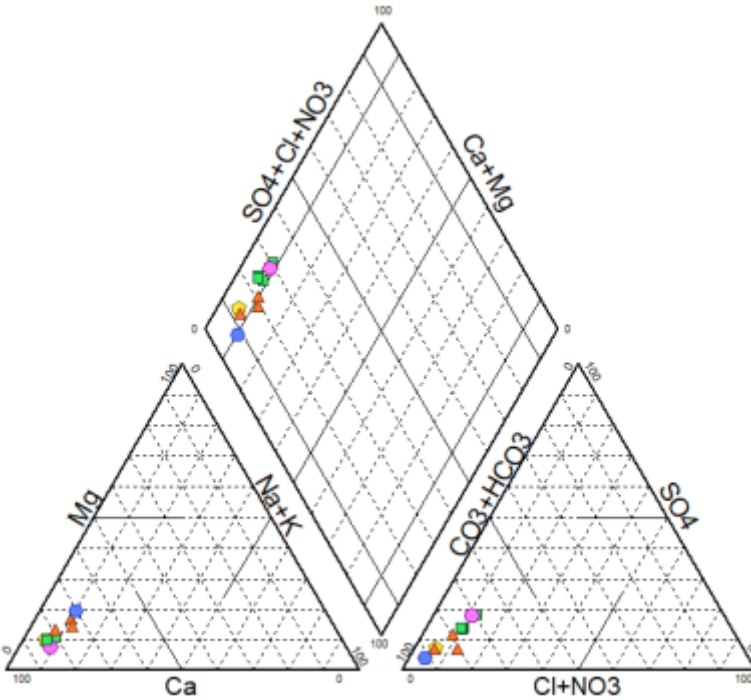


Precipitation of Mineral Phases in Drinking Water Wells of the Water Supply of Lübeck

Analyses of 10 samples have been entered. The data are summerized in the file

data.xls
. A piper diagram has been prepared using the software Diagramme.



