Electronic Supplementary Material

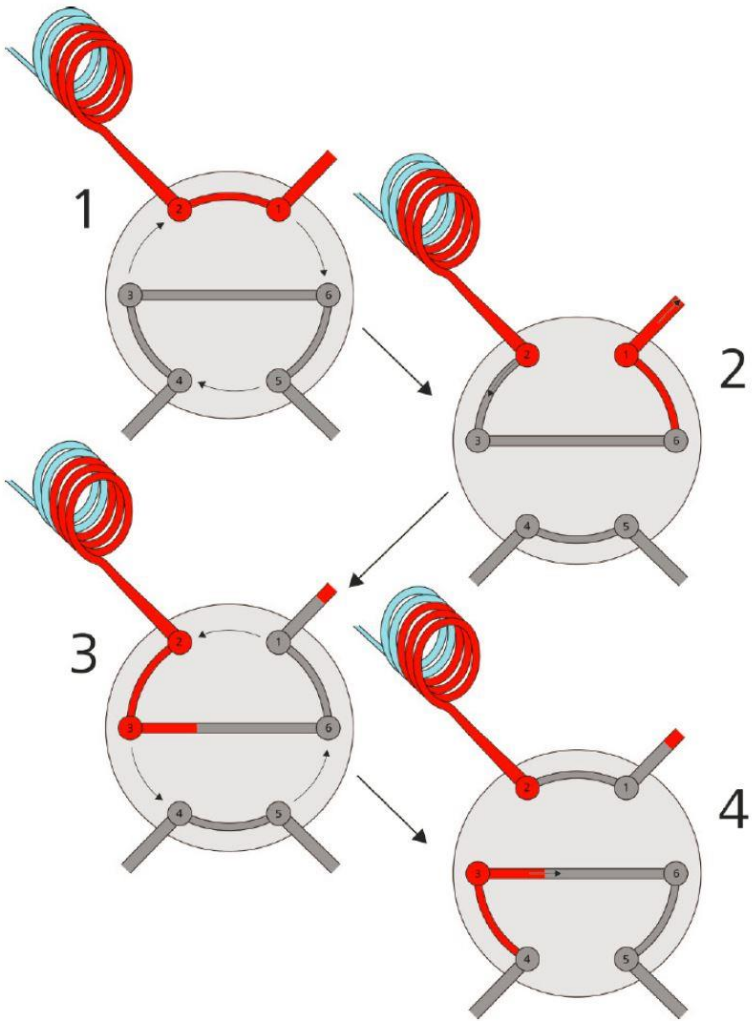
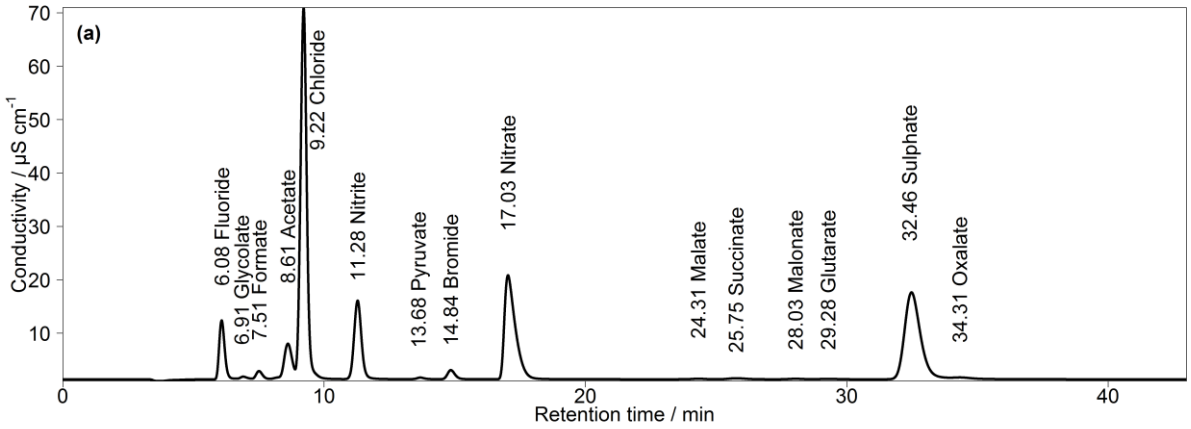


Figure S1. Switch modes of the external 6-way-valve. (1) Sample loop is filled with the sample solutions. In (2) and (3) valve is switched to "fill mode" to pre-concentrate the sample. During the "injection mode" in (4), the eluent dissolved the trapped ions and flows to the separation columns. (https://www.metrohm.com/de-de/produkte/ionenchromatographie/ionenchromatographie-inline-probenvorbereitung/, 10th August 2018)



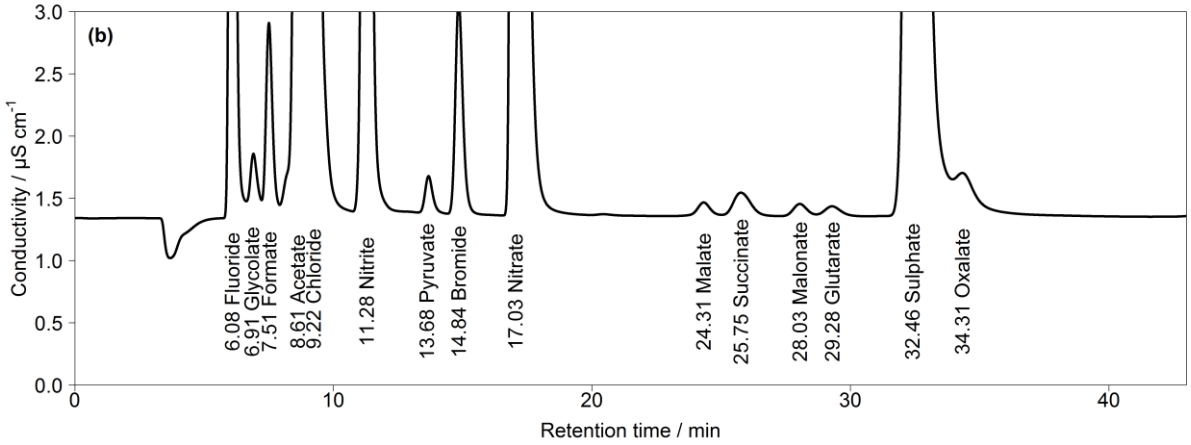
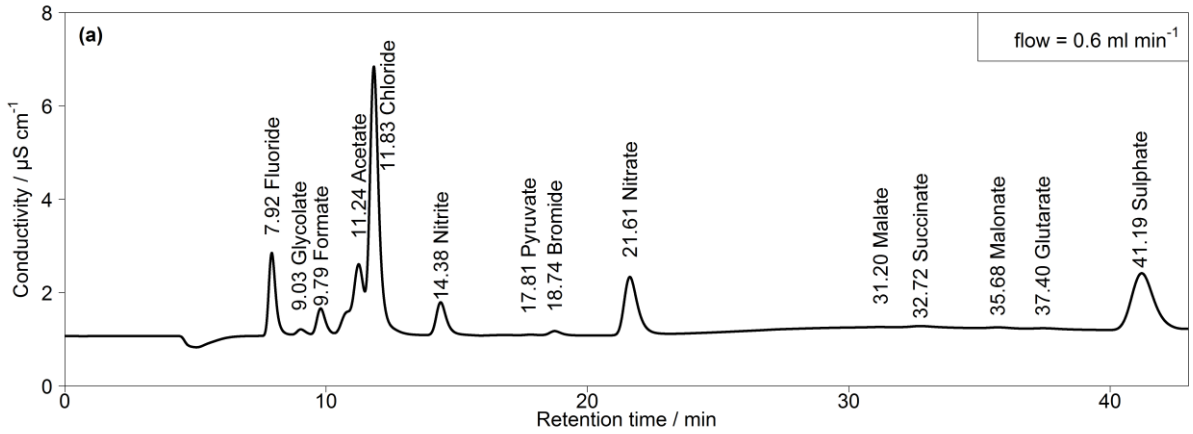


Figure S2. (a) Chromatogram of a standard solution with aqueous concentrations of 150 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 75 µg l^{-1} for NO_2^-, 15 µg l^{-1} for F^-, Br^- and 3 µg l^{-1} for all organic acids. Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in of (a).



