EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.329	0.333	0.353	0.031	-0.788	S
H2		0.254	0.259	0.272	0.024	-0.77	S
H3		0.544	0.555	0.561	0.033	-0.514	S
H4		0.2	0.204	0.209	0.027	-0.336	S
H1	Cd *µg/l*	0.022	0.022	0.048	0.128	-0.201	S
H2		0.027	0.03	0.053	0.128	-0.206	S
H3		0.057	0.059	0.078	0.111	-0.189	S
H4		0.019	0.018	0.044	0.122	-0.203	S
H1	Cr *µg/l*	0.291	0.296	0.286	0.037	0.146	S
H2		0.326	0.333	0.321	0.027	0.189	S
H3		0.577	0.592	0.616	0.284	-0.136	S
H4		0.218	0.222	0.278	0.297	-0.201	S
H1	Cu *µg/l*	0.297	0.333	0.32	0.113	-0.203	S
H2		0.333	0.37	0.355	0.136	-0.163	S
H3		1.283	0.814	0.785	0.206	2.422	U
H4		0.409	0.444	0.436	0.113	-0.236	S
H1	Ni *µg/l*	0.425	0.444	0.399	0.12	0.22	S
H2		0.209	0.222	0.508	1.733	-0.173	S
H3		0.582	0.592	0.536	0.153	0.298	S
H4		0.282	0.296	0.344	0.394	-0.158	S
H1	Pb *µg/l*	0.363	0.37	0.357	0.056	0.111	S
H2		0.574	0.592	0.589	0.228	-0.066	S
H3		1.167	1.18	1.151	0.703	0.023	S
H4		0.328	0.333	0.315	0.088	0.144	S
H1	Zn *µg/l*	3.559	3.52	4.654	6.481	-0.169	S
H2		1.853	1.85	1.861	0.312	-0.024	S
H3		6.353	6.29	6.478	2.495	-0.05	S
H4		2.833	2.78	3.025	1.276	-0.15	S

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***** Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As µg/l	0.337	0.333	0.353	0.031	-0.529	S
H2		0.265	0.259	0.272	0.024	-0.308	S
H3		0.566	0.555	0.561	0.033	0.155	S
H4		0.201	0.204	0.209	0.027	-0.3	S
H1	Cd µg/l	< 0.040	0.022	0.048	0.128		B
H2		< 0.040	0.03	0.053	0.128		B
H3		0.056	0.059	0.078	0.111	-0.198	S
H4		< 0.040	0.018	0.044	0.122		B
H1	Cr µg/l	0.295	0.296	0.286	0.037	0.254	S
H2		0.338	0.333	0.321	0.027	0.641	S
H3		0.595	0.592	0.616	0.284	-0.073	S
H4		0.231	0.222	0.278	0.297	-0.158	S
H1	Cu µg/l	< 0.360	0.333	0.32	0.113		B
H2		< 0.360	0.37	0.355	0.136	-1.287	U
H3		0.802	0.814	0.785	0.206	0.083	S
H4		0.434	0.444	0.436	0.113	-0.015	S
H1	Ni µg/l	0.419	0.444	0.399	0.12	0.17	S
H2		0.199	0.222	0.508	1.733	-0.178	S
H3		0.599	0.592	0.536	0.153	0.409	S
H4		0.283	0.296	0.344	0.394	-0.155	S
H1	Pb µg/l	0.301	0.37	0.357	0.056	-0.999	S
H2		0.506	0.592	0.589	0.228	-0.365	S
H3		1.044	1.18	1.151	0.703	-0.152	S
H4		0.351	0.333	0.315	0.088	0.406	S
H1	Zn µg/l	3.45	3.52	4.654	6.481	-0.186	S
H2		2.03	1.85	1.861	0.312	0.543	S
H3		6.06	6.29	6.478	2.495	-0.167	S
H4		3.31	2.78	3.025	1.276	0.223	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.363	0.333	0.353	0.031	0.319	S
H2		0.283	0.259	0.272	0.024	0.432	S
H3		0.578	0.555	0.561	0.033	0.53	S
H4		0.215	0.204	0.209	0.027	0.215	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.031	0.03	0.053	0.128	-0.176	S
H3		0.06	0.059	0.078	0.111	-0.165	S
H4		0.018	0.018	0.044	0.122	-0.208	S
H1	Cr *µg/l*	0.304	0.296	0.286	0.037	0.491	S
H2		0.342	0.333	0.321	0.027	0.791	S
H3		0.602	0.592	0.616	0.284	-0.047	S
H4		0.238	0.222	0.278	0.297	-0.134	S
H1	Cu *µg/l*	0.338	0.333	0.32	0.113	0.163	S
H2		0.399	0.37	0.355	0.136	0.321	S
H3		0.837	0.814	0.785	0.206	0.252	S
H4		0.463	0.444	0.436	0.113	0.244	S
H1	Ni *µg/l*	0.471	0.444	0.399	0.12	0.602	S
H2		0.238	0.222	0.508	1.733	-0.156	S
H3		0.614	0.592	0.536	0.153	0.505	S
H4		0.307	0.296	0.344	0.394	-0.093	S
H1	Pb *µg/l*	0.377	0.37	0.357	0.056	0.36	S
H2		0.61	0.592	0.589	0.228	0.093	S
H3		1.209	1.18	1.151	0.703	0.083	S
H4		0.344	0.333	0.315	0.088	0.323	S
H1	Zn *µg/l*	3.661	3.52	4.654	6.481	-0.153	S
H2		2.026	1.85	1.861	0.312	0.529	S
H3		6.472	6.29	6.478	2.495	-0.003	S
H4		2.933	2.78	3.025	1.276	-0.072	S

