EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.31	0.314	0.307	0.021	0.155	S
G2		0.332	0.326	0.319	0.021	0.615	S
G3		0.301	0.298	0.294	0.021	0.356	S
G4		0.255	0.26	0.256	0.017	-0.048	S
G1	NH_4^+ *mg N/l*	0.142	0.134	0.138	0.018	0.226	S
G2		0.17	0.16	0.162	0.017	0.451	S
G3		0.163	0.147	0.149	0.019	0.746	S
G4		0.132	0.12	0.12	0.014	0.856	S
G1	NO_3^- *mg N/l*	0.247	0.238	0.227	0.031	0.645	S
G2		0.361	0.342	0.329	0.046	0.697	S
G3		0.359	0.343	0.331	0.048	0.582	S
G4		0.278	0.276	0.265	0.039	0.338	S
G1	Na^+ *mg/l*	0.866	0.948	0.919	0.053	-1.011	S
G2		0.787	0.855	0.835	0.06	-0.805	S
G3		0.705	0.737	0.718	0.046	-0.278	S
G4		0.792	0.851	0.825	0.054	-0.618	S
G1	Mg^{2+} *mg/l*	0.121	0.114	0.115	0.012	0.482	S
G2		0.163	0.145	0.144	0.012	1.528	S
G3		0.105	0.103	0.105	0.01	-0.024	S
G4		0.069	0.083	0.084	0.01	-1.519	Q
G1	Cl^- *mg/l*	1.316	1.35	1.319	0.077	-0.044	S
G2		1.068	1.04	1.015	0.06	0.882	S
G3		0.898	0.888	0.87	0.045	0.62	S
G4		1.106	1.12	1.083	0.055	0.411	S
G1	Ca^{2+} *mg/l*	0.197	0.179	0.174	0.023	0.979	S
G2		0.153	0.14	0.139	0.017	0.838	S
G3		0.183	0.166	0.162	0.019	1.135	S
G4		0.181	0.153	0.151	0.022	1.376	Q
G1	K^+ *mg/l*	0.177	0.162	0.164	0.021	0.635	S
G2		0.212	0.195	0.195	0.025	0.684	S
G3		0.279	0.26	0.257	0.026	0.845	S
G4		0.226	0.21	0.208	0.014	1.254	S
G1	pH *pH units*	5.665	5.47	5.492	0.132	1.308	Q
G2		5.478	5.46	5.465	0.113	0.117	S
G3		5.451	5.41	5.435	0.11	0.142	S
G4		5.401	5.42	5.428	0.102	-0.268	S
G1	Cond *µS/cm*	10.95	11	11.042	1.511	-0.061	S
G2		10.66	10.9	11.214	1.381	-0.401	S
G3		10.12	10.3	10.304	0.517	-0.356	S
G4		9.99	10.1	10.231	0.65	-0.37	S

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***** Z score is unitless

¤ EMEP quality norm; letters indicate:

S – Satisfactory: Your result deviates less than ±10% of the expected value for SO_4^{2-} and NO_3^-, less than ±15% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and less than ±0.1 pH-units for pH

Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

U – Unsatisfactory: Your result deviates more than ±20% of the expected value for for SO_4^{2-} and NO_3^-, more than ±25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and more than ±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://projects.nilu.no/ccc/intercomparison/

EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.31	0.314	0.307	0.021	0.155	S
G2		0.32	0.326	0.319	0.021	0.046	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.25	0.26	0.256	0.017	-0.34	S
G1	NH_4^+ *mg N/l*	0.13	0.134	0.138	0.018	-0.436	S
G2		0.16	0.16	0.162	0.017	-0.135	S
G3		0.14	0.147	0.149	0.019	-0.491	S
G4		0.12	0.12	0.12	0.014	0.025	S
G1	NO_3^- *mg N/l*	0.24	0.238	0.227	0.031	0.422	S
G2		0.35	0.342	0.329	0.046	0.456	S
G3		0.34	0.343	0.331	0.048	0.188	S
G4		0.27	0.276	0.265	0.039	0.131	S
G1	Na^+ *mg/l*	1	0.948	0.919	0.053	1.531	S
G2		0.86	0.855	0.835	0.06	0.412	S
G3		0.73	0.737	0.718	0.046	0.265	S
G4		0.92	0.851	0.825	0.054	1.755	S
G1	Mg^{2+} *mg/l*	0.11	0.114	0.115	0.012	-0.454	S
G2		0.14	0.145	0.144	0.012	-0.347	S
G3		0.1	0.103	0.105	0.01	-0.531	S
G4		0.08	0.083	0.084	0.01	-0.39	S
G1	Cl^- *mg/l*	1.33	1.35	1.319	0.077	0.137	S
G2		1.02	1.04	1.015	0.06	0.087	S
G3		0.86	0.888	0.87	0.045	-0.217	S
G4		1.1	1.12	1.083	0.055	0.302	S
G1	Ca^{2+} *mg/l*	0.17	0.179	0.174	0.023	-0.183	S
G2		0.13	0.14	0.139	0.017	-0.506	S
G3		0.16	0.166	0.162	0.019	-0.094	S
G4		0.14	0.153	0.151	0.022	-0.514	S
G1	K^+ *mg/l*	0.17	0.162	0.164	0.021	0.297	S
G2		0.15	0.195	0.195	0.025	-1.796	Q
G3		0.21	0.26	0.257	0.026	-1.816	Q
G4		0.17	0.21	0.208	0.014	-2.628	Q
G1	pH *pH units*	5.39	5.47	5.492	0.132	-0.777	S
G2		5.4	5.46	5.465	0.113	-0.572	S
G3		5.36	5.41	5.435	0.11	-0.684	S
G4		5.36	5.42	5.428	0.102	-0.669	S
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.313	0.314	0.307	0.021	0.312	S
G2		0.334	0.326	0.319	0.021	0.695	S
G3		0.297	0.298	0.294	0.021	0.172	S
G4		0.256	0.26	0.256	0.017	-0.001	S
G1	NH_4^+ *mg N/l*	0.137	0.134	0.138	0.018	-0.072	S
G2		0.166	0.16	0.162	0.017	0.193	S
G3		0.149	0.147	0.149	0.019	-0.002	S
G4		0.127	0.12	0.12	0.014	0.489	S
G1	NO_3^- *mg N/l*	0.231	0.238	0.227	0.031	0.123	S
G2		0.338	0.342	0.329	0.046	0.192	S
G3		0.344	0.343	0.331	0.048	0.271	S
G4		0.275	0.276	0.265	0.039	0.264	S
G1	Na^+ *mg/l*	0.956	0.948	0.919	0.053	0.699	S
G2		0.862	0.855	0.835	0.06	0.449	S
G3		0.744	0.737	0.718	0.046	0.576	S
G4		0.863	0.851	0.825	0.054	0.695	S
G1	Mg^{2+} *mg/l*	0.118	0.114	0.115	0.012	0.26	S
G2		0.153	0.145	0.144	0.012	0.721	S
G3		0.111	0.103	0.105	0.01	0.545	S
G4		0.088	0.083	0.084	0.01	0.452	S
G1	Cl^- *mg/l*	1.33	1.35	1.319	0.077	0.136	S
G2		1.042	1.04	1.015	0.06	0.449	S
G3		0.89	0.888	0.87	0.045	0.44	S
G4		1.122	1.12	1.083	0.055	0.704	S
G1	Ca^{2+} *mg/l*	0.185	0.179	0.174	0.023	0.471	S
G2		0.145	0.14	0.139	0.017	0.365	S
G3		0.168	0.166	0.162	0.019	0.339	S
G4		0.157	0.153	0.151	0.022	0.27	S
G1	K^+ *mg/l*	0.171	0.162	0.164	0.021	0.35	S
G2		0.203	0.195	0.195	0.025	0.32	S
G3		0.276	0.26	0.257	0.026	0.71	S
G4		0.22	0.21	0.208	0.014	0.866	S
G1	pH *pH units*	5.39	5.47	5.492	0.132	-0.777	S
G2		5.39	5.46	5.465	0.113	-0.661	S
G3		5.35	5.41	5.435	0.11	-0.775	S
G4		5.4	5.42	5.428	0.102	-0.278	S
G1	Cond *µS/cm*	11.32	11	11.042	1.511	0.184	S
G2		11.31	10.9	11.214	1.381	0.069	S
G3		10.62	10.3	10.304	0.517	0.61	S
G4		10.36	10.1	10.231	0.65	0.198	S

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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 ¤
G1	SO_4^{2-} *mg S/l*	0.317	0.314	0.307	0.021	0.484	S
G2		0.332	0.326	0.319	0.021	0.615	S
G3		0.303	0.298	0.294	0.021	0.453	S
G4		0.259	0.26	0.256	0.017	0.186	S
G1	NH_4^+ *mg N/l*	0.124	0.134	0.138	0.018	-0.768	S
G2		0.148	0.16	0.162	0.017	-0.839	S
G3		0.137	0.147	0.149	0.019	-0.653	S
G4		0.113	0.12	0.12	0.014	-0.46	S
G1	NO_3^- *mg N/l*	0.25	0.238	0.227	0.031	0.74	S
G2		0.364	0.342	0.329	0.046	0.763	S
G3		0.364	0.343	0.331	0.048	0.686	S
G4		0.291	0.276	0.265	0.039	0.674	S
G1	Na^+ *mg/l*	0.923	0.948	0.919	0.053	0.07	S
G2		0.84	0.855	0.835	0.06	0.078	S
G3		0.724	0.737	0.718	0.046	0.135	S
G4		0.837	0.851	0.825	0.054	0.216	S
G1	Mg^{2+} *mg/l*	0.109	0.114	0.115	0.012	-0.539	S
G2		0.142	0.145	0.144	0.012	-0.184	S
G3		0.1	0.103	0.105	0.01	-0.531	S
G4		0.079	0.083	0.084	0.01	-0.492	S
G1	Cl^- *mg/l*	0.148	1.35	1.319	0.077	-15.156	U
G2		0.142	1.04	1.015	0.06	-14.458	U
G3		0.972	0.888	0.87	0.045	2.252	S
G4		1.232	1.12	1.083	0.055	2.701	S
G1	Ca^{2+} *mg/l*	0.165	0.179	0.174	0.023	-0.398	S
G2		0.13	0.14	0.139	0.017	-0.506	S
G3		0.153	0.166	0.162	0.019	-0.468	S
G4		0.145	0.153	0.151	0.022	-0.283	S
G1	K^+ *mg/l*	0.161	0.162	0.164	0.021	-0.137	S
G2		0.195	0.195	0.195	0.025	0.004	S
G3		0.262	0.26	0.257	0.026	0.19	S
G4		0.212	0.21	0.208	0.014	0.284	S
G1	pH *pH units*	5.54	5.47	5.492	0.132	0.36	S
G2		5.49	5.46	5.465	0.113	0.223	S
G3		-999	5.41	5.435	0.11		B
G4		5.47	5.42	5.428	0.102	0.407	S
G1	Cond *µS/cm*	10.67	11	11.042	1.511	-0.246	S
G2		11.07	10.9	11.214	1.381	-0.104	S
G3		10.3	10.3	10.304	0.517	-0.008	S
G4		10.29	10.1	10.231	0.65	0.091	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 7, SGS Analytics Germany GmbH, Niederlassung Markkleeberg (Germany)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.954	0.314	0.307	0.021	30.504	U
G2		0.994	0.326	0.319	0.021	32.007	U
G3		0.907	0.298	0.294	0.021	29.701	U
G4		0.783	0.26	0.256	0.017	30.782	U
G1	NH_4^+ *mg N/l*	0.165	0.134	0.138	0.018	1.497	Q
G2		0.199	0.16	0.162	0.017	2.153	Q
G3		0.187	0.147	0.149	0.019	2.038	U
G4		0.152	0.12	0.12	0.014	2.24	U
G1	NO_3^- *mg N/l*	0.928	0.238	0.227	0.031	22.338	U
G2		1.45	0.342	0.329	0.046	24.537	U
G3		1.45	0.343	0.331	0.048	23.25	U
G4		1.12	0.276	0.265	0.039	22.122	U
G1	Na^+ *mg/l*	0.923	0.948	0.919	0.053	0.07	S
G2		0.834	0.855	0.835	0.06	-0.022	S
G3		0.718	0.737	0.718	0.046	0.004	S
G4		0.832	0.851	0.825	0.054	0.124	S
G1	Mg^{2+} *mg/l*	0.102	0.114	0.115	0.012	-1.135	S
G2		0.131	0.145	0.144	0.012	-1.081	S
G3		0.092	0.103	0.105	0.01	-1.313	S
G4		0.072	0.083	0.084	0.01	-1.232	S
G1	Cl^- *mg/l*	1.26	1.35	1.319	0.077	-0.769	S
G2		0.879	1.04	1.015	0.06	-2.249	Q
G3		0.885	0.888	0.87	0.045	0.334	S
G4		0.982	1.12	1.083	0.055	-1.843	S
G1	Ca^{2+} *mg/l*	0.153	0.179	0.174	0.023	-0.915	S
G2		0.118	0.14	0.139	0.017	-1.207	Q
G3		0.142	0.166	0.162	0.019	-1.056	S
G4		0.13	0.153	0.151	0.022	-0.975	Q
G1	K^+ *mg/l*	0.136	0.162	0.164	0.021	-1.342	Q
G2		0.165	0.195	0.195	0.025	-1.196	Q
G3		0.241	0.26	0.257	0.026	-0.62	S
G4		0.186	0.21	0.208	0.014	-1.518	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 8, Umweltbundesamt, Langen (Germany)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.31	0.314	0.307	0.021	0.155	S
G2		0.324	0.326	0.319	0.021	0.235	S
G3		0.295	0.298	0.294	0.021	0.065	S
G4		0.254	0.26	0.256	0.017	-0.106	S
G1	NH_4^+ *mg N/l*	0.131	0.134	0.138	0.018	-0.381	S
G2		0.158	0.16	0.162	0.017	-0.253	S
G3		0.144	0.147	0.149	0.019	-0.276	S
G4		0.119	0.12	0.12	0.014	-0.044	S
G1	NO_3^- *mg N/l*	0.231	0.238	0.227	0.031	0.135	S
G2		0.343	0.342	0.329	0.046	0.303	S
G3		0.344	0.343	0.331	0.048	0.271	S
G4		0.271	0.276	0.265	0.039	0.156	S
G1	Na^+ *mg/l*	0.918	0.948	0.919	0.053	-0.025	S
G2		0.828	0.855	0.835	0.06	-0.122	S
G3		0.726	0.737	0.718	0.046	0.178	S
G4		0.826	0.851	0.825	0.054	0.012	S
G1	Mg^{2+} *mg/l*	0.104	0.114	0.115	0.012	-0.965	S
G2		0.136	0.145	0.144	0.012	-0.674	S
G3		0.096	0.103	0.105	0.01	-0.937	S
G4		0.076	0.083	0.084	0.01	-0.8	S
G1	Cl^- *mg/l*	1.296	1.35	1.319	0.077	-0.303	S
G2		1.064	1.04	1.015	0.06	0.816	S
G3		0.897	0.888	0.87	0.045	0.598	S
G4		1.075	1.12	1.083	0.055	-0.152	S
G1	Ca^{2+} *mg/l*	0.172	0.179	0.174	0.023	-0.097	S
G2		0.136	0.14	0.139	0.017	-0.155	S
G3		0.162	0.166	0.162	0.019	0.013	S
G4		0.149	0.153	0.151	0.022	-0.099	S
G1	K^+ *mg/l*	0.149	0.162	0.164	0.021	-0.715	S
G2		0.183	0.195	0.195	0.025	-0.476	S
G3		0.252	0.26	0.257	0.026	-0.196	S
G4		0.2	0.21	0.208	0.014	-0.548	S
G1	pH *pH units*	5.45	5.47	5.492	0.132	-0.322	S
G2		5.45	5.46	5.465	0.113	-0.13	S
G3		5.45	5.41	5.435	0.11	0.133	S
G4		5.46	5.42	5.428	0.102	0.309	S
G1	Cond *µS/cm*	11.3	11	11.042	1.511	0.171	S
G2		11.4	10.9	11.214	1.381	0.135	S
G3		10.6	10.3	10.304	0.517	0.571	S
G4		10.2	10.1	10.231	0.65	-0.048	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.3	0.314	0.307	0.021	-0.317	S
G2		0.31	0.326	0.319	0.021	-0.429	S
G3		0.29	0.298	0.294	0.021	-0.177	S
G4		0.25	0.26	0.256	0.017	-0.34	S
G1	NH_4^+ *mg N/l*	0.132	0.134	0.138	0.018	-0.326	S
G2		0.144	0.16	0.162	0.017	-1.074	S
G3		0.136	0.147	0.149	0.019	-0.707	S
G4		0.103	0.12	0.12	0.014	-1.152	S
G1	NO_3^- *mg N/l*	0.219	0.238	0.227	0.031	-0.247	S
G2		0.317	0.342	0.329	0.046	-0.266	S
G3		0.323	0.343	0.331	0.048	-0.166	S
G4		0.257	0.276	0.265	0.039	-0.206	S
G1	Na^+ *mg/l*	0.929	0.948	0.919	0.053	0.184	S
G2		0.856	0.855	0.835	0.06	0.345	S
G3		0.743	0.737	0.718	0.046	0.548	S
G4		0.829	0.851	0.825	0.054	0.068	S
G1	Mg^{2+} *mg/l*	0.107	0.114	0.115	0.012	-0.71	S
G2		0.142	0.145	0.144	0.012	-0.184	S
G3		0.096	0.103	0.105	0.01	-0.937	S
G4		0.073	0.083	0.084	0.01	-1.109	S
G1	Cl^- *mg/l*	1.281	1.35	1.319	0.077	-0.497	S
G2		0.97	1.04	1.015	0.06	-0.741	S
G3		0.908	0.888	0.87	0.045	0.841	S
G4		1.071	1.12	1.083	0.055	-0.225	S
G1	Ca^{2+} *mg/l*	0.186	0.179	0.174	0.023	0.506	S
G2		0.151	0.14	0.139	0.017	0.722	S
G3		0.177	0.166	0.162	0.019	0.814	S
G4		0.157	0.153	0.151	0.022	0.27	S
G1	K^+ *mg/l*	0.167	0.162	0.164	0.021	0.152	S
G2		0.2	0.195	0.195	0.025	0.204	S
G3		0.268	0.26	0.257	0.026	0.421	S
G4		0.216	0.21	0.208	0.014	0.561	S
G1	pH *pH units*	5.4	5.47	5.492	0.132	-0.702	S
G2		5.31	5.46	5.465	0.113	-1.368	Q
G3		5.34	5.41	5.435	0.11	-0.866	S
G4		5.22	5.42	5.428	0.102	-2.039	U
G1	Cond *µS/cm*	11.56	11	11.042	1.511	0.343	S
G2		11.57	10.9	11.214	1.381	0.258	S
G3		10.93	10.3	10.304	0.517	1.209	S
G4		10.64	10.1	10.231	0.65	0.629	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.26	0.314	0.307	0.021	-2.202	Q
G2		0.27	0.326	0.319	0.021	-2.326	Q
G3		0.24	0.298	0.294	0.021	-2.598	Q
G4		0.21	0.26	0.256	0.017	-2.675	Q
G1	NH_4^+ *mg N/l*	0.1	0.134	0.138	0.018	-2.093	U
G2		0.15	0.16	0.162	0.017	-0.722	S
G3		0.13	0.147	0.149	0.019	-1.03	S
G4		0.1	0.12	0.12	0.014	-1.36	Q
G1	NO_3^- *mg N/l*	0.21	0.238	0.227	0.031	-0.534	S
G2		0.32	0.342	0.329	0.046	-0.201	S
G3		0.32	0.343	0.331	0.048	-0.228	S
G4		0.25	0.276	0.265	0.039	-0.387	S
G1	Na^+ *mg/l*	0.87	0.948	0.919	0.053	-0.935	S
G2		0.79	0.855	0.835	0.06	-0.755	S
G3		0.68	0.737	0.718	0.046	-0.822	S
G4		0.79	0.851	0.825	0.054	-0.655	S
G1	Mg^{2+} *mg/l*	0.118	0.114	0.115	0.012	0.226	S
G2		0.14	0.145	0.144	0.012	-0.347	S
G3		0.111	0.103	0.105	0.01	0.585	S
G4		0.096	0.083	0.084	0.01	1.253	Q
G1	Cl^- *mg/l*	1.23	1.35	1.319	0.077	-1.157	S
G2		0.96	1.04	1.015	0.06	-0.907	S
G3		0.82	0.888	0.87	0.045	-1.099	S
G4		1.04	1.12	1.083	0.055	-0.788	S
G1	Ca^{2+} *mg/l*	0.13	0.179	0.174	0.023	-1.905	U
G2		0.11	0.14	0.139	0.017	-1.674	Q
G3		0.13	0.166	0.162	0.019	-1.697	Q
G4		0.12	0.153	0.151	0.022	-1.436	Q
G1	K^+ *mg/l*	0.17	0.162	0.164	0.021	0.297	S
G2		0.2	0.195	0.195	0.025	0.204	S
G3		0.26	0.26	0.257	0.026	0.113	S
G4		0.22	0.21	0.208	0.014	0.839	S
G1	pH *pH units*	5.22	5.47	5.492	0.132	-2.067	U
G2		5.2	5.46	5.465	0.113	-2.34	U
G3		5.22	5.41	5.435	0.11	-1.956	Q
G4		5.17	5.42	5.428	0.102	-2.528	U
G1	Cond *µS/cm*	11.4	11	11.042	1.511	0.237	S
G2		11.3	10.9	11.214	1.381	0.062	S
G3		10.7	10.3	10.304	0.517	0.765	S
G4		10.5	10.1	10.231	0.65	0.414	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 15, NILU (Norway)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.341	0.314	0.307	0.021	1.616	S
G2		0.327	0.326	0.319	0.021	0.377	S
G3		0.298	0.298	0.294	0.021	0.211	S
G4		0.26	0.26	0.256	0.017	0.244	S
G1	NH_4^+ *mg N/l*	0.166	0.134	0.138	0.018	1.552	Q
G2		0.183	0.16	0.162	0.017	1.214	S
G3		0.181	0.147	0.149	0.019	1.715	Q
G4		0.14	0.12	0.12	0.014	1.41	Q
G1	NO_3^- *mg N/l*	0.237	0.238	0.227	0.031	0.326	S
G2		0.342	0.342	0.329	0.046	0.281	S
G3		0.342	0.343	0.331	0.048	0.229	S
G4		0.275	0.276	0.265	0.039	0.26	S
G1	Na^+ *mg/l*	0.98	0.948	0.919	0.053	1.152	S
G2		0.877	0.855	0.835	0.06	0.695	S
G3		0.749	0.737	0.718	0.046	0.678	S
G4		0.866	0.851	0.825	0.054	0.754	S
G1	Mg^{2+} *mg/l*	0.133	0.114	0.115	0.012	1.503	Q
G2		0.156	0.145	0.144	0.012	0.957	S
G3		0.11	0.103	0.105	0.01	0.484	S
G4		0.084	0.083	0.084	0.01	0.021	S
G1	Cl^- *mg/l*	1.322	1.35	1.319	0.077	0.033	S
G2		1.024	1.04	1.015	0.06	0.153	S
G3		0.873	0.888	0.87	0.045	0.069	S
G4		1.107	1.12	1.083	0.055	0.429	S
G1	Ca^{2+} *mg/l*	0.194	0.179	0.174	0.023	0.85	S
G2		0.156	0.14	0.139	0.017	1.014	S
G3		0.174	0.166	0.162	0.019	0.654	S
G4		0.158	0.153	0.151	0.022	0.316	S
G1	K^+ *mg/l*	0.157	0.162	0.164	0.021	-0.33	S
G2		0.191	0.195	0.195	0.025	-0.156	S
G3		0.265	0.26	0.257	0.026	0.305	S
G4		0.213	0.21	0.208	0.014	0.353	S
G1	pH *pH units*	5.447	5.47	5.492	0.132	-0.345	S
G2		5.413	5.46	5.465	0.113	-0.457	S
G3		5.423	5.41	5.435	0.11	-0.112	S
G4		5.44	5.42	5.428	0.102	0.113	S
G1	Cond *µS/cm*	10.8	11	11.042	1.511	-0.16	S
G2		11	10.9	11.214	1.381	-0.155	S
G3		10.4	10.3	10.304	0.517	0.185	S
G4		10.5	10.1	10.231	0.65	0.414	S

