

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 1, Federal Environmental Agency, Vienna (UBA) (Austria)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.698	0.673	0.667	0.071	0.432	S
G2		0.8	0.776	0.773	0.074	0.369	S
G3		1.35	1.319	1.319	0.087	0.353	S
G4		1.51	1.474	1.487	0.078	0.301	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.208	0.214	0.216	0.021	-0.393	S
G3		0.259	0.267	0.276	0.027	-0.625	S
G4		0.33	0.348	0.36	0.043	-0.697	S
G1	NO <sub>3</sub> <sup>-</sup>	0.281	0.274	0.271	0.025	0.388	S
G2		0.397	0.396	0.393	0.037	0.096	S
G3		0.533	0.529	0.528	0.044	0.111	S
G4		0.614	0.612	0.602	0.093	0.134	S
G1	Na <sup>+</sup>	0.201	0.208	0.21	0.02	-0.466	S
G2		0.313	0.329	0.323	0.026	-0.373	S
G3		0.455	0.476	0.471	0.029	-0.542	S
G4		0.441	0.465	0.454	0.025	-0.495	S
G1	Mg <sup>2+</sup>	0.127	0.124	0.124	0.009	0.358	S
G2		0.116	0.114	0.009	0.009	0.216	S
G3		0.158	0.155	0.155	0.011	0.285	S
G4		0.179	0.175	0.176	0.012	0.265	S
G1	Cl <sup>-</sup>	0.127	0.154	0.154	0.036	-0.768	Q
G2		0.196	0.232	0.241	0.125	-0.359	Q
G3		0.311	0.347	0.337	0.039	-0.661	S
G4		0.354	0.386	0.379	0.046	-0.542	S
G1	Ca <sup>2+</sup>	0.099	0.102	0.104	0.019	-0.275	S
G2		0.109	0.115	0.115	0.017	-0.364	S
G3		0.183	0.192	0.188	0.022	-0.235	S
G4		0.208	0.217	0.209	0.023	-0.063	S
G1	K <sup>+</sup>	0.128	0.136	0.133	0.02	-0.276	S
G2		0.196	0.204	0.202	0.017	-0.355	S
G3		0.289	0.306	0.3	0.022	-0.48	S
G4		0.347	0.374	0.368	0.028	-0.729	S
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 3, Czech Hydrometeorological Institute, Praha (Czech Republic)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.682	0.673	0.667	0.071	0.208	S
G2		0.785	0.776	0.773	0.074	0.166	S
G3		1.338	1.319	1.319	0.087	0.214	S
G4		1.494	1.474	1.487	0.078	0.096	S
G1	NH <sub>4</sub> <sup>+</sup>	0.161	0.16	0.169	0.019	-0.42	S
G2		0.201	0.214	0.216	0.021	-0.731	S
G3		0.29	0.267	0.276	0.027	0.504	S
G4		0.366	0.348	0.36	0.043	0.147	S
G1	NO <sub>3</sub> <sup>-</sup>	0.281	0.274	0.271	0.025	0.388	S
G2		0.4	0.396	0.393	0.037	0.176	S
G3		0.539	0.529	0.528	0.044	0.248	S
G4		0.622	0.612	0.602	0.093	0.22	S
G1	Na <sup>+</sup>	0.219	0.208	0.21	0.02	0.452	S
G2		0.336	0.329	0.323	0.026	0.496	S
G3		0.482	0.476	0.471	0.029	0.395	S
G4		0.459	0.465	0.454	0.025	0.216	S
G1	Mg <sup>2+</sup>	0.124	0.124	0.124	0.009	0.034	S
G2		0.114	0.114	0.009	0.009	-0.001	S
G3		0.154	0.155	0.155	0.011	-0.067	S
G4		0.175	0.175	0.176	0.012	-0.058	S
G1	Cl <sup>-</sup>	0.16	0.154	0.154	0.036	0.156	S
G2		0.232	0.232	0.241	0.125	-0.071	S
G3		0.338	0.347	0.337	0.039	0.023	S
G4		0.377	0.386	0.379	0.046	-0.045	S
G1	Ca <sup>2+</sup>	0.102	0.102	0.104	0.019	-0.119	S
G2		0.118	0.115	0.115	0.017	0.159	S
G3		0.191	0.192	0.188	0.022	0.123	S
G4		0.211	0.217	0.209	0.023	0.07	S
G1	K <sup>+</sup>	0.141	0.136	0.133	0.02	0.386	S
G2		0.214	0.204	0.202	0.017	0.725	S
G3		0.311	0.306	0.3	0.022	0.508	S
G4		0.38	0.374	0.368	0.028	0.432	S
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.522	4.48	4.522	0.056	0.004	S
G3		4.281	4.22	4.259	0.051	0.434	S
G4		4.231	4.18	4.207	0.058	0.425	S
G1	Cond	15.65	16.79	16.135	1.145	-0.423	S
G2		20.37	21.08	20.617	1.06	-0.233	S
G3		33.6	35.23	34.179	1.671	-0.346	S
G4		36.8	39.53	38.389	1.678	-0.947	S

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 4, Aarhus University, Department of Environmental Science (Denmark)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.669	0.673	0.667	0.071	0.026	S
G2		0.786	0.776	0.773	0.074	0.18	S
G3		1.333	1.319	1.319	0.087	0.157	S
G4		1.486	1.474	1.487	0.078	-0.007	S
G1	NH <sub>4</sub> <sup>+</sup>	0.166	0.16	0.169	0.019	-0.15	S
G2		0.212	0.214	0.216	0.021	-0.2	S
G3		0.266	0.267	0.276	0.027	-0.37	S
G4		0.344	0.348	0.36	0.043	-0.368	S
G1	NO <sub>3</sub> <sup>-</sup>	0.273	0.274	0.271	0.025	0.065	S
G2		0.397	0.396	0.393	0.037	0.096	S
G3		0.536	0.529	0.528	0.044	0.179	S
G4		0.614	0.612	0.602	0.093	0.134	S
G1	Na <sup>+</sup>	0.2	0.208	0.21	0.02	-0.517	S
G2		0.32	0.329	0.323	0.026	-0.108	S
G3		0.47	0.476	0.471	0.029	-0.021	S
G4		0.45	0.465	0.454	0.025	-0.14	S
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.12	0.114	0.009	0.009	0.652	S
G3		0.17	0.155	0.155	0.011	1.339	S
G4		0.19	0.175	0.176	0.012	1.152	S
G1	Cl <sup>-</sup>	< 0.200	0.154	0.154	0.036		B
G2		0.212	0.232	0.241	0.125	-0.231	S
G3		0.328	0.347	0.337	0.039	-0.23	S
G4		0.365	0.386	0.379	0.046	-0.305	S
G1	Ca <sup>2+</sup>	0.09	0.102	0.104	0.019	-0.741	S
G2		0.11	0.115	0.115	0.017	-0.306	S
G3		0.25	0.192	0.188	0.022	2.768	U
G4		0.23	0.217	0.209	0.023	0.912	S
G1	K <sup>+</sup>	0.14	0.136	0.133	0.02	0.335	S
G2		0.2	0.204	0.202	0.017	-0.115	S
G3		0.3	0.306	0.3	0.022	0.014	S
G4		0.37	0.374	0.368	0.028	0.08	S
G1	pH	4.6	4.57	4.643	0.083	-0.518	S
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.28	4.22	4.259	0.051	0.414	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 5, Finnish Meteorological Institute. Air Quality Department (Finland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.699	0.673	0.667	0.071	0.446	S
G2		0.807	0.776	0.773	0.074	0.463	S
G3		1.367	1.319	1.319	0.087	0.55	S
G4		1.515	1.474	1.487	0.078	0.365	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.213	0.214	0.216	0.021	-0.152	S
G3		0.272	0.267	0.276	0.027	-0.152	S
G4		0.34	0.348	0.36	0.043	-0.462	S
G1	NO <sub>3</sub> <sup>-</sup>	0.277	0.274	0.271	0.025	0.227	S
G2		0.397	0.396	0.393	0.037	0.096	S
G3		0.54	0.529	0.528	0.044	0.271	S
G4		0.632	0.612	0.602	0.093	0.328	S
G1	Na <sup>+</sup>	0.218	0.208	0.21	0.02	0.401	S
G2		0.337	0.329	0.323	0.026	0.534	S
G3		0.49	0.476	0.471	0.029	0.673	S
G4		0.472	0.465	0.454	0.025	0.73	S
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.12	0.114	0.009	0.009	0.652	S
G3		0.163	0.155	0.155	0.011	0.724	S
G4		0.185	0.175	0.176	0.012	0.748	S
G1	Cl <sup>-</sup>	0.163	0.154	0.154	0.036	0.24	S
G2		0.235	0.232	0.241	0.125	-0.047	S
G3		0.342	0.347	0.337	0.039	0.124	S
G4		0.378	0.386	0.379	0.046	-0.023	S
G1	Ca <sup>2+</sup>	0.103	0.102	0.104	0.019	-0.067	S
G2		0.116	0.115	0.115	0.017	0.043	S
G3		0.194	0.192	0.188	0.022	0.258	S
G4		0.219	0.217	0.209	0.023	0.425	S
G1	K <sup>+</sup>	0.146	0.136	0.133	0.02	0.641	S
G2		0.22	0.204	0.202	0.017	1.086	S
G3		0.333	0.306	0.3	0.022	1.495	S
G4		0.411	0.374	0.368	0.028	1.522	S
G1	pH	4.59	4.57	4.643	0.083	-0.639	S
G2		4.5	4.48	4.522	0.056	-0.39	S
G3		4.24	4.22	4.259	0.051	-0.372	S
G4		4.19	4.18	4.207	0.058	-0.287	S
G1	Cond	16.5	16.79	16.135	1.145	0.319	S
G2		20.6	21.08	20.617	1.06	-0.016	S
G3		33.9	35.23	34.179	1.671	-0.167	S
G4		38	39.53	38.389	1.678	-0.232	S

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>



## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 6, SGS Multilab (France)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.637	0.673	0.667	0.071	-0.422	S
G2		0.743	0.776	0.773	0.074	-0.4	S
G3		1.274	1.319	1.319	0.087	-0.525	S
G4		1.432	1.474	1.487	0.078	-0.699	S
G1	NH <sub>4</sub> <sup>+</sup>	0.217	0.16	0.169	0.019	2.603	U
G2		0.279	0.214	0.216	0.021	3.037	U
G3		0.344	0.267	0.276	0.027	2.472	U
G4		0.435	0.348	0.36	0.043	1.766	U
G1	NO <sub>3</sub> <sup>-</sup>	0.252	0.274	0.271	0.025	-0.782	S
G2		0.367	0.396	0.393	0.037	-0.708	S
G3		0.499	0.529	0.528	0.044	-0.665	S
G4		0.581	0.612	0.602	0.093	-0.222	S
G1	Na <sup>+</sup>	0.2	0.208	0.21	0.02	-0.517	S
G2		0.311	0.329	0.323	0.026	-0.448	S
G3		0.455	0.476	0.471	0.029	-0.542	S
G4		0.446	0.465	0.454	0.025	-0.298	S
G1	Mg <sup>2+</sup>	0.102	0.124	0.124	0.009	-2.336	Q
G2		0.092	0.114	0.009	0.009	-2.399	Q
G3		0.135	0.155	0.155	0.011	-1.735	S
G4		0.157	0.175	0.176	0.012	-1.51	S
G1	Cl <sup>-</sup>	0.136	0.154	0.154	0.036	-0.516	S
G2		0.208	0.232	0.241	0.125	-0.263	S
G3		0.323	0.347	0.337	0.039	-0.357	S
G4		0.364	0.386	0.379	0.046	-0.326	S
G1	Ca <sup>2+</sup>	0.084	0.102	0.104	0.019	-1.052	Q
G2		0.094	0.115	0.115	0.017	-1.235	Q
G3		0.166	0.192	0.188	0.022	-0.997	S
G4		0.192	0.217	0.209	0.023	-0.771	S
G1	K <sup>+</sup>	0.123	0.136	0.133	0.02	-0.531	S
G2		0.193	0.204	0.202	0.017	-0.536	S
G3		0.289	0.306	0.3	0.022	-0.48	S
G4		0.356	0.374	0.368	0.028	-0.412	S
G1	pH	4.77	4.57	4.643	0.083	1.541	Q
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.21	4.22	4.259	0.051	-0.961	S
G4		4.15	4.18	4.207	0.058	-0.981	S
G1	Cond	16.63	16.79	16.135	1.145	0.432	S
G2		20.96	21.08	20.617	1.06	0.323	S
G3		35.3	35.23	34.179	1.671	0.671	S
G4		39.9	39.53	38.389	1.678	0.901	S

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 8, Umweltbundesamt, Langen (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.689	0.673	0.667	0.071	0.306	S
G2		0.795	0.776	0.773	0.074	0.301	S
G3		1.36	1.319	1.319	0.087	0.469	S
G4		1.52	1.474	1.487	0.078	0.429	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.215	0.214	0.216	0.021	-0.055	S
G3		0.271	0.267	0.276	0.027	-0.188	S
G4		0.334	0.348	0.36	0.043	-0.603	S
G1	NO <sub>3</sub> <sup>-</sup>	0.29	0.274	0.271	0.025	0.752	S
G2		0.429	0.396	0.393	0.037	0.954	S
G3		0.59	0.529	0.528	0.044	1.412	Q
G4		0.609	0.612	0.602	0.093	0.08	S
G1	Na <sup>+</sup>	0.212	0.208	0.21	0.02	0.095	S
G2		0.327	0.329	0.323	0.026	0.156	S
G3		0.47	0.476	0.471	0.029	-0.021	S
G4		0.459	0.465	0.454	0.025	0.216	S
G1	Mg <sup>2+</sup>	0.125	0.124	0.124	0.009	0.142	S
G2		0.114	0.114	0.009	0.009	-0.001	S
G3		0.157	0.155	0.155	0.011	0.197	S
G4		0.179	0.175	0.176	0.012	0.265	S
G1	Cl <sup>-</sup>	0.153	0.154	0.154	0.036	-0.04	S
G2		0.225	0.232	0.241	0.125	-0.127	S
G3		0.34	0.347	0.337	0.039	0.074	S
G4		0.383	0.386	0.379	0.046	0.085	S
G1	Ca <sup>2+</sup>	0.084	0.102	0.104	0.019	-1.052	Q
G2		0.095	0.115	0.115	0.017	-1.177	Q
G3		0.166	0.192	0.188	0.022	-0.997	S
G4		0.194	0.217	0.209	0.023	-0.683	S
G1	K <sup>+</sup>	0.129	0.136	0.133	0.02	-0.225	S
G2		0.198	0.204	0.202	0.017	-0.235	S
G3		0.291	0.306	0.3	0.022	-0.39	S
G4		0.363	0.374	0.368	0.028	-0.166	S
G1	pH	4.62	4.57	4.643	0.083	-0.276	S
G2		4.53	4.48	4.522	0.056	0.148	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.22	4.18	4.207	0.058	0.234	S
G1	Cond	17.1	16.79	16.135	1.145	0.843	S
G2		21.2	21.08	20.617	1.06	0.55	S
G3		35.1	35.23	34.179	1.671	0.551	S
G4		39.7	39.53	38.389	1.678	0.781	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 10, Institute for Atmospheric Physics (Hungary)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.574	0.673	0.667	0.071	-1.304	Q
G2		0.789	0.776	0.773	0.074	0.22	S
G3		1.348	1.319	1.319	0.087	0.33	S
G4		1.507	1.474	1.487	0.078	0.262	S
G1	NH <sub>4</sub> <sup>+</sup>	0.149	0.16	0.169	0.019	-1.068	S
G2		0.199	0.214	0.216	0.021	-0.828	S
G3		0.252	0.267	0.276	0.027	-0.88	S
G4		0.306	0.348	0.36	0.043	-1.259	S
G1	NO <sub>3</sub> <sup>-</sup>	0.237	0.274	0.271	0.025	-1.388	Q
G2		0.394	0.396	0.393	0.037	0.016	S
G3		0.531	0.529	0.528	0.044	0.065	S
G4		0.618	0.612	0.602	0.093	0.177	S
G1	Na <sup>+</sup>	0.173	0.208	0.21	0.02	-1.893	Q
G2		0.291	0.329	0.323	0.026	-1.204	S
G3		0.429	0.476	0.471	0.029	-1.444	S
G4		0.415	0.465	0.454	0.025	-1.523	S
G1	Mg <sup>2+</sup>	0.124	0.124	0.124	0.009	0.034	S
G2		0.109	0.114	0.009	0.009	-0.546	S
G3		0.152	0.155	0.155	0.011	-0.242	S
G4		0.17	0.175	0.176	0.012	-0.461	S
G1	Cl <sup>-</sup>	0.117	0.154	0.154	0.036	-1.047	Q
G2		0.259	0.232	0.241	0.125	0.145	S
G3		0.324	0.347	0.337	0.039	-0.332	S
G4		0.35	0.386	0.379	0.046	-0.629	S
G1	Ca <sup>2+</sup>	0.067	0.102	0.104	0.019	-1.934	U
G2		0.11	0.115	0.115	0.017	-0.306	S
G3		0.194	0.192	0.188	0.022	0.258	S
G4		0.209	0.217	0.209	0.023	-0.018	S
G1	K <sup>+</sup>	0.125	0.136	0.133	0.02	-0.429	S
G2		0.195	0.204	0.202	0.017	-0.416	S
G3		0.304	0.306	0.3	0.022	0.193	S
G4		0.367	0.374	0.368	0.028	-0.025	S
G1	pH	4.64	4.57	4.643	0.083	-0.034	S
G2		4.55	4.48	4.522	0.056	0.506	S
G3		4.28	4.22	4.259	0.051	0.414	S
G4		4.24	4.18	4.207	0.058	0.581	S
G1	Cond	17.92	16.79	16.135	1.145	1.559	S
G2		22.28	21.08	20.617	1.06	1.569	S
G3		37.3	35.23	34.179	1.671	1.868	S
G4		41.6	39.53	38.389	1.678	1.914	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 13, C.N.R. Istituto Inquinamento Atmosferico (Italy)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.638	0.673	0.667	0.071	-0.408	S
G2		0.737	0.776	0.773	0.074	-0.481	S
G3		1.272	1.319	1.319	0.087	-0.548	S
G4		1.519	1.474	1.487	0.078	0.416	S
G1	NH <sub>4</sub> <sup>+</sup>	0.166	0.16	0.169	0.019	-0.15	S
G2		0.22	0.214	0.216	0.021	0.187	S
G3		0.269	0.267	0.276	0.027	-0.261	S
G4		0.344	0.348	0.36	0.043	-0.368	S
G1	NO <sub>3</sub> <sup>-</sup>	0.275	0.274	0.271	0.025	0.146	S
G2		0.378	0.396	0.393	0.037	-0.413	S
G3		0.517	0.529	0.528	0.044	-0.254	S
G4		0.595	0.612	0.602	0.093	-0.071	S
G1	Na <sup>+</sup>	0.213	0.208	0.21	0.02	0.146	S
G2		0.329	0.329	0.323	0.026	0.232	S
G3		0.478	0.476	0.471	0.029	0.256	S
G4		0.464	0.465	0.454	0.025	0.414	S
G1	Mg <sup>2+</sup>	0.11	0.124	0.124	0.009	-1.474	S
G2		0.104	0.114	0.009	0.009	-1.091	S
G3		0.139	0.155	0.155	0.011	-1.384	S
G4		0.16	0.175	0.176	0.012	-1.268	S
G1	Cl <sup>-</sup>	0.154	0.154	0.154	0.036	-0.012	S
G2		0.222	0.232	0.241	0.125	-0.151	S
G3		0.343	0.347	0.337	0.039	0.15	S
G4		0.374	0.386	0.379	0.046	-0.11	S
G1	Ca <sup>2+</sup>	0.093	0.102	0.104	0.019	-0.586	S
G2		0.107	0.115	0.115	0.017	-0.48	S
G3		0.177	0.192	0.188	0.022	-0.504	S
G4		0.201	0.217	0.209	0.023	-0.373	S
G1	K <sup>+</sup>	0.126	0.136	0.133	0.02	-0.378	S
G2		0.191	0.204	0.202	0.017	-0.656	S
G3		0.295	0.306	0.3	0.022	-0.211	S
G4		0.36	0.374	0.368	0.028	-0.271	S
G1	pH	4.62	4.57	4.643	0.083	-0.276	S
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.18	4.18	4.207	0.058	-0.46	S
G1	Cond	16.5	16.79	16.135	1.145	0.319	S
G2		21.4	21.08	20.617	1.06	0.739	S
G3		34.9	35.23	34.179	1.671	0.432	S
G4		37.9	39.53	38.389	1.678	-0.291	S