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Laboratory 6, SGS France - EHS (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As µg/l	0.44	0.333	0.353	0.031	2.81	Q
H2		0.42	0.259	0.272	0.024	6.207	U
H3		0.74	0.555	0.561	0.033	5.449	Q
H4		0.37	0.204	0.209	0.027	5.895	U
H1	Cd µg/l	< 0.100	0.022	0.048	0.128		B
H2		< 0.100	0.03	0.053	0.128		B
H3		< 0.100	0.059	0.078	0.111		B
H4		< 0.100	0.018	0.044	0.122		B
H1	Cr µg/l	< 0.500	0.296	0.286	0.037		B
H2		< 0.500	0.333	0.321	0.027		B
H3		0.67	0.592	0.616	0.284	0.191	S
H4		< 0.500	0.222	0.278	0.297		B
H1	Cu µg/l	< 0.500	0.333	0.32	0.113		B
H2		< 0.500	0.37	0.355	0.136		B
H3		0.8	0.814	0.785	0.206	0.073	S
H4		< 0.500	0.444	0.436	0.113		B
H1	Ni µg/l	< 1.000	0.444	0.399	0.12		B
H2		< 1.000	0.222	0.508	1.733		B
H3		< 1.000	0.592	0.536	0.153		B
H4		< 1.000	0.296	0.344	0.394		B
H1	Pb µg/l	< 0.400	0.37	0.357	0.056		B
H2		0.57	0.592	0.589	0.228	-0.083	S
H3		1.15	1.18	1.151	0.703	-0.002	S
H4		< 0.400	0.333	0.315	0.088		B
H1	Zn µg/l	< 10.000	3.52	4.654	6.481		B
H2		< 10.000	1.85	1.861	0.312		B
H3		< 10.000	6.29	6.478	2.495		B
H4		< 10.000	2.78	3.025	1.276		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 8, Umweltbundesamt, Langen (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.35	0.333	0.353	0.031	-0.107	S
H2		0.275	0.259	0.272	0.024	0.113	S
H3		0.589	0.555	0.561	0.033	0.855	S
H4		0.218	0.204	0.209	0.027	0.323	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.03	0.03	0.053	0.128	-0.182	S
H3		0.06	0.059	0.078	0.111	-0.162	S
H4		0.02	0.018	0.044	0.122	-0.195	S
H1	Cr *µg/l*	0.302	0.296	0.286	0.037	0.443	S
H2		0.336	0.333	0.321	0.027	0.566	S
H3		0.6	0.592	0.616	0.284	-0.055	S
H4		0.228	0.222	0.278	0.297	-0.168	S
H1	Cu *µg/l*	0.349	0.333	0.32	0.113	0.259	S
H2		0.392	0.37	0.355	0.136	0.271	S
H3		0.836	0.814	0.785	0.206	0.248	S
H4		0.487	0.444	0.436	0.113	0.454	S
H1	Ni *µg/l*	0.451	0.444	0.399	0.12	0.437	S
H2		0.221	0.222	0.508	1.733	-0.166	S
H3		0.589	0.592	0.536	0.153	0.344	S
H4		0.31	0.296	0.344	0.394	-0.087	S
H1	Pb *µg/l*	0.379	0.37	0.357	0.056	0.397	S
H2		0.607	0.592	0.589	0.228	0.079	S
H3		1.21	1.18	1.151	0.703	0.084	S
H4		0.345	0.333	0.315	0.088	0.338	S
H1	Zn *µg/l*	3.504	3.52	4.654	6.481	-0.177	S
H2		1.874	1.85	1.861	0.312	0.043	S
H3		6.222	6.29	6.478	2.495	-0.103	S
H4		2.829	2.78	3.025	1.276	-0.154	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 10, Air Quality Reference Centre (Hungary)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As µg/l	0.39	0.333	0.353	0.031	1.189	S
H2		< 0.300	0.259	0.272	0.024		B
H3		0.425	0.555	0.561	0.033	-4.134	S
H4		< 0.300	0.204	0.209	0.027		B
H1	Cd µg/l	< 0.050	0.022	0.048	0.128		B
H2		< 0.050	0.03	0.053	0.128		B
H3		< 0.050	0.059	0.078	0.111	-0.478	U
H4		< 0.050	0.018	0.044	0.122		B
H1	Cr µg/l	-999	0.296	0.286	0.037		B
H2		-999	0.333	0.321	0.027		B
H3		-999	0.592	0.616	0.284		B
H4		-999	0.222	0.278	0.297		B
H1	Cu µg/l	-999	0.333	0.32	0.113		B
H2		-999	0.37	0.355	0.136		B
H3		-999	0.814	0.785	0.206		B
H4		-999	0.444	0.436	0.113		B
H1	Ni µg/l	< 1.300	0.444	0.399	0.12		B
H2		< 1.300	0.222	0.508	1.733		B
H3		< 1.300	0.592	0.536	0.153		B
H4		< 1.300	0.296	0.344	0.394		B
H1	Pb µg/l	< 0.500	0.37	0.357	0.056		B
H2		< 0.500	0.592	0.589	0.228	-1.489	U
H3		< 0.500	1.18	1.151	0.703	-1.281	U
H4		< 0.500	0.333	0.315	0.088		B
H1	Zn µg/l	-999	3.52	4.654	6.481		B
H2		-999	1.85	1.861	0.312		B
H3		-999	6.29	6.478	2.495		B
H4		-999	2.78	3.025	1.276		B

