

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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 *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.332	0.33	0.316	0.021	0.771	S
G2		0.28	0.281	0.269	0.02	0.547	S
G3		0.249	0.252	0.243	0.018	0.342	S
G4		0.241	0.236	0.23	0.018	0.634	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.103	0.099	0.101	0.013	0.182	S
G2		0.12	0.123	0.125	0.015	-0.317	S
G3		0.199	0.195	0.195	0.018	0.245	S
G4		0.17	0.171	0.171	0.017	-0.072	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.201	0.201	0.194	0.012	0.599	S
G2		0.297	0.295	0.286	0.015	0.721	S
G3		0.362	0.359	0.348	0.016	0.911	S
G4		0.394	0.393	0.379	0.016	0.94	S
G1	Na <sup>+</sup> mg/l	0.685	0.744	0.722	0.037	-0.995	S
G2		1.196	1.19	1.162	0.059	0.582	S
G3		0.926	1.06	1.031	0.05	-2.088	S
G4		0.921	1.06	1.019	0.057	-1.711	S
G1	Mg <sup>2+</sup> mg/l	0.141	0.134	0.131	0.008	1.133	S
G2		0.117	0.114	0.112	0.008	0.641	S
G3		0.1	0.098	0.099	0.009	0.125	S
G4		0.091	0.092	0.092	0.01	-0.108	S
G1	Cl <sup>-</sup> mg/l	0.978	1	0.972	0.034	0.18	S
G2		1.529	1.58	1.53	0.068	-0.01	S
G3		1.414	1.43	1.392	0.058	0.384	S
G4		1.226	1.27	1.227	0.055	-0.025	S
G1	Ca <sup>2+</sup> mg/l	0.173	0.166	0.154	0.017	1.105	S
G2		0.15	0.14	0.132	0.011	1.637	S
G3		0.154	0.121	0.119	0.021	1.63	U
G4		0.128	0.114	0.11	0.017	1.035	S
G1	K <sup>+</sup> mg/l	0.117	0.117	0.116	0.01	0.14	S
G2		0.182	0.181	0.18	0.01	0.147	S
G3		0.213	0.22	0.219	0.014	-0.418	S
G4		0.212	0.214	0.211	0.014	0.045	S
G1	pH pH units	5.237	5.48	5.477	0.117	-2.049	U
G2		5.37	5.49	5.463	0.099	-0.944	Q
G3		5.355	5.44	5.439	0.129	-0.656	S
G4		5.441	5.45	5.46	0.125	-0.156	S
G1	Cond µS/cm	9.646	9.44	9.701	0.641	-0.086	S
G2		12.25	12	12.028	0.58	0.383	S
G3		12.16	12	12.072	0.667	0.132	S
G4		11.66	11.5	11.651	0.735	0.013	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.335	0.33	0.316	0.021	0.916	S
G2		0.287	0.281	0.269	0.02	0.889	S
G3		0.257	0.252	0.243	0.018	0.786	S
G4		0.276	0.236	0.23	0.018	2.63	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.095	0.099	0.101	0.013	-0.453	S
G2		0.116	0.123	0.125	0.015	-0.589	S
G3		0.185	0.195	0.195	0.018	-0.554	S
G4		0.161	0.171	0.171	0.017	-0.603	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.201	0.201	0.194	0.012	0.599	S
G2		0.299	0.295	0.286	0.015	0.857	S
G3		0.361	0.359	0.348	0.016	0.847	S
G4		0.394	0.393	0.379	0.016	0.94	S
G1	Na <sup>+</sup> mg/l	0.746	0.744	0.722	0.037	0.644	S
G2		1.209	1.19	1.162	0.059	0.802	S
G3		1.072	1.06	1.031	0.05	0.82	S
G4		1.068	1.06	1.019	0.057	0.852	S
G1	Mg <sup>2+</sup> mg/l	0.126	0.134	0.131	0.008	-0.638	S
G2		0.106	0.114	0.112	0.008	-0.787	S
G3		0.094	0.098	0.099	0.009	-0.539	S
G4		0.086	0.092	0.092	0.01	-0.616	S
G1	Cl <sup>-</sup> mg/l	1.03	1	0.972	0.034	1.73	S
G2		1.63	1.58	1.53	0.068	1.484	S
G3		1.48	1.43	1.392	0.058	1.514	S
G4		1.3	1.27	1.227	0.055	1.33	S
G1	Ca <sup>2+</sup> mg/l	0.16	0.166	0.154	0.017	0.361	S
G2		0.134	0.14	0.132	0.011	0.197	S
G3		0.119	0.121	0.119	0.021	-0.015	S
G4		0.111	0.114	0.11	0.017	0.054	S
G1	K <sup>+</sup> mg/l	0.107	0.117	0.116	0.01	-0.91	S
G2		0.164	0.181	0.18	0.01	-1.614	S
G3		0.196	0.22	0.219	0.014	-1.596	S
G4		0.189	0.214	0.211	0.014	-1.619	S
G1	pH pH units	5.48	5.48	5.477	0.117	0.026	S
G2		5.49	5.49	5.463	0.099	0.27	S
G3		5.45	5.44	5.439	0.129	0.082	S
G4		5.46	5.45	5.46	0.125	-0.003	S
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

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## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 5, Finnish Meteorological Institute, Atmospheric Composition, Air Quality (Finland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm <sup>ⓧ</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.324	0.33	0.316	0.021	0.385	S
G2		0.276	0.281	0.269	0.02	0.351	S
G3		0.249	0.252	0.243	0.018	0.342	S
G4		0.234	0.236	0.23	0.018	0.235	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.103	0.099	0.101	0.013	0.182	S
G2		0.129	0.123	0.125	0.015	0.295	S
G3		0.199	0.195	0.195	0.018	0.245	S
G4		0.176	0.171	0.171	0.017	0.282	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.195	0.201	0.194	0.012	0.102	S
G2		0.29	0.295	0.286	0.015	0.245	S
G3		0.349	0.359	0.348	0.016	0.084	S
G4		0.382	0.393	0.379	0.016	0.192	S
G1	Na <sup>+</sup> mg/l	0.747	0.744	0.722	0.037	0.671	S
G2		1.205	1.19	1.162	0.059	0.734	S
G3		1.068	1.06	1.031	0.05	0.74	S
G4		1.061	1.06	1.019	0.057	0.73	S
G1	Mg <sup>2+</sup> mg/l	0.136	0.134	0.131	0.008	0.543	S
G2		0.116	0.114	0.112	0.008	0.511	S
G3		0.101	0.098	0.099	0.009	0.235	S
G4		0.094	0.092	0.092	0.01	0.196	S
G1	Cl <sup>-</sup> mg/l	0.984	1	0.972	0.034	0.359	S
G2		1.574	1.58	1.53	0.068	0.656	S
G3		1.425	1.43	1.392	0.058	0.573	S
G4		1.256	1.27	1.227	0.055	0.524	S
G1	Ca <sup>2+</sup> mg/l	0.163	0.166	0.154	0.017	0.533	S
G2		0.139	0.14	0.132	0.011	0.647	S
G3		0.119	0.121	0.119	0.021	-0.015	S
G4		0.111	0.114	0.11	0.017	0.054	S
G1	K <sup>+</sup> mg/l	0.126	0.117	0.116	0.01	1.086	S
G2		0.197	0.181	0.18	0.01	1.616	S
G3		0.234	0.22	0.219	0.014	1.036	S
G4		0.228	0.214	0.211	0.014	1.202	S
G1	pH pH units	5.46	5.48	5.477	0.117	-0.145	S
G2		5.45	5.49	5.463	0.099	-0.135	S
G3		5.39	5.44	5.439	0.129	-0.384	S
G4		5.45	5.45	5.46	0.125	-0.084	S
G1	Cond µS/cm	9.74	9.44	9.701	0.641	0.06	S
G2		12.34	12	12.028	0.58	0.538	S
G3		12.21	12	12.072	0.667	0.207	S
G4		11.66	11.5	11.651	0.735	0.013	S

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## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 6, SGS France - EHS (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> mg S/l	0.331	0.33	0.316	0.021	0.742	S
G2		0.281	0.281	0.269	0.02	0.581	S
G3		0.254	0.252	0.243	0.018	0.631	S
G4		0.238	0.236	0.23	0.018	0.469	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.102	0.099	0.101	0.013	0.103	S
G2		0.122	0.123	0.125	0.015	-0.167	S
G3		0.188	0.195	0.195	0.018	-0.366	S
G4		0.164	0.171	0.171	0.017	-0.432	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.201	0.201	0.194	0.012	0.599	S
G2		0.298	0.295	0.286	0.015	0.796	S
G3		0.362	0.359	0.348	0.016	0.898	S
G4		0.397	0.393	0.379	0.016	1.096	S
G1	Na <sup>+</sup> mg/l	0.737	0.744	0.722	0.037	0.389	S
G2		1.165	1.19	1.162	0.059	0.064	S
G3		1.042	1.06	1.031	0.05	0.219	S
G4		1.027	1.06	1.019	0.057	0.134	S
G1	Mg <sup>2+</sup> mg/l	0.123	0.134	0.131	0.008	-0.968	S
G2		0.103	0.114	0.112	0.008	-1.163	S
G3		0.088	0.098	0.099	0.009	-1.203	S
G4		0.082	0.092	0.092	0.01	-1.012	S
G1	Cl <sup>-</sup> mg/l	1.03	1	0.972	0.034	1.742	S
G2		1.612	1.58	1.53	0.068	1.221	S
G3		1.461	1.43	1.392	0.058	1.191	S
G4		1.29	1.27	1.227	0.055	1.151	S
G1	Ca <sup>2+</sup> mg/l	0.152	0.166	0.154	0.017	-0.08	S
G2		0.126	0.14	0.132	0.011	-0.541	S
G3		0.108	0.121	0.119	0.021	-0.546	S
G4		0.1	0.114	0.11	0.017	-0.558	S
G1	K <sup>+</sup> mg/l	0.132	0.117	0.116	0.01	1.664	S
G2		0.185	0.181	0.18	0.01	0.48	S
G3		0.221	0.22	0.219	0.014	0.136	S
G4		0.215	0.214	0.211	0.014	0.298	S
G1	pH pH units	5.69	5.48	5.477	0.117	1.819	U
G2		5.5	5.49	5.463	0.099	0.371	S
G3		5.33	5.44	5.439	0.129	-0.85	Q
G4		5.48	5.45	5.46	0.125	0.157	S
G1	Cond µS/cm	9.665	9.44	9.701	0.641	-0.057	S
G2		11.65	12	12.028	0.58	-0.651	S
G3		11.62	12	12.072	0.667	-0.678	S
G4		11.3	11.5	11.651	0.735	-0.477	S

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## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.313	0.33	0.316	0.021	-0.145	S
G2		0.262	0.281	0.269	0.02	-0.332	S
G3		0.238	0.252	0.243	0.018	-0.268	S
G4		0.221	0.236	0.23	0.018	-0.506	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.091	0.099	0.101	0.013	-0.771	S
G2		0.117	0.123	0.125	0.015	-0.521	S
G3		0.189	0.195	0.195	0.018	-0.326	S
G4		0.164	0.171	0.171	0.017	-0.426	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.187	0.201	0.194	0.012	-0.561	S
G2		0.303	0.295	0.286	0.015	1.129	S
G3		0.354	0.359	0.348	0.016	0.402	S
G4		0.389	0.393	0.379	0.016	0.628	S
G1	Na <sup>+</sup> mg/l	0.725	0.744	0.722	0.037	0.08	S
G2		1.161	1.19	1.162	0.059	-0.012	S
G3		1.032	1.06	1.031	0.05	0.023	S
G4		1.022	1.06	1.019	0.057	0.05	S
G1	Mg <sup>2+</sup> mg/l	0.12	0.134	0.131	0.008	-1.346	S
G2		0.102	0.114	0.112	0.008	-1.306	S
G3		0.089	0.098	0.099	0.009	-1.092	S
G4		0.082	0.092	0.092	0.01	-1.022	S
G1	Cl <sup>-</sup> mg/l	0.932	1	0.972	0.034	-1.191	S
G2		1.504	1.58	1.53	0.068	-0.38	S
G3		1.361	1.43	1.392	0.058	-0.523	S
G4		1.195	1.27	1.227	0.055	-0.593	S
G1	Ca <sup>2+</sup> mg/l	0.147	0.166	0.154	0.017	-0.383	S
G2		0.128	0.14	0.132	0.011	-0.343	S
G3		0.108	0.121	0.119	0.021	-0.532	S
G4		0.103	0.114	0.11	0.017	-0.408	S
G1	K <sup>+</sup> mg/l	0.109	0.117	0.116	0.01	-0.7	S
G2		0.174	0.181	0.18	0.01	-0.636	S
G3		0.211	0.22	0.219	0.014	-0.557	S
G4		0.206	0.214	0.211	0.014	-0.39	S
G1	pH pH units	5.52	5.48	5.477	0.117	0.367	S
G2		5.54	5.49	5.463	0.099	0.776	S
G3		5.53	5.44	5.439	0.129	0.702	S
G4		5.54	5.45	5.46	0.125	0.639	S
G1	Cond µS/cm	9.275	9.44	9.701	0.641	-0.665	S
G2		11.7	12	12.028	0.58	-0.565	S
G3		11.6	12	12.072	0.667	-0.708	S
G4		11.05	11.5	11.651	0.735	-0.817	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 10, Air Quality Reference Centre (Hungary)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.337	0.33	0.316	0.021	1.013	S
G2		0.29	0.281	0.269	0.02	1.035	S
G3		0.266	0.252	0.243	0.018	1.285	S
G4		0.252	0.236	0.23	0.018	1.262	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.071	0.099	0.101	0.013	-2.36	U
G2		0.104	0.123	0.125	0.015	-1.404	Q
G3		0.171	0.195	0.195	0.018	-1.353	S
G4		0.138	0.171	0.171	0.017	-1.959	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.198	0.201	0.194	0.012	0.351	S
G2		0.283	0.295	0.286	0.015	-0.232	S
G3		0.341	0.359	0.348	0.016	-0.425	S
G4		0.37	0.393	0.379	0.016	-0.557	S
G1	Na <sup>+</sup> mg/l	0.751	0.744	0.722	0.037	0.779	S
G2		1.209	1.19	1.162	0.059	0.802	S
G3		1.06	1.06	1.031	0.05	0.581	S
G4		1.04	1.06	1.019	0.057	0.364	S
G1	Mg <sup>2+</sup> mg/l	0.127	0.134	0.131	0.008	-0.52	S
G2		0.106	0.114	0.112	0.008	-0.787	S
G3		0.089	0.098	0.099	0.009	-1.092	S
G4		0.082	0.092	0.092	0.01	-1.022	S
G1	Cl <sup>-</sup> mg/l	0.971	1	0.972	0.034	-0.028	S
G2		1.51	1.58	1.53	0.068	-0.291	S
G3		1.375	1.43	1.392	0.058	-0.284	S
G4		1.217	1.27	1.227	0.055	-0.19	S
G1	Ca <sup>2+</sup> mg/l	0.156	0.166	0.154	0.017	0.132	S
G2		0.11	0.14	0.132	0.011	-1.962	Q
G3		0.1	0.121	0.119	0.021	-0.908	Q
G4		0.089	0.114	0.11	0.017	-1.216	Q
G1	K <sup>+</sup> mg/l	0.118	0.117	0.116	0.01	0.245	S
G2		0.188	0.181	0.18	0.01	0.735	S
G3		0.223	0.22	0.219	0.014	0.274	S
G4		0.216	0.214	0.211	0.014	0.334	S
G1	pH pH units	5.57	5.48	5.477	0.117	0.794	S
G2		5.44	5.49	5.463	0.099	-0.236	S
G3		5.38	5.44	5.439	0.129	-0.462	S
G4		5.35	5.45	5.46	0.125	-0.886	Q
G1	Cond µS/cm	9.78	9.44	9.701	0.641	0.123	S
G2		12.31	12	12.028	0.58	0.487	S
G3		12.28	12	12.072	0.667	0.312	S
G4		11.72	11.5	11.651	0.735	0.094	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 12, Met Eireann, Dublin (Ireland)