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If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>



## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 15, Norwegian Institute for Air Research NILU (Norway)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.672	0.673	0.667	0.071	0.068	S
G2		0.792	0.776	0.773	0.074	0.261	S
G3		1.318	1.319	1.319	0.087	-0.017	S
G4		1.476	1.474	1.487	0.078	-0.135	S
G1	NH <sub>4</sub> <sup>+</sup>	0.193	0.16	0.169	0.019	1.307	Q
G2		0.256	0.214	0.216	0.021	1.926	Q
G3		0.357	0.267	0.276	0.027	2.946	U
G4		0.401	0.348	0.36	0.043	0.968	Q
G1	NO <sub>3</sub> <sup>-</sup>	0.274	0.274	0.271	0.025	0.106	S
G2		0.389	0.396	0.393	0.037	-0.118	S
G3		0.51	0.529	0.528	0.044	-0.414	S
G4		0.592	0.612	0.602	0.093	-0.103	S
G1	Na <sup>+</sup>	0.211	0.208	0.21	0.02	0.044	S
G2		0.335	0.329	0.323	0.026	0.458	S
G3		0.483	0.476	0.471	0.029	0.43	S
G4		0.47	0.465	0.454	0.025	0.651	S
G1	Mg <sup>2+</sup>	0.112	0.124	0.124	0.009	-1.258	S
G2		0.122	0.114	0.009	0.009	0.87	S
G3		0.194	0.155	0.155	0.011	3.446	U
G4		0.218	0.175	0.176	0.012	3.41	Q
G1	Cl <sup>-</sup>	0.149	0.154	0.154	0.036	-0.152	S
G2		0.22	0.232	0.241	0.125	-0.167	S
G3		0.342	0.347	0.337	0.039	0.124	S
G4		0.375	0.386	0.379	0.046	-0.088	S
G1	Ca <sup>2+</sup>	0.124	0.102	0.104	0.019	1.021	Q
G2		0.121	0.115	0.115	0.017	0.333	S
G3		0.194	0.192	0.188	0.022	0.258	S
G4		0.218	0.217	0.209	0.023	0.38	S
G1	K <sup>+</sup>	0.114	0.136	0.133	0.02	-0.99	Q
G2		0.208	0.204	0.202	0.017	0.365	S
G3		0.306	0.306	0.3	0.022	0.283	S
G4		0.369	0.374	0.368	0.028	0.045	S
G1	pH	4.64	4.57	4.643	0.083	-0.034	S
G2		4.53	4.48	4.522	0.056	0.148	S
G3		4.3	4.22	4.259	0.051	0.807	S
G4		4.26	4.18	4.207	0.058	0.928	S
G1	Cond	16.6	16.79	16.135	1.145	0.406	S
G2		21	21.08	20.617	1.06	0.361	S
G3		34.4	35.23	34.179	1.671	0.132	S
G4		39.2	39.53	38.389	1.678	0.483	S

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✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 16, Institute of Meteorology and Water Management, Warsaw (Poland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.676	0.673	0.667	0.071	0.124	S
G2		0.762	0.776	0.773	0.074	-0.144	S
G3		1.295	1.319	1.319	0.087	-0.283	S
G4		1.452	1.474	1.487	0.078	-0.443	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.205	0.214	0.216	0.021	-0.538	S
G3		0.257	0.267	0.276	0.027	-0.698	S
G4		3.334	0.348	0.36	0.043	69.746	U
G1	NO <sub>3</sub> <sup>-</sup>	0.27	0.274	0.271	0.025	-0.056	S
G2		0.381	0.396	0.393	0.037	-0.333	S
G3		0.511	0.529	0.528	0.044	-0.391	S
G4		0.589	0.612	0.602	0.093	-0.136	S
G1	Na <sup>+</sup>	0.216	0.208	0.21	0.02	0.299	S
G2		0.326	0.329	0.323	0.026	0.118	S
G3		0.469	0.476	0.471	0.029	-0.056	S
G4		0.454	0.465	0.454	0.025	0.019	S
G1	Mg <sup>2+</sup>	0.126	0.124	0.124	0.009	0.25	S
G2		0.116	0.114	0.009	0.009	0.216	S
G3		0.156	0.155	0.155	0.011	0.109	S
G4		0.178	0.175	0.176	0.012	0.184	S
G1	Cl <sup>-</sup>	0.165	0.154	0.154	0.036	0.295	S
G2		0.238	0.232	0.241	0.125	-0.023	S
G3		0.345	0.347	0.337	0.039	0.2	S
G4		0.367	0.386	0.379	0.046	-0.261	S
G1	Ca <sup>2+</sup>	0.103	0.102	0.104	0.019	-0.067	S
G2		0.119	0.115	0.115	0.017	0.217	S
G3		0.188	0.192	0.188	0.022	-0.011	S
G4		0.215	0.217	0.209	0.023	0.247	S
G1	K <sup>+</sup>	0.135	0.136	0.133	0.02	0.08	S
G2		0.208	0.204	0.202	0.017	0.365	S
G3		0.308	0.306	0.3	0.022	0.373	S
G4		0.377	0.374	0.368	0.028	0.326	S
G1	pH	4.58	4.57	4.643	0.083	-0.76	S
G2		4.49	4.48	4.522	0.056	-0.569	S
G3		4.2	4.22	4.259	0.051	-1.157	S
G4		4.15	4.18	4.207	0.058	-0.981	S
G1	Cond	16.7	16.79	16.135	1.145	0.493	S
G2		20.9	21.08	20.617	1.06	0.267	S
G3		34.8	35.23	34.179	1.671	0.372	S
G4		39	39.53	38.389	1.678	0.364	S

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 18, National Environment Protection Agency (Romania)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.673	0.673	0.667	0.071	0.082	S
G2		0.78	0.776	0.773	0.074	0.099	S
G3		1.323	1.319	1.319	0.087	0.041	S
G4		1.482	1.474	1.487	0.078	-0.058	S
G1	NH <sub>4</sub> <sup>+</sup>		0.16	0.169	0.019		B
G2			0.214	0.216	0.021		B
G3			0.267	0.276	0.027		B
G4			0.348	0.36	0.043		B
G1	NO <sub>3</sub> <sup>-</sup>	0.272	0.274	0.271	0.025	0.025	S
G2		0.389	0.396	0.393	0.037	-0.118	S
G3		0.526	0.529	0.528	0.044	-0.049	S
G4		0.608	0.612	0.602	0.093	0.069	S
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>	0.156	0.154	0.154	0.036	0.044	S
G2		0.231	0.232	0.241	0.125	-0.079	S
G3		0.346	0.347	0.337	0.039	0.226	S
G4		0.386	0.386	0.379	0.046	0.15	S
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 19, Centro Nacional de Sanidad Ambiental (Spain)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.78	0.673	0.667	0.071	1.581	Q
G2		0.86	0.776	0.773	0.074	1.178	Q
G3		1.3	1.319	1.319	0.087	-0.225	S
G4		1.41	1.474	1.487	0.078	-0.981	S
G1	NH <sub>4</sub> <sup>+</sup>	0.19	0.16	0.169	0.019	1.145	Q
G2		0.27	0.214	0.216	0.021	2.603	U
G3		0.3	0.267	0.276	0.027	0.869	S
G4		0.4	0.348	0.36	0.043	0.945	S
G1	NO <sub>3</sub> <sup>-</sup>	0.27	0.274	0.271	0.025	-0.056	S
G2		0.48	0.396	0.393	0.037	2.321	U
G3		0.58	0.529	0.528	0.044	1.184	S
G4		0.64	0.612	0.602	0.093	0.414	S
G1	Na <sup>+</sup>	0.22	0.208	0.21	0.02	0.503	S
G2		0.36	0.329	0.323	0.026	1.403	S
G3		0.53	0.476	0.471	0.029	2.061	S
G4		0.54	0.465	0.454	0.025	3.418	Q
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.12	0.114	0.009	0.009	0.652	S
G3		0.16	0.155	0.155	0.011	0.46	S
G4		0.18	0.175	0.176	0.012	0.345	S
G1	Cl <sup>-</sup>	< 0.300	0.154	0.154	0.036		B
G2		< 0.300	0.232	0.241	0.125		B
G3		0.33	0.347	0.337	0.039	-0.18	S
G4		0.36	0.386	0.379	0.046	-0.413	S
G1	Ca <sup>2+</sup>	0.1	0.102	0.104	0.019	-0.223	S
G2		0.11	0.115	0.115	0.017	-0.306	S
G3		0.19	0.192	0.188	0.022	0.078	S
G4		0.22	0.217	0.209	0.023	0.469	S
G1	K <sup>+</sup>	0.14	0.136	0.133	0.02	0.335	S
G2		0.23	0.204	0.202	0.017	1.686	S
G3		0.34	0.306	0.3	0.022	1.81	S
G4		0.42	0.374	0.368	0.028	1.839	S
G1	pH	4.79	4.57	4.643	0.083	1.784	U
G2		4.56	4.48	4.522	0.056	0.685	S
G3		4.3	4.22	4.259	0.051	0.807	S
G4		4.24	4.18	4.207	0.058	0.581	S
G1	Cond	16.6	16.79	16.135	1.145	0.406	S
G2		20.4	21.08	20.617	1.06	-0.205	S
G3		34.4	35.23	34.179	1.671	0.132	S
G4		38.8	39.53	38.389	1.678	0.245	S

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Foretaksnr./Enterprise no. 941705561

If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>



## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 20, Swedish Environmental Research Institute IVL, Gothenburg (Sweden)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.674	0.673	0.667	0.071	0.096	S
G2		0.771	0.776	0.773	0.074	-0.022	S
G3		1.31	1.319	1.319	0.087	-0.109	S
G4		1.46	1.474	1.487	0.078	-0.34	S
G1	NH <sub>4</sub> <sup>+</sup>	0.168	0.16	0.169	0.019	-0.042	S
G2		0.23	0.214	0.216	0.021	0.67	S
G3		0.28	0.267	0.276	0.027	0.14	S
G4		0.365	0.348	0.36	0.043	0.124	S
G1	NO <sub>3</sub> <sup>-</sup>	0.279	0.274	0.271	0.025	0.308	S
G2		0.393	0.396	0.393	0.037	-0.011	S
G3		0.522	0.529	0.528	0.044	-0.14	S
G4		0.603	0.612	0.602	0.093	0.015	S
G1	Na <sup>+</sup>	0.221	0.208	0.21	0.02	0.554	S
G2		0.338	0.329	0.323	0.026	0.572	S
G3		0.487	0.476	0.471	0.029	0.569	S
G4		0.472	0.465	0.454	0.025	0.73	S
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.117	0.114	0.009	0.009	0.325	S
G3		0.159	0.155	0.155	0.011	0.372	S
G4		0.18	0.175	0.176	0.012	0.345	S
G1	Cl <sup>-</sup>	0.149	0.154	0.154	0.036	-0.152	S
G2		0.218	0.232	0.241	0.125	-0.183	S
G3		0.329	0.347	0.337	0.039	-0.205	S
G4		0.367	0.386	0.379	0.046	-0.261	S
G1	Ca <sup>2+</sup>	0.101	0.102	0.104	0.019	-0.171	S
G2		0.113	0.115	0.115	0.017	-0.131	S
G3		0.186	0.192	0.188	0.022	-0.101	S
G4		0.21	0.217	0.209	0.023	0.026	S
G1	K <sup>+</sup>	0.144	0.136	0.133	0.02	0.539	S
G2		0.216	0.204	0.202	0.017	0.846	S
G3		0.315	0.306	0.3	0.022	0.687	S
G4		0.387	0.374	0.368	0.028	0.678	S
G1	pH	4.61	4.57	4.643	0.083	-0.397	S
G2		4.5	4.48	4.522	0.056	-0.39	S
G3		4.23	4.22	4.259	0.051	-0.568	S
G4		4.2	4.18	4.207	0.058	-0.113	S
G1	Cond	17.1	16.79	16.135	1.145	0.843	S
G2		21.5	21.08	20.617	1.06	0.833	S
G3		35.1	35.23	34.179	1.671	0.551	S
G4		39.6	39.53	38.389	1.678	0.722	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 21, Swiss Federal Laboratories for Materials Testing EMPA (Switzerland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.694	0.673	0.667	0.071	0.376	S
G2		0.798	0.776	0.773	0.074	0.342	S
G3		1.362	1.319	1.319	0.087	0.492	S
G4		1.507	1.474	1.487	0.078	0.262	S
G1	NH <sub>4</sub> <sup>+</sup>	0.169	0.16	0.169	0.019	0.012	S
G2		0.239	0.214	0.216	0.021	1.105	S
G3		0.309	0.267	0.276	0.027	1.197	Q
G4		0.391	0.348	0.36	0.043	0.734	S
G1	NO <sub>3</sub> <sup>-</sup>	0.274	0.274	0.271	0.025	0.106	S
G2		0.394	0.396	0.393	0.037	0.016	S
G3		0.527	0.529	0.528	0.044	-0.026	S
G4		0.613	0.612	0.602	0.093	0.123	S
G1	Na <sup>+</sup>	0.203	0.208	0.21	0.02	-0.364	S
G2		0.32	0.329	0.323	0.026	-0.108	S
G3		0.47	0.476	0.471	0.029	-0.021	S
G4		0.455	0.465	0.454	0.025	0.058	S
G1	Mg <sup>2+</sup>	0.128	0.124	0.124	0.009	0.465	S
G2		0.117	0.114	0.009	0.009	0.325	S
G3		0.162	0.155	0.155	0.011	0.636	S
G4		0.186	0.175	0.176	0.012	0.829	S
G1	Cl <sup>-</sup>	0.141	0.154	0.154	0.036	-0.376	S
G2		0.224	0.232	0.241	0.125	-0.135	S
G3		0.345	0.347	0.337	0.039	0.2	S
G4		0.393	0.386	0.379	0.046	0.301	S
G1	Ca <sup>2+</sup>	0.112	0.102	0.104	0.019	0.399	S
G2		0.123	0.115	0.115	0.017	0.449	S
G3		0.196	0.192	0.188	0.022	0.347	S
G4		0.22	0.217	0.209	0.023	0.469	S
G1	K <sup>+</sup>	0.143	0.136	0.133	0.02	0.488	S
G2		0.225	0.204	0.202	0.017	1.386	S
G3		0.338	0.306	0.3	0.022	1.72	S
G4		0.417	0.374	0.368	0.028	1.733	S
G1	pH	4.6	4.57	4.643	0.083	-0.518	S
G2		4.52	4.48	4.522	0.056	-0.032	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.22	4.18	4.207	0.058	0.234	S
G1	Cond	16.99	16.79	16.135	1.145	0.747	S
G2		21.28	21.08	20.617	1.06	0.625	S
G3		35.22	35.23	34.179	1.671	0.623	S
G4		39.52	39.53	38.389	1.678	0.674	S

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B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 22, Institute of Global Climate and Ecology (Russian Federation)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.636	0.673	0.667	0.071	-0.436	S
G2		0.731	0.776	0.773	0.074	-0.561	S
G3		1.283	1.319	1.319	0.087	-0.421	S
G4		1.439	1.474	1.487	0.078	-0.609	S
G1	NH <sub>4</sub> <sup>+</sup>	0.205	0.16	0.169	0.019	1.955	U
G2		0.242	0.214	0.216	0.021	1.25	S
G3		0.295	0.267	0.276	0.027	0.686	S
G4		0.372	0.348	0.36	0.043	0.288	S
G1	NO <sub>3</sub> <sup>-</sup>	0.267	0.274	0.271	0.025	-0.177	S
G2		0.384	0.396	0.393	0.037	-0.253	S
G3		0.523	0.529	0.528	0.044	-0.117	S
G4		0.612	0.612	0.602	0.093	0.112	S
G1	Na <sup>+</sup>	0.233	0.208	0.21	0.02	1.165	S
G2		0.304	0.329	0.323	0.026	-0.713	S
G3		0.422	0.476	0.471	0.029	-1.687	S
G4		0.421	0.465	0.454	0.025	-1.286	S
G1	Mg <sup>2+</sup>	0.121	0.124	0.124	0.009	-0.289	S
G2		0.107	0.114	0.009	0.009	-0.764	S
G3		0.144	0.155	0.155	0.011	-0.945	S
G4		0.163	0.175	0.176	0.012	-1.026	S
G1	Cl <sup>-</sup>	0.184	0.154	0.154	0.036	0.827	Q
G2		0.203	0.232	0.241	0.125	-0.303	S
G3		0.302	0.347	0.337	0.039	-0.889	S
G4		0.357	0.386	0.379	0.046	-0.478	S
G1	Ca <sup>2+</sup>	0.18	0.102	0.104	0.019	3.925	U
G2		0.178	0.115	0.115	0.017	3.644	U
G3		0.261	0.192	0.188	0.022	3.261	U
G4		0.27	0.217	0.209	0.023	2.684	Q
G1	K <sup>+</sup>	0.154	0.136	0.133	0.02	1.049	S
G2		0.198	0.204	0.202	0.017	-0.235	S
G3		0.296	0.306	0.3	0.022	-0.166	S
G4		0.373	0.374	0.368	0.028	0.186	S
G1	pH	4.64	4.57	4.643	0.083	-0.034	S
G2		4.56	4.48	4.522	0.056	0.685	S
G3		4.29	4.22	4.259	0.051	0.611	S
G4		4.25	4.18	4.207	0.058	0.754	S
G1	Cond	15.3	16.79	16.135	1.145	-0.729	S
G2		19	21.08	20.617	1.06	-1.526	S
G3		31.3	35.23	34.179	1.671	-1.723	S
G4		35.9	39.53	38.389	1.678	-1.483	S

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 23, Ricardo-AEA Energy and environment (United Kingdom)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.658	0.673	0.667	0.071	-0.128	S
G2		0.754	0.776	0.773	0.074	-0.245	S
G3		1.278	1.319	1.319	0.087	-0.479	S
G4		1.436	1.474	1.487	0.078	-0.648	S
G1	NH <sub>4</sub> <sup>+</sup>	0.173	0.16	0.169	0.019	0.255	S
G2		0.232	0.214	0.216	0.021	0.742	S
G3		0.284	0.267	0.276	0.027	0.286	S
G4		0.373	0.348	0.36	0.043	0.323	S
G1	NO <sub>3</sub> <sup>-</sup>	0.281	0.274	0.271	0.025	0.368	S
G2		0.4	0.396	0.393	0.037	0.163	S
G3		0.536	0.529	0.528	0.044	0.179	S
G4		0.623	0.612	0.602	0.093	0.231	S
G1	Na <sup>+</sup>	0.213	0.208	0.21	0.02	0.171	S
G2		0.331	0.329	0.323	0.026	0.288	S
G3		0.469	0.476	0.471	0.029	-0.039	S
G4		0.464	0.465	0.454	0.025	0.414	S
G1	Mg <sup>2+</sup>	0.124	0.124	0.124	0.009	0.088	S
G2		0.116	0.114	0.009	0.009	0.162	S
G3		0.154	0.155	0.155	0.011	-0.023	S
G4		0.177	0.175	0.176	0.012	0.144	S
G1	Cl <sup>-</sup>	0.139	0.154	0.154	0.036	-0.432	S
G2		0.216	0.232	0.241	0.125	-0.199	S
G3		0.334	0.347	0.337	0.039	-0.078	S
G4		0.377	0.386	0.379	0.046	-0.045	S
G1	Ca <sup>2+</sup>	0.091	0.102	0.104	0.019	-0.664	S
G2		0.102	0.115	0.115	0.017	-0.799	S
G3		0.168	0.192	0.188	0.022	-0.908	S
G4		0.199	0.217	0.209	0.023	-0.461	S
G1	K <sup>+</sup>	0.129	0.136	0.133	0.02	-0.225	S
G2		0.199	0.204	0.202	0.017	-0.205	S
G3		0.285	0.306	0.3	0.022	-0.66	S
G4		0.358	0.374	0.368	0.028	-0.342	S
G1	pH	4.54	4.57	4.643	0.083	-1.245	S
G2		4.44	4.48	4.522	0.056	-1.465	S
G3		4.175	4.22	4.259	0.051	-1.649	S
G4		4.09	4.18	4.207	0.058	-2.022	S
G1	Cond	16.15	16.79	16.135	1.145	0.013	S
G2		20.8	21.08	20.617	1.06	0.173	S
G3		34.85	35.23	34.179	1.671	0.402	S
G4		38.25	39.53	38.389	1.678	-0.083	S