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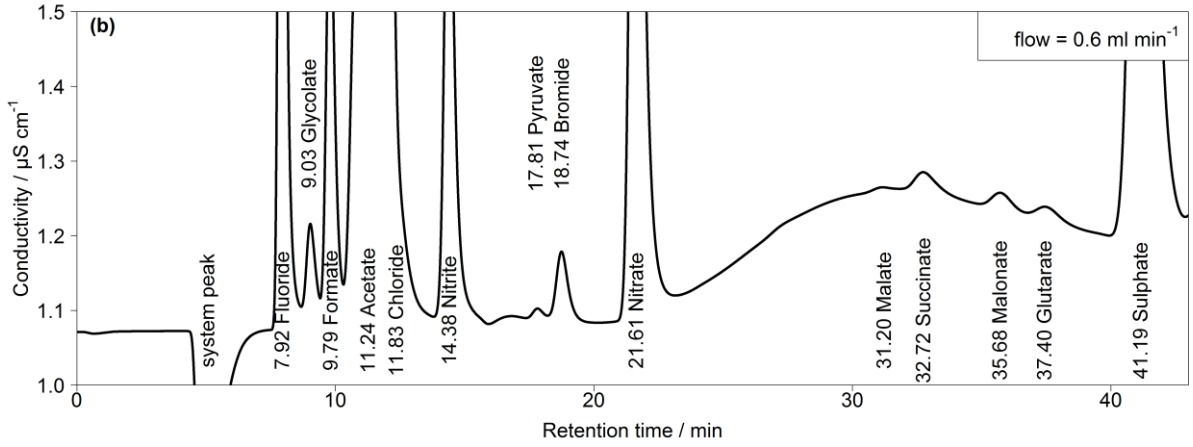

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19 **Figure S3.** (a) Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1}
20 for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids.
21 Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of
22 0.6 ml min^{-1}. (b) Zoom in of chromatogram in (a).

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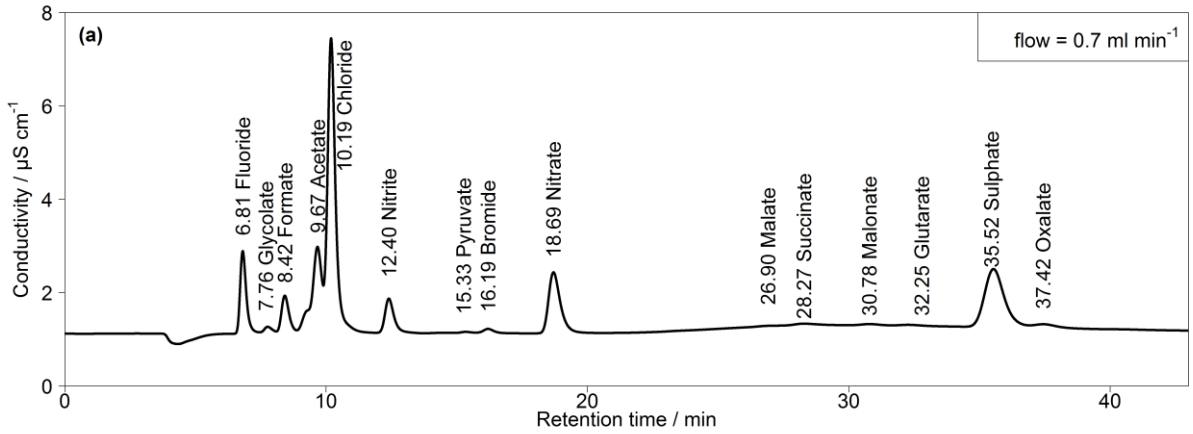


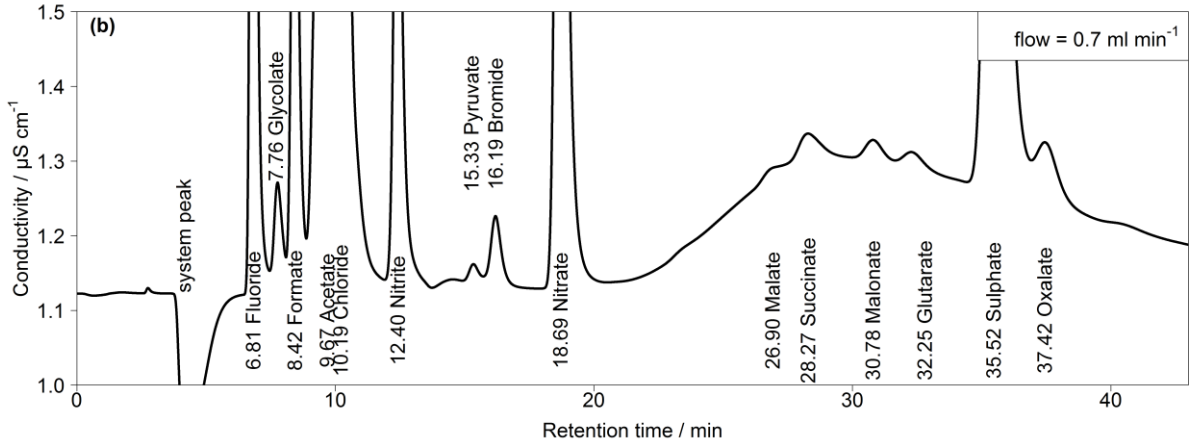
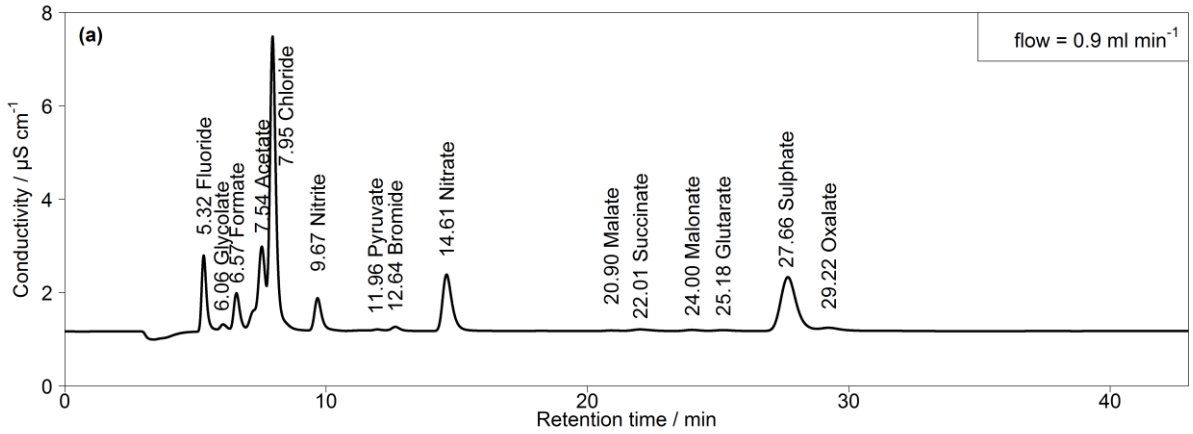


Figure S4. (a) Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of 0.7 ml min^{-1}. (b) Zoom in of chromatogram in (a).



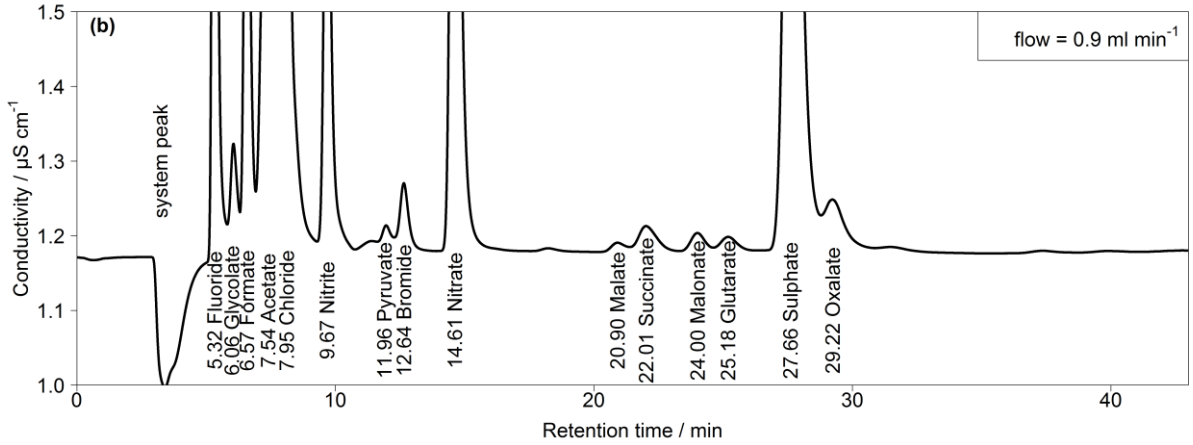
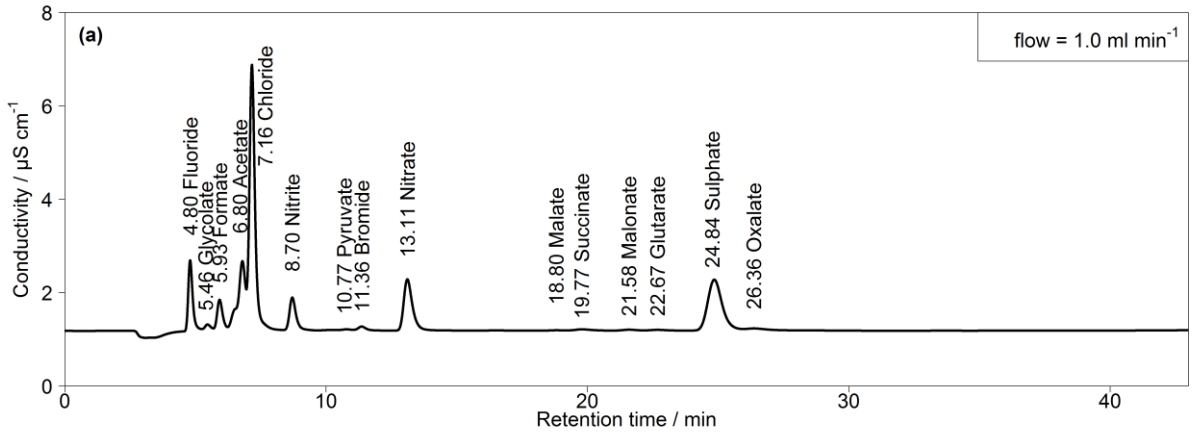


Figure S5. (a) Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of 0.9 ml min^{-1}. (b) Zoom in of chromatogram in (a).



