

Supplementary Material

The Synthesis of Novel Triazole-Containing Phosphonate Polymers

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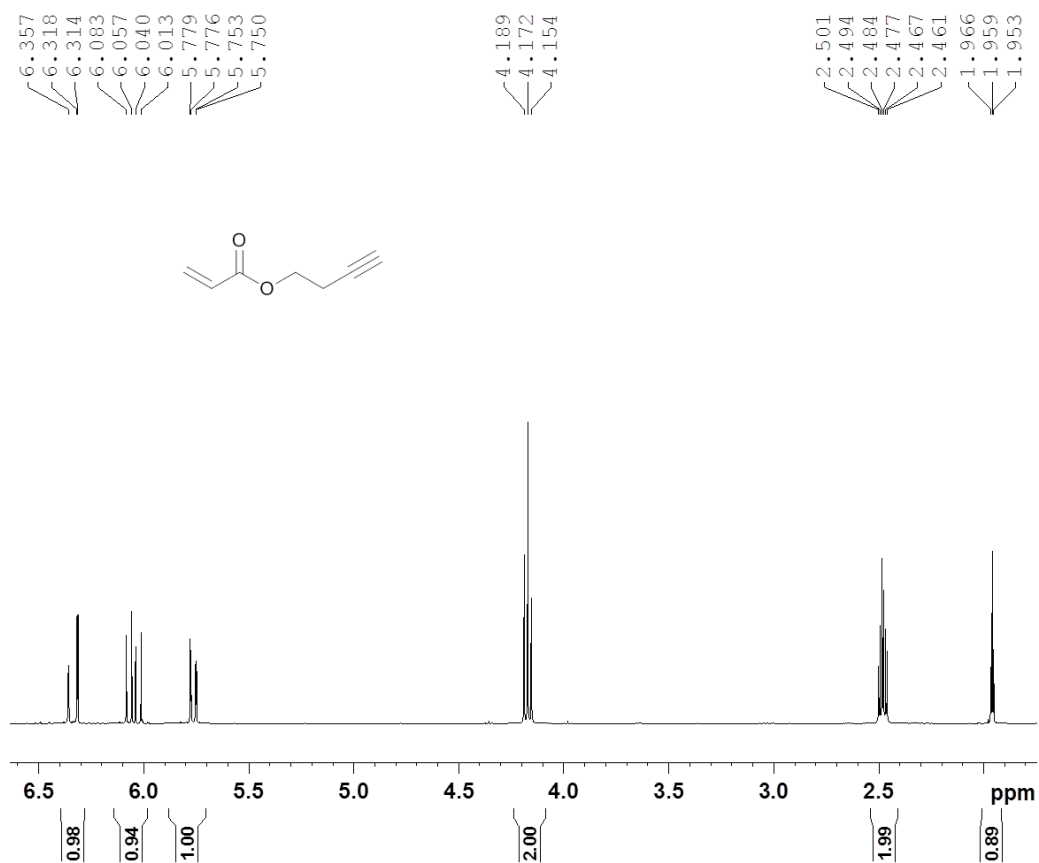


Figure S1: ¹H NMR in CDCl₃ of but-3-yn-1-yl acrylate (**1**).