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 24, Serbian Environmental Protection Agency (Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.656	0.673	0.667	0.071	-0.156	S
G2		0.769	0.776	0.773	0.074	-0.049	S
G3		1.305	1.319	1.319	0.087	-0.167	S
G4		1.491	1.474	1.487	0.078	0.057	S
G1	NH <sub>4</sub> <sup>+</sup>	0.163	0.16	0.169	0.019	-0.312	S
G2		0.216	0.214	0.216	0.021	-0.007	S
G3		0.279	0.267	0.276	0.027	0.103	S
G4		0.355	0.348	0.36	0.043	-0.11	S
G1	NO <sub>3</sub> <sup>-</sup>	0.266	0.274	0.271	0.025	-0.217	S
G2		0.377	0.396	0.393	0.037	-0.44	S
G3		0.52	0.529	0.528	0.044	-0.186	S
G4		0.608	0.612	0.602	0.093	0.069	S
G1	Na <sup>+</sup>	0.215	0.208	0.21	0.02	0.248	S
G2		0.33	0.329	0.323	0.026	0.269	S
G3		0.481	0.476	0.471	0.029	0.361	S
G4		0.463	0.465	0.454	0.025	0.374	S
G1	Mg <sup>2+</sup>	0.122	0.124	0.124	0.009	-0.181	S
G2		0.115	0.114	0.009	0.009	0.107	S
G3		0.16	0.155	0.155	0.011	0.46	S
G4		0.183	0.175	0.176	0.012	0.587	S
G1	Cl <sup>-</sup>	0.138	0.154	0.154	0.036	-0.46	S
G2		0.206	0.232	0.241	0.125	-0.279	S
G3		0.319	0.347	0.337	0.039	-0.458	S
G4		0.355	0.386	0.379	0.046	-0.521	S
G1	Ca <sup>2+</sup>	0.094	0.102	0.104	0.019	-0.534	S
G2		0.113	0.115	0.115	0.017	-0.131	S
G3		0.19	0.192	0.188	0.022	0.078	S
G4		0.215	0.217	0.209	0.023	0.247	S
G1	K <sup>+</sup>	0.148	0.136	0.133	0.02	0.743	S
G2		0.217	0.204	0.202	0.017	0.906	S
G3		0.321	0.306	0.3	0.022	0.957	S
G4		0.376	0.374	0.368	0.028	0.291	S
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond	17.04	16.79	16.135	1.145	0.79	S
G2		21.37	21.08	20.617	1.06	0.71	S
G3		35.38	35.23	34.179	1.671	0.719	S
G4		39.6	39.53	38.389	1.678	0.722	S

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B – Blank: You reported either no value or the detection limit

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<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 26, Environment Canada, Ontario (Canada)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.674	0.673	0.667	0.071	0.096	S
G2		0.778	0.776	0.773	0.074	0.072	S
G3		1.318	1.319	1.319	0.087	-0.017	S
G4		1.473	1.474	1.487	0.078	-0.173	S
G1	NH <sub>4</sub> <sup>+</sup>	0.163	0.16	0.169	0.019	-0.312	S
G2		0.215	0.214	0.216	0.021	-0.055	S
G3		0.27	0.267	0.276	0.027	-0.225	S
G4		0.352	0.348	0.36	0.043	-0.181	S
G1	NO <sub>3</sub> <sup>-</sup>	0.276	0.274	0.271	0.025	0.187	S
G2		0.398	0.396	0.393	0.037	0.123	S
G3		0.533	0.529	0.528	0.044	0.111	S
G4		0.617	0.612	0.602	0.093	0.166	S
G1	Na <sup>+</sup>	0.213	0.208	0.21	0.02	0.146	S
G2		0.335	0.329	0.323	0.026	0.458	S
G3		0.487	0.476	0.471	0.029	0.569	S
G4		0.472	0.465	0.454	0.025	0.73	S
G1	Mg <sup>2+</sup>	0.128	0.124	0.124	0.009	0.465	S
G2		0.121	0.114	0.009	0.009	0.761	S
G3		0.164	0.155	0.155	0.011	0.812	S
G4		0.186	0.175	0.176	0.012	0.829	S
G1	Cl <sup>-</sup>	0.154	0.154	0.154	0.036	-0.012	S
G2		0.231	0.232	0.241	0.125	-0.079	S
G3		0.349	0.347	0.337	0.039	0.302	S
G4		0.39	0.386	0.379	0.046	0.236	S
G1	Ca <sup>2+</sup>	0.102	0.102	0.104	0.019	-0.119	S
G2		0.12	0.115	0.115	0.017	0.275	S
G3		0.196	0.192	0.188	0.022	0.347	S
G4		0.222	0.217	0.209	0.023	0.557	S
G1	K <sup>+</sup>	0.138	0.136	0.133	0.02	0.233	S
G2		0.215	0.204	0.202	0.017	0.786	S
G3		0.316	0.306	0.3	0.022	0.732	S
G4		0.386	0.374	0.368	0.028	0.643	S
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.52	4.48	4.522	0.056	-0.032	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.2	4.18	4.207	0.058	-0.113	S
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 27, Illinois State Water Survey (United States of America)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.671	0.673	0.667	0.071	0.056	S
G2		0.771	0.776	0.773	0.074	-0.026	S
G3		1.317	1.319	1.319	0.087	-0.023	S
G4		1.471	1.474	1.487	0.078	-0.198	S
G1	NH <sub>4</sub> <sup>+</sup>	0.161	0.16	0.169	0.019	-0.42	S
G2		0.213	0.214	0.216	0.021	-0.152	S
G3		0.266	0.267	0.276	0.027	-0.37	S
G4		0.347	0.348	0.36	0.043	-0.298	S
G1	NO <sub>3</sub> <sup>-</sup>	0.278	0.274	0.271	0.025	0.247	S
G2		0.395	0.396	0.393	0.037	0.048	S
G3		0.526	0.529	0.528	0.044	-0.04	S
G4		0.607	0.612	0.602	0.093	0.062	S
G1	Na <sup>+</sup>	0.217	0.208	0.21	0.02	0.355	S
G2		0.341	0.329	0.323	0.026	0.7	S
G3		0.472	0.476	0.471	0.029	0.055	S
G4		0.479	0.465	0.454	0.025	1.007	S
G1	Mg <sup>2+</sup>	0.126	0.124	0.124	0.009	0.239	S
G2		0.114	0.114	0.009	0.009	0.02	S
G3		0.157	0.155	0.155	0.011	0.214	S
G4		0.177	0.175	0.176	0.012	0.119	S
G1	Cl <sup>-</sup>	0.153	0.154	0.154	0.036	-0.029	S
G2		0.229	0.232	0.241	0.125	-0.096	S
G3		0.348	0.347	0.337	0.039	0.269	S
G4		0.388	0.386	0.379	0.046	0.199	S
G1	Ca <sup>2+</sup>	0.103	0.102	0.104	0.019	-0.062	S
G2		0.117	0.115	0.115	0.017	0.089	S
G3		0.189	0.192	0.188	0.022	0.02	S
G4		0.216	0.217	0.209	0.023	0.301	S
G1	K <sup>+</sup>	0.137	0.136	0.133	0.02	0.193	S
G2		0.214	0.204	0.202	0.017	0.749	S
G3		0.31	0.306	0.3	0.022	0.463	S
G4		0.392	0.374	0.368	0.028	0.857	S
G1	pH	4.61	4.57	4.643	0.083	-0.397	S
G2		4.52	4.48	4.522	0.056	-0.032	S
G3		4.28	4.22	4.259	0.051	0.414	S
G4		4.23	4.18	4.207	0.058	0.407	S
G1	Cond	17.3	16.79	16.135	1.145	1.017	S
G2		21.5	21.08	20.617	1.06	0.833	S
G3		35.6	35.23	34.179	1.671	0.851	S
G4		40	39.53	38.389	1.678	0.96	S

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 30, Joint Research Centre, Ispra (Italy)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.68	0.673	0.667	0.071	0.18	S
G2		0.782	0.776	0.773	0.074	0.126	S
G3		1.361	1.319	1.319	0.087	0.48	S
G4		1.553	1.474	1.487	0.078	0.852	S
G1	NH <sub>4</sub> <sup>+</sup>	0.158	0.16	0.169	0.019	-0.582	S
G2		0.21	0.214	0.216	0.021	-0.296	S
G3		0.277	0.267	0.276	0.027	0.03	S
G4		0.349	0.348	0.36	0.043	-0.251	S
G1	NO <sub>3</sub> <sup>-</sup>	0.275	0.274	0.271	0.025	0.146	S
G2		0.397	0.396	0.393	0.037	0.096	S
G3		0.535	0.529	0.528	0.044	0.157	S
G4		0.628	0.612	0.602	0.093	0.285	S
G1	Na <sup>+</sup>	0.216	0.208	0.21	0.02	0.299	S
G2		0.335	0.329	0.323	0.026	0.458	S
G3		0.48	0.476	0.471	0.029	0.326	S
G4		0.469	0.465	0.454	0.025	0.612	S
G1	Mg <sup>2+</sup>	0.136	0.124	0.124	0.009	1.327	S
G2		0.123	0.114	0.009	0.009	0.979	S
G3		0.165	0.155	0.155	0.011	0.899	S
G4		0.188	0.175	0.176	0.012	0.99	S
G1	Cl <sup>-</sup>	0.159	0.154	0.154	0.036	0.128	S
G2		0.244	0.232	0.241	0.125	0.025	S
G3		0.357	0.347	0.337	0.039	0.504	S
G4		0.402	0.386	0.379	0.046	0.496	S
G1	Ca <sup>2+</sup>	0.108	0.102	0.104	0.019	0.192	S
G2		0.121	0.115	0.115	0.017	0.333	S
G3		0.193	0.192	0.188	0.022	0.213	S
G4		0.226	0.217	0.209	0.023	0.735	S
G1	K <sup>+</sup>	0.129	0.136	0.133	0.02	-0.225	S
G2		0.212	0.204	0.202	0.017	0.605	S
G3		0.325	0.306	0.3	0.022	1.136	S
G4		0.411	0.374	0.368	0.028	1.522	S
G1	pH	4.49	4.57	4.643	0.083	-1.851	S
G2		4.39	4.48	4.522	0.056	-2.36	S
G3		4.16	4.22	4.259	0.051	-1.943	S
G4		4.15	4.18	4.207	0.058	-0.981	S
G1	Cond	16	16.79	16.135	1.145	-0.118	S
G2		21.1	21.08	20.617	1.06	0.456	S
G3		35.4	35.23	34.179	1.671	0.731	S
G4		39.7	39.53	38.389	1.678	0.781	S

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 31, Slovak Hydrometeorological Institute (Slovakia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.681	0.673	0.667	0.071	0.194	S
G2		0.792	0.776	0.773	0.074	0.261	S
G3		1.346	1.319	1.319	0.087	0.307	S
G4		1.5	1.474	1.487	0.078	0.173	S
G1	NH <sub>4</sub> <sup>+</sup>	0.134	0.16	0.169	0.019	-1.878	Q
G2		0.199	0.214	0.216	0.021	-0.828	S
G3		0.266	0.267	0.276	0.027	-0.37	S
G4		0.354	0.348	0.36	0.043	-0.134	S
G1	NO <sub>3</sub> <sup>-</sup>	0.275	0.274	0.271	0.025	0.146	S
G2		0.396	0.396	0.393	0.037	0.069	S
G3		0.531	0.529	0.528	0.044	0.065	S
G4		0.615	0.612	0.602	0.093	0.145	S
G1	Na <sup>+</sup>	0.222	0.208	0.21	0.02	0.605	S
G2		0.33	0.329	0.323	0.026	0.269	S
G3		0.477	0.476	0.471	0.029	0.222	S
G4		0.461	0.465	0.454	0.025	0.295	S
G1	Mg <sup>2+</sup>	0.123	0.124	0.124	0.009	-0.073	S
G2		0.112	0.114	0.009	0.009	-0.219	S
G3		0.154	0.155	0.155	0.011	-0.067	S
G4		0.174	0.175	0.176	0.012	-0.139	S
G1	Cl <sup>-</sup>	0.173	0.154	0.154	0.036	0.519	S
G2		0.214	0.232	0.241	0.125	-0.215	S
G3		0.318	0.347	0.337	0.039	-0.484	S
G4		0.353	0.386	0.379	0.046	-0.564	S
G1	Ca <sup>2+</sup>	0.102	0.102	0.104	0.019	-0.119	S
G2		0.112	0.115	0.115	0.017	-0.189	S
G3		0.186	0.192	0.188	0.022	-0.101	S
G4		0.211	0.217	0.209	0.023	0.07	S
G1	K <sup>+</sup>	0.146	0.136	0.133	0.02	0.641	S
G2		0.205	0.204	0.202	0.017	0.185	S
G3		0.307	0.306	0.3	0.022	0.328	S
G4		0.376	0.374	0.368	0.028	0.291	S
G1	pH	4.61	4.57	4.643	0.083	-0.397	S
G2		4.53	4.48	4.522	0.056	0.148	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.23	4.18	4.207	0.058	0.407	S
G1	Cond	17.23	16.79	16.135	1.145	0.956	S
G2		21.35	21.08	20.617	1.06	0.691	S
G3		35.2	35.23	34.179	1.671	0.611	S
G4		39.4	39.53	38.389	1.678	0.603	S

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 32, Atmospheric Pollution Research Laboratory, Institute of Physics, Vilnius (Lithuania)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.654	0.673	0.667	0.071	-0.184	S
G2		0.757	0.776	0.773	0.074	-0.211	S
G3		1.305	1.319	1.319	0.087	-0.167	S
G4		1.484	1.474	1.487	0.078	-0.033	S
G1	NH <sub>4</sub> <sup>+</sup>	0.182	0.16	0.169	0.019	0.713	S
G2		0.231	0.214	0.216	0.021	0.718	S
G3		0.287	0.267	0.276	0.027	0.395	S
G4		0.361	0.348	0.36	0.043	0.03	S
G1	NO <sub>3</sub> <sup>-</sup>	0.282	0.274	0.271	0.025	0.429	S
G2		0.404	0.396	0.393	0.037	0.284	S
G3		0.546	0.529	0.528	0.044	0.408	S
G4		0.651	0.612	0.602	0.093	0.532	S
G1	Na <sup>+</sup>	0.2	0.208	0.21	0.02	-0.517	S
G2		0.34	0.329	0.323	0.026	0.647	S
G3		0.484	0.476	0.471	0.029	0.465	S
G4		0.465	0.465	0.454	0.025	0.453	S
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>	0.149	0.154	0.154	0.036	-0.152	S
G2		0.232	0.232	0.241	0.125	-0.071	S
G3		0.339	0.347	0.337	0.039	0.048	S
G4		0.39	0.386	0.379	0.046	0.236	S
G1	Ca <sup>2+</sup>	0.06	0.102	0.104	0.019	-2.297	U
G2		0.06	0.115	0.115	0.017	-3.209	U
G3		0.09	0.192	0.188	0.022	-4.403	U
G4		0.09	0.217	0.209	0.023	-5.29	U
G1	K <sup>+</sup>	0.13	0.136	0.133	0.02	-0.174	S
G2		0.2	0.204	0.202	0.017	-0.115	S
G3		0.3	0.306	0.3	0.022	0.014	S
G4		0.365	0.374	0.368	0.028	-0.096	S
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.56	4.48	4.522	0.056	0.685	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.25	4.18	4.207	0.058	0.754	S
G1	Cond	15.5	16.79	16.135	1.145	-0.554	S
G2		20	21.08	20.617	1.06	-0.582	S
G3		33.2	35.23	34.179	1.671	-0.586	S
G4		38	39.53	38.389	1.678	-0.232	S

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 33, Environmental Pollution Observ. Centre (Latvia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.742	0.673	0.667	0.071	1.048	Q
G2		0.856	0.776	0.773	0.074	1.124	Q
G3		1.451	1.319	1.319	0.087	1.52	Q
G4		1.636	1.474	1.487	0.078	1.915	Q
G1	NH <sub>4</sub> <sup>+</sup>	0.162	0.16	0.169	0.019	-0.366	S
G2		0.215	0.214	0.216	0.021	-0.055	S
G3		0.27	0.267	0.276	0.027	-0.225	S
G4		0.346	0.348	0.36	0.043	-0.322	S
G1	NO <sub>3</sub> <sup>-</sup>	0.313	0.274	0.271	0.025	1.68	Q
G2		0.434	0.396	0.393	0.037	1.088	S
G3		0.582	0.529	0.528	0.044	1.23	Q
G4		0.653	0.612	0.602	0.093	0.554	S
G1	Na <sup>+</sup>	0.165	0.208	0.21	0.02	-2.301	Q
G2		0.309	0.329	0.323	0.026	-0.524	S
G3		0.473	0.476	0.471	0.029	0.083	S
G4		0.461	0.465	0.454	0.025	0.295	S
G1	Mg <sup>2+</sup>	0.119	0.124	0.124	0.009	-0.504	S
G2		0.113	0.114	0.009	0.009	-0.11	S
G3		0.15	0.155	0.155	0.011	-0.418	S
G4		0.172	0.175	0.176	0.012	-0.3	S
G1	Cl <sup>-</sup>	0.187	0.154	0.154	0.036	0.911	Q
G2		0.278	0.232	0.241	0.125	0.298	Q
G3		0.405	0.347	0.337	0.039	1.72	Q
G4		0.466	0.386	0.379	0.046	1.88	Q
G1	Ca <sup>2+</sup>	0.1	0.102	0.104	0.019	-0.223	S
G2		0.117	0.115	0.115	0.017	0.101	S
G3		0.195	0.192	0.188	0.022	0.303	S
G4		0.225	0.217	0.209	0.023	0.69	S
G1	K <sup>+</sup>	0.125	0.136	0.133	0.02	-0.429	S
G2		0.209	0.204	0.202	0.017	0.425	S
G3		0.32	0.306	0.3	0.022	0.912	S
G4		0.39	0.374	0.368	0.028	0.784	S
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.54	4.48	4.522	0.056	0.327	S
G3		4.28	4.22	4.259	0.051	0.414	S
G4		4.23	4.18	4.207	0.058	0.407	S
G1	Cond	17.1	16.79	16.135	1.145	0.843	S
G2		21.3	21.08	20.617	1.06	0.644	S
G3		35.7	35.23	34.179	1.671	0.91	S
G4		39.6	39.53	38.389	1.678	0.722	S

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 34, Ministry of Environment and Urbanisation (Turkey)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.62	0.673	0.667	0.071	-0.66	S
G2		0.723	0.776	0.773	0.074	-0.669	S
G3		1.286	1.319	1.319	0.087	-0.387	S
G4		1.453	1.474	1.487	0.078	-0.43	S
G1	NH <sub>4</sub> <sup>+</sup>	0.179	0.16	0.169	0.019	0.552	S
G2		0.395	0.214	0.216	0.021	8.642	U
G3		0.457	0.267	0.276	0.027	6.59	U
G4		0.491	0.348	0.36	0.043	3.079	U
G1	NO <sub>3</sub> <sup>-</sup>	0.254	0.274	0.271	0.025	-0.702	S
G2		0.359	0.396	0.393	0.037	-0.923	S
G3		0.486	0.529	0.528	0.044	-0.962	S
G4		0.57	0.612	0.602	0.093	-0.34	S
G1	Na <sup>+</sup>	0.218	0.208	0.21	0.02	0.401	S
G2		0.335	0.329	0.323	0.026	0.458	S
G3		0.403	0.476	0.471	0.029	-2.346	Q
G4		0.395	0.465	0.454	0.025	-2.314	Q
G1	Mg <sup>2+</sup>	0.048	0.124	0.124	0.009	-8.154	U
G2		0.065	0.114	0.009	0.009	-5.341	U
G3		0.093	0.155	0.155	0.011	-5.424	U
G4		0.122	0.175	0.176	0.012	-4.333	U
G1	Cl <sup>-</sup>	4.809	0.154	0.154	0.036	130.207	U
G2		3.573	0.232	0.241	0.125	26.702	U
G3		1.102	0.347	0.337	0.039	19.378	U
G4		1.4	0.386	0.379	0.046	22.078	U
G1	Ca <sup>2+</sup>	0.155	0.102	0.104	0.019	2.628	U
G2		0.198	0.115	0.115	0.017	4.805	U
G3		0.206	0.192	0.188	0.022	0.796	S
G4		0.212	0.217	0.209	0.023	0.114	S
G1	K <sup>+</sup>	0.976	0.136	0.133	0.02	42.933	U
G2		0.148	0.204	0.202	0.017	-3.238	U
G3		0.175	0.306	0.3	0.022	-5.598	U
G4		0.318	0.374	0.368	0.028	-1.748	S
G1	pH	4.78	4.57	4.643	0.083	1.662	U
G2		4.547	4.48	4.522	0.056	0.452	S
G3		4.366	4.22	4.259	0.051	2.104	Q
G4		4.26	4.18	4.207	0.058	0.928	S
G1	Cond	14.9	16.79	16.135	1.145	-1.078	S
G2		18.7	21.08	20.617	1.06	-1.809	S
G3		31.2	35.23	34.179	1.671	-1.783	S
G4		36.3	39.53	38.389	1.678	-1.245	S