### 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> mg S/l	0.28	0.33	0.316	0.021	-1.737	Q
G2		0.23	0.281	0.269	0.02	-1.895	Q
G3		0.2	0.252	0.243	0.018	-2.376	U
G4		0.19	0.236	0.23	0.018	-2.273	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.04	0.099	0.101	0.013	-4.822	U
G2		0.07	0.123	0.125	0.015	-3.715	U
G3		0.17	0.195	0.195	0.018	-1.41	S
G4		0.13	0.171	0.171	0.017	-2.431	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.18	0.201	0.194	0.012	-1.141	S
G2		0.27	0.295	0.286	0.015	-1.116	S
G3		0.33	0.359	0.348	0.016	-1.124	S
G4		0.35	0.393	0.379	0.016	-1.804	S
G1	Na <sup>+</sup> mg/l	0.64	0.744	0.722	0.037	-2.204	S
G2		1.06	1.19	1.162	0.059	-1.726	S
G3		0.93	1.06	1.031	0.05	-2.009	S
G4		0.93	1.06	1.019	0.057	-1.554	S
G1	Mg <sup>2+</sup> mg/l	0.112	0.134	0.131	0.008	-2.29	Q
G2		0.095	0.114	0.112	0.008	-2.214	Q
G3		0.084	0.098	0.099	0.009	-1.646	S
G4		0.079	0.092	0.092	0.01	-1.326	S
G1	Cl <sup>-</sup> mg/l	0.96	1	0.972	0.034	-0.356	S
G2		1.53	1.58	1.53	0.068	0.005	S
G3		1.38	1.43	1.392	0.058	-0.198	S
G4		1.22	1.27	1.227	0.055	-0.135	S
G1	Ca <sup>2+</sup> mg/l	0.13	0.166	0.154	0.017	-1.355	Q
G2		0.11	0.14	0.132	0.011	-1.962	Q
G3		0.1	0.121	0.119	0.021	-0.908	Q
G4		0.1	0.114	0.11	0.017	-0.581	S
G1	K <sup>+</sup> mg/l	0.09	0.117	0.116	0.01	-2.696	Q
G2		0.16	0.181	0.18	0.01	-2.006	S
G3		0.19	0.22	0.219	0.014	-2.011	S
G4		0.19	0.214	0.211	0.014	-1.547	S
G1	pH pH units	5.64	5.48	5.477	0.117	1.392	Q
G2		5.8	5.49	5.463	0.099	3.406	U
G3		5.67	5.44	5.439	0.129	1.789	U
G4		5.71	5.45	5.46	0.125	2.004	U
G1	Cond µS/cm	9.3	9.44	9.701	0.641	-0.626	S
G2		11.8	12	12.028	0.58	-0.392	S
G3		11.8	12	12.072	0.667	-0.408	S
G4		11.3	11.5	11.651	0.735	-0.477	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 15, NILU (Norway)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm <sup>†</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.341	0.33	0.316	0.021	1.205	S
G2		0.286	0.281	0.269	0.02	0.84	S
G3		0.262	0.252	0.243	0.018	1.063	S
G4		0.243	0.236	0.23	0.018	0.748	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.118	0.099	0.101	0.013	1.373	Q
G2		0.155	0.123	0.125	0.015	2.062	U
G3		0.227	0.195	0.195	0.018	1.842	Q
G4		0.201	0.171	0.171	0.017	1.756	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.196	0.201	0.194	0.012	0.185	S
G2		0.289	0.295	0.286	0.015	0.176	S
G3		0.352	0.359	0.348	0.016	0.275	S
G4		0.384	0.393	0.379	0.016	0.317	S
G1	Na <sup>+</sup> mg/l	0.754	0.744	0.722	0.037	0.859	S
G2		1.24	1.19	1.162	0.059	1.328	S
G3		1.097	1.06	1.031	0.05	1.318	S
G4		1.084	1.06	1.019	0.057	1.131	S
G1	Mg <sup>2+</sup> mg/l	0.123	0.134	0.131	0.008	-0.992	S
G2		0.103	0.114	0.112	0.008	-1.176	S
G3		0.087	0.098	0.099	0.009	-1.314	S
G4		0.08	0.092	0.092	0.01	-1.225	S
G1	Cl <sup>-</sup> mg/l	1.002	1	0.972	0.034	0.895	S
G2		1.589	1.58	1.53	0.068	0.878	S
G3		1.449	1.43	1.392	0.058	0.984	S
G4		1.278	1.27	1.227	0.055	0.927	S
G1	Ca <sup>2+</sup> mg/l	0.142	0.166	0.154	0.017	-0.669	S
G2		0.116	0.14	0.132	0.011	-1.422	Q
G3		0.1	0.121	0.119	0.021	-0.908	Q
G4		0.09	0.114	0.11	0.017	-1.158	Q
G1	K <sup>+</sup> mg/l	0.109	0.117	0.116	0.01	-0.7	S
G2		0.18	0.181	0.18	0.01	-0.048	S
G3		0.222	0.22	0.219	0.014	0.205	S
G4		0.215	0.214	0.211	0.014	0.262	S
G1	pH pH units	5.36	5.48	5.477	0.117	-0.999	Q
G2		5.48	5.49	5.463	0.099	0.169	S
G3		5.44	5.44	5.439	0.129	0.004	S
G4		5.45	5.45	5.46	0.125	-0.084	S
G1	Cond µS/cm	9.8	9.44	9.701	0.641	0.154	S
G2		11.7	12	12.028	0.58	-0.565	S
G3		12	12	12.072	0.667	-0.108	S
G4		11.7	11.5	11.651	0.735	0.067	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.329	0.33	0.316	0.021	0.627	S
G2		0.279	0.281	0.269	0.02	0.498	S
G3		0.255	0.252	0.243	0.018	0.675	S
G4		0.242	0.236	0.23	0.018	0.691	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.093	0.099	0.101	0.013	-0.612	S
G2		0.117	0.123	0.125	0.015	-0.521	S
G3		0.183	0.195	0.195	0.018	-0.668	S
G4		0.156	0.171	0.171	0.017	-0.898	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.197	0.201	0.194	0.012	0.268	S
G2		0.286	0.295	0.286	0.015	-0.028	S
G3		0.35	0.359	0.348	0.016	0.148	S
G4		0.382	0.393	0.379	0.016	0.192	S
G1	Na <sup>+</sup> mg/l	0.701	0.744	0.722	0.037	-0.565	S
G2		1.161	1.19	1.162	0.059	-0.012	S
G3		1.044	1.06	1.031	0.05	0.262	S
G4		1.023	1.06	1.019	0.057	0.067	S
G1	Mg <sup>2+</sup> mg/l	0.13	0.134	0.131	0.008	-0.166	S
G2		0.112	0.114	0.112	0.008	-0.008	S
G3		0.099	0.098	0.099	0.009	0.014	S
G4		0.092	0.092	0.092	0.01	-0.007	S
G1	Cl <sup>-</sup> mg/l	0.962	1	0.972	0.034	-0.297	S
G2		1.534	1.58	1.53	0.068	0.064	S
G3		1.396	1.43	1.392	0.058	0.076	S
G4		1.238	1.27	1.227	0.055	0.195	S
G1	Ca <sup>2+</sup> mg/l	0.168	0.166	0.154	0.017	0.819	S
G2		0.138	0.14	0.132	0.011	0.557	S
G3		0.124	0.121	0.119	0.021	0.22	S
G4		0.118	0.114	0.11	0.017	0.458	S
G1	K <sup>+</sup> mg/l	0.124	0.117	0.116	0.01	0.876	S
G2		0.191	0.181	0.18	0.01	1.028	S
G3		0.224	0.22	0.219	0.014	0.343	S
G4		0.217	0.214	0.211	0.014	0.406	S
G1	pH pH units	5.46	5.48	5.477	0.117	-0.145	S
G2		5.49	5.49	5.463	0.099	0.27	S
G3		5.47	5.44	5.439	0.129	0.237	S
G4		5.44	5.45	5.46	0.125	-0.164	S
G1	Cond µS/cm	9.36	9.44	9.701	0.641	-0.533	S
G2		11.6	12	12.028	0.58	-0.737	S
G3		11.45	12	12.072	0.667	-0.933	S
G4		11.02	11.5	11.651	0.735	-0.858	S

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.

\* Z score is unitless

✕ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , 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  $\pm 10$ - $20\%$  of the expected value for  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$ , between  $\pm 15$ - $25\%$  of the expected value for  $\text{NH}_4^+$ , 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  $\text{NH}_4^+$ , 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### 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> mg S/l	0.317	0.33	0.316	0.021	0.048	S
G2		0.273	0.281	0.269	0.02	0.205	S
G3		0.249	0.252	0.243	0.018	0.342	S
G4		0.237	0.236	0.23	0.018	0.406	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	< 0.120	0.099	0.101	0.013		B
G2		0.122	0.123	0.125	0.015	-0.181	S
G3		0.2	0.195	0.195	0.018	0.302	S
G4		0.173	0.171	0.171	0.017	0.105	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.194	0.201	0.194	0.012	0.019	S
G2		0.287	0.295	0.286	0.015	0.04	S
G3		0.355	0.359	0.348	0.016	0.465	S
G4		0.377	0.393	0.379	0.016	-0.12	S
G1	Na <sup>+</sup> mg/l	0.708	0.744	0.722	0.037	-0.377	S
G2		1.139	1.19	1.162	0.059	-0.386	S
G3		1.015	1.06	1.031	0.05	-0.315	S
G4		1.013	1.06	1.019	0.057	-0.107	S
G1	Mg <sup>2+</sup> mg/l	0.137	0.134	0.131	0.008	0.661	S
G2		0.117	0.114	0.112	0.008	0.641	S
G3		0.102	0.098	0.099	0.009	0.346	S
G4		0.095	0.092	0.092	0.01	0.298	S
G1	Cl <sup>-</sup> mg/l	0.938	1	0.972	0.034	-1.012	S
G2		1.467	1.58	1.53	0.068	-0.927	S
G3		1.338	1.43	1.392	0.058	-0.917	S
G4		1.217	1.27	1.227	0.055	-0.19	S
G1	Ca <sup>2+</sup> mg/l	0.157	0.166	0.154	0.017	0.189	S
G2		0.14	0.14	0.132	0.011	0.737	S
G3		0.116	0.121	0.119	0.021	-0.156	S
G4		0.109	0.114	0.11	0.017	-0.061	S
G1	K <sup>+</sup> mg/l	0.114	0.117	0.116	0.01	-0.175	S
G2		0.179	0.181	0.18	0.01	-0.146	S
G3		0.212	0.22	0.219	0.014	-0.488	S
G4		0.205	0.214	0.211	0.014	-0.462	S
G1	pH pH units	5.281	5.48	5.477	0.117	-1.673	Q
G2		5.257	5.49	5.463	0.099	-2.087	U
G3		5.267	5.44	5.439	0.129	-1.338	Q
G4		5.249	5.45	5.46	0.125	-1.697	U
G1	Cond µS/cm	10.42	9.44	9.701	0.641	1.122	S
G2		12.8	12	12.028	0.58	1.331	S
G3		12.86	12	12.072	0.667	1.182	S
G4		12.24	11.5	11.651	0.735	0.801	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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>ⓧ</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.332	0.33	0.316	0.021	0.771	S
G2		0.287	0.281	0.269	0.02	0.889	S
G3		0.252	0.252	0.243	0.018	0.509	S
G4		0.237	0.236	0.23	0.018	0.406	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.098	0.099	0.101	0.013	-0.215	S
G2		0.124	0.123	0.125	0.015	-0.045	S
G3		0.197	0.195	0.195	0.018	0.131	S
G4		0.17	0.171	0.171	0.017	-0.072	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.2	0.201	0.194	0.012	0.516	S
G2		0.292	0.295	0.286	0.015	0.381	S
G3		0.354	0.359	0.348	0.016	0.402	S
G4		0.385	0.393	0.379	0.016	0.379	S
G1	Na <sup>+</sup> mg/l	0.668	0.744	0.722	0.037	-1.452	S
G2		1.06	1.19	1.162	0.059	-1.726	S
G3		0.949	1.06	1.031	0.05	-1.63	S
G4		0.94	1.06	1.019	0.057	-1.38	S
G1	Mg <sup>2+</sup> mg/l	0.13	0.134	0.131	0.008	-0.166	S
G2		0.109	0.114	0.112	0.008	-0.397	S
G3		0.096	0.098	0.099	0.009	-0.318	S
G4		0.09	0.092	0.092	0.01	-0.21	S
G1	Cl <sup>-</sup> mg/l	0.99	1	0.972	0.034	0.538	S
G2		1.58	1.58	1.53	0.068	0.744	S
G3		1.44	1.43	1.392	0.058	0.829	S
G4		1.26	1.27	1.227	0.055	0.598	S
G1	Ca <sup>2+</sup> mg/l	0.155	0.166	0.154	0.017	0.075	S
G2		0.128	0.14	0.132	0.011	-0.343	S
G3		0.113	0.121	0.119	0.021	-0.297	S
G4		0.105	0.114	0.11	0.017	-0.292	S
G1	K <sup>+</sup> mg/l	0.118	0.117	0.116	0.01	0.245	S
G2		0.185	0.181	0.18	0.01	0.441	S
G3		0.222	0.22	0.219	0.014	0.205	S
G4		0.216	0.214	0.211	0.014	0.334	S
G1	pH pH units	5.38	5.48	5.477	0.117	-0.828	Q
G2		5.49	5.49	5.463	0.099	0.27	S
G3		5.43	5.44	5.439	0.129	-0.074	S
G4		5.47	5.45	5.46	0.125	0.077	S
G1	Cond µS/cm	10.2	9.44	9.701	0.641	0.778	S
G2		12.4	12	12.028	0.58	0.642	S
G3		12.5	12	12.072	0.667	0.642	S
G4		11.9	11.5	11.651	0.735	0.339	S

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.

\* Z score is unitless

✕ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 21, Swiss Federal Laboratories for Materials Science and Technology (EMPA) (Switzerland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm <sup>ⓧ</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.338	0.33	0.316	0.021	1.061	S
G2		0.285	0.281	0.269	0.02	0.791	S
G3		0.26	0.252	0.243	0.018	0.952	S
G4		0.244	0.236	0.23	0.018	0.805	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.104	0.099	0.101	0.013	0.261	S
G2		0.127	0.123	0.125	0.015	0.159	S
G3		0.198	0.195	0.195	0.018	0.188	S
G4		0.168	0.171	0.171	0.017	-0.19	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.198	0.201	0.194	0.012	0.351	S
G2		0.291	0.295	0.286	0.015	0.313	S
G3		0.355	0.359	0.348	0.016	0.465	S
G4		0.384	0.393	0.379	0.016	0.317	S
G1	Na <sup>+</sup> mg/l	0.748	0.744	0.722	0.037	0.698	S
G2		1.21	1.19	1.162	0.059	0.819	S
G3		1.07	1.06	1.031	0.05	0.78	S
G4		1.061	1.06	1.019	0.057	0.73	S
G1	Mg <sup>2+</sup> mg/l	0.137	0.134	0.131	0.008	0.661	S
G2		0.116	0.114	0.112	0.008	0.511	S
G3		0.101	0.098	0.099	0.009	0.235	S
G4		0.094	0.092	0.092	0.01	0.196	S
G1	Cl <sup>-</sup> mg/l	0.988	1	0.972	0.034	0.478	S
G2		1.564	1.58	1.53	0.068	0.508	S
G3		1.42	1.43	1.392	0.058	0.487	S
G4		1.251	1.27	1.227	0.055	0.433	S
G1	Ca <sup>2+</sup> mg/l	0.134	0.166	0.154	0.017	-1.127	Q
G2		0.113	0.14	0.132	0.011	-1.692	Q
G3		0.088	0.121	0.119	0.021	-1.472	U
G4		0.086	0.114	0.11	0.017	-1.389	Q
G1	K <sup>+</sup> mg/l	0.124	0.117	0.116	0.01	0.876	S
G2		0.193	0.181	0.18	0.01	1.224	S
G3		0.229	0.22	0.219	0.014	0.69	S
G4		0.226	0.214	0.211	0.014	1.057	S
G1	pH pH units	5.46	5.48	5.477	0.117	-0.145	S
G2		5.45	5.49	5.463	0.099	-0.135	S
G3		5.43	5.44	5.439	0.129	-0.074	S
G4		5.43	5.45	5.46	0.125	-0.244	S
G1	Cond µS/cm	9.39	9.44	9.701	0.641	-0.486	S
G2		11.85	12	12.028	0.58	-0.306	S
G3		11.82	12	12.072	0.667	-0.378	S
G4		11.37	11.5	11.651	0.735	-0.382	S

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.

