**Assignment 17**
Due: *In Lab,* Thursday, March 30/Friday, March 31

This week you will be synthesizing polylactide (PLA), a polymer which has received a lot of recent press due to the fact that it can be made entirely from natural, renewable feedstock. Cargill Dow LLC (http://www.cargilldow.com/) is currently synthesizing PLA from corn at a new facility in Blair, Nebraska. Like any polymer material, the uses of PLA are largely determined by the polymer's physical properties; you can read Cargill Dow scientists' review of these properties and uses in: Drumright, R. E.; Gruber, P. R.; Henton, D. E. "Polylactic Acid Technology." *Adv. Mater.* **2000**, *12*, 1841. Like Cargill Dow, you will be synthesizing your polymer by tin-catalyzed ring-opening polymerization. (Info on the mechanism: Kricheldorf, H. R.; Kreiser-Saunders, I.; Boettcher, C. *Polymer* **1995**, *36*, 1995.)

L-lactide   poly(L-lactide)
                                                  PLLA
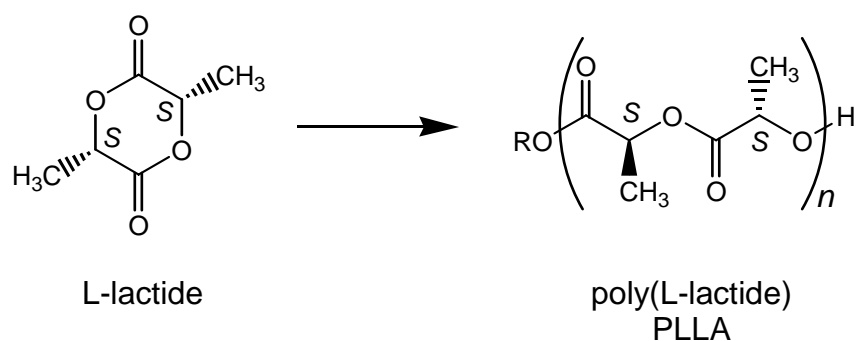
As this article points out, the properties and processing of PLA are intimately related to its stereochemical purity, i.e., the relative amounts of L- and D-lactic acid units (or *S* and *R* stereocenters) that are present in the polymer. This dependence of properties on stereoisomeric purity is the focus of Lab 6. In addition to polymerizing pure L-lactide to form isotactic PLLA, you will also be intentionally doping your natural L-lactide with "impurity", racemic lactide, according to the following chart:

Pair #	1	2	3	4	5	6	7	8	9	10	11
% L-lactide	98%	85%	95%	80%	92%	75%	90%	70%	95%	88%	65%

The chart shows the percentage of pure material you'll use; the remainder will be *rac*-lactide. The dark boxes show "supergroups" that will be sharing data and instrument time in this lab.

Calculate how many grams of racemic lactide and how many grams of L-lactide you will be using to synthesize your stereochemically "impure" material. Given your pair's percentage of racemic lactide, what will be the fraction of R and S stereocenters in your material? What about in the material from the other members of your supergroup?