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 35, Meteorological and Hydrological Service of Croatia (Croatia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.717	0.673	0.667	0.071	0.698	S
G2		0.825	0.776	0.773	0.074	0.706	S
G3		1.398	1.319	1.319	0.087	0.908	S
G4		1.559	1.474	1.487	0.078	0.929	S
G1	NH <sub>4</sub> <sup>+</sup>	0.165	0.16	0.169	0.019	-0.204	S
G2		0.215	0.214	0.216	0.021	-0.055	S
G3		0.269	0.267	0.276	0.027	-0.261	S
G4		0.348	0.348	0.36	0.043	-0.275	S
G1	NO <sub>3</sub> <sup>-</sup>	0.284	0.274	0.271	0.025	0.51	S
G2		0.408	0.396	0.393	0.037	0.391	S
G3		0.551	0.529	0.528	0.044	0.522	S
G4		0.632	0.612	0.602	0.093	0.328	S
G1	Na <sup>+</sup>	0.219	0.208	0.21	0.02	0.452	S
G2		0.337	0.329	0.323	0.026	0.534	S
G3		0.487	0.476	0.471	0.029	0.569	S
G4		0.471	0.465	0.454	0.025	0.691	S
G1	Mg <sup>2+</sup>	0.134	0.124	0.124	0.009	1.112	S
G2		0.124	0.114	0.009	0.009	1.088	S
G3		0.166	0.155	0.155	0.011	0.987	S
G4		0.188	0.175	0.176	0.012	0.99	S
G1	Cl <sup>-</sup>	0.151	0.154	0.154	0.036	-0.096	S
G2		0.224	0.232	0.241	0.125	-0.135	S
G3		0.341	0.347	0.337	0.039	0.099	S
G4		0.378	0.386	0.379	0.046	-0.023	S
G1	Ca <sup>2+</sup>	0.111	0.102	0.104	0.019	0.347	S
G2		0.125	0.115	0.115	0.017	0.566	S
G3		0.198	0.192	0.188	0.022	0.437	S
G4		0.224	0.217	0.209	0.023	0.646	S
G1	K <sup>+</sup>	0.144	0.136	0.133	0.02	0.539	S
G2		0.217	0.204	0.202	0.017	0.906	S
G3		0.318	0.306	0.3	0.022	0.822	S
G4		0.387	0.374	0.368	0.028	0.678	S
G1	pH	4.61	4.57	4.643	0.083	-0.397	S
G2		4.53	4.48	4.522	0.056	0.148	S
G3		4.24	4.22	4.259	0.051	-0.372	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond	16.8	16.79	16.135	1.145	0.581	S
G2		21	21.08	20.617	1.06	0.361	S
G3		35	35.23	34.179	1.671	0.491	S
G4		38.9	39.53	38.389	1.678	0.305	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 36, Hydrometeorological Institute of Slovenia (Slovenia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.721	0.673	0.667	0.071	0.754	S
G2		0.834	0.776	0.773	0.074	0.827	S
G3		1.378	1.319	1.319	0.087	0.677	S
G4		1.549	1.474	1.487	0.078	0.8	S
G1	NH <sub>4</sub> <sup>+</sup>	0.163	0.16	0.169	0.019	-0.312	S
G2		0.219	0.214	0.216	0.021	0.138	S
G3		0.273	0.267	0.276	0.027	-0.115	S
G4		0.349	0.348	0.36	0.043	-0.251	S
G1	NO <sub>3</sub> <sup>-</sup>	0.276	0.274	0.271	0.025	0.187	S
G2		0.404	0.396	0.393	0.037	0.284	S
G3		0.546	0.529	0.528	0.044	0.408	S
G4		0.636	0.612	0.602	0.093	0.371	S
G1	Na <sup>+</sup>	0.225	0.208	0.21	0.02	0.757	S
G2		0.342	0.329	0.323	0.026	0.723	S
G3		0.49	0.476	0.471	0.029	0.673	S
G4		0.474	0.465	0.454	0.025	0.809	S
G1	Mg <sup>2+</sup>	0.128	0.124	0.124	0.009	0.465	S
G2		0.121	0.114	0.009	0.009	0.761	S
G3		0.163	0.155	0.155	0.011	0.724	S
G4		0.185	0.175	0.176	0.012	0.748	S
G1	Cl <sup>-</sup>	0.153	0.154	0.154	0.036	-0.04	S
G2		0.26	0.232	0.241	0.125	0.153	S
G3		0.353	0.347	0.337	0.039	0.403	S
G4		0.39	0.386	0.379	0.046	0.236	S
G1	Ca <sup>2+</sup>	0.087	0.102	0.104	0.019	-0.897	S
G2		0.103	0.115	0.115	0.017	-0.712	S
G3		0.174	0.192	0.188	0.022	-0.639	S
G4		0.209	0.217	0.209	0.023	-0.018	S
G1	K <sup>+</sup>	0.112	0.136	0.133	0.02	-1.092	Q
G2		0.194	0.204	0.202	0.017	-0.476	S
G3		0.302	0.306	0.3	0.022	0.104	S
G4		0.365	0.374	0.368	0.028	-0.096	S
G1	pH	4.56	4.57	4.643	0.083	-1.003	S
G2		4.46	4.48	4.522	0.056	-1.106	S
G3		4.22	4.22	4.259	0.051	-0.764	S
G4		4.18	4.18	4.207	0.058	-0.46	S
G1	Cond	16.3	16.79	16.135	1.145	0.144	S
G2		20.7	21.08	20.617	1.06	0.078	S
G3		35	35.23	34.179	1.671	0.491	S
G4		39	39.53	38.389	1.678	0.364	S

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 38, Estonian Environmental Research Centre, Tallinn (Estonia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.707	0.673	0.667	0.071	0.558	S
G2		0.83	0.776	0.773	0.074	0.773	S
G3		1.39	1.319	1.319	0.087	0.815	S
G4		1.57	1.474	1.487	0.078	1.07	S
G1	NH <sub>4</sub> <sup>+</sup>	0.202	0.16	0.169	0.019	1.793	U
G2		0.23	0.214	0.216	0.021	0.67	S
G3		0.34	0.267	0.276	0.027	2.326	U
G4		0.454	0.348	0.36	0.043	2.211	U
G1	NO <sub>3</sub> <sup>-</sup>	0.287	0.274	0.271	0.025	0.631	S
G2		0.427	0.396	0.393	0.037	0.9	S
G3		0.587	0.529	0.528	0.044	1.344	Q
G4		0.673	0.612	0.602	0.093	0.769	S
G1	Na <sup>+</sup>	0.203	0.208	0.21	0.02	-0.364	S
G2		0.315	0.329	0.323	0.026	-0.297	S
G3		0.469	0.476	0.471	0.029	-0.056	S
G4		0.448	0.465	0.454	0.025	-0.219	S
G1	Mg <sup>2+</sup>	0.158	0.124	0.124	0.009	3.698	U
G2		0.141	0.114	0.009	0.009	2.941	Q
G3		0.159	0.155	0.155	0.011	0.372	S
G4		0.174	0.175	0.176	0.012	-0.139	S
G1	Cl <sup>-</sup>	0.141	0.154	0.154	0.036	-0.376	S
G2		0.195	0.232	0.241	0.125	-0.368	Q
G3		0.319	0.347	0.337	0.039	-0.458	S
G4		0.369	0.386	0.379	0.046	-0.218	S
G1	Ca <sup>2+</sup>	0.155	0.102	0.104	0.019	2.628	U
G2		0.127	0.115	0.115	0.017	0.682	S
G3		0.133	0.192	0.188	0.022	-2.476	U
G4		0.131	0.217	0.209	0.023	-3.474	U
G1	K <sup>+</sup>	0.109	0.136	0.133	0.02	-1.244	Q
G2		0.181	0.204	0.202	0.017	-1.256	S
G3		0.278	0.306	0.3	0.022	-0.974	S
G4		0.347	0.374	0.368	0.028	-0.729	S
G1	pH	4.69	4.57	4.643	0.083	0.572	Q
G2		4.5	4.48	4.522	0.056	-0.39	S
G3		4.23	4.22	4.259	0.051	-0.568	S
G4		4.19	4.18	4.207	0.058	-0.287	S
G1	Cond	32.8	16.79	16.135	1.145	14.553	U
G2		24.8	21.08	20.617	1.06	3.946	Q
G3		31.5	35.23	34.179	1.671	-1.603	S
G4		34.2	39.53	38.389	1.678	-2.496	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 39, Environmental Monitoring Laboratory, Institute of Environmental Protection (Poland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.677	0.673	0.667	0.071	0.138	S
G2		0.786	0.776	0.773	0.074	0.18	S
G3		1.329	1.319	1.319	0.087	0.11	S
G4		1.509	1.474	1.487	0.078	0.288	S
G1	NH <sub>4</sub> <sup>+</sup>	0.203	0.16	0.169	0.019	1.847	U
G2		0.232	0.214	0.216	0.021	0.766	S
G3		0.452	0.267	0.276	0.027	6.407	U
G4		0.428	0.348	0.36	0.043	1.601	Q
G1	NO <sub>3</sub> <sup>-</sup>	0.269	0.274	0.271	0.025	-0.096	S
G2		0.392	0.396	0.393	0.037	-0.038	S
G3		0.523	0.529	0.528	0.044	-0.117	S
G4		0.607	0.612	0.602	0.093	0.058	S
G1	Na <sup>+</sup>	0.22	0.208	0.21	0.02	0.503	S
G2		0.334	0.329	0.323	0.026	0.42	S
G3		0.484	0.476	0.471	0.029	0.465	S
G4		0.466	0.465	0.454	0.025	0.493	S
G1	Mg <sup>2+</sup>	0.125	0.124	0.124	0.009	0.142	S
G2		0.115	0.114	0.009	0.009	0.107	S
G3		0.157	0.155	0.155	0.011	0.197	S
G4		0.176	0.175	0.176	0.012	0.023	S
G1	Cl <sup>-</sup>	0.141	0.154	0.154	0.036	-0.376	S
G2		0.213	0.232	0.241	0.125	-0.223	S
G3		0.328	0.347	0.337	0.039	-0.23	S
G4		0.362	0.386	0.379	0.046	-0.369	S
G1	Ca <sup>2+</sup>	0.104	0.102	0.104	0.019	-0.016	S
G2		0.115	0.115	0.115	0.017	-0.015	S
G3		0.192	0.192	0.188	0.022	0.168	S
G4		0.216	0.217	0.209	0.023	0.292	S
G1	K <sup>+</sup>	0.137	0.136	0.133	0.02	0.182	S
G2		0.21	0.204	0.202	0.017	0.485	S
G3		0.307	0.306	0.3	0.022	0.328	S
G4		0.377	0.374	0.368	0.028	0.326	S
G1	pH	5.16	4.57	4.643	0.083	6.266	U
G2		4.47	4.48	4.522	0.056	-0.927	S
G3		4.19	4.22	4.259	0.051	-1.354	S
G4		4.14	4.18	4.207	0.058	-1.154	S
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 40, Hydrometeorological Institute, Skopje (Macedonia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>		0.673	0.667	0.071		B
G2			0.776	0.773	0.074		B
G3			1.319	1.319	0.087		B
G4			1.474	1.487	0.078		B
G1	NH <sub>4</sub> <sup>+</sup>	0.136	0.16	0.169	0.019	-1.77	S
G2		0.181	0.214	0.216	0.021	-1.698	Q
G3		0.198	0.267	0.276	0.027	-2.848	U
G4		0.236	0.348	0.36	0.043	-2.901	U
G1	NO <sub>3</sub> <sup>-</sup>	0.246	0.274	0.271	0.025	-1.025	Q
G2		0.403	0.396	0.393	0.037	0.257	S
G3		0.514	0.529	0.528	0.044	-0.323	S
G4		0.573	0.612	0.602	0.093	-0.308	S
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>	0.319	0.154	0.154	0.036	4.603	U
G2		0.439	0.232	0.241	0.125	1.588	U
G3		0.519	0.347	0.337	0.039	4.608	U
G4		0.64	0.386	0.379	0.046	5.642	U
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH	3.94	4.57	4.643	0.083	-8.514	U
G2		3.65	4.48	4.522	0.056	-15.617	U
G3		3.43	4.22	4.259	0.051	-16.286	U
G4		3.47	4.18	4.207	0.058	-12.78	U
G1	Cond	18	16.79	16.135	1.145	1.629	S
G2		23	21.08	20.617	1.06	2.248	S
G3		30	35.23	34.179	1.671	-2.501	S
G4		36	39.53	38.389	1.678	-1.423	S

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 42, State Hydrometeorological Service, Chisnau (Moldova)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.52	0.673	0.667	0.071	-2.06	U
G2		0.709	0.776	0.773	0.074	-0.858	S
G3		1.112	1.319	1.319	0.087	-2.398	Q
G4		1.358	1.474	1.487	0.078	-1.647	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.189	0.214	0.216	0.021	-1.311	S
G3		0.245	0.267	0.276	0.027	-1.136	S
G4		0.294	0.348	0.36	0.043	-1.541	Q
G1	NO <sub>3</sub> <sup>-</sup>	0.144	0.274	0.271	0.025	-5.143	U
G2		0.203	0.396	0.393	0.037	-5.105	U
G3		0.295	0.529	0.528	0.044	-5.323	U
G4		0.367	0.612	0.602	0.093	-2.527	U
G1	Na <sup>+</sup>	0.246	0.208	0.21	0.02	1.828	Q
G2		0.308	0.329	0.323	0.026	-0.562	S
G3		0.356	0.476	0.471	0.029	-3.977	U
G4		0.469	0.465	0.454	0.025	0.612	S
G1	Mg <sup>2+</sup>	0.145	0.124	0.124	0.009	2.297	Q
G2		0.083	0.114	0.009	0.009	-3.379	U
G3		0.103	0.155	0.155	0.011	-4.546	U
G4		0.124	0.175	0.176	0.012	-4.171	U
G1	Cl <sup>-</sup>	0.11	0.154	0.154	0.036	-1.243	U
G2		0.156	0.232	0.241	0.125	-0.68	U
G3		0.271	0.347	0.337	0.039	-1.674	Q
G4		0.342	0.386	0.379	0.046	-0.802	S
G1	Ca <sup>2+</sup>	0.098	0.102	0.104	0.019	-0.327	S
G2		0.154	0.115	0.115	0.017	2.25	U
G3		0.193	0.192	0.188	0.022	0.213	S
G4		0.217	0.217	0.209	0.023	0.336	S
G1	K <sup>+</sup>	0.204	0.136	0.133	0.02	3.596	U
G2		0.187	0.204	0.202	0.017	-0.896	S
G3		0.156	0.306	0.3	0.022	-6.451	U
G4		0.136	0.374	0.368	0.028	-8.149	U
G1	pH	4.7	4.57	4.643	0.083	0.693	Q
G2		4.46	4.48	4.522	0.056	-1.106	S
G3		4.2	4.22	4.259	0.051	-1.157	S
G4		4.15	4.18	4.207	0.058	-0.981	S
G1	Cond	14	16.79	16.135	1.145	-1.864	Q
G2		16	21.08	20.617	1.06	-4.356	Q
G3		27	35.23	34.179	1.671	-4.296	Q
G4		29	39.53	38.389	1.678	-5.595	U

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 45, Environmental Impact Monitoring Center, Yerevan (Armenia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.731	0.673	0.667	0.071	0.894	S
G2		0.829	0.776	0.773	0.074	0.76	S
G3		1.399	1.319	1.319	0.087	0.919	S
G4		1.566	1.474	1.487	0.078	1.018	S
G1	NH <sub>4</sub> <sup>+</sup>	0.175	0.16	0.169	0.019	0.336	S
G2		0.232	0.214	0.216	0.021	0.766	S
G3		0.295	0.267	0.276	0.027	0.686	S
G4		0.354	0.348	0.36	0.043	-0.134	S
G1	NO <sub>3</sub> <sup>-</sup>	0.279	0.274	0.271	0.025	0.308	S
G2		0.39	0.396	0.393	0.037	-0.092	S
G3		0.528	0.529	0.528	0.044	-0.003	S
G4		0.611	0.612	0.602	0.093	0.101	S
G1	Na <sup>+</sup>	0.238	0.208	0.21	0.02	1.42	S
G2		0.351	0.329	0.323	0.026	1.063	S
G3		0.463	0.476	0.471	0.029	-0.264	S
G4		0.442	0.465	0.454	0.025	-0.456	S
G1	Mg <sup>2+</sup>	0.136	0.124	0.124	0.009	1.327	S
G2		0.122	0.114	0.009	0.009	0.87	S
G3		0.153	0.155	0.155	0.011	-0.154	S
G4		0.17	0.175	0.176	0.012	-0.461	S
G1	Cl <sup>-</sup>	0.15	0.154	0.154	0.036	-0.124	S
G2		0.221	0.232	0.241	0.125	-0.159	S
G3		0.339	0.347	0.337	0.039	0.048	S
G4		0.379	0.386	0.379	0.046	-0.002	S
G1	Ca <sup>2+</sup>	0.085	0.102	0.104	0.019	-1.001	Q
G2		0.137	0.115	0.115	0.017	1.263	Q
G3		0.163	0.192	0.188	0.022	-1.132	Q
G4		0.165	0.217	0.209	0.023	-1.967	Q
G1	K <sup>+</sup>	0.117	0.136	0.133	0.02	-0.837	S
G2		0.25	0.204	0.202	0.017	2.887	Q
G3		0.319	0.306	0.3	0.022	0.867	S
G4		0.381	0.374	0.368	0.028	0.467	S
G1	pH	4.654	4.57	4.643	0.083	0.136	S
G2		4.518	4.48	4.522	0.056	-0.067	S
G3		4.248	4.22	4.259	0.051	-0.214	S
G4		4.188	4.18	4.207	0.058	-0.321	S
G1	Cond	16.5	16.79	16.135	1.145	0.319	S
G2		20.9	21.08	20.617	1.06	0.267	S
G3		35.1	35.23	34.179	1.671	0.551	S
G4		39.9	39.53	38.389	1.678	0.901	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 46, Diabla Gora Station (Poland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>		0.673	0.667	0.071		B
G2			0.776	0.773	0.074		B
G3			1.319	1.319	0.087		B
G4			1.474	1.487	0.078		B
G1	NH <sub>4</sub> <sup>+</sup>		0.16	0.169	0.019		B
G2			0.214	0.216	0.021		B
G3			0.267	0.276	0.027		B
G4			0.348	0.36	0.043		B
G1	NO <sub>3</sub> <sup>-</sup>		0.274	0.271	0.025		B
G2			0.396	0.393	0.037		B
G3			0.529	0.528	0.044		B
G4			0.612	0.602	0.093		B
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>		0.154	0.154	0.036		B
G2			0.232	0.241	0.125		B
G3			0.347	0.337	0.039		B
G4			0.386	0.379	0.046		B
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH	4.6	4.57	4.643	0.083	-0.518	S
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.23	4.18	4.207	0.058	0.407	S
G1	Cond	16.12	16.79	16.135	1.145	-0.013	S
G2		20.63	21.08	20.617	1.06	0.012	S
G3		34.03	35.23	34.179	1.671	-0.089	S
G4		38.18	39.53	38.389	1.678	-0.124	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 48, Afdeling Rapportering Water Labovestiging Gent, VMM (Belgium)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.62	0.673	0.667	0.071	-0.667	S
G2		0.721	0.776	0.773	0.074	-0.702	S
G3		1.26	1.319	1.319	0.087	-0.683	S
G4		1.411	1.474	1.487	0.078	-0.962	S
G1	NH <sub>4</sub> <sup>+</sup>	0.102	0.16	0.169	0.019	-3.589	U
G2		0.162	0.214	0.216	0.021	-2.596	Q
G3		0.224	0.267	0.276	0.027	-1.89	Q
G4		0.305	0.348	0.36	0.043	-1.29	S
G1	NO <sub>3</sub> <sup>-</sup>	0.281	0.274	0.271	0.025	0.372	S
G2		0.39	0.396	0.393	0.037	-0.081	S
G3		0.521	0.529	0.528	0.044	-0.161	S
G4		0.615	0.612	0.602	0.093	0.139	S
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>	0.156	0.154	0.154	0.036	0.033	S
G2		0.191	0.232	0.241	0.125	-0.401	Q
G3		0.3	0.347	0.337	0.039	-0.937	S
G4		0.332	0.386	0.379	0.046	-1.01	S
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 107, The Finnish Forest Institute (Finland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.694	0.673	0.667	0.071	0.376	S
G2		0.813	0.776	0.773	0.074	0.544	S
G3		1.42	1.319	1.319	0.087	1.162	S
G4		1.59	1.474	1.487	0.078	1.326	S
G1	NH <sub>4</sub> <sup>+</sup>	0.151	0.16	0.169	0.019	-0.96	S
G2		0.206	0.214	0.216	0.021	-0.49	S
G3		0.253	0.267	0.276	0.027	-0.844	S
G4		0.331	0.348	0.36	0.043	-0.673	S
G1	NO <sub>3</sub> <sup>-</sup>	0.286	0.274	0.271	0.025	0.59	S
G2		0.41	0.396	0.393	0.037	0.445	S
G3		0.561	0.529	0.528	0.044	0.75	S
G4		0.652	0.612	0.602	0.093	0.543	S
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>	0.138	0.154	0.154	0.036	-0.46	S
G2		0.221	0.232	0.241	0.125	-0.159	S
G3		0.322	0.347	0.337	0.039	-0.382	S
G4		0.349	0.386	0.379	0.046	-0.651	S
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH	4.64	4.57	4.643	0.083	-0.034	S
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond	16	16.79	16.135	1.145	-0.118	S
G2		21	21.08	20.617	1.06	0.361	S
G3		35	35.23	34.179	1.671	0.491	S
G4		39	39.53	38.389	1.678	0.364	S