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

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.31	0.314	0.307	0.021	0.155	S
G2		0.327	0.326	0.319	0.021	0.377	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.13	0.134	0.138	0.018	-0.436	S
G2		0.152	0.16	0.162	0.017	-0.605	S
G3		0.146	0.147	0.149	0.019	-0.168	S
G4		0.122	0.12	0.12	0.014	0.163	S
G1	NO_3^- *mg N/l*	0.236	0.238	0.227	0.031	0.294	S
G2		0.335	0.342	0.329	0.046	0.128	S
G3		0.338	0.343	0.331	0.048	0.146	S
G4		0.278	0.276	0.265	0.039	0.338	S
G1	Na^+ *mg/l*	0.95	0.948	0.919	0.053	0.582	S
G2		0.871	0.855	0.835	0.06	0.595	S
G3		0.75	0.737	0.718	0.046	0.7	S
G4		0.863	0.851	0.825	0.054	0.698	S
G1	Mg^{2+} *mg/l*	0.117	0.114	0.115	0.012	0.141	S
G2		0.147	0.145	0.144	0.012	0.223	S
G3		0.108	0.103	0.105	0.01	0.281	S
G4		0.086	0.083	0.084	0.01	0.226	S
G1	Cl^- *mg/l*	1.266	1.35	1.319	0.077	-0.691	S
G2		0.985	1.04	1.015	0.06	-0.493	S
G3		0.842	0.888	0.87	0.045	-0.614	S
G4		1.063	1.12	1.083	0.055	-0.37	S
G1	Ca^{2+} *mg/l*	0.154	0.179	0.174	0.023	-0.872	S
G2		0.126	0.14	0.139	0.017	-0.739	S
G3		0.14	0.166	0.162	0.019	-1.162	Q
G4		0.138	0.153	0.151	0.022	-0.606	S
G1	K^+ *mg/l*	0.17	0.162	0.164	0.021	0.297	S
G2		0.203	0.195	0.195	0.025	0.324	S
G3		0.272	0.26	0.257	0.026	0.575	S
G4		0.224	0.21	0.208	0.014	1.116	S
G1	pH *pH units*	5.53	5.47	5.492	0.132	0.285	S
G2		5.54	5.46	5.465	0.113	0.665	S
G3		5.55	5.41	5.435	0.11	1.042	Q
G4		5.53	5.42	5.428	0.102	0.994	Q
G1	Cond *µS/cm*	10.49	11	11.042	1.511	-0.365	S
G2		10.38	10.9	11.214	1.381	-0.604	S
G3		9.6	10.3	10.304	0.517	-1.361	S
G4		9.51	10.1	10.231	0.65	-1.108	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.314	0.314	0.307	0.021	0.343	S
G2		0.326	0.326	0.319	0.021	0.33	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.137	0.134	0.138	0.018	-0.05	S
G2		0.165	0.16	0.162	0.017	0.158	S
G3		0.151	0.147	0.149	0.019	0.101	S
G4		0.125	0.12	0.12	0.014	0.371	S
G1	NO_3^- *mg N/l*	0.233	0.238	0.227	0.031	0.199	S
G2		0.334	0.342	0.329	0.046	0.106	S
G3		0.334	0.343	0.331	0.048	0.063	S
G4		0.269	0.276	0.265	0.039	0.105	S
G1	Na^+ *mg/l*	0.9	0.948	0.919	0.053	-0.366	S
G2		0.794	0.855	0.835	0.06	-0.688	S
G3		0.695	0.737	0.718	0.046	-0.496	S
G4		0.806	0.851	0.825	0.054	-0.359	S
G1	Mg^{2+} *mg/l*	0.113	0.114	0.115	0.012	-0.199	S
G2		0.14	0.145	0.144	0.012	-0.347	S
G3		0.102	0.103	0.105	0.01	-0.328	S
G4		0.083	0.083	0.084	0.01	-0.082	S
G1	Cl^- *mg/l*	1.3	1.35	1.319	0.077	-0.251	S
G2		1.01	1.04	1.015	0.06	-0.078	S
G3		0.869	0.888	0.87	0.045	-0.019	S
G4		1.09	1.12	1.083	0.055	0.12	S
G1	Ca^{2+} *mg/l*	0.172	0.179	0.174	0.023	-0.097	S
G2		0.133	0.14	0.139	0.017	-0.33	S
G3		0.156	0.166	0.162	0.019	-0.308	S
G4		0.149	0.153	0.151	0.022	-0.099	S
G1	K^+ *mg/l*	0.161	0.162	0.164	0.021	-0.137	S
G2		0.187	0.195	0.195	0.025	-0.316	S
G3		0.25	0.26	0.257	0.026	-0.273	S
G4		0.209	0.21	0.208	0.014	0.076	S
G1	pH *pH units*	5.42	5.47	5.492	0.132	-0.55	S
G2		5.44	5.46	5.465	0.113	-0.219	S
G3		5.42	5.41	5.435	0.11	-0.139	S
G4		5.45	5.42	5.428	0.102	0.211	S
G1	Cond *µS/cm*	11.4	11	11.042	1.511	0.237	S
G2		11.3	10.9	11.214	1.381	0.062	S
G3		10.7	10.3	10.304	0.517	0.765	S
G4		10.4	10.1	10.231	0.65	0.26	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.317	0.314	0.307	0.021	0.484	S
G2		0.329	0.326	0.319	0.021	0.472	S
G3		0.302	0.298	0.294	0.021	0.404	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.136	0.134	0.138	0.018	-0.105	S
G2		0.16	0.16	0.162	0.017	-0.135	S
G3		0.146	0.147	0.149	0.019	-0.168	S
G4		0.124	0.12	0.12	0.014	0.302	S
G1	NO_3^- *mg N/l*	0.237	0.238	0.227	0.031	0.326	S
G2		0.34	0.342	0.329	0.046	0.237	S
G3		0.341	0.343	0.331	0.048	0.208	S
G4		0.275	0.276	0.265	0.039	0.26	S
G1	Na^+ *mg/l*	0.938	0.948	0.919	0.053	0.355	S
G2		0.85	0.855	0.835	0.06	0.245	S
G3		0.729	0.737	0.718	0.046	0.243	S
G4		0.843	0.851	0.825	0.054	0.327	S
G1	Mg^{2+} *mg/l*	0.116	0.114	0.115	0.012	0.056	S
G2		0.148	0.145	0.144	0.012	0.305	S
G3		0.106	0.103	0.105	0.01	0.078	S
G4		0.085	0.083	0.084	0.01	0.124	S
G1	Cl^- *mg/l*	1.326	1.35	1.319	0.077	0.085	S
G2		1.023	1.04	1.015	0.06	0.137	S
G3		0.869	0.888	0.87	0.045	-0.019	S
G4		1.104	1.12	1.083	0.055	0.375	S
G1	Ca^{2+} *mg/l*	0.164	0.179	0.174	0.023	-0.441	S
G2		0.126	0.14	0.139	0.017	-0.739	S
G3		0.153	0.166	0.162	0.019	-0.468	S
G4		0.14	0.153	0.151	0.022	-0.514	S
G1	K^+ *mg/l*	0.166	0.162	0.164	0.021	0.104	S
G2		0.202	0.195	0.195	0.025	0.284	S
G3		0.271	0.26	0.257	0.026	0.537	S
G4		0.22	0.21	0.208	0.014	0.839	S
G1	pH *pH units*	5.45	5.47	5.492	0.132	-0.322	S
G2		5.41	5.46	5.465	0.113	-0.484	S
G3		5.39	5.41	5.435	0.11	-0.412	S
G4		5.39	5.42	5.428	0.102	-0.376	S
G1	Cond *µS/cm*	11.03	11	11.042	1.511	-0.008	S
G2		11.16	10.9	11.214	1.381	-0.039	S
G3		10.52	10.3	10.304	0.517	0.417	S
G4		10.39	10.1	10.231	0.65	0.245	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.284	0.314	0.307	0.021	-1.071	S
G2		0.301	0.326	0.319	0.021	-0.855	S
G3		0.288	0.298	0.294	0.021	-0.274	S
G4		0.231	0.26	0.256	0.017	-1.449	Q
G1	NH_4^+ *mg N/l*	0.034	0.134	0.138	0.018	-5.738	U
G2		0.055	0.16	0.162	0.017	-6.296	U
G3		0.053	0.147	0.149	0.019	-5.173	U
G4		0.024	0.12	0.12	0.014	-6.622	U
G1	NO_3^- *mg N/l*	0.203	0.238	0.227	0.031	-0.757	S
G2		0.305	0.342	0.329	0.046	-0.529	S
G3		0.307	0.343	0.331	0.048	-0.498	S
G4		0.235	0.276	0.265	0.039	-0.775	S
G1	Na^+ *mg/l*	1.261	0.948	0.919	0.053	6.482	U
G2		1.107	0.855	0.835	0.06	4.528	U
G3		0.982	0.737	0.718	0.046	5.742	U
G4		1.164	0.851	0.825	0.054	6.28	U
G1	Mg^{2+} *mg/l*	0.284	0.114	0.115	0.012	14.352	U
G2		0.353	0.145	0.144	0.012	17.021	U
G3		0.234	0.103	0.105	0.01	13.07	U
G4		0.201	0.083	0.084	0.01	12.035	U
G1	Cl^- *mg/l*	1.517	1.35	1.319	0.077	2.556	S
G2		1.133	1.04	1.015	0.06	1.959	S
G3		0.962	0.888	0.87	0.045	2.031	S
G4		1.176	1.12	1.083	0.055	1.684	S
G1	Ca^{2+} *mg/l*	0.251	0.179	0.174	0.023	3.304	U
G2		0.182	0.14	0.139	0.017	2.533	U
G3		0.194	0.166	0.162	0.019	1.723	Q
G4		0.221	0.153	0.151	0.022	3.22	U
G1	K^+ *mg/l*	0.143	0.162	0.164	0.021	-1.005	S
G2		0.179	0.195	0.195	0.025	-0.636	S
G3		0.226	0.26	0.257	0.026	-1.199	S
G4		0.193	0.21	0.208	0.014	-1.033	S
G1	pH *pH units*	4.583	5.47	5.492	0.132	-6.898	U
G2		4.613	5.46	5.465	0.113	-7.527	U
G3		4.634	5.41	5.435	0.11	-7.278	U
G4		4.565	5.42	5.428	0.102	-8.448	U
G1	Cond *µS/cm*	18	11	11.042	1.511	4.604	U
G2		19.3	10.9	11.214	1.381	5.857	U
G3		19.8	10.3	10.304	0.517	18.354	U
G4		18	10.1	10.231	0.65	11.944	U

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.286	0.314	0.307	0.021	-0.976	S
G2		0.3	0.326	0.319	0.021	-0.903	S
G3		0.272	0.298	0.294	0.021	-1.048	S
G4		0.236	0.26	0.256	0.017	-1.157	S
G1	NH_4^+ *mg N/l*	0.114	0.134	0.138	0.018	-1.32	S
G2		0.139	0.16	0.162	0.017	-1.367	S
G3		0.129	0.147	0.149	0.019	-1.083	S
G4		0.103	0.12	0.12	0.014	-1.152	S
G1	NO_3^- *mg N/l*	0.222	0.238	0.227	0.031	-0.152	S
G2		0.317	0.342	0.329	0.046	-0.266	S
G3		0.315	0.343	0.331	0.048	-0.332	S
G4		0.255	0.276	0.265	0.039	-0.257	S
G1	Na^+ *mg/l*	0.855	0.948	0.919	0.053	-1.22	S
G2		0.767	0.855	0.835	0.06	-1.138	S
G3		0.673	0.737	0.718	0.046	-0.974	S
G4		0.768	0.851	0.825	0.054	-1.063	S
G1	Mg^{2+} *mg/l*	0.087	0.114	0.115	0.012	-2.428	Q
G2		0.111	0.145	0.144	0.012	-2.712	Q
G3		0.081	0.103	0.105	0.01	-2.51	Q
G4		0.066	0.083	0.084	0.01	-1.868	Q
G1	Cl^- *mg/l*	1.24	1.35	1.319	0.077	-1.028	S
G2		0.954	1.04	1.015	0.06	-1.006	S
G3		0.814	0.888	0.87	0.045	-1.231	S
G4		1.03	1.12	1.083	0.055	-0.97	S
G1	Ca^{2+} *mg/l*	0.13	0.179	0.174	0.023	-1.905	U
G2		0.106	0.14	0.139	0.017	-1.908	Q
G3		0.122	0.166	0.162	0.019	-2.124	U
G4		0.113	0.153	0.151	0.022	-1.758	U
G1	K^+ *mg/l*	0.133	0.162	0.164	0.021	-1.487	Q
G2		0.162	0.195	0.195	0.025	-1.316	Q
G3		0.219	0.26	0.257	0.026	-1.469	Q
G4		0.175	0.21	0.208	0.014	-2.281	Q
G1	pH *pH units*	5.52	5.47	5.492	0.132	0.209	S
G2		5.5	5.46	5.465	0.113	0.312	S
G3		5.49	5.41	5.435	0.11	0.497	S
G4		5.48	5.42	5.428	0.102	0.505	S
G1	Cond *µS/cm*	10.75	11	11.042	1.511	-0.193	S
G2		10.36	10.9	11.214	1.381	-0.619	S
G3		9.72	10.3	10.304	0.517	-1.129	S
G4		9.63	10.1	10.231	0.65	-0.924	S