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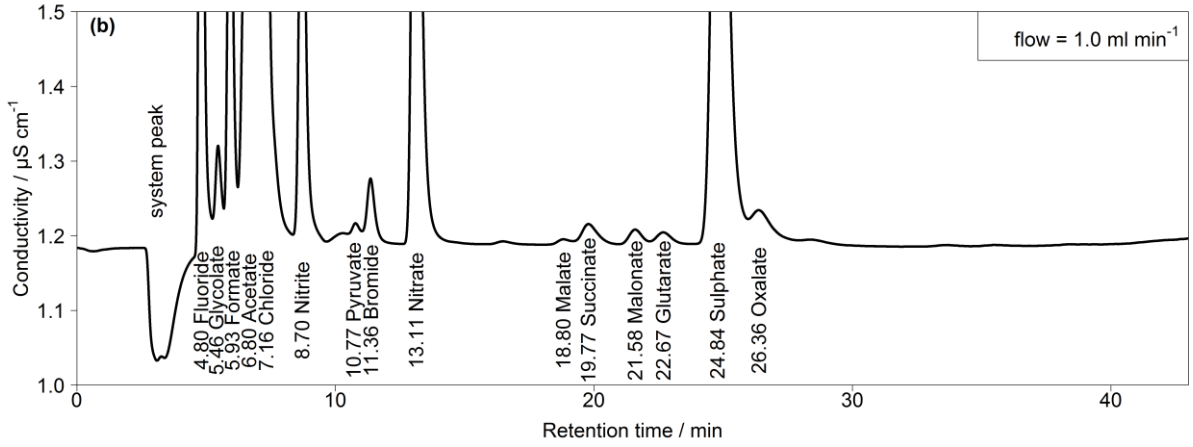

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40 **Figure S6.** (a) Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1}
41 for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids.
42 Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of
43 1.0 ml min^{-1}. (b) Zoom in of chromatogram in (a).

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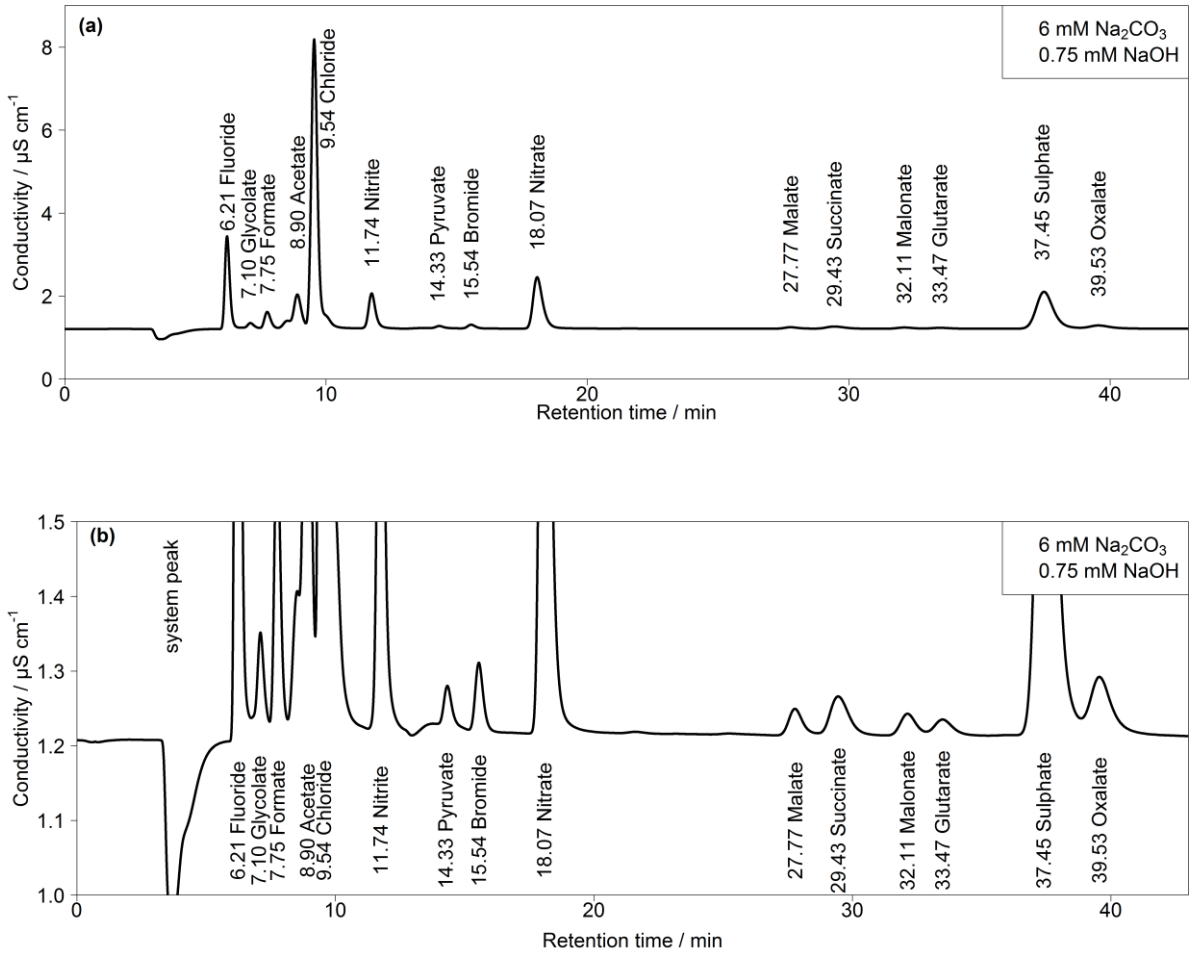
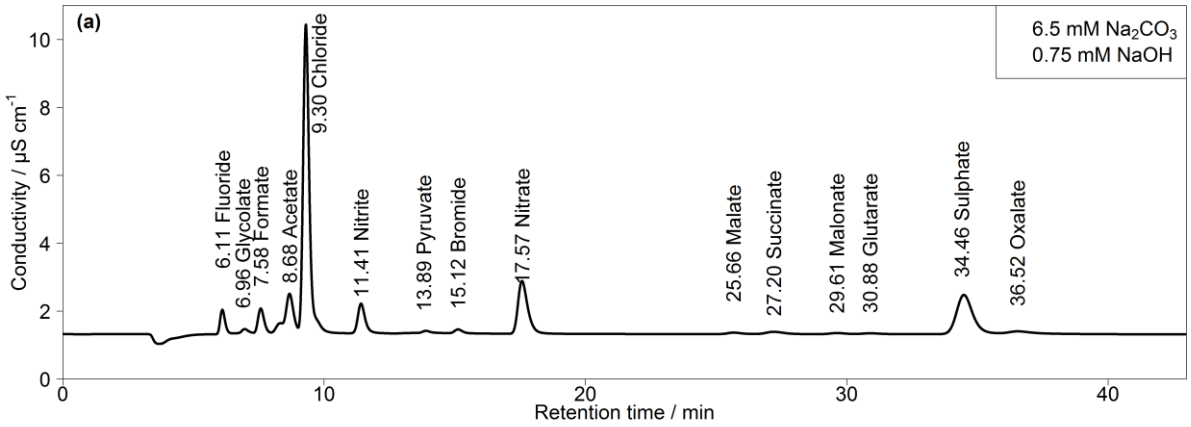


Figure S7. (a) Different eluent concentration of 6 mM Na_2CO_3 and 0.75 mM NaOH. Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in of chromatogram in (a).



