



APPENDIX

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved

Appendix A

Summary of bulk concentration (ueq/L), Ion balance (R₁) and EC check (R₂)

Summary
3

Site name : Mae Hia, Chiang Mai

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req,R1	R1	EC _{cal}	EC _{meas}	Req,R2	R2	Amount of ppt.(cal) M mm	Amount of ppt. R mm	%CE (M/R) %	Sampling period day(s)
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m						
1	6.2	5.0	5.6	13.3	30.2	20.0	0.0	0.0	4.0	1.6	0.42	26.0	56.2	15	-7.4	0.44	0.40	20	4.9	8.8	9.0	97	1
2	9.6	4.2	4.9	9.8	28.6	30.5	0.3	0.8	13.5	1.6	0.56	47.2	75.8	15	24.7	0.57	0.59	13	-1.5	9.2	8.8	105	1
3	3.7	2.8	3.8	14.2	24.6	8.5	0.0	0.3	6.3	4.0	0.39	19.5	44.1	30	-11.4	0.34	0.29	20	8.4	4.2	4.4	95	1
4	9.0	4.5	8.9		22.3	44.3	2.6	2.3	12.7	4.1										0.3	0.4	81	1
5	7.1	2.3	2.0	11.6	22.9	12.3	3.0	1.9	9.8	0.0	0.48	27.3	50.2	15	8.9	0.38	0.29	20	14.1	43.2	44.4	97	1
6	6.2	3.4	2.4	17.5	29.5	14.6	0.3	0.5	7.5	1.8	0.32	25.0	54.5	15	-8.3	0.43	0.35	20	9.8	10.7	11.0	97	1
7	11.9	4.0	5.6	8.8	30.3	41.4	2.2	0.9	13.0	2.5	0.63	60.5	90.9	15	33.3	0.68	0.70	13	-1.5	4.7	5.0	93	1
8	20.8	10.0	12.7	16.7	60.2	38.8	7.0	1.8	44.9	5.8	0.33	98.6	158.8	8	24.1	1.13	1.10	13	1.2	2.7	2.8	96	1
9	12.5	7.3	7.1	10.3	37.1	24.9	1.5	1.3	17.5	2.5	0.54	48.3	85.4	15	13.1	0.63	0.62	13	1.2	9.7	10.0	97	1
10	6.6	5.0	1.9	16.3	29.8	18.3	2.6	0.0	15.9	0.0	0.34	37.0	66.8	15	10.8	0.50	0.50	13	0.2	2.6	3.1	85	1
11	12.5	7.9	10.0	17.1	47.6	18.6	2.6	2.1	39.3	5.0	0.32	67.9	115.5	8	17.5	0.82	0.78	13	2.7	2.5	2.8	91	1
12	9.0	6.9	5.6	11.3	32.8	13.3	4.3	1.8	15.5	6.6	0.49	42.0	74.8	15	12.2	0.54	0.48	20	6.1	5.6	6.0	93	1
13	20.8	21.3	17.5	7.0	66.6	61.0	8.7	2.6	26.9	10.7	0.79	110.7	177.2	8	24.9	1.27	1.29	13	-0.8	0.6	0.6	94	1
14	6.2	5.6	4.7	8.8	25.3	12.7	1.0	1.3	7.5	2.5	0.63	25.6	50.9	15	0.5	0.39	0.45	20	-6.9	4.4	4.6	97	1
15	0.0	4.4	5.2	11.6	21.1	13.4	1.8	0.7	4.7	3.2	0.48	24.3	45.4	30	7.1	0.35	0.37	20	-3.0	11.0	12.6	87	1
16	9.7	6.4	2.6	11.8	30.5	21.5	0.9	0.4	12.0	3.1	0.47	38.3	68.8	15	11.3	0.52	0.59	13	-6.5	5.6	6.0	93	1
17	12.5	6.4	1.7	13.9	34.5	17.8	0.9	0.5	16.7	4.6	0.40	40.8	75.3	15	8.4	0.56	0.73	13	-13.3	33.1	30.4	109	1
18	1.8	6.1	2.0	17.5	27.4	16.6	0.0	1.3	9.0	3.3	0.32	30.5	57.9	15	5.4	0.44	0.45	20	-0.8	43.2	43.8	99	1
Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1713.3	1749.1	98.0	122
Mean	11.1	7.4	3.7	--	--	18.8	2.2	1.6	11.6	2.4	3.0	--	--	--	--	--	0.69	--	--	--	--	--	--
Max.	241.5	115.8	55.2	--	390.6	221.7	60.9	30.7	374.8	67.1	63.1	522.5	747.6	--	54.8	7.23	6.45	--	78.2	106.9	110.8	111	1
Min.	0.0	0.8	0.0	--	7.8	1.7	0.0	0.0	0.0	0.0	0.1	4.9	25.3	--	-71.2	0.21	0.12	--	-44.2	0.2	0.2	62	1