\* Z score is unitless

☒ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.3	0.33	0.316	0.021	-0.772	S
G2		0.254	0.281	0.269	0.02	-0.723	S
G3		0.225	0.252	0.243	0.018	-0.989	Q
G4		0.21	0.236	0.23	0.018	-1.133	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.109	0.099	0.101	0.013	0.658	S
G2		0.157	0.123	0.125	0.015	2.198	U
G3		0.212	0.195	0.195	0.018	0.986	S
G4		0.176	0.171	0.171	0.017	0.282	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.199	0.201	0.194	0.012	0.434	S
G2		0.286	0.295	0.286	0.015	-0.028	S
G3		0.345	0.359	0.348	0.016	-0.17	S
G4		0.379	0.393	0.379	0.016	0.005	S
G1	Na <sup>+</sup> mg/l	0.84	0.744	0.722	0.037	3.171	S
G2		1.146	1.19	1.162	0.059	-0.267	S
G3		1.05	1.06	1.031	0.05	0.382	S
G4		1.095	1.06	1.019	0.057	1.323	S
G1	Mg <sup>2+</sup> mg/l	0.117	0.134	0.131	0.008	-1.7	S
G2		0.111	0.114	0.112	0.008	-0.138	S
G3		0.097	0.098	0.099	0.009	-0.207	S
G4		0.079	0.092	0.092	0.01	-1.326	S
G1	Cl <sup>-</sup> mg/l	0.898	1	0.972	0.034	-2.204	S
G2		1.417	1.58	1.53	0.068	-1.667	S
G3		1.272	1.43	1.392	0.058	-2.047	S
G4		1.118	1.27	1.227	0.055	-2.003	S
G1	Ca <sup>2+</sup> mg/l	0.137	0.166	0.154	0.017	-0.955	Q
G2		0.138	0.14	0.132	0.011	0.557	S
G3		0.123	0.121	0.119	0.021	0.173	S
G4		0.134	0.114	0.11	0.017	1.382	Q
G1	K <sup>+</sup> mg/l	0.111	0.117	0.116	0.01	-0.49	S
G2		0.2	0.181	0.18	0.01	1.909	S
G3		0.225	0.22	0.219	0.014	0.413	S
G4		0.201	0.214	0.211	0.014	-0.751	S
G1	pH pH units	5.52	5.48	5.477	0.117	0.367	S
G2		5.55	5.49	5.463	0.099	0.877	S
G3		5.42	5.44	5.439	0.129	-0.151	S
G4		5.43	5.45	5.46	0.125	-0.244	S
G1	Cond µS/cm	11.83	9.44	9.701	0.641	3.322	U
G2		13.51	12	12.028	0.58	2.554	S
G3		14.27	12	12.072	0.667	3.297	Q
G4		14.95	11.5	11.651	0.735	4.486	U

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 23, Ricardo-AEA Limited (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> mg S/l	0.285	0.33	0.316	0.021	-1.496	Q
G2		0.24	0.281	0.269	0.02	-1.407	Q
G3		0.21	0.252	0.243	0.018	-1.821	Q
G4		0.2	0.236	0.23	0.018	-1.703	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.098	0.099	0.101	0.013	-0.223	S
G2		0.11	0.123	0.125	0.015	-0.997	S
G3		0.18	0.195	0.195	0.018	-0.839	S
G4		0.156	0.171	0.171	0.017	-0.898	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.182	0.201	0.194	0.012	-0.976	S
G2		0.269	0.295	0.286	0.015	-1.184	S
G3		0.326	0.359	0.348	0.016	-1.379	S
G4		0.356	0.393	0.379	0.016	-1.43	S
G1	Na <sup>+</sup> mg/l	0.711	0.744	0.722	0.037	-0.296	S
G2		1.13	1.19	1.162	0.059	-0.538	S
G3		0.998	1.06	1.031	0.05	-0.654	S
G4		0.998	1.06	1.019	0.057	-0.368	S
G1	Mg <sup>2+</sup> mg/l	0.111	0.134	0.131	0.008	-2.408	Q
G2		0.092	0.114	0.112	0.008	-2.603	Q
G3		0.083	0.098	0.099	0.009	-1.812	Q
G4		0.074	0.092	0.092	0.01	-1.864	Q
G1	Cl <sup>-</sup> mg/l	0.922	1	0.972	0.034	-1.489	S
G2		1.46	1.58	1.53	0.068	-1.031	S
G3		1.33	1.43	1.392	0.058	-1.054	S
G4		1.17	1.27	1.227	0.055	-1.051	S
G1	Ca <sup>2+</sup> mg/l	0.13	0.166	0.154	0.017	-1.355	Q
G2		0.136	0.14	0.132	0.011	0.377	S
G3		0.111	0.121	0.119	0.021	-0.391	S
G4		0.098	0.114	0.11	0.017	-0.725	S
G1	K <sup>+</sup> mg/l	0.123	0.117	0.116	0.01	0.771	S
G2		0.168	0.181	0.18	0.01	-1.223	S
G3		0.202	0.22	0.219	0.014	-1.18	S
G4		0.201	0.214	0.211	0.014	-0.751	S
G1	pH pH units	5.57	5.48	5.477	0.117	0.794	S
G2		5.6	5.49	5.463	0.099	1.383	Q
G3		5.49	5.44	5.439	0.129	0.392	S
G4		5.49	5.45	5.46	0.125	0.237	S
G1	Cond µS/cm	9.29	9.44	9.701	0.641	-0.642	S
G2		11.76	12	12.028	0.58	-0.461	S
G3		11.76	12	12.072	0.667	-0.468	S
G4		11.27	11.5	11.651	0.735	-0.518	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 26, Environment and Climate Change Canada (Canada)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.327	0.33	0.316	0.021	0.53	S
G2		0.277	0.281	0.269	0.02	0.4	S
G3		0.252	0.252	0.243	0.018	0.509	S
G4		0.236	0.236	0.23	0.018	0.349	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.098	0.099	0.101	0.013	-0.215	S
G2		0.123	0.123	0.125	0.015	-0.113	S
G3		0.199	0.195	0.195	0.018	0.245	S
G4		0.171	0.171	0.171	0.017	-0.013	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.196	0.201	0.194	0.012	0.185	S
G2		0.294	0.295	0.286	0.015	0.517	S
G3		0.353	0.359	0.348	0.016	0.338	S
G4		0.384	0.393	0.379	0.016	0.317	S
G1	Na <sup>+</sup> mg/l	0.736	0.744	0.722	0.037	0.376	S
G2		1.187	1.19	1.162	0.059	0.429	S
G3		1.05	1.06	1.031	0.05	0.382	S
G4		1.041	1.06	1.019	0.057	0.381	S
G1	Mg <sup>2+</sup> mg/l	0.133	0.134	0.131	0.008	0.189	S
G2		0.114	0.114	0.112	0.008	0.252	S
G3		0.099	0.098	0.099	0.009	0.014	S
G4		0.093	0.092	0.092	0.01	0.095	S
G1	Cl <sup>-</sup> mg/l	0.986	1	0.972	0.034	0.419	S
G2		1.565	1.58	1.53	0.068	0.523	S
G3		1.42	1.43	1.392	0.058	0.487	S
G4		1.253	1.27	1.227	0.055	0.47	S
G1	Ca <sup>2+</sup> mg/l	0.163	0.166	0.154	0.017	0.533	S
G2		0.14	0.14	0.132	0.011	0.737	S
G3		0.122	0.121	0.119	0.021	0.126	S
G4		0.114	0.114	0.11	0.017	0.227	S
G1	K <sup>+</sup> mg/l	0.124	0.117	0.116	0.01	0.876	S
G2		0.188	0.181	0.18	0.01	0.735	S
G3		0.222	0.22	0.219	0.014	0.205	S
G4		0.214	0.214	0.211	0.014	0.189	S
G1	pH pH units	5.83	5.48	5.477	0.117	3.014	U
G2		5.52	5.49	5.463	0.099	0.573	S
G3		5.49	5.44	5.439	0.129	0.392	S
G4		5.81	5.45	5.46	0.125	2.806	U
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### 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> mg S/l	0.326	0.33	0.316	0.021	0.482	S
G2		0.278	0.281	0.269	0.02	0.449	S
G3		0.257	0.252	0.243	0.018	0.786	S
G4		0.24	0.236	0.23	0.018	0.577	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.105	0.099	0.101	0.013	0.341	S
G2		0.132	0.123	0.125	0.015	0.499	S
G3		0.203	0.195	0.195	0.018	0.473	S
G4		0.176	0.171	0.171	0.017	0.282	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.2	0.201	0.194	0.012	0.516	S
G2		0.298	0.295	0.286	0.015	0.789	S
G3		0.365	0.359	0.348	0.016	1.101	S
G4		0.399	0.393	0.379	0.016	1.252	S
G1	Na <sup>+</sup> mg/l	0.712	0.744	0.722	0.037	-0.267	S
G2		1.141	1.19	1.162	0.059	-0.348	S
G3		1.016	1.06	1.031	0.05	-0.303	S
G4		0.991	1.06	1.019	0.057	-0.485	S
G1	Mg <sup>2+</sup> mg/l	0.136	0.134	0.131	0.008	0.543	S
G2		0.116	0.114	0.112	0.008	0.511	S
G3		0.104	0.098	0.099	0.009	0.567	S
G4		0.091	0.092	0.092	0.01	-0.108	S
G1	Cl <sup>-</sup> mg/l	1.009	1	0.972	0.034	1.104	S
G2		1.609	1.58	1.53	0.068	1.174	S
G3		1.47	1.43	1.392	0.058	1.35	S
G4		1.29	1.27	1.227	0.055	1.138	S
G1	Ca <sup>2+</sup> mg/l	0.173	0.166	0.154	0.017	1.105	S
G2		0.137	0.14	0.132	0.011	0.467	S
G3		0.12	0.121	0.119	0.021	0.032	S
G4		0.109	0.114	0.11	0.017	-0.061	S
G1	K <sup>+</sup> mg/l	0.123	0.117	0.116	0.01	0.771	S
G2		0.189	0.181	0.18	0.01	0.833	S
G3		0.227	0.22	0.219	0.014	0.551	S
G4		0.218	0.214	0.211	0.014	0.479	S
G1	pH pH units	5.53	5.48	5.477	0.117	0.453	S
G2		5.54	5.49	5.463	0.099	0.776	S
G3		5.53	5.44	5.439	0.129	0.702	S
G4		5.52	5.45	5.46	0.125	0.478	S
G1	Cond µS/cm	9.33	9.44	9.701	0.641	-0.579	S
G2		11.66	12	12.028	0.58	-0.634	S
G3		11.66	12	12.072	0.667	-0.618	S
G4		11.13	11.5	11.651	0.735	-0.708	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.325	0.33	0.316	0.021	0.434	S
G2		0.273	0.281	0.269	0.02	0.205	S
G3		0.246	0.252	0.243	0.018	0.176	S
G4		0.229	0.236	0.23	0.018	-0.05	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.095	0.099	0.101	0.013	-0.453	S
G2		0.124	0.123	0.125	0.015	-0.045	S
G3		0.194	0.195	0.195	0.018	-0.041	S
G4		0.176	0.171	0.171	0.017	0.282	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.189	0.201	0.194	0.012	-0.395	S
G2		0.29	0.295	0.286	0.015	0.245	S
G3		0.359	0.359	0.348	0.016	0.72	S
G4		0.394	0.393	0.379	0.016	0.94	S
G1	Na <sup>+</sup> mg/l	0.721	0.744	0.722	0.037	-0.027	S
G2		1.177	1.19	1.162	0.059	0.259	S
G3		1.049	1.06	1.031	0.05	0.362	S
G4		1.037	1.06	1.019	0.057	0.311	S
G1	Mg <sup>2+</sup> mg/l	0.139	0.134	0.131	0.008	0.897	S
G2		0.117	0.114	0.112	0.008	0.641	S
G3		0.102	0.098	0.099	0.009	0.346	S
G4		0.093	0.092	0.092	0.01	0.095	S
G1	Cl <sup>-</sup> mg/l	0.946	1	0.972	0.034	-0.773	S
G2		1.541	1.58	1.53	0.068	0.167	S
G3		1.404	1.43	1.392	0.058	0.213	S
G4		1.23	1.27	1.227	0.055	0.048	S
G1	Ca <sup>2+</sup> mg/l	0.182	0.166	0.154	0.017	1.62	S
G2		0.147	0.14	0.132	0.011	1.367	S
G3		0.13	0.121	0.119	0.021	0.502	S
G4		0.117	0.114	0.11	0.017	0.401	S
G1	K <sup>+</sup> mg/l	0.111	0.117	0.116	0.01	-0.49	S
G2		0.178	0.181	0.18	0.01	-0.244	S
G3		0.219	0.22	0.219	0.014	-0.003	S
G4		0.192	0.214	0.211	0.014	-1.402	S
G1	pH pH units	5.5	5.48	5.477	0.117	0.196	S
G2		5.39	5.49	5.463	0.099	-0.742	Q
G3		5.49	5.44	5.439	0.129	0.392	S
G4		5.3	5.45	5.46	0.125	-1.288	Q
G1	Cond µS/cm	8.97	9.44	9.701	0.641	-1.141	S
G2		11.3	12	12.028	0.58	-1.254	S
G3		11.25	12	12.072	0.667	-1.233	S
G4		10.75	11.5	11.651	0.735	-1.225	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

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## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### 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 *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.262	0.33	0.316	0.021	-2.605	U
G2		0.227	0.281	0.269	0.02	-2.041	Q
G3		0.221	0.252	0.243	0.018	-1.211	Q
G4		0.202	0.236	0.23	0.018	-1.589	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.1	0.099	0.101	0.013	-0.056	S
G2		0.123	0.123	0.125	0.015	-0.113	S
G3		0.19	0.195	0.195	0.018	-0.269	S
G4		0.167	0.171	0.171	0.017	-0.249	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.174	0.201	0.194	0.012	-1.639	S
G2		0.259	0.295	0.286	0.015	-1.865	S
G3		0.325	0.359	0.348	0.016	-1.442	S
G4		0.353	0.393	0.379	0.016	-1.617	S
G1	Na <sup>+</sup> mg/l	0.726	0.744	0.722	0.037	0.107	S
G2		1.173	1.19	1.162	0.059	0.191	S
G3		1.046	1.06	1.031	0.05	0.302	S
G4		1.035	1.06	1.019	0.057	0.277	S
G1	Mg <sup>2+</sup> mg/l	0.13	0.134	0.131	0.008	-0.166	S
G2		0.108	0.114	0.112	0.008	-0.527	S
G3		0.093	0.098	0.099	0.009	-0.65	S
G4		0.087	0.092	0.092	0.01	-0.514	S
G1	Cl <sup>-</sup> mg/l	0.941	1	0.972	0.034	-0.922	S
G2		1.506	1.58	1.53	0.068	-0.35	S
G3		1.383	1.43	1.392	0.058	-0.147	S
G4		1.201	1.27	1.227	0.055	-0.483	S
G1	Ca <sup>2+</sup> mg/l	0.158	0.166	0.154	0.017	0.247	S
G2		0.131	0.14	0.132	0.011	-0.073	S
G3		0.115	0.121	0.119	0.021	-0.203	S
G4		0.107	0.114	0.11	0.017	-0.177	S
G1	K <sup>+</sup> mg/l	0.111	0.117	0.116	0.01	-0.49	S
G2		0.177	0.181	0.18	0.01	-0.342	S
G3		0.216	0.22	0.219	0.014	-0.211	S
G4		0.206	0.214	0.211	0.014	-0.39	S
G1	pH pH units	5.46	5.48	5.477	0.117	-0.145	S
G2		5.48	5.49	5.463	0.099	0.169	S
G3		5.5	5.44	5.439	0.129	0.47	S
G4		5.43	5.45	5.46	0.125	-0.244	S
G1	Cond µS/cm	9.97	9.44	9.701	0.641	0.419	S
G2		12.8	12	12.028	0.58	1.331	S
G3		12.68	12	12.072	0.667	0.912	S
G4		12.48	11.5	11.651	0.735	1.128	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 32, Center for Physical Sciences and Technology (Lithuania)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.322	0.33	0.316	0.021	0.289	S
G2		0.273	0.281	0.269	0.02	0.205	S
G3		0.243	0.252	0.243	0.018	0.009	S
G4		0.232	0.236	0.23	0.018	0.121	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.112	0.099	0.101	0.013	0.897	S
G2		0.134	0.123	0.125	0.015	0.635	S
G3		0.197	0.195	0.195	0.018	0.131	S
G4		0.184	0.171	0.171	0.017	0.754	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.19	0.201	0.194	0.012	-0.313	S
G2		0.279	0.295	0.286	0.015	-0.504	S
G3		0.341	0.359	0.348	0.016	-0.425	S
G4		0.384	0.393	0.379	0.016	0.317	S
G1	Na <sup>+</sup> mg/l	0.742	0.744	0.722	0.037	0.537	S
G2		1.154	1.19	1.162	0.059	-0.131	S
G3		1.029	1.06	1.031	0.05	-0.036	S
G4		1.02	1.06	1.019	0.057	0.015	S
G1	Mg <sup>2+</sup> mg/l	0.139	0.134	0.131	0.008	0.897	S
G2		0.139	0.114	0.112	0.008	3.496	Q
G3		0.133	0.098	0.099	0.009	3.776	U
G4		0.119	0.092	0.092	0.01	2.734	U
G1	Cl <sup>-</sup> mg/l	0.97	1	0.972	0.034	-0.058	S
G2		1.528	1.58	1.53	0.068	-0.025	S
G3		1.392	1.43	1.392	0.058	0.008	S
G4		1.229	1.27	1.227	0.055	0.03	S
G1	Ca <sup>2+</sup> mg/l	0.095	0.166	0.154	0.017	-3.358	U
G2		0.119	0.14	0.132	0.011	-1.153	Q
G3		0.12	0.121	0.119	0.021	0.032	S
G4		0.104	0.114	0.11	0.017	-0.35	S
G1	K <sup>+</sup> mg/l	0.098	0.117	0.116	0.01	-1.856	Q
G2		0.166	0.181	0.18	0.01	-1.419	S
G3		0.225	0.22	0.219	0.014	0.413	S
G4		0.216	0.214	0.211	0.014	0.334	S
G1	pH pH units	5.49	5.48	5.477	0.117	0.111	S
G2		5.46	5.49	5.463	0.099	-0.033	S
G3		5.4	5.44	5.439	0.129	-0.306	S
G4		5.43	5.45	5.46	0.125	-0.244	S
G1	Cond µS/cm	9.5	9.44	9.701	0.641	-0.314	S
G2		12.05	12	12.028	0.58	0.038	S
G3		12.14	12	12.072	0.667	0.102	S
G4		11.57	11.5	11.651	0.735	-0.11	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 33, Latvian Environment, Geology and Meteorology Centre (Latvia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.27	0.33	0.316	0.021	-2.22	Q
G2		0.225	0.281	0.269	0.02	-2.139	Q
G3		0.196	0.252	0.243	0.018	-2.598	U
G4		0.19	0.236	0.23	0.018	-2.273	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.091	0.099	0.101	0.013	-0.771	S
G2		0.112	0.123	0.125	0.015	-0.861	S
G3		0.178	0.195	0.195	0.018	-0.953	S
G4		0.159	0.171	0.171	0.017	-0.721	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.185	0.201	0.194	0.012	-0.727	S
G2		0.274	0.295	0.286	0.015	-0.844	S
G3		0.325	0.359	0.348	0.016	-1.442	S
G4		0.363	0.393	0.379	0.016	-0.993	S
G1	Na <sup>+</sup> mg/l	0.734	0.744	0.722	0.037	0.322	S
G2		1.202	1.19	1.162	0.059	0.683	S
G3		1.067	1.06	1.031	0.05	0.72	S
G4		1.074	1.06	1.019	0.057	0.957	S
G1	Mg <sup>2+</sup> mg/l	0.134	0.134	0.131	0.008	0.307	S
G2		0.121	0.114	0.112	0.008	1.16	S
G3		0.114	0.098	0.099	0.009	1.674	Q
G4		0.102	0.092	0.092	0.01	1.008	S
G1	Cl <sup>-</sup> mg/l	0.93	1	0.972	0.034	-1.25	S
G2		1.507	1.58	1.53	0.068	-0.336	S
G3		1.348	1.43	1.392	0.058	-0.746	S
G4		1.191	1.27	1.227	0.055	-0.666	S
G1	Ca <sup>2+</sup> mg/l	0.116	0.166	0.154	0.017	-2.156	U
G2		0.133	0.14	0.132	0.011	0.107	S
G3		0.106	0.121	0.119	0.021	-0.626	S
G4		0.077	0.114	0.11	0.017	-1.908	U
G1	K <sup>+</sup> mg/l	0.129	0.117	0.116	0.01	1.401	S
G2		0.198	0.181	0.18	0.01	1.713	S
G3		0.242	0.22	0.219	0.014	1.59	S
G4		0.237	0.214	0.211	0.014	1.853	S
G1	pH pH units	5.8	5.48	5.477	0.117	2.758	U
G2		5.6	5.49	5.463	0.099	1.383	Q
G3		5.5	5.44	5.439	0.129	0.47	S
G4		5.5	5.45	5.46	0.125	0.318	S
G1	Cond µS/cm	10.2	9.44	9.701	0.641	0.778	S
G2		13	12	12.028	0.58	1.676	S
G3		13	12	12.072	0.667	1.392	S
G4		12.8	11.5	11.651	0.735	1.563	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### 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> mg S/l	0.275	0.33	0.316	0.021	-1.978	Q
G2		0.226	0.281	0.269	0.02	-2.09	Q
G3		0.204	0.252	0.243	0.018	-2.154	Q
G4		0.196	0.236	0.23	0.018	-1.931	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.144	0.099	0.101	0.013	3.438	U
G2		0.183	0.123	0.125	0.015	3.965	U
G3		0.255	0.195	0.195	0.018	3.439	U
G4		0.221	0.171	0.171	0.017	2.936	U
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.177	0.201	0.194	0.012	-1.39	S
G2		0.267	0.295	0.286	0.015	-1.32	S
G3		0.331	0.359	0.348	0.016	-1.061	S
G4		0.358	0.393	0.379	0.016	-1.305	S
G1	Na <sup>+</sup> mg/l	0.604	0.744	0.722	0.037	-3.172	Q
G2		0.923	1.19	1.162	0.059	-4.051	Q
G3		0.817	1.06	1.031	0.05	-4.26	Q
G4		0.793	1.06	1.019	0.057	-3.942	U
G1	Mg <sup>2+</sup> mg/l	0.077	0.134	0.131	0.008	-6.421	U
G2		0.086	0.114	0.112	0.008	-3.382	Q
G3		0.237	0.098	0.099	0.009	15.282	U
G4		0.273	0.092	0.092	0.01	18.366	U
G1	Cl <sup>-</sup> mg/l	0.735	1	0.972	0.034	-7.061	U
G2		1.207	1.58	1.53	0.068	-4.774	Q
G3		1.118	1.43	1.392	0.058	-4.684	Q
G4		0.965	1.27	1.227	0.055	-4.806	Q
G1	Ca <sup>2+</sup> mg/l	0.114	0.166	0.154	0.017	-2.271	U
G2		0.116	0.14	0.132	0.011	-1.422	Q
G3		0.318	0.121	0.119	0.021	9.34	U
G4		0.37	0.114	0.11	0.017	15.003	U
G1	K <sup>+</sup> mg/l	0.309	0.117	0.116	0.01	20.31	U
G2		0.259	0.181	0.18	0.01	7.684	U
G3		0.468	0.22	0.219	0.014	17.239	U
G4		0.629	0.214	0.211	0.014	30.211	U
G1	pH pH units	5.83	5.48	5.477	0.117	3.014	U
G2		5.8	5.49	5.463	0.099	3.406	U
G3		14.6	5.44	5.439	0.129	71.09	U
G4		5.61	5.45	5.46	0.125	1.201	Q
G1	Cond µS/cm	19.8	9.44	9.701	0.641	15.761	U
G2		13.8	12	12.028	0.58	3.054	Q
G3		14.6	12	12.072	0.667	3.792	Q
G4		13.3	11.5	11.651	0.735	2.243	Q