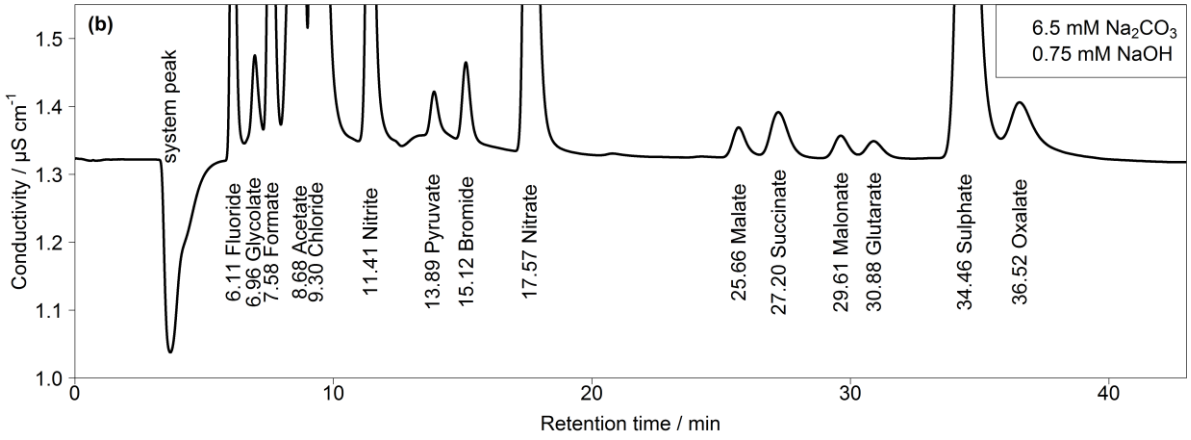
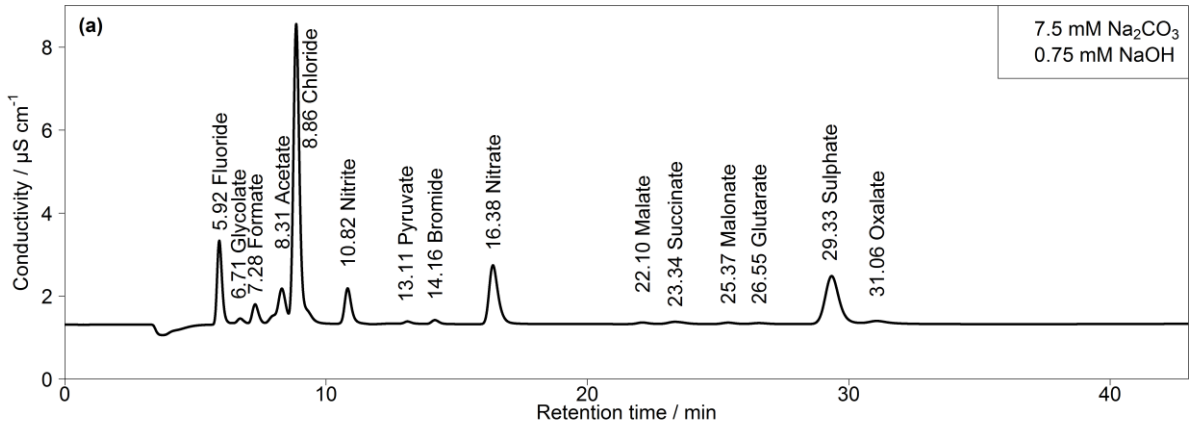


Figure S8. (a) Different eluent concentration of 6.5 mM Na_2CO_3 and 0.75 mM NaOH. Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in of chromatogram in (a).



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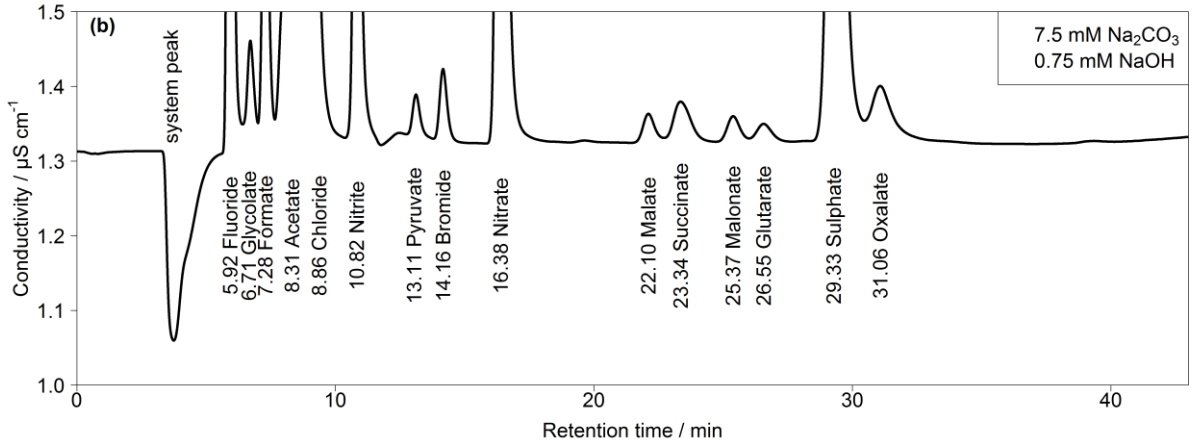
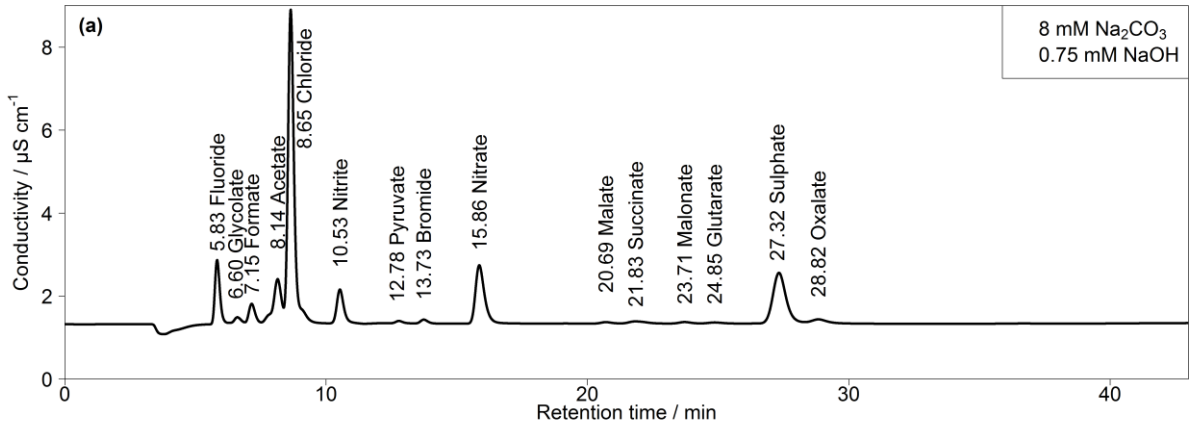


62

63 **Figure S9.** (a) Different eluent concentration of 7.5 mM Na_2CO_3 and 0.75 mM NaOH.
64 Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-,
65 SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of
66 the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in
67 of chromatogram in (a).

68



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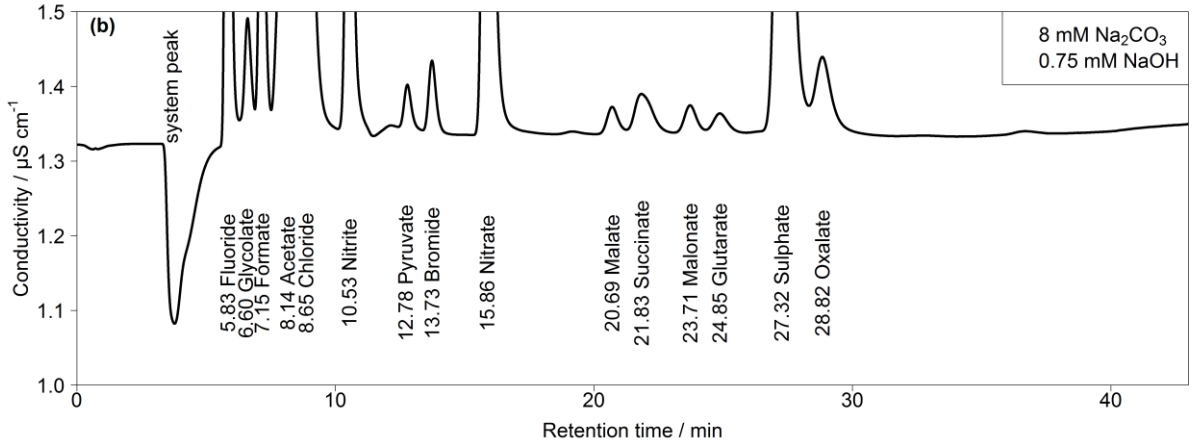

70

71 **Figure S10.** (a) Different eluent concentration of 8 mM Na_2CO_3 and 0.75 mM NaOH.
72 Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-,
73 SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of
74 the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in
75 of chromatogram in (a).
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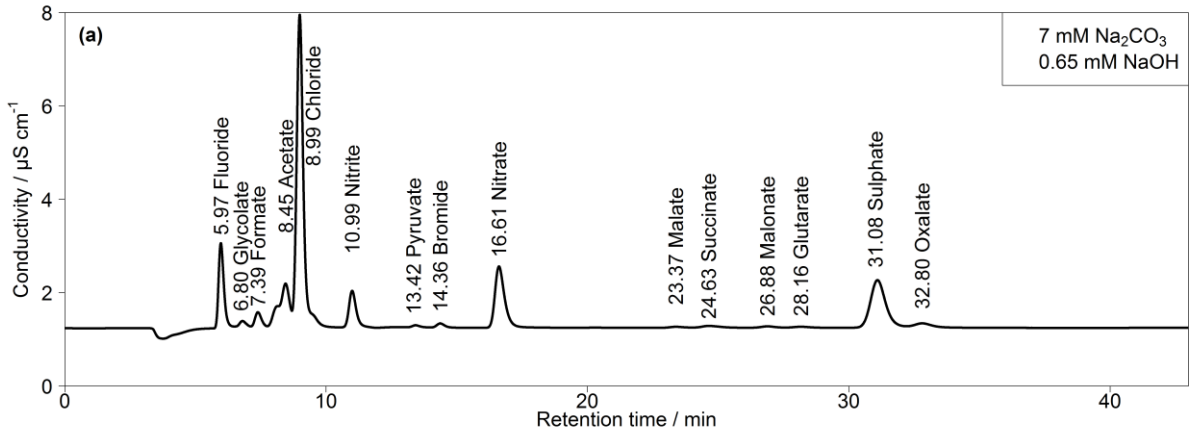

