

Chemical Additives Facilitate Molecular Weight Characterization of Underivatized Dextran by High-resolution Electrospray Ionization Mass Spectrometry

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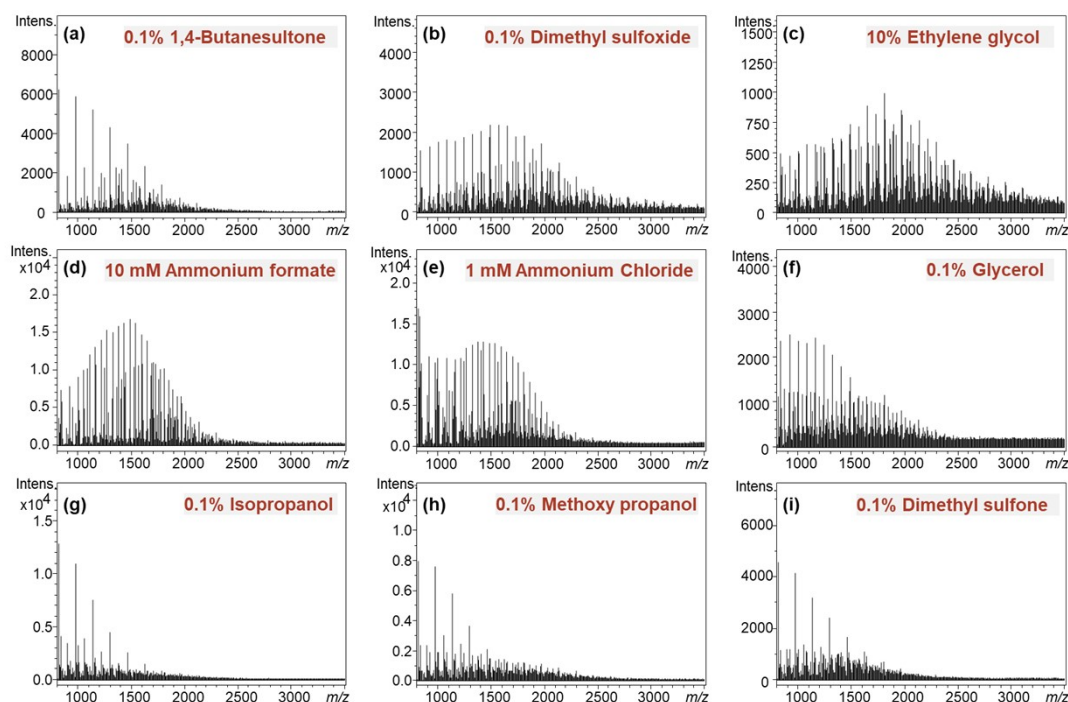


Figure S1. ESI-MS results of other chemical additives that were screened for dextran, including (a) 1,4-Butanesultone, (b) Dimethyl sulfoxide, (c) Ethylene glycol, (d) Ammonium formate, (e) Ammonium Chloride, (f) Glycerol, (g) Isopropanol, (h) Methoxy propanol, (i) Dimethyl sulfone. Displayed results were spectra assisted by additives at the optimal concentration.

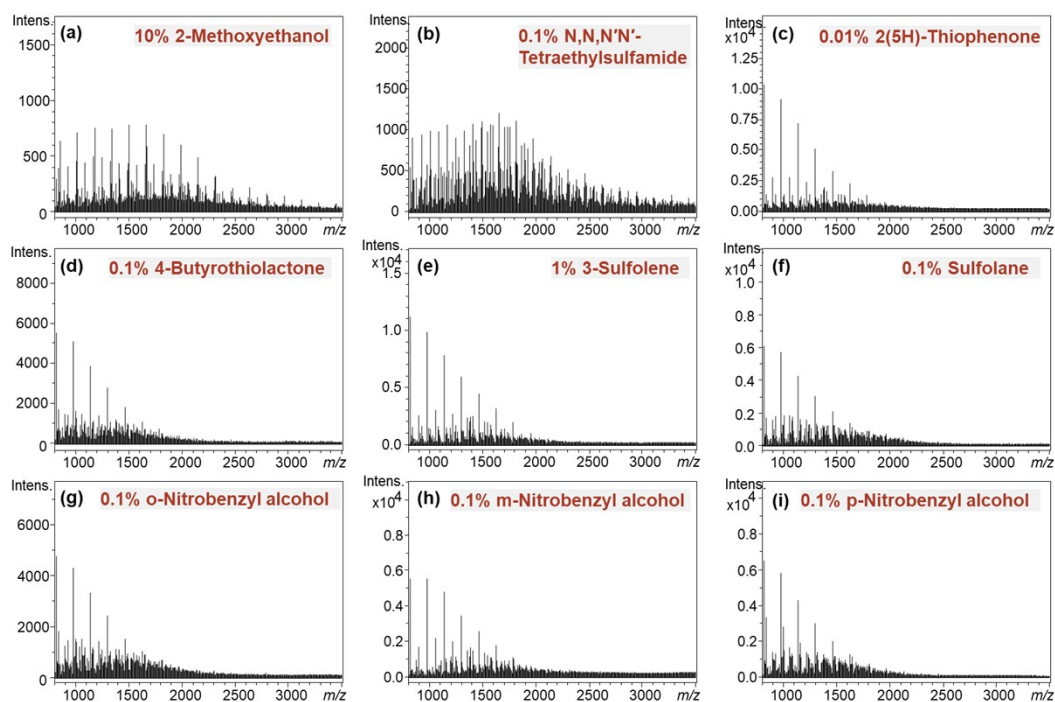


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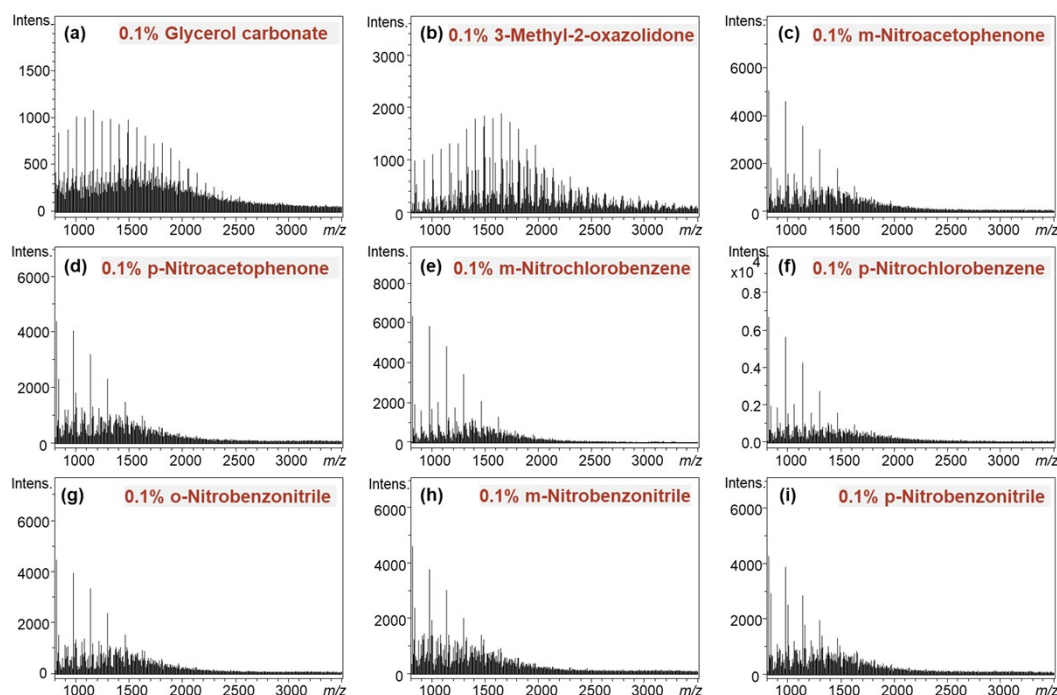


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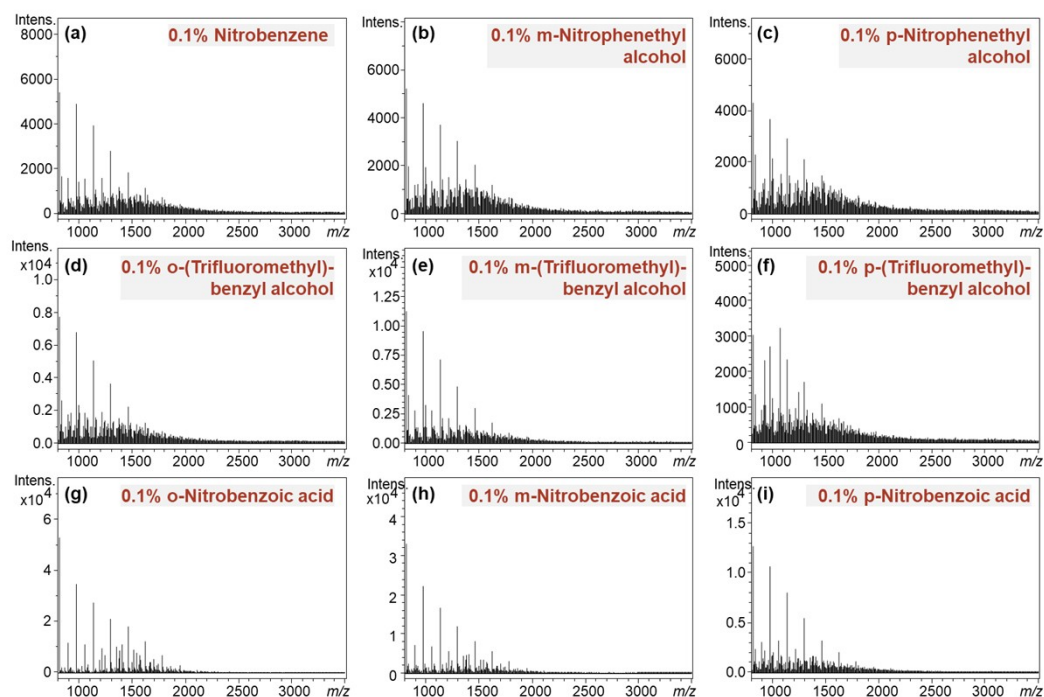
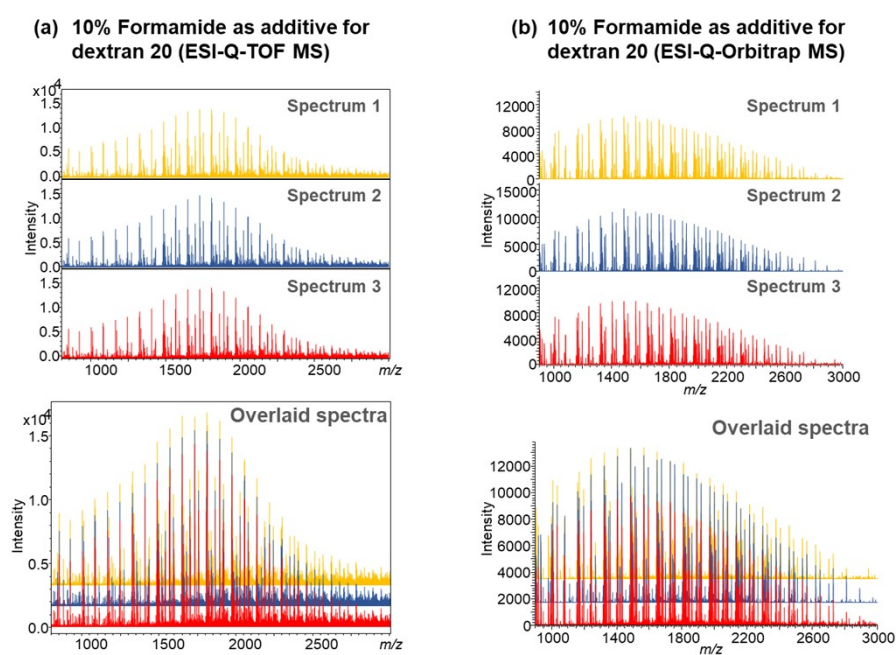


