

Chemical Engineering 160/260
Professor C.W. Frank
Problem Set #1

The first problem set will consist of the following problems from Sperling, 2nd Ed:

Ch 1: #2, #3

Ch 2: #1, #3

Ch 3: #8, #10, #12, #15, #16, #20

The problem set will be due Monday, January 29 in class.

I selected the problems in Ch 1 to emphasize the fact that, whereas I do not intend to dwell on the organic chemistry in our class, I do want you to be able to recognize common polymers. In this context, you should study Appendix 1.1

I selected the problems in Ch 2 to force you to put chemical structures in place of the generic "beads" that I used in class for the stereoregular structures. The size of the substituent group will have a significant effect on crystallization phenomena, to be considered later in the course. The head-to-head and head-to-tail question is of lesser overall importance, but it still should force you to think about intramolecular interactions.

All of the problems that I selected in Ch 3 are directed at some aspect of molecular weight and size determination. These techniques are all based on dilute solution measurements. To set the stage for these, Sperling includes a section on the thermodynamics of mixtures (Sections 3.2 and 3.3). You should read these, but I will not discuss them in class until we cover polymer blends later in the course. The problems selected from Ch 3 cover the most important dilute solution methods: osmotic pressure, light scattering, and intrinsic viscosity. You should be very comfortable using these techniques to evaluate polymer molecular weight, coil size, and thermodynamic interaction with the solvent.