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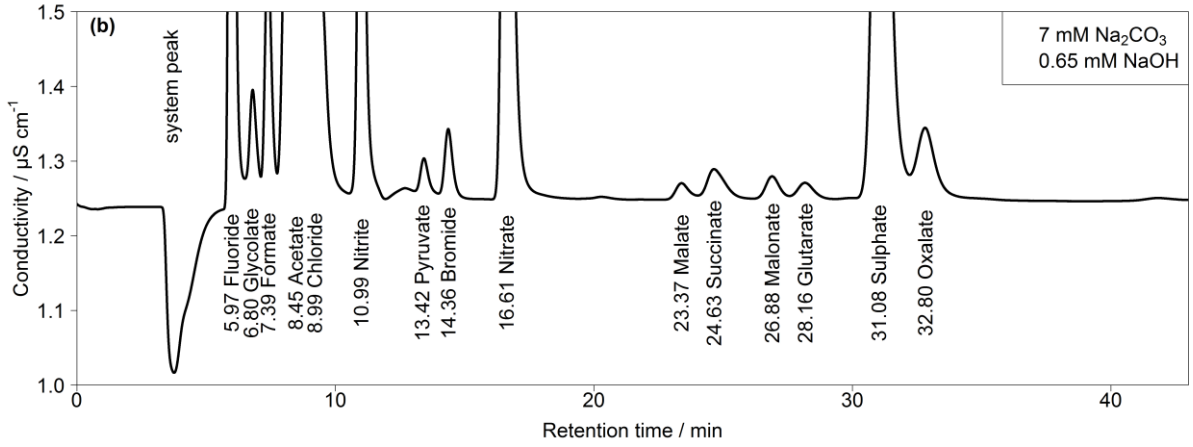

78

79 **Figure S11.** (a) Different eluent concentration of 7 mM Na_2CO_3 and 0.65 mM NaOH.
80 Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-,
81 SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of
82 the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in
83 of chromatogram in (a).

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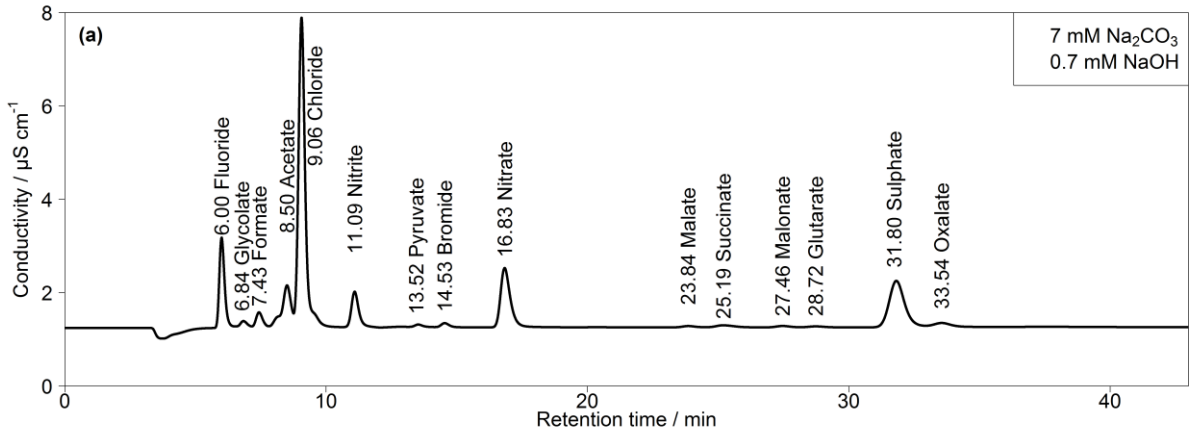


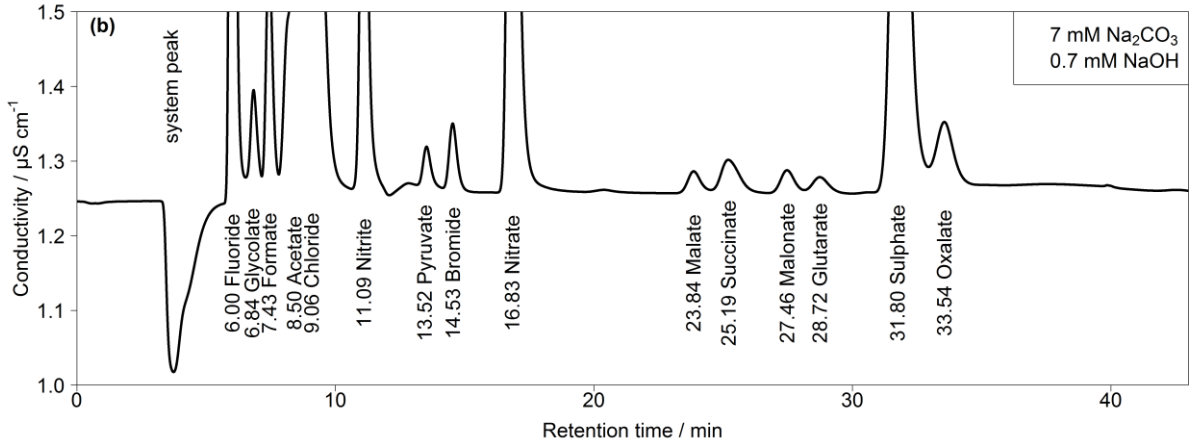
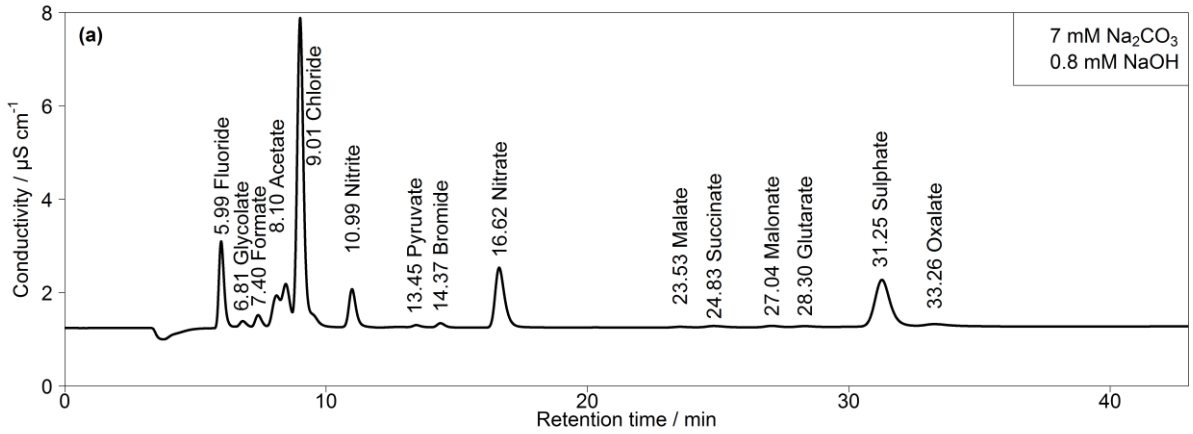


Figure S12. (a) Different eluent concentration of 7 mM Na_2CO_3 and 0.7 mM NaOH. Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in of chromatogram in (a).