Figure S4. ESI-MS results of other chemical additives that were screened for dextran, including (a) Nitrobenzene, (b) m-Nitrophenethyl alcohol, (c) p-Nitrophenethyl alcohol, (d) o-(Trifluoromethyl)-benzyl alcohol, (e) m-(Trifluoromethyl)-benzyl alcohol, (f) p-(Trifluoromethyl)-benzyl alcohol, (g) o-Nitrobenzoic acid, (h) m-Nitrobenzoic acid, (i) p-Nitrobenzoic acid. Displayed results were spectra assisted by additives at the optimal concentration.



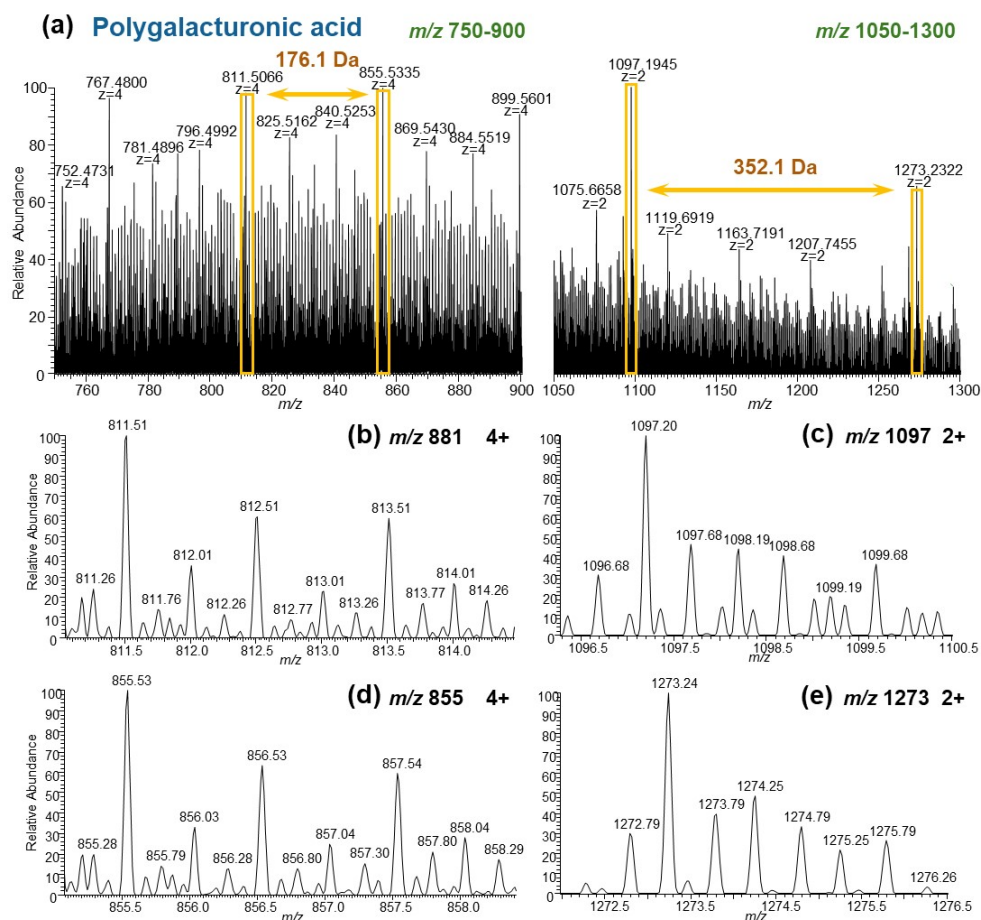


Figure S8. MS spectrum of polygalacturonic acid, magnifying *m/z* 750-900 and *m/z* 1050-1300 as examples.

Table S1. The list of all potential additive chemicals and tested conditions.

No.	Additives	Tested conditions
1	Formic acid	0.1%, 1%, 10%
2	1,3-Propanesultone	0.1%, 1%, 10%
3	Formamide	0.1%, 1%, 10%, 20%
4	Ammonium nitrate	0.1mM, 1mM, 10mM, 100mM
5	Ammonium acetate	0.1mM, 1mM, 10mM, 100mM
6	1,4-Butanesultone	0.1%, 1%, 10%
7	Dimethyl sulfoxide	0.1%, 1%, 10%
8	Ethylene glycol	0.1%, 1%, 10%
9	Ammonium formate	0.1mM, 1mM, 10mM, 100mM
10	Ammonium chloride	0.1mM, 1mM, 10mM, 100mM
11	Glycerol	0.1%, 1%, 10%
12	Isopropanol	0.1%, 1%, 10%
13	Methoxy propanol	0.1%, 1%, 10%

14	Dimethyl sulfone (200mg/mL in H ₂ O) ^a	0.1%, 1%, 10%
15	2-Methoxyethanol	0.1%, 1%, 10%
16	N,N,N'-Tetraethylsulfamide	0.1%, 1%, 10%
17	2(5H)-Thiophenone	0.01%, 0.1%, 1% ^b
18	4-Butyrolactone	0.1%, 1%, 10%
19	3-Sulfolene	0.1%, 1%, 10%
20	Sulfolane	0.1%, 1%, 10%
21	o-Nitrobenzyl alcohol (200mg/mL in MeOH)	0.01%, 0.1%, 1%
22	m-Nitrobenzyl alcohol (200mg/mL in MeOH)	0.01%, 0.1%, 1%
23	p-Nitrobenzyl alcohol (200mg/mL in MeOH)	0.01%, 0.1%, 1%
24	Glycerol carbonate	0.1%, 1%, 10%
25	3-Methyl-2-oxazolidone	0.1%, 1%, 10%
26	m-Nitroacetophenone (50mg/mL in MeOH)	0.01%, 0.1%, 1%
27	p-Nitroacetophenone (50mg/mL in MeOH)	0.01%, 0.1%, 1%
28	m-Nitrochlorobenzene	0.1%, 1%, 10%
29	p-Nitrochlorobenzene	0.1%, 1%, 10%
30	o-Nitrobenzonitrile (25mg/mL in MeOH)	0.01%, 0.1%, 1%
31	m-Nitrobenzonitrile (25mg/mL in MeOH)	0.01%, 0.1%, 1%
32	p-Nitrobenzonitrile (25mg/mL in MeOH)	0.01%, 0.1%, 1%
33	Nitrobenzene	0.01%, 0.1%, 1%
34	m-Nitrophenethyl alcohol (200mg/mL in MeOH)	0.1%, 1%, 10%
35	p-Nitrophenethyl alcohol (200mg/mL in MeOH)	0.1%, 1%, 10%
36	o-(Trifluoromethyl)-benzyl alcohol	0.1%, 1%, 10%
37	m-(Trifluoromethyl)-benzyl alcohol	0.1%, 1%, 10%
38	p-(Trifluoromethyl)-benzyl alcohol	0.1%, 1%, 10%
39	o-Nitrobenzoic acid (200mg/mL in MeOH)	0.1%, 1%, 10%
40	m-Nitrobenzoic acid (200mg/mL in MeOH)	0.01%, 0.1%, 1%
41	p-Nitrobenzoic acid (25mg/mL in MeOH)	0.1%, 1%, 10%

^a Solid additives are dissolved in water or methanol at high concentrations before tested at different volume ratio conditions.

^b The tested ratio of 0.01%-1% represents that the additive may cause the precipitation of dextran at a higher amount of usage.

Table S2. Sensitivity enhancement from different additives.

Additives	Sensitivity enhancement*
0.1% Formic acid	7.79 ± 0.70
0.1% 1,3-Propanesultone	10.89 ± 0.87
10% Formamide	10.59 ± 0.65

10 mM Ammonium nitrate

10.76 ± 0.45

10 mM Ammonium acetate

10.85 ± 0.61

*Represents the sensitivity increased times relative to water.

Table S3. Observed dextran ions assisted by 0.1% formic acid.

