Appendix 1. Effective factors, levels, and matrix of the central composite design (CCD).

Parameter	Levels of factors (α = 2.83)				
	-α	**-1**	**0**	**1**	**+α**
A-Drift region temp. (ºC)	133	170	190	210	246
B-Injection region temp. (ºC)	164	200	220	240	276
C-Dopant flow (ml/min)	22	40	50	60	78
D-Drift flow (ml/min)	617	800	900	1000	1183
E-Carrier flow (ml/min)	50	100	150	200	291
F-Pulse width (µS)	32	50	60	70	88
G-Voltage (kV)	4.2	6	7	8	9.8

Run	Drift region temp.	Injection region temp.	Dopant flow	Drift flow	Carrier flow	Pulse width	Voltage	Normalized response (V)
1	0	0	0	2.83	0	0	0	2.0
2	-1	1	-1	1	-1	1	-1	1.3
3	-1	-1	-1	1	1	-1	1	5.2
4	0	0	0	0	0	2.83	0	2.6
5	1	1	1	1	1	-1	-1	2.0
6	1	-1	-1	-1	1	1	-1	3.0
7	-1	-1	-1	1	-1	1	1	1.0
8	1	-1	-1	1	1	-1	-1	0.2
9	-1	1	1	-1	-1	1	-1	10.3
10	1	-1	-1	-1	-1	1	1	8.2
11	-1	1	-1	1	1	1	1	5.8
12	-1	-1	1	1	1	-1	-1	3.6
13	1	-1	-1	-1	-1	-1	-1	8.4
14	0	0	0	0	0	0	-2.83	12.6
15	-1	1	1	-1	1	-1	-1	7.5
16	1	1	1	-1	1	-1	1	2.1
17	-2.83	0	0	0	0	0	0	1.6
18	1	-1	1	-1	-1	-1	1	2.8
19	1	1	1	1	-1	-1	1	3.6
20	1	1	1	-1	-1	-1	-1	6.7
21	0	0	0	0	0	0	0	9.5
22	0	0	0	-2.83	0	0	0	6.1
23	0	2.83	0	0	0	0	0	11.5
24	1	-1	1	1	1	1	-1	14.3
25	1	1	-1	-1	1	1	1	2.6
26	-1	-1	1	-1	1	-1	1	6.7
27	1	1	1	-1	-1	1	1	4.5
28	1	1	-1	-1	-1	-1	1	1.6
29	-1	-1	-1	-1	1	-1	-1	9.7
30	1	1	-1	1	1	1	-1	7.5
31	-1	-1	-1	-1	-1	1	-1	5.6
32	-1	1	1	1	-1	1	1	4.3
33	-1	-1	1	-1	-1	-1	-1	2.4
34	0	0	2.83	0	0	0	0	1.9
35	-1	1	-1	-1	-1	1	1	6.8
36	1	-1	-1	1	1	1	1	11.6
37	-1	1	1	1	1	-1	1	5.8
38	-1	1	1	1	-1	-1	-1	9.5
39	1	-1	-1	1	-1	1	-1	2.0
40	-1	-1	-1	1	-1	-1	-1	1.3
41	0	0	0	0	2.83	0	0	5.2
42	-1	-1	1	-1	1	1	-1	2.6
43	0	0	0	0	-2.83	0	0	2.0
44	1	-1	1	1	-1	1	1	3.0
45	1	1	-1	1	-1	1	1	1.0
46	-1	-1	1	-1	-1	1	1	0.2

47	-1	1	-1	1	1	-1	-1	10.3
48	0	0	0	0	0	0	0	8.2
49	-1	-1	1	1	1	1	1	5.8
50	-1	-1	-1	1	1	1	-1	3.6
51	-1	1	-1	-1	1	1	-1	8.4
52	1	1	-1	1	1	-1	1	12.6
53	2.83	0	0	0	0	0	0	7.5
54	-1	-1	-1	-1	1	1	1	2.1
55	-1	1	1	-1	-1	-1	1	1.6
56	-1	-1	1	1	-1	1	-1	2.8
57	-1	-1	1	1	-1	-1	1	3.6
58	1	-1	1	1	1	-1	1	6.7
59	1	1	1	1	-1	1	-1	9.5
60	0	0	0	0	0	0	0	2.6
61	-1	1	1	1	1	1	-1	6.7
62	0	0	-2.83	0	0	0	0	4.5
63	1	-1	-1	1	-1	-1	1	1.6
64	1	1	1	-1	1	1	-1	9.7
65	1	-1	1	-1	1	1	1	7.5
66	-1	1	1	-1	1	1	1	5.6
67	0	0	0	0	0	0	2.83	4.3
68	1	1	-1	-1	-1	1	-1	2.4
69	1	-1	-1	-1	1	-1	1	1.9
70	-1	1	-1	-1	-1	-1	-1	6.8
71	0	0	0	0	0	-2.83	0	11.6
72	1	-1	1	-1	-1	1	-1	5.8
73	-1	1	-1	-1	1	-1	1	9.5
74	1	-1	1	1	-1	-1	-1	2.0
75	-1	1	-1	1	-1	-1	1	1.3
76	0	-2.83	0	0	0	0	0	5.2
77	1	-1	1	-1	1	-1	-1	2.6
78	1	1	-1	1	-1	-1	-1	2.0
79	1	1	-1	-1	1	-1	-1	3.0
80	1	1	1	1	1	1	1	1.0
81	-1	-1	-1	-1	-1	-1	1	2.6

Appendix 2. Optimum operating conditions of IMS.

Operating parameters	***Setting***
Corona voltage	*2.0 KV*
Drift field	*700 V* cm^{-1}
Drift gas flow (Air)	*1000 ml* min^{-1}
Carrier gas flow (Air)	*200 ml* min^{-1}
Dopant gas flow (NH_3)	*70 ml* min^{-1}
Drift tube temperature	*200 °C*
Injection temperature	*250 °C*
Shutter grid pulse	*80 µs*
Number of IMS averages	*50*