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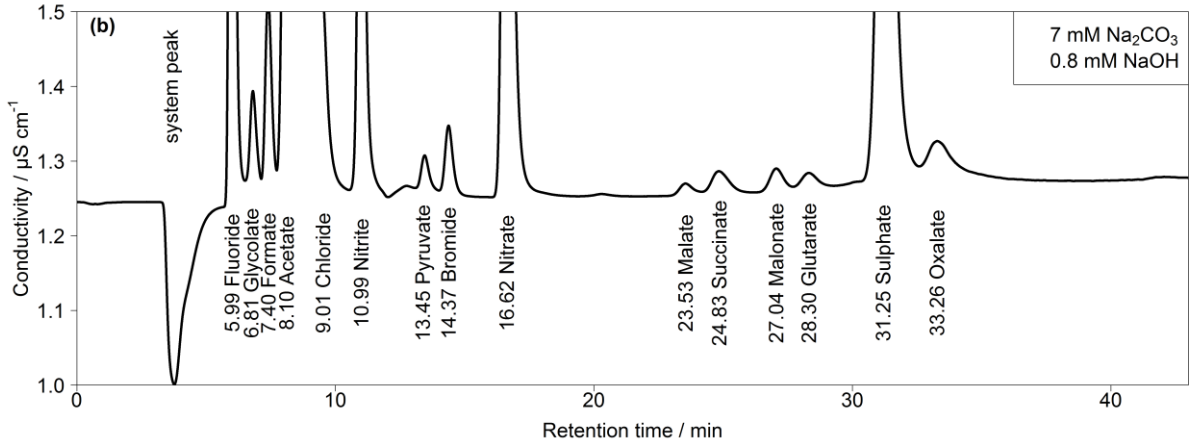
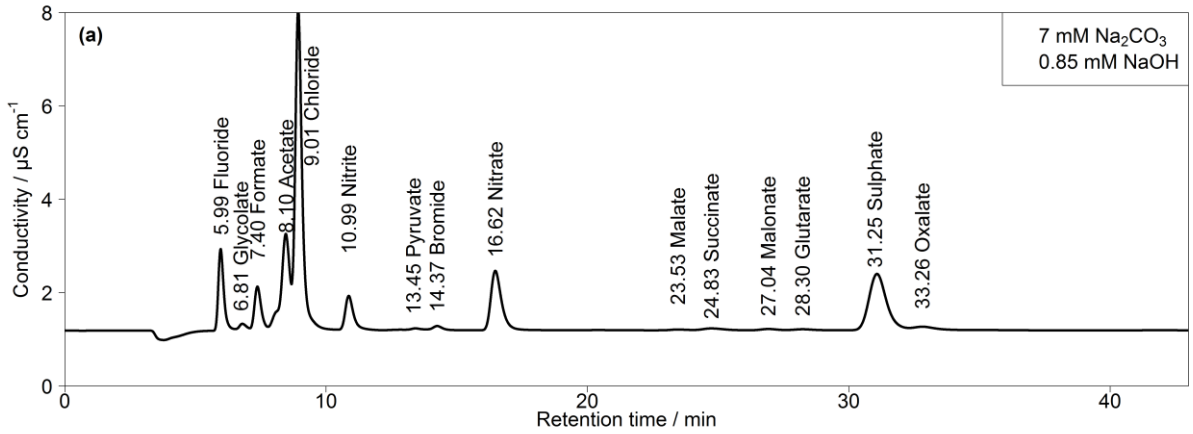


94

95 **Figure S13.** (a) Different eluent concentration of 7 mM Na_2CO_3 and 0.8 mM NaOH.
96 Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-,
97 SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of
98 the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in
99 of chromatogram in (a).

100



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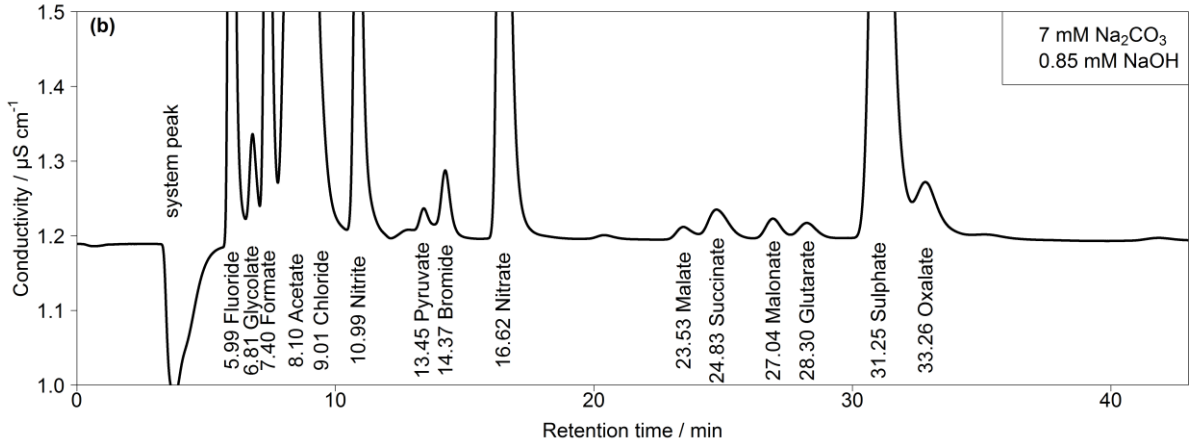


102

103 **Figure S14.** (a) Different eluent concentration of 7 mM Na_2CO_3 and 0.85 mM NaOH.
104 Chromatogram of a standard solution with aqueous concentrations of 10 µg l^{-1} for Cl^-, NO_3^-,
105 SO_4^{2-}, 5 µg l^{-1} for NO_2^- and 1 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of
106 the ion names are the retention times. T = 65 °C and eluent flow of 0.8 ml min^{-1}. (b) Zoom in
107 of chromatogram in (a).

108

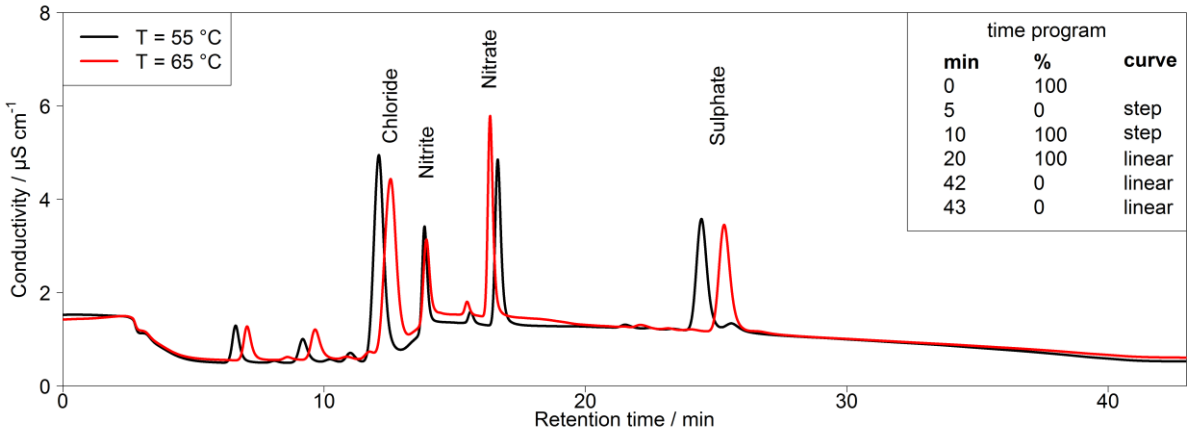
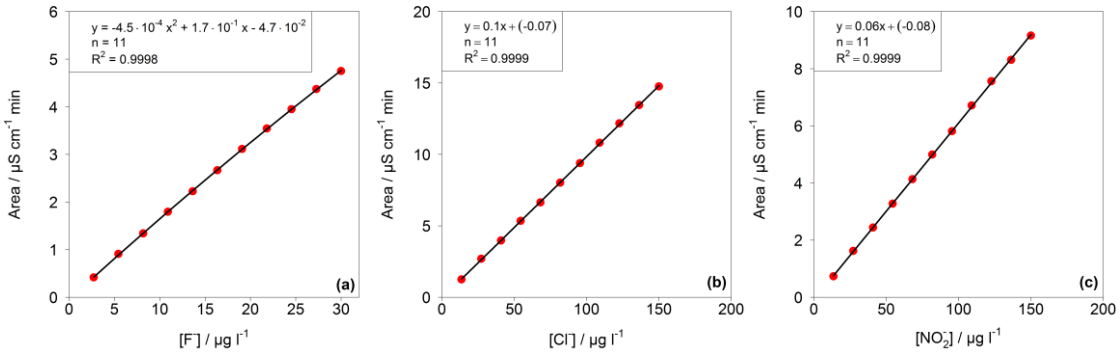


Figure S15. Temperature variation of the column oven for 55 °C (black) and 65 °C (red). Eluent concentration of 1-14 mM Na_2CO_3 and 0.75 mM NaOH. Chromatogram of a standard solution with aqueous concentrations of 50 µg l^{-1} for Cl^-, NO_3^-, SO_4^{2-}, 25 µg l^{-1} for NO_2^- and 3 µg l^{-1} for F^-, Br^- as well as all organic acids. Numbers in front of the ion names are the retention times. Eluent flow of 1.0 ml min^{-1}.