No.	Experimental <i>m/z</i>	Charge state	Ion type	Degree of polymerization (DP)	Chemical composition of M	Theoretical <i>m/z</i>	Mass error (ppm)
1	487.1650	1+	[M+H] ¹⁺	3	C18H30O15	487.1648	0.45
2	649.2187	1+	[M+H] ¹⁺	4	C24H40O20	649.2173	2.19
3	811.2709	1+	[M+H] ¹⁺	5	C30H50O25	811.2698	1.38
4	973.3209	1+	[M+H] ¹⁺	6	C36H60O30	973.3223	-1.42
5	1135.3732	1+	[M+H] ¹⁺	7	C42H70O35	1135.3748	-1.39
6	1297.4259	1+	[M+H] ¹⁺	8	C48H80O40	1297.4273	-1.06
7	1459.4787	1+	[M+H] ¹⁺	9	C54H90O45	1459.4798	-0.74
8	1621.5319	1+	[M+H] ¹⁺	10	C60H100O50	1621.5323	-0.23
9	568.1915	2+	[M+2H] ²⁺	7	C42H70O35	568.1910	0.83
10	730.2463	2+	[M+2H] ²⁺	9	C54H90O45	730.2435	3.79
11	811.2709	2+	[M+2H] ²⁺	10	C60H100O50	811.2698	1.38
12	892.2952	2+	[M+2H] ²⁺	11	C66H110O55	892.2960	-0.93
13	973.3209	2+	[M+2H] ²⁺	12	C72H120O60	973.3223	-1.42
14	1054.3464	2+	[M+2H] ²⁺	13	C78H130O65	1054.3485	-2.02
15	1135.3732	2+	[M+2H] ²⁺	14	C84H140O70	1135.3748	-1.39
16	1216.3987	2+	[M+2H] ²⁺	15	C90H150O75	1216.4010	-1.92
17	1297.4259	2+	[M+2H] ²⁺	16	C96H160O80	1297.4273	-1.06
18	1378.4515	2+	[M+2H] ²⁺	17	C102H170O85	1378.4535	-1.47
19	1459.4787	2+	[M+2H] ²⁺	18	C108H180O90	1459.4798	-0.74
20	1540.5025	2+	[M+2H] ²⁺	19	C114H190O95	1540.5060	-2.29
21	1621.5319	2+	[M+2H] ²⁺	20	C120H200O100	1621.5323	-0.23
22	703.2371	3+	[M+3H] ³⁺	13	C78H130O65	703.2348	3.30
23	757.2544	3+	[M+3H] ³⁺	14	C84H140O70	757.2523	2.80
24	865.2870	3+	[M+3H] ³⁺	16	C96H160O80	865.2873	-0.32
25	919.3031	3+	[M+3H] ³⁺	17	C102H170O85	919.3048	-1.83
26	973.3209	3+	[M+3H] ³⁺	18	C108H180O90	973.3223	-1.42
27	1027.3382	3+	[M+3H] ³⁺	19	C114H190O95	1027.3398	-1.54
28	1081.3552	3+	[M+3H] ³⁺	20	C120H200O100	1081.3573	-1.92
29	1135.3732	3+	[M+3H] ³⁺	21	C126H210O105	1135.3748	-1.39
30	1189.3902	3+	[M+3H] ³⁺	22	C132H220O110	1189.3923	-1.75
31	1243.4075	3+	[M+3H] ³⁺	23	C138H230O115	1243.4098	-1.83
32	1297.4259	3+	[M+3H] ³⁺	24	C144H240O120	1297.4273	-1.06
33	1351.4440	3+	[M+3H] ³⁺	25	C150H250O125	1351.4448	-0.58

34	1405.4604	3+	[M+3H] ³⁺	26	C156H260O130	1405.4623	-1.34
35	1459.4787	3+	[M+3H] ³⁺	27	C162H270O135	1459.4798	-0.74
36	1513.4960	3+	[M+3H] ³⁺	28	C168H280O140	1513.4973	-0.85
37	1567.5150	3+	[M+3H] ³⁺	29	C174H290O145	1567.5148	0.14
38	1621.5319	3+	[M+3H] ³⁺	30	C180H300O150	1621.5323	-0.23
39	1675.5504	3+	[M+3H] ³⁺	31	C186H310O155	1675.5498	0.37
40	1729.5673	3+	[M+3H] ³⁺	32	C192H320O160	1729.5673	0.01
41	1783.5871	3+	[M+3H] ³⁺	33	C198H330O165	1783.5848	1.30
42	1837.6075	3+	[M+3H] ³⁺	34	C204H340O170	1837.6023	2.84
43	1337.9378	4+	[M+4H] ⁴⁺	33	C198H330O165	1337.9404	-1.95
44	1378.4515	4+	[M+4H] ⁴⁺	34	C204H340O170	1378.4535	-1.47
45	1418.9645	4+	[M+4H] ⁴⁺	35	C210H350O175	1418.9667	-1.52
46	1459.4787	4+	[M+4H] ⁴⁺	36	C216H360O180	1459.4798	-0.74
47	1499.9913	4+	[M+4H] ⁴⁺	37	C222H370O185	1499.9929	-1.07
48	1540.5025	4+	[M+4H] ⁴⁺	38	C228H380O190	1540.5060	-2.29
49	1581.0211	4+	[M+4H] ⁴⁺	39	C234H390O195	1581.0192	1.23
50	1621.5319	4+	[M+4H] ⁴⁺	40	C240H400O200	1621.5323	-0.23
51	1662.0458	4+	[M+4H] ⁴⁺	41	C246H410O205	1662.0454	0.24
52	1702.5532	4+	[M+4H] ⁴⁺	42	C252H420O210	1702.5585	-3.13
53	1743.0722	4+	[M+4H] ⁴⁺	43	C258H430O215	1743.0717	0.31
54	1783.5871	4+	[M+4H] ⁴⁺	44	C264H440O220	1783.5848	1.30
55	1824.1032	4+	[M+4H] ⁴⁺	45	C270H450O225	1824.0979	2.90
56	1864.6069	4+	[M+4H] ⁴⁺	46	C276H460O230	1864.6110	-2.21
57	1905.1330	4+	[M+4H] ⁴⁺	47	C282H470O235	1905.1242	4.64
58	1945.6403	4+	[M+4H] ⁴⁺	48	C288H480O240	1945.6373	1.55
59	1585.5188	4+	[M+4H] ⁴⁺	39	C234H392O196	1585.5218	-1.88
60	1626.0395	4+	[M+4H] ⁴⁺	40	C240H402O201	1626.0349	2.83
61	1666.5497	4+	[M+4H] ⁴⁺	41	C246H412O206	1666.5480	1.00
62	1707.0646	4+	[M+4H] ⁴⁺	42	C252H422O211	1707.0612	2.02
63	1747.5754	4+	[M+4H] ⁴⁺	43	C258H432O216	1747.5743	0.64
64	1788.0966	4+	[M+4H] ⁴⁺	44	C264H442O221	1788.0874	5.14
65	1828.6018	4+	[M+4H] ⁴⁺	45	C270H452O226	1828.6005	0.69
66	1869.1153	4+	[M+4H] ⁴⁺	46	C276H462O231	1869.1137	0.88
67	1909.6321	4+	[M+4H] ⁴⁺	47	C282H472O236	1909.6268	2.79
68	1950.1309	4+	[M+4H] ⁴⁺	48	C288H482O241	1950.1399	-4.62
69	1990.6570	4+	[M+4H] ⁴⁺	49	C294H492O246	1990.6530	1.99
70	2031.1725	4+	[M+4H] ⁴⁺	50	C300H502O251	2031.1662	3.12
71	2071.6720	4+	[M+4H] ⁴⁺	51	C306H512O256	2071.6793	-3.51
72	2112.1829	4+	[M+4H] ⁴⁺	52	C312H522O261	2112.1924	-4.50
73	2152.7077	4+	[M+4H] ⁴⁺	53	C318H532O266	2152.7055	1.01
74	2193.2225	4+	[M+4H] ⁴⁺	54	C324H542O271	2193.2187	1.75
75	2233.7346	4+	[M+4H] ⁴⁺	55	C330H552O276	2233.7318	1.26
76	1819.8263	5+	[M+5H] ⁵⁺	56	C336H562O281	1819.7989	15.03
77	1852.2480	5+	[M+5H] ⁵⁺	57	C342H572O286	1852.2094	20.82

78	1884.3835	5+	[M+5H] ⁵⁺	58	C348H582O291	1884.4184	-18.51
79	1917.2506	5+	[M+5H] ⁵⁺	59	C354H592O296	1917.2320	9.70
80	1949.6613	5+	[M+5H] ⁵⁺	60	C360H602O301	1949.6425	9.64
81	1981.6660	5+	[M+5H] ⁵⁺	61	C366H612O306	1981.6499	8.13
82	2014.2821	5+	[M+5H] ⁵⁺	62	C372H622O311	2014.2619	10.01
83	2046.6863	5+	[M+5H] ⁵⁺	63	C378H632O316	2046.6724	6.77
84	2079.0899	5+	[M+5H] ⁵⁺	64	C384H642O321	2079.0829	3.35
85	2111.3413	5+	[M+5H] ⁵⁺	65	C390H652O326	2111.2919	23.41
86	2143.7319	5+	[M+5H] ⁵⁺	66	C396H662O331	2143.7024	13.77
87	2176.1332	5+	[M+5H] ⁵⁺	67	C402H672O336	2176.1129	9.34
88	2208.7469	5+	[M+5H] ⁵⁺	68	C408H682O341	2208.7249	9.94
89	2241.3590	5+	[M+5H] ⁵⁺	69	C414H692O346	2241.3370	9.82
90	2273.6027	5+	[M+5H] ⁵⁺	70	C420H702O351	2273.5459	24.97
91	2305.7285	5+	[M+5H] ⁵⁺	71	C426H712O356	2305.7549	-11.44
92	2338.4131	5+	[M+5H] ⁵⁺	72	C432H722O361	2338.3669	19.74
93	2370.6039	5+	[M+5H] ⁵⁺	73	C438H732O366	2370.5759	11.82
94	2403.2231	5+	[M+5H] ⁵⁺	74	C444H742O371	2403.1879	14.63

Table S4. Observed dextran ions assisted by 0.1% 1,3-propanesultone.

