish Chapter 17,

Chapter 16 Problems:
16.22
16.28
16.33
16.39

Chapter 17 Problems:
17.1
17.2
17.13
17.15
17.22

Additional Problems:
1) When we breath in air, O_2 is taken up in the blood by the protein hemoglobin, which contains Fe^{2+} ions bound to a heme group [(heme)Fe^{2+}]. The iron-heme reversibly binds O_2, picking it up and releasing it in the other tissues (see Oxtoby, pp. 284-286). In the bound form (oxygenated heme), one electron is transferred from the iron to the O_2 so that this species can be described as [(heme)Fe^{3+} (O_2^-)]. Is the oxygen-oxygen bond length in heme longer or shorter than the bond in O_2. Explain.

2) Find a paper with a molecular orbital measurement that shows an experimental measurement of a molecular wavefunction (e.g. via STM, angle resolved UPS, or otherwise). Include a printout on your homework and the citation.

3) **Extra credit** (8 points—all parts must be completed for credit): As noted in Chapter 17, the greenhouse effect caused by the IR absorption of CO_2 has important implications for our use of fossil fuel. Using the DOE data available at http://www.eia.doe.gov/emeu/aer/overview.html

a) determine what fraction of our energy supply current comes from fossil fuels

b) calculate what the average power consumption (in TW) was for the entire US during 2008

c) pick a favorite alternative power source: wave power, wind power, solar power, nuclear power, biofuels. Calculate how much land area (or number of km of wave power stations, or number of new nuclear power stations) that would be needed to generate (on average) 1 TW of non-fossil power. Print out a map of the US from Wikipedia and draw your area devoted to renewables to scale. You can find conversion efficiencies, density values etc. online. A great resource is the free book by David MacKay (chief advisor to the UK government on climate and energy) http://www.withouthotair.com/.