Summary of bulk concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	ECcal	ECmeas	Req.R2	R2	Amount of ppt. M mm	Amount of ppt. R mm	%CE (M/R)	Sampling period	
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	mS/m	mS/m	mS/m	mS/m				%	day(s)	
19	0.0	12.9	2.5	6.4	21.8	31.9	0.0	0.6	15.0	3.3	0.87	51.6	73.4	15	40.6	0.54	0.79	13	-18.4	9.1	9.6	95	1	
20	4.2	6.0	1.7			10.5	0.0	1.2	5.0	0.0	12.59	29.3					1.18				30.6	32.1	95	1
21	33.8	9.7	0.5			31.2	0.0	2.7	11.9	0.0	16.60	62.5					1.43				30.9	29.4	105	1
22	0.8	16.9	9.0			46.6	0.0	0.0	5.0	0.8	33.11	85.5					1.80				22.6	25.0	90	1
23	0.0	11.6	5.1			34.4	0.0	0.0	7.0	1.6	10.23	53.2					1.00				1.2	1.2	103	1
24	1.0	8.1	2.3			9.3	0.6	0.0	5.0	1.6	8.13	24.6					0.78				7.4	7.8	95	1
25	0.0	5.8	1.8			10.1	0.0	0.0	2.9	1.6	5.01	19.7					0.91				16.6	17.6	95	1
26	1.2	1.0	3.7	24.7	30.6	1.7	0.0	0.0	2.1	1.1	0.22	5.2	35.8	30	-71.2	0.30	0.23	20	13.8	38.3	42.0	91	1	
27	0.0	3.2	1.1			5.5	0.0	0.0	3.0	0.0	1.20	9.7					0.12				65.1	66.6	98	1
28	13.7	7.8	5.2	13.9	40.6	26.3	0.0	0.0	11.2	1.6	0.40	39.5	80.1	15	-1.3	0.61	0.74	13	-9.5	0.7	0.7	95	1	
29	9.0	2.6	3.4			8.9	5.8	1.8	9.9	0.0	2.04	28.5					0.45				13.3	14.0	95	1
30	16.4	13.1	4.8	14.2	48.5	19.6	1.5	1.4	16.3	0.0	0.39	39.3	87.8	15	-10.6	0.66	0.88	13	-14.2	2.7	2.6	105	1	
31	4.8	0.9	0.8	19.7	26.2	3.3	0.0	0.0	2.0	0.8	0.28	6.4	32.6	30	-60.6	0.28	0.26	20	3.1	52.3	54.0	97	1	
32	4.9	1.0	1.3	13.9	21.2	1.7	0.0	0.0	1.9	0.8	0.40	4.9	26.0	30	-62.4	0.22	0.22	20	0.7	100.7	110.8	91	1	
33	6.5	5.6	4.2	11.6	27.9	38.8	0.0	0.0	4.0	0.8	0.48	44.1	72.0	15	22.5	0.56	0.52	13	3.5	0.8	0.8	99	1	
34	10.4	6.8	2.3	13.9	33.4	13.9	0.0	0.0	12.5	3.3	0.40	30.0	63.4	15	-5.4	0.48	0.60	13	-11.0	4.5	4.8	95	1	
35	20.8	5.6	2.2	11.1	39.7	16.6	0.0	0.0	25.0	0.8	0.50	42.9	82.6	15	3.8	0.62	0.60	13	1.3	12.5	13.1	95	1	
36	5.0	2.3	2.7			10.2	0.0	0.0	2.7	1.6	1.26	15.8					0.26				11.6	12.2	95	1
37	9.6	4.4	3.7	11.6	29.2	22.2	2.6	1.7	19.4	0.0	0.48	46.4	75.5	15	22.8	0.56	0.45	20	10.9	11.2	11.8	95	1	
38	20.8	1.9	3.1	11.1	36.9	24.4	2.6	1.3	25.0	0.0	0.50	53.7	90.6	15	18.6	0.67	0.60	13	5.6	9.6	9.7	99	1	
39	6.4	11.6	3.3	22.1	43.3	23.3	0.0	0.0	15.3	0.0	0.25	38.8	82.1	15	-5.5	0.63	0.73	13	-7.6	4.5	4.3	105	1	
40	41.6	19.4	3.4			64.4	44.3	0.9	0.3	20.0	5.01	72.9	137.3	8	6.2	1.14	1.40	13	-10.4	36.6	35.6	103	1	
41	35.4	6.5	2.8	11.1	55.7	24.9	1.3	1.5	15.0	0.0	0.50	43.3	99.0	15	-12.6	0.76	0.80	13	-2.7	2.4	2.4	100	1	
42	31.2	12.9	4.2			48.4	33.3	0.9	1.0	20.0	4.1	1.78	109.4	8	11.6	0.83	0.75	13	5.3	15.5	15.7	98	1	
43	67.7	9.8	7.0			84.5	51.2	5.4	1.0	7.7	20.89	88.1	172.6	8	2.1	1.86	2.05	13	-4.8	18.6	19.0	98	1	
44	214.9	66.4	42.3			323.6	173.5	2.6	15.3	119.8	18.1									0.4	0.4	0.4	96	1
45	18.3	8.5	3.9			30.8	33.3	3.5	1.0	12.0	2.5	55.0	85.8	15	28.2	0.69	0.98	13	-17.3	15.9	15.2	105	1	

Summary of bulk concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	ECcal	ECmeas	Req.R2	R2	Amount of ppt (cal) M mm	Amount of ppt. R mm	%CE (M/R)	Sampling period	
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l		mS/m	mS/m	mS/m					%	day(s)	
73	16.0	19.0	8.2		43.2	42.1	5.7	3.1	18.5	4.9	5.50	79.7	123.0	8	29.7	1.02	1.34	13	-13.7	5.9	6.4	92	1	
74	30.2	45.6	11.3	5.7	92.8	57.6	9.7	4.9	40.9	4.9	0.98	119.1	211.9	8	12.4	1.52	1.20	13	11.7	0.8	1.0	75	1	
75	11.5	12.2	6.2		29.8	32.7	5.2	1.3	1.0	11.5	4.47	56.2	86.0	15	30.6	0.73	1.00	13	-15.9	68.7	68.0	101	1	
76	43.7	6.5	8.2		58.4	41.2	4.3	1.9	1.0	28.0	16.22	92.6	150.9	8	22.7	1.52	2.08	13	-15.6	1.7	2.0	85	1	
77	38.6	17.8	6.5		62.9	38.2	11.6	4.8	0.0	67.1	4.17	125.9	188.9	8	33.4	1.36	1.43	13	-2.4	1.8	2.0	89	1	
78	42.9	31.4	5.6		79.8	44.9	7.8	2.3	0.0	28.1	27.54	110.7	190.5	8	16.2	2.11	2.70	13	-12.3	7.1	7.6	94	1	
79	27.3	20.6	5.0		52.9	29.7	4.3	1.9	0.4	17.9	20.89	75.2	128.1	8	17.4	1.49	2.00	13	-14.7	9.1	9.0	101	1	
80	127.0	50.3	10.0		187.3	85.9	5.7	4.3	35.9	3.1										0.2	0.2	0.2	93	1
81	17.5	9.4	2.5		29.4	15.0	0.0	1.5	11.0	0.0	2.57	30.0	59.4	15	1.1	0.50	0.79	13	-22.2	19.3	20.0	97	1	
82	33.3	9.4	2.7		45.4	21.0	2.0	0.9	12.6	1.2	26.92	64.6	110.0	8	17.5	1.55	1.54	13	0.3	1.0	1.2	84	1	
83	2.9	4.0	1.1	10.1	18.2	10.0	2.2	0.0	7.0	0.0	0.55	19.7	37.8	30	4.1	0.30	0.26	20	6.4	18.7	20.0	93	1	
84	7.5	8.9	4.3	11.6	32.2	16.6	3.9	0.5	19.7	1.5	0.48	42.7	74.9	15	14.0	0.55	0.49	20	5.5	35.3	36.0	98	1	
85	21.9	7.7	6.7		36.2	21.3	4.1	1.3	10.7	1.5	1.51	40.4	76.6	15	5.4	0.59	1.53	13	-44.2	1.7	2.0	85	1	
86	2.2	3.2	2.4	13.9	21.7	8.8	2.6	0.0	7.5	0.0	0.40	19.3	41.0	30	-6.0	0.32	0.27	20	8.3	30.2	31.6	95	1	
87	1.9	4.8	2.7	14.6	24.0	6.1	3.9	1.5	13.6	1.6	0.38	27.2	51.1	15	6.3	0.38	0.21	20	28.7	10.9	11.2	97	1	
88	5.2	5.2	3.9	9.6	23.9	17.6	3.7	1.4	10.8	1.6	0.58	35.7	59.6	15	19.7	0.45	0.46	20	-1.6	1.9	2.0	93	1	
89	2.9	3.7	3.7	12.1	22.4	17.2	3.9	1.3	16.4	0.8	0.46	40.1	62.5	15	28.2	0.46	0.37	20	10.8	35.8	34.8	103	1	
90	2.6	2.6	2.5	16.3	24.1	17.7	17.8	2.3	15.0	0.0	0.34	53.2	77.2	15	37.7	0.54	0.38	20	17.6	10.4	11.2	93	1	
91	47.6	6.8	14.0		68.4	76.5	11.7	23.8	25.0	12.3	1.55	150.9	219.3	8	37.6	1.60	1.95	13	-9.8	4.9	5.6	88	1	
92	66.8	56.7	55.2	17.5	196.3	55.4	52.2	15.1	374.8	24.7	0.32	522.5	718.7	8	45.4	4.68	5.24	9	-5.6	1.4	1.4	97	1	
93	16.5	13.7	9.2	44.0	83.4	52.4	8.7	24.1	36.9	4.1	0.13	126.4	209.8	8	20.5	1.55	1.07	13	18.2	7.4	8.1	91	1	
94	13.3	17.7	8.3	6.5	45.9	25.5	7.0	11.8	21.7	2.5	0.85	69.2	115.1	8	20.2	0.84	0.96	13	-6.9	4.1	4.2	99	1	
95	6.6	4.8	3.6	12.1	27.1	9.4	4.8	4.3	17.0	0.5	0.46	36.5	63.6	15	14.7	0.47	0.50	13	-3.3	38.5	38.3	100	1	
96	5.9	5.7	2.3	12.1	26.0	8.3	5.0	4.0	12.5	1.6	0.46	31.9	57.9	15	10.1	0.43	0.49	20	-6.7	8.3	8.6	96	1	
97	42.3	29.0	8.2		79.5	43.0	6.4	3.3	31.8	2.1	28.18	114.7	194.2	8	18.1	2.17	2.16	13	0.2	0.8	0.8	104	1	
98	18.5	19.0	16.7	5.7	59.8	28.8	13.9	4.6	30.9	2.5	0.98	81.7	141.6	8	15.5	1.01	1.24	13	-10.3	1.4	1.4	97	1	
99	6.0	5.2	1.6	12.4	25.2	11.0	0.0	0.5	8.0	0.0	0.45	19.9	45.1	30	-11.7	0.36	0.52	13	-18.8	49.7	48.0	103	1	