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***** Z score in unitless

¤ EMEP quality norm; letters indicate:

S – Satisfactory: Your results deviates less than ±25% of the expected value for theoretical values of Pb, Ni, Cr and As <1 µg/l, Cd <0,5µg/l, Zn<10 µg/l and Cu<2 µg/l and less than ±15% of the expected value for theoretical values of Pb, Ni, Cr and As >1 µg/l, Cd >0,5µg/l, Zn>10 µg/l and Cu>2 µg/l

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 15, NILU (Norway)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.32	0.333	0.353	0.031	-1.08	S
H2		0.25	0.259	0.272	0.024	-0.938	S
H3		0.52	0.555	0.561	0.033	-1.244	S
H4		0.19	0.204	0.209	0.027	-0.703	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.059	0.059	0.078	0.111	-0.171	S
H4		0.017	0.018	0.044	0.122	-0.219	S
H1	Cr *µg/l*	0.3	0.296	0.286	0.037	0.389	S
H2		0.33	0.333	0.321	0.027	0.339	S
H3		0.58	0.592	0.616	0.284	-0.126	S
H4		0.22	0.222	0.278	0.297	-0.195	S
H1	Cu *µg/l*	0.34	0.333	0.32	0.113	0.179	S
H2		0.37	0.37	0.355	0.136	0.109	S
H3		0.8	0.814	0.785	0.206	0.073	S
H4		0.44	0.444	0.436	0.113	0.038	S
H1	Ni *µg/l*	0.45	0.444	0.399	0.12	0.429	S
H2		0.22	0.222	0.508	1.733	-0.166	S
H3		0.58	0.592	0.536	0.153	0.285	S
H4		0.3	0.296	0.344	0.394	-0.112	S
H1	Pb *µg/l*	0.38	0.37	0.357	0.056	0.415	S
H2		0.58	0.592	0.589	0.228	-0.039	S
H3		1.17	1.18	1.151	0.703	0.027	S
H4		0.34	0.333	0.315	0.088	0.281	S
H1	Zn *µg/l*	3.73	3.52	4.654	6.481	-0.143	S
H2		1.95	1.85	1.861	0.312	0.287	S
H3		6.49	6.29	6.478	2.495	0.005	S
H4		2.94	2.78	3.025	1.276	-0.067	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	-999	0.333	0.353	0.031		B
H2		-999	0.259	0.272	0.024		B
H3		-999	0.555	0.561	0.033		B
H4		-999	0.204	0.209	0.027		B
H1	Cd *µg/l*	0.036	0.022	0.048	0.128	-0.095	U
H2		0.035	0.03	0.053	0.128	-0.14	S
H3		0.074	0.059	0.078	0.111	-0.034	Q
H4		0.041	0.018	0.044	0.122	-0.026	U
H1	Cr *µg/l*	0.211	0.296	0.286	0.037	-2.017	Q
H2		0.257	0.333	0.321	0.027	-2.427	S
H3		0.467	0.592	0.616	0.284	-0.524	S
H4		0.171	0.222	0.278	0.297	-0.361	S
H1	Cu *µg/l*	0.208	0.333	0.32	0.113	-0.989	Q
H2		0.215	0.37	0.355	0.136	-1.027	Q
H3		0.567	0.814	0.785	0.206	-1.062	Q
H4		0.285	0.444	0.436	0.113	-1.335	Q
H1	Ni *µg/l*	0.291	0.444	0.399	0.12	-0.898	Q
H2		0.176	0.222	0.508	1.733	-0.192	S
H3		0.392	0.592	0.536	0.153	-0.948	Q
H4		0.152	0.296	0.344	0.394	-0.487	Q
H1	Pb *µg/l*	0.294	0.37	0.357	0.056	-1.123	S
H2		0.637	0.592	0.589	0.228	0.21	S
H3		1.272	1.18	1.151	0.703	0.172	S
H4		0.287	0.333	0.315	0.088	-0.327	S
H1	Zn *µg/l*	2.088	3.52	4.654	6.481	-0.396	Q
H2		1.247	1.85	1.861	0.312	-1.966	Q
H3		3.378	6.29	6.478	2.495	-1.242	Q
H4		1.729	2.78	3.025	1.276	-1.016	Q