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.331	0.33	0.316	0.021	0.723	S
G2		0.281	0.281	0.269	0.02	0.596	S
G3		0.253	0.252	0.243	0.018	0.564	S
G4		0.236	0.236	0.23	0.018	0.349	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.095	0.099	0.101	0.013	-0.453	S
G2		0.117	0.123	0.125	0.015	-0.521	S
G3		0.188	0.195	0.195	0.018	-0.383	S
G4		0.163	0.171	0.171	0.017	-0.485	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.197	0.201	0.194	0.012	0.268	S
G2		0.291	0.295	0.286	0.015	0.313	S
G3		0.355	0.359	0.348	0.016	0.465	S
G4		0.386	0.393	0.379	0.016	0.441	S
G1	Na <sup>+</sup> mg/l	0.739	0.744	0.722	0.037	0.456	S
G2		1.199	1.19	1.162	0.059	0.633	S
G3		1.065	1.06	1.031	0.05	0.681	S
G4		1.056	1.06	1.019	0.057	0.643	S
G1	Mg <sup>2+</sup> mg/l	0.13	0.134	0.131	0.008	-0.166	S
G2		0.109	0.114	0.112	0.008	-0.397	S
G3		0.094	0.098	0.099	0.009	-0.539	S
G4		0.087	0.092	0.092	0.01	-0.514	S
G1	Cl <sup>-</sup> mg/l	1.016	1	0.972	0.034	1.313	S
G2		1.594	1.58	1.53	0.068	0.952	S
G3		1.452	1.43	1.392	0.058	1.035	S
G4		1.283	1.27	1.227	0.055	1.019	S
G1	Ca <sup>2+</sup> mg/l	0.156	0.166	0.154	0.017	0.132	S
G2		0.137	0.14	0.132	0.011	0.467	S
G3		0.113	0.121	0.119	0.021	-0.297	S
G4		0.106	0.114	0.11	0.017	-0.234	S
G1	K <sup>+</sup> mg/l	0.114	0.117	0.116	0.01	-0.175	S
G2		0.185	0.181	0.18	0.01	0.441	S
G3		0.222	0.22	0.219	0.014	0.205	S
G4		0.216	0.214	0.211	0.014	0.334	S
G1	pH pH units	5.39	5.48	5.477	0.117	-0.743	S
G2		5.44	5.49	5.463	0.099	-0.236	S
G3		5.35	5.44	5.439	0.129	-0.694	S
G4		5.38	5.45	5.46	0.125	-0.646	S
G1	Cond µS/cm	10	9.44	9.701	0.641	0.466	S
G2		12.3	12	12.028	0.58	0.469	S
G3		12.5	12	12.072	0.667	0.642	S
G4		11.9	11.5	11.651	0.735	0.339	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 36, Slovenian Environment Agency (Slovenia)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.313	0.33	0.316	0.021	-0.145	S
G2		0.265	0.281	0.269	0.02	-0.186	S
G3		0.241	0.252	0.243	0.018	-0.102	S
G4		0.226	0.236	0.23	0.018	-0.221	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.101	0.099	0.101	0.013	0.023	S
G2		0.13	0.123	0.125	0.015	0.363	S
G3		0.194	0.195	0.195	0.018	-0.041	S
G4		0.169	0.171	0.171	0.017	-0.131	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.192	0.201	0.194	0.012	-0.147	S
G2		0.285	0.295	0.286	0.015	-0.096	S
G3		0.346	0.359	0.348	0.016	-0.107	S
G4		0.377	0.393	0.379	0.016	-0.12	S
G1	Na <sup>+</sup> mg/l	0.728	0.744	0.722	0.037	0.161	S
G2		1.173	1.19	1.162	0.059	0.191	S
G3		1.046	1.06	1.031	0.05	0.302	S
G4		1.036	1.06	1.019	0.057	0.294	S
G1	Mg <sup>2+</sup> mg/l	0.134	0.134	0.131	0.008	0.307	S
G2		0.111	0.114	0.112	0.008	-0.138	S
G3		0.099	0.098	0.099	0.009	0.014	S
G4		0.092	0.092	0.092	0.01	-0.007	S
G1	Cl <sup>-</sup> mg/l	0.975	1	0.972	0.034	0.091	S
G2		1.57	1.58	1.53	0.068	0.597	S
G3		1.424	1.43	1.392	0.058	0.555	S
G4		1.253	1.27	1.227	0.055	0.47	S
G1	Ca <sup>2+</sup> mg/l	0.164	0.166	0.154	0.017	0.59	S
G2		0.137	0.14	0.132	0.011	0.467	S
G3		0.127	0.121	0.119	0.021	0.361	S
G4		0.117	0.114	0.11	0.017	0.401	S
G1	K <sup>+</sup> mg/l	0.12	0.117	0.116	0.01	0.455	S
G2		0.179	0.181	0.18	0.01	-0.146	S
G3		0.22	0.22	0.219	0.014	0.066	S
G4		0.207	0.214	0.211	0.014	-0.317	S
G1	pH pH units	5.46	5.48	5.477	0.117	-0.145	S
G2		5.49	5.49	5.463	0.099	0.27	S
G3		5.49	5.44	5.439	0.129	0.392	S
G4		5.45	5.45	5.46	0.125	-0.084	S
G1	Cond µS/cm	9.4	9.44	9.701	0.641	-0.47	S
G2		11.8	12	12.028	0.58	-0.392	S
G3		11.9	12	12.072	0.667	-0.258	S
G4		11.4	11.5	11.651	0.735	-0.341	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.321	0.33	0.316	0.021	0.241	S
G2		0.282	0.281	0.269	0.02	0.644	S
G3		0.255	0.252	0.243	0.018	0.675	S
G4		0.238	0.236	0.23	0.018	0.463	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.152	0.099	0.101	0.013	4.074	U
G2		0.168	0.123	0.125	0.015	2.946	U
G3		0.223	0.195	0.195	0.018	1.614	S
G4		0.211	0.171	0.171	0.017	2.346	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.19	0.201	0.194	0.012	-0.313	S
G2		0.287	0.295	0.286	0.015	0.04	S
G3		0.349	0.359	0.348	0.016	0.084	S
G4		0.381	0.393	0.379	0.016	0.129	S
G1	Na <sup>+</sup> mg/l	0.656	0.744	0.722	0.037	-1.774	S
G2		1.104	1.19	1.162	0.059	-0.979	S
G3		1.024	1.06	1.031	0.05	-0.136	S
G4		1.013	1.06	1.019	0.057	-0.107	S
G1	Mg <sup>2+</sup> mg/l	0.091	0.134	0.131	0.008	-4.768	U
G2		0.121	0.114	0.112	0.008	1.16	S
G3		0.112	0.098	0.099	0.009	1.452	S
G4		0.101	0.092	0.092	0.01	0.907	S
G1	Cl <sup>-</sup> mg/l	0.961	1	0.972	0.034	-0.326	S
G2		1.559	1.58	1.53	0.068	0.434	S
G3		1.413	1.43	1.392	0.058	0.367	S
G4		1.245	1.27	1.227	0.055	0.323	S
G1	Ca <sup>2+</sup> mg/l	0.203	0.166	0.154	0.017	2.821	Q
G2		0.213	0.14	0.132	0.011	7.305	U
G3		0.18	0.121	0.119	0.021	2.853	U
G4		0.151	0.114	0.11	0.017	2.363	U
G1	K <sup>+</sup> mg/l	0.106	0.117	0.116	0.01	-1.015	S
G2		0.174	0.181	0.18	0.01	-0.636	S
G3		0.188	0.22	0.219	0.014	-2.15	S
G4		0.184	0.214	0.211	0.014	-1.981	S
G1	pH pH units	5.55	5.48	5.477	0.117	0.623	S
G2		5.52	5.49	5.463	0.099	0.573	S
G3		5.52	5.44	5.439	0.129	0.625	S
G4		5.55	5.45	5.46	0.125	0.719	S
G1	Cond µS/cm	9.69	9.44	9.701	0.641	-0.018	S
G2		12.35	12	12.028	0.58	0.555	S
G3		12.04	12	12.072	0.667	-0.048	S
G4		11.63	11.5	11.651	0.735	-0.028	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 39, Central Environmental Analysis Laboratory - CentLab (Poland)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.33	0.33	0.316	0.021	0.675	S
G2		0.27	0.281	0.269	0.02	0.058	S
G3		0.25	0.252	0.243	0.018	0.398	S
G4		0.24	0.236	0.23	0.018	0.577	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.1	0.099	0.101	0.013	-0.056	S
G2		0.12	0.123	0.125	0.015	-0.317	S
G3		0.19	0.195	0.195	0.018	-0.269	S
G4		0.11	0.171	0.171	0.017	-3.611	U
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.2	0.201	0.194	0.012	0.516	S
G2		0.28	0.295	0.286	0.015	-0.436	S
G3		0.35	0.359	0.348	0.016	0.148	S
G4		0.38	0.393	0.379	0.016	0.067	S
G1	Na <sup>+</sup> mg/l	0.69	0.744	0.722	0.037	-0.861	S
G2		1.07	1.19	1.162	0.059	-1.556	S
G3		0.95	1.06	1.031	0.05	-1.61	S
G4		0.94	1.06	1.019	0.057	-1.38	S
G1	Mg <sup>2+</sup> mg/l	0.13	0.134	0.131	0.008	-0.166	S
G2		0.12	0.114	0.112	0.008	1.03	S
G3		0.1	0.098	0.099	0.009	0.125	S
G4		0.1	0.092	0.092	0.01	0.805	S
G1	Cl <sup>-</sup> mg/l	0.97	1	0.972	0.034	-0.058	S
G2		1.55	1.58	1.53	0.068	0.301	S
G3		1.4	1.43	1.392	0.058	0.145	S
G4		1.24	1.27	1.227	0.055	0.231	S
G1	Ca <sup>2+</sup> mg/l	0.16	0.166	0.154	0.017	0.361	S
G2		0.13	0.14	0.132	0.011	-0.163	S
G3		0.11	0.121	0.119	0.021	-0.438	S
G4		0.11	0.114	0.11	0.017	-0.004	S
G1	K <sup>+</sup> mg/l	0.12	0.117	0.116	0.01	0.455	S
G2		0.19	0.181	0.18	0.01	0.93	S
G3		0.23	0.22	0.219	0.014	0.759	S
G4		0.22	0.214	0.211	0.014	0.623	S
G1	pH pH units	5.89	5.48	5.477	0.117	3.526	U
G2		5.93	5.49	5.463	0.099	4.721	U
G3		5.92	5.44	5.439	0.129	3.729	U
G4		6.04	5.45	5.46	0.125	4.653	U
G1	Cond µS/cm	9.33	9.44	9.701	0.641	-0.579	S
G2		12.08	12	12.028	0.58	0.09	S
G3		11.89	12	12.072	0.667	-0.273	S
G4		11.39	11.5	11.651	0.735	-0.354	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 42, Environment Reference Laboratory, Environment Agency  
(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> mg S/l	0.161	0.33	0.316	0.021	-7.478	U
G2		0.031	0.281	0.269	0.02	-11.613	U
G3		0.027	0.252	0.243	0.018	-11.972	U
G4		0.025	0.236	0.23	0.018	-11.681	U
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	-999	0.099	0.101	0.013		B
G2		-999	0.123	0.125	0.015		B
G3		-999	0.195	0.195	0.018		B
G4		-999	0.171	0.171	0.017		B
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.372	0.201	0.194	0.012	14.774	U
G2		0.026	0.295	0.286	0.015	-17.718	U
G3		0.032	0.359	0.348	0.016	-20.074	U
G4		0.034	0.393	0.379	0.016	-21.513	U
G1	Na <sup>+</sup> mg/l	-999	0.744	0.722	0.037		B
G2		-999	1.19	1.162	0.059		B
G3		-999	1.06	1.031	0.05		B
G4		-999	1.06	1.019	0.057		B
G1	Mg <sup>2+</sup> mg/l	-999	0.134	0.131	0.008		B
G2		-999	0.114	0.112	0.008		B
G3		-999	0.098	0.099	0.009		B
G4		-999	0.092	0.092	0.01		B
G1	Cl <sup>-</sup> mg/l	0.978	1	0.972	0.034	0.18	S
G2		0.133	1.58	1.53	0.068	-20.664	U
G3		0.127	1.43	1.392	0.058	-21.654	U
G4		0.114	1.27	1.227	0.055	-20.393	U
G1	Ca <sup>2+</sup> mg/l	-999	0.166	0.154	0.017		B
G2		-999	0.14	0.132	0.011		B
G3		-999	0.121	0.119	0.021		B
G4		-999	0.114	0.11	0.017		B
G1	K <sup>+</sup> mg/l	-999	0.117	0.116	0.01		B
G2		-999	0.181	0.18	0.01		B
G3		-999	0.22	0.219	0.014		B
G4		-999	0.214	0.211	0.014		B
G1	pH pH units	5.604	5.48	5.477	0.117	1.084	Q
G2		5.541	5.49	5.463	0.099	0.786	S
G3		5.546	5.44	5.439	0.129	0.827	Q
G4		5.479	5.45	5.46	0.125	0.149	S
G1	Cond µS/cm	10.45	9.44	9.701	0.641	1.168	S
G2		13.04	12	12.028	0.58	1.744	S
G3		12.75	12	12.072	0.667	1.017	S
G4		12.8	11.5	11.651	0.735	1.563	S

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.

