Problem Set 4
Chemistry 109H, Lecture 4 (Weisshaar), Fall, 2004

Reading: Chapter 2. Perusal for organic nomenclature: Chapters 18, 19.

Problem Assignment (due in class, Monday, Oct. 11)

Problems 1-14: Atkins and Jones, problems 2.2, 2.10, 2.12, 2.20, 2.32, 2.36, 2.38, 2.46, 2.52, 2.54, 2.58, 2.64, 2.70, 2.82, 2.86.

16. The energies required to atomize gas phase CH₄, C₂H₆, C₂H₄, and C₂H₂ are 1642, 2788, 2226, and 1627 kJ mol⁻¹, respectively. (Atomization means what it sounds like, e.g., CH₄(g) → C(g) + 4 H(g).) Assume the CH bond energy is the same for all of these molecules. Use the atomization energies to calculate values for the C–H, C–C, C=C, and CC≡ bond energies. Gaseous C₂ has D = 599 kJ mol⁻¹. Is this closest to a single, double, or triple CC bond energy? Draw the Lewis structure most consistent with this result.

17. A stable triatomic molecule can be formed containing one atom each of N, S, and F. Three connectivities are imaginable: NSF, NFS, and SNF. Write a Lewis diagram for each, indicating the formal charge on each atom. Predict which connectivity occurs in nature and explain your prediction. Hint: Often the structure with the least separation of formal charge is most stable. In addition, formal charges are often in accord with electronegativities as well.