No.	Experimental m/z	Charge state	Ion type	Degree of polymerization (DP)	Chemical composition of M	Theoretical m/z	Mass error (ppm)
1	487.1677	1+	[M+H] ¹⁺	3	C18H30O15	487.1648	5.99
2	649.2222	1+	[M+H] ¹⁺	4	C24H40O20	649.2173	7.58
3	811.2762	1+	[M+H] ¹⁺	5	C30H50O25	811.2698	7.91
4	973.3277	1+	[M+H] ¹⁺	6	C36H60O30	973.3223	5.57
5	1135.3809	1+	[M+H] ¹⁺	7	C42H70O35	1135.3748	5.39
6	1297.4344	1+	[M+H] ¹⁺	8	C48H80O40	1297.4273	5.49
7	1459.4883	1+	[M+H] ¹⁺	9	C54H90O45	1459.4798	5.84
8	1621.5427	1+	[M+H] ¹⁺	10	C60H100O50	1621.5323	6.43
9	730.2500	2+	[M+2H] ²⁺	9	C54H90O45	730.2435	8.86
10	811.2762	2+	[M+2H] ²⁺	10	C60H100O50	811.2698	7.91
11	892.3014	2+	[M+2H] ²⁺	11	C66H110O55	892.2960	6.02
12	973.3277	2+	[M+2H] ²⁺	12	C72H120O60	973.3223	5.57
13	1054.3538	2+	[M+2H] ²⁺	13	C78H130O65	1054.3485	5.00
14	1135.3809	2+	[M+2H] ²⁺	14	C84H140O70	1135.3748	5.39
15	1216.4093	2+	[M+2H] ²⁺	15	C90H150O75	1216.4010	6.80
16	1297.4344	2+	[M+2H] ²⁺	16	C96H160O80	1297.4273	5.49
17	1378.4607	2+	[M+2H] ²⁺	17	C102H170O85	1378.4535	5.20
18	1459.4883	2+	[M+2H] ²⁺	18	C108H180O90	1459.4798	5.84
19	1540.5148	2+	[M+2H] ²⁺	19	C114H190O95	1540.5060	5.69
20	1621.5427	2+	[M+2H] ²⁺	20	C120H200O100	1621.5323	6.43
21	757.2559	3+	[M+3H] ³⁺	14	C84H140O70	757.2523	4.78

22	865.2932	3+	[M+3H] ³⁺	16	C96H160O80	865.2873	6.84
23	919.3090	3+	[M+3H] ³⁺	17	C102H170O85	919.3048	4.59
24	973.3277	3+	[M+3H] ³⁺	18	C108H180O90	973.3223	5.57
25	1027.3450	3+	[M+3H] ³⁺	19	C114H190O95	1027.3398	5.08
26	1081.3627	3+	[M+3H] ³⁺	20	C120H200O100	1081.3573	5.01
27	1135.3809	3+	[M+3H] ³⁺	21	C126H210O105	1135.3748	5.39
28	1189.3983	3+	[M+3H] ³⁺	22	C132H220O110	1189.3923	5.06
29	1243.4164	3+	[M+3H] ³⁺	23	C138H230O115	1243.4098	5.32
30	1297.4344	3+	[M+3H] ³⁺	24	C144H240O120	1297.4273	5.49
31	1351.4524	3+	[M+3H] ³⁺	25	C150H250O125	1351.4448	5.64
32	1405.4707	3+	[M+3H] ³⁺	26	C156H260O130	1405.4623	5.99
33	1459.4883	3+	[M+3H] ³⁺	27	C162H270O135	1459.4798	5.84
34	1513.5061	3+	[M+3H] ³⁺	28	C168H280O140	1513.4973	5.83
35	1567.5242	3+	[M+3H] ³⁺	29	C174H290O145	1567.5148	6.01
36	1621.5427	3+	[M+3H] ³⁺	30	C180H300O150	1621.5323	6.43
37	1675.5592	3+	[M+3H] ³⁺	31	C186H310O155	1675.5498	5.62
38	1729.5786	3+	[M+3H] ³⁺	32	C192H320O160	1729.5673	6.54
39	1783.5963	3+	[M+3H] ³⁺	33	C198H330O165	1783.5848	6.46
40	1837.6124	3+	[M+3H] ³⁺	34	C204H340O170	1837.6023	5.51
41	1891.6332	3+	[M+3H] ³⁺	35	C210H350O175	1891.6198	7.09
42	1945.6500	3+	[M+3H] ³⁺	36	C216H360O180	1945.6373	6.54
43	1999.6691	3+	[M+3H] ³⁺	37	C222H370O185	1999.6548	7.16
44	2053.6931	3+	[M+3H] ³⁺	38	C228H380O190	2053.6723	10.14
45	1337.9475	4+	[M+4H] ⁴⁺	33	C198H330O165	1337.9404	5.30
46	1378.4607	4+	[M+4H] ⁴⁺	34	C204H340O170	1378.4535	5.20
47	1418.9774	4+	[M+4H] ⁴⁺	35	C210H350O175	1418.9667	7.57
48	1459.4883	4+	[M+4H] ⁴⁺	36	C216H360O180	1459.4798	5.84
49	1500.0028	4+	[M+4H] ⁴⁺	37	C222H370O185	1499.9929	6.60
50	1540.5148	4+	[M+4H] ⁴⁺	38	C228H380O190	1540.5060	5.69
51	1581.0306	4+	[M+4H] ⁴⁺	39	C234H390O195	1581.0192	7.24
52	1621.5427	4+	[M+4H] ⁴⁺	40	C240H400O200	1621.5323	6.43
53	1662.0561	4+	[M+4H] ⁴⁺	41	C246H410O205	1662.0454	6.43
54	1702.5671	4+	[M+4H] ⁴⁺	42	C252H420O210	1702.5585	5.03
55	1743.0839	4+	[M+4H] ⁴⁺	43	C258H430O215	1743.0717	7.02
56	1783.5963	4+	[M+4H] ⁴⁺	44	C264H440O220	1783.5848	6.46
57	1824.1099	4+	[M+4H] ⁴⁺	45	C270H450O225	1824.0979	6.58
58	1864.6227	4+	[M+4H] ⁴⁺	46	C276H460O230	1864.6110	6.26
59	1905.1372	4+	[M+4H] ⁴⁺	47	C282H470O235	1905.1242	6.85
60	1945.6500	4+	[M+4H] ⁴⁺	48	C288H480O240	1945.6373	6.54
61	1986.1318	4+	[M+4H] ⁴⁺	49	C294H490O245	1986.1504	-9.37
62	2026.6816	4+	[M+4H] ⁴⁺	50	C300H500O250	2026.6635	8.92
63	2067.2074	4+	[M+4H] ⁴⁺	51	C306H510O255	2067.1767	14.87
64	2107.7167	4+	[M+4H] ⁴⁺	52	C312H520O260	2107.6898	12.77
65	2148.1859	4+	[M+4H] ⁴⁺	53	C318H530O265	2148.2029	-7.92

66	2188.7347	4+	[M+4H] ⁴⁺	54	C324H540O270	2188.7160	8.53
67	2229.2250	4+	[M+4H] ⁴⁺	55	C330H550O275	2229.2292	-1.86
68	2269.7144	4+	[M+4H] ⁴⁺	56	C336H560O280	2269.7423	-12.28
69	2310.2219	4+	[M+4H] ⁴⁺	57	C342H570O285	2310.2554	-14.50
70	1819.8263	5+	[M+5H] ⁵⁺	56	C336H562O281	1819.7989	15.03
71	1852.2480	5+	[M+5H] ⁵⁺	57	C342H572O286	1852.2094	20.82
72	1884.3835	5+	[M+5H] ⁵⁺	58	C348H582O291	1884.4184	-18.51
73	1917.2506	5+	[M+5H] ⁵⁺	59	C354H592O296	1917.2320	9.70
74	1949.6613	5+	[M+5H] ⁵⁺	60	C360H602O301	1949.6425	9.64
75	1981.6660	5+	[M+5H] ⁵⁺	61	C366H612O306	1981.6499	8.13
76	2014.2821	5+	[M+5H] ⁵⁺	62	C372H622O311	2014.2619	10.01
77	2046.6863	5+	[M+5H] ⁵⁺	63	C378H632O316	2046.6724	6.77
78	2079.0899	5+	[M+5H] ⁵⁺	64	C384H642O321	2079.0829	3.35
79	2111.3413	5+	[M+5H] ⁵⁺	65	C390H652O326	2111.2919	23.41
80	2143.7319	5+	[M+5H] ⁵⁺	66	C396H662O331	2143.7024	13.77
81	2176.1332	5+	[M+5H] ⁵⁺	67	C402H672O336	2176.1129	9.34
82	2208.7469	5+	[M+5H] ⁵⁺	68	C408H682O341	2208.7249	9.94
83	2241.3590	5+	[M+5H] ⁵⁺	69	C414H692O346	2241.3370	9.82
84	2273.6027	5+	[M+5H] ⁵⁺	70	C420H702O351	2273.5459	24.97
85	2305.7385	5+	[M+5H] ⁵⁺	71	C426H712O356	2305.7549	-7.10
86	2338.4131	5+	[M+5H] ⁵⁺	72	C432H722O361	2338.3669	19.74
87	2370.6039	5+	[M+5H] ⁵⁺	73	C438H732O366	2370.5759	11.82
88	2403.2231	5+	[M+5H] ⁵⁺	74	C444H742O371	2403.1879	14.63
89	2435.6482	5+	[M+5H] ⁵⁺	75	C450H752O376	2435.5984	20.43
90	2467.8073	5+	[M+5H] ⁵⁺	76	C456H762O381	2467.8074	-0.03
91	2500.4607	5+	[M+5H] ⁵⁺	77	C462H772O386	2500.4194	16.50
92	2532.8604	5+	[M+5H] ⁵⁺	78	C468H782O391	2532.8299	12.03
93	2565.2647	5+	[M+5H] ⁵⁺	79	C474H792O396	2565.2404	9.46
94	2597.5358	5+	[M+5H] ⁵⁺	80	C480H802O401	2597.4494	33.27
95	2630.4756	5+	[M+5H] ⁵⁺	81	C486H812O406	2630.4646	4.20
96	2662.4263	5+	[M+5H] ⁵⁺	82	C492H822O411	2662.4719	-17.14
97	2694.9035	5+	[M+5H] ⁵⁺	83	C498H832O416	2694.8824	7.81
98	2727.1270	5+	[M+5H] ⁵⁺	84	C504H842O421	2727.0914	13.06
99	2759.5964	5+	[M+5H] ⁵⁺	85	C510H852O426	2759.5019	34.25
100	2792.4991	5+	[M+5H] ⁵⁺	86	C516H862O431	2792.5171	-6.44

Table S5. Observed dextran ions assisted by 10% formamide.