\* Z score is unitless

☒ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

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## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 45, Hydrometeorology and Monitoring Center (Armenia)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.352	0.33	0.316	0.021	1.746	S
G2		0.302	0.281	0.269	0.02	1.646	S
G3		0.279	0.252	0.243	0.018	2.006	Q
G4		0.254	0.236	0.23	0.018	1.381	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.03	0.099	0.101	0.013	-5.616	U
G2		0.044	0.123	0.125	0.015	-5.482	U
G3		0.068	0.195	0.195	0.018	-7.228	U
G4		0.063	0.171	0.171	0.017	-6.382	U
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.224	0.201	0.194	0.012	2.539	S
G2		0.322	0.295	0.286	0.015	2.415	S
G3		0.397	0.359	0.348	0.016	3.162	S
G4		0.419	0.393	0.379	0.016	2.506	S
G1	Na <sup>+</sup> mg/l	0.704	0.744	0.722	0.037	-0.484	S
G2		1.076	1.19	1.162	0.059	-1.455	S
G3		0.894	1.06	1.031	0.05	-2.726	Q
G4		0.927	1.06	1.019	0.057	-1.61	S
G1	Mg <sup>2+</sup> mg/l	0.133	0.134	0.131	0.008	0.189	S
G2		0.112	0.114	0.112	0.008	-0.008	S
G3		0.098	0.098	0.099	0.009	-0.052	S
G4		0.094	0.092	0.092	0.01	0.216	S
G1	Cl <sup>-</sup> mg/l	1.001	1	0.972	0.034	0.863	S
G2		1.612	1.58	1.53	0.068	1.216	S
G3		1.458	1.43	1.392	0.058	1.138	S
G4		1.257	1.27	1.227	0.055	0.541	S
G1	Ca <sup>2+</sup> mg/l	0.14	0.166	0.154	0.017	-0.783	Q
G2		0.119	0.14	0.132	0.011	-1.153	Q
G3		0.116	0.121	0.119	0.021	-0.156	S
G4		0.107	0.114	0.11	0.017	-0.177	S
G1	K <sup>+</sup> mg/l	0.117	0.117	0.116	0.01	0.14	S
G2		0.175	0.181	0.18	0.01	-0.538	S
G3		0.214	0.22	0.219	0.014	-0.349	S
G4		0.213	0.214	0.211	0.014	0.117	S
G1	pH pH units	5.455	5.48	5.477	0.117	-0.188	S
G2		5.321	5.49	5.463	0.099	-1.44	Q
G3		5.279	5.44	5.439	0.129	-1.245	Q
G4		5.559	5.45	5.46	0.125	0.791	Q
G1	Cond µS/cm	9.9	9.44	9.701	0.641	0.31	S
G2		12.4	12	12.028	0.58	0.642	S
G3		12.3	12	12.072	0.667	0.342	S
G4		11.7	11.5	11.651	0.735	0.067	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### 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> mg S/l	-999	0.33	0.316	0.021		B
G2		-999	0.281	0.269	0.02		B
G3		-999	0.252	0.243	0.018		B
G4		-999	0.236	0.23	0.018		B
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	-999	0.099	0.101	0.013		B
G2		-999	0.123	0.125	0.015		B
G3		-999	0.195	0.195	0.018		B
G4		-999	0.171	0.171	0.017		B
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	-999	0.201	0.194	0.012		B
G2		-999	0.295	0.286	0.015		B
G3		-999	0.359	0.348	0.016		B
G4		-999	0.393	0.379	0.016		B
G1	Na <sup>+</sup> mg/l	-999	0.744	0.722	0.037		B
G2		-999	1.19	1.162	0.059		B
G3		-999	1.06	1.031	0.05		B
G4		-999	1.06	1.019	0.057		B
G1	Mg <sup>2+</sup> mg/l	-999	0.134	0.131	0.008		B
G2		-999	0.114	0.112	0.008		B
G3		-999	0.098	0.099	0.009		B
G4		-999	0.092	0.092	0.01		B
G1	Cl <sup>-</sup> mg/l	-999	1	0.972	0.034		B
G2		-999	1.58	1.53	0.068		B
G3		-999	1.43	1.392	0.058		B
G4		-999	1.27	1.227	0.055		B
G1	Ca <sup>2+</sup> mg/l	-999	0.166	0.154	0.017		B
G2		-999	0.14	0.132	0.011		B
G3		-999	0.121	0.119	0.021		B
G4		-999	0.114	0.11	0.017		B
G1	K <sup>+</sup> mg/l	-999	0.117	0.116	0.01		B
G2		-999	0.181	0.18	0.01		B
G3		-999	0.22	0.219	0.014		B
G4		-999	0.214	0.211	0.014		B
G1	pH pH units	5.39	5.48	5.477	0.117	-0.743	S
G2		5.4	5.49	5.463	0.099	-0.64	S
G3		5.37	5.44	5.439	0.129	-0.539	S
G4		5.39	5.45	5.46	0.125	-0.565	S
G1	Cond µS/cm	9.07	9.44	9.701	0.641	-0.985	S
G2		11.48	12	12.028	0.58	-0.944	S
G3		11.39	12	12.072	0.667	-1.023	S
G4		10.93	11.5	11.651	0.735	-0.98	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 47, Jelenia Gora (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> mg S/l	0.32	0.33	0.316	0.021	0.192	S
G2		0.265	0.281	0.269	0.02	-0.186	S
G3		0.242	0.252	0.243	0.018	-0.046	S
G4		0.228	0.236	0.23	0.018	-0.107	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.13	0.099	0.101	0.013	2.326	U
G2		0.156	0.123	0.125	0.015	2.13	U
G3		0.22	0.195	0.195	0.018	1.443	S
G4		0.202	0.171	0.171	0.017	1.815	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.207	0.201	0.194	0.012	1.097	S
G2		0.292	0.295	0.286	0.015	0.381	S
G3		0.35	0.359	0.348	0.016	0.148	S
G4		0.384	0.393	0.379	0.016	0.317	S
G1	Na <sup>+</sup> mg/l	0.728	0.744	0.722	0.037	0.161	S
G2		1.16	1.19	1.162	0.059	-0.029	S
G3		1.021	1.06	1.031	0.05	-0.196	S
G4		1	1.06	1.019	0.057	-0.334	S
G1	Mg <sup>2+</sup> mg/l	0.131	0.134	0.131	0.008	-0.047	S
G2		0.112	0.114	0.112	0.008	-0.008	S
G3		0.097	0.098	0.099	0.009	-0.207	S
G4		0.091	0.092	0.092	0.01	-0.108	S
G1	Cl <sup>-</sup> mg/l	0.954	1	0.972	0.034	-0.535	S
G2		1.521	1.58	1.53	0.068	-0.128	S
G3		1.369	1.43	1.392	0.058	-0.386	S
G4		1.205	1.27	1.227	0.055	-0.41	S
G1	Ca <sup>2+</sup> mg/l	0.148	0.166	0.154	0.017	-0.326	S
G2		0.138	0.14	0.132	0.011	0.557	S
G3		0.113	0.121	0.119	0.021	-0.297	S
G4		0.117	0.114	0.11	0.017	0.401	S
G1	K <sup>+</sup> mg/l	0.121	0.117	0.116	0.01	0.56	S
G2		0.181	0.181	0.18	0.01	0.05	S
G3		0.218	0.22	0.219	0.014	-0.072	S
G4		0.24	0.214	0.211	0.014	2.07	S
G1	pH pH units	5.28	5.48	5.477	0.117	-1.682	U
G2		5.29	5.49	5.463	0.099	-1.753	U
G3		5.22	5.44	5.439	0.129	-1.703	U
G4		5.29	5.45	5.46	0.125	-1.368	Q
G1	Cond µS/cm	9.5	9.44	9.701	0.641	-0.314	S
G2		11.9	12	12.028	0.58	-0.22	S
G3		12.3	12	12.072	0.667	0.342	S
G4		11.5	11.5	11.651	0.735	-0.205	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 48, Monitoring waterkwaliteit 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> mg S/l	0.588	0.33	0.316	0.021	13.106	U
G2		0.316	0.281	0.269	0.02	2.324	Q
G3		0.387	0.252	0.243	0.018	7.975	U
G4		0.225	0.236	0.23	0.018	-0.289	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.114	0.099	0.101	0.013	1.056	Q
G2		0.133	0.123	0.125	0.015	0.567	S
G3		0.209	0.195	0.195	0.018	0.815	S
G4		0.182	0.171	0.171	0.017	0.636	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.218	0.201	0.194	0.012	2.009	S
G2		0.326	0.295	0.286	0.015	2.694	S
G3		0.388	0.359	0.348	0.016	2.564	S
G4		0.414	0.393	0.379	0.016	2.188	S
G1	Na <sup>+</sup> mg/l	-999	0.744	0.722	0.037		B
G2		-999	1.19	1.162	0.059		B
G3		-999	1.06	1.031	0.05		B
G4		-999	1.06	1.019	0.057		B
G1	Mg <sup>2+</sup> mg/l	-999	0.134	0.131	0.008		B
G2		-999	0.114	0.112	0.008		B
G3		-999	0.098	0.099	0.009		B
G4		-999	0.092	0.092	0.01		B
G1	Cl <sup>-</sup> mg/l	1.034	1	0.972	0.034	1.849	S
G2		1.491	1.58	1.53	0.068	-0.572	S
G3		1.371	1.43	1.392	0.058	-0.352	S
G4		1.167	1.27	1.227	0.055	-1.106	S
G1	Ca <sup>2+</sup> mg/l	-999	0.166	0.154	0.017		B
G2		-999	0.14	0.132	0.011		B
G3		-999	0.121	0.119	0.021		B
G4		-999	0.114	0.11	0.017		B
G1	K <sup>+</sup> mg/l	-999	0.117	0.116	0.01		B
G2		-999	0.181	0.18	0.01		B
G3		-999	0.22	0.219	0.014		B
G4		-999	0.214	0.211	0.014		B
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

### Laboratory 49, The Cyprus Institute (Cyl) (Cyprus)

#### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.327	0.33	0.316	0.021	0.53	S
G2		0.283	0.281	0.269	0.02	0.693	S
G3		0.26	0.252	0.243	0.018	0.952	S
G4		0.246	0.236	0.23	0.018	0.919	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.109	0.099	0.101	0.013	0.658	S
G2		0.138	0.123	0.125	0.015	0.907	S
G3		0.211	0.195	0.195	0.018	0.929	S
G4		0.183	0.171	0.171	0.017	0.695	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.201	0.201	0.194	0.012	0.599	S
G2		0.297	0.295	0.286	0.015	0.721	S
G3		0.361	0.359	0.348	0.016	0.847	S
G4		0.395	0.393	0.379	0.016	1.003	S
G1	Na <sup>+</sup> mg/l	0.752	0.744	0.722	0.037	0.806	S
G2		1.213	1.19	1.162	0.059	0.87	S
G3		1.081	1.06	1.031	0.05	0.999	S
G4		1.071	1.06	1.019	0.057	0.904	S
G1	Mg <sup>2+</sup> mg/l	0.133	0.134	0.131	0.008	0.189	S
G2		0.114	0.114	0.112	0.008	0.252	S
G3		0.098	0.098	0.099	0.009	-0.097	S
G4		0.092	0.092	0.092	0.01	-0.007	S
G1	Cl <sup>-</sup> mg/l	1.007	1	0.972	0.034	1.044	S
G2		1.595	1.58	1.53	0.068	0.966	S
G3		1.448	1.43	1.392	0.058	0.966	S
G4		1.281	1.27	1.227	0.055	0.982	S
G1	Ca <sup>2+</sup> mg/l	0.157	0.166	0.154	0.017	0.189	S
G2		0.132	0.14	0.132	0.011	0.017	S
G3		0.113	0.121	0.119	0.021	-0.297	S
G4		0.105	0.114	0.11	0.017	-0.292	S
G1	K <sup>+</sup> mg/l	0.12	0.117	0.116	0.01	0.455	S
G2		0.18	0.181	0.18	0.01	-0.048	S
G3		0.215	0.22	0.219	0.014	-0.28	S
G4		0.208	0.214	0.211	0.014	-0.245	S
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 50, CEA Saclay - Orme des Merisiers (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> mg S/l	0.341	0.33	0.316	0.021	1.205	S
G2		0.281	0.281	0.269	0.02	0.596	S
G3		0.251	0.252	0.243	0.018	0.453	S
G4		0.234	0.236	0.23	0.018	0.235	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.114	0.099	0.101	0.013	1.056	Q
G2		0.146	0.123	0.125	0.015	1.45	Q
G3		0.226	0.195	0.195	0.018	1.785	Q
G4		0.198	0.171	0.171	0.017	1.579	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.196	0.201	0.194	0.012	0.185	S
G2		0.268	0.295	0.286	0.015	-1.252	S
G3		0.33	0.359	0.348	0.016	-1.124	S
G4		0.363	0.393	0.379	0.016	-0.993	S
G1	Na <sup>+</sup> mg/l	0.721	0.744	0.722	0.037	-0.027	S
G2		1.186	1.19	1.162	0.059	0.412	S
G3		1.046	1.06	1.031	0.05	0.302	S
G4		1.035	1.06	1.019	0.057	0.277	S
G1	Mg <sup>2+</sup> mg/l	0.136	0.134	0.131	0.008	0.543	S
G2		0.113	0.114	0.112	0.008	0.122	S
G3		0.098	0.098	0.099	0.009	-0.097	S
G4		0.091	0.092	0.092	0.01	-0.108	S
G1	Cl <sup>-</sup> mg/l	0.966	1	0.972	0.034	-0.177	S
G2		1.549	1.58	1.53	0.068	0.286	S
G3		1.402	1.43	1.392	0.058	0.179	S
G4		1.238	1.27	1.227	0.055	0.195	S
G1	Ca <sup>2+</sup> mg/l	0.154	0.166	0.154	0.017	0.018	S
G2		0.134	0.14	0.132	0.011	0.197	S
G3		0.113	0.121	0.119	0.021	-0.297	S
G4		0.106	0.114	0.11	0.017	-0.234	S
G1	K <sup>+</sup> mg/l	0.111	0.117	0.116	0.01	-0.49	S
G2		0.181	0.181	0.18	0.01	0.05	S
G3		0.212	0.22	0.219	0.014	-0.488	S
G4		0.207	0.214	0.211	0.014	-0.317	S
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 54, Central Research Laboratory Division in Lublin (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> mg S/l	0.318	0.33	0.316	0.021	0.096	S
G2		0.27	0.281	0.269	0.02	0.058	S
G3		0.249	0.252	0.243	0.018	0.342	S
G4		0.235	0.236	0.23	0.018	0.292	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.107	0.099	0.101	0.013	0.5	S
G2		0.135	0.123	0.125	0.015	0.703	S
G3		0.205	0.195	0.195	0.018	0.587	S
G4		0.18	0.171	0.171	0.017	0.518	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.194	0.201	0.194	0.012	0.019	S
G2		0.29	0.295	0.286	0.015	0.245	S
G3		0.356	0.359	0.348	0.016	0.529	S
G4		0.39	0.393	0.379	0.016	0.691	S
G1	Na <sup>+</sup> mg/l	0.7	0.744	0.722	0.037	-0.592	S
G2		1.125	1.19	1.162	0.059	-0.623	S
G3		0.991	1.06	1.031	0.05	-0.793	S
G4		0.962	1.06	1.019	0.057	-0.996	S
G1	Mg <sup>2+</sup> mg/l	0.134	0.134	0.131	0.008	0.307	S
G2		0.111	0.114	0.112	0.008	-0.138	S
G3		0.095	0.098	0.099	0.009	-0.429	S
G4		0.09	0.092	0.092	0.01	-0.21	S
G1	Cl <sup>-</sup> mg/l	0.972	1	0.972	0.034	0.001	S
G2		1.552	1.58	1.53	0.068	0.33	S
G3		1.407	1.43	1.392	0.058	0.264	S
G4		1.248	1.27	1.227	0.055	0.378	S
G1	Ca <sup>2+</sup> mg/l	0.138	0.166	0.154	0.017	-0.898	Q
G2		0.122	0.14	0.132	0.011	-0.883	S
G3		0.107	0.121	0.119	0.021	-0.579	S
G4		0.098	0.114	0.11	0.017	-0.696	S
G1	K <sup>+</sup> mg/l	0.118	0.117	0.116	0.01	0.245	S
G2		0.182	0.181	0.18	0.01	0.147	S
G3		0.212	0.22	0.219	0.014	-0.488	S
G4		0.215	0.214	0.211	0.014	0.262	S
G1	pH pH units	5.22	5.48	5.477	0.117	-2.194	U
G2		5.24	5.49	5.463	0.099	-2.259	U
G3		5.2	5.44	5.439	0.129	-1.858	U
G4		5.23	5.45	5.46	0.125	-1.85	U
G1	Cond µS/cm	9.8	9.44	9.701	0.641	0.154	S
G2		12.9	12	12.028	0.58	1.503	S
G3		13.7	12	12.072	0.667	2.442	S
G4		11.9	11.5	11.651	0.735	0.339	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 110, Thüringer Landesamt für Landwirtschaft und ländlichen Raum (TLLLR) (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm <sup>†</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.28	0.33	0.316	0.021	-1.737	Q
G2		0.27	0.281	0.269	0.02	0.058	S
G3		0.25	0.252	0.243	0.018	0.398	S
G4		0.23	0.236	0.23	0.018	0.007	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.085	0.099	0.101	0.013	-1.248	S
G2		0.106	0.123	0.125	0.015	-1.268	S
G3		0.172	0.195	0.195	0.018	-1.296	S
G4		0.151	0.171	0.171	0.017	-1.193	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.19	0.201	0.194	0.012	-0.313	S
G2		0.29	0.295	0.286	0.015	0.245	S
G3		0.35	0.359	0.348	0.016	0.148	S
G4		0.38	0.393	0.379	0.016	0.067	S
G1	Na <sup>+</sup> mg/l	0.704	0.744	0.722	0.037	-0.484	S
G2		1.14	1.19	1.162	0.059	-0.369	S
G3		1.02	1.06	1.031	0.05	-0.216	S
G4		1.01	1.06	1.019	0.057	-0.159	S
G1	Mg <sup>2+</sup> mg/l	0.137	0.134	0.131	0.008	0.661	S
G2		0.116	0.114	0.112	0.008	0.511	S
G3		0.102	0.098	0.099	0.009	0.346	S
G4		0.095	0.092	0.092	0.01	0.298	S
G1	Cl <sup>-</sup> mg/l	0.983	1	0.972	0.034	0.329	S
G2		1.53	1.58	1.53	0.068	0.005	S
G3		1.41	1.43	1.392	0.058	0.316	S
G4		1.25	1.27	1.227	0.055	0.415	S
G1	Ca <sup>2+</sup> mg/l	0.158	0.166	0.154	0.017	0.247	S
G2		0.132	0.14	0.132	0.011	0.017	S
G3		0.116	0.121	0.119	0.021	-0.156	S
G4		0.11	0.114	0.11	0.017	-0.004	S
G1	K <sup>+</sup> mg/l	0.12	0.117	0.116	0.01	0.455	S
G2		0.182	0.181	0.18	0.01	0.147	S
G3		0.219	0.22	0.219	0.014	-0.003	S
G4		0.216	0.214	0.211	0.014	0.334	S
G1	pH pH units	5.47	5.48	5.477	0.117	-0.06	S
G2		5.46	5.49	5.463	0.099	-0.033	S
G3		5.38	5.44	5.439	0.129	-0.462	S
G4		5.41	5.45	5.46	0.125	-0.405	S
G1	Cond µS/cm	< 10.000	9.44	9.701	0.641		B
G2		10.9	12	12.028	0.58	-1.943	S
G3		10.9	12	12.072	0.667	-1.758	S
G4		10.7	11.5	11.651	0.735	-1.293	S