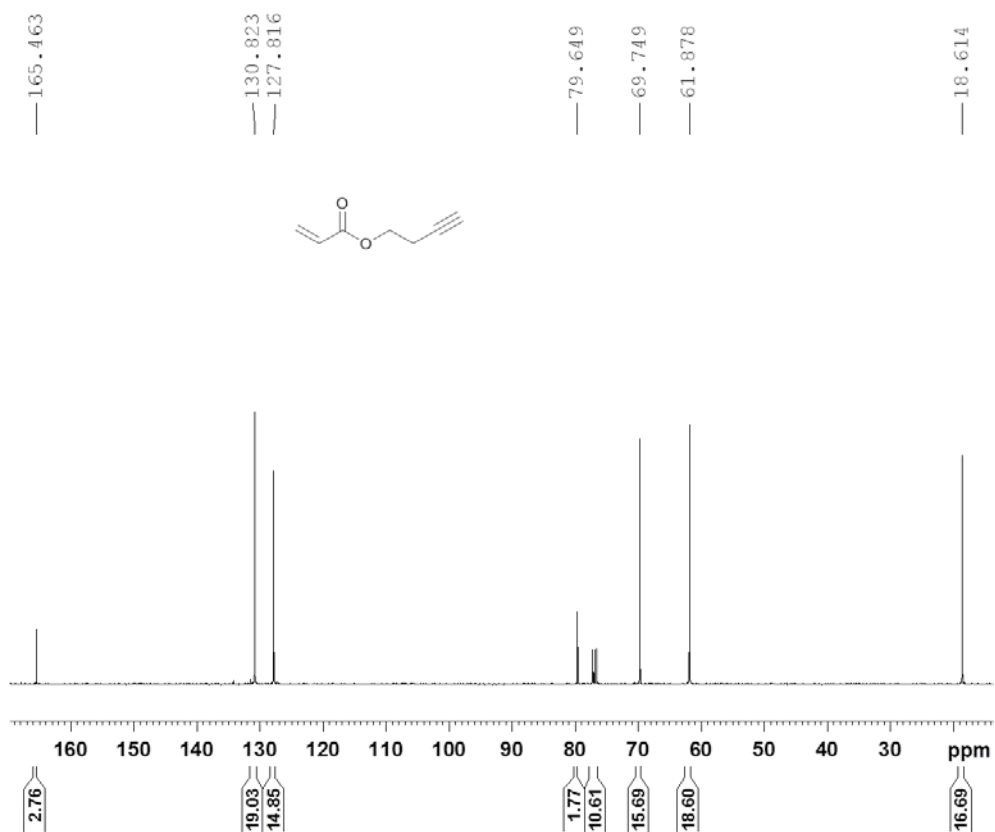


Figure S2: ¹³C NMR in CDCl₃ of but-3-yn-1-yl acrylate (**1**).

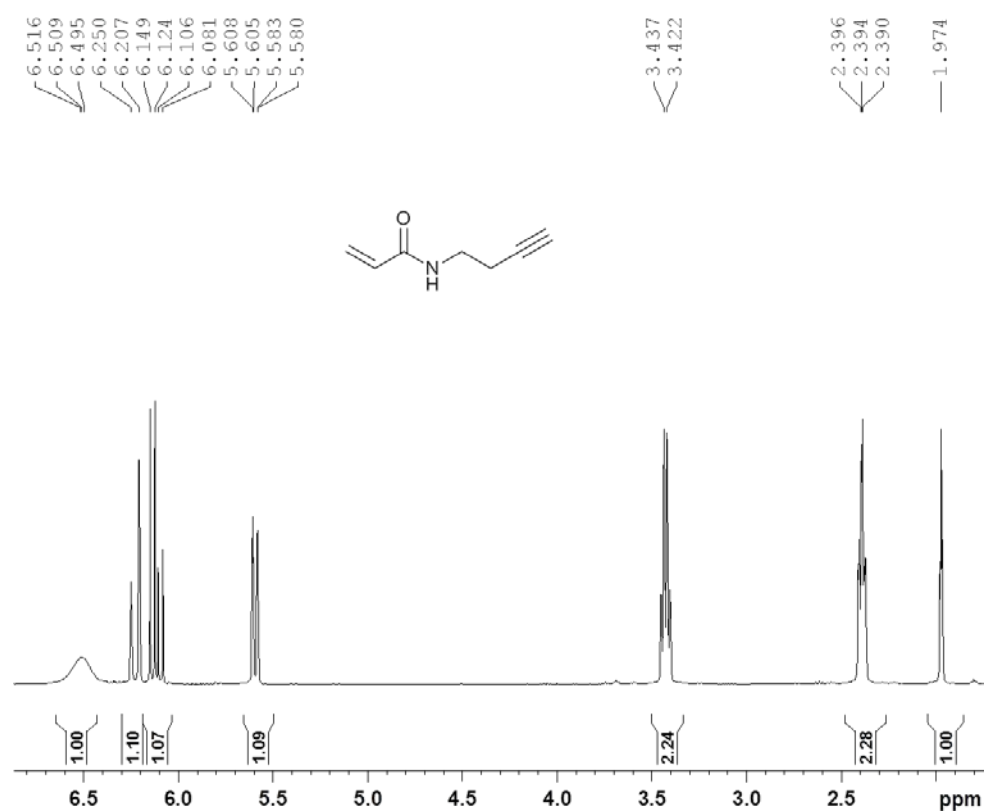


Figure S3: ¹H NMR in CDCl₃ of *N*-(but-3-yn-1-yl)acrylamide (2).