No.	Experimental m/z	Charge state	Ion type	Degree of polymerization (DP)	Chemical composition of M	Theoretical m/z	Mass error (ppm)
1	837.3011	2+	[M+2NH ₄] ²⁺	10	C60H102O51	837.3015	-0.51
2	918.3240	2+	[M+2NH ₄] ²⁺	11	C66H112O56	918.3278	-4.12
3	999.3497	2+	[M+2NH ₄] ²⁺	12	C72H122O61	999.3540	-4.33

4	1080.3738	2+	[M+2NH ₄] ²⁺	13	C78H132O66	1080.3803	-6.00
5	1161.3996	2+	[M+2NH ₄] ²⁺	14	C84H142O71	1161.4065	-5.97
6	1242.4262	2+	[M+2NH ₄] ²⁺	15	C90H152O76	1242.4328	-5.30
7	1323.4510	2+	[M+2NH ₄] ²⁺	16	C96H162O81	1323.4590	-6.07
8	1404.4774	2+	[M+2NH ₄] ²⁺	17	C102H172O86	1404.4853	-5.61
9	1485.5030	2+	[M+2NH ₄] ²⁺	18	C108H182O91	1485.5115	-5.74
10	1566.5294	2+	[M+2NH ₄] ²⁺	19	C114H192O96	1566.5378	-5.35
11	1647.5545	2+	[M+2NH ₄] ²⁺	20	C120H202O101	1647.5640	-5.78
12	1728.5824	2+	[M+2NH ₄] ²⁺	21	C126H212O106	1728.5903	-4.56
13	1809.6069	2+	[M+2NH ₄] ²⁺	22	C132H222O111	1809.6165	-5.32
14	1890.6336	2+	[M+2NH ₄] ²⁺	23	C138H232O116	1890.6428	-4.86
15	1971.6594	2+	[M+2NH ₄] ²⁺	24	C144H242O121	1971.6690	-4.88
16	2052.6860	2+	[M+2NH ₄] ²⁺	25	C150H252O126	2052.6953	-4.52
17	2133.7114	2+	[M+2NH ₄] ²⁺	26	C156H262O131	2133.7215	-4.75
18	2214.7390	2+	[M+2NH ₄] ²⁺	27	C162H272O136	2214.7478	-3.96
19	2295.7617	2+	[M+2NH ₄] ²⁺	28	C168H282O141	2295.7740	-5.37
20	2376.7900	2+	[M+2NH ₄] ²⁺	29	C174H292O146	2376.8003	-4.33
21	2457.8172	2+	[M+2NH ₄] ²⁺	30	C180H302O151	2457.8265	-3.80
22	2538.8463	2+	[M+2NH ₄] ²⁺	31	C186H312O156	2538.8528	-2.55
23	2619.8688	2+	[M+2NH ₄] ²⁺	32	C192H322O161	2619.8790	-3.90
24	2700.9014	2+	[M+2NH ₄] ²⁺	33	C198H332O166	2700.9053	-1.44
25	2781.9245	2+	[M+2NH ₄] ²⁺	34	C204H342O171	2781.9315	-2.53
26	2862.9452	2+	[M+2NH ₄] ²⁺	35	C210H352O176	2862.9578	-4.39
27	2943.9791	2+	[M+2NH ₄] ²⁺	36	C216H362O181	2943.9840	-1.67
28	3025.0041	2+	[M+2NH ₄] ²⁺	37	C222H372O186	3025.0103	-2.04
29	3106.0247	2+	[M+2NH ₄] ²⁺	38	C228H382O191	3106.0365	-3.81
30	1374.4660	3+	[M+3NH ₄] ³⁺	25	C150H252O126	1374.4748	-6.39
31	1428.4832	3+	[M+3NH ₄] ³⁺	26	C156H262O131	1428.4923	-6.36
32	1482.5047	3+	[M+3NH ₄] ³⁺	27	C162H272O136	1482.5098	-3.43
33	1536.5199	3+	[M+3NH ₄] ³⁺	28	C168H282O141	1536.5273	-4.80
34	1590.5370	3+	[M+3NH ₄] ³⁺	29	C174H292O146	1590.5448	-4.89
35	1644.5544	3+	[M+3NH ₄] ³⁺	30	C180H302O151	1644.5623	-4.79
36	1698.5794	3+	[M+3NH ₄] ³⁺	31	C186H312O156	1698.5798	-0.22
37	1752.5899	3+	[M+3NH ₄] ³⁺	32	C192H322O161	1752.5973	-4.21
38	1806.6060	3+	[M+3NH ₄] ³⁺	33	C198H332O166	1806.6148	-4.86
39	1860.6240	3+	[M+3NH ₄] ³⁺	34	C204H342O171	1860.6323	-4.45
40	1914.6403	3+	[M+3NH ₄] ³⁺	35	C210H352O176	1914.6498	-4.95
41	1968.6596	3+	[M+3NH ₄] ³⁺	36	C216H362O181	1968.6673	-3.90
42	2022.6758	3+	[M+3NH ₄] ³⁺	37	C222H372O186	2022.6848	-4.44
43	2076.6939	3+	[M+3NH ₄] ³⁺	38	C228H382O191	2076.7023	-4.04
44	2130.7115	3+	[M+3NH ₄] ³⁺	39	C234H392O196	2130.7198	-3.89
45	2184.7306	3+	[M+3NH ₄] ³⁺	40	C240H402O201	2184.7373	-3.06
46	2238.7455	3+	[M+3NH ₄] ³⁺	41	C246H412O206	2238.7548	-4.15
47	2292.7664	3+	[M+3NH ₄] ³⁺	42	C252H422O211	2292.7723	-2.56

48	2346.7824	3+	[M+3NH ₄] ³⁺	43	C258H432O216	2346.7898	-3.14
49	2400.7958	3+	[M+3NH ₄] ³⁺	44	C264H442O221	2400.8073	-4.78
50	2454.8210	3+	[M+3NH ₄] ³⁺	45	C270H452O226	2454.8248	-1.54
51	2508.8399	3+	[M+3NH ₄] ³⁺	46	C276H462O231	2508.8423	-0.95
52	2562.8528	3+	[M+3NH ₄] ³⁺	47	C282H472O236	2562.8598	-2.72
53	2616.8771	3+	[M+3NH ₄] ³⁺	48	C288H482O241	2616.8773	-0.07
54	2670.8954	3+	[M+3NH ₄] ³⁺	49	C294H492O246	2670.8948	0.23
55	2724.9108	3+	[M+3NH ₄] ³⁺	50	C300H502O251	2724.9123	-0.54
56	2778.9302	3+	[M+3NH ₄] ³⁺	51	C306H512O256	2778.9298	0.15
57	2832.9417	3+	[M+3NH ₄] ³⁺	52	C312H522O261	2832.9473	-1.97
58	2886.9747	3+	[M+3NH ₄] ³⁺	53	C318H532O266	2886.9648	3.44
59	2941.6689	3+	[M+3NH ₄] ³⁺	54	C324H542O271	2941.6541	5.02
60	2995.3296	3+	[M+3NH ₄] ³⁺	55	C330H552O276	2995.3357	-2.04
61	3049.3460	3+	[M+3NH ₄] ³⁺	56	C336H562O281	3049.3532	-2.37
62	3103.0204	3+	[M+3NH ₄] ³⁺	57	C342H572O286	3103.0348	-4.63
63	3157.0377	3+	[M+3NH ₄] ³⁺	58	C348H582O291	3157.0523	-4.62
64	1683.5726	4+	[M+4NH ₄] ⁴⁺	41	C246H412O206	1683.5745	-1.15
65	1724.3328	4+	[M+4NH ₄] ⁴⁺	42	C252H422O211	1724.3396	-3.95
66	1764.5968	4+	[M+4NH ₄] ⁴⁺	43	C258H432O216	1764.6008	-2.26
67	1805.3629	4+	[M+4NH ₄] ⁴⁺	44	C264H442O221	1805.3659	-1.64
68	1845.6240	4+	[M+4NH ₄] ⁴⁺	45	C270H452O226	1845.6270	-1.64
69	1886.3872	4+	[M+4NH ₄] ⁴⁺	46	C276H462O231	1886.3921	-2.60
70	1926.9043	4+	[M+4NH ₄] ⁴⁺	47	C282H472O236	1926.9052	-0.48
71	1967.4094	4+	[M+4NH ₄] ⁴⁺	48	C288H482O241	1967.4184	-4.55
72	2007.6809	4+	[M+4NH ₄] ⁴⁺	49	C294H492O246	2007.6795	0.68
73	2048.1838	4+	[M+4NH ₄] ⁴⁺	50	C300H502O251	2048.1927	-4.32
74	2088.6967	4+	[M+4NH ₄] ⁴⁺	51	C306H512O256	2088.7058	-4.35
75	2129.2136	4+	[M+4NH ₄] ⁴⁺	52	C312H522O261	2129.2189	-2.49
76	2169.7266	4+	[M+4NH ₄] ⁴⁺	53	C318H532O266	2169.7320	-2.50
77	2210.4905	4+	[M+4NH ₄] ⁴⁺	54	C324H542O271	2210.4971	-2.99
78	2250.7441	4+	[M+4NH ₄] ⁴⁺	55	C330H552O276	2250.7583	-6.30
79	2291.2625	4+	[M+4NH ₄] ⁴⁺	56	C336H562O281	2291.2714	-3.89
80	2331.7828	4+	[M+4NH ₄] ⁴⁺	57	C342H572O286	2331.7845	-0.74
81	2372.5426	4+	[M+4NH ₄] ⁴⁺	58	C348H582O291	2372.5496	-2.95
82	2413.0503	4+	[M+4NH ₄] ⁴⁺	59	C354H592O296	2413.0627	-5.15
83	2453.5675	4+	[M+4NH ₄] ⁴⁺	60	C360H602O301	2453.5759	-3.41
84	2493.8341	4+	[M+4NH ₄] ⁴⁺	61	C366H612O306	2493.8370	-1.17
85	2534.5920	4+	[M+4NH ₄] ⁴⁺	62	C372H622O311	2534.6021	-3.99
86	2575.1522	4+	[M+4NH ₄] ⁴⁺	63	C378H632O316	2575.1152	14.36
87	2615.6423	4+	[M+4NH ₄] ⁴⁺	64	C384H642O321	2615.6284	5.33
88	2655.8906	4+	[M+4NH ₄] ⁴⁺	65	C390H652O326	2655.8895	0.40
89	2696.8982	4+	[M+4NH ₄] ⁴⁺	66	C396H662O331	2696.9066	-3.10
90	2737.4114	4+	[M+4NH ₄] ⁴⁺	67	C402H672O336	2737.4197	-3.02
91	2777.9294	4+	[M+4NH ₄] ⁴⁺	68	C408H682O341	2777.9328	-1.23