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.

\* Z score is unitless

✕ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 112, Nordwestdeutsche Forstliche Versuchsanstalt (NFV) (Germany)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.337	0.33	0.316	0.021	1.013	S
G2		0.284	0.281	0.269	0.02	0.742	S
G3		0.256	0.252	0.243	0.018	0.73	S
G4		0.24	0.236	0.23	0.018	0.577	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.099	0.099	0.101	0.013	-0.136	S
G2		0.124	0.123	0.125	0.015	-0.045	S
G3		0.199	0.195	0.195	0.018	0.245	S
G4		0.17	0.171	0.171	0.017	-0.072	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.199	0.201	0.194	0.012	0.434	S
G2		0.289	0.295	0.286	0.015	0.176	S
G3		0.347	0.359	0.348	0.016	-0.043	S
G4		0.377	0.393	0.379	0.016	-0.12	S
G1	Na <sup>+</sup> mg/l	0.76	0.744	0.722	0.037	1.021	S
G2		1.229	1.19	1.162	0.059	1.142	S
G3		1.094	1.06	1.031	0.05	1.258	S
G4		1.084	1.06	1.019	0.057	1.131	S
G1	Mg <sup>2+</sup> mg/l	0.137	0.134	0.131	0.008	0.661	S
G2		0.115	0.114	0.112	0.008	0.381	S
G3		0.1	0.098	0.099	0.009	0.125	S
G4		0.093	0.092	0.092	0.01	0.095	S
G1	Cl <sup>-</sup> mg/l	1.019	1	0.972	0.034	1.402	S
G2		1.568	1.58	1.53	0.068	0.567	S
G3		1.429	1.43	1.392	0.058	0.641	S
G4		1.272	1.27	1.227	0.055	0.818	S
G1	Ca <sup>2+</sup> mg/l	0.157	0.166	0.154	0.017	0.189	S
G2		0.131	0.14	0.132	0.011	-0.109	S
G3		0.114	0.121	0.119	0.021	-0.245	S
G4		0.106	0.114	0.11	0.017	-0.246	S
G1	K <sup>+</sup> mg/l	0.126	0.117	0.116	0.01	1.086	S
G2		0.195	0.181	0.18	0.01	1.42	S
G3		0.23	0.22	0.219	0.014	0.759	S
G4		0.231	0.214	0.211	0.014	1.419	S
G1	pH pH units	5.56	5.48	5.477	0.117	0.709	S
G2		5.38	5.49	5.463	0.099	-0.843	Q
G3		5.33	5.44	5.439	0.129	-0.85	Q
G4		5.3	5.45	5.46	0.125	-1.288	Q
G1	Cond µS/cm	8.9	9.44	9.701	0.641	-1.251	S
G2		11.2	12	12.028	0.58	-1.426	S
G3		11.2	12	12.072	0.667	-1.308	S
G4		10.8	11.5	11.651	0.735	-1.157	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## E MEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 114, C.N.R. Institute of Water Research (Italy)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	E MEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.31	0.33	0.316	0.021	-0.29	S
G2		0.26	0.281	0.269	0.02	-0.43	S
G3		0.237	0.252	0.243	0.018	-0.323	S
G4		0.22	0.236	0.23	0.018	-0.563	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.103	0.099	0.101	0.013	0.182	S
G2		0.128	0.123	0.125	0.015	0.227	S
G3		0.202	0.195	0.195	0.018	0.416	S
G4		0.175	0.171	0.171	0.017	0.223	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.195	0.201	0.194	0.012	0.102	S
G2		0.285	0.295	0.286	0.015	-0.096	S
G3		0.347	0.359	0.348	0.016	-0.043	S
G4		0.38	0.393	0.379	0.016	0.067	S
G1	Na <sup>+</sup> mg/l	0.68	0.744	0.722	0.037	-1.129	S
G2		1.1	1.19	1.162	0.059	-1.047	S
G3		0.99	1.06	1.031	0.05	-0.813	S
G4		0.99	1.06	1.019	0.057	-0.508	S
G1	Mg <sup>2+</sup> mg/l	0.16	0.134	0.131	0.008	3.375	Q
G2		0.11	0.114	0.112	0.008	-0.267	S
G3		0.11	0.098	0.099	0.009	1.231	S
G4		0.12	0.092	0.092	0.01	2.835	U
G1	Cl <sup>-</sup> mg/l	0.99	1	0.972	0.034	0.538	S
G2		1.57	1.58	1.53	0.068	0.597	S
G3		1.41	1.43	1.392	0.058	0.316	S
G4		1.24	1.27	1.227	0.055	0.231	S
G1	Ca <sup>2+</sup> mg/l	0.22	0.166	0.154	0.017	3.794	U
G2		0.21	0.14	0.132	0.011	7.035	U
G3		0.19	0.121	0.119	0.021	3.323	U
G4		0.16	0.114	0.11	0.017	2.882	U
G1	K <sup>+</sup> mg/l	0.1	0.117	0.116	0.01	-1.646	S
G2		0.16	0.181	0.18	0.01	-2.006	S
G3		0.19	0.22	0.219	0.014	-2.011	S
G4		0.18	0.214	0.211	0.014	-2.27	Q
G1	pH pH units	5.43	5.48	5.477	0.117	-0.401	S
G2		5.46	5.49	5.463	0.099	-0.033	S
G3		5.42	5.44	5.439	0.129	-0.151	S
G4		5.42	5.45	5.46	0.125	-0.324	S
G1	Cond µS/cm	9.9	9.44	9.701	0.641	0.31	S
G2		12.1	12	12.028	0.58	0.125	S
G3		12	12	12.072	0.667	-0.108	S
G4		11.5	11.5	11.651	0.735	-0.205	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.316	0.33	0.316	0.021	-0.001	S
G2		0.268	0.281	0.269	0.02	-0.039	S
G3		0.244	0.252	0.243	0.018	0.065	S
G4		0.228	0.236	0.23	0.018	-0.107	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.106	0.099	0.101	0.013	0.42	S
G2		0.132	0.123	0.125	0.015	0.499	S
G3		0.204	0.195	0.195	0.018	0.53	S
G4		0.18	0.171	0.171	0.017	0.518	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.187	0.201	0.194	0.012	-0.561	S
G2		0.276	0.295	0.286	0.015	-0.708	S
G3		0.338	0.359	0.348	0.016	-0.616	S
G4		0.368	0.393	0.379	0.016	-0.681	S
G1	Na <sup>+</sup> mg/l	0.782	0.744	0.722	0.037	1.612	S
G2		1.268	1.19	1.162	0.059	1.803	S
G3		1.123	1.06	1.031	0.05	1.836	S
G4		1.104	1.06	1.019	0.057	1.48	S
G1	Mg <sup>2+</sup> mg/l	0.132	0.134	0.131	0.008	0.071	S
G2		0.116	0.114	0.112	0.008	0.511	S
G3		0.102	0.098	0.099	0.009	0.346	S
G4		0.095	0.092	0.092	0.01	0.298	S
G1	Cl <sup>-</sup> mg/l	0.941	1	0.972	0.034	-0.922	S
G2		1.535	1.58	1.53	0.068	0.079	S
G3		1.393	1.43	1.392	0.058	0.025	S
G4		1.209	1.27	1.227	0.055	-0.336	S
G1	Ca <sup>2+</sup> mg/l	0.162	0.166	0.154	0.017	0.475	S
G2		0.143	0.14	0.132	0.011	1.007	S
G3		0.123	0.121	0.119	0.021	0.173	S
G4		0.109	0.114	0.11	0.017	-0.061	S
G1	K <sup>+</sup> mg/l	0.123	0.117	0.116	0.01	0.771	S
G2		0.156	0.181	0.18	0.01	-2.397	S
G3		0.253	0.22	0.219	0.014	2.351	Q
G4		0.205	0.214	0.211	0.014	-0.462	S
G1	pH pH units	5.33	5.48	5.477	0.117	-1.255	Q
G2		5.34	5.49	5.463	0.099	-1.247	Q
G3		5.3	5.44	5.439	0.129	-1.082	Q
G4		5.33	5.45	5.46	0.125	-1.047	Q
G1	Cond µS/cm	8.7	9.44	9.701	0.641	-1.563	S
G2		11.2	12	12.028	0.58	-1.426	S
G3		11.2	12	12.072	0.667	-1.308	S
G4		10.8	11.5	11.651	0.735	-1.157	S

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.

\* Z score is unitless

✕ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.295	0.33	0.316	0.021	-1.014	Q
G2		0.255	0.281	0.269	0.02	-0.674	S
G3		0.213	0.252	0.243	0.018	-1.655	Q
G4		0.226	0.236	0.23	0.018	-0.221	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.14	0.099	0.101	0.013	3.12	U
G2		0.19	0.123	0.125	0.015	4.441	U
G3		0.25	0.195	0.195	0.018	3.154	U
G4		0.2	0.171	0.171	0.017	1.697	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.19	0.201	0.194	0.012	-0.313	S
G2		0.3	0.295	0.286	0.015	0.925	S
G3		0.33	0.359	0.348	0.016	-1.124	S
G4		0.37	0.393	0.379	0.016	-0.557	S
G1	Na <sup>+</sup> mg/l	0.805	0.744	0.722	0.037	2.23	S
G2		1.286	1.19	1.162	0.059	2.109	S
G3		1.119	1.06	1.031	0.05	1.756	S
G4		1.143	1.06	1.019	0.057	2.159	S
G1	Mg <sup>2+</sup> mg/l	0.146	0.134	0.131	0.008	1.723	S
G2		0.12	0.114	0.112	0.008	1.03	S
G3		0.1	0.098	0.099	0.009	0.08	S
G4		0.108	0.092	0.092	0.01	1.617	Q
G1	Cl <sup>-</sup> mg/l	0.95	1	0.972	0.034	-0.654	S
G2		1.54	1.58	1.53	0.068	0.153	S
G3		1.36	1.43	1.392	0.058	-0.54	S
G4		1.2	1.27	1.227	0.055	-0.501	S
G1	Ca <sup>2+</sup> mg/l	0.186	0.166	0.154	0.017	1.826	S
G2		0.15	0.14	0.132	0.011	1.637	S
G3		0.124	0.121	0.119	0.021	0.234	S
G4		0.134	0.114	0.11	0.017	1.382	Q
G1	K <sup>+</sup> mg/l	0.11	0.117	0.116	0.01	-0.595	S
G2		0.177	0.181	0.18	0.01	-0.342	S
G3		0.202	0.22	0.219	0.014	-1.18	S
G4		0.217	0.214	0.211	0.014	0.413	S
G1	pH pH units	5.51	5.48	5.477	0.117	0.282	S
G2		5.56	5.49	5.463	0.099	0.978	S
G3		5.39	5.44	5.439	0.129	-0.384	S
G4		5.77	5.45	5.46	0.125	2.485	U
G1	Cond µS/cm	11.4	9.44	9.701	0.641	2.651	Q
G2		13.3	12	12.028	0.58	2.193	S
G3		13.8	12	12.072	0.667	2.592	Q
G4		13.4	11.5	11.651	0.735	2.379	Q

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.