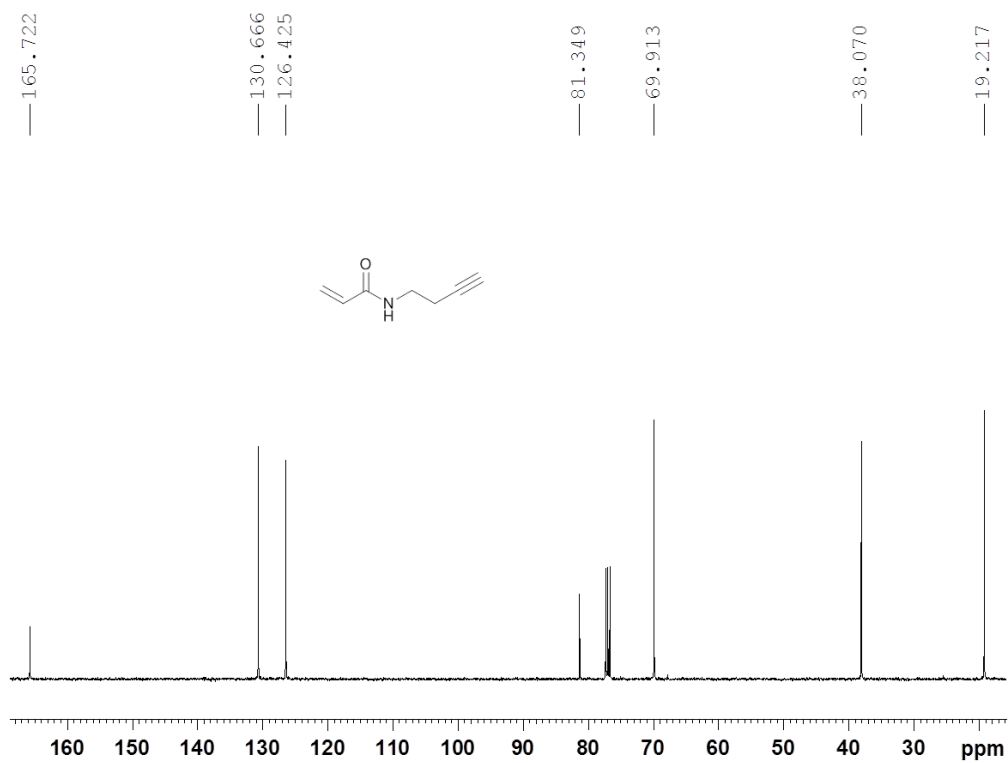


Figure S4: ¹³C NMR in CDCl₃ of *N*-(but-3-yn-1-yl)acrylamide (2).