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 110, Thüringer Landesanstalt für Landwirtschaft TTL, Jena (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.8	0.673	0.667	0.071	1.861	Q
G2		0.83	0.776	0.773	0.074	0.773	S
G3		1.34	1.319	1.319	0.087	0.238	S
G4		1.5	1.474	1.487	0.078	0.173	S
G1	NH <sub>4</sub> <sup>+</sup>	0.17	0.16	0.169	0.019	0.066	S
G2		0.2	0.214	0.216	0.021	-0.78	S
G3		0.28	0.267	0.276	0.027	0.14	S
G4		0.36	0.348	0.36	0.043	0.007	S
G1	NO <sub>3</sub> <sup>-</sup>	0.33	0.274	0.271	0.025	2.367	U
G2		0.49	0.396	0.393	0.037	2.589	U
G3		0.6	0.529	0.528	0.044	1.641	Q
G4		0.68	0.612	0.602	0.093	0.845	Q
G1	Na <sup>+</sup>	0.2	0.208	0.21	0.02	-0.517	S
G2		0.32	0.329	0.323	0.026	-0.108	S
G3		0.47	0.476	0.471	0.029	-0.021	S
G4		0.45	0.465	0.454	0.025	-0.14	S
G1	Mg <sup>2+</sup>	0.126	0.124	0.124	0.009	0.25	S
G2		0.116	0.114	0.009	0.009	0.216	S
G3		0.158	0.155	0.155	0.011	0.285	S
G4		0.18	0.175	0.176	0.012	0.345	S
G1	Cl <sup>-</sup>	0.21	0.154	0.154	0.036	1.554	U
G2		0.26	0.232	0.241	0.125	0.153	S
G3		0.37	0.347	0.337	0.039	0.834	S
G4		0.39	0.386	0.379	0.046	0.236	S
G1	Ca <sup>2+</sup>	0.092	0.102	0.104	0.019	-0.638	S
G2		0.106	0.115	0.115	0.017	-0.538	S
G3		0.176	0.192	0.188	0.022	-0.549	S
G4		0.205	0.217	0.209	0.023	-0.196	S
G1	K <sup>+</sup>	0.1	0.136	0.133	0.02	-1.703	U
G2		0.17	0.204	0.202	0.017	-1.917	Q
G3		0.266	0.306	0.3	0.022	-1.513	S
G4		0.35	0.374	0.368	0.028	-0.623	S
G1	pH	4.86	4.57	4.643	0.083	2.632	U
G2		4.61	4.48	4.522	0.056	1.581	Q
G3		4.29	4.22	4.259	0.051	0.611	S
G4		4.24	4.18	4.207	0.058	0.581	S
G1	Cond	15.8	16.79	16.135	1.145	-0.292	S
G2		20.6	21.08	20.617	1.06	-0.016	S
G3		34.9	35.23	34.179	1.671	0.432	S
G4		37	39.53	38.389	1.678	-0.828	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 112, Niedersächsische Forstliche Versuchsanstalt NVF (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.67	0.673	0.667	0.071	0.04	S
G2		0.77	0.776	0.773	0.074	-0.036	S
G3		1.31	1.319	1.319	0.087	-0.109	S
G4		1.47	1.474	1.487	0.078	-0.212	S
G1	NH <sub>4</sub> <sup>+</sup>	0.17	0.16	0.169	0.019	0.066	S
G2		0.22	0.214	0.216	0.021	0.187	S
G3		0.27	0.267	0.276	0.027	-0.225	S
G4		0.35	0.348	0.36	0.043	-0.228	S
G1	NO <sub>3</sub> <sup>-</sup>	0.26	0.274	0.271	0.025	-0.459	S
G2		0.37	0.396	0.393	0.037	-0.628	S
G3		0.5	0.529	0.528	0.044	-0.643	S
G4		0.58	0.612	0.602	0.093	-0.232	S
G1	Na <sup>+</sup>	0.22	0.208	0.21	0.02	0.503	S
G2		0.35	0.329	0.323	0.026	1.025	S
G3		0.5	0.476	0.471	0.029	1.02	S
G4		0.48	0.465	0.454	0.025	1.046	S
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.12	0.114	0.009	0.009	0.652	S
G3		0.17	0.155	0.155	0.011	1.339	S
G4		0.19	0.175	0.176	0.012	1.152	S
G1	Cl <sup>-</sup>	0.15	0.154	0.154	0.036	-0.124	S
G2		0.23	0.232	0.241	0.125	-0.087	S
G3		0.34	0.347	0.337	0.039	0.074	S
G4		0.38	0.386	0.379	0.046	0.02	S
G1	Ca <sup>2+</sup>	0.12	0.102	0.104	0.019	0.814	Q
G2		0.13	0.115	0.115	0.017	0.856	S
G3		0.21	0.192	0.188	0.022	0.975	S
G4		0.24	0.217	0.209	0.023	1.355	S
G1	K <sup>+</sup>	0.13	0.136	0.133	0.02	-0.174	S
G2		0.22	0.204	0.202	0.017	1.086	S
G3		0.32	0.306	0.3	0.022	0.912	S
G4		0.39	0.374	0.368	0.028	0.784	S
G1	pH	4.61	4.57	4.643	0.083	-0.397	S
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond	16.2	16.79	16.135	1.145	0.057	S
G2		20.2	21.08	20.617	1.06	-0.394	S
G3		34.4	35.23	34.179	1.671	0.132	S
G4		38.5	39.53	38.389	1.678	0.066	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

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<http://www.nilu.no/projects/ccc/intercomparison.html>



## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 113, Fachhochschule Eberswalde (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.72	0.673	0.667	0.071	0.74	S
G2		0.863	0.776	0.773	0.074	1.218	Q
G3		1.393	1.319	1.319	0.087	0.85	S
G4		1.541	1.474	1.487	0.078	0.698	S
G1	NH <sub>4</sub> <sup>+</sup>	0.154	0.16	0.169	0.019	-0.798	S
G2		0.212	0.214	0.216	0.021	-0.2	S
G3		0.281	0.267	0.276	0.027	0.176	S
G4		0.381	0.348	0.36	0.043	0.499	S
G1	NO <sub>3</sub> <sup>-</sup>	0.284	0.274	0.271	0.025	0.51	S
G2		0.426	0.396	0.393	0.037	0.873	S
G3		0.552	0.529	0.528	0.044	0.545	S
G4		0.638	0.612	0.602	0.093	0.392	S
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>	0.215	0.154	0.154	0.036	1.694	U
G2		0.284	0.232	0.241	0.125	0.346	Q
G3		0.382	0.347	0.337	0.039	1.138	S
G4		0.418	0.386	0.379	0.046	0.842	S
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH	4.6	4.57	4.643	0.083	-0.518	S
G2		4.55	4.48	4.522	0.056	0.506	S
G3		4.2	4.22	4.259	0.051	-1.157	S
G4		4.12	4.18	4.207	0.058	-1.501	S
G1	Cond	15.3	16.79	16.135	1.145	-0.729	S
G2		20.8	21.08	20.617	1.06	0.173	S
G3		31.4	35.23	34.179	1.671	-1.663	S
G4		36.7	39.53	38.389	1.678	-1.006	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 114, C.N.R. Istituto Italiano di Idrobiologia (Italy)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.65	0.673	0.667	0.071	-0.24	S
G2		0.75	0.776	0.773	0.074	-0.305	S
G3		1.28	1.319	1.319	0.087	-0.456	S
G4		1.43	1.474	1.487	0.078	-0.725	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.21	0.214	0.216	0.021	-0.296	S
G3		0.26	0.267	0.276	0.027	-0.589	S
G4		0.32	0.348	0.36	0.043	-0.931	S
G1	NO <sub>3</sub> <sup>-</sup>	0.27	0.274	0.271	0.025	-0.056	S
G2		0.38	0.396	0.393	0.037	-0.36	S
G3		0.52	0.529	0.528	0.044	-0.186	S
G4		0.6	0.612	0.602	0.093	-0.017	S
G1	Na <sup>+</sup>	0.21	0.208	0.21	0.02	-0.007	S
G2		0.33	0.329	0.323	0.026	0.269	S
G3		0.47	0.476	0.471	0.029	-0.021	S
G4		0.45	0.465	0.454	0.025	-0.14	S
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.12	0.114	0.009	0.009	0.652	S
G3		0.16	0.155	0.155	0.011	0.46	S
G4		0.18	0.175	0.176	0.012	0.345	S
G1	Cl <sup>-</sup>	0.15	0.154	0.154	0.036	-0.124	S
G2		0.22	0.232	0.241	0.125	-0.167	S
G3		0.33	0.347	0.337	0.039	-0.18	S
G4		0.37	0.386	0.379	0.046	-0.196	S
G1	Ca <sup>2+</sup>	0.11	0.102	0.104	0.019	0.296	S
G2		0.12	0.115	0.115	0.017	0.275	S
G3		0.2	0.192	0.188	0.022	0.527	S
G4		0.23	0.217	0.209	0.023	0.912	S
G1	K <sup>+</sup>	0.13	0.136	0.133	0.02	-0.174	S
G2		0.2	0.204	0.202	0.017	-0.115	S
G3		0.3	0.306	0.3	0.022	0.014	S
G4		0.37	0.374	0.368	0.028	0.08	S
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.52	4.48	4.522	0.056	-0.032	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond	15.6	16.79	16.135	1.145	-0.467	S
G2		21.4	21.08	20.617	1.06	0.739	S
G3		35.4	35.23	34.179	1.671	0.731	S
G4		39.8	39.53	38.389	1.678	0.841	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 115, Bayerische Landesanstalt f. Wald- und Forstwirtschaft (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.666	0.673	0.667	0.071	-0.016	S
G2		0.777	0.776	0.773	0.074	0.059	S
G3		1.352	1.319	1.319	0.087	0.376	S
G4		1.52	1.474	1.487	0.078	0.429	S
G1	NH <sub>4</sub> <sup>+</sup>	0.135	0.16	0.169	0.019	-1.824	Q
G2		0.185	0.214	0.216	0.021	-1.504	S
G3		0.219	0.267	0.276	0.027	-2.083	Q
G4		0.3	0.348	0.36	0.043	-1.4	S
G1	NO <sub>3</sub> <sup>-</sup>	0.262	0.274	0.271	0.025	-0.379	S
G2		0.38	0.396	0.393	0.037	-0.36	S
G3		0.518	0.529	0.528	0.044	-0.232	S
G4		0.605	0.612	0.602	0.093	0.037	S
G1	Na <sup>+</sup>	0.219	0.208	0.21	0.02	0.452	S
G2		0.331	0.329	0.323	0.026	0.307	S
G3		0.48	0.476	0.471	0.029	0.326	S
G4		0.464	0.465	0.454	0.025	0.414	S
G1	Mg <sup>2+</sup>	0.114	0.124	0.124	0.009	-1.043	S
G2		0.105	0.114	0.009	0.009	-0.982	S
G3		0.145	0.155	0.155	0.011	-0.857	S
G4		0.164	0.175	0.176	0.012	-0.945	S
G1	Cl <sup>-</sup>	0.157	0.154	0.154	0.036	0.072	S
G2		0.224	0.232	0.241	0.125	-0.135	S
G3		0.332	0.347	0.337	0.039	-0.129	S
G4		0.367	0.386	0.379	0.046	-0.261	S
G1	Ca <sup>2+</sup>	0.094	0.102	0.104	0.019	-0.534	S
G2		0.106	0.115	0.115	0.017	-0.538	S
G3		0.18	0.192	0.188	0.022	-0.37	S
G4		0.205	0.217	0.209	0.023	-0.196	S
G1	K <sup>+</sup>	0.129	0.136	0.133	0.02	-0.225	S
G2		0.199	0.204	0.202	0.017	-0.175	S
G3		0.286	0.306	0.3	0.022	-0.615	S
G4		0.373	0.374	0.368	0.028	0.186	S
G1	pH	4.6	4.57	4.643	0.083	-0.518	S
G2		4.54	4.48	4.522	0.056	0.327	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.2	4.18	4.207	0.058	-0.113	S
G1	Cond	15.7	16.79	16.135	1.145	-0.38	S
G2		18.8	21.08	20.617	1.06	-1.714	S
G3		33.1	35.23	34.179	1.671	-0.646	S
G4		37.3	39.53	38.389	1.678	-0.649	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 116, Institute for Applied Plant Biology (Switzerland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.646	0.673	0.667	0.071	-0.297	S
G2		0.738	0.776	0.773	0.074	-0.464	S
G3		1.278	1.319	1.319	0.087	-0.481	S
G4		0.017	1.474	1.487	0.078	-18.836	U
G1	NH <sub>4</sub> <sup>+</sup>	0.221	0.16	0.169	0.019	2.819	U
G2		0.303	0.214	0.216	0.021	4.197	U
G3		0.377	0.267	0.276	0.027	3.674	U
G4		0.478	0.348	0.36	0.043	2.774	U
G1	NO <sub>3</sub> <sup>-</sup>	0.252	0.274	0.271	0.025	-0.766	S
G2		0.367	0.396	0.393	0.037	-0.703	S
G3		0.499	0.529	0.528	0.044	-0.67	S
G4		0.008	0.612	0.602	0.093	-6.395	U
G1	Na <sup>+</sup>	0.237	0.208	0.21	0.02	1.369	S
G2		0.356	0.329	0.323	0.026	1.251	S
G3		0.509	0.476	0.471	0.029	1.332	S
G4		0.49	0.465	0.454	0.025	1.442	S
G1	Mg <sup>2+</sup>	0.124	0.124	0.124	0.009	0.034	S
G2		0.114	0.114	0.009	0.009	-0.001	S
G3		0.157	0.155	0.155	0.011	0.197	S
G4		0.176	0.175	0.176	0.012	0.023	S
G1	Cl <sup>-</sup>	0.172	0.154	0.154	0.036	0.494	S
G2		0.2	0.232	0.241	0.125	-0.331	S
G3		0.296	0.347	0.337	0.039	-1.033	S
G4		0.049	0.386	0.379	0.046	-7.14	U
G1	Ca <sup>2+</sup>	0.113	0.102	0.104	0.019	0.451	S
G2		0.118	0.115	0.115	0.017	0.159	S
G3		0.215	0.192	0.188	0.022	1.199	S
G4		0.209	0.217	0.209	0.023	-0.018	S
G1	K <sup>+</sup>	0.142	0.136	0.133	0.02	0.437	S
G2		0.214	0.204	0.202	0.017	0.725	S
G3		0.319	0.306	0.3	0.022	0.867	S
G4		0.383	0.374	0.368	0.028	0.537	S
G1	pH	4.88	4.57	4.643	0.083	2.874	U
G2		4.71	4.48	4.522	0.056	3.372	U
G3		4.46	4.22	4.259	0.051	3.951	U
G4		4.42	4.18	4.207	0.058	3.704	U
G1	Cond	13.4	16.79	16.135	1.145	-2.388	Q
G2		17.2	21.08	20.617	1.06	-3.224	Q
G3		28.3	35.23	34.179	1.671	-3.518	Q
G4		32	39.53	38.389	1.678	-3.807	Q

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If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 117, Standortserkundung/Bodenmonitoring Forsten, Graupa (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.66	0.673	0.667	0.071	-0.1	S
G2		0.76	0.776	0.773	0.074	-0.171	S
G3		1.27	1.319	1.319	0.087	-0.572	S
G4		1.42	1.474	1.487	0.078	-0.853	S
G1	NH <sub>4</sub> <sup>+</sup>		0.16	0.169	0.019		B
G2			0.214	0.216	0.021		B
G3			0.267	0.276	0.027		B
G4			0.348	0.36	0.043		B
G1	NO <sub>3</sub> <sup>-</sup>		0.274	0.271	0.025		B
G2			0.396	0.393	0.037		B
G3			0.529	0.528	0.044		B
G4			0.612	0.602	0.093		B
G1	Na <sup>+</sup>	0.19	0.208	0.21	0.02	-1.026	S
G2		0.3	0.329	0.323	0.026	-0.864	S
G3		0.43	0.476	0.471	0.029	-1.409	S
G4		0.42	0.465	0.454	0.025	-1.325	S
G1	Mg <sup>2+</sup>	0.115	0.124	0.124	0.009	-0.935	S
G2		0.106	0.114	0.009	0.009	-0.873	S
G3		0.146	0.155	0.155	0.011	-0.769	S
G4		0.168	0.175	0.176	0.012	-0.623	S
G1	Cl <sup>-</sup>		0.154	0.154	0.036		B
G2			0.232	0.241	0.125		B
G3			0.347	0.337	0.039		B
G4			0.386	0.379	0.046		B
G1	Ca <sup>2+</sup>	0.095	0.102	0.104	0.019	-0.482	S
G2		0.108	0.115	0.115	0.017	-0.422	S
G3		0.181	0.192	0.188	0.022	-0.325	S
G4		0.205	0.217	0.209	0.023	-0.196	S
G1	K <sup>+</sup>	0.12	0.136	0.133	0.02	-0.684	S
G2		0.19	0.204	0.202	0.017	-0.716	S
G3		0.28	0.306	0.3	0.022	-0.884	S
G4		0.35	0.374	0.368	0.028	-0.623	S
G1	pH	4.62	4.57	4.643	0.083	-0.276	S
G2		4.5	4.48	4.522	0.056	-0.39	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.18	4.18	4.207	0.058	-0.46	S
G1	Cond	15.9	16.79	16.135	1.145	-0.205	S
G2		20.2	21.08	20.617	1.06	-0.394	S
G3		33.6	35.23	34.179	1.671	-0.346	S
G4		38	39.53	38.389	1.678	-0.232	S