\* Z score is unitless

☒ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 121, Landeslabor Schleswig-Holstein (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> mg S/l	0.28	0.33	0.316	0.021	-1.737	Q
G2		0.238	0.281	0.269	0.02	-1.504	Q
G3		0.202	0.252	0.243	0.018	-2.265	Q
G4		0.189	0.236	0.23	0.018	-2.33	Q
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.096	0.099	0.101	0.013	-0.374	S
G2		0.123	0.123	0.125	0.015	-0.113	S
G3		0.19	0.195	0.195	0.018	-0.269	S
G4		0.165	0.171	0.171	0.017	-0.367	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.198	0.201	0.194	0.012	0.351	S
G2		0.293	0.295	0.286	0.015	0.449	S
G3		0.355	0.359	0.348	0.016	0.465	S
G4		0.387	0.393	0.379	0.016	0.504	S
G1	Na <sup>+</sup> mg/l	0.64	0.744	0.722	0.037	-2.204	S
G2		1.038	1.19	1.162	0.059	-2.099	S
G3		0.917	1.06	1.031	0.05	-2.268	S
G4		0.908	1.06	1.019	0.057	-1.938	S
G1	Mg <sup>2+</sup> mg/l	0.115	0.134	0.131	0.008	-1.936	S
G2		0.096	0.114	0.112	0.008	-2.084	Q
G3		0.083	0.098	0.099	0.009	-1.756	Q
G4		0.075	0.092	0.092	0.01	-1.732	Q
G1	Cl <sup>-</sup> mg/l	0.913	1	0.972	0.034	-1.757	S
G2		1.48	1.58	1.53	0.068	-0.735	S
G3		1.33	1.43	1.392	0.058	-1.054	S
G4		1.17	1.27	1.227	0.055	-1.051	S
G1	Ca <sup>2+</sup> mg/l	0.116	0.166	0.154	0.017	-2.156	U
G2		0.092	0.14	0.132	0.011	-3.582	U
G3		0.077	0.121	0.119	0.021	-1.989	U
G4		0.068	0.114	0.11	0.017	-2.428	U
G1	K <sup>+</sup> mg/l	0.106	0.117	0.116	0.01	-1.015	S
G2		0.167	0.181	0.18	0.01	-1.321	S
G3		0.199	0.22	0.219	0.014	-1.388	S
G4		0.194	0.214	0.211	0.014	-1.258	S
G1	pH pH units	5.45	5.48	5.477	0.117	-0.231	S
G2		5.5	5.49	5.463	0.099	0.371	S
G3		5.45	5.44	5.439	0.129	0.082	S
G4		5.47	5.45	5.46	0.125	0.077	S
G1	Cond µS/cm	8.6	9.44	9.701	0.641	-1.719	S
G2		10.8	12	12.028	0.58	-2.116	S
G3		10.9	12	12.072	0.667	-1.758	S
G4		10.4	11.5	11.651	0.735	-1.701	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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 *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.318	0.33	0.316	0.021	0.096	S
G2		0.268	0.281	0.269	0.02	-0.039	S
G3		0.243	0.252	0.243	0.018	0.009	S
G4		0.226	0.236	0.23	0.018	-0.221	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.1	0.099	0.101	0.013	-0.064	S
G2		0.12	0.123	0.125	0.015	-0.317	S
G3		0.195	0.195	0.195	0.018	0.016	S
G4		0.164	0.171	0.171	0.017	-0.426	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.194	0.201	0.194	0.012	0.019	S
G2		0.29	0.295	0.286	0.015	0.245	S
G3		0.356	0.359	0.348	0.016	0.529	S
G4		0.388	0.393	0.379	0.016	0.566	S
G1	Na <sup>+</sup> mg/l	0.723	0.744	0.722	0.037	0.026	S
G2		1.148	1.19	1.162	0.059	-0.233	S
G3		1.044	1.06	1.031	0.05	0.262	S
G4		1.031	1.06	1.019	0.057	0.207	S
G1	Mg <sup>2+</sup> mg/l	0.132	0.134	0.131	0.008	0.071	S
G2		0.11	0.114	0.112	0.008	-0.267	S
G3		0.098	0.098	0.099	0.009	-0.052	S
G4		0.09	0.092	0.092	0.01	-0.159	S
G1	Cl <sup>-</sup> mg/l	0.971	1	0.972	0.034	-0.028	S
G2		1.55	1.58	1.53	0.068	0.301	S
G3		1.41	1.43	1.392	0.058	0.316	S
G4		1.25	1.27	1.227	0.055	0.415	S
G1	Ca <sup>2+</sup> mg/l	0.158	0.166	0.154	0.017	0.247	S
G2		0.129	0.14	0.132	0.011	-0.253	S
G3		0.116	0.121	0.119	0.021	-0.156	S
G4		0.11	0.114	0.11	0.017	-0.004	S
G1	K <sup>+</sup> mg/l	0.117	0.117	0.116	0.01	0.14	S
G2		0.18	0.181	0.18	0.01	-0.048	S
G3		0.221	0.22	0.219	0.014	0.136	S
G4		0.214	0.214	0.211	0.014	0.189	S
G1	pH pH units	5.4	5.48	5.477	0.117	-0.657	S
G2		5.36	5.49	5.463	0.099	-1.045	Q
G3		5.36	5.44	5.439	0.129	-0.617	S
G4		5.34	5.45	5.46	0.125	-0.967	Q
G1	Cond µS/cm	9.7	9.44	9.701	0.641	-0.002	S
G2		12.2	12	12.028	0.58	0.297	S
G3		12.1	12	12.072	0.667	0.042	S
G4		11.7	11.5	11.651	0.735	0.067	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.313	0.33	0.316	0.021	-0.145	S
G2		0.267	0.281	0.269	0.02	-0.088	S
G3		0.245	0.252	0.243	0.018	0.12	S
G4		0.238	0.236	0.23	0.018	0.463	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.094	0.099	0.101	0.013	-0.509	S
G2		0.117	0.123	0.125	0.015	-0.521	S
G3		0.188	0.195	0.195	0.018	-0.383	S
G4		0.164	0.171	0.171	0.017	-0.426	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.193	0.201	0.194	0.012	-0.064	S
G2		0.28	0.295	0.286	0.015	-0.436	S
G3		0.333	0.359	0.348	0.016	-0.933	S
G4		0.367	0.393	0.379	0.016	-0.744	S
G1	Na <sup>+</sup> mg/l	0.703	0.744	0.722	0.037	-0.511	S
G2		1.155	1.19	1.162	0.059	-0.114	S
G3		1.02	1.06	1.031	0.05	-0.216	S
G4		1.006	1.06	1.019	0.057	-0.229	S
G1	Mg <sup>2+</sup> mg/l	0.135	0.134	0.131	0.008	0.425	S
G2		0.108	0.114	0.112	0.008	-0.527	S
G3		0.089	0.098	0.099	0.009	-1.092	S
G4		0.084	0.092	0.092	0.01	-0.86	S
G1	Cl <sup>-</sup> mg/l	0.95	1	0.972	0.034	-0.654	S
G2		1.515	1.58	1.53	0.068	-0.217	S
G3		1.358	1.43	1.392	0.058	-0.575	S
G4		1.209	1.27	1.227	0.055	-0.336	S
G1	Ca <sup>2+</sup> mg/l	0.144	0.166	0.154	0.017	-0.554	S
G2		0.117	0.14	0.132	0.011	-1.332	Q
G3		0.108	0.121	0.119	0.021	-0.532	S
G4		0.102	0.114	0.11	0.017	-0.465	S
G1	K <sup>+</sup> mg/l	0.115	0.117	0.116	0.01	-0.07	S
G2		0.177	0.181	0.18	0.01	-0.342	S
G3		0.215	0.22	0.219	0.014	-0.28	S
G4		0.207	0.214	0.211	0.014	-0.317	S
G1	pH pH units	5.62	5.48	5.477	0.117	1.221	Q
G2		5.55	5.49	5.463	0.099	0.877	S
G3		5.54	5.44	5.439	0.129	0.78	S
G4		5.64	5.45	5.46	0.125	1.442	Q
G1	Cond µS/cm	9.3	9.44	9.701	0.641	-0.626	S
G2		11.7	12	12.028	0.58	-0.565	S
G3		11.8	12	12.072	0.667	-0.408	S
G4		11.2	11.5	11.651	0.735	-0.613	S

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.

\* Z score is unitless

⌘ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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>†</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.31	0.33	0.316	0.021	-0.29	S
G2		0.263	0.281	0.269	0.02	-0.283	S
G3		0.24	0.252	0.243	0.018	-0.157	S
G4		0.223	0.236	0.23	0.018	-0.392	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.087	0.099	0.101	0.013	-1.089	S
G2		0.105	0.123	0.125	0.015	-1.336	S
G3		0.166	0.195	0.195	0.018	-1.638	S
G4		0.15	0.171	0.171	0.017	-1.252	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.185	0.201	0.194	0.012	-0.727	S
G2		0.277	0.295	0.286	0.015	-0.64	S
G3		0.335	0.359	0.348	0.016	-0.806	S
G4		0.375	0.393	0.379	0.016	-0.245	S
G1	Na <sup>+</sup> mg/l	0.674	0.744	0.722	0.037	-1.291	S
G2		1.106	1.19	1.162	0.059	-0.946	S
G3		0.993	1.06	1.031	0.05	-0.754	S
G4		0.965	1.06	1.019	0.057	-0.944	S
G1	Mg <sup>2+</sup> mg/l	0.135	0.134	0.131	0.008	0.425	S
G2		0.147	0.114	0.112	0.008	4.534	U
G3		0.108	0.098	0.099	0.009	1.01	S
G4		0.096	0.092	0.092	0.01	0.399	S
G1	Cl <sup>-</sup> mg/l	0.951	1	0.972	0.034	-0.624	S
G2		1.5	1.58	1.53	0.068	-0.439	S
G3		1.353	1.43	1.392	0.058	-0.66	S
G4		1.21	1.27	1.227	0.055	-0.318	S
G1	Ca <sup>2+</sup> mg/l	0.185	0.166	0.154	0.017	1.791	S
G2		0.146	0.14	0.132	0.011	1.277	S
G3		0.182	0.121	0.119	0.021	2.947	U
G4		0.148	0.114	0.11	0.017	2.19	U
G1	K <sup>+</sup> mg/l	0.126	0.117	0.116	0.01	1.086	S
G2		0.182	0.181	0.18	0.01	0.147	S
G3		0.226	0.22	0.219	0.014	0.482	S
G4		0.212	0.214	0.211	0.014	0.045	S
G1	pH pH units	5.59	5.48	5.477	0.117	0.965	Q
G2		5.5	5.49	5.463	0.099	0.371	S
G3		5.44	5.44	5.439	0.129	0.004	S
G4		5.54	5.45	5.46	0.125	0.639	S
G1	Cond µS/cm	10.4	9.44	9.701	0.641	1.09	S
G2		12.9	12	12.028	0.58	1.503	S
G3		12.9	12	12.072	0.667	1.242	S
G4		13.2	11.5	11.651	0.735	2.107	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	0.336	0.33	0.316	0.021	0.964	S
G2		0.294	0.281	0.269	0.02	1.23	S
G3		0.258	0.252	0.243	0.018	0.841	S
G4		0.255	0.236	0.23	0.018	1.433	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.088	0.099	0.101	0.013	-1.009	S
G2		0.105	0.123	0.125	0.015	-1.336	S
G3		0.176	0.195	0.195	0.018	-1.067	S
G4		0.15	0.171	0.171	0.017	-1.252	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.199	0.201	0.194	0.012	0.434	S
G2		0.296	0.295	0.286	0.015	0.653	S
G3		0.36	0.359	0.348	0.016	0.783	S
G4		0.394	0.393	0.379	0.016	0.94	S
G1	Na <sup>+</sup> mg/l	0.72	0.744	0.722	0.037	-0.054	S
G2		1.155	1.19	1.162	0.059	-0.114	S
G3		1.032	1.06	1.031	0.05	0.023	S
G4		1.015	1.06	1.019	0.057	-0.072	S
G1	Mg <sup>2+</sup> mg/l	0.133	0.134	0.131	0.008	0.189	S
G2		0.113	0.114	0.112	0.008	0.122	S
G3		0.098	0.098	0.099	0.009	-0.097	S
G4		0.091	0.092	0.092	0.01	-0.108	S
G1	Cl <sup>-</sup> mg/l	0.933	1	0.972	0.034	-1.161	S
G2		1.472	1.58	1.53	0.068	-0.853	S
G3		1.34	1.43	1.392	0.058	-0.883	S
G4		1.187	1.27	1.227	0.055	-0.739	S
G1	Ca <sup>2+</sup> mg/l	0.154	0.166	0.154	0.017	0.018	S
G2		0.131	0.14	0.132	0.011	-0.073	S
G3		0.111	0.121	0.119	0.021	-0.391	S
G4		0.11	0.114	0.11	0.017	-0.004	S
G1	K <sup>+</sup> mg/l	0.118	0.117	0.116	0.01	0.245	S
G2		0.183	0.181	0.18	0.01	0.245	S
G3		0.217	0.22	0.219	0.014	-0.141	S
G4		0.212	0.214	0.211	0.014	0.045	S
G1	pH pH units	5.44	5.48	5.477	0.117	-0.316	S
G2		5.44	5.49	5.463	0.099	-0.236	S
G3		5.45	5.44	5.439	0.129	0.082	S
G4		5.44	5.45	5.46	0.125	-0.164	S
G1	Cond µS/cm	9.62	9.44	9.701	0.641	-0.127	S
G2		11.97	12	12.028	0.58	-0.099	S
G3		12.18	12	12.072	0.667	0.162	S
G4		11.69	11.5	11.651	0.735	0.053	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 158, Asia Center for Air Pollution Research (ACAP) (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> mg S/l	0.325	0.33	0.316	0.021	0.434	S
G2		0.275	0.281	0.269	0.02	0.303	S
G3		0.25	0.252	0.243	0.018	0.398	S
G4		0.233	0.236	0.23	0.018	0.178	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.096	0.099	0.101	0.013	-0.374	S
G2		0.121	0.123	0.125	0.015	-0.249	S
G3		0.19	0.195	0.195	0.018	-0.269	S
G4		0.165	0.171	0.171	0.017	-0.367	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.194	0.201	0.194	0.012	0.019	S
G2		0.286	0.295	0.286	0.015	-0.028	S
G3		0.348	0.359	0.348	0.016	0.02	S
G4		0.38	0.393	0.379	0.016	0.067	S
G1	Na <sup>+</sup> mg/l	0.733	0.744	0.722	0.037	0.295	S
G2		1.193	1.19	1.162	0.059	0.531	S
G3		1.058	1.06	1.031	0.05	0.541	S
G4		1.048	1.06	1.019	0.057	0.503	S
G1	Mg <sup>2+</sup> mg/l	0.131	0.134	0.131	0.008	-0.047	S
G2		0.114	0.114	0.112	0.008	0.252	S
G3		0.1	0.098	0.099	0.009	0.125	S
G4		0.094	0.092	0.092	0.01	0.196	S
G1	Cl <sup>-</sup> mg/l	1.009	1	0.972	0.034	1.104	S
G2		1.593	1.58	1.53	0.068	0.937	S
G3		1.443	1.43	1.392	0.058	0.881	S
G4		1.275	1.27	1.227	0.055	0.873	S
G1	Ca <sup>2+</sup> mg/l	0.159	0.166	0.154	0.017	0.304	S
G2		0.134	0.14	0.132	0.011	0.197	S
G3		0.116	0.121	0.119	0.021	-0.156	S
G4		0.109	0.114	0.11	0.017	-0.061	S
G1	K <sup>+</sup> mg/l	0.121	0.117	0.116	0.01	0.56	S
G2		0.187	0.181	0.18	0.01	0.637	S
G3		0.223	0.22	0.219	0.014	0.274	S
G4		0.216	0.214	0.211	0.014	0.334	S
G1	pH pH units	5.51	5.48	5.477	0.117	0.282	S
G2		5.5	5.49	5.463	0.099	0.371	S
G3		5.54	5.44	5.439	0.129	0.78	S
G4		5.54	5.45	5.46	0.125	0.639	S
G1	Cond µS/cm	9.8	9.44	9.701	0.641	0.154	S
G2		12.1	12	12.028	0.58	0.125	S
G3		12.2	12	12.072	0.667	0.192	S
G4		11.8	11.5	11.651	0.735	0.203	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 166, Forest Research Institute, Laboratory of Natural 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> mg S/l	0.322	0.33	0.316	0.021	0.289	S
G2		0.27	0.281	0.269	0.02	0.058	S
G3		0.245	0.252	0.243	0.018	0.12	S
G4		0.229	0.236	0.23	0.018	-0.05	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.09	0.099	0.101	0.013	-0.851	S
G2		0.113	0.123	0.125	0.015	-0.793	S
G3		0.187	0.195	0.195	0.018	-0.44	S
G4		0.162	0.171	0.171	0.017	-0.544	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.197	0.201	0.194	0.012	0.268	S
G2		0.291	0.295	0.286	0.015	0.313	S
G3		0.354	0.359	0.348	0.016	0.402	S
G4		0.386	0.393	0.379	0.016	0.441	S
G1	Na <sup>+</sup> mg/l	0.685	0.744	0.722	0.037	-0.995	S
G2		1.116	1.19	1.162	0.059	-0.776	S
G3		0.996	1.06	1.031	0.05	-0.694	S
G4		0.972	1.06	1.019	0.057	-0.822	S
G1	Mg <sup>2+</sup> mg/l	0.136	0.134	0.131	0.008	0.543	S
G2		0.116	0.114	0.112	0.008	0.511	S
G3		0.101	0.098	0.099	0.009	0.235	S
G4		0.093	0.092	0.092	0.01	0.095	S
G1	Cl <sup>-</sup> mg/l	0.973	1	0.972	0.034	0.031	S
G2		1.554	1.58	1.53	0.068	0.36	S
G3		1.419	1.43	1.392	0.058	0.47	S
G4		1.247	1.27	1.227	0.055	0.36	S
G1	Ca <sup>2+</sup> mg/l	0.163	0.166	0.154	0.017	0.533	S
G2		0.146	0.14	0.132	0.011	1.277	S
G3		0.132	0.121	0.119	0.021	0.596	S
G4		0.123	0.114	0.11	0.017	0.747	S
G1	K <sup>+</sup> mg/l	< 0.400	0.117	0.116	0.01		B
G2		< 0.400	0.181	0.18	0.01		B
G3		< 0.400	0.22	0.219	0.014		B
G4		< 0.400	0.214	0.211	0.014		B
G1	pH pH units	5.42	5.48	5.477	0.117	-0.487	S
G2		5.38	5.49	5.463	0.099	-0.843	Q
G3		5.33	5.44	5.439	0.129	-0.85	Q
G4		5.37	5.45	5.46	0.125	-0.726	S
G1	Cond µS/cm	9.71	9.44	9.701	0.641	0.014	S
G2		12.2	12	12.028	0.58	0.297	S
G3		12.36	12	12.072	0.667	0.432	S
G4		11.7	11.5	11.651	0.735	0.067	S

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.

