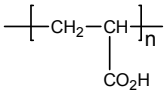
Sample Name:
Poly(acrylic acid)
Sample #: **P3134-AA**

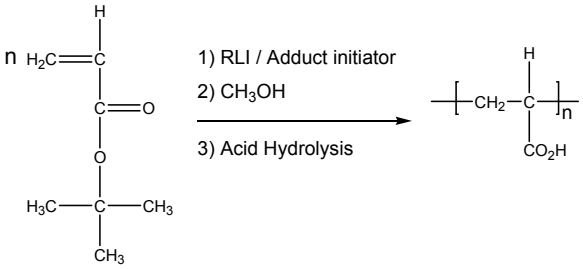
Structure:



Composition:

8.0	1.3
1.3	1.3

Synthesis Procedure:
Poly(acrylic acid) is synthesized by anionic polymerization of t-butyl acrylate followed by hydrolysis of the tert. butyl group. The reaction scheme is below.



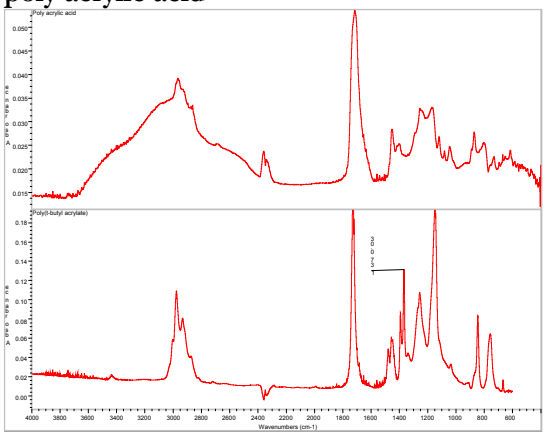
Characterization:

The molecular weight and polydispersity index (PDI) are obtained by size exclusion chromatography (SEC) in THF. SEC analysis was performed on a Varian liquid chromatograph equipped with refractive and UV light scattering detectors. Three SEC columns from Supelco (G6000-4000-2000 HXL) were used with triple detectors from Viscotek Co.

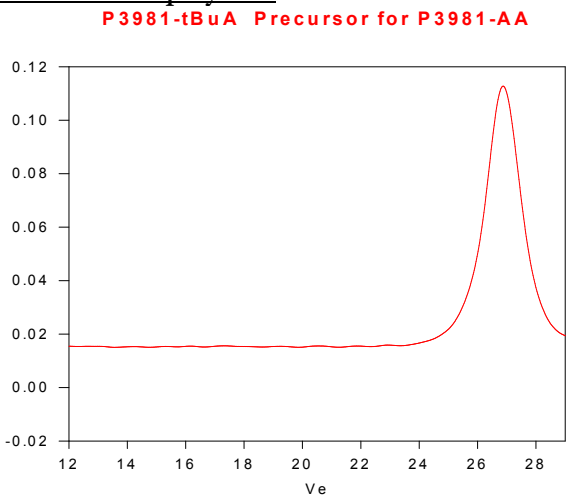
Hydrolyis: The quantitative hydrolysis of the ester is confirmed by the disappearance of tert.butyl ester absorbance at around 1370cm-1.

Solubility:
Poly(acrylic acid) is soluble in THF, water, methanol, ethanol. The polymer precipitates from ether, acetone, and hexane.

FTIR Spectra of Poly tert. butyl acrylate and poly acrylic acid



SEC of Homopolymer:



Size Exclusion Chromatography of Poly tert-butyl acrylate: M_n=2300, M_w=3000, PI=1.3 after hyrolysis of tert.butyl ester

Polyacrylic acid: M_n=1300 M_w/M_n=1.3

References:

1. Ph. Teyssie, Ph. Bayard, R. Jerome, **S. K. Varshney**, and J. S. Wang, *35th IUPAC International Union of Pure & Applied Chemistry International Symposium on Macromolecules" 1994, 67.*
2. R. Fayt, R. Forte, C. Jacobs, R. Jerome, T. Ouhadi, Ph. Teyssie and **S. K. Varshney,** *Macromolecules, 1987, 20, 1442-1444.*
3. Jerome, R. Forte, **S. K. Varshney**, R. Fayt, and Ph. Teyssie, "The Anionic Polymerization of Alkylacrylates:A Challenge" in the Recent Advances in Mechanistic and Synthetic Aspects of Polymerization: M. Fontanaille and A. Guyot Ed., NATO ASI Series *C 215,101 (1987), CA Vol. 108, 12, 094992.*
4. Ph. Teyssie, R. Fayt, C. Jacobs, R. Jerome, L. Leemans, and **S. K. Varshney** *Am. Chem. Soc.,Polym. Prepr. 1988, 28, 2, 52-53*