Summary of bulk concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	ECcal	ECmeas	Req.R2	R2	Amount of ppt.(cal) M mm	Amount of ppt. R mm	%CE (M/R)	Sampling period
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l		mS/m	mS/m					%	day(s)
100	22.9	16.3	4.8		44.0	24.4	3.5	2.3	9.5	0.0	12.59	52.2	96.2	15	8.6	1.05	1.28	13	-10.0	4.3	4.5	96	1
101	13.2	11.8	3.9		28.9	23.6	2.6	1.5	14.5	0.0	11.22	53.4	82.3	15	29.7	0.90	0.94	13	-2.4	5.6	6.0	93	1
102	22.8	12.5	3.9		39.2	34.4	2.4	1.3	9.5	0.0	1.51	49.1	88.3	15	11.2	0.69	1.19	13	-26.9	5.3	6.2	85	1
103	3.6	3.4	5.4	11.1	23.5	7.4	4.2	2.2	16.0	0.0	0.50	30.4	53.8	15	12.8	0.40	0.38	20	2.3	6.0	6.4	93	1
104	4.0	2.8	6.1	6.8	19.7	13.2	0.0	0.0	13.9	1.3	0.81	29.3	49.0	30	19.6	0.38	0.40	20	-3.2	3.5	4.0	89	1
105	12.7	4.3	12.1	12.4	41.5	19.4	0.0	1.3	15.5	3.0	0.45	39.6	81.1	15	-2.4	0.61	0.57	13	3.5	2.0	2.2	89	1
106	6.0	4.8	9.0	13.9	33.8	15.9	0.0	1.4	11.0	0.0	0.40	28.7	62.5	15	-8.1	0.48	0.47	20	1.3	4.7	4.7	100	1
107	1.4	1.4	5.3	17.1	25.3	5.5	0.0	0.7	26.4	0.0	0.32	32.9	58.2	15	13.1	0.43	0.21	20	34.3	25.9	27.4	95	1
108	61.4	6.8	8.9		77.1	29.3	0.0	0.0	19.3	3.3	35.48	87.4	164.5	8	6.2	2.20	2.71	13	-10.5	1.7	1.6	106	1
109	1.5	1.3	0.0	12.7	15.4	6.1	2.2	0.5	11.5	1.6	0.44	22.3	37.8	30	18.3	0.29	0.25	20	6.7	17.4	18.0	97	1
110	7.1	5.3	4.9	8.0	25.3	10.0	0.0	15.6	10.5	0.0	0.69	36.7	62.0	15	18.5	0.48	0.40	20	8.9	1.7	2.0	86	1
111	43.9	16.0	24.2		84.1	49.1	15.4	3.8	44.6	3.9										0.2	0.2	86	1
112	15.2	11.4	14.9		41.5	44.5	6.7	2.6	37.5	4.6										0.3	0.4	83	1
113	9.7	13.1	16.9		39.7	22.1	6.7	0.4	43.3	5.8										0.4	0.4	111	1
114	12.8	7.4	9.1		29.3	17.0	5.1	2.5	37.2	3.5										0.4	0.4	93	1
115	22.0	11.9	16.3	271.3	321.6	26.0	2.9	2.2	56.5	6.4	0.02	94.1	415.7	8	-54.7	3.40	2.14	13	22.7	1.1	1.4	81	1
116	12.8	4.5	6.6	8.0	31.9	19.7	7.9	1.8	24.0	2.5	0.69	56.5	88.4	15	27.7	0.63	0.55	13	7.1	9.2	9.2	100	1
117	3.1	3.7	1.1		7.8	9.9	0.2	0.9	12.3	2.5	1.02	26.8	34.6	30	54.8	0.26	0.33	20	-11.5	7.0	7.6	92	1
118	43.7	25.5	13.3	96.3	178.7	116.4	60.9	5.9	30.9	10.7	0.06	224.9	403.6	8	11.4	2.94	0.36	20	78.2	0.3	0.4	70	1
119	2.7	3.1	1.4	22.1	29.3	9.9	0.9	0.0	5.4	0.0	0.25	16.4	45.7	30	-28.3	0.37	0.30	20	10.3	47.2	44.6	106	1
120	6.8	3.4	5.9	23.6	39.6	12.9	4.6	4.4	9.2	0.4	0.23	31.7	71.3	15	-11.1	0.55	0.42	20	13.3	5.9	6.0	98	1
121	28.1	13.2	20.7	22.1	84.0	32.8	17.0	3.0	25.7	10.1	0.25	88.9	172.9	8	2.8	1.24	1.23	13	0.3	6.5	6.7	96	1
122	3.9	0.8	2.5	38.3	45.5	1.8	1.6	1.0	8.0	0.0	0.14	12.6	58.1	15	-56.6	0.48	0.22	20	37.0	106.9	106.8	100	1



Appendix B

Summary of wet-only concentration (ueq/L), Ion balance (R₁) and EC check (R₂)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.RI	R1	EC _{cal}	EC _{meas}	Req.R2	R2	Amount of ppt.(cal)	Amount of ppt. R	%CE (M/R)	Sampling period	
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l		mS/m	mS/m			M mm	mm	%	day(s)	
Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1743.6	1749.1	99.7	122
Mean	9.2	6.8	3.5	--	--	17.1	1.6	1.3	8.9	2.3	3.3	--	--	--	--	--	0.65	--	--	--	--	--	--	--
Max.	240.0	115.3	47.3	--	386.9	210.5	43.4	28.2	244.4	67.1	66.1	416.7	740.4	--	60.5	7.27	6.42	--	100.0	109.8	110.8	232	1	
Min.	0.0	0.5	0.8	--	7.8	1.1	0.0	0.0	0.0	0.0	0.1	3.6	24.4	--	-72.0	0.21	0.10	--	-42.8	0.1	0.2	29	1	