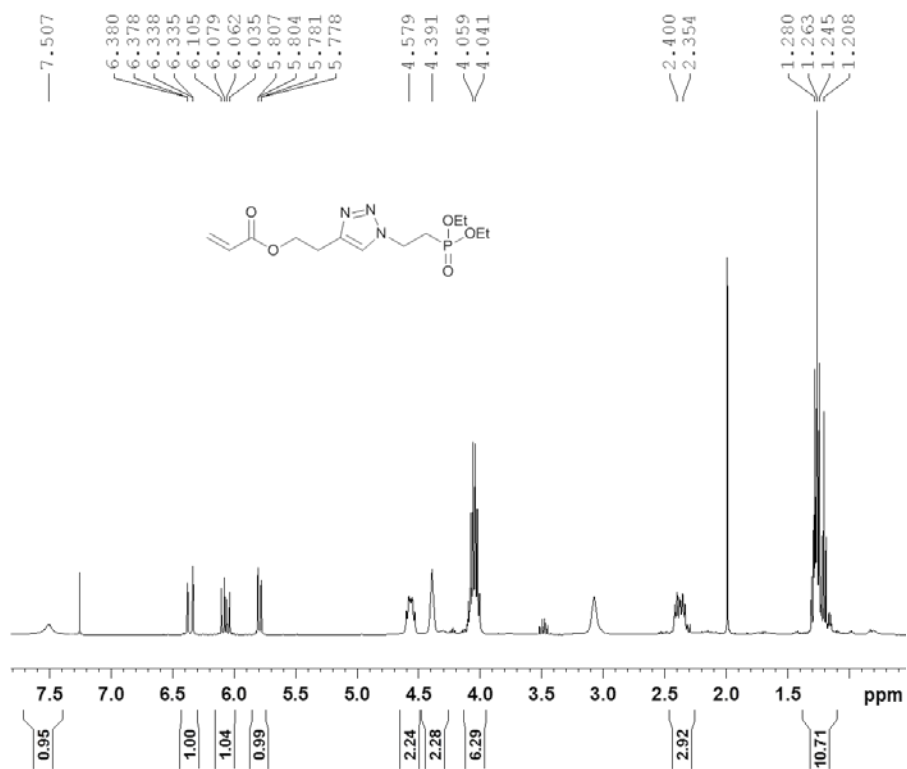


Figure S5: ¹H NMR in CDCl₃ of 2-(1-(2-(diethoxyphosphoryl)ethyl)-1H-1,2,3-triazol-4-yl)ethyl acrylate (**4/M1**).

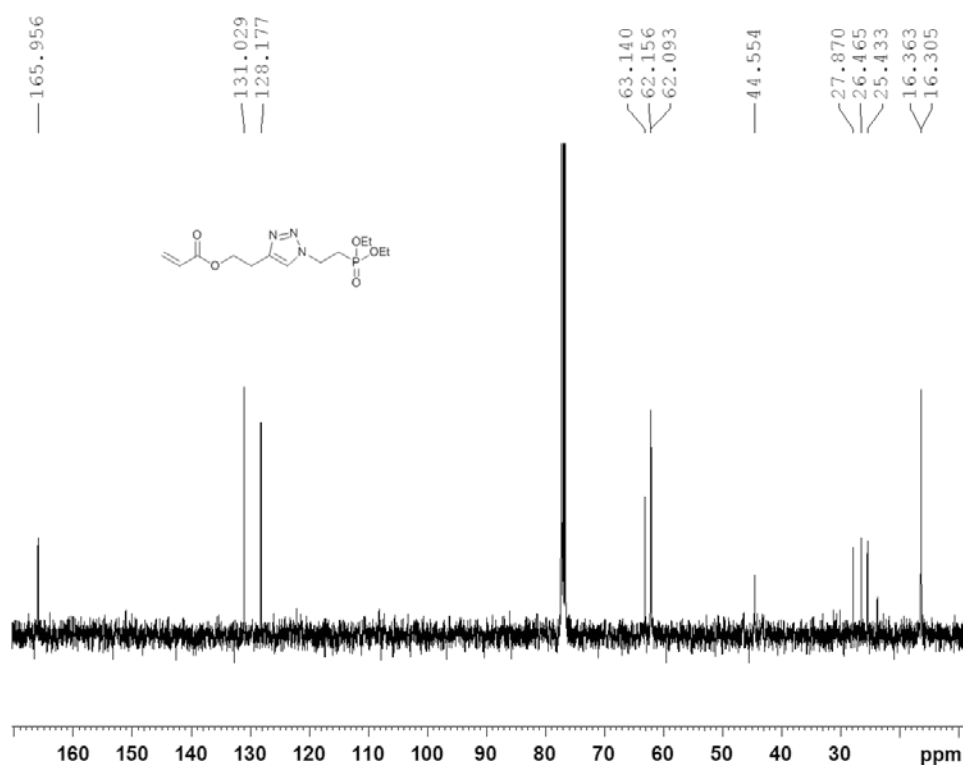


Figure S6: ¹³C NMR in CDCl₃ of 2-(1-(2-(diethoxyphosphoryl)ethyl)-1H-1,2,3-triazol-4-yl)ethyl acrylate (**4/M1**).