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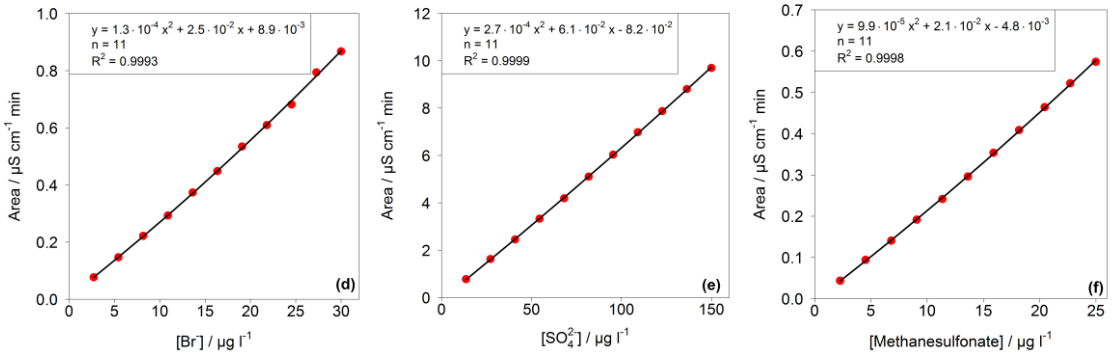

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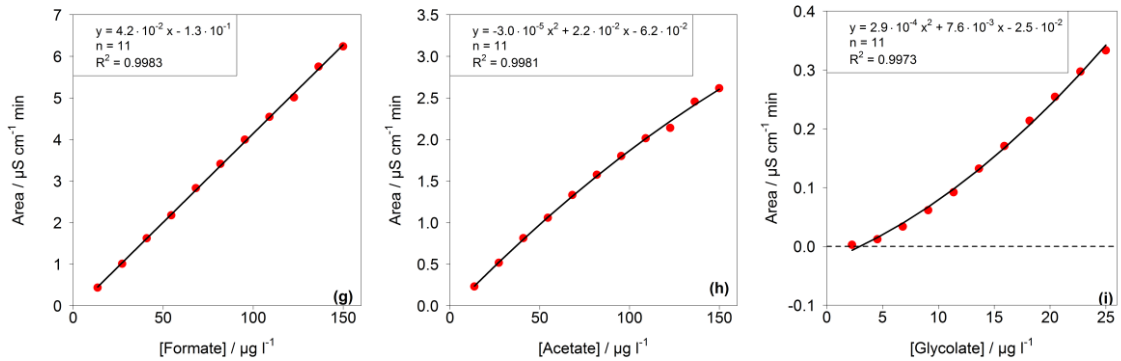

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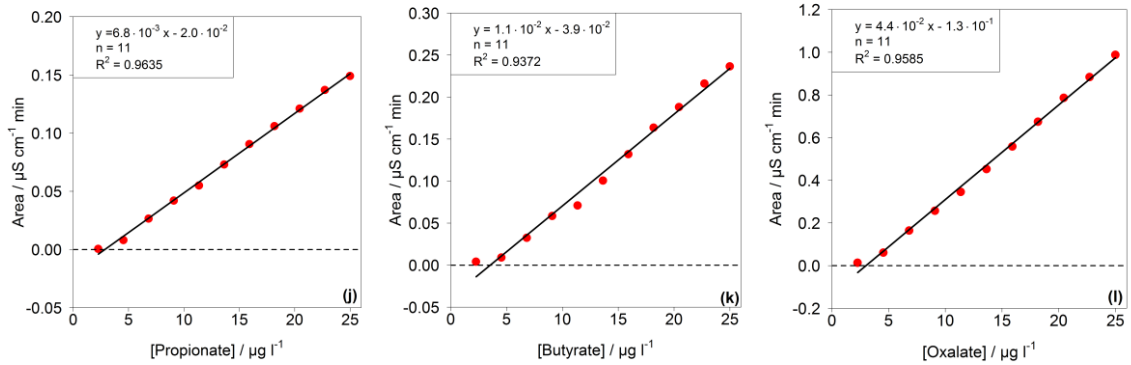

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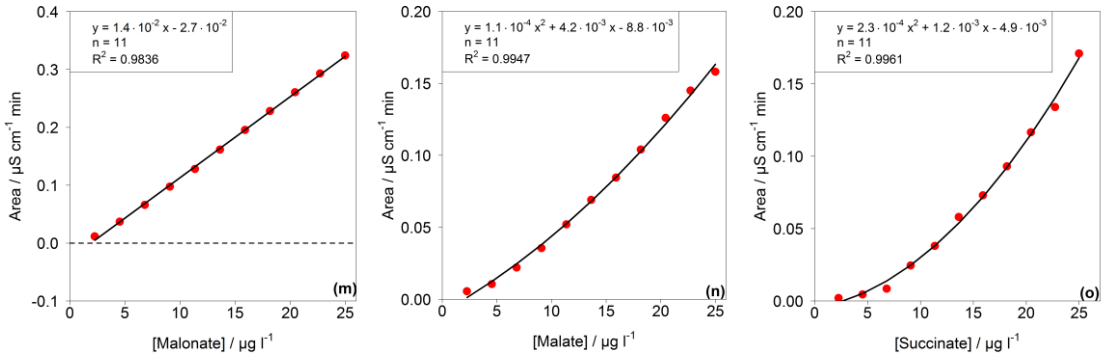

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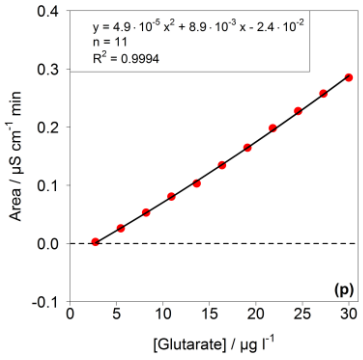

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122 **Figure S16.** Calibration functions of (a) F^-, (b) Cl^-, (c) NO_3^-, (d) Br^-, (e) SO_4^{2-}, (f)
123 methanesulfonate, (g) formate, (h) acetate, (i) glycolate, (j) propionate, (k) butyrate, (l) oxalate,
124 (m) malonate, (n) malate, (o) succinate and (p) glutarate.

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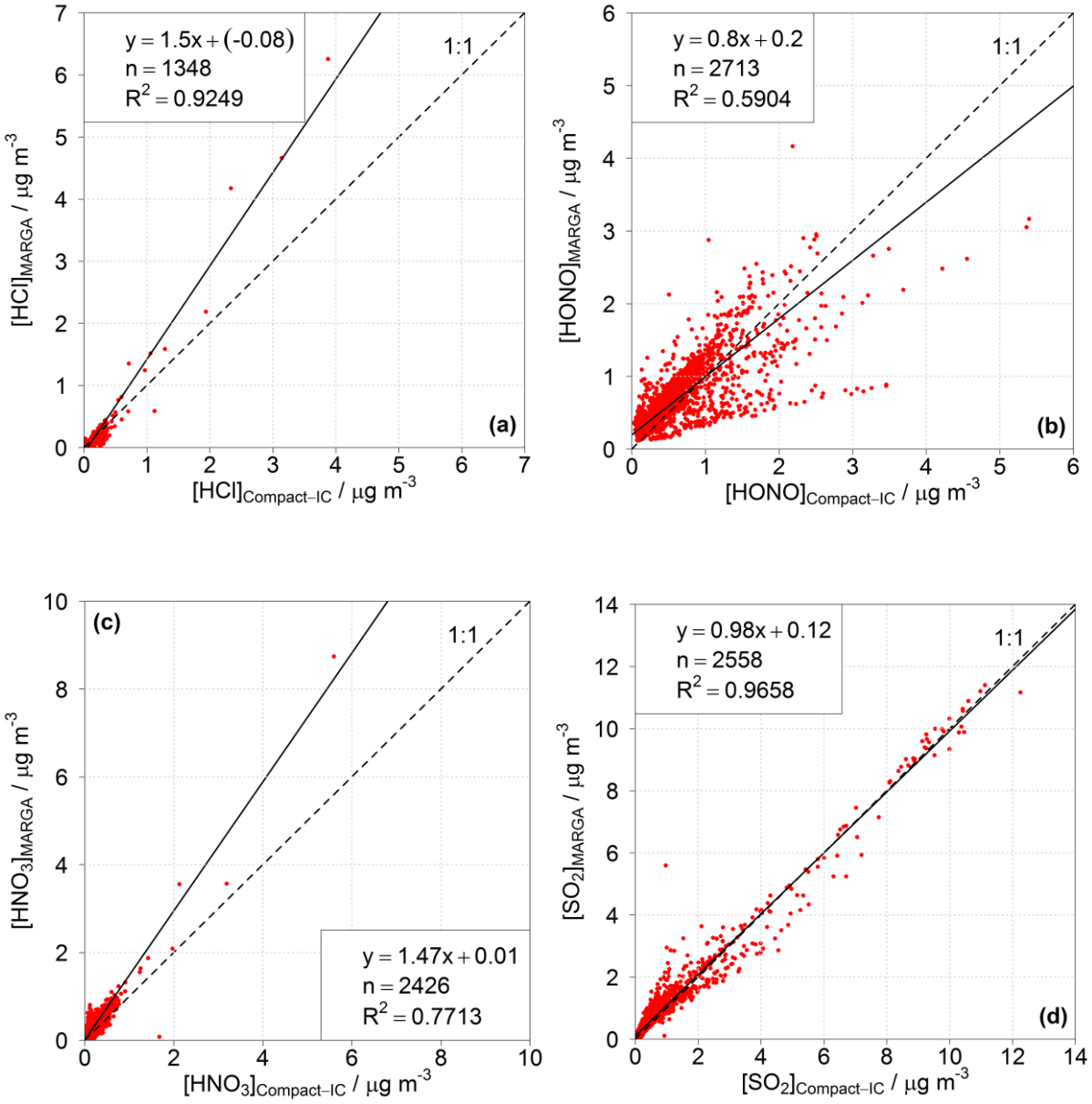

Figure S17. Scatter plots of (a) HCl, (b) HONO, (c) HNO_3 and (d) SO_2 for MARGA and Compact-IC measurements in Melpitz during one-year measurement campaign.