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.349	0.333	0.353	0.031	-0.14	S
H2		0.268	0.259	0.272	0.024	-0.182	S
H3		0.573	0.555	0.561	0.033	0.368	S
H4		0.214	0.204	0.209	0.027	0.177	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.029	0.03	0.053	0.128	-0.19	S
H3		0.06	0.059	0.078	0.111	-0.162	S
H4		0.019	0.018	0.044	0.122	-0.203	S
H1	Cr *µg/l*	0.303	0.296	0.286	0.037	0.47	S
H2		0.339	0.333	0.321	0.027	0.679	S
H3		0.594	0.592	0.616	0.284	-0.076	S
H4		0.229	0.222	0.278	0.297	-0.164	S
H1	Cu *µg/l*	0.351	0.333	0.32	0.113	0.277	S
H2		0.392	0.37	0.355	0.136	0.271	S
H3		0.83	0.814	0.785	0.206	0.219	S
H4		0.465	0.444	0.436	0.113	0.259	S
H1	Ni *µg/l*	0.445	0.444	0.399	0.12	0.387	S
H2		0.21	0.222	0.508	1.733	-0.172	S
H3		0.578	0.592	0.536	0.153	0.272	S
H4		0.287	0.296	0.344	0.394	-0.145	S
H1	Pb *µg/l*	0.336	0.37	0.357	0.056	-0.372	S
H2		0.55	0.592	0.589	0.228	-0.171	S
H3		1.07	1.18	1.151	0.703	-0.115	S
H4		0.304	0.333	0.315	0.088	-0.13	S
H1	Zn *µg/l*	3.86	3.52	4.654	6.481	-0.123	S
H2		2.15	1.85	1.861	0.312	0.927	S
H3		6.71	6.29	6.478	2.495	0.093	S
H4		3.18	2.78	3.025	1.276	0.122	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	-999	0.333	0.353	0.031		B
H2		-999	0.259	0.272	0.024		B
H3		-999	0.555	0.561	0.033		B
H4		-999	0.204	0.209	0.027		B
H1	Cd *µg/l*	0.058	0.022	0.048	0.128	0.079	U
H2		0.066	0.03	0.053	0.128	0.099	U
H3		0.088	0.059	0.078	0.111	0.091	Q
H4		0.066	0.018	0.044	0.122	0.182	U
H1	Cr *µg/l*	-999	0.296	0.286	0.037		B
H2		-999	0.333	0.321	0.027		B
H3		-999	0.592	0.616	0.284		B
H4		-999	0.222	0.278	0.297		B
H1	Cu *µg/l*	0.666	0.333	0.32	0.113	3.076	U
H2		0.59	0.37	0.355	0.136	1.726	U
H3		1.194	0.814	0.785	0.206	1.989	Q
H4		0.849	0.444	0.436	0.113	3.653	U
H1	Ni *µg/l*	-999	0.444	0.399	0.12		B
H2		-999	0.222	0.508	1.733		B
H3		-999	0.592	0.536	0.153		B
H4		-999	0.296	0.344	0.394		B
H1	Pb *µg/l*	0.455	0.37	0.357	0.056	1.758	S
H2		0.634	0.592	0.589	0.228	0.198	S
H3		1.166	1.18	1.151	0.703	0.021	S
H4		0.554	0.333	0.315	0.088	2.721	U
H1	Zn *µg/l*	-999	3.52	4.654	6.481		B
H2		-999	1.85	1.861	0.312		B
H3		-999	6.29	6.478	2.495		B
H4		-999	2.78	3.025	1.276		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 31, Slovak Hydrometeorological Institute (Slovakia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.5	0.333	0.353	0.031	4.755	U
H2		0.5	0.259	0.272	0.024	9.569	U
H3		0.5	0.555	0.561	0.033	-1.853	S
H4		0.5	0.204	0.209	0.027	10.659	U
H1	Cd *µg/l*	0.027	0.022	0.048	0.128	-0.163	S
H2		0.024	0.03	0.053	0.128	-0.229	S
H3		0.021	0.059	0.078	0.111	-0.515	U
H4		0.02	0.018	0.044	0.122	-0.195	S
H1	Cr *µg/l*	0.3	0.296	0.286	0.037	0.389	S
H2		0.273	0.333	0.321	0.027	-1.809	S
H3		0.263	0.592	0.616	0.284	-1.243	U
H4		0.326	0.222	0.278	0.297	0.162	Q
H1	Cu *µg/l*	0.382	0.333	0.32	0.113	0.552	S
H2		0.372	0.37	0.355	0.136	0.124	S
H3		0.268	0.814	0.785	0.206	-2.514	U
H4		0.25	0.444	0.436	0.113	-1.641	Q
H1	Ni *µg/l*	0.16	0.444	0.399	0.12	-1.989	U
H2		0.121	0.222	0.508	1.733	-0.223	Q
H3		0.2	0.592	0.536	0.153	-2.202	U
H4		0.159	0.296	0.344	0.394	-0.47	Q
H1	Pb *µg/l*	0.423	0.37	0.357	0.056	1.185	S
H2		0.484	0.592	0.589	0.228	-0.461	S
H3		0.136	1.18	1.151	0.703	-1.443	U
H4		0.393	0.333	0.315	0.088	0.885	S
H1	Zn *µg/l*	3.868	3.52	4.654	6.481	-0.121	S
H2		1.743	1.85	1.861	0.312	-0.377	S
H3		5.982	6.29	6.478	2.495	-0.199	S
H4		2.237	2.78	3.025	1.276	-0.618	S