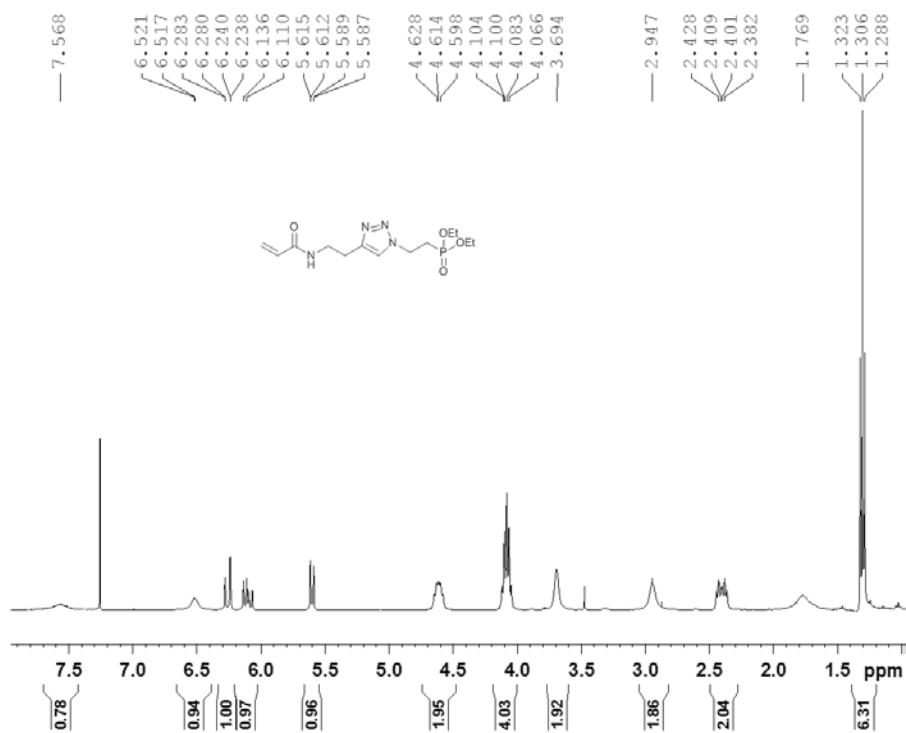


Figure S7: ¹H NMR in CDCl₃ of diethyl (2-(4-(2-acrylamidoethyl)-1H-1,2,3-triazol-1-yl)ethyl)phosphonate (**5/M2**).

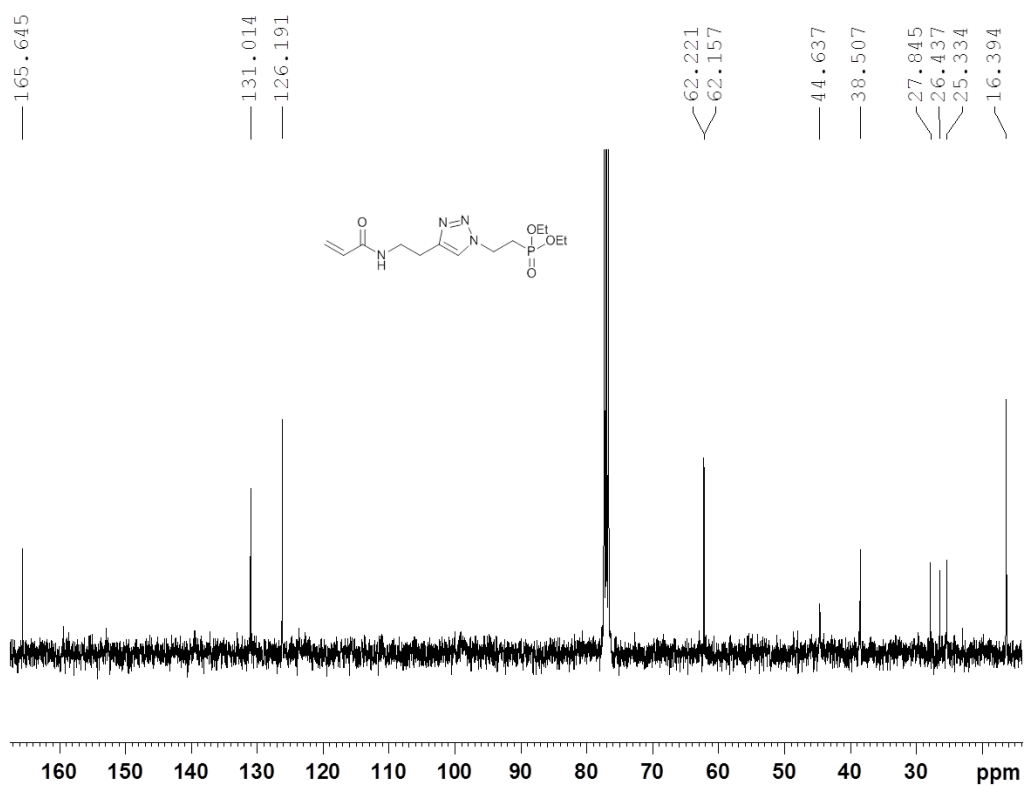


Figure S8: ¹³C NMR in CDCl₃ of diethyl (2-(4-(2-acrylamidoethyl)-1H-1,2,3-triazol-1-yl)ethyl)phosphonate (**5/M2**).