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 118, Forstliche Versuchs-und Forschungsanstalt (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.7	0.673	0.667	0.071	0.46	S
G2		0.8	0.776	0.773	0.074	0.369	S
G3		1.37	1.319	1.319	0.087	0.584	S
G4		1.54	1.474	1.487	0.078	0.685	S
G1	NH <sub>4</sub> <sup>+</sup>	0.166	0.16	0.169	0.019	-0.15	S
G2		0.222	0.214	0.216	0.021	0.283	S
G3		0.28	0.267	0.276	0.027	0.14	S
G4		0.368	0.348	0.36	0.043	0.194	S
G1	NO <sub>3</sub> <sup>-</sup>	0.264	0.274	0.271	0.025	-0.298	S
G2		0.377	0.396	0.393	0.037	-0.44	S
G3		0.502	0.529	0.528	0.044	-0.597	S
G4		0.585	0.612	0.602	0.093	-0.179	S
G1	Na <sup>+</sup>	0.2	0.208	0.21	0.02	-0.517	S
G2		0.31	0.329	0.323	0.026	-0.486	S
G3		0.45	0.476	0.471	0.029	-0.715	S
G4		0.44	0.465	0.454	0.025	-0.535	S
G1	Mg <sup>2+</sup>	0.116	0.124	0.124	0.009	-0.828	S
G2		0.107	0.114	0.109	0.009	-0.764	S
G3		0.149	0.155	0.155	0.011	-0.506	S
G4		0.165	0.175	0.176	0.012	-0.865	S
G1	Cl <sup>-</sup>	0.15	0.154	0.154	0.036	-0.124	S
G2		0.22	0.232	0.241	0.125	-0.167	S
G3		0.32	0.347	0.337	0.039	-0.433	S
G4		0.36	0.386	0.379	0.046	-0.413	S
G1	Ca <sup>2+</sup>	0.11	0.102	0.104	0.019	0.296	S
G2		0.11	0.115	0.115	0.017	-0.306	S
G3		0.19	0.192	0.188	0.022	0.078	S
G4		0.21	0.217	0.209	0.023	0.026	S
G1	K <sup>+</sup>	0.12	0.136	0.133	0.02	-0.684	S
G2		0.19	0.204	0.202	0.017	-0.716	S
G3		0.28	0.306	0.3	0.022	-0.884	S
G4		0.35	0.374	0.368	0.028	-0.623	S
G1	pH	4.68	4.57	4.643	0.083	0.451	Q
G2		4.56	4.48	4.522	0.056	0.685	S
G3		4.28	4.22	4.259	0.051	0.414	S
G4		4.23	4.18	4.207	0.058	0.407	S
G1	Cond	15.9	16.79	16.135	1.145	-0.205	S
G2		19.7	21.08	20.617	1.06	-0.865	S
G3		33.8	35.23	34.179	1.671	-0.227	S
G4		37.7	39.53	38.389	1.678	-0.41	S

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 120, Landwirtschaftliche Untersuchungs- und Forschungsanstalt LUFA (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.66	0.673	0.667	0.071	-0.1	S
G2		0.76	0.776	0.773	0.074	-0.171	S
G3		1.27	1.319	1.319	0.087	-0.572	S
G4		1.44	1.474	1.487	0.078	-0.596	S
G1	NH <sub>4</sub> <sup>+</sup>	0.18	0.16	0.169	0.019	0.605	S
G2		0.23	0.214	0.216	0.021	0.67	S
G3		0.28	0.267	0.276	0.027	0.14	S
G4		0.36	0.348	0.36	0.043	0.007	S
G1	NO <sub>3</sub> <sup>-</sup>	0.28	0.274	0.271	0.025	0.348	S
G2		0.4	0.396	0.393	0.037	0.176	S
G3		0.54	0.529	0.528	0.044	0.271	S
G4		0.63	0.612	0.602	0.093	0.306	S
G1	Na <sup>+</sup>	0.23	0.208	0.21	0.02	1.012	S
G2		0.35	0.329	0.323	0.026	1.025	S
G3		0.5	0.476	0.471	0.029	1.02	S
G4		0.48	0.465	0.454	0.025	1.046	S
G1	Mg <sup>2+</sup>	0.132	0.124	0.124	0.009	0.896	S
G2		0.123	0.114	0.009	0.009	0.979	S
G3		0.165	0.155	0.155	0.011	0.899	S
G4		0.191	0.175	0.176	0.012	1.232	S
G1	Cl <sup>-</sup>	0.2	0.154	0.154	0.036	1.275	U
G2		0.32	0.232	0.241	0.125	0.634	U
G3		0.42	0.347	0.337	0.039	2.1	Q
G4		0.39	0.386	0.379	0.046	0.236	S
G1	Ca <sup>2+</sup>	0.106	0.102	0.104	0.019	0.088	S
G2		0.123	0.115	0.115	0.017	0.449	S
G3		0.19	0.192	0.188	0.022	0.078	S
G4		0.23	0.217	0.209	0.023	0.912	S
G1	K <sup>+</sup>	0.13	0.136	0.133	0.02	-0.174	S
G2		0.2	0.204	0.202	0.017	-0.115	S
G3		0.28	0.306	0.3	0.022	-0.884	S
G4		0.36	0.374	0.368	0.028	-0.271	S
G1	pH	4.62	4.57	4.643	0.083	-0.276	S
G2		4.5	4.48	4.522	0.056	-0.39	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.2	4.18	4.207	0.058	-0.113	S
G1	Cond	16.1	16.79	16.135	1.145	-0.03	S
G2		19.8	21.08	20.617	1.06	-0.771	S
G3		34.1	35.23	34.179	1.671	-0.047	S
G4		37.5	39.53	38.389	1.678	-0.53	S

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✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 124, Laboratorium voor Bondemkunde, Gent (Belgium)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.654	0.673	0.667	0.071	-0.184	S
G2		0.76	0.776	0.773	0.074	-0.171	S
G3		1.304	1.319	1.319	0.087	-0.179	S
G4		1.459	1.474	1.487	0.078	-0.353	S
G1	NH <sub>4</sub> <sup>+</sup>	0.159	0.16	0.169	0.019	-0.528	S
G2		0.205	0.214	0.216	0.021	-0.538	S
G3		0.275	0.267	0.276	0.027	-0.042	S
G4		0.359	0.348	0.36	0.043	-0.017	S
G1	NO <sub>3</sub> <sup>-</sup>	0.27	0.274	0.271	0.025	-0.056	S
G2		0.394	0.396	0.393	0.037	0.016	S
G3		0.538	0.529	0.528	0.044	0.225	S
G4		0.625	0.612	0.602	0.093	0.252	S
G1	Na <sup>+</sup>	0.211	0.208	0.21	0.02	0.044	S
G2		0.324	0.329	0.323	0.026	0.043	S
G3		0.48	0.476	0.471	0.029	0.326	S
G4		0.465	0.465	0.454	0.025	0.453	S
G1	Mg <sup>2+</sup>	0.127	0.124	0.124	0.009	0.358	S
G2		0.116	0.114	0.009	0.009	0.216	S
G3		0.159	0.155	0.155	0.011	0.372	S
G4		0.18	0.175	0.176	0.012	0.345	S
G1	Cl <sup>-</sup>	0.164	0.154	0.154	0.036	0.267	S
G2		0.231	0.232	0.241	0.125	-0.079	S
G3		0.391	0.347	0.337	0.039	1.366	S
G4		0.392	0.386	0.379	0.046	0.279	S
G1	Ca <sup>2+</sup>	0.104	0.102	0.104	0.019	-0.016	S
G2		0.112	0.115	0.115	0.017	-0.189	S
G3		0.189	0.192	0.188	0.022	0.034	S
G4		0.22	0.217	0.209	0.023	0.469	S
G1	K <sup>+</sup>	0.132	0.136	0.133	0.02	-0.072	S
G2		0.199	0.204	0.202	0.017	-0.175	S
G3		0.297	0.306	0.3	0.022	-0.121	S
G4		0.362	0.374	0.368	0.028	-0.201	S
G1	pH	4.87	4.57	4.643	0.083	2.753	U
G2		4.54	4.48	4.522	0.056	0.327	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond	15	16.79	16.135	1.145	-0.991	S
G2		20	21.08	20.617	1.06	-0.582	S
G3		33	35.23	34.179	1.671	-0.705	S
G4		38	39.53	38.389	1.678	-0.232	S

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If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 125, Bayerisches Landesamt für Umweltschutz, Augsburg (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.689	0.673	0.667	0.071	0.306	S
G2		0.801	0.776	0.773	0.074	0.382	S
G3		1.37	1.319	1.319	0.087	0.584	S
G4		1.53	1.474	1.487	0.078	0.557	S
G1	NH <sub>4</sub> <sup>+</sup>	0.187	0.16	0.169	0.019	0.983	Q
G2		0.228	0.214	0.216	0.021	0.573	S
G3		0.289	0.267	0.276	0.027	0.468	S
G4		0.362	0.348	0.36	0.043	0.054	S
G1	NO <sub>3</sub> <sup>-</sup>	0.268	0.274	0.271	0.025	-0.136	S
G2		0.393	0.396	0.393	0.037	-0.011	S
G3		0.529	0.529	0.528	0.044	0.02	S
G4		0.609	0.612	0.602	0.093	0.08	S
G1	Na <sup>+</sup>	0.178	0.208	0.21	0.02	-1.638	S
G2		0.267	0.329	0.323	0.026	-2.111	Q
G3		0.374	0.476	0.471	0.029	-3.353	Q
G4		0.362	0.465	0.454	0.025	-3.618	Q
G1	Mg <sup>2+</sup>	0.104	0.124	0.124	0.009	-2.12	Q
G2		0.093	0.114	0.009	0.009	-2.29	Q
G3		0.124	0.155	0.155	0.011	-2.701	Q
G4		0.14	0.175	0.176	0.012	-2.881	Q
G1	Cl <sup>-</sup>	0.148	0.154	0.154	0.036	-0.18	S
G2		0.212	0.232	0.241	0.125	-0.231	S
G3		0.328	0.347	0.337	0.039	-0.23	S
G4		0.366	0.386	0.379	0.046	-0.283	S
G1	Ca <sup>2+</sup>	0.088	0.102	0.104	0.019	-0.845	S
G2		0.097	0.115	0.115	0.017	-1.061	Q
G3		0.151	0.192	0.188	0.022	-1.669	Q
G4		0.173	0.217	0.209	0.023	-1.613	Q
G1	K <sup>+</sup>	0.125	0.136	0.133	0.02	-0.429	S
G2		0.188	0.204	0.202	0.017	-0.836	S
G3		0.263	0.306	0.3	0.022	-1.647	S
G4		0.32	0.374	0.368	0.028	-1.678	S
G1	pH	4.65	4.57	4.643	0.083	0.088	S
G2		4.53	4.48	4.522	0.056	0.148	S
G3		4.29	4.22	4.259	0.051	0.611	S
G4		4.24	4.18	4.207	0.058	0.581	S
G1	Cond	14.2	16.79	16.135	1.145	-1.69	Q
G2		18.6	21.08	20.617	1.06	-1.903	S
G3		31	35.23	34.179	1.671	-1.902	S
G4		35.3	39.53	38.389	1.678	-1.841	S

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 126, APPA Laboratorio Biologico Provinciale (Italy)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.61	0.673	0.667	0.071	-0.8	S
G2		0.72	0.776	0.773	0.074	-0.71	S
G3		1.27	1.319	1.319	0.087	-0.572	S
G4		1.41	1.474	1.487	0.078	-0.981	S
G1	NH <sub>4</sub> <sup>+</sup>	0.166	0.16	0.169	0.019	-0.15	S
G2		0.232	0.214	0.216	0.021	0.766	S
G3		0.287	0.267	0.276	0.027	0.395	S
G4		0.371	0.348	0.36	0.043	0.265	S
G1	NO <sub>3</sub> <sup>-</sup>	0.273	0.274	0.271	0.025	0.065	S
G2		0.426	0.396	0.393	0.037	0.873	S
G3		0.572	0.529	0.528	0.044	1.001	S
G4		0.709	0.612	0.602	0.093	1.157	Q
G1	Na <sup>+</sup>	0.17	0.208	0.21	0.02	-2.046	Q
G2		0.27	0.329	0.323	0.026	-1.997	Q
G3		0.42	0.476	0.471	0.029	-1.756	S
G4		0.41	0.465	0.454	0.025	-1.721	S
G1	Mg <sup>2+</sup>	0.1	0.124	0.124	0.009	-2.551	Q
G2		0.09	0.114	0.009	0.009	-2.617	Q
G3		0.12	0.155	0.155	0.011	-3.053	Q
G4		0.14	0.175	0.176	0.012	-2.881	Q
G1	Cl <sup>-</sup>	0.13	0.154	0.154	0.036	-0.684	Q
G2		0.21	0.232	0.241	0.125	-0.247	S
G3		0.33	0.347	0.337	0.039	-0.18	S
G4		0.37	0.386	0.379	0.046	-0.196	S
G1	Ca <sup>2+</sup>	0.16	0.102	0.104	0.019	2.888	U
G2		0.14	0.115	0.115	0.017	1.437	Q
G3		0.16	0.192	0.188	0.022	-1.266	Q
G4		0.18	0.217	0.209	0.023	-1.303	Q
G1	K <sup>+</sup>	0.1	0.136	0.133	0.02	-1.703	U
G2		0.16	0.204	0.202	0.017	-2.517	Q
G3		0.25	0.306	0.3	0.022	-2.231	Q
G4		0.31	0.374	0.368	0.028	-2.03	Q
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.49	4.48	4.522	0.056	-0.569	S
G3		4.22	4.22	4.259	0.051	-0.764	S
G4		4.16	4.18	4.207	0.058	-0.807	S
G1	Cond	16.02	16.79	16.135	1.145	-0.1	S
G2		20.62	21.08	20.617	1.06	0.003	S
G3		34.14	35.23	34.179	1.671	-0.023	S
G4		38.78	39.53	38.389	1.678	0.233	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 140, C.N.R. Istituto di Ricerca sulle Acque (Italy)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.695	0.673	0.667	0.071	0.39	S
G2		0.808	0.776	0.773	0.074	0.477	S
G3		1.362	1.319	1.319	0.087	0.492	S
G4		1.541	1.474	1.487	0.078	0.698	S
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.213	0.214	0.216	0.021	-0.152	S
G3		0.271	0.267	0.276	0.027	-0.188	S
G4		0.354	0.348	0.36	0.043	-0.134	S
G1	NO <sub>3</sub> <sup>-</sup>	0.292	0.274	0.271	0.025	0.833	S
G2		0.416	0.396	0.393	0.037	0.605	S
G3		0.562	0.529	0.528	0.044	0.773	S
G4		0.656	0.612	0.602	0.093	0.586	S
G1	Na <sup>+</sup>	0.214	0.208	0.21	0.02	0.197	S
G2		0.327	0.329	0.323	0.026	0.156	S
G3		0.465	0.476	0.471	0.029	-0.195	S
G4		0.452	0.465	0.454	0.025	-0.06	S
G1	Mg <sup>2+</sup>	0.127	0.124	0.124	0.009	0.358	S
G2		0.117	0.114	0.009	0.009	0.325	S
G3		0.158	0.155	0.155	0.011	0.285	S
G4		0.18	0.175	0.176	0.012	0.345	S
G1	Cl <sup>-</sup>	0.162	0.154	0.154	0.036	0.212	S
G2		0.228	0.232	0.241	0.125	-0.103	S
G3		0.358	0.347	0.337	0.039	0.53	S
G4		0.402	0.386	0.379	0.046	0.496	S
G1	Ca <sup>2+</sup>	0.098	0.102	0.104	0.019	-0.327	S
G2		0.114	0.115	0.115	0.017	-0.073	S
G3		0.184	0.192	0.188	0.022	-0.19	S
G4		0.212	0.217	0.209	0.023	0.114	S
G1	K <sup>+</sup>	0.136	0.136	0.133	0.02	0.131	S
G2		0.208	0.204	0.202	0.017	0.365	S
G3		0.307	0.306	0.3	0.022	0.328	S
G4		0.372	0.374	0.368	0.028	0.151	S
G1	pH	4.7	4.57	4.643	0.083	0.693	Q
G2		4.53	4.48	4.522	0.056	0.148	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.25	4.18	4.207	0.058	0.754	S
G1	Cond	16.97	16.79	16.135	1.145	0.729	S
G2		21.69	21.08	20.617	1.06	1.012	S
G3		35.62	35.23	34.179	1.671	0.863	S
G4		40	39.53	38.389	1.678	0.96	S

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Foretaksnr./Enterprise no. 941705561

If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 145, Estonian Environmental Research Centre, Tartu laboratory (Estonia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.645	0.673	0.667	0.071	-0.31	S
G2		0.756	0.776	0.773	0.074	-0.224	S
G3		1.286	1.319	1.319	0.087	-0.387	S
G4		1.436	1.474	1.487	0.078	-0.648	S
G1	NH <sub>4</sub> <sup>+</sup>	0.157	0.16	0.169	0.019	-0.636	S
G2		0.214	0.214	0.216	0.021	-0.103	S
G3		0.276	0.267	0.276	0.027	-0.006	S
G4		0.351	0.348	0.36	0.043	-0.204	S
G1	NO <sub>3</sub> <sup>-</sup>	0.264	0.274	0.271	0.025	-0.298	S
G2		0.395	0.396	0.393	0.037	0.042	S
G3		0.5	0.529	0.528	0.044	-0.643	S
G4		0.588	0.612	0.602	0.093	-0.146	S
G1	Na <sup>+</sup>	0.197	0.208	0.21	0.02	-0.67	S
G2		0.312	0.329	0.323	0.026	-0.411	S
G3		0.459	0.476	0.471	0.029	-0.403	S
G4		0.445	0.465	0.454	0.025	-0.337	S
G1	Mg <sup>2+</sup>	0.119	0.124	0.124	0.009	-0.504	S
G2		0.108	0.114	0.009	0.009	-0.655	S
G3		0.151	0.155	0.155	0.011	-0.33	S
G4		0.174	0.175	0.176	0.012	-0.139	S
G1	Cl <sup>-</sup>	0.146	0.154	0.154	0.036	-0.236	S
G2		0.217	0.232	0.241	0.125	-0.191	S
G3		0.333	0.347	0.337	0.039	-0.104	S
G4		0.372	0.386	0.379	0.046	-0.153	S
G1	Ca <sup>2+</sup>	0.129	0.102	0.104	0.019	1.281	U
G2		0.123	0.115	0.115	0.017	0.449	S
G3		0.163	0.192	0.188	0.022	-1.132	Q
G4		0.181	0.217	0.209	0.023	-1.259	Q
G1	K <sup>+</sup>	0.121	0.136	0.133	0.02	-0.633	S
G2		0.193	0.204	0.202	0.017	-0.536	S
G3		0.297	0.306	0.3	0.022	-0.121	S
G4		0.371	0.374	0.368	0.028	0.115	S
G1	pH	4.72	4.57	4.643	0.083	0.936	Q
G2		4.54	4.48	4.522	0.056	0.327	S
G3		4.26	4.22	4.259	0.051	0.021	S
G4		4.24	4.18	4.207	0.058	0.581	S
G1	Cond	16.5	16.79	16.135	1.145	0.319	S
G2		21	21.08	20.617	1.06	0.361	S
G3		35	35.23	34.179	1.671	0.491	S
G4		39	39.53	38.389	1.678	0.364	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

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Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 146, Cellule de Recherche en Environnement et Biotechnologies Public Research Center-  
Gabriel Lippm (Luxembourg)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>st</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.732	0.673	0.667	0.071	0.908	S
G2		0.853	0.776	0.773	0.074	1.083	S
G3		1.489	1.319	1.319	0.087	1.96	Q
G4		1.673	1.474	1.487	0.078	2.39	Q
G1	NH <sub>4</sub> <sup>+</sup>	0.153	0.16	0.169	0.019	-0.852	S
G2		0.198	0.214	0.216	0.021	-0.876	S
G3		0.247	0.267	0.276	0.027	-1.063	S
G4		0.32	0.348	0.36	0.043	-0.931	S
G1	NO <sub>3</sub> <sup>-</sup>	0.313	0.274	0.271	0.025	1.68	Q
G2		0.44	0.396	0.393	0.037	1.249	Q
G3		0.599	0.529	0.528	0.044	1.618	Q
G4		0.694	0.612	0.602	0.093	0.996	Q
G1	Na <sup>+</sup>	0.21	0.208	0.21	0.02	-0.007	S
G2		0.325	0.329	0.323	0.026	0.08	S
G3		0.475	0.476	0.471	0.029	0.152	S
G4		0.458	0.465	0.454	0.025	0.177	S
G1	Mg <sup>2+</sup>	0.123	0.124	0.124	0.009	-0.073	S
G2		0.113	0.114	0.009	0.009	-0.11	S
G3		0.154	0.155	0.155	0.011	-0.067	S
G4		0.175	0.175	0.176	0.012	-0.058	S
G1	Cl <sup>-</sup>	0.11	0.154	0.154	0.036	-1.243	U
G2		0.179	0.232	0.241	0.125	-0.496	Q
G3		0.291	0.347	0.337	0.039	-1.168	Q
G4		0.329	0.386	0.379	0.046	-1.083	S
G1	Ca <sup>2+</sup>	0.198	0.102	0.104	0.019	4.858	U
G2		0.217	0.115	0.115	0.017	5.909	U
G3		0.354	0.192	0.188	0.022	7.429	U
G4		0.406	0.217	0.209	0.023	8.708	U
G1	K <sup>+</sup>	0.14	0.136	0.133	0.02	0.335	S
G2		0.216	0.204	0.202	0.017	0.846	S
G3		0.321	0.306	0.3	0.022	0.957	S
G4		0.398	0.374	0.368	0.028	1.065	S
G1	pH	4.57	4.57	4.643	0.083	-0.882	S
G2		4.49	4.48	4.522	0.056	-0.569	S
G3		4.22	4.22	4.259	0.051	-0.764	S
G4		4.16	4.18	4.207	0.058	-0.807	S
G1	Cond	17.9	16.79	16.135	1.145	1.541	S
G2		22.6	21.08	20.617	1.06	1.871	S
G3		37.7	35.23	34.179	1.671	2.107	S
G4		42	39.53	38.389	1.678	2.152	S