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***** Z score in unitless

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S – Satisfactory: Your results deviates less than ±25% of the expected value for theoretical values of Pb, Ni, Cr and As <1 µg/l, Cd <0,5µg/l, Zn<10 µg/l and Cu<2 µg/l and less than ±15% of the expected value for theoretical values of Pb, Ni, Cr and As >1 µg/l, Cd >0,5µg/l, Zn>10 µg/l and Cu>2 µg/l

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.33	0.333	0.353	0.031	-0.756	S
H2		0.255	0.259	0.272	0.024	-0.728	S
H3		0.543	0.555	0.561	0.033	-0.544	S
H4		0.204	0.204	0.209	0.027	-0.19	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.033	0.03	0.053	0.128	-0.159	S
H3		0.06	0.059	0.078	0.111	-0.162	S
H4		0.018	0.018	0.044	0.122	-0.211	S
H1	Cr *µg/l*	0.279	0.296	0.286	0.037	-0.178	S
H2		0.306	0.333	0.321	0.027	-0.565	S
H3		0.557	0.592	0.616	0.284	-0.207	S
H4		0.207	0.222	0.278	0.297	-0.238	S
H1	Cu *µg/l*	1.063	0.333	0.32	0.113	6.604	U
H2		0.357	0.37	0.355	0.136	0.014	S
H3		0.763	0.814	0.785	0.206	-0.107	S
H4		0.427	0.444	0.436	0.113	-0.076	S
H1	Ni *µg/l*	0.375	0.444	0.399	0.12	-0.197	S
H2		0.199	0.222	0.508	1.733	-0.178	S
H3		0.495	0.592	0.536	0.153	-0.272	S
H4		0.262	0.296	0.344	0.394	-0.208	S
H1	Pb *µg/l*	0.308	0.37	0.357	0.056	-0.874	S
H2		0.486	0.592	0.589	0.228	-0.452	S
H3		0.965	1.18	1.151	0.703	-0.265	Q
H4		0.275	0.333	0.315	0.088	-0.46	S
H1	Zn *µg/l*	3.228	3.52	4.654	6.481	-0.22	S
H2		1.708	1.85	1.861	0.312	-0.489	S
H3		5.632	6.29	6.478	2.495	-0.339	S
H4		2.537	2.78	3.025	1.276	-0.382	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 34, Ministry of Environment and Urbanisation (Turkey)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.447	0.333	0.353	0.031	3.037	Q
H2		0.292	0.259	0.272	0.024	0.827	S
H3		0.535	0.555	0.561	0.033	-0.788	S
H4		0.179	0.204	0.209	0.027	-1.106	S
H1	Cd *µg/l*	0.727	0.022	0.048	0.128	5.285	U
H2		0.753	0.03	0.053	0.128	5.469	U
H3		0.71	0.059	0.078	0.111	5.717	U
H4		0.677	0.018	0.044	0.122	5.182	U
H1	Cr *µg/l*	1.827	0.296	0.286	0.037	41.581	U
H2		5.346	0.333	0.321	0.027	189.383	U
H3		2.15	0.592	0.616	0.284	5.408	U
H4		1.844	0.222	0.278	0.297	5.271	U
H1	Cu *µg/l*	0	0.333	0.32	0.113	-2.842	U
H2		0	0.37	0.355	0.136	-2.609	U
H3		0.162	0.814	0.785	0.206	-3.029	U
H4		0.318	0.444	0.436	0.113	-1.04	Q
H1	Ni *µg/l*	0	0.444	0.399	0.12	-3.324	U
H2		138.53	0.222	0.508	1.733	79.647	U
H3		0	0.592	0.536	0.153	-3.511	U
