

### ASSIGNMENT 3

### CHEMISTRY 302

Due: 4:30 pm Monday 2 February 2009

1. Look up the bond energy for the following bonds:  
C-C, C-H, C-F, C-Cl, C-Br, C-I, O=O, N $\equiv$ N.  
For each, cite the source of the value of your bond energy and calculate the maximum wavelength for a photon capable of breaking the bond.

2. Consider the blackbody distribution. Expressed in terms of frequency, it is:

$$\rho(\nu; T)d\nu = \frac{8\pi h\nu^3}{c^3} \frac{1}{e^{h\nu/kT} - 1} d\nu$$

Expressed in terms of wavelength, it is:

$$\rho(\lambda; T)d\lambda = \frac{8\pi hc}{\lambda^5} \frac{1}{e^{hc/\lambda kT} - 1} d\lambda$$

The sun may be regarded as a blackbody at 5780 K, while the earth may be regarded as a blackbody at 255 K.

For a temperature of 5780 K, plot the value of  $\rho(\lambda; T)$  as a function of wavelength  $\lambda$  at intervals of 25 nm from 25 to 3000 nm.

For a temperature of 255 K, plot the value of  $\rho(\lambda; T)$  as a function of wavelength  $\lambda$  at intervals of 250 nm from 250 to 70000 nm.

3. Do Problem 7, Chapter 1, page 27.
4. Do Problem 11, parts (a) and (b), Chapter 1, page 28.
5. Do Problem 15, Chapter 1, page 29.