92	2818.4467	4+	[M+4NH ₄] ⁴⁺	69	C414H692O346	2818.4459	0.27
93	2858.9507	4+	[M+4NH ₄] ⁴⁺	70	C420H702O351	2858.9591	-2.92
94	2899.7119	4+	[M+4NH ₄] ⁴⁺	71	C426H712O356	2899.7241	-4.22
95	2939.7667	4+	[M+4NH ₄] ⁴⁺	72	C432H722O361	2939.7334	11.34
96	2980.7591	4+	[M+4NH ₄] ⁴⁺	73	C438H732O366	2980.7504	2.93
97	3021.0067	4+	[M+4NH ₄] ⁴⁺	74	C444H742O371	3021.0116	-1.61
98	3061.8067	4+	[M+4NH ₄] ⁴⁺	75	C450H752O376	3061.7766	9.82
99	3101.8143	4+	[M+4NH ₄] ⁴⁺	76	C456H762O381	3101.7859	9.17
100	3142.7940	4+	[M+4NH ₄] ⁴⁺	77	C462H772O386	3142.8029	-2.83
101	3183.5679	4+	[M+4NH ₄] ⁴⁺	78	C468H782O391	3183.5680	-0.02
102	3223.8589	4+	[M+4NH ₄] ⁴⁺	79	C474H792O396	3223.8291	9.23
103	3263.8681	4+	[M+4NH ₄] ⁴⁺	80	C480H802O401	3263.8384	9.11
104	3304.8449	4+	[M+4NH ₄] ⁴⁺	81	C486H812O406	3304.8554	-3.17
105	3345.1267	4+	[M+4NH ₄] ⁴⁺	82	C492H822O411	3345.1166	3.03
106	3385.8731	4+	[M+4NH ₄] ⁴⁺	83	C498H832O416	3385.8816	-2.52
107	2586.2656	5+	[M+5NH ₄] ⁵⁺	79	C474H794O397	2586.2722	-2.54
108	2651.2577	5+	[M+5NH ₄] ⁵⁺	81	C486H814O407	2651.2947	-13.96
109	2683.8902	5+	[M+5NH ₄] ⁵⁺	82	C492H824O412	2683.9068	-6.18
110	2748.1641	5+	[M+5NH ₄] ⁵⁺	84	C504H844O422	2748.1231	14.92
111	2845.5605	5+	[M+5NH ₄] ⁵⁺	87	C522H874O437	2845.5562	1.53
112	2910.7427	5+	[M+5NH ₄] ⁵⁺	89	C534H894O447	2910.7803	-12.91
113	3008.2053	5+	[M+5NH ₄] ⁵⁺	92	C552H924O462	3008.2133	-2.67
114	3072.6248	5+	[M+5NH ₄] ⁵⁺	94	C564H944O472	3072.6312	-2.09
115	3170.0342	5+	[M+5NH ₄] ⁵⁺	97	C582H974O487	3170.0643	-9.49
116	3202.8717	5+	[M+5NH ₄] ⁵⁺	98	C588H984O492	3202.8779	-1.94
117	3234.8569	5+	[M+5NH ₄] ⁵⁺	99	C594H994O497	3234.8853	-8.77
118	3332.1080	5+	[M+5NH ₄] ⁵⁺	102	C612H1024O512	3332.1168	-2.63
119	3397.1275	5+	[M+5NH ₄] ⁵⁺	104	C624H1044O522	3397.1393	-3.49

Table S6. Observed dextran ions assisted by 10mM ammonium nitrate.

No.	Experimental <i>m/z</i>	Charge state	Ion type	Degree of polymerization (DP)	Chemical composition of M	Theoretical <i>m/z</i>	Mass error (ppm)
1	487.1588	1+	[M+H] ¹⁺	3	C18H30O15	487.1648	-12.28
2	649.2111	1+	[M+H] ¹⁺	4	C24H40O20	649.2173	-9.52
3	811.2643	1+	[M+H] ¹⁺	5	C30H50O25	811.2698	-6.75
4	973.3125	1+	[M+H] ¹⁺	6	C36H60O30	973.3223	-10.05
5	1135.3640	1+	[M+H] ¹⁺	7	C42H70O35	1135.3748	-9.49
6	1297.4166	1+	[M+H] ¹⁺	8	C48H80O40	1297.4273	-8.23
7	1459.4684	1+	[M+H] ¹⁺	9	C54H90O45	1459.4798	-7.80
8	837.2972	2+	[M+2NH ₄] ²⁺	10	C60H102O51	837.3015	-5.17
9	918.3240	2+	[M+2NH ₄] ²⁺	11	C66H112O56	918.3278	-4.12
10	999.3425	2+	[M+2NH ₄] ²⁺	12	C72H122O61	999.3540	-11.54

11	1080.3686	2+	[M+2NH ₄] ²⁺	13	C78H132O66	1080.3803	-10.81
12	1161.3940	2+	[M+2NH ₄] ²⁺	14	C84H142O71	1161.4065	-10.79
13	1242.4200	2+	[M+2NH ₄] ²⁺	15	C90H152O76	1242.4328	-10.29
14	1323.4449	2+	[M+2NH ₄] ²⁺	16	C96H162O81	1323.4590	-10.68
15	1404.4710	2+	[M+2NH ₄] ²⁺	17	C102H172O86	1404.4853	-10.17
16	1485.4959	2+	[M+2NH ₄] ²⁺	18	C108H182O91	1485.5115	-10.52
17	1566.5228	2+	[M+2NH ₄] ²⁺	19	C114H192O96	1566.5378	-9.56
18	888.3116	3+	[M+3NH ₄] ³⁺	16	C96H162O81	888.3173	-6.39
19	942.3260	3+	[M+3NH ₄] ³⁺	17	C102H172O86	942.3348	-9.32
20	996.3413	3+	[M+3NH ₄] ³⁺	18	C108H182O91	996.3523	-11.02
21	1050.3587	3+	[M+3NH ₄] ³⁺	19	C114H192O96	1050.3698	-10.55
22	1104.3756	3+	[M+3NH ₄] ³⁺	20	C120H202O101	1104.3873	-10.58
23	1158.3927	3+	[M+3NH ₄] ³⁺	21	C126H212O106	1158.4048	-10.43
24	1212.4094	3+	[M+3NH ₄] ³⁺	22	C132H222O111	1212.4223	-10.62
25	1266.4267	3+	[M+3NH ₄] ³⁺	23	C138H232O116	1266.4398	-10.33
26	1320.4441	3+	[M+3NH ₄] ³⁺	24	C144H242O121	1320.4573	-9.98
27	1374.4611	3+	[M+3NH ₄] ³⁺	25	C150H252O126	1374.4748	-9.95
28	1428.4832	3+	[M+3NH ₄] ³⁺	26	C156H262O131	1428.4923	-6.36
29	1482.4964	3+	[M+3NH ₄] ³⁺	27	C162H272O136	1482.5098	-9.03
30	1536.5127	3+	[M+3NH ₄] ³⁺	28	C168H282O141	1536.5273	-9.49
31	1590.5300	3+	[M+3NH ₄] ³⁺	29	C174H292O146	1590.5448	-9.29
32	1644.5490	3+	[M+3NH ₄] ³⁺	30	C180H302O151	1644.5623	-8.08
33	1698.5645	3+	[M+3NH ₄] ³⁺	31	C186H312O156	1698.5798	-9.00
34	1752.5825	3+	[M+3NH ₄] ³⁺	32	C192H322O161	1752.5973	-8.43
35	1806.6206	3+	[M+3NH ₄] ³⁺	33	C198H332O166	1806.6148	3.22
36	1860.6240	3+	[M+3NH ₄] ³⁺	34	C204H342O171	1860.6323	-4.45
37	1914.6333	3+	[M+3NH ₄] ³⁺	35	C210H352O176	1914.6498	-8.61
38	1968.6755	3+	[M+3NH ₄] ³⁺	36	C216H362O181	1968.6673	4.18
39	2022.6695	3+	[M+3NH ₄] ³⁺	37	C222H372O186	2022.6848	-7.55
40	1197.4041	4+	[M+4NH ₄] ⁴⁺	29	C174H292O146	1197.4170	-10.80
41	1237.9174	4+	[M+4NH ₄] ⁴⁺	30	C180H302O151	1237.9302	-10.30
42	1278.4306	4+	[M+4NH ₄] ⁴⁺	31	C186H312O156	1278.4433	-9.92
43	1318.9448	4+	[M+4NH ₄] ⁴⁺	32	C192H322O161	1318.9564	-8.80
44	1359.4566	4+	[M+4NH ₄] ⁴⁺	33	C198H332O166	1359.4695	-9.51
45	1399.9697	4+	[M+4NH ₄] ⁴⁺	34	C204H342O171	1399.9827	-9.25
46	1440.4823	4+	[M+4NH ₄] ⁴⁺	35	C210H352O176	1440.4958	-9.36
47	1480.9955	4+	[M+4NH ₄] ⁴⁺	36	C216H362O181	1481.0089	-9.05
48	1521.5082	4+	[M+4NH ₄] ⁴⁺	37	C222H372O186	1521.5220	-9.09
49	1562.0209	4+	[M+4NH ₄] ⁴⁺	38	C228H382O191	1562.0352	-9.13
50	1602.5336	4+	[M+4NH ₄] ⁴⁺	39	C234H392O196	1602.5483	-9.16
51	1643.3014	4+	[M+4NH ₄] ⁴⁺	40	C240H402O201	1643.3134	-7.27
52	1683.5592	4+	[M+4NH ₄] ⁴⁺	41	C246H412O206	1683.5745	-9.11
53	1724.0714	4+	[M+4NH ₄] ⁴⁺	42	C252H422O211	1724.0877	-9.43
54	1764.5834	4+	[M+4NH ₄] ⁴⁺	43	C258H432O216	1764.6008	-9.85