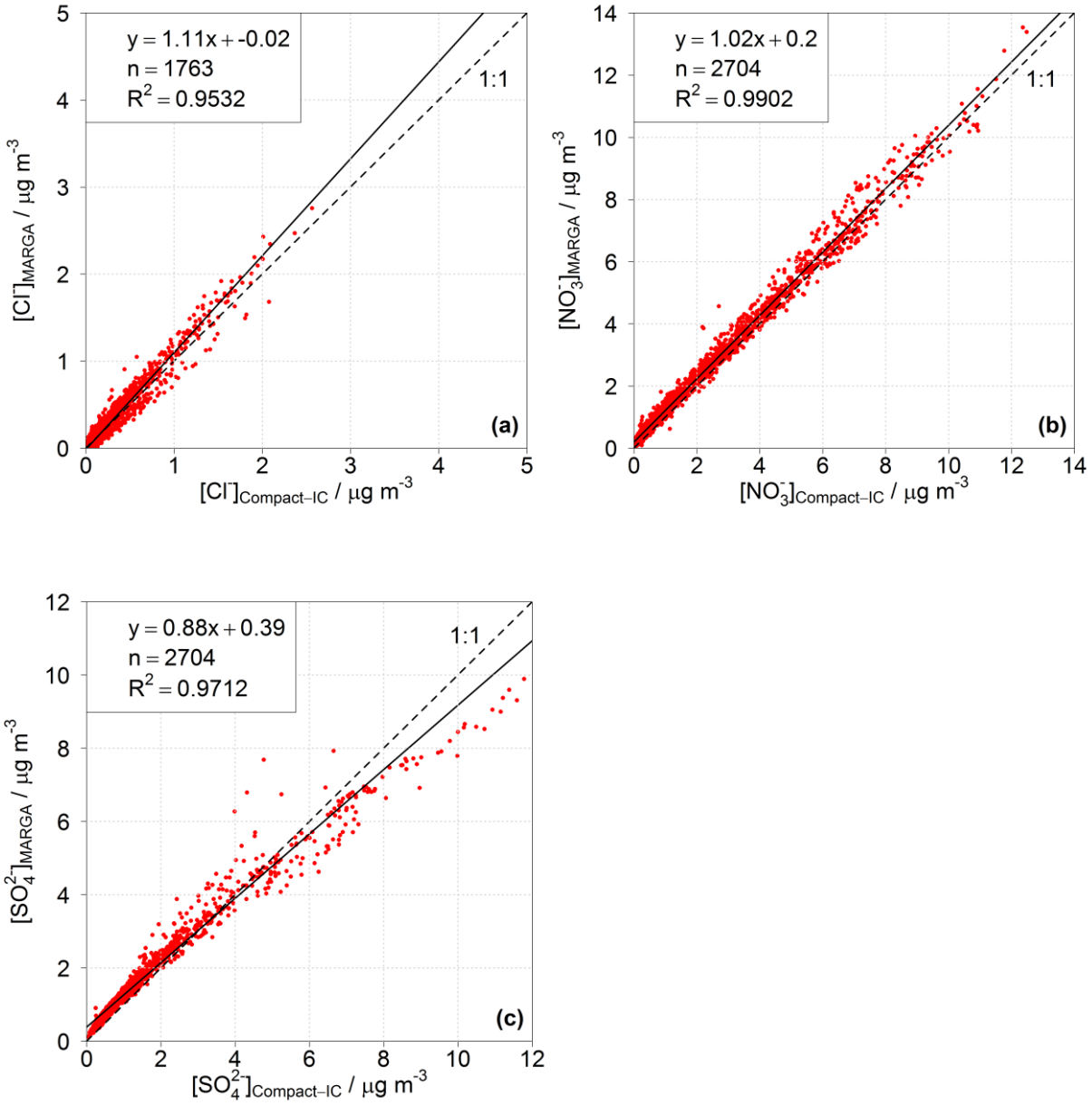

Figure S18. Scatter plots of (a) Cl^-, (b) NO_3^- and (c) SO_4^{2-} for MARGA and Compact-IC measurements in Melpitz during the one-year measurement campaign.

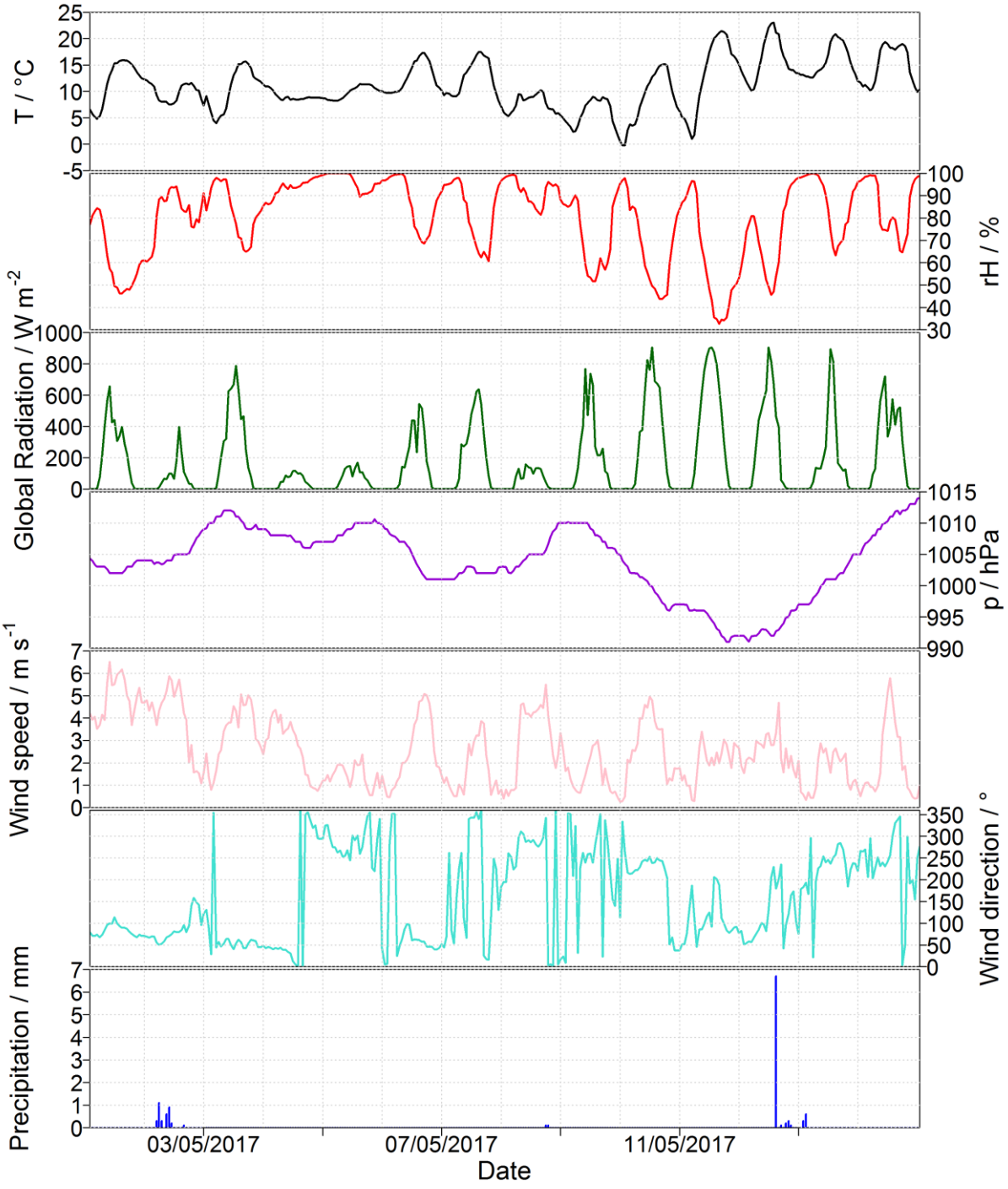

Figure S19. Meteorological parameters during the example application from 1st May until 14th May 2017.

Table S1. Linearity test for the calibration and resulting test values (TV) for each ion.

Ion	TV	Linearity
F^-	56.9	quadratic
Cl^-	0.2	linear
NO_2^-	2.4	linear
Br^-	16.4	quadratic
NO_3^-	2.6	linear
SO_4^{2-}	26.4	quadratic
Methanesulfonate	36.8	quadratic
Formate	1.6	linear
Acetate	24.6	quadratic
Glycolate	34.9	quadratic
Propionate	0.3	linear
Butyrate	9.1	linear
Pyruvate	267.8	quadratic
Oxalate	2.8	linear
Malonate	10.7	linear
Malate	23.7	quadratic
Succinate	88.8	quadratic
Glutarate	16.8	quadratic