H4		2.468	0.296	0.344	0.394	5.389	U
H1	Pb *µg/l*	0	0.37	0.357	0.056	-6.388	U
H2		1.813	0.592	0.589	0.228	5.378	U
H3		0.258	1.18	1.151	0.703	-1.27	U
H4		0	0.333	0.315	0.088	-3.596	U
H1	Zn *µg/l*	2.916	3.52	4.654	6.481	-0.268	S
H2		1.224	1.85	1.861	0.312	-2.04	Q
H3		3.996	6.29	6.478	2.495	-0.995	Q
H4		2.314	2.78	3.025	1.276	-0.557	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.386	0.333	0.353	0.031	1.059	S
H2		0.306	0.259	0.272	0.024	1.416	S
H3		0.64	0.555	0.561	0.033	2.407	S
H4		0.242	0.204	0.209	0.027	1.203	S
H1	Cd *µg/l*	0.026	0.022	0.048	0.128	-0.17	S
H2		0.036	0.03	0.053	0.128	-0.135	S
H3		0.068	0.059	0.078	0.111	-0.09	S
H4		0.022	0.018	0.044	0.122	-0.178	S
H1	Cr *µg/l*	-999	0.296	0.286	0.037		B
H2		-999	0.333	0.321	0.027		B
H3		-999	0.592	0.616	0.284		B
H4		-999	0.222	0.278	0.297		B
H1	Cu *µg/l*	-999	0.333	0.32	0.113		B
H2		-999	0.37	0.355	0.136		B
H3		-999	0.814	0.785	0.206		B
H4		-999	0.444	0.436	0.113		B
H1	Ni *µg/l*	0.466	0.444	0.399	0.12	0.562	S
H2		0.237	0.222	0.508	1.733	-0.156	S
H3		0.614	0.592	0.536	0.153	0.507	S
H4		0.329	0.296	0.344	0.394	-0.038	S
H1	Pb *µg/l*	0.424	0.37	0.357	0.056	1.203	S
H2		0.621	0.592	0.589	0.228	0.141	S
H3		1.217	1.18	1.151	0.703	0.094	S
H4		0.38	0.333	0.315	0.088	0.737	S
H1	Zn *µg/l*	-999	3.52	4.654	6.481		B
H2		-999	1.85	1.861	0.312		B
H3		-999	6.29	6.478	2.495		B
H4		-999	2.78	3.025	1.276		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 36, Slovenian Environment Agency (Slovenia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.332	0.333	0.353	0.031	-0.691	S
H2		0.254	0.259	0.272	0.024	-0.77	S
H3		0.55	0.555	0.561	0.033	-0.331	S
H4		0.205	0.204	0.209	0.027	-0.153	S
H1	Cd *µg/l*	0.022	0.022	0.048	0.128	-0.201	S
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.058	0.059	0.078	0.111	-0.18	S
H4		< 0.020	0.018	0.044	0.122		B
H1	Cr *µg/l*	< 0.300	0.296	0.286	0.037		B
H2		0.319	0.333	0.321	0.027	-0.075	S
H3		0.57	0.592	0.616	0.284	-0.161	S
H4		< 0.300	0.222	0.278	0.297		B
H1	Cu *µg/l*	0.332	0.333	0.32	0.113	0.108	S
H2		0.371	0.37	0.355	0.136	0.117	S
H3		0.799	0.814	0.785	0.206	0.068	S
H4		0.445	0.444	0.436	0.113	0.083	S
H1	Ni *µg/l*	0.433	0.444	0.399	0.12	0.287	S
H2		< 0.300	0.222	0.508	1.733		B
H3		0.574	0.592	0.536	0.153	0.245	S
H4		< 0.300	0.296	0.344	0.394		B
H1	Pb *µg/l*	0.36	0.37	0.357	0.056	0.057	S
H2		0.564	0.592	0.589	0.228	-0.11	S
H3		1.12	1.18	1.151	0.703	-0.044	S
H4		0.323	0.333	0.315	0.088	0.087	S