55	1805.3742	4+	[M+4NH ₄] ⁴⁺	44	C264H442O221	1805.3659	4.62
56	1845.6240	4+	[M+4NH ₄] ⁴⁺	45	C270H452O226	1845.6270	-1.64
57	1886.1226	4+	[M+4NH ₄] ⁴⁺	46	C276H462O231	1886.1402	-9.31
58	1926.6618	4+	[M+4NH ₄] ⁴⁺	47	C282H472O236	1926.6533	4.42
59	1967.6582	4+	[M+4NH ₄] ⁴⁺	48	C288H482O241	1967.6703	-6.15
60	2007.9116	4+	[M+4NH ₄] ⁴⁺	49	C294H492O246	2007.9315	-9.90
61	2048.4258	4+	[M+4NH ₄] ⁴⁺	50	C300H502O251	2048.4446	-9.18
62	2088.6889	4+	[M+4NH ₄] ⁴⁺	51	C306H512O256	2088.7058	-8.08
63	2129.1953	4+	[M+4NH ₄] ⁴⁺	52	C312H522O261	2129.2189	-11.09
64	2169.7129	4+	[M+4NH ₄] ⁴⁺	53	C318H532O266	2169.7320	-8.82
65	2210.4776	4+	[M+4NH ₄] ⁴⁺	54	C324H542O271	2210.4971	-8.82
66	2250.7398	4+	[M+4NH ₄] ⁴⁺	55	C330H552O276	2250.7583	-8.21
67	2291.5025	4+	[M+4NH ₄] ⁴⁺	56	C336H562O281	2291.5234	-9.10
68	2331.7670	4+	[M+4NH ₄] ⁴⁺	57	C342H572O286	2331.7845	-7.52
69	1577.3298	5+	[M+5NH ₄] ⁵⁺	48	C288H482O241	1577.3399	-6.39
70	1609.7388	5+	[M+5NH ₄] ⁵⁺	49	C294H492O246	1609.7504	-7.19
71	1642.1500	5+	[M+5NH ₄] ⁵⁺	50	C300H502O251	1642.1609	-6.63
72	1674.5563	5+	[M+5NH ₄] ⁵⁺	51	C306H512O256	1674.5714	-9.01
73	1706.9680	5+	[M+5NH ₄] ⁵⁺	52	C312H522O261	1706.9819	-8.13
74	1739.3743	5+	[M+5NH ₄] ⁵⁺	53	C318H532O266	1739.3924	-10.39
75	1771.7899	5+	[M+5NH ₄] ⁵⁺	54	C324H542O271	1771.8029	-7.33
76	1804.1983	5+	[M+5NH ₄] ⁵⁺	55	C330H552O276	1804.2134	-8.36
77	1836.6065	5+	[M+5NH ₄] ⁵⁺	56	C336H562O281	1836.6239	-9.46
78	1869.0202	5+	[M+5NH ₄] ⁵⁺	57	C342H572O286	1869.0344	-7.58
79	1901.4312	5+	[M+5NH ₄] ⁵⁺	58	C348H582O291	1901.4449	-7.21
80	1933.8395	5+	[M+5NH ₄] ⁵⁺	59	C354H592O296	1933.8554	-8.22
81	1966.4449	5+	[M+5NH ₄] ⁵⁺	60	C360H602O301	1966.4674	-11.46
82	1998.8940	5+	[M+5NH ₄] ⁵⁺	61	C366H612O306	1998.8779	8.03
83	2031.0710	5+	[M+5NH ₄] ⁵⁺	62	C372H622O311	2031.0869	-7.84
84	2063.4805	5+	[M+5NH ₄] ⁵⁺	63	C378H632O316	2063.4974	-8.20
85	2095.8926	5+	[M+5NH ₄] ⁵⁺	64	C384H642O321	2095.9079	-7.28
86	2128.3093	5+	[M+5NH ₄] ⁵⁺	65	C390H652O326	2128.3184	-4.27
87	2160.7125	5+	[M+5NH ₄] ⁵⁺	66	C396H662O331	2160.7289	-7.58
88	2193.1242	5+	[M+5NH ₄] ⁵⁺	67	C402H672O336	2193.1394	-6.93
89	2225.9728	5+	[M+5NH ₄] ⁵⁺	68	C408H682O341	2225.9530	8.90
90	2257.9378	5+	[M+5NH ₄] ⁵⁺	69	C414H692O346	2257.9604	-10.00
91	2290.3529	5+	[M+5NH ₄] ⁵⁺	70	C420H702O351	2290.3709	-7.85
92	2322.7634	5+	[M+5NH ₄] ⁵⁺	71	C426H712O356	2322.7814	-7.74
93	2355.1686	5+	[M+5NH ₄] ⁵⁺	72	C432H722O361	2355.1919	-9.89

Table S7. Observed dextran ions assisted by 10mM ammonium acetate.

No.	Experimental <i>m/z</i>	Charge state	Ion type	Degree of polymerization	Chemical composition of M	Theoretical <i>m/z</i>	Mass error
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				(DP)				(ppm)
1	325.1109	1+	[M+H] ¹⁺	2	C12H20O10	325.1123	-4.24	
2	487.1621	1+	[M+H] ¹⁺	3	C18H30O15	487.1648	-5.50	
3	649.2150	1+	[M+H] ¹⁺	4	C24H40O20	649.2173	-3.51	
4	811.2661	1+	[M+H] ¹⁺	5	C30H50O25	811.2698	-4.54	
5	973.3167	1+	[M+H] ¹⁺	6	C36H60O30	973.3223	-5.73	
6	1135.3671	1+	[M+H] ¹⁺	7	C42H70O35	1135.3748	-6.76	
7	1297.4232	1+	[M+H] ¹⁺	8	C48H80O40	1297.4273	-3.14	
8	594.2208	2+	[M+2NH ₄] ²⁺	7	C42H72O36	594.2228	-3.33	
9	675.2482	2+	[M+2NH ₄] ²⁺	8	C48H82O41	675.2490	-1.23	
10	756.2729	2+	[M+2NH ₄] ²⁺	9	C54H92O46	756.2753	-3.15	
11	837.2974	2+	[M+2NH ₄] ²⁺	10	C60H102O51	837.3015	-4.93	
12	918.3220	2+	[M+2NH ₄] ²⁺	11	C66H112O56	918.3278	-6.29	
13	999.3425	2+	[M+2NH ₄] ²⁺	12	C72H122O61	999.3540	-11.54	
14	1080.3751	2+	[M+2NH ₄] ²⁺	13	C78H132O66	1080.3803	-4.79	
15	1161.4006	2+	[M+2NH ₄] ²⁺	14	C84H142O71	1161.4065	-5.11	
16	1242.4261	2+	[M+2NH ₄] ²⁺	15	C90H152O76	1242.4328	-5.38	
17	1323.4516	2+	[M+2NH ₄] ²⁺	16	C96H162O81	1323.4590	-5.61	
18	1404.4786	2+	[M+2NH ₄] ²⁺	17	C102H172O86	1404.4853	-4.76	
19	1485.5038	2+	[M+2NH ₄] ²⁺	18	C108H182O91	1485.5115	-5.20	
20	1566.5319	2+	[M+2NH ₄] ²⁺	19	C114H192O96	1566.5378	-3.75	
21	1647.5551	2+	[M+2NH ₄] ²⁺	20	C120H202O101	1647.5640	-5.42	
22	1728.5865	2+	[M+2NH ₄] ²⁺	21	C126H212O106	1728.5903	-2.19	
23	888.3130	3+	[M+3NH ₄] ³⁺	16	C96H162O81	888.3173	-4.82	
24	942.3303	3+	[M+3NH ₄] ³⁺	17	C102H172O86	942.3348	-4.75	
25	996.3472	3+	[M+3NH ₄] ³⁺	18	C108H182O91	996.3523	-5.10	
26	1050.3643	3+	[M+3NH ₄] ³⁺	19	C114H192O96	1050.3698	-5.22	
27	1104.3820	3+	[M+3NH ₄] ³⁺	20	C120H202O101	1104.3873	-4.78	
28	1158.3992	3+	[M+3NH ₄] ³⁺	21	C126H212O106	1158.4048	-4.82	
29	1212.4166	3+	[M+3NH ₄] ³⁺	22	C132H222O111	1212.4223	-4.68	
30	1266.4331	3+	[M+3NH ₄] ³⁺	23	C138H232O116	1266.4398	-5.27	
31	1320.4510	3+	[M+3NH ₄] ³⁺	24	C144H242O121	1320.4573	-4.76	
32	1374.4682	3+	[M+3NH ₄] ³⁺	25	C150H252O126	1374.4748	-4.79	
33	1428.4855	3+	[M+3NH ₄] ³⁺	26	C156H262O131	1428.4923	-4.75	
34	1482.5034	3+	[M+3NH ₄] ³⁺	27	C162H272O136	1482.5098	-4.30	
35	1536.5207	3+	[M+3NH ₄] ³⁺	28	C168H282O141	1536.5273	-4.28	
36	1590.5386	3+	[M+3NH ₄] ³⁺	29	C174H292O146	1590.5448	-3.89	
37	1644.5567	3+	[M+3NH ₄] ³⁺	30	C180H302O151	1644.5623	-3.39	
38	1698.5712	3+	[M+3NH ₄] ³⁺	31	C186H312O156	1698.5798	-5.05	
39	1752.5902	3+	[M+3NH ₄] ³⁺	32	C192H322O161	1752.5973	-4.04	
40	1806.6206	3+	[M+3NH ₄] ³⁺	33	C198H332O166	1806.6148	3.22	
41	1860.6228	3+	[M+3NH ₄] ³⁺	34	C204H342O171	1860.6323	-5.10	
42	1914.6445	3+	[M+3NH ₄] ³⁺	35	C210H352O176	1914.6498	-2.76	
43	1968.6755	3+	[M+3NH ₄] ³⁺	36	C216H362O181	1968.6673	4.18	