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Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 24, Serbian Environmental Protection Agency (Serbia)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.3	0.314	0.307	0.021	-0.317	S
G2		0.314	0.326	0.319	0.021	-0.239	S
G3		0.289	0.298	0.294	0.021	-0.225	S
G4		0.261	0.26	0.256	0.017	0.302	S
G1	NH_4^+ *mg N/l*	0.12	0.134	0.138	0.018	-0.989	S
G2		0.155	0.16	0.162	0.017	-0.429	S
G3		0.143	0.147	0.149	0.019	-0.33	S
G4		0.113	0.12	0.12	0.014	-0.46	S
G1	NO_3^- *mg N/l*	0.22	0.238	0.227	0.031	-0.215	S
G2		0.322	0.342	0.329	0.046	-0.157	S
G3		0.328	0.343	0.331	0.048	-0.062	S
G4		0.26	0.276	0.265	0.039	-0.128	S
G1	Na^+ *mg/l*	0.905	0.948	0.919	0.053	-0.271	S
G2		0.828	0.855	0.835	0.06	-0.122	S
G3		0.73	0.737	0.718	0.046	0.265	S
G4		0.857	0.851	0.825	0.054	0.587	S
G1	Mg^{2+} *mg/l*	0.106	0.114	0.115	0.012	-0.795	S
G2		0.141	0.145	0.144	0.012	-0.266	S
G3		0.102	0.103	0.105	0.01	-0.328	S
G4		0.083	0.083	0.084	0.01	-0.082	S
G1	Cl^- *mg/l*	1.278	1.35	1.319	0.077	-0.536	S
G2		0.985	1.04	1.015	0.06	-0.493	S
G3		0.843	0.888	0.87	0.045	-0.592	S
G4		1.086	1.12	1.083	0.055	0.048	S
G1	Ca^{2+} *mg/l*	0.152	0.179	0.174	0.023	-0.958	Q
G2		0.122	0.14	0.139	0.017	-0.973	S
G3		0.174	0.166	0.162	0.019	0.654	S
G4		0.15	0.153	0.151	0.022	-0.053	S
G1	K^+ *mg/l*	0.15	0.162	0.164	0.021	-0.667	S
G2		0.19	0.195	0.195	0.025	-0.196	S
G3		0.263	0.26	0.257	0.026	0.228	S
G4		0.215	0.21	0.208	0.014	0.492	S
G1	pH *pH units*	5.6	5.47	5.492	0.132	0.815	Q
G2		5.5	5.46	5.465	0.113	0.312	S
G3		5.58	5.41	5.435	0.11	1.314	Q
G4		5.35	5.42	5.428	0.102	-0.767	S
G1	Cond *µS/cm*	11.03	11	11.042	1.511	-0.008	S
G2		11.02	10.9	11.214	1.381	-0.141	S
G3		9.36	10.3	10.304	0.517	-1.825	S
G4		9.55	10.1	10.231	0.65	-1.047	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.318	0.314	0.307	0.021	0.532	S
G2		0.331	0.326	0.319	0.021	0.567	S
G3		0.303	0.298	0.294	0.021	0.453	S
G4		0.263	0.26	0.256	0.017	0.419	S
G1	NH_4^+ *mg N/l*	0.138	0.134	0.138	0.018	0.006	S
G2		0.166	0.16	0.162	0.017	0.217	S
G3		0.149	0.147	0.149	0.019	-0.007	S
G4		0.124	0.12	0.12	0.014	0.302	S
G1	NO_3^- *mg N/l*	0.237	0.238	0.227	0.031	0.326	S
G2		0.342	0.342	0.329	0.046	0.281	S
G3		0.343	0.343	0.331	0.048	0.25	S
G4		0.275	0.276	0.265	0.039	0.26	S
G1	Na^+ *mg/l*	0.935	0.948	0.919	0.053	0.298	S
G2		0.842	0.855	0.835	0.06	0.112	S
G3		0.725	0.737	0.718	0.046	0.156	S
G4		0.831	0.851	0.825	0.054	0.105	S
G1	Mg^{2+} *mg/l*	0.115	0.114	0.115	0.012	-0.029	S
G2		0.146	0.145	0.144	0.012	0.142	S
G3		0.106	0.103	0.105	0.01	0.078	S
G4		0.083	0.083	0.084	0.01	-0.082	S
G1	Cl^- *mg/l*	1.345	1.35	1.319	0.077	0.331	S
G2		1.043	1.04	1.015	0.06	0.468	S
G3		0.892	0.888	0.87	0.045	0.488	S
G4		1.123	1.12	1.083	0.055	0.72	S
G1	Ca^{2+} *mg/l*	0.174	0.179	0.174	0.023	-0.011	S
G2		0.138	0.14	0.139	0.017	-0.038	S
G3		0.164	0.166	0.162	0.019	0.12	S
G4		0.15	0.153	0.151	0.022	-0.053	S
G1	K^+ *mg/l*	0.171	0.162	0.164	0.021	0.345	S
G2		0.205	0.195	0.195	0.025	0.404	S
G3		0.272	0.26	0.257	0.026	0.575	S
G4		0.219	0.21	0.208	0.014	0.769	S
G1	pH *pH units*	5.4	5.47	5.492	0.132	-0.702	S
G2		5.4	5.46	5.465	0.113	-0.572	S
G3		5.37	5.41	5.435	0.11	-0.593	S
G4		5.38	5.42	5.428	0.102	-0.474	S
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.319	0.314	0.307	0.021	0.579	S
G2		0.333	0.326	0.319	0.021	0.662	S
G3		0.304	0.298	0.294	0.021	0.501	S
G4		0.263	0.26	0.256	0.017	0.419	S
G1	NH_4^+ *mg N/l*	0.14	0.134	0.138	0.018	0.116	S
G2		0.163	0.16	0.162	0.017	0.041	S
G3		0.148	0.147	0.149	0.019	-0.061	S
G4		0.124	0.12	0.12	0.014	0.302	S
G1	NO_3^- *mg N/l*	0.251	0.238	0.227	0.031	0.772	S
G2		0.356	0.342	0.329	0.046	0.588	S
G3		0.356	0.343	0.331	0.048	0.52	S
G4		0.289	0.276	0.265	0.039	0.622	S
G1	Na^+ *mg/l*	0.898	0.948	0.919	0.053	-0.404	S
G2		0.81	0.855	0.835	0.06	-0.422	S
G3		0.701	0.737	0.718	0.046	-0.365	S
G4		0.81	0.851	0.825	0.054	-0.284	S
G1	Mg^{2+} *mg/l*	0.116	0.114	0.115	0.012	0.056	S
G2		0.148	0.145	0.144	0.012	0.305	S
G3		0.107	0.103	0.105	0.01	0.179	S
G4		0.085	0.083	0.084	0.01	0.124	S
G1	Cl^- *mg/l*	1.308	1.35	1.319	0.077	-0.148	S
G2		1	1.04	1.015	0.06	-0.244	S
G3		0.866	0.888	0.87	0.045	-0.085	S
G4		1.08	1.12	1.083	0.055	-0.061	S
G1	Ca^{2+} *mg/l*	0.173	0.179	0.174	0.023	-0.054	S
G2		0.138	0.14	0.139	0.017	-0.038	S
G3		0.163	0.166	0.162	0.019	0.066	S
G4		0.15	0.153	0.151	0.022	-0.053	S
G1	K^+ *mg/l*	0.161	0.162	0.164	0.021	-0.137	S
G2		0.194	0.195	0.195	0.025	-0.036	S
G3		0.26	0.26	0.257	0.026	0.113	S
G4		0.211	0.21	0.208	0.014	0.215	S
G1	pH *pH units*	5.46	5.47	5.492	0.132	-0.246	S
G2		5.46	5.46	5.465	0.113	-0.042	S
G3		5.43	5.41	5.435	0.11	-0.048	S
G4		5.44	5.42	5.428	0.102	0.113	S
G1	Cond *µS/cm*	10.8	11	11.042	1.511	-0.16	S
G2		11.1	10.9	11.214	1.381	-0.083	S
G3		10.2	10.3	10.304	0.517	-0.202	S
G4		10.2	10.1	10.231	0.65	-0.048	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.309	0.314	0.307	0.021	0.107	S
G2		0.335	0.326	0.319	0.021	0.757	S
G3		0.302	0.298	0.294	0.021	0.404	S
G4		0.26	0.26	0.256	0.017	0.244	S
G1	NH_4^+ *mg N/l*	0.183	0.134	0.138	0.018	2.491	U
G2		0.216	0.16	0.162	0.017	3.15	U
G3		0.198	0.147	0.149	0.019	2.63	U
G4		0.165	0.12	0.12	0.014	3.141	U
G1	NO_3^- *mg N/l*	0.231	0.238	0.227	0.031	0.135	S
G2		0.34	0.342	0.329	0.046	0.237	S
G3		0.34	0.343	0.331	0.048	0.188	S
G4		0.272	0.276	0.265	0.039	0.182	S
G1	Na^+ *mg/l*	0.942	0.948	0.919	0.053	0.431	S
G2		0.853	0.855	0.835	0.06	0.295	S
G3		0.727	0.737	0.718	0.046	0.2	S
G4		0.848	0.851	0.825	0.054	0.42	S
G1	Mg^{2+} *mg/l*	0.114	0.114	0.115	0.012	-0.114	S
G2		0.145	0.145	0.144	0.012	0.06	S
G3		0.102	0.103	0.105	0.01	-0.328	S
G4		0.082	0.083	0.084	0.01	-0.184	S
G1	Cl^- *mg/l*	1.305	1.35	1.319	0.077	-0.187	S
G2		1.305	1.04	1.015	0.06	4.809	U
G3		0.873	0.888	0.87	0.045	0.069	S
G4		1.106	1.12	1.083	0.055	0.411	S
G1	Ca^{2+} *mg/l*	0.17	0.179	0.174	0.023	-0.183	S
G2		0.134	0.14	0.139	0.017	-0.272	S
G3		0.159	0.166	0.162	0.019	-0.147	S
G4		0.147	0.153	0.151	0.022	-0.191	S
G1	K^+ *mg/l*	0.159	0.162	0.164	0.021	-0.233	S
G2		0.191	0.195	0.195	0.025	-0.156	S
G3		0.256	0.26	0.257	0.026	-0.042	S
G4		0.213	0.21	0.208	0.014	0.353	S
G1	pH *pH units*	5.59	5.47	5.492	0.132	0.74	Q
G2		5.52	5.46	5.465	0.113	0.488	S
G3		5.47	5.41	5.435	0.11	0.315	S
G4		5.34	5.42	5.428	0.102	-0.865	S
G1	Cond *µS/cm*	11.82	11	11.042	1.511	0.515	S
G2		11.7	10.9	11.214	1.381	0.352	S
G3		11.1	10.3	10.304	0.517	1.538	S
G4		11.05	10.1	10.231	0.65	1.259	S

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***** Z score is unitless

¤ EMEP quality norm; letters indicate:

S – Satisfactory: Your result deviates less than ±10% of the expected value for SO_4^{2-} and NO_3^-, less than ±15% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and less than ±0.1 pH-units for pH

Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

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

Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect: https://projects.nilu.no/ccc/intercomparison/

EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.287	0.314	0.307	0.021	-0.929	S
G2		0.309	0.326	0.319	0.021	-0.476	S
G3		0.281	0.298	0.294	0.021	-0.613	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.146	0.134	0.138	0.018	0.447	S
G2		0.179	0.16	0.162	0.017	0.979	S
G3		0.151	0.147	0.149	0.019	0.101	S
G4		0.111	0.12	0.12	0.014	-0.598	S
G1	NO_3^- *mg N/l*	0.219	0.238	0.227	0.031	-0.247	S
G2		0.324	0.342	0.329	0.046	-0.113	S
G3		0.33	0.343	0.331	0.048	-0.02	S
G4		0.264	0.276	0.265	0.039	-0.025	S
G1	Na^+ *mg/l*	0.93	0.948	0.919	0.053	0.203	S
G2		0.84	0.855	0.835	0.06	0.078	S
G3		0.72	0.737	0.718	0.046	0.048	S
G4		0.815	0.851	0.825	0.054	-0.192	S
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		-999	0.145	0.144	0.012		B
G3		-999	0.103	0.105	0.01		B
G4		-999	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	1.277	1.35	1.319	0.077	-0.549	S
G2		1.001	1.04	1.015	0.06	-0.228	S
G3		0.848	0.888	0.87	0.045	-0.482	S
G4		1.074	1.12	1.083	0.055	-0.17	S
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		-999	0.14	0.139	0.017		B
G3		-999	0.166	0.162	0.019		B
G4		-999	0.153	0.151	0.022		B
G1	K^+ *mg/l*	0.17	0.162	0.164	0.021	0.297	S
G2		0.211	0.195	0.195	0.025	0.644	S
G3		0.27	0.26	0.257	0.026	0.498	S
G4		0.215	0.21	0.208	0.014	0.492	S
G1	pH *pH units*	5.49	5.47	5.492	0.132	-0.019	S
G2		5.5	5.46	5.465	0.113	0.312	S
G3		5.44	5.41	5.435	0.11	0.043	S
G4		5.43	5.42	5.428	0.102	0.016	S
G1	Cond *µS/cm*	10.5	11	11.042	1.511	-0.359	S
G2		10.7	10.9	11.214	1.381	-0.372	S
G3		10	10.3	10.304	0.517	-0.588	S
G4		10	10.1	10.231	0.65	-0.355	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.29	0.314	0.307	0.021	-0.788	S
G2		0.303	0.326	0.319	0.021	-0.761	S
G3		0.272	0.298	0.294	0.021	-1.048	S
G4		0.236	0.26	0.256	0.017	-1.157	S
G1	NH_4^+ *mg N/l*	0.094	0.134	0.138	0.018	-2.425	U
G2		0.12	0.16	0.162	0.017	-2.482	U
G3		0.13	0.147	0.149	0.019	-1.03	S
G4		0.107	0.12	0.12	0.014	-0.875	S
G1	NO_3^- *mg N/l*	0.219	0.238	0.227	0.031	-0.247	S
G2		0.329	0.342	0.329	0.046	-0.004	S
G3		0.323	0.343	0.331	0.048	-0.166	S
G4		0.254	0.276	0.265	0.039	-0.283	S
G1	Na^+ *mg/l*	0.873	0.948	0.919	0.053	-0.878	S
G2		0.781	0.855	0.835	0.06	-0.905	S
G3		0.668	0.737	0.718	0.046	-1.082	S
G4		0.774	0.851	0.825	0.054	-0.952	S
G1	Mg^{2+} *mg/l*	0.119	0.114	0.115	0.012	0.311	S
G2		0.15	0.145	0.144	0.012	0.468	S
G3		0.114	0.103	0.105	0.01	0.89	S
G4		0.091	0.083	0.084	0.01	0.74	S
G1	Cl^- *mg/l*	1.298	1.35	1.319	0.077	-0.277	S
G2		1.006	1.04	1.015	0.06	-0.145	S
G3		0.842	0.888	0.87	0.045	-0.614	S
G4		1.093	1.12	1.083	0.055	0.175	S
G1	Ca^{2+} *mg/l*	0.193	0.179	0.174	0.023	0.807	S
G2		0.157	0.14	0.139	0.017	1.072	S
G3		0.171	0.166	0.162	0.019	0.494	S
G4		0.179	0.153	0.151	0.022	1.284	Q
G1	K^+ *mg/l*	0.168	0.162	0.164	0.021	0.201	S
G2		0.198	0.195	0.195	0.025	0.124	S
G3		0.256	0.26	0.257	0.026	-0.042	S
G4		0.209	0.21	0.208	0.014	0.076	S
G1	pH *pH units*	5.58	5.47	5.492	0.132	0.664	Q
G2		5.53	5.46	5.465	0.113	0.577	S
G3		5.52	5.41	5.435	0.11	0.769	Q
G4		5.49	5.42	5.428	0.102	0.603	S
G1	Cond *µS/cm*	11.7	11	11.042	1.511	0.435	S
G2		11.5	10.9	11.214	1.381	0.207	S
G3		10.7	10.3	10.304	0.517	0.765	S
G4		10.6	10.1	10.231	0.65	0.567	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.248	0.314	0.307	0.021	-2.781	U
G2		0.259	0.326	0.319	0.021	-2.847	U
G3		0.231	0.298	0.294	0.021	-3.024	U
G4		0.201	0.26	0.256	0.017	-3.201	U
G1	NH_4^+ *mg N/l*	0.16	0.134	0.138	0.018	1.221	Q
G2		0.21	0.16	0.162	0.017	2.798	U
G3		0.22	0.147	0.149	0.019	3.814	U
G4		0.22	0.12	0.12	0.014	6.949	U
G1	NO_3^- *mg N/l*	0.219	0.238	0.227	0.031	-0.247	S
G2		0.326	0.342	0.329	0.046	-0.078	S
G3		0.326	0.343	0.331	0.048	-0.114	S
G4		0.262	0.276	0.265	0.039	-0.084	S
G1	Na^+ *mg/l*	0.98	0.948	0.919	0.053	1.152	S
G2		0.877	0.855	0.835	0.06	0.695	S
G3		0.778	0.737	0.718	0.046	1.308	S
G4		0.904	0.851	0.825	0.054	1.459	S
G1	Mg^{2+} *mg/l*	0.109	0.114	0.115	0.012	-0.539	S
G2		0.14	0.145	0.144	0.012	-0.347	S
G3		0.097	0.103	0.105	0.01	-0.836	S
G4		0.081	0.083	0.084	0.01	-0.287	S
G1	Cl^- *mg/l*	1.655	1.35	1.319	0.077	4.348	Q
G2		1.504	1.04	1.015	0.06	8.109	U
G3		1.053	0.888	0.87	0.045	4.037	Q
G4		0.851	1.12	1.083	0.055	-4.233	Q
G1	Ca^{2+} *mg/l*	0.142	0.179	0.174	0.023	-1.388	Q
G2		0.298	0.14	0.139	0.017	9.312	U
G3		0.128	0.166	0.162	0.019	-1.804	Q
G4		0.12	0.153	0.151	0.022	-1.436	Q
G1	K^+ *mg/l*	2.138	0.162	0.164	0.021	95.173	U
G2		1.124	0.195	0.195	0.025	37.173	U
G3		0.779	0.26	0.257	0.026	20.133	U
G4		0.228	0.21	0.208	0.014	1.393	S
G1	pH *pH units*	5.69	5.47	5.492	0.132	1.498	U
G2		5.61	5.46	5.465	0.113	1.284	Q
G3		5.68	5.41	5.435	0.11	2.222	U
G4		5.62	5.42	5.428	0.102	1.875	U
G1	Cond *µS/cm*	11.1	11	11.042	1.511	0.038	S
G2		11.4	10.9	11.214	1.381	0.135	S
G3		10.6	10.3	10.304	0.517	0.571	S
G4		10.4	10.1	10.231	0.65	0.26	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.32	0.314	0.307	0.021	0.626	S
G2		0.333	0.326	0.319	0.021	0.662	S
G3		0.305	0.298	0.294	0.021	0.55	S
G4		0.265	0.26	0.256	0.017	0.536	S
G1	NH_4^+ *mg N/l*	0.127	0.134	0.138	0.018	-0.602	S
G2		0.153	0.16	0.162	0.017	-0.546	S
G3		0.141	0.147	0.149	0.019	-0.438	S
G4		0.115	0.12	0.12	0.014	-0.321	S
G1	NO_3^- *mg N/l*	0.239	0.238	0.227	0.031	0.39	S
G2		0.344	0.342	0.329	0.046	0.325	S
G3		0.344	0.343	0.331	0.048	0.271	S
G4		0.277	0.276	0.265	0.039	0.312	S
G1	Na^+ *mg/l*	0.949	0.948	0.919	0.053	0.563	S
G2		0.86	0.855	0.835	0.06	0.412	S
G3		0.741	0.737	0.718	0.046	0.504	S
G4		0.857	0.851	0.825	0.054	0.587	S
G1	Mg^{2+} *mg/l*	0.111	0.114	0.115	0.012	-0.369	S
G2		0.145	0.145	0.144	0.012	0.06	S
G3		0.101	0.103	0.105	0.01	-0.43	S
G4		0.079	0.083	0.084	0.01	-0.492	S
G1	Cl^- *mg/l*	1.348	1.35	1.319	0.077	0.37	S
G2		1.044	1.04	1.015	0.06	0.485	S
G3		0.887	0.888	0.87	0.045	0.378	S
G4		1.123	1.12	1.083	0.055	0.72	S
G1	Ca^{2+} *mg/l*	0.18	0.179	0.174	0.023	0.247	S
G2		0.138	0.14	0.139	0.017	-0.038	S
G3		0.166	0.166	0.162	0.019	0.227	S
G4		0.153	0.153	0.151	0.022	0.086	S
G1	K^+ *mg/l*	0.159	0.162	0.164	0.021	-0.233	S
G2		0.193	0.195	0.195	0.025	-0.076	S
G3		0.262	0.26	0.257	0.026	0.19	S
G4		0.21	0.21	0.208	0.014	0.145	S
G1	pH *pH units*	5.8	5.47	5.492	0.132	2.332	U
G2		5.77	5.46	5.465	0.113	2.698	U
G3		5.65	5.41	5.435	0.11	1.95	U
G4		5.5	5.42	5.428	0.102	0.7	S
G1	Cond *µS/cm*	11.69	11	11.042	1.511	0.429	S
G2		11.57	10.9	11.214	1.381	0.258	S
G3		10.91	10.3	10.304	0.517	1.171	S
G4		10.64	10.1	10.231	0.65	0.629	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.31	0.314	0.307	0.021	0.155	S
G2		0.323	0.326	0.319	0.021	0.188	S
G3		0.294	0.298	0.294	0.021	0.017	S
G4		0.254	0.26	0.256	0.017	-0.106	S
G1	NH_4^+ *mg N/l*	0.139	0.134	0.138	0.018	0.061	S
G2		0.163	0.16	0.162	0.017	0.041	S
G3		0.149	0.147	0.149	0.019	-0.007	S
G4		0.128	0.12	0.12	0.014	0.579	S
G1	NO_3^- *mg N/l*	0.23	0.238	0.227	0.031	0.103	S
G2		0.332	0.342	0.329	0.046	0.062	S
G3		0.335	0.343	0.331	0.048	0.084	S
G4		0.271	0.276	0.265	0.039	0.156	S
G1	Na^+ *mg/l*	0.94	0.948	0.919	0.053	0.393	S
G2		0.85	0.855	0.835	0.06	0.245	S
G3		0.731	0.737	0.718	0.046	0.287	S
G4		0.854	0.851	0.825	0.054	0.531	S
G1	Mg^{2+} *mg/l*	0.116	0.114	0.115	0.012	0.056	S
G2		0.149	0.145	0.144	0.012	0.386	S
G3		0.108	0.103	0.105	0.01	0.281	S
G4		0.088	0.083	0.084	0.01	0.432	S
G1	Cl^- *mg/l*	1.34	1.35	1.319	0.077	0.266	S
G2		1.03	1.04	1.015	0.06	0.253	S
G3		0.873	0.888	0.87	0.045	0.069	S
G4		1.11	1.12	1.083	0.055	0.484	S
G1	Ca^{2+} *mg/l*	0.171	0.179	0.174	0.023	-0.14	S
G2		0.136	0.14	0.139	0.017	-0.155	S
G3		0.159	0.166	0.162	0.019	-0.147	S
G4		0.15	0.153	0.151	0.022	-0.053	S
G1	K^+ *mg/l*	0.15	0.162	0.164	0.021	-0.667	S
G2		0.186	0.195	0.195	0.025	-0.356	S
G3		0.247	0.26	0.257	0.026	-0.389	S
G4		0.204	0.21	0.208	0.014	-0.271	S
G1	pH *pH units*	5.36	5.47	5.492	0.132	-1.005	Q
G2		5.44	5.46	5.465	0.113	-0.219	S
G3		5.44	5.41	5.435	0.11	0.043	S
G4		5.41	5.42	5.428	0.102	-0.18	S
G1	Cond *µS/cm*	11.1	11	11.042	1.511	0.038	S
G2		10.9	10.9	11.214	1.381	-0.228	S
G3		10	10.3	10.304	0.517	-0.588	S
G4		9.93	10.1	10.231	0.65	-0.463	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.32	0.314	0.307	0.021	0.626	S
G2		0.34	0.326	0.319	0.021	0.994	S
G3		0.31	0.298	0.294	0.021	0.792	S
G4		0.27	0.26	0.256	0.017	0.828	S
G1	NH_4^+ *mg N/l*	0.13	0.134	0.138	0.018	-0.436	S
G2		0.16	0.16	0.162	0.017	-0.135	S
G3		0.15	0.147	0.149	0.019	0.047	S
G4		0.12	0.12	0.12	0.014	0.025	S
G1	NO_3^- *mg N/l*	0.24	0.238	0.227	0.031	0.422	S
G2		0.34	0.342	0.329	0.046	0.237	S
G3		0.35	0.343	0.331	0.048	0.395	S
G4		0.28	0.276	0.265	0.039	0.389	S
G1	Na^+ *mg/l*	0.74	0.948	0.919	0.053	-3.401	Q
G2		0.69	0.855	0.835	0.06	-2.421	Q
G3		0.6	0.737	0.718	0.046	-2.56	Q
G4		0.67	0.851	0.825	0.054	-2.88	Q
G1	Mg^{2+} *mg/l*	0.12	0.114	0.115	0.012	0.397	S
G2		0.12	0.145	0.144	0.012	-1.978	Q
G3		0.12	0.103	0.105	0.01	1.499	Q
G4		0.11	0.083	0.084	0.01	2.691	U
G1	Cl^- *mg/l*	1.34	1.35	1.319	0.077	0.266	S
G2		1.04	1.04	1.015	0.06	0.418	S
G3		0.88	0.888	0.87	0.045	0.224	S
G4		1.12	1.12	1.083	0.055	0.666	S
G1	Ca^{2+} *mg/l*	0.34	0.179	0.174	0.023	7.135	U
G2		0.28	0.14	0.139	0.017	8.26	U
G3		0.23	0.166	0.162	0.019	3.646	U
G4		0.2	0.153	0.151	0.022	2.252	U
G1	K^+ *mg/l*	0.16	0.162	0.164	0.021	-0.185	S
G2		0.18	0.195	0.195	0.025	-0.596	S
G3		0.23	0.26	0.257	0.026	-1.045	S
G4		0.19	0.21	0.208	0.014	-1.241	S
G1	pH *pH units*	5.48	5.47	5.492	0.132	-0.095	S
G2		5.44	5.46	5.465	0.113	-0.219	S
G3		5.45	5.41	5.435	0.11	0.133	S
G4		5.43	5.42	5.428	0.102	0.016	S
G1	Cond *µS/cm*	11.36	11	11.042	1.511	0.21	S
G2		11.32	10.9	11.214	1.381	0.077	S
G3		10.58	10.3	10.304	0.517	0.533	S
G4		10.54	10.1	10.231	0.65	0.475	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.346	0.314	0.307	0.021	1.851	Q
G2		0.333	0.326	0.319	0.021	0.662	S
G3		0.308	0.298	0.294	0.021	0.695	S
G4		0.27	0.26	0.256	0.017	0.828	S
G1	NH_4^+ *mg N/l*	0.146	0.134	0.138	0.018	0.447	S
G2		0.168	0.16	0.162	0.017	0.334	S
G3		0.153	0.147	0.149	0.019	0.208	S
G4		0.127	0.12	0.12	0.014	0.509	S
G1	NO_3^- *mg N/l*	0.242	0.238	0.227	0.031	0.485	S
G2		0.347	0.342	0.329	0.046	0.391	S
G3		0.345	0.343	0.331	0.048	0.292	S
G4		0.278	0.276	0.265	0.039	0.338	S
G1	Na^+ *mg/l*	0.989	0.948	0.919	0.053	1.322	S
G2		0.894	0.855	0.835	0.06	0.978	S
G3		0.806	0.737	0.718	0.046	1.917	S
G4		0.891	0.851	0.825	0.054	1.218	S
G1	Mg^{2+} *mg/l*	0.135	0.114	0.115	0.012	1.673	Q
G2		0.168	0.145	0.144	0.012	1.936	Q
G3		0.124	0.103	0.105	0.01	1.905	Q
G4		0.098	0.083	0.084	0.01	1.458	Q
G1	Cl^- *mg/l*	1.331	1.35	1.319	0.077	0.15	S
G2		1.044	1.04	1.015	0.06	0.485	S
G3		0.888	0.888	0.87	0.045	0.4	S
G4		1.096	1.12	1.083	0.055	0.229	S
G1	Ca^{2+} *mg/l*	0.173	0.179	0.174	0.023	-0.054	S
G2		0.139	0.14	0.139	0.017	0.02	S
G3		0.166	0.166	0.162	0.019	0.227	S
G4		0.145	0.153	0.151	0.022	-0.283	S
G1	K^+ *mg/l*	-999	0.162	0.164	0.021		B
G2		-999	0.195	0.195	0.025		B
G3		-999	0.26	0.257	0.026		B
G4		-999	0.21	0.208	0.014		B
G1	pH *pH units*	5.39	5.47	5.492	0.132	-0.777	S
G2		5.3	5.46	5.465	0.113	-1.456	Q
G3		5.35	5.41	5.435	0.11	-0.775	S
G4		5.46	5.42	5.428	0.102	0.309	S
G1	Cond *µS/cm*	11.7	11	11.042	1.511	0.435	S
G2		11.089	10.9	11.214	1.381	-0.091	S
G3		10.291	10.3	10.304	0.517	-0.026	S
G4		9.84	10.1	10.231	0.65	-0.601	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.031	0.314	0.307	0.021	-12.993	U
G2		0.036	0.326	0.319	0.021	-13.422	U
G3		0.031	0.298	0.294	0.021	-12.719	U
G4		0.029	0.26	0.256	0.017	-13.244	U
G1	NH_4^+ *mg N/l*	-999	0.134	0.138	0.018		B
G2		-999	0.16	0.162	0.017		B
G3		-999	0.147	0.149	0.019		B
G4		-999	0.12	0.12	0.014		B
G1	NO_3^- *mg N/l*	0.022	0.238	0.227	0.031	-6.523	U
G2		0.031	0.342	0.329	0.046	-6.527	U
G3		0.007	0.343	0.331	0.048	-6.731	U
G4		0.005	0.276	0.265	0.039	-6.725	U
G1	Na^+ *mg/l*	-999	0.948	0.919	0.053		B
G2		-999	0.855	0.835	0.06		B
G3		-999	0.737	0.718	0.046		B
G4		-999	0.851	0.825	0.054		B
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		-999	0.145	0.144	0.012		B
G3		-999	0.103	0.105	0.01		B
G4		-999	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	0.113	1.35	1.319	0.077	-15.609	U
G2		0.087	1.04	1.015	0.06	-15.369	U
G3		0.075	0.888	0.87	0.045	-17.523	U
G4		0.095	1.12	1.083	0.055	-17.965	U
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		-999	0.14	0.139	0.017		B
G3		-999	0.166	0.162	0.019		B
G4		-999	0.153	0.151	0.022		B
G1	K^+ *mg/l*	-999	0.162	0.164	0.021		B
G2		-999	0.195	0.195	0.025		B
G3		-999	0.26	0.257	0.026		B
G4		-999	0.21	0.208	0.014		B
G1	pH *pH units*	5.52	5.47	5.492	0.132	0.209	S
G2		5.55	5.46	5.465	0.113	0.753	S
G3		5.48	5.41	5.435	0.11	0.406	S
G4		5.54	5.42	5.428	0.102	1.092	Q
G1	Cond *µS/cm*	31.99	11	11.042	1.511	13.86	U
G2		529.73	10.9	11.214	1.381	375.569	U
G3		13.96	10.3	10.304	0.517	7.066	U
G4		12.97	10.1	10.231	0.65	4.211	U

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.323	0.314	0.307	0.021	0.744	S
G2		0.335	0.326	0.319	0.021	0.776	S
G3		0.313	0.298	0.294	0.021	0.927	S
G4		0.284	0.26	0.256	0.017	1.645	S
G1	NH_4^+ *mg N/l*	0.131	0.134	0.138	0.018	-0.409	S
G2		0.147	0.16	0.162	0.017	-0.91	S
G3		0.124	0.147	0.149	0.019	-1.336	Q
G4		0.09	0.12	0.12	0.014	-2.018	Q
G1	NO_3^- *mg N/l*	0.24	0.238	0.227	0.031	0.428	S
G2		0.351	0.342	0.329	0.046	0.482	S
G3		0.345	0.343	0.331	0.048	0.294	S
G4		0.283	0.276	0.265	0.039	0.459	S
G1	Na^+ *mg/l*	0.974	0.948	0.919	0.053	1.028	S
G2		0.906	0.855	0.835	0.06	1.177	S
G3		0.78	0.737	0.718	0.046	1.352	S
G4		0.911	0.851	0.825	0.054	1.59	S
G1	Mg^{2+} *mg/l*	0.127	0.114	0.115	0.012	0.984	S
G2		0.158	0.145	0.144	0.012	1.096	S
G3		0.116	0.103	0.105	0.01	1.103	S
G4		0.092	0.083	0.084	0.01	0.801	S
G1	Cl^- *mg/l*	0.244	1.35	1.319	0.077	-13.908	U
G2		0.999	1.04	1.015	0.06	-0.266	S
G3		0.876	0.888	0.87	0.045	0.144	S
G4		1.084	1.12	1.083	0.055	0.013	S
G1	Ca^{2+} *mg/l*	0.207	0.179	0.174	0.023	1.418	Q
G2		0.149	0.14	0.139	0.017	0.605	S
G3		0.197	0.166	0.162	0.019	1.888	Q
G4		0.171	0.153	0.151	0.022	0.934	S
G1	K^+ *mg/l*	0.204	0.162	0.164	0.021	1.941	U
G2		0.251	0.195	0.195	0.025	2.233	U
G3		0.307	0.26	0.257	0.026	1.937	Q
G4		0.264	0.21	0.208	0.014	3.854	U
G1	pH *pH units*	5.499	5.47	5.492	0.132	0.049	S
G2		5.197	5.46	5.465	0.113	-2.366	U
G3		5.18	5.41	5.435	0.11	-2.319	U
G4		5.116	5.42	5.428	0.102	-3.057	U
G1	Cond *µS/cm*	10.8	11	11.042	1.511	-0.16	S
G2		10.9	10.9	11.214	1.381	-0.228	S
G3		10.2	10.3	10.304	0.517	-0.202	S
G4		10	10.1	10.231	0.65	-0.355	S

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***** Z score is unitless

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S – Satisfactory: Your result deviates less than ±10% of the expected value for SO_4^{2-} and NO_3^-, less than ±15% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and less than ±0.1 pH-units for pH

Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

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

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	-999	0.314	0.307	0.021		B
G2		-999	0.326	0.319	0.021		B
G3		-999	0.298	0.294	0.021		B
G4		-999	0.26	0.256	0.017		B
G1	NH_4^+ *mg N/l*	-999	0.134	0.138	0.018		B
G2		-999	0.16	0.162	0.017		B
G3		-999	0.147	0.149	0.019		B
G4		-999	0.12	0.12	0.014		B
G1	NO_3^- *mg N/l*	-999	0.238	0.227	0.031		B
G2		-999	0.342	0.329	0.046		B
G3		-999	0.343	0.331	0.048		B
G4		-999	0.276	0.265	0.039		B
G1	Na^+ *mg/l*	-999	0.948	0.919	0.053		B
G2		-999	0.855	0.835	0.06		B
G3		-999	0.737	0.718	0.046		B
G4		-999	0.851	0.825	0.054		B
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		-999	0.145	0.144	0.012		B
G3		-999	0.103	0.105	0.01		B
G4		-999	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	-999	1.35	1.319	0.077		B
G2		-999	1.04	1.015	0.06		B
G3		-999	0.888	0.87	0.045		B
G4		-999	1.12	1.083	0.055		B
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		-999	0.14	0.139	0.017		B
G3		-999	0.166	0.162	0.019		B
G4		-999	0.153	0.151	0.022		B
G1	K^+ *mg/l*	-999	0.162	0.164	0.021		B
G2		-999	0.195	0.195	0.025		B
G3		-999	0.26	0.257	0.026		B
G4		-999	0.21	0.208	0.014		B
G1	pH *pH units*	5.41	5.47	5.492	0.132	-0.626	S
G2		5.42	5.46	5.465	0.113	-0.395	S
G3		5.37	5.41	5.435	0.11	-0.593	S
G4		5.38	5.42	5.428	0.102	-0.474	S
G1	Cond *µS/cm*	10.57	11	11.042	1.511	-0.312	S
G2		10.42	10.9	11.214	1.381	-0.575	S
G3		9.88	10.3	10.304	0.517	-0.82	S
G4		9.68	10.1	10.231	0.65	-0.847	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 47, Jelenia Gora (Poland)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.304	0.314	0.307	0.021	-0.128	S
G2		0.329	0.326	0.319	0.021	0.472	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.267	0.26	0.256	0.017	0.653	S
G1	NH_4^+ *mg N/l*	0.14	0.134	0.138	0.018	0.116	S
G2		0.179	0.16	0.162	0.017	0.979	S
G3		0.163	0.147	0.149	0.019	0.746	S
G4		0.134	0.12	0.12	0.014	0.994	S
G1	NO_3^- *mg N/l*	0.244	0.238	0.227	0.031	0.549	S
G2		0.344	0.342	0.329	0.046	0.325	S
G3		0.349	0.343	0.331	0.048	0.375	S
G4		0.286	0.276	0.265	0.039	0.545	S
G1	Na^+ *mg/l*	0.93	0.948	0.919	0.053	0.203	S
G2		0.815	0.855	0.835	0.06	-0.338	S
G3		0.705	0.737	0.718	0.046	-0.278	S
G4		0.813	0.851	0.825	0.054	-0.229	S
G1	Mg^{2+} *mg/l*	0.114	0.114	0.115	0.012	-0.114	S
G2		0.139	0.145	0.144	0.012	-0.429	S
G3		0.099	0.103	0.105	0.01	-0.633	S
G4		0.081	0.083	0.084	0.01	-0.287	S
G1	Cl^- *mg/l*	1.547	1.35	1.319	0.077	2.945	S
G2		1.497	1.04	1.015	0.06	7.989	U
G3		1.176	0.888	0.87	0.045	6.749	U
G4		1.05	1.12	1.083	0.055	-0.607	S
G1	Ca^{2+} *mg/l*	0.166	0.179	0.174	0.023	-0.355	S
G2		0.126	0.14	0.139	0.017	-0.739	S
G3		0.146	0.166	0.162	0.019	-0.842	S
G4		0.139	0.153	0.151	0.022	-0.56	S
G1	K^+ *mg/l*	0.156	0.162	0.164	0.021	-0.378	S
G2		0.183	0.195	0.195	0.025	-0.476	S
G3		0.244	0.26	0.257	0.026	-0.505	S
G4		0.202	0.21	0.208	0.014	-0.409	S
G1	pH *pH units*	5.71	5.47	5.492	0.132	1.65	U
G2		5.72	5.46	5.465	0.113	2.256	U
G3		5.58	5.41	5.435	0.11	1.314	Q
G4		5.56	5.42	5.428	0.102	1.288	Q
G1	Cond *µS/cm*	11.2	11	11.042	1.511	0.104	S
G2		11.1	10.9	11.214	1.381	-0.083	S
G3		10.4	10.3	10.304	0.517	0.185	S
G4		9.7	10.1	10.231	0.65	-0.816	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 49, The Cyprus Institute (CyI) (Cyprus)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.309	0.314	0.307	0.021	0.107	S
G2		0.327	0.326	0.319	0.021	0.377	S
G3		0.298	0.298	0.294	0.021	0.211	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.143	0.134	0.138	0.018	0.282	S
G2		0.166	0.16	0.162	0.017	0.217	S
G3		0.147	0.147	0.149	0.019	-0.115	S
G4		0.125	0.12	0.12	0.014	0.371	S
G1	NO_3^- *mg N/l*	0.235	0.238	0.227	0.031	0.262	S
G2		0.343	0.342	0.329	0.046	0.303	S
G3		0.338	0.343	0.331	0.048	0.146	S
G4		0.281	0.276	0.265	0.039	0.415	S
G1	Na^+ *mg/l*	0.957	0.948	0.919	0.053	0.715	S
G2		0.861	0.855	0.835	0.06	0.428	S
G3		0.743	0.737	0.718	0.046	0.548	S
G4		0.853	0.851	0.825	0.054	0.513	S
G1	Mg^{2+} *mg/l*	0.126	0.114	0.115	0.012	0.907	S
G2		0.154	0.145	0.144	0.012	0.794	S
G3		0.114	0.103	0.105	0.01	0.89	S
G4		0.092	0.083	0.084	0.01	0.842	S
G1	Cl^- *mg/l*	1.38	1.35	1.319	0.077	0.784	S
G2		1.042	1.04	1.015	0.06	0.452	S
G3		0.853	0.888	0.87	0.045	-0.372	S
G4		1.145	1.12	1.083	0.055	1.12	S
G1	Ca^{2+} *mg/l*	0.192	0.179	0.174	0.023	0.764	S
G2		0.181	0.14	0.139	0.017	2.475	U
G3		0.191	0.166	0.162	0.019	1.562	Q
G4		0.184	0.153	0.151	0.022	1.515	Q
G1	K^+ *mg/l*	0.166	0.162	0.164	0.021	0.104	S
G2		0.193	0.195	0.195	0.025	-0.076	S
G3		0.252	0.26	0.257	0.026	-0.196	S
G4		0.203	0.21	0.208	0.014	-0.34	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.251	0.314	0.307	0.021	-2.626	U
G2		0.266	0.326	0.319	0.021	-2.515	Q
G3		0.233	0.298	0.294	0.021	-2.937	U
G4		0.273	0.26	0.256	0.017	1.003	S
G1	NH_4^+ *mg N/l*	0.144	0.134	0.138	0.018	0.337	S
G2		0.171	0.16	0.162	0.017	0.51	S
G3		0.158	0.147	0.149	0.019	0.477	S
G4		0.128	0.12	0.12	0.014	0.579	S
G1	NO_3^- *mg N/l*	0.225	0.238	0.227	0.031	-0.056	S
G2		0.331	0.342	0.329	0.046	0.04	S
G3		0.33	0.343	0.331	0.048	-0.02	S
G4		0.264	0.276	0.265	0.039	-0.025	S
G1	Na^+ *mg/l*	0.922	0.948	0.919	0.053	0.051	S
G2		0.822	0.855	0.835	0.06	-0.222	S
G3		0.711	0.737	0.718	0.046	-0.148	S
G4		0.825	0.851	0.825	0.054	-0.006	S
G1	Mg^{2+} *mg/l*	0.117	0.114	0.115	0.012	0.141	S
G2		0.15	0.145	0.144	0.012	0.468	S
G3		0.11	0.103	0.105	0.01	0.484	S
G4		0.088	0.083	0.084	0.01	0.432	S
G1	Cl^- *mg/l*	1.323	1.35	1.319	0.077	0.046	S
G2		1.012	1.04	1.015	0.06	-0.045	S
G3		0.854	0.888	0.87	0.045	-0.35	S
G4		1.094	1.12	1.083	0.055	0.193	S
G1	Ca^{2+} *mg/l*	0.173	0.179	0.174	0.023	-0.054	S
G2		0.133	0.14	0.139	0.017	-0.33	S
G3		0.169	0.166	0.162	0.019	0.387	S
G4		0.145	0.153	0.151	0.022	-0.283	S
G1	K^+ *mg/l*	0.156	0.162	0.164	0.021	-0.378	S
G2		0.185	0.195	0.195	0.025	-0.396	S
G3		0.255	0.26	0.257	0.026	-0.08	S
G4		0.205	0.21	0.208	0.014	-0.201	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 53, ARPA UMBRIA multisite laboratory (Italy)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.298	0.314	0.307	0.021	-0.411	S
G2		0.306	0.326	0.319	0.021	-0.618	S
G3		0.285	0.298	0.294	0.021	-0.419	S
G4		0.237	0.26	0.256	0.017	-1.099	S
G1	NH_4^+ *mg N/l*	0.129	0.134	0.138	0.018	-0.492	S
G2		0.154	0.16	0.162	0.017	-0.487	S
G3		0.141	0.147	0.149	0.019	-0.438	S
G4		0.116	0.12	0.12	0.014	-0.252	S
G1	NO_3^- *mg N/l*	0.213	0.238	0.227	0.031	-0.438	S
G2		0.32	0.342	0.329	0.046	-0.201	S
G3		0.319	0.343	0.331	0.048	-0.249	S
G4		0.25	0.276	0.265	0.039	-0.387	S
G1	Na^+ *mg/l*	0.877	0.948	0.919	0.053	-0.802	S
G2		0.791	0.855	0.835	0.06	-0.738	S
G3		0.681	0.737	0.718	0.046	-0.8	S
G4		0.793	0.851	0.825	0.054	-0.6	S
G1	Mg^{2+} *mg/l*	0.102	0.114	0.115	0.012	-1.135	S
G2		0.129	0.145	0.144	0.012	-1.244	S
G3		< 0.100	0.103	0.105	0.01	-5.606	U
G4		< 0.100	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	1.275	1.35	1.319	0.077	-0.575	S
G2		0.966	1.04	1.015	0.06	-0.807	S
G3		0.81	0.888	0.87	0.045	-1.32	S
G4		1.045	1.12	1.083	0.055	-0.698	S
G1	Ca^{2+} *mg/l*	0.159	0.179	0.174	0.023	-0.657	S
G2		0.127	0.14	0.139	0.017	-0.681	S
G3		0.153	0.166	0.162	0.019	-0.468	S
G4		0.141	0.153	0.151	0.022	-0.467	S
G1	K^+ *mg/l*	0.166	0.162	0.164	0.021	0.104	S
G2		0.199	0.195	0.195	0.025	0.164	S
G3		0.263	0.26	0.257	0.026	0.228	S
G4		0.217	0.21	0.208	0.014	0.631	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

U – Unsatisfactory: Your result deviates more than ±20% of the expected value for for SO_4^{2-} and NO_3^-, more than ±25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and more than ±0.2 pH-units for pH

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.292	0.314	0.307	0.021	-0.694	S
G2		0.302	0.326	0.319	0.021	-0.808	S
G3		0.278	0.298	0.294	0.021	-0.758	S
G4		0.238	0.26	0.256	0.017	-1.041	S
G1	NH_4^+ *mg N/l*	0.148	0.134	0.138	0.018	0.558	S
G2		0.178	0.16	0.162	0.017	0.921	S
G3		0.159	0.147	0.149	0.019	0.531	S
G4		0.129	0.12	0.12	0.014	0.648	S
G1	NO_3^- *mg N/l*	0.24	0.238	0.227	0.031	0.422	S
G2		0.362	0.342	0.329	0.046	0.719	S
G3		0.359	0.343	0.331	0.048	0.582	S
G4		0.283	0.276	0.265	0.039	0.467	S
G1	Na^+ *mg/l*	0.822	0.948	0.919	0.053	-1.846	S
G2		0.737	0.855	0.835	0.06	-1.638	S
G3		0.633	0.737	0.718	0.046	-1.843	S
G4		0.72	0.851	0.825	0.054	-1.953	Q
G1	Mg^{2+} *mg/l*	0.103	0.114	0.115	0.012	-1.05	S
G2		0.132	0.145	0.144	0.012	-1	S
G3		0.094	0.103	0.105	0.01	-1.14	S
G4		0.075	0.083	0.084	0.01	-0.903	S
G1	Cl^- *mg/l*	1.281	1.35	1.319	0.077	-0.497	S
G2		1.003	1.04	1.015	0.06	-0.194	S
G3		0.828	0.888	0.87	0.045	-0.923	S
G4		1.048	1.12	1.083	0.055	-0.643	S
G1	Ca^{2+} *mg/l*	0.151	0.179	0.174	0.023	-1.001	Q
G2		0.12	0.14	0.139	0.017	-1.09	S
G3		0.138	0.166	0.162	0.019	-1.269	Q
G4		0.128	0.153	0.151	0.022	-1.067	Q
G1	K^+ *mg/l*	0.15	0.162	0.164	0.021	-0.667	S
G2		0.181	0.195	0.195	0.025	-0.556	S
G3		0.237	0.26	0.257	0.026	-0.775	S
G4		0.193	0.21	0.208	0.014	-1.033	S
G1	pH *pH units*	5.66	5.47	5.492	0.132	1.271	Q
G2		5.58	5.46	5.465	0.113	1.019	Q
G3		5.5	5.41	5.435	0.11	0.587	S
G4		5.49	5.42	5.428	0.102	0.603	S
G1	Cond *µS/cm*	11	11	11.042	1.511	-0.028	S
G2		10.8	10.9	11.214	1.381	-0.3	S
G3		10.1	10.3	10.304	0.517	-0.395	S
G4		10.2	10.1	10.231	0.65	-0.048	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.311	0.314	0.307	0.021	0.202	S
G2		0.324	0.326	0.319	0.021	0.235	S
G3		0.34	0.298	0.294	0.021	2.244	Q
G4		0.274	0.26	0.256	0.017	1.062	S
G1	NH_4^+ *mg N/l*	0.134	0.134	0.138	0.018	-0.215	S
G2		0.155	0.16	0.162	0.017	-0.429	S
G3		0.144	0.147	0.149	0.019	-0.276	S
G4		0.109	0.12	0.12	0.014	-0.737	S
G1	NO_3^- *mg N/l*	0.237	0.238	0.227	0.031	0.326	S
G2		0.341	0.342	0.329	0.046	0.259	S
G3		0.35	0.343	0.331	0.048	0.395	S
G4		0.278	0.276	0.265	0.039	0.338	S
G1	Na^+ *mg/l*	0.91	0.948	0.919	0.053	-0.176	S
G2		0.878	0.855	0.835	0.06	0.712	S
G3		0.759	0.737	0.718	0.046	0.895	S
G4		0.872	0.851	0.825	0.054	0.865	S
G1	Mg^{2+} *mg/l*	0.105	0.114	0.115	0.012	-0.88	S
G2		0.138	0.145	0.144	0.012	-0.511	S
G3		0.093	0.103	0.105	0.01	-1.242	S
G4		0.071	0.083	0.084	0.01	-1.314	S
G1	Cl^- *mg/l*	1.31	1.35	1.319	0.077	-0.122	S
G2		0.972	1.04	1.015	0.06	-0.708	S
G3		0.906	0.888	0.87	0.045	0.797	S
G4		1.06	1.12	1.083	0.055	-0.425	S
G1	Ca^{2+} *mg/l*	0.168	0.179	0.174	0.023	-0.269	S
G2		0.125	0.14	0.139	0.017	-0.798	S
G3		0.153	0.166	0.162	0.019	-0.468	S
G4		0.138	0.153	0.151	0.022	-0.606	S
G1	K^+ *mg/l*	0.169	0.162	0.164	0.021	0.249	S
G2		0.214	0.195	0.195	0.025	0.764	S
G3		0.282	0.26	0.257	0.026	0.961	S
G4		0.23	0.21	0.208	0.014	1.532	S
G1	pH *pH units*	5.4	5.47	5.492	0.132	-0.702	S
G2		5.37	5.46	5.465	0.113	-0.837	S
G3		5.37	5.41	5.435	0.11	-0.593	S
G4		5.42	5.42	5.428	0.102	-0.082	S
G1	Cond *µS/cm*	< 10.000	11	11.042	1.511	-3.998	U
G2		10.2	10.9	11.214	1.381	-0.735	S
G3		10	10.3	10.304	0.517	-0.588	S
G4		< 10.000	10.1	10.231	0.65	-8.042	U

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.328	0.314	0.307	0.021	1.003	S
G2		0.342	0.326	0.319	0.021	1.089	S
G3		0.312	0.298	0.294	0.021	0.889	S
G4		0.268	0.26	0.256	0.017	0.711	S
G1	NH_4^+ *mg N/l*	0.133	0.134	0.138	0.018	-0.271	S
G2		0.162	0.16	0.162	0.017	-0.018	S
G3		0.148	0.147	0.149	0.019	-0.061	S
G4		0.121	0.12	0.12	0.014	0.094	S
G1	NO_3^- *mg N/l*	0.241	0.238	0.227	0.031	0.454	S
G2		0.349	0.342	0.329	0.046	0.434	S
G3		0.349	0.343	0.331	0.048	0.375	S
G4		0.279	0.276	0.265	0.039	0.363	S
G1	Na^+ *mg/l*	0.958	0.948	0.919	0.053	0.734	S
G2		0.869	0.855	0.835	0.06	0.562	S
G3		0.749	0.737	0.718	0.046	0.678	S
G4		0.866	0.851	0.825	0.054	0.754	S
G1	Mg^{2+} *mg/l*	0.117	0.114	0.115	0.012	0.141	S
G2		0.148	0.145	0.144	0.012	0.305	S
G3		0.107	0.103	0.105	0.01	0.179	S
G4		0.085	0.083	0.084	0.01	0.124	S
G1	Cl^- *mg/l*	1.304	1.35	1.319	0.077	-0.2	S
G2		1.006	1.04	1.015	0.06	-0.145	S
G3		0.859	0.888	0.87	0.045	-0.239	S
G4		1.082	1.12	1.083	0.055	-0.025	S
G1	Ca^{2+} *mg/l*	0.173	0.179	0.174	0.023	-0.054	S
G2		0.136	0.14	0.139	0.017	-0.155	S
G3		0.161	0.166	0.162	0.019	-0.04	S
G4		0.149	0.153	0.151	0.022	-0.099	S
G1	K^+ *mg/l*	0.174	0.162	0.164	0.021	0.49	S
G2		0.205	0.195	0.195	0.025	0.404	S
G3		0.278	0.26	0.257	0.026	0.807	S
G4		0.223	0.21	0.208	0.014	1.046	S
G1	pH *pH units*	5.55	5.47	5.492	0.132	0.436	S
G2		5.54	5.46	5.465	0.113	0.665	S
G3		5.53	5.41	5.435	0.11	0.86	Q
G4		5.5	5.42	5.428	0.102	0.7	S
G1	Cond *µS/cm*	10.4	11	11.042	1.511	-0.425	S
G2		10.3	10.9	11.214	1.381	-0.662	S
G3		9.6	10.3	10.304	0.517	-1.361	S
G4		9.5	10.1	10.231	0.65	-1.124	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.3	0.314	0.307	0.021	-0.317	S
G2		0.314	0.326	0.319	0.021	-0.239	S
G3		0.287	0.298	0.294	0.021	-0.322	S
G4		0.247	0.26	0.256	0.017	-0.515	S
G1	NH_4^+ *mg N/l*	0.145	0.134	0.138	0.018	0.392	S
G2		0.165	0.16	0.162	0.017	0.158	S
G3		0.15	0.147	0.149	0.019	0.047	S
G4		0.125	0.12	0.12	0.014	0.371	S
G1	NO_3^- *mg N/l*	0.226	0.238	0.227	0.031	-0.024	S
G2		0.331	0.342	0.329	0.046	0.04	S
G3		0.332	0.343	0.331	0.048	0.021	S
G4		0.262	0.276	0.265	0.039	-0.076	S
G1	Na^+ *mg/l*	0.93	0.948	0.919	0.053	0.203	S
G2		0.84	0.855	0.835	0.06	0.078	S
G3		0.72	0.737	0.718	0.046	0.048	S
G4		0.83	0.851	0.825	0.054	0.086	S
G1	Mg^{2+} *mg/l*	0.12	0.114	0.115	0.012	0.397	S
G2		0.14	0.145	0.144	0.012	-0.347	S
G3		0.11	0.103	0.105	0.01	0.484	S
G4		0.09	0.083	0.084	0.01	0.637	S
G1	Cl^- *mg/l*	1.29	1.35	1.319	0.077	-0.381	S
G2		0.99	1.04	1.015	0.06	-0.41	S
G3		0.85	0.888	0.87	0.045	-0.438	S
G4		1.07	1.12	1.083	0.055	-0.243	S
G1	Ca^{2+} *mg/l*	0.2	0.179	0.174	0.023	1.108	S
G2		0.17	0.14	0.139	0.017	1.832	Q
G3		0.19	0.166	0.162	0.019	1.509	S
G4		0.16	0.153	0.151	0.022	0.408	S
G1	K^+ *mg/l*	0.16	0.162	0.164	0.021	-0.185	S
G2		0.2	0.195	0.195	0.025	0.204	S
G3		0.26	0.26	0.257	0.026	0.113	S
G4		0.21	0.21	0.208	0.014	0.145	S
G1	pH *pH units*	5.71	5.47	5.492	0.132	1.65	U
G2		5.63	5.46	5.465	0.113	1.46	Q
G3		5.48	5.41	5.435	0.11	0.406	S
G4		5.5	5.42	5.428	0.102	0.7	S
G1	Cond *µS/cm*	11	11	11.042	1.511	-0.028	S
G2		11	10.9	11.214	1.381	-0.155	S
G3		10.4	10.3	10.304	0.517	0.185	S
G4		10.1	10.1	10.231	0.65	-0.201	S