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B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 153, Slovenian Forestry Institute, Ljubljana (Slovenia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.64	0.673	0.667	0.071	-0.38	S
G2		0.741	0.776	0.773	0.074	-0.427	S
G3		1.277	1.319	1.319	0.087	-0.491	S
G4		1.428	1.474	1.487	0.078	-0.75	S
G1	NH <sub>4</sub> <sup>+</sup>	0.164	0.16	0.169	0.019	-0.258	S
G2		0.212	0.214	0.216	0.021	-0.2	S
G3		0.268	0.267	0.276	0.027	-0.297	S
G4		0.35	0.348	0.36	0.043	-0.228	S
G1	NO <sub>3</sub> <sup>-</sup>	0.253	0.274	0.271	0.025	-0.742	S
G2		0.365	0.396	0.393	0.037	-0.762	S
G3		0.495	0.529	0.528	0.044	-0.757	S
G4		0.574	0.612	0.602	0.093	-0.297	S
G1	Na <sup>+</sup>	0.154	0.208	0.21	0.02	-2.861	U
G2		0.273	0.329	0.323	0.026	-1.884	Q
G3		0.453	0.476	0.471	0.029	-0.611	S
G4		0.456	0.465	0.454	0.025	0.098	S
G1	Mg <sup>2+</sup>	0.126	0.124	0.124	0.009	0.25	S
G2		0.114	0.114	0.009	0.009	-0.001	S
G3		0.159	0.155	0.155	0.011	0.372	S
G4		0.186	0.175	0.176	0.012	0.829	S
G1	Cl <sup>-</sup>	0.129	0.154	0.154	0.036	-0.712	Q
G2		0.196	0.232	0.241	0.125	-0.359	Q
G3		0.299	0.347	0.337	0.039	-0.965	S
G4		0.332	0.386	0.379	0.046	-1.018	S
G1	Ca <sup>2+</sup>	0.117	0.102	0.104	0.019	0.658	S
G2		0.116	0.115	0.115	0.017	0.043	S
G3		0.233	0.192	0.188	0.022	2.006	Q
G4		0.236	0.217	0.209	0.023	1.178	S
G1	K <sup>+</sup>	0.118	0.136	0.133	0.02	-0.786	S
G2		0.186	0.204	0.202	0.017	-0.956	S
G3		0.294	0.306	0.3	0.022	-0.256	S
G4		0.365	0.374	0.368	0.028	-0.096	S
G1	pH	5.06	4.57	4.643	0.083	5.055	U
G2		4.61	4.48	4.522	0.056	1.581	Q
G3		4.26	4.22	4.259	0.051	0.021	S
G4		4.22	4.18	4.207	0.058	0.234	S
G1	Cond	12.11	16.79	16.135	1.145	-3.515	U
G2		18.48	21.08	20.617	1.06	-2.016	S
G3		32.72	35.23	34.179	1.671	-0.873	S
G4		38.21	39.53	38.389	1.678	-0.107	S

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 155, Environmental Research Branch, Farnheim (UK)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.672	0.673	0.667	0.071	0.068	S
G2		0.78	0.776	0.773	0.074	0.099	S
G3		1.307	1.319	1.319	0.087	-0.144	S
G4		1.462	1.474	1.487	0.078	-0.314	S
G1	NH <sub>4</sub> <sup>+</sup>	0.153	0.16	0.169	0.019	-0.852	S
G2		0.208	0.214	0.216	0.021	-0.393	S
G3		0.268	0.267	0.276	0.027	-0.297	S
G4		0.351	0.348	0.36	0.043	-0.204	S
G1	NO <sub>3</sub> <sup>-</sup>	0.255	0.274	0.271	0.025	-0.661	S
G2		0.374	0.396	0.393	0.037	-0.521	S
G3		0.51	0.529	0.528	0.044	-0.414	S
G4		0.595	0.612	0.602	0.093	-0.071	S
G1	Na <sup>+</sup>	0.218	0.208	0.21	0.02	0.401	S
G2		0.334	0.329	0.323	0.026	0.42	S
G3		0.482	0.476	0.471	0.029	0.395	S
G4		0.466	0.465	0.454	0.025	0.493	S
G1	Mg <sup>2+</sup>	0.126	0.124	0.124	0.009	0.25	S
G2		0.115	0.114	0.009	0.009	0.107	S
G3		0.158	0.155	0.155	0.011	0.285	S
G4		0.179	0.175	0.176	0.012	0.265	S
G1	Cl <sup>-</sup>	0.15	0.154	0.154	0.036	-0.124	S
G2		0.213	0.232	0.241	0.125	-0.223	S
G3		0.328	0.347	0.337	0.039	-0.23	S
G4		0.372	0.386	0.379	0.046	-0.153	S
G1	Ca <sup>2+</sup>	0.091	0.102	0.104	0.019	-0.69	S
G2		0.099	0.115	0.115	0.017	-0.944	S
G3		0.17	0.192	0.188	0.022	-0.818	S
G4		0.198	0.217	0.209	0.023	-0.506	S
G1	K <sup>+</sup>	0.13	0.136	0.133	0.02	-0.174	S
G2		0.198	0.204	0.202	0.017	-0.235	S
G3		0.289	0.306	0.3	0.022	-0.48	S
G4		0.35	0.374	0.368	0.028	-0.623	S
G1	pH	4.63	4.57	4.643	0.083	-0.155	S
G2		4.52	4.48	4.522	0.056	-0.032	S
G3		4.25	4.22	4.259	0.051	-0.175	S
G4		4.21	4.18	4.207	0.058	0.06	S
G1	Cond	16.42	16.79	16.135	1.145	0.249	S
G2		20.9	21.08	20.617	1.06	0.267	S
G3		34.9	35.23	34.179	1.671	0.432	S
G4		39.3	39.53	38.389	1.678	0.543	S

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✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 158, Acid Deposition and Oxidant Research Center ADCRC, Niigata (Japan)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.716	0.673	0.667	0.071	0.684	S
G2		0.813	0.776	0.773	0.074	0.544	S
G3		1.394	1.319	1.319	0.087	0.862	S
G4		1.574	1.474	1.487	0.078	1.121	S
G1	NH <sub>4</sub> <sup>+</sup>	0.173	0.16	0.169	0.019	0.228	S
G2		0.223	0.214	0.216	0.021	0.332	S
G3		0.283	0.267	0.276	0.027	0.249	S
G4		0.364	0.348	0.36	0.043	0.101	S
G1	NO <sub>3</sub> <sup>-</sup>	0.283	0.274	0.271	0.025	0.469	S
G2		0.413	0.396	0.393	0.037	0.525	S
G3		0.562	0.529	0.528	0.044	0.773	S
G4		0.659	0.612	0.602	0.093	0.619	S
G1	Na <sup>+</sup>	0.222	0.208	0.21	0.02	0.605	S
G2		0.338	0.329	0.323	0.026	0.572	S
G3		0.493	0.476	0.471	0.029	0.777	S
G4		0.475	0.465	0.454	0.025	0.849	S
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.121	0.114	0.009	0.009	0.761	S
G3		0.166	0.155	0.155	0.011	0.987	S
G4		0.188	0.175	0.176	0.012	0.99	S
G1	Cl <sup>-</sup>	0.155	0.154	0.154	0.036	0.016	S
G2		0.241	0.232	0.241	0.125	0.001	S
G3		0.356	0.347	0.337	0.039	0.479	S
G4		0.411	0.386	0.379	0.046	0.69	S
G1	Ca <sup>2+</sup>	0.102	0.102	0.104	0.019	-0.119	S
G2		0.119	0.115	0.115	0.017	0.217	S
G3		0.193	0.192	0.188	0.022	0.213	S
G4		0.221	0.217	0.209	0.023	0.513	S
G1	K <sup>+</sup>	0.139	0.136	0.133	0.02	0.284	S
G2		0.212	0.204	0.202	0.017	0.605	S
G3		0.315	0.306	0.3	0.022	0.687	S
G4		0.386	0.374	0.368	0.028	0.643	S
G1	pH	4.71	4.57	4.643	0.083	0.814	Q
G2		4.55	4.48	4.522	0.056	0.506	S
G3		4.31	4.22	4.259	0.051	1.004	S
G4		4.24	4.18	4.207	0.058	0.581	S
G1	Cond	15.3	16.79	16.135	1.145	-0.729	S
G2		19.9	21.08	20.617	1.06	-0.677	S
G3		32.4	35.23	34.179	1.671	-1.065	S
G4		37.4	39.53	38.389	1.678	-0.589	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>



## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 165, Institute of Meteorology and Hydrology, Ha Noi city (Vietnam)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.706	0.673	0.667	0.071	0.544	S
G2		0.834	0.776	0.773	0.074	0.827	S
G3		1.463	1.319	1.319	0.087	1.659	Q
G4		1.558	1.474	1.487	0.078	0.916	S
G1	NH <sub>4</sub> <sup>+</sup>	0.148	0.16	0.169	0.019	-1.122	S
G2		0.235	0.214	0.216	0.021	0.911	S
G3		0.282	0.267	0.276	0.027	0.213	S
G4		0.368	0.348	0.36	0.043	0.194	S
G1	NO <sub>3</sub> <sup>-</sup>	0.262	0.274	0.271	0.025	-0.379	S
G2		0.397	0.396	0.393	0.037	0.096	S
G3		0.545	0.529	0.528	0.044	0.385	S
G4		0.635	0.612	0.602	0.093	0.36	S
G1	Na <sup>+</sup>	0.239	0.208	0.21	0.02	1.471	S
G2		0.317	0.329	0.323	0.026	-0.222	S
G3		0.467	0.476	0.471	0.029	-0.125	S
G4		0.46	0.465	0.454	0.025	0.256	S
G1	Mg <sup>2+</sup>	0.127	0.124	0.124	0.009	0.358	S
G2		0.118	0.114	0.009	0.009	0.434	S
G3		0.165	0.155	0.155	0.011	0.899	S
G4		0.188	0.175	0.176	0.012	0.99	S
G1	Cl <sup>-</sup>	0.153	0.154	0.154	0.036	-0.04	S
G2		0.206	0.232	0.241	0.125	-0.279	S
G3		0.271	0.347	0.337	0.039	-1.674	Q
G4		0.299	0.386	0.379	0.046	-1.732	Q
G1	Ca <sup>2+</sup>	0.13	0.102	0.104	0.019	1.332	U
G2		0.189	0.115	0.115	0.017	4.283	U
G3		0.271	0.192	0.188	0.022	3.709	U
G4		0.305	0.217	0.209	0.023	4.234	U
G1	K <sup>+</sup>	0.14	0.136	0.133	0.02	0.335	S
G2		0.184	0.204	0.202	0.017	-1.076	S
G3		0.279	0.306	0.3	0.022	-0.929	S
G4		0.327	0.374	0.368	0.028	-1.432	S
G1	pH	4.61	4.57	4.643	0.083	-0.397	S
G2		4.59	4.48	4.522	0.056	1.222	Q
G3		4.26	4.22	4.259	0.051	0.021	S
G4		4.2	4.18	4.207	0.058	-0.113	S
G1	Cond	16.5	16.79	16.135	1.145	0.319	S
G2		19.4	21.08	20.617	1.06	-1.148	S
G3		34.1	35.23	34.179	1.671	-0.047	S
G4		36.8	39.53	38.389	1.678	-0.947	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 166, Forest Research Institute, Laboratory of Forest Environment Chemistry (Poland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.696	0.673	0.667	0.071	0.404	S
G2		0.797	0.776	0.773	0.074	0.328	S
G3		1.406	1.319	1.319	0.087	1	S
G4		1.51	1.474	1.487	0.078	0.301	S
G1	NH <sub>4</sub> <sup>+</sup>	0.161	0.16	0.169	0.019	-0.42	S
G2		0.213	0.214	0.216	0.021	-0.152	S
G3		0.265	0.267	0.276	0.027	-0.407	S
G4		0.343	0.348	0.36	0.043	-0.392	S
G1	NO <sub>3</sub> <sup>-</sup>	0.274	0.274	0.271	0.025	0.106	S
G2		0.398	0.396	0.393	0.037	0.123	S
G3		0.536	0.529	0.528	0.044	0.179	S
G4		0.632	0.612	0.602	0.093	0.328	S
G1	Na <sup>+</sup>	0.21	0.208	0.21	0.02	-0.007	S
G2		0.33	0.329	0.323	0.026	0.269	S
G3		0.479	0.476	0.471	0.029	0.291	S
G4		0.457	0.465	0.454	0.025	0.137	S
G1	Mg <sup>2+</sup>	0.122	0.124	0.124	0.009	-0.181	S
G2		0.115	0.114	0.009	0.009	0.107	S
G3		0.156	0.155	0.155	0.011	0.109	S
G4		0.175	0.175	0.176	0.012	-0.058	S
G1	Cl <sup>-</sup>	0.157	0.154	0.154	0.036	0.072	S
G2		0.223	0.232	0.241	0.125	-0.143	S
G3		0.335	0.347	0.337	0.039	-0.053	S
G4		0.366	0.386	0.379	0.046	-0.283	S
G1	Ca <sup>2+</sup>	0.091	0.102	0.104	0.019	-0.69	S
G2		0.112	0.115	0.115	0.017	-0.189	S
G3		0.188	0.192	0.188	0.022	-0.011	S
G4		0.203	0.217	0.209	0.023	-0.284	S
G1	K <sup>+</sup>	0.135	0.136	0.133	0.02	0.08	S
G2		0.193	0.204	0.202	0.017	-0.536	S
G3		0.318	0.306	0.3	0.022	0.822	S
G4		0.366	0.374	0.368	0.028	-0.06	S
G1	pH	4.58	4.57	4.643	0.083	-0.76	S
G2		4.51	4.48	4.522	0.056	-0.211	S
G3		4.27	4.22	4.259	0.051	0.218	S
G4		4.22	4.18	4.207	0.058	0.234	S
G1	Cond	17.2	16.79	16.135	1.145	0.93	S
G2		21	21.08	20.617	1.06	0.361	S
G3		34.2	35.23	34.179	1.671	0.013	S
G4		38.7	39.53	38.389	1.678	0.185	S

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 167, CEH Edinburgh (United Kingdom)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.772	0.673	0.667	0.071	1.469	Q
G2		0.823	0.776	0.773	0.074	0.679	S
G3		1.364	1.319	1.319	0.087	0.515	S
G4		1.579	1.474	1.487	0.078	1.185	S
G1	NH <sub>4</sub> <sup>+</sup>	0.155	0.16	0.169	0.019	-0.744	S
G2		0.205	0.214	0.216	0.021	-0.538	S
G3		0.26	0.267	0.276	0.027	-0.589	S
G4		0.337	0.348	0.36	0.043	-0.533	S
G1	NO <sub>3</sub> <sup>-</sup>	0.284	0.274	0.271	0.025	0.51	S
G2		0.397	0.396	0.393	0.037	0.096	S
G3		0.539	0.529	0.528	0.044	0.248	S
G4		0.617	0.612	0.602	0.093	0.166	S
G1	Na <sup>+</sup>	0.218	0.208	0.21	0.02	0.401	S
G2		0.327	0.329	0.323	0.026	0.156	S
G3		0.479	0.476	0.471	0.029	0.291	S
G4		0.467	0.465	0.454	0.025	0.532	S
G1	Mg <sup>2+</sup>	0.122	0.124	0.124	0.009	-0.181	S
G2		0.106	0.114	0.009	0.009	-0.873	S
G3		0.152	0.155	0.155	0.011	-0.242	S
G4		0.174	0.175	0.176	0.012	-0.139	S
G1	Cl <sup>-</sup>	0.194	0.154	0.154	0.036	1.107	U
G2		0.284	0.232	0.241	0.125	0.346	Q
G3		0.394	0.347	0.337	0.039	1.442	S
G4		0.427	0.386	0.379	0.046	1.036	S
G1	Ca <sup>2+</sup>	0.122	0.102	0.104	0.019	0.918	Q
G2		0.126	0.115	0.115	0.017	0.624	S
G3		0.202	0.192	0.188	0.022	0.616	S
G4		0.221	0.217	0.209	0.023	0.513	S
G1	K <sup>+</sup>	0.168	0.136	0.133	0.02	1.762	Q
G2		0.266	0.204	0.202	0.017	3.848	U
G3		0.42	0.306	0.3	0.022	5.401	U
G4		0.499	0.374	0.368	0.028	4.617	U
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 176, Main Geophysical Observatory, Saint-Petersburg (Russian Federation)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.66	0.673	0.667	0.071	-0.1	S
G2		0.76	0.776	0.773	0.074	-0.171	S
G3		1.26	1.319	1.319	0.087	-0.687	S
G4		1.24	1.474	1.487	0.078	-3.159	Q
G1	NH <sub>4</sub> <sup>+</sup>	0.16	0.16	0.169	0.019	-0.474	S
G2		0.21	0.214	0.216	0.021	-0.296	S
G3		0.26	0.267	0.276	0.027	-0.589	S
G4		0.36	0.348	0.36	0.043	0.007	S
G1	NO <sub>3</sub> <sup>-</sup>	0.26	0.274	0.271	0.025	-0.459	S
G2		0.38	0.396	0.393	0.037	-0.36	S
G3		0.5	0.529	0.528	0.044	-0.643	S
G4		0.6	0.612	0.602	0.093	-0.017	S
G1	Na <sup>+</sup>	0.23	0.208	0.21	0.02	1.012	S
G2		0.37	0.329	0.323	0.026	1.78	S
G3		0.54	0.476	0.471	0.029	2.408	S
G4		0.54	0.465	0.454	0.025	3.418	Q
G1	Mg <sup>2+</sup>	0.13	0.124	0.124	0.009	0.681	S
G2		0.13	0.114	0.009	0.009	1.742	S
G3		0.17	0.155	0.155	0.011	1.339	S
G4		0.19	0.175	0.176	0.012	1.152	S
G1	Cl <sup>-</sup>	0.14	0.154	0.154	0.036	-0.404	S
G2		0.21	0.232	0.241	0.125	-0.247	S
G3		0.31	0.347	0.337	0.039	-0.686	S
G4		0.45	0.386	0.379	0.046	1.534	Q
G1	Ca <sup>2+</sup>	0.09	0.102	0.104	0.019	-0.741	S
G2		0.1	0.115	0.115	0.017	-0.886	S
G3		0.16	0.192	0.188	0.022	-1.266	Q
G4		0.18	0.217	0.209	0.023	-1.303	Q
G1	K <sup>+</sup>	0.13	0.136	0.133	0.02	-0.174	S
G2		0.19	0.204	0.202	0.017	-0.716	S
G3		0.29	0.306	0.3	0.022	-0.435	S
G4		0.37	0.374	0.368	0.028	0.08	S
G1	pH	4.56	4.57	4.643	0.083	-1.003	S
G2		4.46	4.48	4.522	0.056	-1.106	S
G3		4.21	4.22	4.259	0.051	-0.961	S
G4		4.16	4.18	4.207	0.058	-0.807	S
G1	Cond	14.31	16.79	16.135	1.145	-1.594	S
G2		18.08	21.08	20.617	1.06	-2.393	S
G3		30.32	35.23	34.179	1.671	-2.309	S
G4		34.01	39.53	38.389	1.678	-2.609	S