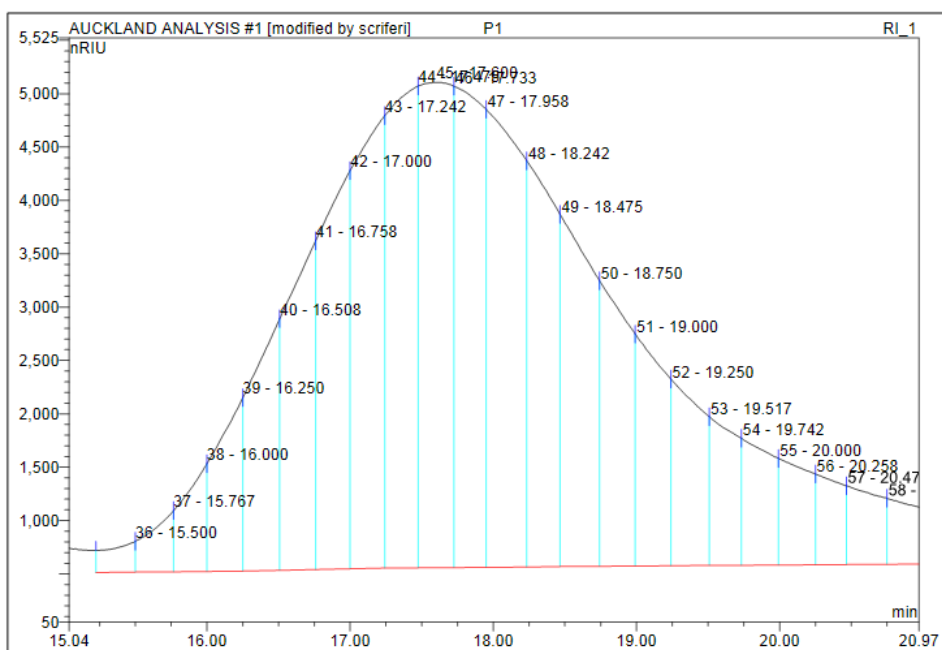


Figure S10: GPC chromatogram of **P1**.

P1						
Integration start	Fraction midpoint	Integration	w_i	M_i	$w_i M_i$	w_i / M_i
15.5	15.6335	64	1%	83543.83	440.8	6.31E-08
15.767	15.8835	110	1%	60665.73	550.1	1.49E-07
16	16.125	181	1%	45024.88	671.8	3.31E-07
16.25	16.379	327	3%	33284.44	897.2	8.1E-07
16.508	16.633	513	4%	24892.94	1053	1.7E-06
16.758	16.879	679	6%	18994.84	1063	2.95E-06
17	17.121	825	7%	14709.92	1000	4.62E-06
17.242	17.361	966	8%	11530.88	918.2	6.91E-06
17.48	17.54	1026	8%	9678.039	818.5	8.74E-06
17.6	17.665	1134	9%	8591.423	803.1	1.09E-05
17.73	17.845	993	8%	7271.015	595.2	1.13E-05
17.96	18.1	1151	9%	5793.626	549.7	1.64E-05
18.24	18.36	831	7%	4646.936	318.3	1.47E-05
18.48	18.615	821	7%	3783.234	256	1.79E-05
18.75	18.875	605	5%	3100.785	154.6	1.61E-05
19	19.125	488	4%	2586.906	104.1	1.56E-05
19.25	19.385	417	3%	2164.861	74.42	1.59E-05
19.52	19.63	289	2%	1847.863	44.02	1.29E-05
19.74	19.87	282	2%	1596.397	37.11	1.46E-05
20	20.13	238	2%	1375.725	26.99	1.43E-05
20.26	20.37	191	2%	1209.833	19.05	1.3E-05
20.48						
		$1 / \sum w_i / M_i$	M_n	5009		
		$\sum w_i M_i$	M_w	10396		
			\bar{D}	2.1		

Figure S11: Table showing calculations of M_n , M_w and M_w/M_n (\bar{D}) for polymer **P1**.