Summary of wet-only concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	EC _{cal}	EC _{meas}	Req.R2	R2	Amount of ppt. (cal) M mm	Amount of ppt. R mm	%CE (M/R)	Sampling period day(s)
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m					%	
19	0.0	12.5	2.4	6.2	21.2	31.3	0.0	0.5	13.9	3.2	0.89	49.8	70.9	15	40.4	0.53	0.78	13	-19.2	9.3	9.6	97	1
20	0.0	5.8	1.6			10.5	0.0	1.2	4.4	2.7	12.59	31.3					1.18			32.5	32.1	101	1
21	0.0	9.3	1.5			28.9	0.0	0.0	6.8	1.2	15.49	52.3					1.44			30.6	29.4	104	1
22	0.0	16.5	9.0			46.1	0.0	0.0	5.0	0.6	33.11	84.8					1.79			23.2	25.0	93	1
23	0.0	11.6	4.9			34.3	0.0	0.0	6.7	1.5	10.47	52.9					0.99			0.9	1.2	72	1
24	0.0	7.8	2.4			9.1	0.0	0.0	4.6	1.1	8.51	23.4					0.77			6.1	7.8	78	1
25	0.0	5.7	1.8			9.9	0.0	0.0	2.9	0.9	5.25	18.9					0.89			14.6	17.6	83	1
26	1.1	0.9	3.7	24.7	30.5	1.6	0.0	0.0	2.1	1.0	0.22	5.0	35.5	30	-72.0	0.30	0.22	20	15.7	41.1	42.0	98	1
27	0.0	3.1	1.1			4.5	0.0	0.0	2.5	0.7	1.29	9.0					0.10			66.4	66.6	100	1
28	13.7	7.8	5.2	13.0	39.6	26.2	0.0	0.0	11.2	1.7	0.43	39.5	79.1	15	-0.2	0.60	0.73	13	-9.5	0.5	0.7	69	1
29	10.6	2.4	2.3			8.7	0.0	0.0	3.1	0.8	1.07	13.5					0.39			13.1	14.0	94	1
30	11.7	9.2	4.9	8.0	33.8	14.7	0.0	0.0	9.6	2.1	0.69	27.0	60.8	15	-11.1	0.47	0.62	13	-13.9	1.5	2.6	59	1
31	4.6	0.7	0.8	18.3	24.4	2.9	0.0	0.0	1.8	0.6	0.30	5.6	30.0	30	-62.8	0.26	0.24	20	3.3	52.7	54.0	98	1
32	4.9	1.0	1.3	13.6	20.8	1.1	0.0	0.0	1.5	0.6	0.41	3.6	24.4	30	-70.1	0.21	0.22	20	-1.9	109.8	110.8	99	1
33	6.4	5.6	4.1	11.1	27.1	38.5	0.0	0.0	3.5	0.4	0.50	42.9	70.0	15	22.7	0.54	0.50	13	4.2	0.5	0.8	62	1
34	7.0	6.8	2.2	14.2	30.2	12.3	0.0	0.0	3.7	0.9	0.39	17.3	47.5	30	-27.2	0.38	0.51	13	-14.8	4.4	4.8	91	1
35	7.2	5.5	2.1	7.0	21.8	8.8	0.0	0.0	2.7	0.7	0.79	13.0	34.8	30	-25.2	0.29	0.46	20	-23.1	12.6	13.1	96	1
36	4.6	1.9	2.2			9.1	0.0	0.0	1.7	0.7	1.38	12.8					0.26			10.1	12.2	83	1
37	4.6	1.9	2.2	10.3	19.0	24.0	0.0	0.0	11.8	2.1	0.54	38.4	57.4	15	33.8	0.44	0.50	13	-6.9	10.7	11.8	90	1
38	8.3	1.1	3.0	8.8	21.1	23.1	0.0	0.0	11.7	1.2	0.63	36.7	57.8	15	26.9	0.44	0.43	20	1.5	11.4	9.7	117	1
39	6.4	11.4	3.2	18.3	39.4	21.6	0.0	0.0	15.3	1.2	0.30	38.4	77.8	15	-1.2	0.59	0.51	13	7.1	4.8	4.3	111	1
40	32.4	14.7	2.8			49.9	32.5	0.3	0.2	14.5	10.23	59.3	109.2	8	8.6	1.08	1.14	13	-2.7	39.7	35.6	112	1
41	30.1	5.3	2.5	9.4	47.3	21.7	0.6	1.0	6.8	1.4	0.59	32.2	79.5	15	-19.0	0.62	0.80	13	-12.6	2.4	2.4	101	1
42	16.1	7.3	2.7			26.2	15.5	0.7	6.4	1.5	2.29	26.6	52.7	15	0.8	0.45	0.67	13	-19.9	15.7	15.7	100	1
43	67.7	9.8	7.0			84.5	51.2	5.4	7.7	1.9	20.89	88.1	172.6	8	2.1	1.86	2.05	13	-4.8	24.3	19.0	128	1
44	172.9	50.5	28.6			252.0	125.7	1.2	13.2	72.3	64.57	286.3	538.3	8	6.4	5.73		20	100.0	0.4	0.4	90	1
45	15.3	6.8	3.1			25.2	27.0	2.8	0.7	5.1	3.55	40.9	66.2	15	23.7	0.58	0.98	13	-25.9	17.5	15.2	115	1