Student project

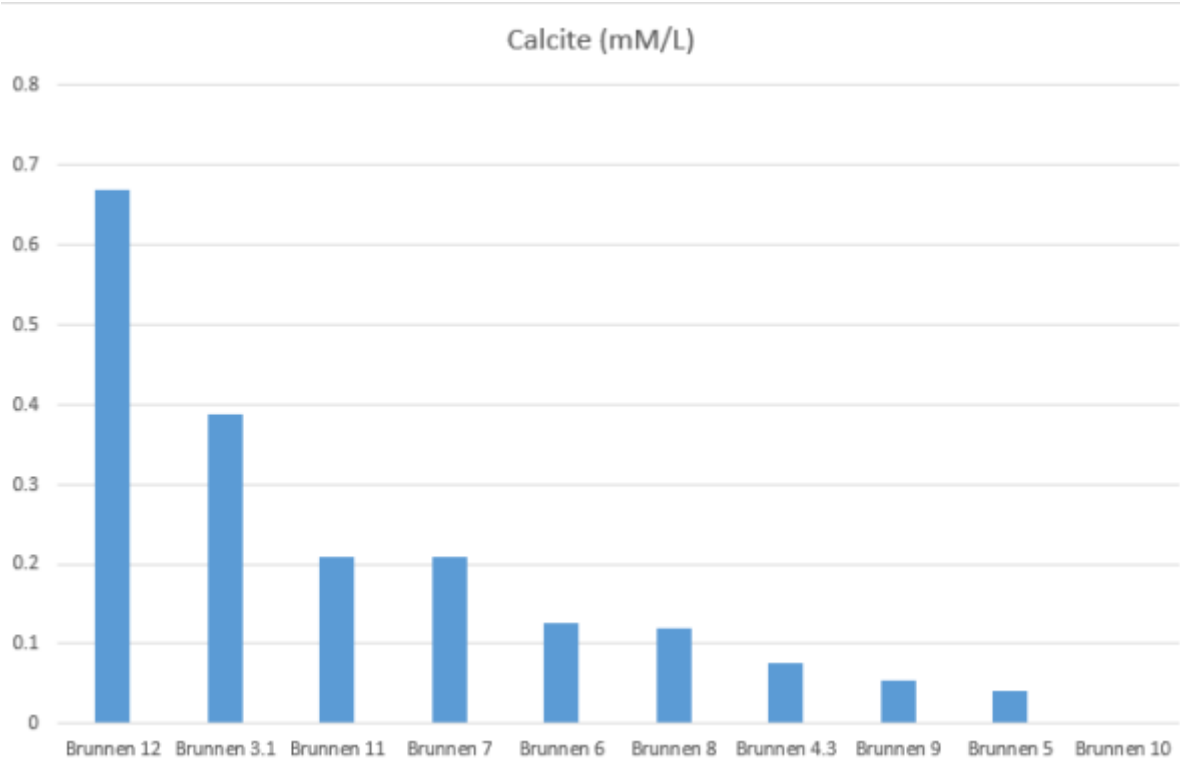
Data

Name	Libellé	Groupe	T°C	pH	c25°C	eH	O2	Ca	Mg	Na	K	HCO3-	CO2	F	Cl	Br	SO4	NO2	NO3	Mn	NH4	TOC	Fe	Zn	DOC
Brunnen 3.1	gw	1	9.5	7.31	800	-140	0.1	128	16.9	18.6	2.7	425	28.2		27.9	0.07	46.4			0.203	0.37	3.2	3.09		2.9
Brunnen 4.3	gw	1	9.6	7.35	607	-175	0.1	122	9.7	13.4	2.6	365	17.6		29.5		51.4			0.106	0.16	1.8	1.71		1.8
Brunnen 5	gw	1	9.5	7.27	639	-79	0.2	117	8.8	9.3	1.9	336	14.5		26.5		46.4			0.146	0.38	2.3	1.53		2.3
Brunnen 6	gw	1	9.2	7.36	700	-154	0.1	119	9.4	12.4	3.5	318	19.4		32.7	0.05	64.7			0.197	0.2	1.7	2.08		1.7
Brunnen 7	gw	1	9.6	7.51	500	-96	0.2	91.8	6.7	7.2	1.6	289	12.8		12		18.6	0.01	0.4	0.101	0.15	1.8	1.34		1.8
Brunnen 8	gw	1	9.7	7.36	700	-164	0.1	103	11.3	17.5	2.3	350	20.7		30.7	0.05	22.5			0.132	0.24	1.8	2.32		1.7
Brunnen 9	gw	1	9.8	7.56	600	-143	0.1	88	4.7	9.8	1.5	232	7.48		20.6		44.9			0.126	0.15	1.7	1.04		1.6
Brunnen 10	gw	1	9.3	7.34	672	-161	0.1	120	8.8	10.2	1.9	356	15.8		27.2		50.2	0.01		0.146	0.34	2	1.53		2
Brunnen 11	gw	1	9.6	7.32	649	-168	0.2	117	11.3	12	2.1	406	17.2		15.2		24.1	0.01		0.128	0.2	2	2.18		1.8
Brunnen 12	gw	1	10.3	7.48	779			120	20.3	18.2	3.7		15.4	0.23	13.7		16.4	0.02		0.19	0.69		3.22	0.007	2.5

Graphs

First the solution is balanced with PH. Column graphs are made by excel.