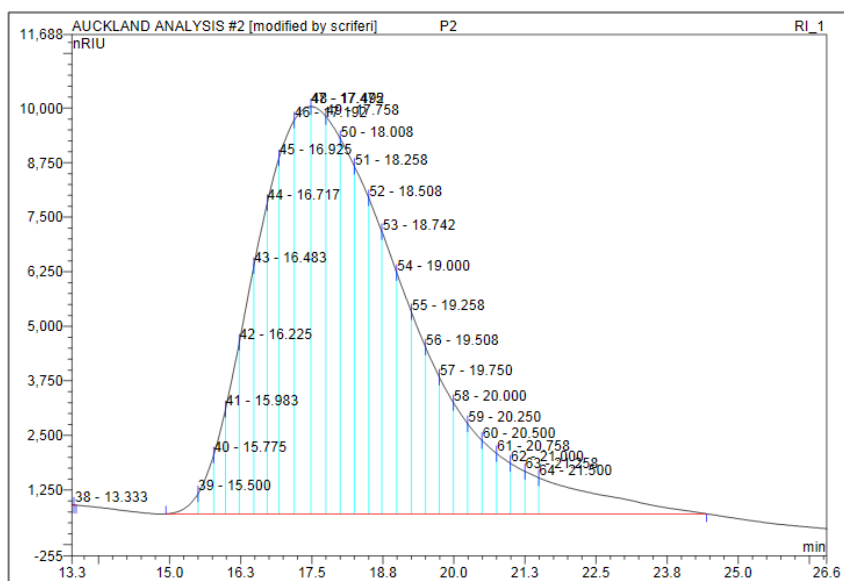


Figure S12: GPC chromatogram of **P2**.

P2							
Integrator	Fraction m	Integrator	w_i	M_i	$w_i M_i$	w_i / M_i	
	15.5	15.64	80	0%	82839.46	230.4216	3.36E-08
	15.78	15.88	237	1%	60933.25	502.1098	1.35E-07
	15.98	16.105	386	1%	46131.79	619.1325	2.91E-07
	16.23	16.355	761	3%	34231.22	905.7389	7.73E-07
	16.48	16.6	1244	4%	25833.58	1117.38	1.67E-06
	16.72	16.825	1500	5%	20138.07	1050.28	2.59E-06
	16.93	17.06	1598	6%	15673.93	870.8647	3.54E-06
	17.19	17.335	2303	8%	11833.43	947.5464	6.77E-06
	17.48	17.485	2691	9%	10207.28	955.0356	9.17E-06
	17.49	17.625	2468	9%	8922.597	765.6538	9.62E-06
	17.76	17.885	2217	8%	7011.498	540.4711	1.1E-05
	18.01	18.135	2072	7%	5620.513	404.913	1.28E-05
	18.26	18.385	1903	7%	4552.075	301.1925	1.45E-05
	18.51	18.625	1600	6%	3753.65	208.8189	1.48E-05
	18.74	18.87	1550	5%	3112.354	167.7323	1.73E-05
	19	19.13	1312	5%	2577.806	117.5926	1.77E-05
	19.26	19.385	1054	4%	2164.861	79.33532	1.69E-05
	19.51	19.63	839	3%	1847.863	53.90483	1.58E-05
	19.75	19.875	708	2%	1591.686	39.182	1.55E-05
	20	20.125	575	2%	1379.537	27.58018	1.45E-05
	20.25	20.375	467	2%	1206.706	19.59361	1.35E-05
	20.5	20.63	396	1%	1062.571	14.63016	1.3E-05
	20.76	20.88	307	1%	946.4724	10.10281	1.13E-05
	21	21.13	275	1%	850.4909	8.132019	1.12E-05
	21.26	21.38	218	1%	770.8735	5.842997	9.83E-06
	21.5	10.75					
			$1 / \sum w_i / M_i$	M_n	4095		
			$\sum w_i M_i$	M_w	9963		
			\bar{D}		2.4		

Figure S13: Table showing calculations of M_n , M_w and M_w/M_n (\bar{D}) for polymer **P2**.