Summary of wet-only concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	EC _{cal}	EC _{meas}	Req.R2	R2	Amount of ppt. (cal) M mm	Amount of ppt. R mm	%CE (M/R) %	Sampling period day(s)
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l		ms/m	mS/m			mm	mm	%	
73	21.0	16.2	9.0		46.2	36.6	7.4	5.0	11.4	2.2	4.68	67.3	113.5	8	18.6	0.94	1.33	13	-17.2	6.3	6.4	98	1
74	30.1	45.5	11.0	5.7	92.3	57.6	9.7	4.9	40.5	4.7	0.98	118.4	210.7	8	12.4	1.51	1.20	13	11.4	0.8	1.0	78	1
75	11.4	12.1	6.0		29.5	32.4	5.1	1.2	0.8	11.4	4.47	55.4	84.9	15	30.4	0.72	0.99	13	-15.9	65.9	68.0	97	1
76	43.3	5.5	8.2		57.0	41.1	3.9	1.8	0.8	27.9	16.60	92.1	149.1	8	23.6	1.52	2.08	13	-15.6	1.6	2.0	79	1
77	38.6	17.8	6.5		62.9	38.2	11.6	4.8	0.0	67.1	4.17	125.9	188.9	8	33.4	1.36	1.43	13	-2.4	1.3	2.0	65	1
78	42.8	31.3	5.5		79.6	44.6	7.9	2.2	0.0	28.0	29.51	112.2	191.8	8	17.0	2.17	2.68	13	-10.5	7.1	7.6	93	1
79	27.2	20.6	4.9		52.8	29.4	4.2	1.8	0.3	17.6	19.95	73.3	126.1	8	16.3	1.45	1.99	13	-15.8	8.9	9.0	99	1
80	126.4	50.2	9.9		186.5	85.9	5.6	4.2	35.7	2.8										0.2	0.2	113	1
81	15.3	8.5	2.8		26.5	14.9	3.0	0.0	7.5	0.0	1.38	26.7	53.3	15	0.4	0.42	0.77	13	-29.3	19.8	20.0	99	1
82	32.9	9.3	2.7		44.8	20.7	2.0	0.8	12.5	1.0	28.18	65.2	110.0	8	18.5	1.58	1.54	13	1.4	1.0	1.2	80	1
83	2.8	3.9	1.0	9.4	17.2	9.6	1.9	0.0	4.9	0.0	0.59	17.1	34.2	30	-0.2	0.27	0.25	20	4.3	19.2	20.0	96	1
84	7.5	8.8	4.2	11.1	31.5	16.3	3.9	0.4	19.5	1.3	0.50	41.9	73.4	15	14.1	0.54	0.48	20	5.6	35.9	36.0	100	1
85	21.2	7.6	6.5		35.4	21.0	3.8	1.2	10.3	0.9	1.62	38.8	74.2	15	4.7	0.58	1.02	13	-27.5	1.7	2.0	87	1
86	2.1	3.1	2.2	13.9	21.4	8.5	2.3	0.0	7.2	0.0	0.40	18.3	39.7	30	-7.7	0.31	0.25	20	10.8	32.0	31.6	101	1
87	1.7	4.6	2.4	13.9	22.6	5.6	3.4	1.3	13.0	1.1	0.40	24.8	47.4	30	4.5	0.35	0.20	20	27.8	11.2	11.2	100	1
88	5.2	4.8	3.8	9.4	23.2	17.3	3.3	1.2	10.4	1.1	0.59	33.9	57.2	15	18.7	0.43	0.46	20	-3.4	1.9	2.0	97	1
89	2.8	3.6	3.6	11.6	21.5	17.2	3.8	1.1	15.9	0.5	0.48	39.0	60.5	15	28.9	0.45	0.36	20	10.7	37.1	34.8	107	1
90	3.1	2.8	2.9	16.3	25.1	18.8	5.3	0.3	15.9	0.6	0.34	41.2	66.2	15	24.3	0.49	0.38	20	12.5	10.8	11.2	97	1
91	10.4	5.4	5.6	10.3	21.4	42.4	5.0	19.6	17.9	1.6	0.54	87.1	108.5	8	60.5	0.87	0.68	13	12.4	5.0	5.6	90	1
92	60.3	48.5	47.3	11.6	167.7	60.2	43.4	27.8	244.4	22.3	0.48	398.6	566.3	8	40.8	3.75	4.07	9	-4.0	1.4	1.4	98	1
93	16.3	12.8	8.8	42.0	79.9	51.8	8.3	23.9	36.5	3.9	0.13	124.5	204.5	8	21.8	1.50	1.06	13	17.3	8.0	8.1	99	1
94	13.1	17.6	8.0	6.2	44.9	24.9	6.5	11.5	21.2	2.3	0.89	67.3	112.3	8	19.9	0.82	0.95	13	-7.5	4.3	4.2	101	1
95	6.7	4.8	3.2	11.6	26.2	9.5	4.2	4.4	17.0	0.5	0.48	36.0	62.2	15	15.7	0.46	0.48	20	-2.3	39.5	38.3	103	1
96	6.0	5.7	2.5	12.4	26.6	8.6	5.2	4.0	12.5	1.0	0.45	31.7	58.3	15	8.8	0.43	0.48	20	-5.2	19.9	8.6	232	1
97	42.2	30.2	8.0		80.4	42.5	6.0	3.0	31.3	1.2	30.20	114.2	194.6	8	17.4	2.23	2.15	13	1.8	0.6	0.8	80	1
98	20.0	22.0	5.7		47.8	44.6	2.0	1.4	18.1	0.0	10.72	76.9	124.7	8	23.3	1.19	1.38	13	-7.3	1.4	1.4	97	1
99	5.7	5.1	1.4	11.8	24.1	10.4	0.0	0.3	7.6	0.0	0.47	18.8	42.9	30	-12.2	0.34	0.51	13	-20.1	49.3	48.0	103	1

Summary of wet-only concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (Continued)

Sample No.	SO ₄ ²⁻		NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion		NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req,R1	R1	ECcal	ECmeas	Req,R2	R2	Amount of ppt.(cal)		Amount of ppt.	%CE (M/R)	Sampling period
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m			M mm	R mm	%	day(s)
100	22.2	15.8	3.8		41.8	22.3	1.9	1.4	7.6	0.0	13.18	46.3	88.1	15	5.1	1.01	1.28	13	-11.8	4.3	4.5	95	1			
101	12.7	11.6	3.7		28.0	23.0	2.3	1.2	14.0	0.0	12.02	52.6	80.6	15	30.4	0.91	0.92	13	-0.7	5.4	6.0	90	1			
102	22.8	12.5	3.9		39.2	34.4	2.4	1.3	9.5	0.0	1.51	49.1	88.3	15	11.2	0.69	1.19	13	-26.9	5.7	6.2	92	1			
103	2.6	2.6	4.0	10.6	19.7	4.7	2.0	0.9	13.5	0.0	0.52	21.7	41.4	30	4.8	0.31	0.37	20	-8.2	6.1	6.4	95	1			
104	3.9	2.7	6.1	6.8	19.6	13.2	0.0	0.0	13.9	0.0	0.81	27.9	47.5	30	17.4	0.37	0.40	20	-4.3	3.5	4.0	87	1			
105	12.5	4.1	11.8	12.1	40.6	18.8	0.0	1.3	15.0	2.2	0.46	37.8	78.4	15	-3.7	0.59	0.57	13	2.0	2.0	2.2	93	1			
106	6.0	4.6	8.8	13.9	33.3	15.5	0.0	1.2	10.5	0.0	0.40	27.5	60.9	15	-9.6	0.47	0.47	20	0.1	4.5	4.7	95	1			
107	1.4	1.4	5.3	17.1	25.3	5.5	0.0	0.7	26.4	0.0	0.32	32.9	58.2	15	13.1	0.43	0.21	20	34.3	27.8	27.4	102	1			
108	61.2	6.7	8.6		76.5	28.7	0.0	0.0	18.8	2.6	37.15	87.3	163.8	8	6.6	2.24	2.71	13	-9.5	0.7	1.6	43	1			
109	1.9	1.4	5.6	13.6	22.5	5.7	0.0	0.6	5.8	0.0	0.41	12.6	35.1	30	-28.3	0.29	0.20	20	17.5	17.5	18.0	97	1			
110	7.0	5.2	4.8	7.6	24.6	9.7	0.0	14.3	10.2	0.0	0.72	35.0	59.6	15	17.5	0.46	0.39	20	8.3	1.8	2.0	92	1			
111	43.9	16.0	24.2		84.1	49.1	15.4	3.8	44.6	3.9										0.2	0.2	102	1			
112	15.2	11.4	14.9	11.1	41.5	44.5	6.7	2.6	37.5	4.6	0.50	96.4	137.9	8	39.8	1.06		20	100.0	0.3	0.4	86	1			
113	9.7	13.1	16.9	16.0	39.7	22.1	6.7	0.4	43.3	5.8	0.35	78.7	118.3	8	32.9	0.94		20	100.0	0.3	0.4	82	1			
114	12.8	7.4	9.1		29.3	17.0	5.1	2.5	37.2	3.5										0.3	0.4	67	1			
115	22.0	11.9	16.3	5.9	56.2	26.0	2.9	2.2	56.5	6.4	0.93	95.1	151.3	8	25.7	1.07		20	100.0	0.4	1.4	29	1			
116	12.8	4.5	6.6	8.0	31.9	19.7	7.9	1.8	24.0	2.5	0.69	56.5	88.4	15	27.7	0.63	0.55	13	7.1	7.4	9.2	80	1			
117	3.1	3.7	1.1		7.8	9.9	0.2	0.9	12.3	2.5	1.02	26.8	34.6	30	54.8	0.26	0.33	20	-11.5	7.6	7.6	100	1			
118	43.8	25.5	13.2		82.4	114.8	5.8	5.8	30.6	10.3										0.3	0.4	75	1			
119	2.7	3.1	1.4	21.1	28.2	9.5	0.8	0.0	5.2	0.0	0.26	15.7	43.9	30	-28.3	0.36	0.30	20	8.4	43.9	44.6	98	1			
120	6.8	3.4	5.9	23.6	39.6	12.9	4.6	4.4	9.2	0.4	0.23	31.7	71.3	15	-11.1	0.55	0.42	20	13.3	4.8	6.0	81	1			
121	28.1	13.2	20.7	22.1	84.0	32.8	17.0	3.0	25.7	10.1	0.25	88.9	172.9	8	2.8	1.24	1.23	13	0.3	6.5	6.7	96	1			
122	4.8	0.5	0.9	22.1	28.2	1.2	0.5	0.0	3.0	0.0	0.25	5.0	33.2	30	-70.0	0.28	0.20	20	17.2	107.3	106.8	101	1			