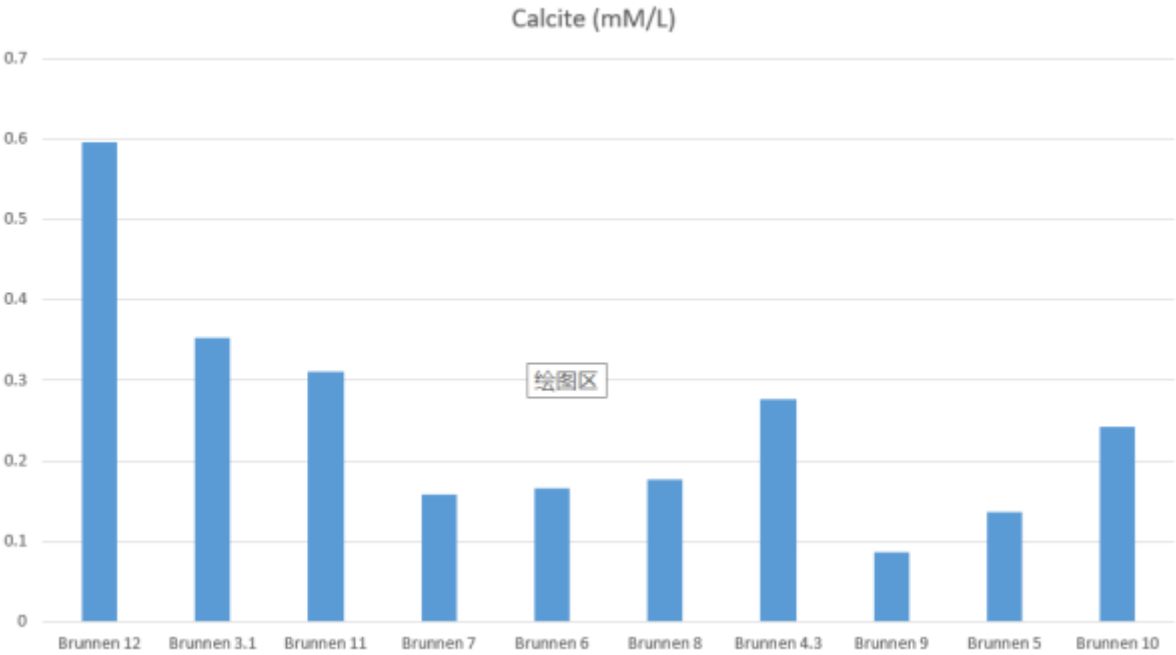
Name	Calcite(mM)	Calcit(mg/L)	Siderite(mM)	pH	DIC(mM)	pCO2(g)	Goethite(mM)	Hematite(mM)	Magnetite(mM)	Pyrite	Mackinawite	Greigite
Brunnen 12	0.67	-69.7	0.044	7.14	8.46	1.99		1.89	2.46	9.37	0.557	0.536
Brunnen 3.1	0.388	-41.7	0.039	7.11	7.81	1.82	0.702	3.34	3.88			
Brunnen 11	0.208	-22.4	0.024	7.11	7.46	1.74	0.224	2.38	2.94	6.31		
Brunnen 7	0.21	-22.1	0.013	7.34	5.11	2.24	2.09	6.12	7.03			
Brunnen 6	0.126	-14.4	0.022	7.21	5.79	1.93	0.728	3.39	4.12	2.43		
Brunnen 8	0.119	-13.9	0.028	7.2	6.36	1.87	0.528	2.99	3.69	3.78		
Brunnen 4.3	0.077	-8.4	0.014	7.13	6.67	1.74	0.163	2.26	2.87	8.55	0.019	
Brunnen 9	0.054	-6	0.008	7.41	4.07	2.24	1.49	4.9	5.98			
Brunnen 5	0.042	-5.1	0.012	7.16	6.25	1.78	1.95	5.83	6.49			
Brunnen 10		0.8	0.01	7.12	6.52	1.71	0.383	2.7	3.3	5.36		