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***** Z score is unitless

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S – Satisfactory: Your result deviates less than ±10% of the expected value for SO_4^{2-} and NO_3^-, less than ±15% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and less than ±0.1 pH-units for pH

Q – Questionable: Your result deviates between ±10-20% of the expected value for SO_4^{2-} and NO_3^-, between ±15-25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and between ±0.1-0.2 pH-units for pH

U – Unsatisfactory: Your result deviates more than ±20% of the expected value for for SO_4^{2-} and NO_3^-, more than ±25% of the expected value for NH_4^+, Cl^-, Na^+, Mg^{2+}, Ca^{2+}, K^+ and cond and more than ±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://projects.nilu.no/ccc/intercomparison/

EMEP – 41st intercomparison of analytical methods - 2023

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

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.308	0.314	0.307	0.021	0.06	S
G2		0.319	0.326	0.319	0.021	-0.002	S
G3		0.292	0.298	0.294	0.021	-0.08	S
G4		0.255	0.26	0.256	0.017	-0.048	S
G1	NH_4^+ *mg N/l*	0.13	0.134	0.138	0.018	-0.436	S
G2		0.153	0.16	0.162	0.017	-0.546	S
G3		0.145	0.147	0.149	0.019	-0.222	S
G4		0.126	0.12	0.12	0.014	0.44	S
G1	NO_3^- *mg N/l*	0.228	0.238	0.227	0.031	0.039	S
G2		0.329	0.342	0.329	0.046	-0.004	S
G3		0.329	0.343	0.331	0.048	-0.041	S
G4		0.263	0.276	0.265	0.039	-0.05	S
G1	Na^+ *mg/l*	0.906	0.948	0.919	0.053	-0.252	S
G2		0.822	0.855	0.835	0.06	-0.222	S
G3		0.708	0.737	0.718	0.046	-0.213	S
G4		0.822	0.851	0.825	0.054	-0.062	S
G1	Mg^{2+} *mg/l*	0.102	0.114	0.115	0.012	-1.135	S
G2		0.131	0.145	0.144	0.012	-1.081	S
G3		0.093	0.103	0.105	0.01	-1.242	S
G4		0.073	0.083	0.084	0.01	-1.109	S
G1	Cl^- *mg/l*	1.301	1.35	1.319	0.077	-0.238	S
G2		0.996	1.04	1.015	0.06	-0.31	S
G3		0.842	0.888	0.87	0.045	-0.614	S
G4		1.073	1.12	1.083	0.055	-0.189	S
G1	Ca^{2+} *mg/l*	0.162	0.179	0.174	0.023	-0.527	S
G2		0.128	0.14	0.139	0.017	-0.622	S
G3		0.151	0.166	0.162	0.019	-0.575	S
G4		0.134	0.153	0.151	0.022	-0.79	S
G1	K^+ *mg/l*	0.208	0.162	0.164	0.021	2.129	U
G2		0.228	0.195	0.195	0.025	1.324	Q
G3		0.251	0.26	0.257	0.026	-0.235	S
G4		0.193	0.21	0.208	0.014	-1.033	S
G1	pH *pH units*	5.51	5.47	5.492	0.132	0.133	S
G2		5.49	5.46	5.465	0.113	0.223	S
G3		5.46	5.41	5.435	0.11	0.224	S
G4		5.48	5.42	5.428	0.102	0.505	S
G1	Cond *µS/cm*	10	11	11.042	1.511	-0.69	S
G2		10.2	10.9	11.214	1.381	-0.735	S
G3		9.5	10.3	10.304	0.517	-1.555	S
G4		9.3	10.1	10.231	0.65	-1.431	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 116, Institute for Applied Plant Biology (Switzerland)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.297	0.314	0.307	0.021	-0.463	S
G2		0.309	0.326	0.319	0.021	-0.452	S
G3		0.273	0.298	0.294	0.021	-0.985	S
G4		0.235	0.26	0.256	0.017	-1.21	S
G1	NH_4^+ *mg N/l*	0.116	0.134	0.138	0.018	-1.21	S
G2		0.145	0.16	0.162	0.017	-1.015	S
G3		0.135	0.147	0.149	0.019	-0.76	S
G4		0.111	0.12	0.12	0.014	-0.598	S
G1	NO_3^- *mg N/l*	0.209	0.238	0.227	0.031	-0.572	S
G2		0.31	0.342	0.329	0.046	-0.413	S
G3		0.303	0.343	0.331	0.048	-0.589	S
G4		0.242	0.276	0.265	0.039	-0.602	S
G1	Na^+ *mg/l*	1.03	0.948	0.919	0.053	2.1	S
G2		0.88	0.855	0.835	0.06	0.745	S
G3		0.77	0.737	0.718	0.046	1.134	S
G4		0.87	0.851	0.825	0.054	0.828	S
G1	Mg^{2+} *mg/l*	0.16	0.114	0.115	0.012	3.8	U
G2		0.18	0.145	0.144	0.012	2.914	Q
G3		0.14	0.103	0.105	0.01	3.529	U
G4		0.11	0.083	0.084	0.01	2.691	U
G1	Cl^- *mg/l*	1.293	1.35	1.319	0.077	-0.346	S
G2		0.995	1.04	1.015	0.06	-0.32	S
G3		0.82	0.888	0.87	0.045	-1.106	S
G4		1.061	1.12	1.083	0.055	-0.405	S
G1	Ca^{2+} *mg/l*	< 0.300	0.179	0.174	0.023		B
G2		< 0.300	0.14	0.139	0.017		B
G3		< 0.300	0.166	0.162	0.019		B
G4		< 0.300	0.153	0.151	0.022		B
G1	K^+ *mg/l*	0.18	0.162	0.164	0.021	0.779	S
G2		0.2	0.195	0.195	0.025	0.204	S
G3		0.28	0.26	0.257	0.026	0.884	S
G4		0.22	0.21	0.208	0.014	0.839	S
G1	pH *pH units*	5.65	5.47	5.492	0.132	1.195	Q
G2		5.42	5.46	5.465	0.113	-0.395	S
G3		5.38	5.41	5.435	0.11	-0.502	S
G4		5.36	5.42	5.428	0.102	-0.669	S
G1	Cond *µS/cm*	10	11	11.042	1.511	-0.69	S
G2		10.1	10.9	11.214	1.381	-0.807	S
G3		9.5	10.3	10.304	0.517	-1.555	S
G4		9.5	10.1	10.231	0.65	-1.124	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 117, SBS Standortserkundung/Bodenmonitoring (Germany)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.32	0.314	0.307	0.021	0.626	S
G2		0.33	0.326	0.319	0.021	0.52	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.27	0.26	0.256	0.017	0.828	S
G1	NH_4^+ *mg N/l*	0.13	0.134	0.138	0.018	-0.436	S
G2		0.16	0.16	0.162	0.017	-0.135	S
G3		0.15	0.147	0.149	0.019	0.047	S
G4		0.12	0.12	0.12	0.014	0.025	S
G1	NO_3^- *mg N/l*	0.23	0.238	0.227	0.031	0.103	S
G2		0.35	0.342	0.329	0.046	0.456	S
G3		0.35	0.343	0.331	0.048	0.395	S
G4		0.27	0.276	0.265	0.039	0.131	S
G1	Na^+ *mg/l*	0.91	0.948	0.919	0.053	-0.176	S
G2		0.83	0.855	0.835	0.06	-0.088	S
G3		0.72	0.737	0.718	0.046	0.048	S
G4		0.81	0.851	0.825	0.054	-0.284	S
G1	Mg^{2+} *mg/l*	0.11	0.114	0.115	0.012	-0.454	S
G2		0.14	0.145	0.144	0.012	-0.347	S
G3		0.1	0.103	0.105	0.01	-0.531	S
G4		0.08	0.083	0.084	0.01	-0.39	S
G1	Cl^- *mg/l*	1.2	1.35	1.319	0.077	-1.545	S
G2		1	1.04	1.015	0.06	-0.244	S
G3		0.87	0.888	0.87	0.045	0.003	S
G4		1.03	1.12	1.083	0.055	-0.97	S
G1	Ca^{2+} *mg/l*	0.18	0.179	0.174	0.023	0.247	S
G2		0.14	0.14	0.139	0.017	0.079	S
G3		0.17	0.166	0.162	0.019	0.44	S
G4		0.16	0.153	0.151	0.022	0.408	S
G1	K^+ *mg/l*	0.15	0.162	0.164	0.021	-0.667	S
G2		0.18	0.195	0.195	0.025	-0.596	S
G3		0.24	0.26	0.257	0.026	-0.659	S
G4		0.2	0.21	0.208	0.014	-0.548	S
G1	pH *pH units*	5.47	5.47	5.492	0.132	-0.171	S
G2		5.48	5.46	5.465	0.113	0.135	S
G3		5.44	5.41	5.435	0.11	0.043	S
G4		5.45	5.42	5.428	0.102	0.211	S
G1	Cond *µS/cm*	11.3	11	11.042	1.511	0.171	S
G2		13.1	10.9	11.214	1.381	1.366	Q
G3		11.2	10.3	10.304	0.517	1.731	S
G4		11.5	10.1	10.231	0.65	1.951	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 118, Forstliche Versuchs-und Forschungsanstalt (Germany)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.35	0.314	0.307	0.021	2.04	Q
G2		0.36	0.326	0.319	0.021	1.942	Q
G3		0.32	0.298	0.294	0.021	1.276	S
G4		0.29	0.26	0.256	0.017	1.996	Q
G1	NH_4^+ *mg N/l*	0.137	0.134	0.138	0.018	-0.05	S
G2		0.153	0.16	0.162	0.017	-0.546	S
G3		0.145	0.147	0.149	0.019	-0.222	S
G4		0.118	0.12	0.12	0.014	-0.114	S
G1	NO_3^- *mg N/l*	0.243	0.238	0.227	0.031	0.517	S
G2		0.35	0.342	0.329	0.046	0.456	S
G3		0.349	0.343	0.331	0.048	0.375	S
G4		0.28	0.276	0.265	0.039	0.389	S
G1	Na^+ *mg/l*	0.9	0.948	0.919	0.053	-0.366	S
G2		0.81	0.855	0.835	0.06	-0.422	S
G3		0.7	0.737	0.718	0.046	-0.387	S
G4		0.8	0.851	0.825	0.054	-0.47	S
G1	Mg^{2+} *mg/l*	0.095	0.114	0.115	0.012	-1.731	Q
G2		0.12	0.145	0.144	0.012	-1.978	Q
G3		0.09	0.103	0.105	0.01	-1.546	S
G4		0.066	0.083	0.084	0.01	-1.827	Q
G1	Cl^- *mg/l*	1.31	1.35	1.319	0.077	-0.122	S
G2		1.06	1.04	1.015	0.06	0.75	S
G3		0.87	0.888	0.87	0.045	0.003	S
G4		1.1	1.12	1.083	0.055	0.302	S
G1	Ca^{2+} *mg/l*	0.12	0.179	0.174	0.023	-2.336	U
G2		0.095	0.14	0.139	0.017	-2.551	U
G3		0.125	0.166	0.162	0.019	-1.964	Q
G4		0.115	0.153	0.151	0.022	-1.666	Q
G1	K^+ *mg/l*	0.165	0.162	0.164	0.021	0.056	S
G2		0.2	0.195	0.195	0.025	0.204	S
G3		0.265	0.26	0.257	0.026	0.305	S
G4		0.21	0.21	0.208	0.014	0.145	S
G1	pH *pH units*	5.67	5.47	5.492	0.132	1.346	U
G2		5.5	5.46	5.465	0.113	0.312	S
G3		5.51	5.41	5.435	0.11	0.678	S
G4		5.47	5.42	5.428	0.102	0.407	S
G1	Cond *µS/cm*	9	11	11.042	1.511	-1.351	Q
G2		9	10.9	11.214	1.381	-1.604	Q
G3		9	10.3	10.304	0.517	-2.521	S
G4		9	10.1	10.231	0.65	-1.892	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.301	0.314	0.307	0.021	-0.27	S
G2		0.315	0.326	0.319	0.021	-0.182	S
G3		0.291	0.298	0.294	0.021	-0.128	S
G4		0.249	0.26	0.256	0.017	-0.398	S
G1	NH_4^+ *mg N/l*	0.14	0.134	0.138	0.018	0.116	S
G2		0.16	0.16	0.162	0.017	-0.135	S
G3		0.14	0.147	0.149	0.019	-0.491	S
G4		0.09	0.12	0.12	0.014	-2.052	Q
G1	NO_3^- *mg N/l*	0.21	0.238	0.227	0.031	-0.534	S
G2		0.3	0.342	0.329	0.046	-0.638	S
G3		0.34	0.343	0.331	0.048	0.188	S
G4		0.27	0.276	0.265	0.039	0.131	S
G1	Na^+ *mg/l*	0.902	0.948	0.919	0.053	-0.328	S
G2		0.816	0.855	0.835	0.06	-0.322	S
G3		0.701	0.737	0.718	0.046	-0.365	S
G4		0.811	0.851	0.825	0.054	-0.266	S
G1	Mg^{2+} *mg/l*	0.12	0.114	0.115	0.012	0.397	S
G2		0.151	0.145	0.144	0.012	0.549	S
G3		0.106	0.103	0.105	0.01	0.078	S
G4		0.09	0.083	0.084	0.01	0.637	S
G1	Cl^- *mg/l*	1.3	1.35	1.319	0.077	-0.251	S
G2		0.94	1.04	1.015	0.06	-1.238	S
G3		0.8	0.888	0.87	0.045	-1.54	S
G4		1.02	1.12	1.083	0.055	-1.152	S
G1	Ca^{2+} *mg/l*	0.181	0.179	0.174	0.023	0.29	S
G2		0.135	0.14	0.139	0.017	-0.213	S
G3		0.159	0.166	0.162	0.019	-0.147	S
G4		0.146	0.153	0.151	0.022	-0.237	S
G1	K^+ *mg/l*	0.142	0.162	0.164	0.021	-1.053	S
G2		0.168	0.195	0.195	0.025	-1.076	S
G3		0.222	0.26	0.257	0.026	-1.353	S
G4		0.18	0.21	0.208	0.014	-1.934	S
G1	pH *pH units*	5.43	5.47	5.492	0.132	-0.474	S
G2		5.48	5.46	5.465	0.113	0.135	S
G3		5.46	5.41	5.435	0.11	0.224	S
G4		5.48	5.42	5.428	0.102	0.505	S
G1	Cond *µS/cm*	11.1	11	11.042	1.511	0.038	S
G2		11.1	10.9	11.214	1.381	-0.083	S
G3		10.4	10.3	10.304	0.517	0.185	S
G4		10.2	10.1	10.231	0.65	-0.048	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.255	0.314	0.307	0.021	-2.437	Q
G2		0.254	0.326	0.319	0.021	-3.084	U
G3		0.256	0.298	0.294	0.021	-1.823	Q
G4		0.221	0.26	0.256	0.017	-2.033	Q
G1	NH_4^+ *mg N/l*	0.142	0.134	0.138	0.018	0.226	S
G2		0.167	0.16	0.162	0.017	0.275	S
G3		0.153	0.147	0.149	0.019	0.208	S
G4		0.129	0.12	0.12	0.014	0.648	S
G1	NO_3^- *mg N/l*	0.237	0.238	0.227	0.031	0.326	S
G2		0.345	0.342	0.329	0.046	0.347	S
G3		0.344	0.343	0.331	0.048	0.271	S
G4		0.276	0.276	0.265	0.039	0.286	S
G1	Na^+ *mg/l*	0.962	0.948	0.919	0.053	0.81	S
G2		0.873	0.855	0.835	0.06	0.628	S
G3		0.687	0.737	0.718	0.046	-0.67	S
G4		0.894	0.851	0.825	0.054	1.273	S
G1	Mg^{2+} *mg/l*	0.116	0.114	0.115	0.012	0.056	S
G2		0.146	0.145	0.144	0.012	0.142	S
G3		0.104	0.103	0.105	0.01	-0.125	S
G4		0.083	0.083	0.084	0.01	-0.082	S
G1	Cl^- *mg/l*	1.198	1.35	1.319	0.077	-1.571	S
G2		0.914	1.04	1.015	0.06	-1.669	S
G3		0.776	0.888	0.87	0.045	-2.069	S
G4		1.014	1.12	1.083	0.055	-1.261	S
G1	Ca^{2+} *mg/l*	0.182	0.179	0.174	0.023	0.333	S
G2		0.143	0.14	0.139	0.017	0.254	S
G3		0.104	0.166	0.162	0.019	-3.086	U
G4		0.159	0.153	0.151	0.022	0.362	S
G1	K^+ *mg/l*	0.167	0.162	0.164	0.021	0.152	S
G2		0.202	0.195	0.195	0.025	0.284	S
G3		0.259	0.26	0.257	0.026	0.074	S
G4		0.236	0.21	0.208	0.014	1.948	S
G1	pH *pH units*	5.48	5.47	5.492	0.132	-0.095	S
G2		5.46	5.46	5.465	0.113	-0.042	S
G3		5.46	5.41	5.435	0.11	0.224	S
G4		5.42	5.42	5.428	0.102	-0.082	S
G1	Cond *µS/cm*	10.1	11	11.042	1.511	-0.623	S
G2		10.2	10.9	11.214	1.381	-0.735	S
G3		9.4	10.3	10.304	0.517	-1.748	S
G4		9.5	10.1	10.231	0.65	-1.124	S