Appendix C

Summary of bulk concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (n=42)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	EC _{cal}	EC _{meas}	Req.R2	R2	Amount of ppt.(cal) M mm	Amount of ppt. R mm	%CE (M/R) %	Sampling period day(s)	
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m							
Total	843	485	236	--	2065	--	--	--	--	--	--	2095	--	--	--	--	--	--	--	--	555.5	556.7	99.8	42
Mean	11.6	7.2	3.5	--	--	17.7	2.3	1.3	12.1	1.5	2.0	--	--	--	--	--	0.58	--	--	--	--	--	--	--
Max.	241.5	115.8	33.3	--	390.6	188.5	19.1	12.3	69.9	11.5	63.1	357.0	747.6	--	22.5	7.23	6.45	--	13.3	47.2	44.6	106	1	
Min.	0.0	1.3	0.0	--	10.0	4.4	0.0	0.0	2.7	0.0	0.1	13.2	25.3	--	-28.3	0.21	0.22	--	-11.0	0.4	0.7	62	1	

Summary of bulk concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (n=42) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	ECcal	ECmeas	Req.R2	R2	Amount of ppt. (cal) M mm	Amount of ppt. R mm	%CE (M/R) %	Sampling period day(s)
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m					%	
18	35.4	6.5	2.8	11.1	55.7	24.9	1.3	1.5	15.0	0.0	0.50	43.3	99.0	15	-12.6	0.76	0.80	13	-2.7	2.4	2.4	100	1
19	67.7	9.8	7.0		84.5	51.2	5.4	1.0	7.7	1.9	20.89	88.1	172.6	8	2.1	1.86	2.05	13	-4.8	18.6	19.0	98	1
20	8.3	8.9	2.7	15.6	35.5	15.5	0.0	3.1	7.5	2.5	0.35	28.9	64.4	15	-10.2	0.50	0.56	13	-6.0	7.2	7.4	98	1
21	8.3	8.9	2.7	15.6	35.5	15.5	0.0	3.1	7.5	2.5	0.35	28.9	64.4	15	-10.2	0.50	0.56	13	-6.0	7.2	7.4	98	1
22	5.8	4.8	2.3	13.9	26.8	18.8	1.7	1.3	8.0	0.0	0.40	30.2	57.1	15	6.0	0.44	0.38	20	7.4	5.3	5.4	98	1
23	3.3	2.0	1.1	5.7	12.1	4.4	0.3	1.0	6.5	0.0	0.98	13.2	25.3	30	4.1	0.21	0.22	20	-1.3	3.8	4.0	95	1
24	10.0	15.4	6.2	44.0	75.6	34.9	2.6	2.3	44.9	0.0	0.13	84.9	160.5	8	5.7	1.19	0.93	13	12.2	5.7	6.0	94	1
25	83.5	53.9	18.3		155.7	94.2	3.5	5.6	29.9	4.9	25.12	163.3	319.0	8	2.4	3.03	2.90	13	2.2	0.6	0.9	62	1
26	95.8	48.9	15.8		160.4	71.0	8.3	4.6	31.9	6.6	29.51	151.9	312.3	8	-2.7	3.09	3.40	9	-4.8	3.3	3.6	92	1
27	241.5	115.8	33.3		390.6	188.5	11.7	12.3	69.9	11.5	63.10	357.0	747.6	8	-4.5	7.23	6.45	9	5.7	1.7	1.6	103	1
28	2.3	5.0	1.4	7.5	16.2	9.4	1.3	1.0	8.5	2.5	0.74	23.4	39.6	30	18.4	0.30	0.31	20	-0.9	32.2	32.2	100	1
29	4.4	20.6	3.1	5.9	34.1	13.9	3.0	1.8	16.5	0.0	0.93	36.1	70.1	15	2.9	0.52	0.40	20	13.1	13.0	13.6	95	1
30	2.9	4.0	1.1	10.1	18.2	10.0	2.2	0.0	7.0	0.0	0.55	19.7	37.8	30	4.1	0.30	0.26	20	6.4	18.7	20.0	93	1
31	7.5	8.9	4.3	11.6	32.2	16.6	3.9	0.5	19.7	1.5	0.48	42.7	74.9	15	14.0	0.55	0.49	20	5.5	35.3	36.0	98	1
32	2.2	3.2	2.4	13.9	21.7	8.8	2.6	0.0	7.5	0.0	0.40	19.3	41.0	30	-6.0	0.32	0.27	20	8.3	30.2	31.6	95	1
33	6.6	4.8	3.6	12.1	27.1	9.4	4.8	4.3	17.0	0.5	0.46	36.5	63.6	15	14.7	0.47	0.50	13	-3.3	38.5	38.3	100	1
34	5.9	5.7	2.3	12.1	26.0	8.3	5.0	4.0	12.5	1.6	0.46	31.9	57.9	15	10.1	0.43	0.49	20	-6.7	8.3	8.6	96	1
35	22.9	16.3	4.8		44.0	24.4	3.5	2.3	9.5	0.0	12.59	52.2	96.2	15	8.6	1.05	1.28	13	-10.0	4.3	4.5	96	1
36	3.6	3.4	5.4	11.1	23.5	7.4	4.2	2.2	16.0	0.0	0.50	30.4	53.8	15	12.8	0.40	0.38	20	2.3	6.0	6.4	93	1
37	12.7	4.3	12.1	12.4	41.5	19.4	0.0	1.3	15.5	3.0	0.45	39.6	81.1	15	-2.4	0.61	0.57	13	3.5	2.0	2.2	89	1
38	6.0	4.8	9.0	13.9	33.8	15.9	0.0	1.4	11.0	0.0	0.40	28.7	62.5	15	-8.1	0.48	0.47	20	1.3	4.7	4.7	100	1
39	1.5	1.3	0.0	12.7	15.4	6.1	2.2	0.5	11.5	1.6	0.44	22.3	37.8	30	18.3	0.29	0.25	20	6.7	17.4	18.0	97	1
40	2.7	3.1	1.4	22.1	29.3	9.9	0.9	0.0	5.4	0.0	0.25	16.4	45.7	30	-28.3	0.37	0.30	20	10.3	47.2	44.6	106	1
41	6.8	3.4	5.9	23.6	39.6	12.9	4.6	4.4	9.2	0.4	0.23	31.7	71.3	15	-11.1	0.55	0.42	20	13.3	5.9	6.0	98	1
42	29.1	14.0	22.0	24.7	89.9	35.5	19.1	4.3	25.7	10.1	0.22	94.9	184.8	8	2.7	1.32	1.24	13	3.3	6.5	6.7	96	1

Appendix D

Summary of wet-only concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (n=31)