\* Z score is unitless

⌘ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 178, Laboratory of Hydrochemistry and Atmospheric Chemistry an  
EANET Monitoring Laboratory (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> mg S/l	0.29	0.33	0.316	0.021	-1.255	Q
G2		0.25	0.281	0.269	0.02	-0.918	Q
G3		0.234	0.252	0.243	0.018	-0.49	S
G4		0.23	0.236	0.23	0.018	0.007	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.05	0.099	0.101	0.013	-4.027	U
G2		0.1	0.123	0.125	0.015	-1.676	Q
G3		0.18	0.195	0.195	0.018	-0.839	S
G4		0.16	0.171	0.171	0.017	-0.662	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.174	0.201	0.194	0.012	-1.639	S
G2		0.262	0.295	0.286	0.015	-1.661	S
G3		0.332	0.359	0.348	0.016	-0.997	S
G4		0.373	0.393	0.379	0.016	-0.369	S
G1	Na <sup>+</sup> mg/l	0.62	0.744	0.722	0.037	-2.742	Q
G2		1.07	1.19	1.162	0.059	-1.556	S
G3		0.95	1.06	1.031	0.05	-1.61	S
G4		0.91	1.06	1.019	0.057	-1.903	S
G1	Mg <sup>2+</sup> mg/l	0.13	0.134	0.131	0.008	-0.166	S
G2		0.12	0.114	0.112	0.008	1.03	S
G3		0.1	0.098	0.099	0.009	0.125	S
G4		0.1	0.092	0.092	0.01	0.805	S
G1	Cl <sup>-</sup> mg/l	0.91	1	0.972	0.034	-1.846	S
G2		1.445	1.58	1.53	0.068	-1.253	S
G3		1.375	1.43	1.392	0.058	-0.284	S
G4		1.265	1.27	1.227	0.055	0.689	S
G1	Ca <sup>2+</sup> mg/l	0.16	0.166	0.154	0.017	0.361	S
G2		0.14	0.14	0.132	0.011	0.737	S
G3		0.13	0.121	0.119	0.021	0.502	S
G4		0.11	0.114	0.11	0.017	-0.004	S
G1	K <sup>+</sup> mg/l	0.09	0.117	0.116	0.01	-2.696	Q
G2		0.17	0.181	0.18	0.01	-1.027	S
G3		0.22	0.22	0.219	0.014	0.066	S
G4		0.19	0.214	0.211	0.014	-1.547	S
G1	pH pH units	5.56	5.48	5.477	0.117	0.709	S
G2		5.36	5.49	5.463	0.099	-1.045	Q
G3		5.3	5.44	5.439	0.129	-1.082	Q
G4		5.35	5.45	5.46	0.125	-0.886	Q
G1	Cond µS/cm	9.5	9.44	9.701	0.641	-0.314	S
G2		11.5	12	12.028	0.58	-0.909	S
G3		11.2	12	12.072	0.667	-1.308	S
G4		10.5	11.5	11.651	0.735	-1.565	S

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.

\* Z score is unitless

⌘ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

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> mg S/l	-999	0.33	0.316	0.021		B
G2		-999	0.281	0.269	0.02		B
G3		-999	0.252	0.243	0.018		B
G4		-999	0.236	0.23	0.018		B
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.121	0.099	0.101	0.013	1.611	Q
G2		0.103	0.123	0.125	0.015	-1.472	Q
G3		0.152	0.195	0.195	0.018	-2.437	Q
G4		0.166	0.171	0.171	0.017	-0.308	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.155	0.201	0.194	0.012	-3.214	Q
G2		0.238	0.295	0.286	0.015	-3.293	Q
G3		0.301	0.359	0.348	0.016	-2.968	Q
G4		0.328	0.393	0.379	0.016	-3.176	Q
G1	Na <sup>+</sup> mg/l	-999	0.744	0.722	0.037		B
G2		-999	1.19	1.162	0.059		B
G3		-999	1.06	1.031	0.05		B
G4		-999	1.06	1.019	0.057		B
G1	Mg <sup>2+</sup> mg/l	-999	0.134	0.131	0.008		B
G2		-999	0.114	0.112	0.008		B
G3		-999	0.098	0.099	0.009		B
G4		-999	0.092	0.092	0.01		B
G1	Cl <sup>-</sup> mg/l	-999	1	0.972	0.034		B
G2		-999	1.58	1.53	0.068		B
G3		-999	1.43	1.392	0.058		B
G4		-999	1.27	1.227	0.055		B
G1	Ca <sup>2+</sup> mg/l	-999	0.166	0.154	0.017		B
G2		-999	0.14	0.132	0.011		B
G3		-999	0.121	0.119	0.021		B
G4		-999	0.114	0.11	0.017		B
G1	K <sup>+</sup> mg/l	-999	0.117	0.116	0.01		B
G2		-999	0.181	0.18	0.01		B
G3		-999	0.22	0.219	0.014		B
G4		-999	0.214	0.211	0.014		B
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	11	9.44	9.701	0.641	2.027	Q
G2		12.7	12	12.028	0.58	1.159	S
G3		13.3	12	12.072	0.667	1.842	S
G4		12.9	11.5	11.651	0.735	1.699	S

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.

\* Z score is unitless

✕ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 200, FUB AG (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> mg S/l	0.316	0.33	0.316	0.021	-0.001	S
G2		0.266	0.281	0.269	0.02	-0.137	S
G3		0.24	0.252	0.243	0.018	-0.157	S
G4		0.226	0.236	0.23	0.018	-0.221	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.106	0.099	0.101	0.013	0.42	S
G2		0.132	0.123	0.125	0.015	0.499	S
G3		0.202	0.195	0.195	0.018	0.416	S
G4		0.178	0.171	0.171	0.017	0.4	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.189	0.201	0.194	0.012	-0.395	S
G2		0.282	0.295	0.286	0.015	-0.3	S
G3		0.344	0.359	0.348	0.016	-0.234	S
G4		0.384	0.393	0.379	0.016	0.317	S
G1	Na <sup>+</sup> mg/l	0.723	0.744	0.722	0.037	0.026	S
G2		1.181	1.19	1.162	0.059	0.327	S
G3		1.046	1.06	1.031	0.05	0.302	S
G4		1.053	1.06	1.019	0.057	0.59	S
G1	Mg <sup>2+</sup> mg/l	0.15	0.134	0.131	0.008	2.195	S
G2		0.13	0.114	0.112	0.008	2.328	S
G3		0.113	0.098	0.099	0.009	1.563	Q
G4		0.107	0.092	0.092	0.01	1.516	Q
G1	Cl <sup>-</sup> mg/l	0.985	1	0.972	0.034	0.389	S
G2		1.561	1.58	1.53	0.068	0.463	S
G3		1.412	1.43	1.392	0.058	0.35	S
G4		1.266	1.27	1.227	0.055	0.708	S
G1	Ca <sup>2+</sup> mg/l	0.153	0.166	0.154	0.017	-0.04	S
G2		0.13	0.14	0.132	0.011	-0.163	S
G3		0.113	0.121	0.119	0.021	-0.297	S
G4		0.115	0.114	0.11	0.017	0.285	S
G1	K <sup>+</sup> mg/l	0.114	0.117	0.116	0.01	-0.175	S
G2		0.183	0.181	0.18	0.01	0.245	S
G3		0.22	0.22	0.219	0.014	0.066	S
G4		0.217	0.214	0.211	0.014	0.406	S
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	9.45	9.44	9.701	0.641	-0.392	S
G2		12	12	12.028	0.58	-0.048	S
G3		12.12	12	12.072	0.667	0.072	S
G4		11.45	11.5	11.651	0.735	-0.273	S

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>



## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 203, The Public Health Institute Vranje (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> mg S/l	< 1.000	0.33	0.316	0.021		B
G2		< 1.000	0.281	0.269	0.02		B
G3		< 1.000	0.252	0.243	0.018		B
G4		< 1.000	0.236	0.23	0.018		B
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	-999	0.099	0.101	0.013		B
G2		-999	0.123	0.125	0.015		B
G3		-999	0.195	0.195	0.018		B
G4		-999	0.171	0.171	0.017		B
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.186	0.201	0.194	0.012	-0.644	S
G2		0.279	0.295	0.286	0.015	-0.504	S
G3		0.341	0.359	0.348	0.016	-0.425	S
G4		0.374	0.393	0.379	0.016	-0.307	S
G1	Na <sup>+</sup> mg/l	0.725	0.744	0.722	0.037	0.08	S
G2		1.085	1.19	1.162	0.059	-1.302	S
G3		0.974	1.06	1.031	0.05	-1.132	S
G4		0.94	1.06	1.019	0.057	-1.38	S
G1	Mg <sup>2+</sup> mg/l	0.121	0.134	0.131	0.008	-1.228	S
G2		0.11	0.114	0.112	0.008	-0.267	S
G3		0.098	0.098	0.099	0.009	-0.097	S
G4		0.082	0.092	0.092	0.01	-1.022	S
G1	Cl <sup>-</sup> mg/l	-999	1	0.972	0.034		B
G2		-999	1.58	1.53	0.068		B
G3		-999	1.43	1.392	0.058		B
G4		-999	1.27	1.227	0.055		B
G1	Ca <sup>2+</sup> mg/l	0.185	0.166	0.154	0.017	1.791	S
G2		0.145	0.14	0.132	0.011	1.187	S
G3		0.13	0.121	0.119	0.021	0.502	S
G4		0.124	0.114	0.11	0.017	0.805	S
G1	K <sup>+</sup> mg/l	0.115	0.117	0.116	0.01	-0.07	S
G2		0.182	0.181	0.18	0.01	0.147	S
G3		0.255	0.22	0.219	0.014	2.49	Q
G4		0.225	0.214	0.211	0.014	0.985	S
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

✂ EMEP quality norm; letters indicate:

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  $\pm 10$ - $20\%$  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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 207, IRMB - Institute of Mining and Metallurgy Bor (Republic of Serbia)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm <sup>ⓧ</sup>
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.315	0.33	0.316	0.021	-0.049	S
G2		0.283	0.281	0.269	0.02	0.693	S
G3		0.251	0.252	0.243	0.018	0.453	S
G4		0.249	0.236	0.23	0.018	1.091	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.086	0.099	0.101	0.013	-1.168	S
G2		0.124	0.123	0.125	0.015	-0.045	S
G3		0.213	0.195	0.195	0.018	1.043	S
G4		0.178	0.171	0.171	0.017	0.4	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.182	0.201	0.194	0.012	-0.976	S
G2		0.268	0.295	0.286	0.015	-1.252	S
G3		0.33	0.359	0.348	0.016	-1.124	S
G4		0.352	0.393	0.379	0.016	-1.679	S
G1	Na <sup>+</sup> mg/l	0.726	0.744	0.722	0.037	0.107	S
G2		1.181	1.19	1.162	0.059	0.327	S
G3		1.068	1.06	1.031	0.05	0.74	S
G4		1.047	1.06	1.019	0.057	0.486	S
G1	Mg <sup>2+</sup> mg/l	0.122	0.134	0.131	0.008	-1.11	S
G2		0.104	0.114	0.112	0.008	-1.046	S
G3		0.09	0.098	0.099	0.009	-0.982	S
G4		0.082	0.092	0.092	0.01	-1.022	S
G1	Cl <sup>-</sup> mg/l	0.974	1	0.972	0.034	0.061	S
G2		1.513	1.58	1.53	0.068	-0.247	S
G3		1.385	1.43	1.392	0.058	-0.112	S
G4		1.227	1.27	1.227	0.055	-0.007	S
G1	Ca <sup>2+</sup> mg/l	0.129	0.166	0.154	0.017	-1.413	Q
G2		0.107	0.14	0.132	0.011	-2.232	Q
G3		0.093	0.121	0.119	0.021	-1.237	Q
G4		0.083	0.114	0.11	0.017	-1.562	U
G1	K <sup>+</sup> mg/l	0.107	0.117	0.116	0.01	-0.91	S
G2		0.177	0.181	0.18	0.01	-0.342	S
G3		0.213	0.22	0.219	0.014	-0.418	S
G4		0.201	0.214	0.211	0.014	-0.751	S
G1	pH pH units	-999	5.48	5.477	0.117		B
G2		-999	5.49	5.463	0.099		B
G3		-999	5.44	5.439	0.129		B
G4		-999	5.45	5.46	0.125		B
G1	Cond µS/cm	-999	9.44	9.701	0.641		B
G2		-999	12	12.028	0.58		B
G3		-999	12	12.072	0.667		B
G4		-999	11.5	11.651	0.735		B

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.

\* Z score is unitless

☒ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## EMEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 209, PHIB - Public Health Institute of Belgrade  
(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> mg S/l	0.315	0.33	0.316	0.021	-0.049	S
G2		0.219	0.281	0.269	0.02	-2.432	U
G3		0.235	0.252	0.243	0.018	-0.434	S
G4		0.223	0.236	0.23	0.018	-0.392	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.078	0.099	0.101	0.013	-1.804	Q
G2		0.126	0.123	0.125	0.015	0.091	S
G3		0.243	0.195	0.195	0.018	2.755	Q
G4		0.212	0.171	0.171	0.017	2.405	Q
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.232	0.201	0.194	0.012	3.169	Q
G2		0.3	0.295	0.286	0.015	0.925	S
G3		0.352	0.359	0.348	0.016	0.275	S
G4		0.377	0.393	0.379	0.016	-0.12	S
G1	Na <sup>+</sup> mg/l	0.803	0.744	0.722	0.037	2.176	S
G2		1.23	1.19	1.162	0.059	1.159	S
G3		1.11	1.06	1.031	0.05	1.577	S
G4		1.19	1.06	1.019	0.057	2.979	S
G1	Mg <sup>2+</sup> mg/l	< 0.250	0.134	0.131	0.008		B
G2		< 0.250	0.114	0.112	0.008		B
G3		< 0.250	0.098	0.099	0.009		B
G4		< 0.250	0.092	0.092	0.01		B
G1	Cl <sup>-</sup> mg/l	1.04	1	0.972	0.034	2.028	S
G2		1.437	1.58	1.53	0.068	-1.371	S
G3		1.343	1.43	1.392	0.058	-0.832	S
G4		1.264	1.27	1.227	0.055	0.671	S
G1	Ca <sup>2+</sup> mg/l	< 1.500	0.166	0.154	0.017		B
G2		< 1.500	0.14	0.132	0.011		B
G3		< 1.500	0.121	0.119	0.021		B
G4		< 1.500	0.114	0.11	0.017		B
G1	K <sup>+</sup> mg/l	0.379	0.117	0.116	0.01	27.663	U
G2		0.384	0.181	0.18	0.01	19.918	U
G3		0.406	0.22	0.219	0.014	12.946	U
G4		0.606	0.214	0.211	0.014	28.547	U
G1	pH pH units	5.82	5.48	5.477	0.117	2.929	U
G2		5.74	5.49	5.463	0.099	2.799	U
G3		5.7	5.44	5.439	0.129	2.022	U
G4		5.92	5.45	5.46	0.125	3.689	U
G1	Cond µS/cm	9.3	9.44	9.701	0.641	-0.626	S
G2		11.6	12	12.028	0.58	-0.737	S
G3		11.83	12	12.072	0.667	-0.363	S
G4		12.5	11.5	11.651	0.735	1.155	S

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.

\* Z score is unitless

✕ EMEP quality norm; letters indicate:

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> and cond and less than  $\pm 0.1$  pH-units for pH

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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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  $\text{NH}_4^+$ , Cl, Na<sup>+</sup>,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ , K<sup>+</sup> 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 more statistics, Youden plots, updated expected values ect:

<https://emep-ccc.nilu.no/intercomparison>

## E MEP – 42<sup>nd</sup> intercomparison of analytical methods - 2024

Laboratory 211, Eurofins Omegam B.V. (The Netherlands)

### Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	E MEP quality norm *
G1	SO <sub>4</sub> <sup>2-</sup> mg S/l	0.32	0.33	0.316	0.021	0.188	S
G2		0.268	0.281	0.269	0.02	-0.039	S
G3		0.245	0.252	0.243	0.018	0.115	S
G4		0.217	0.236	0.23	0.018	-0.74	S
G1	NH <sub>4</sub> <sup>+</sup> mg N/l	0.099	0.099	0.101	0.013	-0.104	S
G2		0.12	0.123	0.125	0.015	-0.344	S
G3		0.172	0.195	0.195	0.018	-1.273	S
G4		0.162	0.171	0.171	0.017	-0.526	S
G1	NO <sub>3</sub> <sup>-</sup> mg N/l	0.19	0.201	0.194	0.012	-0.304	S
G2		0.299	0.295	0.286	0.015	0.877	S
G3		0.354	0.359	0.348	0.016	0.389	S
G4		0.36	0.393	0.379	0.016	-1.205	S
G1	Na <sup>+</sup> mg/l	0.795	0.744	0.722	0.037	1.972	S
G2		1.288	1.19	1.162	0.059	2.146	S
G3		1.16	1.06	1.031	0.05	2.579	S
G4		1.133	1.06	1.019	0.057	1.99	S
G1	Mg <sup>2+</sup> mg/l	0.147	0.134	0.131	0.008	1.9	S
G2		0.129	0.114	0.112	0.008	2.146	S
G3		0.11	0.098	0.099	0.009	1.264	S
G4		0.107	0.092	0.092	0.01	1.516	Q
G1	Cl <sup>-</sup> mg/l	0.961	1	0.972	0.034	-0.341	S
G2		1.506	1.58	1.53	0.068	-0.356	S
G3		1.404	1.43	1.392	0.058	0.22	S
G4		1.161	1.27	1.227	0.055	-1.217	S
G1	Ca <sup>2+</sup> mg/l	0.167	0.166	0.154	0.017	0.733	S
G2		0.141	0.14	0.132	0.011	0.845	S
G3		0.126	0.121	0.119	0.021	0.291	S
G4		0.115	0.114	0.11	0.017	0.291	S
G1	K <sup>+</sup> mg/l	0.132	0.117	0.116	0.01	1.758	S
G2		0.195	0.181	0.18	0.01	1.4	S
G3		0.248	0.22	0.219	0.014	1.998	S
G4		0.245	0.214	0.211	0.014	2.41	S
G1	pH pH units	5.51	5.48	5.477	0.117	0.282	S
G2		5.59	5.49	5.463	0.099	1.282	S
G3		5.55	5.44	5.439	0.129	0.858	Q
G4		5.56	5.45	5.46	0.125	0.799	Q
G1	Cond µS/cm	9.07	9.44	9.701	0.641	-0.985	S
G2		11.6	12	12.028	0.58	-0.737	S
G3		11.55	12	12.072	0.667	-0.783	S
G4		11.02	11.5	11.651	0.735	-0.858	S

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.

\* Z score is unitless

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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

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