

## CHE 173

Winter, 2005

### Supplemental Procedure

**Lab 4:** Chain-growth Polymerization of Styrene and Methyl Methacrylate (Lehman, Experiment 25)

In this experiment you will conduct two polymerization reactions simultaneously; one is the polymerization of styrene and the other is the polymerization of methyl methacrylate. Follow the procedure below for both reactions:

1. Fill a medium-sized beaker with water and begin heating on a hot plate.
2. Obtain two test tubes. Measure 20 mmol of styrene into one (label flask "A") and 20 mmol of methyl methacrylate into the other (label flask "B").
3. Add 10 mL of toluene to flask A, followed by 0.1 g of benzoyl peroxide.
4. Add 10 mL of toluene to flask B, followed by ~5 drops of t-butyl peroxybenzoate.
5. Put both test tubes into the water bath and heat for one hour.
6. When finished heating, transfer the contents of test tubes A and B into two separate flasks, each containing ~10 mL of methanol (you may use methanol to rinse out the test tubes, as well), and work up each product as described in steps 7-10, below.
7. Allow the polymer product to solidify and settle out of solution. Decant off most of the methanol, then add more methanol (10 mL), swirl the solution, let it settle and decant off the methanol again (repeat this "washing" procedure again if necessary, until the original "gooey" product becomes more "solid" and can be filtered).
8. Collect the solid product by vacuum filtration and pull a vacuum on the product until it appears dry.
9. Record the mass of your product.
10. Prepare samples for IR analysis as follows:
  - (a) dissolve 50 mg of the product in 10 mL of tetrahydrofuran (THF)
  - (b) transfer about 10 drops of the solution to a clean microscope slide and tilt to coat the slide evenly
  - (c) let the solvent evaporate completely under the hood at your bench
  - (d) *carefully* strip off the polymer film with a razor blade and record the IR spectrum of the film
  - (e) interpret the spectrum as completely as you can and calculate the thickness of the film (see Lehman, p. 199)