Sample No.	SO ₄ ²⁻	NO ₃	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	EC _{cal}	EC _{meas}	Req.R2	R2	Amount of ppt.(cal) M mm	Amount of ppt. R mm	%CE (M/R) %	Sampling period day(s)	
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m							
Total	--	--	--	--	1578	--	--	--	--	--	--	1547	--	--	--	--	--	--	--	--	363.0	358.3	101.3	31
Mean	10.9	6.0	3.8	--	--	16.0	2.0	0.8	8.8	1.3	2.4	--	--	--	--	--	0.53	--	--	--	--	--	--	
Max.	240.0	115.3	31.7	--	386.9	187.2	17.0	11.6	67.2	10.4	66.1	353.5	740.4	--	19.3	7.27	6.42	--	15.3	44.3	44.6	232	1	
Min.	0.0	1.6	1.0	--	8.7	4.3	0.0	0.0	1.7	0.0	0.2	12.7	21.5	--	-28.3	0.20	0.21	--	-14.1	0.5	0.7	67	1	

Summary of wet-only concentration (ueq/L), Ion balance (R₁) and EC check (R₂) (n=31) (Continued)

Sample No.	SO ₄ ²⁻	NO ₃ ⁻	Cl ⁻	HCO ₃ ⁻	Anion	NH ₄ ⁺	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	H ⁺	Cation	C+A	Req.R1	R1	ECcal	ECmeas	Req.R2	R2	Amount of ppt.(cal)	Amount of ppt.	%CE (M/R)	Sampling period
	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l	ueq/l			mS/m	mS/m			M mm	R mm	%	day(s)
18	94.9	48.3	14.7		158.0	68.9	6.5	4.2	29.9	5.3	33.11	148.0	306.0	8	-3.3	3.15	3.20	9	-0.7	3.5	3.6	97	1
19	240.0	115.3	31.7		386.9	187.2	11.0	11.6	67.2	10.4	66.07	353.5	740.4	8	-4.5	7.27	6.42	9	6.2	1.1	1.6	67	1
20	2.6	4.7	2.8	7.8	17.8	9.1	0.0	1.3	6.2	2.5	0.71	19.9	37.7	30	5.4	0.30	0.33	20	-5.3	32.6	32.2	101	1
21	2.8	3.9	1.0	9.4	17.2	9.6	1.9	0.0	4.9	0.0	0.59	17.1	34.2	30	-0.2	0.27	0.25	20	4.3	19.2	20.0	96	1
22	7.5	8.8	4.2	11.1	31.5	16.3	3.9	0.4	19.5	1.3	0.50	41.9	73.4	15	14.1	0.54	0.48	20	5.6	35.9	36.0	100	1
23	2.1	3.1	2.2	13.9	21.4	8.5	2.3	0.0	7.2	0.0	0.40	18.3	39.7	30	-7.7	0.31	0.25	20	10.8	32.0	31.6	101	1
24	6.0	5.7	2.5	12.4	26.6	8.6	5.2	4.0	12.5	1.0	0.45	31.7	58.3	15	8.8	0.43	0.48	20	-5.2	19.9	8.6	232	1
25	22.2	15.8	3.8		41.8	22.3	1.9	1.4	7.6	0.0	13.18	46.3	88.1	15	5.1	1.01	1.28	13	-11.8	4.3	4.5	95	1
26	2.6	2.6	4.0	10.6	19.7	4.7	2.0	0.9	13.5	0.0	0.52	21.7	41.4	30	4.8	0.31	0.37	20	-8.2	6.1	6.4	95	1
27	12.5	4.1	11.8	12.1	40.6	18.8	0.0	1.3	15.0	2.2	0.46	37.8	78.4	15	-3.7	0.59	0.57	13	2.0	2.0	2.2	93	1
28	6.0	4.6	8.8	13.9	33.3	15.5	0.0	1.2	10.5	0.0	0.40	27.5	60.9	15	-9.6	0.47	0.47	20	0.1	4.5	4.7	95	1
29	2.7	3.1	1.4	21.1	28.2	9.5	0.8	0.0	5.2	0.0	0.26	15.7	43.9	30	-28.3	0.36	0.30	20	8.4	43.9	44.6	98	1
30	6.8	3.4	5.9	23.6	39.6	12.9	4.6	4.4	9.2	0.4	0.23	31.7	71.3	15	-11.1	0.55	0.42	20	13.3	4.8	6.0	81	1
31	28.1	13.2	20.7	22.1	84.0	32.8	17.0	3.0	25.7	10.1	0.25	88.9	172.9	8	2.8	1.24	1.23	13	0.3	6.5	6.7	96	1

Appendix E

bulk Correlations (August 05-October 05)

	sulfate	nitrate	chloride	ammonium	sodium	potassium	calcium	magnesium	hydronium
sulfate	Pearson Correlation Sig. (2-tailed) N	1 19							
nitrate	Pearson Correlation Sig. (2-tailed) N	.572(*) 19							
chloride	Pearson Correlation Sig. (2-tailed) N	.011 19	1 19						
ammonium	Pearson Correlation Sig. (2-tailed) N	.274 19	.161 19	1 19					
sodium	Pearson Correlation Sig. (2-tailed) N	.256 19	.509 19	.763(**) 19	.406 19				
potassium	Pearson Correlation Sig. (2-tailed) N	.880(**) 19	.000 19	.084 19	.000 19				
calcium	Pearson Correlation Sig. (2-tailed) N	.597(**) 19	.602(**) 19	.483(*) 19	.036 19	1 19			
magnesium	Pearson Correlation Sig. (2-tailed) N	.207 19	.006 19	.076 19	.076 19	.507(*) 19	1 19		
hydronium	Pearson Correlation Sig. (2-tailed) N	.396 19	.718 19	.229 19	.757 19	.027 19	.737 19	1 19	
	Pearson Correlation Sig. (2-tailed) N	-.231 19	.220 19	-.245 19	.290 19	-.017 19	.320 19	-.225 19	1 19
	Pearson Correlation Sig. (2-tailed) N	.342 19	.366 19	.312 19	.092 19	.092 19	.182 19	.354 19	.097 19
	Pearson Correlation Sig. (2-tailed) N	.848(**) 19	.362 19	.423 19	.773(**) 19	.707(**) 19	.097 19	-.077 19	-.054 19
	Pearson Correlation Sig. (2-tailed) N	.000 19	.127 19	.071 19	.000 19	.001 19	.692 19	.754 19	.826 19

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

wet-only Correlations (August 05-October 05)

	sulfate	nitrate	chloride	ammonium	sodium	potassium	calcium	magnesium	hydronium
sulfate	Pearson Correlation Sig. (2-tailed) N	1							
nitrate	Pearson Correlation Sig. (2-tailed) N	.505 12							
chloride	Pearson Correlation Sig. (2-tailed) N	.508 12	1						
ammonium	Pearson Correlation Sig. (2-tailed) N	.092 12	.650(*) 12	1					
sodium	Pearson Correlation Sig. (2-tailed) N	.672(*) 12	.022 12	.566 12	1				
potassium	Pearson Correlation Sig. (2-tailed) N	.440 12	.632(*) 12	.055 12	.446 12	1			
calcium	Pearson Correlation Sig. (2-tailed) N	.009 12	.028 12	.276 12	.146 12	.236 12	1		
magnesium	Pearson Correlation Sig. (2-tailed) N	.278 12	.547 12	.384 12	.245 12	.459 12	.155 12	1	
hydronium	Pearson Correlation Sig. (2-tailed) N	.381 12	.066 12	.277 12	.442 12	.203 12	.630 12	.010 12	1
		.770(**) 12	.378 12	.858(**) 12	.723(**) 12	.258 12	-.035 12	.975 12	
		.003 12	.226 12	.000 12	.008 12	.418 12	.913 12		
		.005 12	.339 12	.111 12	.008 12	.418 12	.913 12		
		.987 12	.281 12	.484 12	.723(**) 12	.258 12	-.035 12	.975 12	
		.424 12	.169 12	.111 12	.008 12	.418 12	.913 12		
		.978(**) 12	.169 12	.111 12	.008 12	.418 12	.913 12		
		.000 12	.169 12	.111 12	.008 12	.418 12	.913 12		