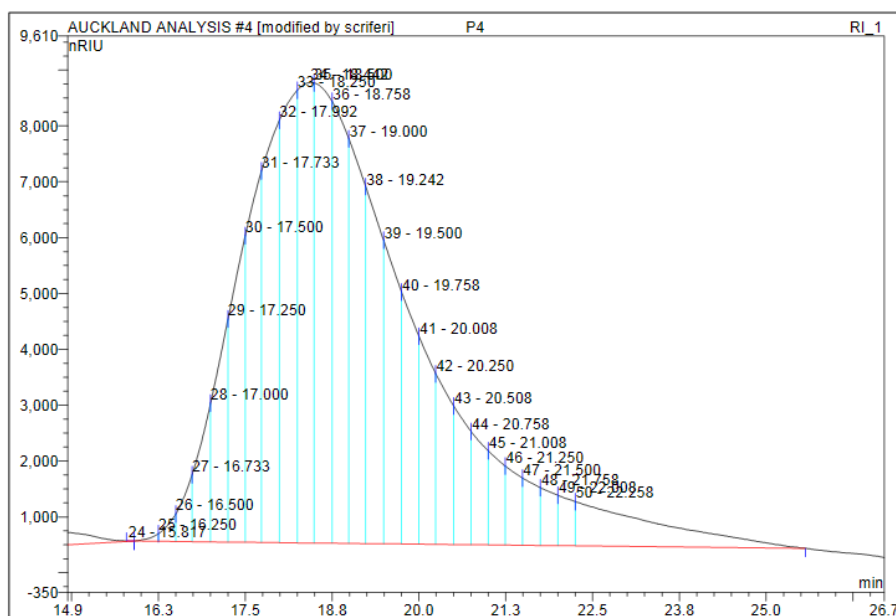


Figure S16: GPC chromatogram of **P4**.

P4							
Integrator	Fraction m	Integrator	w _i	M _i	w _i M _i	w _i / M _i	
	15.82	16.035	0.24	0%	50253.6106	0.514208	2.04E-10
	16.25	16.375	17	0%	33440.1602	24.23692	2.17E-08
	16.5	16.615	73	0%	25401.079	79.05606	1.23E-07
	16.73	16.865	189	1%	19283.8972	155.3877	4.18E-07
	17	17.125	480	2%	14649.1546	299.7878	1.4E-06
	17.25	17.375	806	3%	11371.7386	390.7707	3.02E-06
	17.5	17.615	1189	5%	9007.74673	456.6234	5.63E-06
	17.73	17.86	1423	6%	7172.36429	435.1383	8.46E-06
	17.99	18.12	1844	8%	5693.9212	447.6437	1.38E-05
	18.25	18.345	2033	9%	4705.02853	407.8118	1.84E-05
	18.44	18.47	1983	8%	4247.01741	359.0599	1.99E-05
	18.5	18.63	2096	9%	3738.96755	334.1205	2.39E-05
	18.76	18.88	1837	8%	3089.27033	241.9498	2.54E-05
	19	19.12	1649	7%	2596.0485	182.5129	2.71E-05
	19.24	19.37	1527	7%	2186.59963	142.3536	2.98E-05
	19.5	19.63	1284	5%	1847.86269	101.1567	2.96E-05
	19.76	19.885	1027	4%	1582.32227	69.28281	2.77E-05
	20.01	20.13	817	3%	1375.72538	47.91968	2.53E-05
	20.25	20.38	714	3%	1203.59178	36.63849	2.53E-05
	20.51	20.635	562	2%	1060.02266	25.39871	2.26E-05
	20.76	20.885	462	2%	944.369709	18.60134	2.09E-05
	21.01	21.13	374	2%	850.490855	13.5613	1.87E-05
	21.25	21.375	327	1%	772.325665	10.76734	1.81E-05
	21.5	21.63	289	1%	704.674519	8.682535	1.75E-05
	21.76	21.885	242	1%	648.568099	6.691617	1.59E-05
	22.01	22.135	211	1%	602.887684	5.423492	1.49E-05
	22.26						
			1 / Σ w _i / M _n	M _n	2417		
			Σ w _i M _i	M _w	4301		
			Đ		1.8		

Figure S17: Table showing calculations of M_n, M_w and M_w/M_n (Đ) for polymer **P4**.

Polystyrene standards: (name, retention time, Mw)

A500	22.042	589
A1000	20.875	1013
A2500	19.267	2500
A5000	18.108	6200
F1	17.400	9490
F2	16.858	15400
F4	16.317	37200
F10	15.625	98900
F20	15.092	189000
F40	14.567	397000
F80	14.158	707000
F128	13.808	1110000

Figure S9: Table showing the polystyrene standards used in calculating the relative weight average molecular weight (M_w) of polymers **P1-P4**.