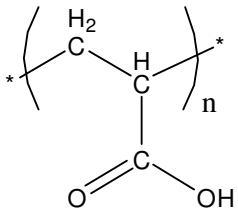
Sample Name: **Poly(acrylic acid)**

Sample #: **P11089A-AA**

Structure:

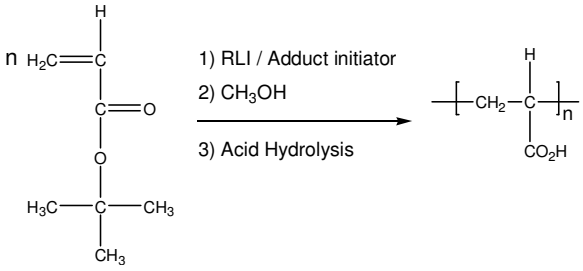


Composition:

M_n x 10^3 (g/mol)	M_w/M_n
84.0	1.13

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:

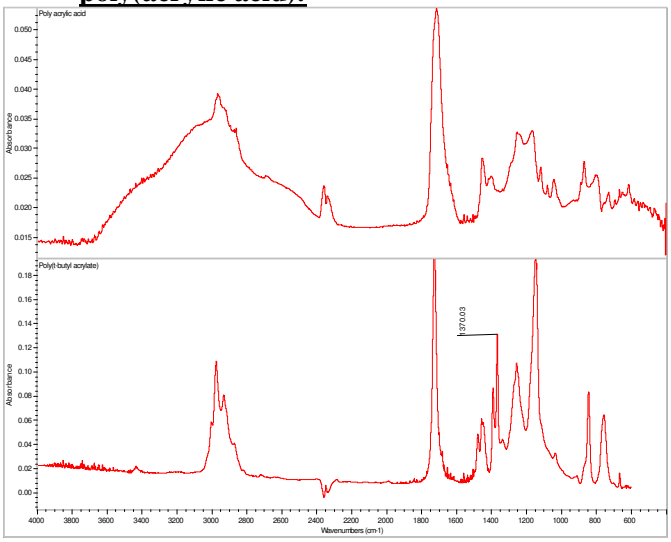
The molecular weight and polydispersity index (PDI) are obtained by size exclusion chromatography (SEC) in THF. SEC analysis was performed on a Varian liquid chromatograph equipped with refractive and UV light scattering detectors. Three SEC columns from Supelco (G6000-4000-2000 HXL) were used with triple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

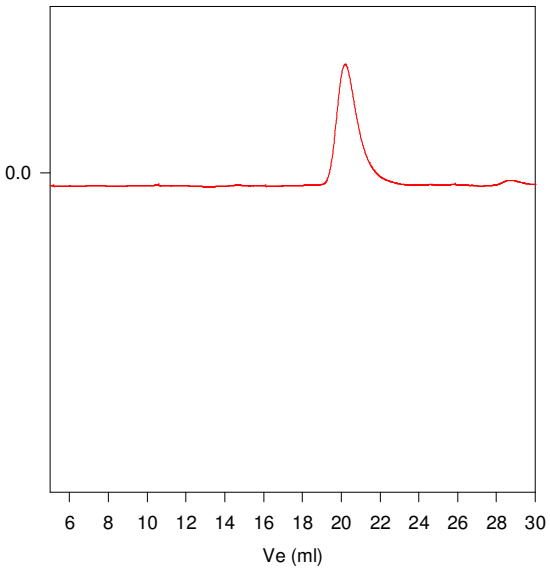
Poly(acrylic acid) is soluble in THF, water, methanol, ethanol. The polymer precipitates from ether, acetone, hexane.

FTIR spectra of poly(tert-butyl acrylate) and poly(acrylic acid):



SEC of poly(tert-butyl acrylate) precursor:

P11089-tBuA for P11089-AA



Size Exclusion Chromatography of Poly tert.Butyl acrylate

Mn : 150,000 Mw: 169,000 Mw/Mn 1.13
after Hydrolysis of tert. butyl ester PAA : Mn 84,000 Mw/Mn 1.13

References:

1. Ph. Teyssie, Ph. Bayard, R. Jerome, **S. K. Varshney**, 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, **S. K. Varshney**. *Macromolecules, 1987, 20, 1442–1444.*
3. R. Jerome, R. Forte, **S. K. Varshney**, R. Fayt, 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, **S. K. Varshney**. *Am. Chem. Soc.,Polym. Prepr. 1988, 28, 2, 52–53.*