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EMEP – 41st intercomparison of analytical methods - 2023

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_4^{2-} *mg S/l*	0.3	0.314	0.307	0.021	-0.317	S
G2		0.316	0.326	0.319	0.021	-0.144	S
G3		0.29	0.298	0.294	0.021	-0.177	S
G4		0.253	0.26	0.256	0.017	-0.165	S
G1	NH_4^+ *mg N/l*	0.129	0.134	0.138	0.018	-0.492	S
G2		0.154	0.16	0.162	0.017	-0.487	S
G3		0.141	0.147	0.149	0.019	-0.438	S
G4		0.115	0.12	0.12	0.014	-0.321	S
G1	NO_3^- *mg N/l*	0.224	0.238	0.227	0.031	-0.088	S
G2		0.332	0.342	0.329	0.046	0.062	S
G3		0.335	0.343	0.331	0.048	0.084	S
G4		0.27	0.276	0.265	0.039	0.131	S
G1	Na^+ *mg/l*	0.886	0.948	0.919	0.053	-0.632	S
G2		0.814	0.855	0.835	0.06	-0.355	S
G3		0.696	0.737	0.718	0.046	-0.474	S
G4		0.801	0.851	0.825	0.054	-0.451	S
G1	Mg^{2+} *mg/l*	0.11	0.114	0.115	0.012	-0.454	S
G2		0.143	0.145	0.144	0.012	-0.103	S
G3		0.107	0.103	0.105	0.01	0.179	S
G4		0.081	0.083	0.084	0.01	-0.287	S
G1	Cl^- *mg/l*	1.32	1.35	1.319	0.077	0.007	S
G2		1.01	1.04	1.015	0.06	-0.078	S
G3		0.861	0.888	0.87	0.045	-0.195	S
G4		1.09	1.12	1.083	0.055	0.12	S
G1	Ca^{2+} *mg/l*	0.177	0.179	0.174	0.023	0.118	S
G2		0.139	0.14	0.139	0.017	0.02	S
G3		0.174	0.166	0.162	0.019	0.654	S
G4		0.159	0.153	0.151	0.022	0.362	S
G1	K^+ *mg/l*	0.163	0.162	0.164	0.021	-0.04	S
G2		0.198	0.195	0.195	0.025	0.124	S
G3		0.264	0.26	0.257	0.026	0.267	S
G4		0.212	0.21	0.208	0.014	0.284	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.315	0.314	0.307	0.021	0.39	S
G2		0.322	0.326	0.319	0.021	0.14	S
G3		0.297	0.298	0.294	0.021	0.162	S
G4		0.266	0.26	0.256	0.017	0.594	S
G1	NH_4^+ *mg N/l*	0.131	0.134	0.138	0.018	-0.381	S
G2		0.158	0.16	0.162	0.017	-0.253	S
G3		0.146	0.147	0.149	0.019	-0.168	S
G4		0.123	0.12	0.12	0.014	0.232	S
G1	NO_3^- *mg N/l*	0.236	0.238	0.227	0.031	0.294	S
G2		0.328	0.342	0.329	0.046	-0.025	S
G3		0.334	0.343	0.331	0.048	0.063	S
G4		0.271	0.276	0.265	0.039	0.156	S
G1	Na^+ *mg/l*	0.909	0.948	0.919	0.053	-0.195	S
G2		0.832	0.855	0.835	0.06	-0.055	S
G3		0.721	0.737	0.718	0.046	0.069	S
G4		0.827	0.851	0.825	0.054	0.031	S
G1	Mg^{2+} *mg/l*	0.116	0.114	0.115	0.012	0.056	S
G2		0.135	0.145	0.144	0.012	-0.755	S
G3		0.111	0.103	0.105	0.01	0.585	S
G4		0.084	0.083	0.084	0.01	0.021	S
G1	Cl^- *mg/l*	1.307	1.35	1.319	0.077	-0.161	S
G2		1.006	1.04	1.015	0.06	-0.145	S
G3		0.856	0.888	0.87	0.045	-0.306	S
G4		1.073	1.12	1.083	0.055	-0.189	S
G1	Ca^{2+} *mg/l*	0.188	0.179	0.174	0.023	0.592	S
G2		0.147	0.14	0.139	0.017	0.488	S
G3		0.173	0.166	0.162	0.019	0.601	S
G4		0.149	0.153	0.151	0.022	-0.099	S
G1	K^+ *mg/l*	0.141	0.162	0.164	0.021	-1.101	S
G2		0.177	0.195	0.195	0.025	-0.716	S
G3		0.232	0.26	0.257	0.026	-0.968	S
G4		0.19	0.21	0.208	0.014	-1.241	S
G1	pH *pH units*	5.501	5.47	5.492	0.132	0.065	S
G2		5.56	5.46	5.465	0.113	0.842	S
G3		5.48	5.41	5.435	0.11	0.406	S
G4		5.56	5.42	5.428	0.102	1.288	Q
G1	Cond *µS/cm*	10.9	11	11.042	1.511	-0.094	S
G2		11.2	10.9	11.214	1.381	-0.01	S
G3		10.3	10.3	10.304	0.517	-0.008	S
G4		10.2	10.1	10.231	0.65	-0.048	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.317	0.314	0.307	0.021	0.484	S
G2		0.326	0.326	0.319	0.021	0.33	S
G3		0.302	0.298	0.294	0.021	0.404	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.145	0.134	0.138	0.018	0.392	S
G2		0.169	0.16	0.162	0.017	0.393	S
G3		0.157	0.147	0.149	0.019	0.423	S
G4		0.141	0.12	0.12	0.014	1.479	Q
G1	NO_3^- *mg N/l*	0.239	0.238	0.227	0.031	0.39	S
G2		0.342	0.342	0.329	0.046	0.281	S
G3		0.351	0.343	0.331	0.048	0.416	S
G4		0.273	0.276	0.265	0.039	0.208	S
G1	Na^+ *mg/l*	0.865	0.948	0.919	0.053	-1.03	S
G2		0.765	0.855	0.835	0.06	-1.171	S
G3		0.639	0.737	0.718	0.046	-1.713	S
G4		0.761	0.851	0.825	0.054	-1.193	S
G1	Mg^{2+} *mg/l*	0.197	0.114	0.115	0.012	6.949	U
G2		0.225	0.145	0.144	0.012	6.584	U
G3		0.181	0.103	0.105	0.01	7.69	U
G4		0.164	0.083	0.084	0.01	8.235	U
G1	Cl^- *mg/l*	1.329	1.35	1.319	0.077	0.124	S
G2		1.014	1.04	1.015	0.06	-0.012	S
G3		0.864	0.888	0.87	0.045	-0.129	S
G4		1.104	1.12	1.083	0.055	0.375	S
G1	Ca^{2+} *mg/l*	0.307	0.179	0.174	0.023	5.715	U
G2		0.269	0.14	0.139	0.017	7.617	U
G3		0.282	0.166	0.162	0.019	6.424	U
G4		0.282	0.153	0.151	0.022	6.032	U
G1	K^+ *mg/l*	0.148	0.162	0.164	0.021	-0.764	S
G2		0.183	0.195	0.195	0.025	-0.476	S
G3		0.228	0.26	0.257	0.026	-1.122	S
G4		0.19	0.21	0.208	0.014	-1.241	S
G1	pH *pH units*	5.51	5.47	5.492	0.132	0.133	S
G2		5.3	5.46	5.465	0.113	-1.456	Q
G3		5.4	5.41	5.435	0.11	-0.321	S
G4		5.43	5.42	5.428	0.102	0.016	S
G1	Cond *µS/cm*	11.9	11	11.042	1.511	0.568	S
G2		11.8	10.9	11.214	1.381	0.424	S
G3		11.1	10.3	10.304	0.517	1.538	S
G4		10.9	10.1	10.231	0.65	1.029	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.308	0.314	0.307	0.021	0.06	S
G2		0.313	0.326	0.319	0.021	-0.286	S
G3		0.282	0.298	0.294	0.021	-0.564	S
G4		0.243	0.26	0.256	0.017	-0.749	S
G1	NH_4^+ *mg N/l*	-999	0.134	0.138	0.018		B
G2		-999	0.16	0.162	0.017		B
G3		-999	0.147	0.149	0.019		B
G4		-999	0.12	0.12	0.014		B
G1	NO_3^- *mg N/l*	0.236	0.238	0.227	0.031	0.294	S
G2		0.339	0.342	0.329	0.046	0.215	S
G3		0.344	0.343	0.331	0.048	0.271	S
G4		0.272	0.276	0.265	0.039	0.182	S
G1	Na^+ *mg/l*	-999	0.948	0.919	0.053		B
G2		-999	0.855	0.835	0.06		B
G3		-999	0.737	0.718	0.046		B
G4		-999	0.851	0.825	0.054		B
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		-999	0.145	0.144	0.012		B
G3		-999	0.103	0.105	0.01		B
G4		-999	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	1.297	1.35	1.319	0.077	-0.29	S
G2		0.98	1.04	1.015	0.06	-0.575	S
G3		0.826	0.888	0.87	0.045	-0.967	S
G4		1.061	1.12	1.083	0.055	-0.407	S
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		-999	0.14	0.139	0.017		B
G3		-999	0.166	0.162	0.019		B
G4		-999	0.153	0.151	0.022		B
G1	K^+ *mg/l*	-999	0.162	0.164	0.021		B
G2		-999	0.195	0.195	0.025		B
G3		-999	0.26	0.257	0.026		B
G4		-999	0.21	0.208	0.014		B
G1	pH *pH units*	5.5	5.47	5.492	0.132	0.057	S
G2		5.52	5.46	5.465	0.113	0.488	S
G3		5.49	5.41	5.435	0.11	0.497	S
G4		5.46	5.42	5.428	0.102	0.309	S
G1	Cond *µS/cm*	10.85	11	11.042	1.511	-0.127	S
G2		10.79	10.9	11.214	1.381	-0.307	S
G3		10.15	10.3	10.304	0.517	-0.298	S
G4		10.06	10.1	10.231	0.65	-0.263	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.331	0.314	0.307	0.021	1.144	S
G2		0.351	0.326	0.319	0.021	1.516	S
G3		0.325	0.298	0.294	0.021	1.518	S
G4		0.285	0.26	0.256	0.017	1.704	S
G1	NH_4^+ *mg N/l*	0.132	0.134	0.138	0.018	-0.326	S
G2		0.159	0.16	0.162	0.017	-0.194	S
G3		0.145	0.147	0.149	0.019	-0.222	S
G4		0.119	0.12	0.12	0.014	-0.044	S
G1	NO_3^- *mg N/l*	0.248	0.238	0.227	0.031	0.677	S
G2		0.363	0.342	0.329	0.046	0.741	S
G3		0.367	0.343	0.331	0.048	0.749	S
G4		0.297	0.276	0.265	0.039	0.829	S
G1	Na^+ *mg/l*	0.949	0.948	0.919	0.053	0.563	S
G2		0.858	0.855	0.835	0.06	0.378	S
G3		0.74	0.737	0.718	0.046	0.482	S
G4		0.857	0.851	0.825	0.054	0.587	S
G1	Mg^{2+} *mg/l*	0.114	0.114	0.115	0.012	-0.114	S
G2		0.146	0.145	0.144	0.012	0.142	S
G3		0.105	0.103	0.105	0.01	-0.024	S
G4		0.084	0.083	0.084	0.01	0.021	S
G1	Cl^- *mg/l*	1.41	1.35	1.319	0.077	1.172	S
G2		1.113	1.04	1.015	0.06	1.628	S
G3		0.959	0.888	0.87	0.045	1.965	S
G4		1.22	1.12	1.083	0.055	2.483	S
G1	Ca^{2+} *mg/l*	0.177	0.179	0.174	0.023	0.118	S
G2		0.139	0.14	0.139	0.017	0.02	S
G3		0.164	0.166	0.162	0.019	0.12	S
G4		0.157	0.153	0.151	0.022	0.27	S
G1	K^+ *mg/l*	0.164	0.162	0.164	0.021	0.008	S
G2		0.198	0.195	0.195	0.025	0.124	S
G3		0.266	0.26	0.257	0.026	0.344	S
G4		0.215	0.21	0.208	0.014	0.492	S
G1	pH *pH units*	5.22	5.47	5.492	0.132	-2.067	U
G2		5.27	5.46	5.465	0.113	-1.721	Q
G3		5.05	5.41	5.435	0.11	-3.5	U
G4		5.15	5.42	5.428	0.102	-2.724	U
G1	Cond *µS/cm*	11.4	11	11.042	1.511	0.237	S
G2		11.2	10.9	11.214	1.381	-0.01	S
G3		10.9	10.3	10.304	0.517	1.151	S
G4		10.5	10.1	10.231	0.65	0.414	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.309	0.314	0.307	0.021	0.107	S
G2		0.306	0.326	0.319	0.021	-0.618	S
G3		0.305	0.298	0.294	0.021	0.55	S
G4		0.257	0.26	0.256	0.017	0.069	S
G1	NH_4^+ *mg N/l*	0.131	0.134	0.138	0.018	-0.381	S
G2		0.153	0.16	0.162	0.017	-0.546	S
G3		0.13	0.147	0.149	0.019	-1.03	S
G4		0.101	0.12	0.12	0.014	-1.291	Q
G1	NO_3^- *mg N/l*	0.219	0.238	0.227	0.031	-0.247	S
G2		0.319	0.342	0.329	0.046	-0.222	S
G3		0.321	0.343	0.331	0.048	-0.207	S
G4		0.254	0.276	0.265	0.039	-0.283	S
G1	Na^+ *mg/l*	0.866	0.948	0.919	0.053	-1.011	S
G2		0.783	0.855	0.835	0.06	-0.871	S
G3		0.676	0.737	0.718	0.046	-0.909	S
G4		0.785	0.851	0.825	0.054	-0.748	S
G1	Mg^{2+} *mg/l*	0.11	0.114	0.115	0.012	-0.454	S
G2		0.141	0.145	0.144	0.012	-0.266	S
G3		0.101	0.103	0.105	0.01	-0.43	S
G4		0.084	0.083	0.084	0.01	0.021	S
G1	Cl^- *mg/l*	1.336	1.35	1.319	0.077	0.214	S
G2		1.03	1.04	1.015	0.06	0.253	S
G3		0.885	0.888	0.87	0.045	0.334	S
G4		1.113	1.12	1.083	0.055	0.538	S
G1	Ca^{2+} *mg/l*	0.156	0.179	0.174	0.023	-0.786	S
G2		0.133	0.14	0.139	0.017	-0.33	S
G3		0.151	0.166	0.162	0.019	-0.575	S
G4		0.141	0.153	0.151	0.022	-0.467	S
G1	K^+ *mg/l*	0.159	0.162	0.164	0.021	-0.233	S
G2		0.191	0.195	0.195	0.025	-0.156	S
G3		0.252	0.26	0.257	0.026	-0.196	S
G4		0.206	0.21	0.208	0.014	-0.132	S
G1	pH *pH units*	5.35	5.47	5.492	0.132	-1.081	Q
G2		5.38	5.46	5.465	0.113	-0.749	S
G3		5.38	5.41	5.435	0.11	-0.502	S
G4		5.39	5.42	5.428	0.102	-0.376	S
G1	Cond *µS/cm*	11.32	11	11.042	1.511	0.184	S
G2		11.31	10.9	11.214	1.381	0.069	S
G3		10.64	10.3	10.304	0.517	0.649	S
G4		10.46	10.1	10.231	0.65	0.352	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	-999	0.314	0.307	0.021		B
G2		0.327	0.326	0.319	0.021	0.377	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.253	0.26	0.256	0.017	-0.165	S
G1	NH_4^+ *mg N/l*	-999	0.134	0.138	0.018		B
G2		0.148	0.16	0.162	0.017	-0.839	S
G3		0.097	0.147	0.149	0.019	-2.805	U
G4		0.095	0.12	0.12	0.014	-1.706	Q
G1	NO_3^- *mg N/l*	-999	0.238	0.227	0.031		B
G2		0.334	0.342	0.329	0.046	0.106	S
G3		0.339	0.343	0.331	0.048	0.167	S
G4		0.268	0.276	0.265	0.039	0.079	S
G1	Na^+ *mg/l*	-999	0.948	0.919	0.053		B
G2		0.774	0.855	0.835	0.06	-1.021	S
G3		0.68	0.737	0.718	0.046	-0.822	S
G4		0.807	0.851	0.825	0.054	-0.34	S
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		0.142	0.145	0.144	0.012	-0.184	S
G3		0.103	0.103	0.105	0.01	-0.227	S
G4		0.078	0.083	0.084	0.01	-0.595	S
G1	Cl^- *mg/l*	-999	1.35	1.319	0.077		B
G2		1.018	1.04	1.015	0.06	0.054	S
G3		0.877	0.888	0.87	0.045	0.157	S
G4		1.092	1.12	1.083	0.055	0.157	S
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		0.143	0.14	0.139	0.017	0.254	S
G3		0.161	0.166	0.162	0.019	-0.04	S
G4		0.151	0.153	0.151	0.022	-0.007	S
G1	K^+ *mg/l*	-999	0.162	0.164	0.021		B
G2		0.185	0.195	0.195	0.025	-0.396	S
G3		0.215	0.26	0.257	0.026	-1.623	Q
G4		0.199	0.21	0.208	0.014	-0.617	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		5.53	5.46	5.465	0.113	0.577	S
G3		5.46	5.41	5.435	0.11	0.224	S
G4		5.5	5.42	5.428	0.102	0.7	S
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		11.47	10.9	11.214	1.381	0.185	S
G3		10.46	10.3	10.304	0.517	0.301	S
G4		10.18	10.1	10.231	0.65	-0.078	S

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Please check the EMEP intercalibration website for more statistics, Youden plots, updated expected values ect: https://projects.nilu.no/ccc/intercomparison/

EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	-999	0.314	0.307	0.021		B
G2		-999	0.326	0.319	0.021		B
G3		-999	0.298	0.294	0.021		B
G4		-999	0.26	0.256	0.017		B
G1	NH_4^+ *mg N/l*	0.189	0.134	0.138	0.018	2.822	U
G2		0.18	0.16	0.162	0.017	1.038	S
G3		0.198	0.147	0.149	0.019	2.63	U
G4		0.195	0.12	0.12	0.014	5.218	U
G1	NO_3^- *mg N/l*	0.212	0.238	0.227	0.031	-0.47	S
G2		0.26	0.342	0.329	0.046	-1.514	Q
G3		0.29	0.343	0.331	0.048	-0.851	Q
G4		0.256	0.276	0.265	0.039	-0.232	S
G1	Na^+ *mg/l*	1.4	0.948	0.919	0.053	9.119	U
G2		2.3	0.855	0.835	0.06	24.408	U
G3		0.27	0.737	0.718	0.046	-9.733	U
G4		0.35	0.851	0.825	0.054	-8.814	U
G1	Mg^{2+} *mg/l*	0.12	0.114	0.115	0.012	0.397	S
G2		0.16	0.145	0.144	0.012	1.283	S
G3		0.11	0.103	0.105	0.01	0.484	S
G4		0.08	0.083	0.084	0.01	-0.39	S
G1	Cl^- *mg/l*	-999	1.35	1.319	0.077		B
G2		-999	1.04	1.015	0.06		B
G3		-999	0.888	0.87	0.045		B
G4		-999	1.12	1.083	0.055		B
G1	Ca^{2+} *mg/l*	0.22	0.179	0.174	0.023	1.969	Q
G2		0.166	0.14	0.139	0.017	1.598	Q
G3		0.18	0.166	0.162	0.019	0.975	S
G4		0.3	0.153	0.151	0.022	6.862	U
G1	K^+ *mg/l*	0.118	0.162	0.164	0.021	-2.21	U
G2		0.134	0.195	0.195	0.025	-2.437	U
G3		0.194	0.26	0.257	0.026	-2.433	U
G4		0.148	0.21	0.208	0.014	-4.153	U
G1	pH *pH units*	5.15	5.47	5.492	0.132	-2.598	U
G2		4.9	5.46	5.465	0.113	-4.991	U
G3		4.88	5.41	5.435	0.11	-5.044	U
G4		4.86	5.42	5.428	0.102	-5.562	U
G1	Cond *µS/cm*	11.12	11	11.042	1.511	0.051	S
G2		11.45	10.9	11.214	1.381	0.171	S
G3		10.34	10.3	10.304	0.517	0.069	S
G4		10.01	10.1	10.231	0.65	-0.34	S

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EMEP – 41st intercomparison of analytical methods - 2023

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

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	-999	0.314	0.307	0.021		B
G2		-999	0.326	0.319	0.021		B
G3		-999	0.298	0.294	0.021		B
G4		-999	0.26	0.256	0.017		B
G1	NH_4^+ *mg N/l*	-999	0.134	0.138	0.018		B
G2		-999	0.16	0.162	0.017		B
G3		-999	0.147	0.149	0.019		B
G4		-999	0.12	0.12	0.014		B
G1	NO_3^- *mg N/l*	-999	0.238	0.227	0.031		B
G2		-999	0.342	0.329	0.046		B
G3		-999	0.343	0.331	0.048		B
G4		-999	0.276	0.265	0.039		B
G1	Na^+ *mg/l*	0.836	0.948	0.919	0.053	-1.58	S
G2		0.744	0.855	0.835	0.06	-1.521	S
G3		0.631	0.737	0.718	0.046	-1.887	S
G4		0.69	0.851	0.825	0.054	-2.509	Q
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		-999	0.145	0.144	0.012		B
G3		-999	0.103	0.105	0.01		B
G4		-999	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	-999	1.35	1.319	0.077		B
G2		-999	1.04	1.015	0.06		B
G3		-999	0.888	0.87	0.045		B
G4		-999	1.12	1.083	0.055		B
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		-999	0.14	0.139	0.017		B
G3		-999	0.166	0.162	0.019		B
G4		-999	0.153	0.151	0.022		B
G1	K^+ *mg/l*	0.159	0.162	0.164	0.021	-0.233	S
G2		0.198	0.195	0.195	0.025	0.124	S
G3		0.255	0.26	0.257	0.026	-0.08	S
G4		0.207	0.21	0.208	0.014	-0.063	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 200, FUB AG (Switzerland)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.318	0.314	0.307	0.021	0.532	S
G2		0.329	0.326	0.319	0.021	0.472	S
G3		0.302	0.298	0.294	0.021	0.404	S
G4		0.262	0.26	0.256	0.017	0.361	S
G1	NH_4^+ *mg N/l*	0.133	0.134	0.138	0.018	-0.271	S
G2		0.162	0.16	0.162	0.017	-0.018	S
G3		0.147	0.147	0.149	0.019	-0.115	S
G4		0.117	0.12	0.12	0.014	-0.183	S
G1	NO_3^- *mg N/l*	0.238	0.238	0.227	0.031	0.358	S
G2		0.341	0.342	0.329	0.046	0.259	S
G3		0.342	0.343	0.331	0.048	0.229	S
G4		0.275	0.276	0.265	0.039	0.26	S
G1	Na^+ *mg/l*	0.935	0.948	0.919	0.053	0.298	S
G2		0.851	0.855	0.835	0.06	0.262	S
G3		0.729	0.737	0.718	0.046	0.243	S
G4		0.845	0.851	0.825	0.054	0.365	S
G1	Mg^{2+} *mg/l*	0.119	0.114	0.115	0.012	0.311	S
G2		0.164	0.145	0.144	0.012	1.61	S
G3		0.109	0.103	0.105	0.01	0.382	S
G4		0.082	0.083	0.084	0.01	-0.184	S
G1	Cl^- *mg/l*	1.32	1.35	1.319	0.077	0.007	S
G2		1.019	1.04	1.015	0.06	0.071	S
G3		0.868	0.888	0.87	0.045	-0.041	S
G4		1.104	1.12	1.083	0.055	0.375	S
G1	Ca^{2+} *mg/l*	0.212	0.179	0.174	0.023	1.625	Q
G2		0.164	0.14	0.139	0.017	1.481	Q
G3		0.201	0.166	0.162	0.019	2.097	Q
G4		0.19	0.153	0.151	0.022	1.791	Q
G1	K^+ *mg/l*	0.17	0.162	0.164	0.021	0.297	S
G2		0.203	0.195	0.195	0.025	0.324	S
G3		0.268	0.26	0.257	0.026	0.421	S
G4		0.218	0.21	0.208	0.014	0.7	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	11.27	11	11.042	1.511	0.151	S
G2		10.85	10.9	11.214	1.381	-0.264	S
G3		10.24	10.3	10.304	0.517	-0.124	S
G4		10.06	10.1	10.231	0.65	-0.263	S

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	-999	0.314	0.307	0.021		B
G2		-999	0.326	0.319	0.021		B
G3		-999	0.298	0.294	0.021		B
G4		-999	0.26	0.256	0.017		B
G1	NH_4^+ *mg N/l*	0.19	0.134	0.138	0.018	2.877	U
G2		0.18	0.16	0.162	0.017	1.038	S
G3		0.201	0.147	0.149	0.019	2.791	U
G4		0.195	0.12	0.12	0.014	5.218	U
G1	NO_3^- *mg N/l*	< 0.500	0.238	0.227	0.031		B
G2		< 0.500	0.342	0.329	0.046		B
G3		< 0.500	0.343	0.331	0.048		B
G4		< 0.500	0.276	0.265	0.039		B
G1	Na^+ *mg/l*	0.866	0.948	0.919	0.053	-1.011	S
G2		0.789	0.855	0.835	0.06	-0.771	S
G3		0.683	0.737	0.718	0.046	-0.756	S
G4		0.735	0.851	0.825	0.054	-1.675	S
G1	Mg^{2+} *mg/l*	0.118	0.114	0.115	0.012	0.226	S
G2		0.136	0.145	0.144	0.012	-0.674	S
G3		0.099	0.103	0.105	0.01	-0.633	S
G4		0.082	0.083	0.084	0.01	-0.184	S
G1	Cl^- *mg/l*	-999	1.35	1.319	0.077		B
G2		-999	1.04	1.015	0.06		B
G3		-999	0.888	0.87	0.045		B
G4		-999	1.12	1.083	0.055		B
G1	Ca^{2+} *mg/l*	0.157	0.179	0.174	0.023	-0.743	S
G2		0.143	0.14	0.139	0.017	0.254	S
G3		0.128	0.166	0.162	0.019	-1.804	Q
G4		0.114	0.153	0.151	0.022	-1.712	U
G1	K^+ *mg/l*	0.172	0.162	0.164	0.021	0.393	S
G2		0.211	0.195	0.195	0.025	0.644	S
G3		0.267	0.26	0.257	0.026	0.383	S
G4		0.224	0.21	0.208	0.014	1.116	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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

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EMEP – 41st intercomparison of analytical methods - 2023

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 ¤
G1	SO_4^{2-} *mg S/l*	0.31	0.314	0.307	0.021	0.155	S
G2		0.32	0.326	0.319	0.021	0.046	S
G3		0.3	0.298	0.294	0.021	0.307	S
G4		0.26	0.26	0.256	0.017	0.244	S
G1	NH_4^+ *mg N/l*	0.13	0.134	0.138	0.018	-0.436	S
G2		0.13	0.16	0.162	0.017	-1.895	Q
G3		0.14	0.147	0.149	0.019	-0.491	S
G4		0.1	0.12	0.12	0.014	-1.36	Q
G1	NO_3^- *mg N/l*	0.23	0.238	0.227	0.031	0.103	S
G2		0.33	0.342	0.329	0.046	0.018	S
G3		0.33	0.343	0.331	0.048	-0.02	S
G4		0.27	0.276	0.265	0.039	0.131	S
G1	Na^+ *mg/l*	0.915	0.948	0.919	0.053	-0.082	S
G2		0.799	0.855	0.835	0.06	-0.605	S
G3		0.682	0.737	0.718	0.046	-0.778	S
G4		0.783	0.851	0.825	0.054	-0.785	S
G1	Mg^{2+} *mg/l*	0.113	0.114	0.115	0.012	-0.199	S
G2		0.137	0.145	0.144	0.012	-0.592	S
G3		0.1	0.103	0.105	0.01	-0.531	S
G4		0.077	0.083	0.084	0.01	-0.698	S
G1	Cl^- *mg/l*	1.28	1.35	1.319	0.077	-0.51	S
G2		1	1.04	1.015	0.06	-0.244	S
G3		0.88	0.888	0.87	0.045	0.224	S
G4		1.08	1.12	1.083	0.055	-0.061	S
G1	Ca^{2+} *mg/l*	0.172	0.179	0.174	0.023	-0.097	S
G2		0.141	0.14	0.139	0.017	0.137	S
G3		0.158	0.166	0.162	0.019	-0.201	S
G4		0.139	0.153	0.151	0.022	-0.56	S
G1	K^+ *mg/l*	0.147	0.162	0.164	0.021	-0.812	S
G2		0.165	0.195	0.195	0.025	-1.196	Q
G3		0.242	0.26	0.257	0.026	-0.582	S
G4		0.198	0.21	0.208	0.014	-0.687	S
G1	pH *pH units*	-999	5.47	5.492	0.132		B
G2		-999	5.46	5.465	0.113		B
G3		-999	5.41	5.435	0.11		B
G4		-999	5.42	5.428	0.102		B
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 208, VINCA - Vinca Institute of Nuclear Sciences (Republic of Serbia)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.306	0.314	0.307	0.021	-0.043	S
G2		0.324	0.326	0.319	0.021	0.245	S
G3		0.296	0.298	0.294	0.021	0.114	S
G4		0.258	0.26	0.256	0.017	0.133	S
G1	NH_4^+ *mg N/l*	-999	0.134	0.138	0.018		B
G2		-999	0.16	0.162	0.017		B
G3		-999	0.147	0.149	0.019		B
G4		-999	0.12	0.12	0.014		B
G1	NO_3^- *mg N/l*	0.23	0.238	0.227	0.031	0.11	S
G2		0.333	0.342	0.329	0.046	0.091	S
G3		0.334	0.343	0.331	0.048	0.067	S
G4		0.269	0.276	0.265	0.039	0.11	S
G1	Na^+ *mg/l*	-999	0.948	0.919	0.053		B
G2		-999	0.855	0.835	0.06		B
G3		-999	0.737	0.718	0.046		B
G4		-999	0.851	0.825	0.054		B
G1	Mg^{2+} *mg/l*	-999	0.114	0.115	0.012		B
G2		-999	0.145	0.144	0.012		B
G3		-999	0.103	0.105	0.01		B
G4		-999	0.083	0.084	0.01		B
G1	Cl^- *mg/l*	1.306	1.35	1.319	0.077	-0.175	S
G2		1.011	1.04	1.015	0.06	-0.065	S
G3		0.859	0.888	0.87	0.045	-0.239	S
G4		1.104	1.12	1.083	0.055	0.368	S
G1	Ca^{2+} *mg/l*	-999	0.179	0.174	0.023		B
G2		-999	0.14	0.139	0.017		B
G3		-999	0.166	0.162	0.019		B
G4		-999	0.153	0.151	0.022		B
G1	K^+ *mg/l*	-999	0.162	0.164	0.021		B
G2		-999	0.195	0.195	0.025		B
G3		-999	0.26	0.257	0.026		B
G4		-999	0.21	0.208	0.014		B
G1	pH *pH units*	5.5	5.47	5.492	0.132	0.057	S
G2		5.5	5.46	5.465	0.113	0.312	S
G3		5	5.41	5.435	0.11	-3.954	U
G4		5.5	5.42	5.428	0.102	0.7	S
G1	Cond *µS/cm*	-999	11	11.042	1.511		B
G2		-999	10.9	11.214	1.381		B
G3		-999	10.3	10.304	0.517		B
G4		-999	10.1	10.231	0.65		B

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EMEP – 41st intercomparison of analytical methods - 2023

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

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.904	0.314	0.307	0.021	28.161	U
G2		0.938	0.326	0.319	0.021	29.342	U
G3		0.855	0.298	0.294	0.021	27.198	U
G4		0.745	0.26	0.256	0.017	28.558	U
G1	NH_4^+ *mg N/l*	0.139	0.134	0.138	0.018	0.061	S
G2		0.161	0.16	0.162	0.017	-0.077	S
G3		0.152	0.147	0.149	0.019	0.154	S
G4		0.127	0.12	0.12	0.014	0.509	S
G1	NO_3^- *mg N/l*	1	0.238	0.227	0.031	24.619	U
G2		1.455	0.342	0.329	0.046	24.646	U
G3		1.449	0.343	0.331	0.048	23.238	U
G4		1.16	0.276	0.265	0.039	23.167	U
G1	Na^+ *mg/l*	1.143	0.948	0.919	0.053	4.244	Q
G2		0.898	0.855	0.835	0.06	1.048	S
G3		0.851	0.737	0.718	0.046	2.89	Q
G4		1.082	0.851	0.825	0.054	4.759	U
G1	Mg^{2+} *mg/l*	0.143	0.114	0.115	0.012	2.371	U
G2		0.156	0.145	0.144	0.012	0.957	S
G3		0.124	0.103	0.105	0.01	1.874	Q
G4		0.109	0.083	0.084	0.01	2.588	U
G1	Cl^- *mg/l*	1.266	1.35	1.319	0.077	-0.695	S
G2		0.976	1.04	1.015	0.06	-0.635	S
G3		0.83	0.888	0.87	0.045	-0.881	S
G4		1.049	1.12	1.083	0.055	-0.619	S
G1	Ca^{2+} *mg/l*	0.174	0.179	0.174	0.023	0.011	S
G2		0.143	0.14	0.139	0.017	0.237	S
G3		0.172	0.166	0.162	0.019	0.569	S
G4		0.183	0.153	0.151	0.022	1.487	Q
G1	K^+ *mg/l*	0.209	0.162	0.164	0.021	2.163	U
G2		0.218	0.195	0.195	0.025	0.936	S
G3		0.326	0.26	0.257	0.026	2.674	U
G4		0.3	0.21	0.208	0.014	6.357	U
G1	pH *pH units*	5.5	5.47	5.492	0.132	0.057	S
G2		5.54	5.46	5.465	0.113	0.665	S
G3		5.49	5.41	5.435	0.11	0.497	S
G4		5.52	5.42	5.428	0.102	0.896	S
G1	Cond *µS/cm*	11.46	11	11.042	1.511	0.276	S
G2		11.44	10.9	11.214	1.381	0.164	S
G3		10.73	10.3	10.304	0.517	0.823	S
G4		10.58	10.1	10.231	0.65	0.537	S

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EMEP – 41st intercomparison of analytical methods - 2023

Laboratory 212, Institute of Environmental Assessment and Water Research (Spain)

Precipitation (G-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
G1	SO_4^{2-} *mg S/l*	0.33	0.314	0.307	0.021	1.097	S
G2		0.34	0.326	0.319	0.021	0.994	S
G3		0.32	0.298	0.294	0.021	1.276	S
G4		0.27	0.26	0.256	0.017	0.828	S
G1	NH_4^+ *mg N/l*	0.25	0.134	0.138	0.018	6.191	U
G2		0.27	0.16	0.162	0.017	6.318	U
G3		0.29	0.147	0.149	0.019	7.581	U
G4		0.22	0.12	0.12	0.014	6.949	U
G1	NO_3^- *mg N/l*	0.23	0.238	0.227	0.031	0.103	S
G2		0.34	0.342	0.329	0.046	0.237	S
G3		0.34	0.343	0.331	0.048	0.188	S
G4		0.27	0.276	0.265	0.039	0.131	S
G1	Na^+ *mg/l*	1.04	0.948	0.919	0.053	2.29	S
G2		0.93	0.855	0.835	0.06	1.578	S
G3		0.82	0.737	0.718	0.046	2.221	S
G4		0.94	0.851	0.825	0.054	2.126	S
G1	Mg^{2+} *mg/l*	0.123	0.114	0.115	0.012	0.652	S
G2		0.152	0.145	0.144	0.012	0.631	S
G3		0.108	0.103	0.105	0.01	0.281	S
G4		0.089	0.083	0.084	0.01	0.534	S
G1	Cl^- *mg/l*	1.33	1.35	1.319	0.077	0.137	S
G2		1.02	1.04	1.015	0.06	0.087	S
G3		0.88	0.888	0.87	0.045	0.224	S
G4		1.11	1.12	1.083	0.055	0.484	S
G1	Ca^{2+} *mg/l*	0.191	0.179	0.174	0.023	0.721	S
G2		0.147	0.14	0.139	0.017	0.488	S
G3		0.173	0.166	0.162	0.019	0.601	S
G4		0.16	0.153	0.151	0.022	0.408	S
G1	K^+ *mg/l*	0.25	0.162	0.164	0.021	4.154	U
G2		0.31	0.195	0.195	0.025	4.605	U
G3		0.34	0.26	0.257	0.026	3.199	U
G4		0.29	0.21	0.208	0.014	5.691	U
G1	pH *pH units*	6.03	5.47	5.492	0.132	4.077	U
G2		5.45	5.46	5.465	0.113	-0.13	S
G3		5.38	5.41	5.435	0.11	-0.502	S
G4		5.41	5.42	5.428	0.102	-0.18	S
G1	Cond *µS/cm*	11.7	11	11.042	1.511	0.435	S
G2		11.6	10.9	11.214	1.381	0.279	S
G3		11	10.3	10.304	0.517	1.345	S
G4		10.9	10.1	10.231	0.65	1.029	S

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