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Q – Questionable: Your result deviates between  $\pm 10$ - $20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15$ - $25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1$ - $0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 178, Environmental Chemistry and EANET Monitoring Laboratory, Limnological Institute  
RAS/SB, Irkutsk (Russian Federation)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>st</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	1.98	0.673	0.667	0.071	18.382	U
G2		2.1	0.776	0.773	0.074	17.893	U
G3		3.56	1.319	1.319	0.087	25.896	U
G4		4.46	1.474	1.487	0.078	38.106	U
G1	NH <sub>4</sub> <sup>+</sup>	0.002	0.16	0.169	0.019	-9.004	U
G2		0.246	0.214	0.216	0.021	1.443	S
G3		0.32	0.267	0.276	0.027	1.597	Q
G4		0.442	0.348	0.36	0.043	1.93	U
G1	NO <sub>3</sub> <sup>-</sup>		0.274	0.271	0.025		B
G2			0.396	0.393	0.037		B
G3			0.529	0.528	0.044		B
G4			0.612	0.602	0.093		B
G1	Na <sup>+</sup>	0.17	0.208	0.21	0.02	-2.046	Q
G2		0.26	0.329	0.323	0.026	-2.375	Q
G3		0.38	0.476	0.471	0.029	-3.144	Q
G4		0.37	0.465	0.454	0.025	-3.302	Q
G1	Mg <sup>2+</sup>	0.125	0.124	0.124	0.009	0.142	S
G2		0.115	0.114	0.009	0.009	0.107	S
G3		0.157	0.155	0.155	0.011	0.197	S
G4		0.178	0.175	0.176	0.012	0.184	S
G1	Cl <sup>-</sup>	0.13	0.154	0.154	0.036	-0.684	Q
G2		1.09	0.232	0.241	0.125	6.805	U
G3		0.26	0.347	0.337	0.039	-1.953	U
G4		0.37	0.386	0.379	0.046	-0.196	S
G1	Ca <sup>2+</sup>	0.1	0.102	0.104	0.019	-0.223	S
G2		0.1	0.115	0.115	0.017	-0.886	S
G3		0.18	0.192	0.188	0.022	-0.37	S
G4		0.22	0.217	0.209	0.023	0.469	S
G1	K <sup>+</sup>	0.08	0.136	0.133	0.02	-2.722	U
G2		0.13	0.204	0.202	0.017	-4.319	U
G3		0.21	0.306	0.3	0.022	-4.027	U
G4		0.27	0.374	0.368	0.028	-3.436	U
G1	pH	5.54	4.57	4.643	0.083	10.87	U
G2		4.56	4.48	4.522	0.056	0.685	S
G3		4.36	4.22	4.259	0.051	1.986	Q
G4		4.28	4.18	4.207	0.058	1.275	Q
G1	Cond	16.59	16.79	16.135	1.145	0.397	S
G2		20.6	21.08	20.617	1.06	-0.016	S
G3		33.7	35.23	34.179	1.671	-0.287	S
G4		37.7	39.53	38.389	1.678	-0.41	S

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 179, Murmansk Environmental Monitoring Center, Murmansk (Russian Federation)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.517	0.673	0.667	0.071	-2.102	U
G2		0.605	0.776	0.773	0.074	-2.26	U
G3		1.067	1.319	1.319	0.087	-2.918	Q
G4		0.181	1.474	1.487	0.078	-16.731	U
G1	NH <sub>4</sub> <sup>+</sup>	0.166	0.16	0.169	0.019	-0.15	S
G2		0.234	0.214	0.216	0.021	0.863	S
G3		0.306	0.267	0.276	0.027	1.087	S
G4		3.87	0.348	0.36	0.043	82.315	U
G1	NO <sub>3</sub> <sup>-</sup>	0.207	0.274	0.271	0.025	-2.599	U
G2		0.294	0.396	0.393	0.037	-2.665	U
G3		0.411	0.529	0.528	0.044	-2.675	U
G4		0.46	0.612	0.602	0.093	-1.525	U
G1	Na <sup>+</sup>	0.228	0.208	0.21	0.02	0.91	S
G2		0.365	0.329	0.323	0.026	1.591	S
G3		0.483	0.476	0.471	0.029	0.43	S
G4		0.462	0.465	0.454	0.025	0.335	S
G1	Mg <sup>2+</sup>	0.076	0.124	0.124	0.009	-5.137	U
G2		0.068	0.114	0.009	0.009	-5.014	U
G3		0.117	0.155	0.155	0.011	-3.316	Q
G4		0.135	0.175	0.176	0.012	-3.284	Q
G1	Cl <sup>-</sup>	0.116	0.154	0.154	0.036	-1.075	Q
G2		0.196	0.232	0.241	0.125	-0.359	Q
G3		0.287	0.347	0.337	0.039	-1.269	Q
G4		0.303	0.386	0.379	0.046	-1.645	Q
G1	Ca <sup>2+</sup>	0.097	0.102	0.104	0.019	-0.378	S
G2		0.106	0.115	0.115	0.017	-0.538	S
G3		0.161	0.192	0.188	0.022	-1.221	Q
G4		0.156	0.217	0.209	0.023	-2.366	U
G1	K <sup>+</sup>	0.176	0.136	0.133	0.02	2.17	U
G2		0.288	0.204	0.202	0.017	5.169	U
G3		0.311	0.306	0.3	0.022	0.508	S
G4		0.409	0.374	0.368	0.028	1.452	S
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 181, TNO innovation for life (The Netherlands)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.646	0.673	0.667	0.071	-0.296	S
G2		0.747	0.776	0.773	0.074	-0.346	S
G3		1.3	1.319	1.319	0.087	-0.225	S
G4		1.46	1.474	1.487	0.078	-0.34	S
G1	NH <sub>4</sub> <sup>+</sup>	0.17	0.16	0.169	0.019	0.066	S
G2		0.22	0.214	0.216	0.021	0.187	S
G3		0.27	0.267	0.276	0.027	-0.225	S
G4		0.35	0.348	0.36	0.043	-0.228	S
G1	NO <sub>3</sub> <sup>-</sup>	0.276	0.274	0.271	0.025	0.187	S
G2		0.389	0.396	0.393	0.037	-0.118	S
G3		0.513	0.529	0.528	0.044	-0.346	S
G4		0.589	0.612	0.602	0.093	-0.136	S
G1	Na <sup>+</sup>	0.223	0.208	0.21	0.02	0.656	S
G2		0.347	0.329	0.323	0.026	0.911	S
G3		0.492	0.476	0.471	0.029	0.742	S
G4		0.468	0.465	0.454	0.025	0.572	S
G1	Mg <sup>2+</sup>	0.132	0.124	0.124	0.009	0.896	S
G2		0.122	0.114	0.009	0.009	0.87	S
G3		0.161	0.155	0.155	0.011	0.548	S
G4		0.184	0.175	0.176	0.012	0.668	S
G1	Cl <sup>-</sup>	0.206	0.154	0.154	0.036	1.442	U
G2		0.267	0.232	0.241	0.125	0.209	Q
G3		0.367	0.347	0.337	0.039	0.758	S
G4		0.401	0.386	0.379	0.046	0.474	S
G1	Ca <sup>2+</sup>	0.108	0.102	0.104	0.019	0.192	S
G2		0.15	0.115	0.115	0.017	2.018	U
G3		0.219	0.192	0.188	0.022	1.378	S
G4		0.241	0.217	0.209	0.023	1.399	S
G1	K <sup>+</sup>	0.14	0.136	0.133	0.02	0.335	S
G2		0.234	0.204	0.202	0.017	1.927	S
G3		0.325	0.306	0.3	0.022	1.136	S
G4		0.394	0.374	0.368	0.028	0.924	S
G1	pH	4.68	4.57	4.643	0.083	0.451	Q
G2		4.6	4.48	4.522	0.056	1.402	Q
G3		4.35	4.22	4.259	0.051	1.79	Q
G4		4.27	4.18	4.207	0.058	1.101	S
G1	Cond	17.8	16.79	16.135	1.145	1.454	S
G2		22.3	21.08	20.617	1.06	1.588	S
G3		36.9	35.23	34.179	1.671	1.629	S
G4		41.4	39.53	38.389	1.678	1.794	S

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S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 187, Public Health Institute - Nis, Department for Sanitary Chemistry (Republic of Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	0.29	0.673	0.667	0.071	-5.28	U
G2		0.33	0.776	0.773	0.074	-5.967	U
G3		0.94	1.319	1.319	0.087	-4.386	U
G4		1.22	1.474	1.487	0.078	-3.416	Q
G1	NH <sub>4</sub> <sup>+</sup>	0.198	0.16	0.169	0.019	1.577	Q
G2		0.212	0.214	0.216	0.021	-0.2	S
G3		0.285	0.267	0.276	0.027	0.322	S
G4		0.343	0.348	0.36	0.043	-0.392	S
G1	NO <sub>3</sub> <sup>-</sup>	0.281	0.274	0.271	0.025	0.388	S
G2		0.403	0.396	0.393	0.037	0.257	S
G3		0.546	0.529	0.528	0.044	0.408	S
G4		0.636	0.612	0.602	0.093	0.371	S
G1	Na <sup>+</sup>	0.219	0.208	0.21	0.02	0.452	S
G2		0.255	0.329	0.323	0.026	-2.564	Q
G3		0.406	0.476	0.471	0.029	-2.242	S
G4		0.368	0.465	0.454	0.025	-3.381	Q
G1	Mg <sup>2+</sup>	0.107	0.124	0.124	0.009	-1.797	S
G2		0.099	0.114	0.009	0.009	-1.636	S
G3		0.139	0.155	0.155	0.011	-1.384	S
G4		0.157	0.175	0.176	0.012	-1.51	S
G1	Cl <sup>-</sup>		0.154	0.154	0.036		B
G2			0.232	0.241	0.125		B
G3			0.347	0.337	0.039		B
G4			0.386	0.379	0.046		B
G1	Ca <sup>2+</sup>	0.139	0.102	0.104	0.019	1.799	U
G2		0.098	0.115	0.115	0.017	-1.002	S
G3		0.194	0.192	0.188	0.022	0.258	S
G4		0.199	0.217	0.209	0.023	-0.461	S
G1	K <sup>+</sup>	0.183	0.136	0.133	0.02	2.526	U
G2		0.259	0.204	0.202	0.017	3.428	U
G3		0.225	0.306	0.3	0.022	-3.353	U
G4		0.273	0.374	0.368	0.028	-3.331	U
G1	pH	4.51	4.57	4.643	0.083	-1.608	S
G2		4.62	4.48	4.522	0.056	1.76	Q
G3		4.29	4.22	4.259	0.051	0.611	S
G4		4.27	4.18	4.207	0.058	1.101	S
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 194, Institute of Public Health - Zrenjanin (Republic of Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	< 1.700	0.673	0.667	0.071		B
G2		< 1.700	0.776	0.773	0.074		B
G3		< 1.700	1.319	1.319	0.087		B
G4		< 1.700	1.474	1.487	0.078		B
G1	NH <sub>4</sub> <sup>+</sup>		0.16	0.169	0.019		B
G2			0.214	0.216	0.021		B
G3			0.267	0.276	0.027		B
G4			0.348	0.36	0.043		B
G1	NO <sub>3</sub> <sup>-</sup>		0.274	0.271	0.025		B
G2			0.396	0.393	0.037		B
G3			0.529	0.528	0.044		B
G4			0.612	0.602	0.093		B
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>	0.132	0.124	0.124	0.009	0.896	S
G2		0.118	0.114	0.009	0.009	0.434	S
G3		0.162	0.155	0.155	0.011	0.636	S
G4		0.187	0.175	0.176	0.012	0.91	S
G1	Cl <sup>-</sup>		0.154	0.154	0.036		B
G2			0.232	0.241	0.125		B
G3			0.347	0.337	0.039		B
G4			0.386	0.379	0.046		B
G1	Ca <sup>2+</sup>	< 0.500	0.102	0.104	0.019		B
G2		< 0.500	0.115	0.115	0.017		B
G3		< 0.500	0.192	0.188	0.022		B
G4		< 0.500	0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH	4.67	4.57	4.643	0.083	0.33	S
G2		4.38	4.48	4.522	0.056	-2.54	Q
G3		4.17	4.22	4.259	0.051	-1.747	S
G4		3.99	4.18	4.207	0.058	-3.757	Q
G1	Cond	15.63	16.79	16.135	1.145	-0.441	S
G2		19.33	21.08	20.617	1.06	-1.214	S
G3		35.06	35.23	34.179	1.671	0.527	S
G4		31.46	39.53	38.389	1.678	-4.129	Q

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B – Blank: You reported either no value or the detection limit

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 195, Institute of Public Health - Suobtica (Republic of Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>		0.673	0.667	0.071		B
G2			0.776	0.773	0.074		B
G3			1.319	1.319	0.087		B
G4			1.474	1.487	0.078		B
G1	NH <sub>4</sub> <sup>+</sup>	0.198	0.16	0.169	0.019	1.577	Q
G2		0.187	0.214	0.216	0.021	-1.408	S
G3		0.285	0.267	0.276	0.027	0.322	S
G4		0.336	0.348	0.36	0.043	-0.556	S
G1	NO <sub>3</sub> <sup>-</sup>	0.3	0.274	0.271	0.025	1.156	S
G2		0.398	0.396	0.393	0.037	0.123	S
G3		0.539	0.529	0.528	0.044	0.248	S
G4		0.608	0.612	0.602	0.093	0.069	S
G1	Na <sup>+</sup>	0.17	0.208	0.21	0.02	-2.046	Q
G2		0.25	0.329	0.323	0.026	-2.753	Q
G3		0.36	0.476	0.471	0.029	-3.838	Q
G4		0.36	0.465	0.454	0.025	-3.697	Q
G1	Mg <sup>2+</sup>	0.1	0.124	0.124	0.009	-2.551	Q
G2		0.09	0.114	0.009	0.009	-2.617	Q
G3		0.12	0.155	0.155	0.011	-3.053	Q
G4		0.14	0.175	0.176	0.012	-2.881	Q
G1	Cl <sup>-</sup>	< 0.070	0.154	0.154	0.036	-3.341	U
G2		< 0.070	0.232	0.241	0.125	-1.65	U
G3		< 0.070	0.347	0.337	0.039	-7.653	U
G4		< 0.070	0.386	0.379	0.046	-7.441	U
G1	Ca <sup>2+</sup>	< 0.010	0.102	0.104	0.019	-5.148	U
G2		< 0.010	0.115	0.115	0.017	-6.404	U
G3		0.05	0.192	0.188	0.022	-6.196	U
G4		0.08	0.217	0.209	0.023	-5.733	U
G1	K <sup>+</sup>	0.14	0.136	0.133	0.02	0.335	S
G2		0.17	0.204	0.202	0.017	-1.917	Q
G3		0.26	0.306	0.3	0.022	-1.782	Q
G4		0.3	0.374	0.368	0.028	-2.381	Q
G1	pH	4.53	4.57	4.643	0.083	-1.366	S
G2		4.38	4.48	4.522	0.056	-2.54	Q
G3		4.2	4.22	4.259	0.051	-1.157	S
G4		4.15	4.18	4.207	0.058	-0.981	S
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

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B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

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## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 197, Institute of Occupational Health - Novi Sad (Republic of Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>	1.77	0.673	0.667	0.071	15.442	U
G2		2.21	0.776	0.773	0.074	19.376	U
G3		4.12	1.319	1.319	0.087	32.369	U
G4		3.09	1.474	1.487	0.078	20.549	U
G1	NH <sub>4</sub> <sup>+</sup>	0.19	0.16	0.169	0.019	1.145	Q
G2		0.17	0.214	0.216	0.021	-2.229	Q
G3		0.32	0.267	0.276	0.027	1.597	Q
G4		0.4	0.348	0.36	0.043	0.945	S
G1	NO <sub>3</sub> <sup>-</sup>	1	0.274	0.271	0.025	29.418	U
G2		2.16	0.396	0.393	0.037	47.359	U
G3		2.94	0.529	0.528	0.044	55.07	U
G4		3.08	0.612	0.602	0.093	26.698	U
G1	Na <sup>+</sup>		0.208	0.21	0.02		B
G2			0.329	0.323	0.026		B
G3			0.476	0.471	0.029		B
G4			0.465	0.454	0.025		B
G1	Mg <sup>2+</sup>		0.124	0.124	0.009		B
G2			0.114	0.009	0.009		B
G3			0.155	0.155	0.011		B
G4			0.175	0.176	0.012		B
G1	Cl <sup>-</sup>		0.154	0.154	0.036		B
G2			0.232	0.241	0.125		B
G3			0.347	0.337	0.039		B
G4			0.386	0.379	0.046		B
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>		0.136	0.133	0.02		B
G2			0.204	0.202	0.017		B
G3			0.306	0.3	0.022		B
G4			0.374	0.368	0.028		B
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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If your laboratory reported values as less than the detection limit, and your detection limit is lower than the expected value,  $\frac{1}{2}$  DL is taken as the reported value in further calculations.

✕ EMEP quality norm; the letters in the column indicates:

S – Satisfactory: Your result deviates less than  $\pm 10\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , less than  $\pm 15\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and less than  $\pm 0.1$  pH-units for pH

Q – Questionable: Your result deviates between  $\pm 10\text{-}20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15\text{-}25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and between  $\pm 0.1\text{-}0.2$  pH-units for pH

U – Unsatisfactory: Your result deviates more than  $\pm 20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , more than  $\pm 25\%$  of the expected value for  $\text{NH}_4^+$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{K}^+$  and cond and more than  $\pm 0.2$  pH-units for pH

B – Blank: You reported either no value or the detection limit

Please check the EMEP intercalibration website for Youden plots, updated expected values ect:

<http://www.nilu.no/projects/ccc/intercomparison.html>

## EMEP – 31<sup>st</sup> intercomparison of analytical methods

Laboratory 198, Institute for public health - Sremska Mitrovica (Republic of Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score	EMEP quality norm <sup>x</sup>
G1	SO <sub>4</sub> <sup>2-</sup>		0.673	0.667	0.071		B
G2			0.776	0.773	0.074		B
G3			1.319	1.319	0.087		B
G4			1.474	1.487	0.078		B
G1	NH <sub>4</sub> <sup>+</sup>	0.161	0.16	0.169	0.019	-0.42	S
G2		0.206	0.214	0.216	0.021	-0.49	S
G3		0.237	0.267	0.276	0.027	-1.427	S
G4		0.33	0.348	0.36	0.043	-0.697	S
G1	NO <sub>3</sub> <sup>-</sup>		0.274	0.271	0.025		B
G2			0.396	0.393	0.037		B
G3			0.529	0.528	0.044		B
G4			0.612	0.602	0.093		B
G1	Na <sup>+</sup>	< 0.051	0.208	0.21	0.02	-9.411	U
G2		0.111	0.329	0.323	0.026	-8.003	U
G3		0.292	0.476	0.471	0.029	-6.198	U
G4		0.278	0.465	0.454	0.025	-6.938	U
G1	Mg <sup>2+</sup>	0.162	0.124	0.124	0.009	4.129	U
G2		0.134	0.114	0.009	0.009	2.178	Q
G3		0.192	0.155	0.155	0.011	3.271	Q
G4		0.226	0.175	0.176	0.012	4.055	U
G1	Cl <sup>-</sup>		0.154	0.154	0.036		B
G2			0.232	0.241	0.125		B
G3			0.347	0.337	0.039		B
G4			0.386	0.379	0.046		B
G1	Ca <sup>2+</sup>		0.102	0.104	0.019		B
G2			0.115	0.115	0.017		B
G3			0.192	0.188	0.022		B
G4			0.217	0.209	0.023		B
G1	K <sup>+</sup>	0.111	0.136	0.133	0.02	-1.142	Q
G2		0.182	0.204	0.202	0.017	-1.196	S
G3		0.289	0.306	0.3	0.022	-0.48	S
G4		0.364	0.374	0.368	0.028	-0.131	S
G1	pH		4.57	4.643	0.083		B
G2			4.48	4.522	0.056		B
G3			4.22	4.259	0.051		B
G4			4.18	4.207	0.058		B
G1	Cond		16.79	16.135	1.145		B
G2			21.08	20.617	1.06		B
G3			35.23	34.179	1.671		B
G4			39.53	38.389	1.678		B

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B – Blank: You reported either no value or the detection limit

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