44	2022.6751	3+	[M+3NH ₄] ³⁺	37	C222H372O186	2022.6848	-4.79
45	2076.6985	3+	[M+3NH ₄] ³⁺	38	C228H382O191	2076.7023	-1.82
46	2130.7000	3+	[M+3NH ₄] ³⁺	39	C234H392O196	2130.7198	-9.28
47	2184.7326	3+	[M+3NH ₄] ³⁺	40	C240H402O201	2184.7373	-2.14
48	2238.7554	3+	[M+3NH ₄] ³⁺	41	C246H412O206	2238.7548	0.28
49	1116.3812	4+	[M+4NH ₄] ⁴⁺	27	C162H272O136	1116.3908	-8.58
50	1156.8990	4+	[M+4NH ₄] ⁴⁺	28	C168H282O141	1156.9039	-4.24
51	1197.4076	4+	[M+4NH ₄] ⁴⁺	29	C174H292O146	1197.4170	-7.88
52	1237.9251	4+	[M+4NH ₄] ⁴⁺	30	C180H302O151	1237.9302	-4.08
53	1278.4374	4+	[M+4NH ₄] ⁴⁺	31	C186H312O156	1278.4433	-4.60
54	1318.9509	4+	[M+4NH ₄] ⁴⁺	32	C192H322O161	1318.9564	-4.17
55	1359.4566	4+	[M+4NH ₄] ⁴⁺	33	C198H332O166	1359.4695	-9.51
56	1399.9759	4+	[M+4NH ₄] ⁴⁺	34	C204H342O171	1399.9827	-4.83
57	1440.4901	4+	[M+4NH ₄] ⁴⁺	35	C210H352O176	1440.4958	-3.94
58	1481.5018	4+	[M+4NH ₄] ⁴⁺	36	C216H362O181	1481.5128	-7.43
59	1521.7639	4+	[M+4NH ₄] ⁴⁺	37	C222H372O186	1521.7740	-6.62
60	1562.2785	4+	[M+4NH ₄] ⁴⁺	38	C228H382O191	1562.2871	-5.51
61	1602.5446	4+	[M+4NH ₄] ⁴⁺	39	C234H392O196	1602.5483	-2.30
62	1643.3089	4+	[M+4NH ₄] ⁴⁺	40	C240H402O201	1643.3134	-2.71
63	1683.5662	4+	[M+4NH ₄] ⁴⁺	41	C246H412O206	1683.5745	-4.95
64	1724.3295	4+	[M+4NH ₄] ⁴⁺	42	C252H422O211	1724.3396	-5.86
65	1764.5951	4+	[M+4NH ₄] ⁴⁺	43	C258H432O216	1764.6008	-3.22
66	1805.3710	4+	[M+4NH ₄] ⁴⁺	44	C264H442O221	1805.3659	2.85
67	1845.6117	4+	[M+4NH ₄] ⁴⁺	45	C270H452O226	1845.6270	-8.31
68	1886.3816	4+	[M+4NH ₄] ⁴⁺	46	C276H462O231	1886.3921	-5.57
69	1926.8981	4+	[M+4NH ₄] ⁴⁺	47	C282H472O236	1926.9052	-3.70
70	1967.4406	4+	[M+4NH ₄] ⁴⁺	48	C288H482O241	1967.4184	11.31
71	2007.6679	4+	[M+4NH ₄] ⁴⁺	49	C294H492O246	2007.6795	-5.79
72	2048.1913	4+	[M+4NH ₄] ⁴⁺	50	C300H502O251	2048.1927	-0.66
73	2088.7062	4+	[M+4NH ₄] ⁴⁺	51	C306H512O256	2088.7058	0.20
74	2129.2000	4+	[M+4NH ₄] ⁴⁺	52	C312H522O261	2129.2189	-8.88
75	2169.7169	4+	[M+4NH ₄] ⁴⁺	53	C318H532O266	2169.7320	-6.97
76	2210.2176	4+	[M+4NH ₄] ⁴⁺	54	C324H542O271	2210.2452	-12.47
77	2250.7433	4+	[M+4NH ₄] ⁴⁺	55	C330H552O276	2250.7583	-6.66
78	2291.2625	4+	[M+4NH ₄] ⁴⁺	56	C336H562O281	2291.2714	-3.89
79	2331.7877	4+	[M+4NH ₄] ⁴⁺	57	C342H572O286	2331.7845	1.36
80	1512.5156	5+	[M+5NH ₄] ⁵⁺	46	C276H462O231	1512.5189	-2.17
81	1544.9320	5+	[M+5NH ₄] ⁵⁺	47	C282H472O236	1544.9294	1.70
82	1577.3346	5+	[M+5NH ₄] ⁵⁺	48	C288H482O241	1577.3399	-3.35
83	1609.7706	5+	[M+5NH ₄] ⁵⁺	49	C294H492O246	1609.7504	12.56
84	1642.1588	5+	[M+5NH ₄] ⁵⁺	50	C300H502O251	1642.1609	-1.27
85	1674.5611	5+	[M+5NH ₄] ⁵⁺	51	C306H512O256	1674.5714	-6.14
86	1706.9814	5+	[M+5NH ₄] ⁵⁺	52	C312H522O261	1706.9819	-0.28
87	1739.3743	5+	[M+5NH ₄] ⁵⁺	53	C318H532O266	1739.3924	-10.39

88	1771.7903	5+	[M+5NH ₄] ⁵⁺	54	C324H542O271	1771.8029	-7.10
89	1804.4129	5+	[M+5NH ₄] ⁵⁺	55	C330H552O276	1804.4149	-1.13
90	1836.6132	5+	[M+5NH ₄] ⁵⁺	56	C336H562O281	1836.6239	-5.82
91	1869.0209	5+	[M+5NH ₄] ⁵⁺	57	C342H572O286	1869.0344	-7.21
92	1901.6397	5+	[M+5NH ₄] ⁵⁺	58	C348H582O291	1901.6464	-3.54
93	1934.0473	5+	[M+5NH ₄] ⁵⁺	59	C354H592O296	1934.0569	-4.98
94	1966.3229	5+	[M+5NH ₄] ⁵⁺	60	C360H602O301	1966.2659	29.00
95	1998.6736	5+	[M+5NH ₄] ⁵⁺	61	C366H612O306	1998.6764	-1.39
96	2031.0740	5+	[M+5NH ₄] ⁵⁺	62	C372H622O311	2031.0869	-6.34
97	2063.6905	5+	[M+5NH ₄] ⁵⁺	63	C378H632O316	2063.6989	-4.09
98	2095.9334	5+	[M+5NH ₄] ⁵⁺	64	C384H642O321	2095.9079	12.18
99	2128.3175	5+	[M+5NH ₄] ⁵⁺	65	C390H652O326	2128.3184	-0.41
100	2160.7226	5+	[M+5NH ₄] ⁵⁺	66	C396H662O331	2160.7289	-2.91
101	2193.3296	5+	[M+5NH ₄] ⁵⁺	67	C402H672O336	2193.3409	-5.17
102	2225.5277	5+	[M+5NH ₄] ⁵⁺	68	C408H682O341	2225.5499	-9.97
103	2257.9678	5+	[M+5NH ₄] ⁵⁺	69	C414H692O346	2257.9604	3.29
104	2290.3607	5+	[M+5NH ₄] ⁵⁺	70	C420H702O351	2290.3709	-4.44
105	2326.6149	5+	[M+5NH ₄] ⁵⁺	71	C426H714O357	2326.5850	12.83
106	2355.1869	5+	[M+5NH ₄] ⁵⁺	72	C432H722O361	2355.1919	-2.11
107	2387.8059	5+	[M+5NH ₄] ⁵⁺	73	C438H732O366	2387.8039	0.82
108	2420.2299	5+	[M+5NH ₄] ⁵⁺	74	C444H742O371	2420.2144	6.39
109	1914.8216	6+	[M+6NH ₄] ⁶⁺	70	C420H704O352	1914.8177	2.01
110	2022.8664	6+	[M+6NH ₄] ⁶⁺	74	C444H744O372	2022.8527	6.75
111	2077.2059	6+	[M+6NH ₄] ⁶⁺	76	C456H764O382	2077.2062	-0.13
112	2104.0501	6+	[M+6NH ₄] ⁶⁺	77	C462H774O387	2104.0470	1.49
113	2158.2079	6+	[M+6NH ₄] ⁶⁺	79	C474H794O397	2158.2324	-11.37
114	2184.9325	6+	[M+6NH ₄] ⁶⁺	80	C480H804O402	2184.9052	12.47
115	2238.9111	6+	[M+6NH ₄] ⁶⁺	82	C492H824O412	2238.9227	-5.20
116	2266.2745	6+	[M+6NH ₄] ⁶⁺	83	C498H834O417	2266.2674	3.12
117	2320.4334	6+	[M+6NH ₄] ⁶⁺	85	C510H854O427	2320.4529	-8.40
118	2347.2940	6+	[M+6NH ₄] ⁶⁺	86	C516H864O432	2347.2937	0.14
119	2374.6168	6+	[M+6NH ₄] ⁶⁺	87	C522H874O437	2374.6384	-9.08
120	2401.3075	6+	[M+6NH ₄] ⁶⁺	88	C528H884O442	2401.3112	-1.53
121	2428.2843	6+	[M+6NH ₄] ⁶⁺	89	C534H894O447	2428.3199	-14.67
122	2482.5393	6+	[M+6NH ₄] ⁶⁺	91	C546H914O457	2482.5054	13.66

Table S8. Optimization of ESI conditions for MS analysis of dextran 20 ^a.

Conditions	Value	<i>m/z</i> 2377.78	<i>m/z</i> 2215.73	<i>m/z</i> 2134.73	<i>m/z</i> 2053.69	<i>m/z</i> 1972.66	<i>m/z</i> 1891.14	<i>m/z</i> 1729.09	<i>m/z</i> 1648.07	<i>m/z</i> 1567.04	<i>m/z</i> 1486.02	<i>m/z</i> 1323.96	<i>m/z</i> 1242.94
Spray voltage (kV)	2.5	23667±450	31433±826	32333±3504	37767±1034	40500±860	44100±1158	49667±1312	50367±1302	54000±1512	52500±980	47767±309	44000±432
	3	37300±1499	45033±704	49900±1675	52800±1757	54500±374	58700±779	66000±864	65767±1642	65367±1907	64200±2202	59167±1062	52000±1020
	3.5	9510±396	12000±648	14133±249	15267±287	16200±0	17433±249	20233±492	20100±82	20333±759	21067±419	19100±648	21267±4779
Capillary	200	12300±616	15667±525	19200±510	20567±340	21700±1020	23067±946	28400±356	29067±896	29200±860	30200±990	26967±732	25867±591
temperature	250	17267±411	20000±572	23133±189	24900±535	23867±287	24933±741	27600±408	27067±287	26667±125	26433±1087	23300±356	21167±189
e (°C)	300	15067±94	16233±47	18667±170	19033±94	18767±94	19367±125	20067±47	19767±309	19000±356	18367±125	15900±163	13400±163
Sheath gas	5	1477±136	2453±128	2557±68	3103±39	3180±212	3547±57	4130±64	4090±128	4597±87	4627±306	4500±85	4037±205
	8	12300±616	15667±525	19200±510	20567±340	21700±1020	23067±946	28400±356	29067±896	29200±860	30200±990	26967±732	25867±591
	10	11433±618	14400±216	17833±634	18900±245	20067±450	22033±403	24967±450	25967±450	26167±946	26500±374	24800±163	23467±471
Aux gas	0	9510±396	12000±648	14133±249	15267±287	16200±0	17433±249	20233±492	20100±82	20333±759	21067±419	19100±648	21267±4779
	2	6973±68	8523±289	10253±399	11033±205	11867±205	11733±330	13900±356	14167±464	14100±572	14367±492	12933±403	12267±236
	4	7183±194	8790±185	10667±125	11167±94	11967±47	12700±455	14333±170	15167±340	14633±377	15167±368	13967±544	13100±432

^a For all optimization experiments, the injection flow rate was set as 16 µL/min.

Table S9. MS ion intensity at different concentration of dextran 20 ^a.

Concentration of dextran 20 (mg/mL)	<i>m/z</i> 1891.14	<i>m/z</i> 1972.66	<i>m/z</i> 2215.73	<i>m/z</i> 2539.83
0.01	2990±65	2987±74	2473±111	1633±158
0.05	11033±94	10050±71	8740±114	6177±196

0.1	20933±340	19733±170	16300±82	10333±94
0.2	28400±327	26300±141	21700±245	15700±82
0.5	57767±94	54233±47	44767±47	30367±613

^a Experimental conditions were set as the optimal parameters tested in table S7, including 3kV for spray voltage, 250°C for capillary temperature, 8 for sheath gas and 0 for aux gas.