Chemistry/MatSci 5223W Wednesday, February 8

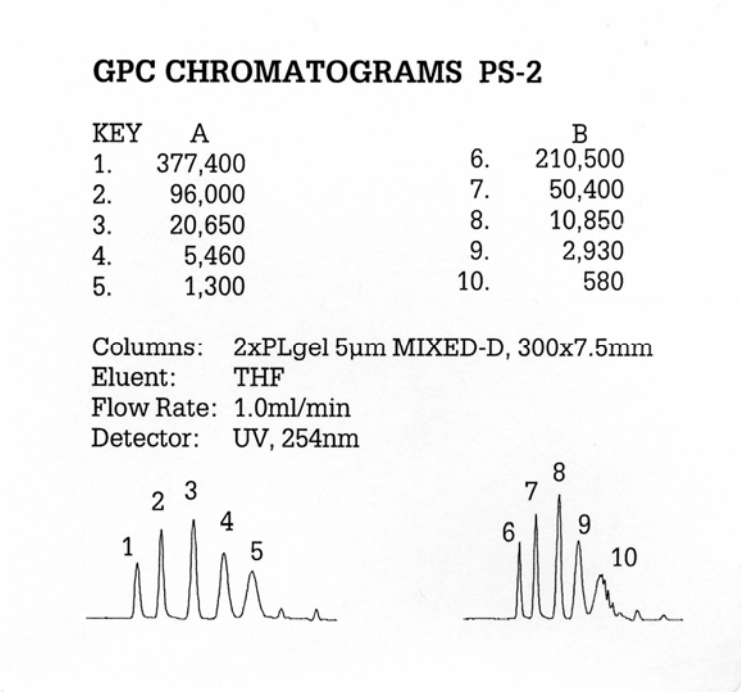
Assignment 8
Due: *In Lab*, Thursday, February 9/Friday, February 10

This week you will be characterizing the molecular weights and weight distributions of the polymers you synthesized last week. You will be using gel permeation chromatography (GPC) to do this. In preparation for this lab, you may want to read:

Sperling, L. H. *Introduction to Physical Polymer Science* (Wiley-Interscience: New York, 2001), pp. 103-112.

Sandler, S. R.; Karo, W.; Bonesteel, J.; Pearce, E. M. *Polymer Synthesis and Characterization: A Laboratory Manual* (Academic Press: San Diego, 1998), pp. 140-146.

GPC is a relative (rather than absolute) method for determining molecular weight, and the instrument and column must be calibrated with a set of polymer standards. The set of 5 polystyrene standards you will use in this lab come from Polymer Labs (http://www.polymerlabs.com/; EasyCal PS-2, M_w range 580-400,000). Data on this set of standards:



In the spectra above, the *x*-axis represents retention time. Notice that, characteristically for GPC, the highest masses elute first. The values listed represent M_x at each peak maximum. We will probably only use one of the two calibration sets (A/1-5 or B/6-10); make sure you find out from the TA's which set we use. The calibration only really works if the mobility of the reference polymer is very similar to that of the polymer you are analyzing. Polystyrene is a good reference for poly(ethyl

acrylate), but there are better ones; what other Polymer Labs GPC calibration standards could we have used?

The GPC column we will use is a Polymer Labs PLgel 10-μm-pore MIXED-B column; data on this column is available at http://www.polymerlabs.com/gpc/mixedgel.htm. What types of GPC columns are available? What other sorts of polymers would these have been more appropriate for?

To collect your GPC data for this experiment, one of your group members will need to bring a PC-formatted, 3.5” floppy disk.