H1	Zn *µg/l*	3.35	3.52	4.654	6.481	-0.201	S
H2		1.78	1.85	1.861	0.312	-0.258	S
H3		5.89	6.29	6.478	2.495	-0.236	S
H4		2.64	2.78	3.025	1.276	-0.302	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.37	0.333	0.353	0.031	0.541	S
H2		0.29	0.259	0.272	0.024	0.743	S
H3		0.62	0.555	0.561	0.033	1.798	S
H4		0.22	0.204	0.209	0.027	0.397	S
H1	Cd *µg/l*	< 0.010	0.022	0.048	0.128	-0.334	U
H2		0.01	0.03	0.053	0.128	-0.339	U
H3		0.05	0.059	0.078	0.111	-0.252	S
H4		< 0.010	0.018	0.044	0.122	-0.317	U
H1	Cr *µg/l*	0.31	0.296	0.286	0.037	0.659	S
H2		0.35	0.333	0.321	0.027	1.093	S
H3		0.63	0.592	0.616	0.284	0.05	S
H4		0.23	0.222	0.278	0.297	-0.161	S
H1	Cu *µg/l*	0.07	0.333	0.32	0.113	-2.22	U
H2		0.11	0.37	0.355	0.136	-1.801	U
H3		0.58	0.814	0.785	0.206	-0.996	Q
H4		0.2	0.444	0.436	0.113	-2.083	U
H1	Ni *µg/l*	0.44	0.444	0.399	0.12	0.345	S
H2		0.21	0.222	0.508	1.733	-0.172	S
H3		0.61	0.592	0.536	0.153	0.481	S
H4		0.3	0.296	0.344	0.394	-0.112	S
H1	Pb *µg/l*	0.16	0.37	0.357	0.056	-3.524	U
H2		0.4	0.592	0.589	0.228	-0.83	Q
H3		1.05	1.18	1.151	0.703	-0.144	S
H4		0.12	0.333	0.315	0.088	-2.228	U
H1	Zn *µg/l*	3.63	3.52	4.654	6.481	-0.158	S
H2		1.62	1.85	1.861	0.312	-0.771	S
H3		7	6.29	6.478	2.495	0.209	S
H4		2.74	2.78	3.025	1.276	-0.223	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 41, Micro Pollutants Technology (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.32	0.333	0.353	0.031	-1.08	S
H2		0.259	0.259	0.272	0.024	-0.56	S
H3		0.527	0.555	0.561	0.033	-1.031	S
H4		0.202	0.204	0.209	0.027	-0.263	S
H1	Cd *µg/l*	< 0.030	0.022	0.048	0.128		B
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.063	0.059	0.078	0.111	-0.135	S
H4		< 0.030	0.018	0.044	0.122		B
H1	Cr *µg/l*	0.269	0.296	0.286	0.037	-0.447	S
H2		0.305	0.333	0.321	0.027	-0.603	S
H3		0.524	0.592	0.616	0.284	-0.323	S
H4		0.194	0.222	0.278	0.297	-0.282	S
H1	Cu *µg/l*	0.326	0.333	0.32	0.113	0.055	S
H2		0.338	0.37	0.355	0.136	-0.126	S
H3		0.743	0.814	0.785	0.206	-0.204	S
H4		0.403	0.444	0.436	0.113	-0.289	S
H1	Ni *µg/l*	0.44	0.444	0.399	0.12	0.345	S
H2		0.205	0.222	0.508	1.733	-0.175	S
H3		0.564	0.592	0.536	0.153	0.18	S
H4		0.276	0.296	0.344	0.394	-0.173	S
H1	Pb *µg/l*	0.346	0.37	0.357	0.056	-0.193	S
H2		0.56	0.592	0.589	0.228	-0.127	S
H3		1.09	1.18	1.151	0.703	-0.087	S
H4		0.311	0.333	0.315	0.088	-0.05	S
H1	Zn *µg/l*	3.57	3.52	4.654	6.481	-0.167	S
H2		1.84	1.85	1.861	0.312	-0.066	S
H3		6.29	6.29	6.478	2.495	-0.075	S
H4		2.8	2.78	3.025	1.276	-0.176	S