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

bulk Correlations (November 05-April 06)

	sulfate	nitrate	chloride	ammonium	sodium	potassium	calcium	magnesium	hydronium
sulfate	Pearson Correlation Sig. (2-tailed) N	1 10							
nitrate	Pearson Correlation Sig. (2-tailed) N	.988(**) 10	1						
chloride	Pearson Correlation Sig. (2-tailed) N	.985(**) 10	.985(**) 10	1					
ammonium	Pearson Correlation Sig. (2-tailed) N	.986(**) 10	.989(**) 10	.986(**) 10	1				
sodium	Pearson Correlation Sig. (2-tailed) N	.930(**) 10	.918(**) 10	.916(**) 10	.916(**) 10	1			
potassium	Pearson Correlation Sig. (2-tailed) N	.970(**) 10	.965(**) 10	.982(**) 10	.875(**) 10	.826(**) 10	1		
calcium	Pearson Correlation Sig. (2-tailed) N	.846(**) 10	.866(**) 10	.878(**) 10	.838(**) 10	.826(**) 10	.781(**) 10	1	
magnesium	Pearson Correlation Sig. (2-tailed) N	.969(**) 10	.943(**) 10	.935(**) 10	.903(**) 10	.936(**) 10	.781(**) 10	.966(**) 10	1
hydronium	Pearson Correlation Sig. (2-tailed) N	.989(**) 10	.988(**) 10	.976(**) 10	.923(**) 10	.953(**) 10	.815(**) 10	.966(**) 10	.966(**) 10

** Correlation is significant at the 0.01 level (2-tailed).

wet-only Correlations (November 05-April 06)

	sulfate	nitrate	chloride	ammonium	sodium	potassium	calcium	magnesium	hydronium
sulfate	Pearson Correlation Sig. (2-tailed) N	1 8							
nitrate	Pearson Correlation Sig. (2-tailed) N	.996(***) .000 8	1 8						
chloride	Pearson Correlation Sig. (2-tailed) N	.978(***) .000 8	.991(***) .000 8	1 8					
ammonium	Pearson Correlation Sig. (2-tailed) N	.989(***) .000 8	.986(***) .000 8	.945(***) .000 8	1 8				
sodium	Pearson Correlation Sig. (2-tailed) N	.956(***) .000 8	.925(***) .001 8	.945(***) .000 8	.945(***) .000 8	1 8			
potassium	Pearson Correlation Sig. (2-tailed) N	.976(***) .000 8	.970(***) .000 8	.989(***) .000 8	.914(***) .001 8	.973(***) .000 8	1 8		
calcium	Pearson Correlation Sig. (2-tailed) N	1.000(***) .000 8	.979(***) .000 8	.989(***) .000 8	.955(***) .000 8	.973(***) .000 8	.974(***) .000 8	1 8	
magnesium	Pearson Correlation Sig. (2-tailed) N	.974(***) .000 8	.968(***) .000 8	.951(***) .000 8	.931(***) .001 8	.934(***) .001 8	.974(***) .000 8	.969(***) .000 8	1 8
hydronium	Pearson Correlation Sig. (2-tailed) N	.988(***) .000 8	.992(***) .000 8	.979(***) .000 8	.946(***) .000 8	.957(***) .000 8	.989(***) .000 8	.969(***) .000 8	1 8

** Correlation is significant at the 0.01 level (2-tailed).

bulk Correlations (May 06-July 06)

	sulfate	nitrate	chloride	ammonium	sodium	potassium	calcium	magnesium	hydronium
sulfate	Pearson Correlation Sig. (2-tailed) N	1 13							
nitrate	Pearson Correlation Sig. (2-tailed) N	.897(**) 13							
chloride	Pearson Correlation Sig. (2-tailed) N	.000 13	.516 13						
ammonium	Pearson Correlation Sig. (2-tailed) N	.785(**) 13	.071 13	.838(**) 13	.954(**) 13				
sodium	Pearson Correlation Sig. (2-tailed) N	.001 13	.000 13	.860(**) 13	.699(**) 13	.663(*) 13			
potassium	Pearson Correlation Sig. (2-tailed) N	.008 13	.041 13	.008 13	.013 13	.589(*) 13	.480 13		
calcium	Pearson Correlation Sig. (2-tailed) N	.464 13	.329 13	.434 13	.319 13	.034 13	.138 13		
magnesium	Pearson Correlation Sig. (2-tailed) N	.110 13	.272 13	.139 13	.289 13	.034 13	.435 13		
hydronium	Pearson Correlation Sig. (2-tailed) N	.605(*) 13	.470 13	.747(**) 13	.615(*) 13	.760(**) 13	.172 13	.525 13	.194 13

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

wet-only Correlations (May 06-July 06)

	sulfate	nitrate	chloride	ammonium	sodium	potassium	calcium	magnesium	hydronium
sulfate	Pearson Correlation Sig. (2-tailed) N	1 11							
nitrate	Pearson Correlation Sig. (2-tailed) N	.881(**) .000 11							
chloride	Pearson Correlation Sig. (2-tailed) N	.745(**) .008 11	1 11						
ammonium	Pearson Correlation Sig. (2-tailed) N	.943(**) .000 11	.829(**) .002 11	1 11					
sodium	Pearson Correlation Sig. (2-tailed) N	.661(*) .027 11	.692(*) .018 11	.653(*) .029 11	1 11				
potassium	Pearson Correlation Sig. (2-tailed) N	.351 .289 11	.370 .262 11	.266 .428 11	.505 .113 11	1 11			
calcium	Pearson Correlation Sig. (2-tailed) N	.588 .057 11	.783(**) .004 11	.642(*) .033 11	.729(*) .011 11	.325 .330 11	1 11		
magnesium	Pearson Correlation Sig. (2-tailed) N	.755(**) .007 11	.886(**) .000 11	.797(**) .003 11	.912(**) .000 11	.353 .287 11	.820(**) .002 11	1 11	
hydronium	Pearson Correlation Sig. (2-tailed) N	.496 .121 11	-.138 .685 11	.312 .350 11	-.131 .700 11	-.037 .915 11	-.227 .502 11	-.163 .632 11	1 11

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

CURRICULUM VITAE

Name: Nawarut Chunsuk

Sex: Male

Date of Birth: November 19, 1980

Nationality: Thai

Education Background:

1995 – 1996 High School, Kawila Wittayalai, Chaing mai

1996 – 1998 High School, Uttaradit Wittayalai, Uttaradit

1998 – 2003 Bachelor of Science in Chemistry, Chiang Mai University,
Chiang mai

Scholarship Donor:

The Postgraduate Education and Research Program in
Chemistry (PERCH), Ministry of University Affairs

List of Conferences:

2006 Comparison of Rainwater Sampling Methods Based on
Chemical Composition, 32nd Congress on Science and
Technology of Thailand, Bangkok

2007 Chemical Composition of Rainwater Samples from Bulk and
Wet-only collectors, PERCH-CIC Congress V, Chonburi