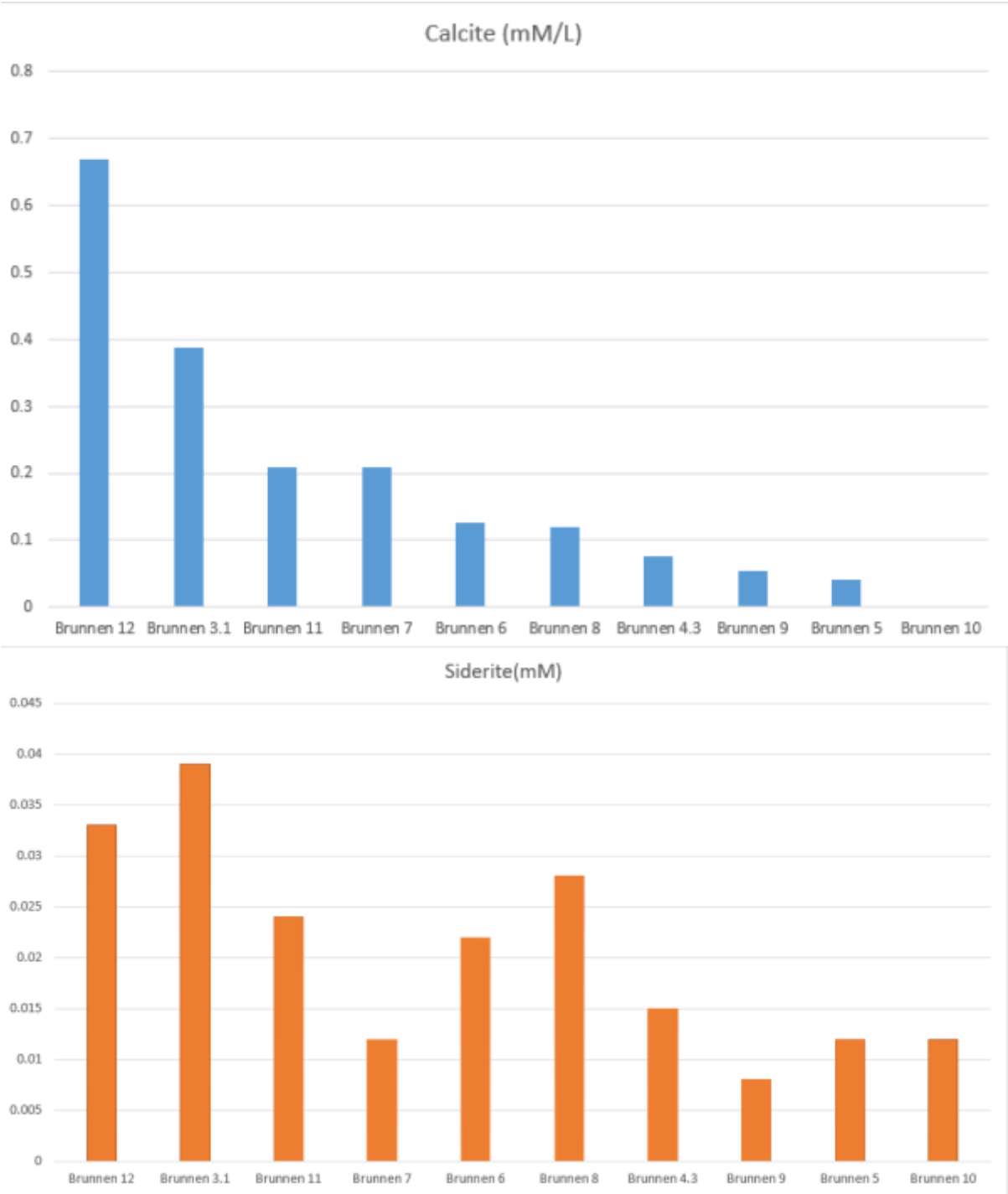


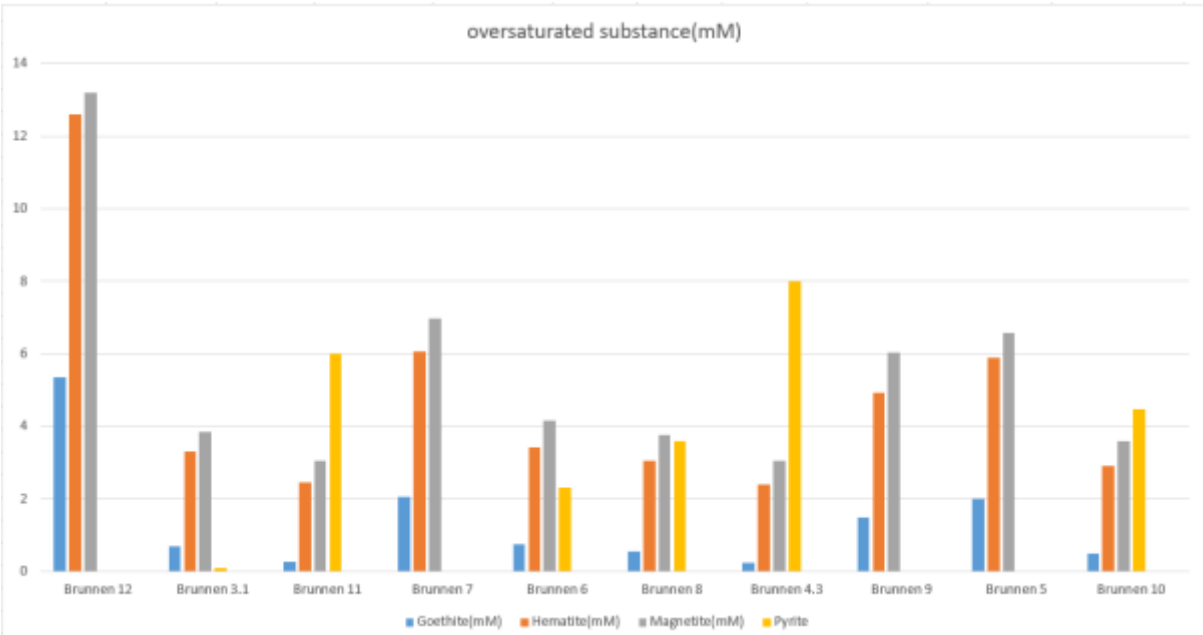


But to show the mineral precipitation better, Cl is used to balance the solution.

Name	Calcite(mM)	Calcit(mg/L)	Siderite(mM)	Fe(OH)3(a)	pH	DIC(mM)	pCO2(g)	Goethite(mM)	Hematite(mM)	Magnetite(mM)	Pyrite
Brunnen 12	0.596	61.9	0.033	0.011	7.12	8.46	1.91	5.34	12.6	13.2	
Brunnen 3.1	0.353	38.3	0.039		7.1	7.81	1.8	0.69	3.31	3.85	0.087
Brunnen 11	0.311	33	0.024		7.13	7.46	1.82	0.262	2.46	3.04	6.02
Brunnen 7	0.158	16.8	0.012		7.33	5.11	2.15	2.06	6.06	6.96	
Brunnen 6	0.166	18.4	0.022		7.21	5.79	1.97	0.745	3.42	4.16	2.31
Brunnen 8	0.177	19.9	0.028		7.21	6.36	1.92	0.553	3.04	3.76	3.59
Brunnen 4.3	0.276	28.8	0.015		7.16	6.67	1.9	0.237	2.41	3.06	8
Brunnen 9	0.086	9.21	0.008		7.42	4.07	2.3	1.5	4.94	6.03	
Brunnen 5	0.136	14.6	0.012		7.17	6.25	1.85	1.99	5.9	6.58	
Brunnen 10	0.242	25.4	0.012		7.17	6.52	1.9	0.497	2.92	3.58	4.47







Report

the_chemical_reasons_why_some_wells_in_luebeck.pdf
the_chemical_reasons_why_some_wells_in_luebeck_v2.pdf

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