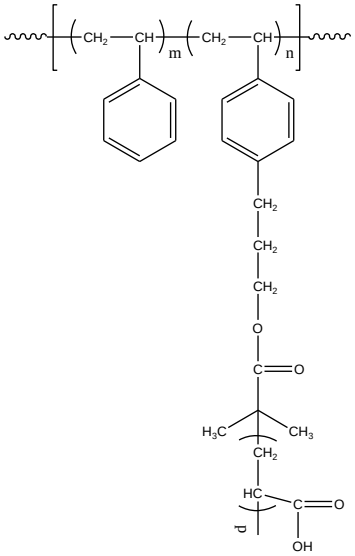
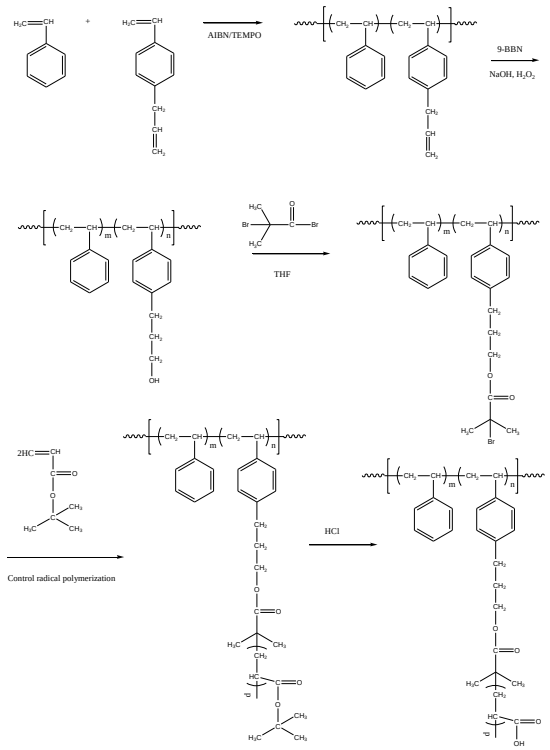
Sample Name: **Polystyrene grafted with poly acrylic acid**

Sample #: **P14642B-SAAcomb**

Structure:





Composition:

Mn x 10^3 (Styrene main chain)	40.4
Mn x 10^3 (Each PAA graft chain)	1.9
Mw/Mn	6.1
Ratio of m:n (mol/mol by NMR)	7 : 1
Number of branching in polymer	48

Synthesis Procedure:

The brief synthetic route is illustrated as following scheme. The styrene-co-allyl styrene was firstly prepared, followed by the hydroxylation of double bond of allyl group, and then the polymer was reacted with 2-bromo isobutyryl bromide to form bromo-functionalized polymer. Poly(tert-butyl acrylate) was grafted onto the polymer by controlled radical process and final polystyrene grafted with poly acrylic acid was obtained by hydrolysis of poly(tertbutyl acrylate) to poly(acrylic acid) branches.

Characterization:

The molecular weight and polydispersity index (PDI) of polymers are obtained by light scattering size exclusion chromatography. The composition of styrene-co-allyl styrene copolymer is determined by NMR by comparing the double bond at 5.97 ppm and 5.06 ppm to the aromatic protons. The hydroxylation was confirmed by the disappearance of double bond proton and the esterification was proved by the appearance of methylene group adjacent to the ester groups at 4.16ppm. The molecular weight of polytert butyl acrylate grafting chain was determined by proton NMR and the molecular weight of resulting polyacrylic acid grafting chain was calculated accordingly.

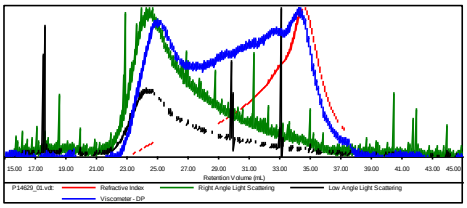
Solubility:

The grafted polymer is soluble in DMF and dioxane.

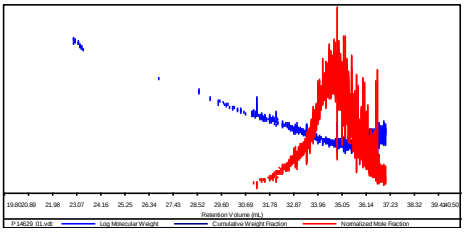
SEC of poly(styrene-co-allyl styrene):

Sample ID: P14629

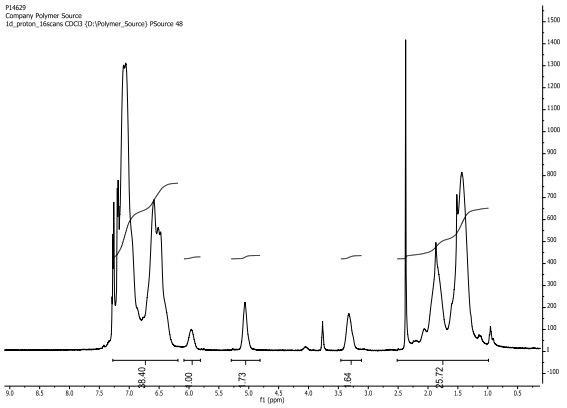
Concentration (mg/mL)	5.6628
Sample dn/dc (mL/g)	0.1850
Method File	PS80K-Aug-2013-0003.vcm
Column Set	3x PL 1113-6300
System	System 1



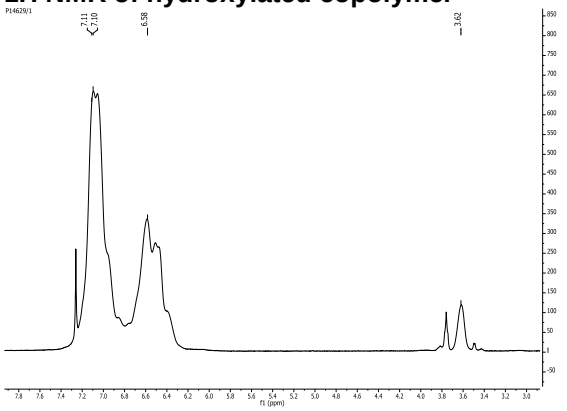
Sample	Mn	Mw	Mp	Mw/Mn	IV
P14629_01.vdt	40,369	248,286	24,988	6.150	0.3655



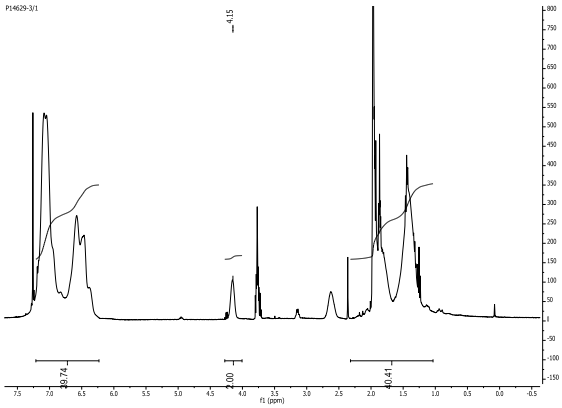
1H NMR of Poly(styrene-co-allyl styrene)



1H NMR of hydroxylated copolymer



1H NMR of bromo-functionalized copolymer



1H NMR of poly(styrene-graft-tert butyl acrylate)