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If your laboratory reported values as less than the detection limit, and your detection limit equal or is lower than the expected value, ½ DL is taken as the reported value in further calculations.

***** Z score in unitless

¤ EMEP quality norm; letters indicate:

S – Satisfactory: Your results deviates less than ±25% of the expected value for theoretical values of Pb, Ni, Cr and As <1 µg/l, Cd <0,5µg/l, Zn<10 µg/l and Cu<2 µg/l and less than ±15% of the expected value for theoretical values of Pb, Ni, Cr and As >1 µg/l, Cd >0,5µg/l, Zn>10 µg/l and Cu>2 µg/l

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 47, Jelenia Gora (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.334	0.333	0.353	0.031	-0.626	S
H2		0.257	0.259	0.272	0.024	-0.644	S
H3		0.551	0.555	0.561	0.033	-0.301	S
H4		0.218	0.204	0.209	0.027	0.323	S
H1	Cd *µg/l*	0.022	0.022	0.048	0.128	-0.201	S
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.06	0.059	0.078	0.111	-0.162	S
H4		0.021	0.018	0.044	0.122	-0.186	S
H1	Cr *µg/l*	0.314	0.296	0.286	0.037	0.767	S
H2		0.338	0.333	0.321	0.027	0.641	S
H3		0.594	0.592	0.616	0.284	-0.076	S
H4		0.23	0.222	0.278	0.297	-0.161	S
H1	Cu *µg/l*	0.326	0.333	0.32	0.113	0.055	S
H2		0.363	0.37	0.355	0.136	0.058	S
H3		0.798	0.814	0.785	0.206	0.064	S
H4		0.551	0.444	0.436	0.113	1.02	S
H1	Ni *µg/l*	0.461	0.444	0.399	0.12	0.52	S
H2		0.248	0.222	0.508	1.733	-0.15	S
H3		0.612	0.592	0.536	0.153	0.494	S
H4		0.32	0.296	0.344	0.394	-0.061	S
H1	Pb *µg/l*	0.373	0.37	0.357	0.056	0.29	S
H2		0.589	0.592	0.589	0.228	0	S
H3		1.12	1.18	1.151	0.703	-0.044	S
H4		0.34	0.333	0.315	0.088	0.281	S
H1	Zn *µg/l*	3.568	3.52	4.654	6.481	-0.168	S
H2		1.877	1.85	1.861	0.312	0.053	S
H3		6.32	6.29	6.478	2.495	-0.063	S
H4		2.886	2.78	3.025	1.276	-0.109	S

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***** Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 48, Monitoring waterkwaliteit Labovestiging Gent, VMM (Belgium)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.339	0.333	0.353	0.031	-0.464	S
H2		0.262	0.259	0.272	0.024	-0.434	S
H3		0.552	0.555	0.561	0.033	-0.271	S
H4		0.209	0.204	0.209	0.027	-0.006	S
H1	Cd *µg/l*	0.022	0.022	0.048	0.128	-0.201	S
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.06	0.059	0.078	0.111	-0.162	S
H4		0.021	0.018	0.044	0.122	-0.186	S
H1	Cr *µg/l*	0.302	0.296	0.286	0.037	0.443	S
H2		0.362	0.333	0.321	0.027	1.545	S
H3		0.575	0.592	0.616	0.284	-0.143	S
H4		0.221	0.222	0.278	0.297	-0.191	S
H1	Cu *µg/l*	0.33	0.333	0.32	0.113	0.09	S
H2		0.803	0.37	0.355	0.136	3.291	U
H3		2.774	0.814	0.785	0.206	9.671	U
H4		0.456	0.444	0.436	0.113	0.18	S
H1	Ni *µg/l*	0.456	0.444	0.399	0.12	0.479	S
H2		0.22	0.222	0.508	1.733	-0.166	S
H3		0.589	0.592	0.536	0.153	0.344	S
H4		0.309	0.296	0.344	0.394	-0.089	S
H1	Pb *µg/l*	0.412	0.37	0.357	0.056	0.988	S
H2		0.648	0.592	0.589	0.228	0.259	S
H3		1.282	1.18	1.151	0.703	0.186	S
H4		0.374	0.333	0.315	0.088	0.669	S
H1	Zn *µg/l*	4.038	3.52	4.654	6.481	-0.095	S
H2		2.082	1.85	1.861	0.312	0.709	S
H3		6.899	6.29	6.478	2.495	0.169	S
H4		3.007	2.78	3.025	1.276	-0.014	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.436	0.333	0.353	0.031	2.68	Q
H2		0.354	0.259	0.272	0.024	3.433	Q
H3		0.759	0.555	0.561	0.033	6.027	Q
H4		0.269	0.204	0.209	0.027	2.193	Q
H1	Cd *µg/l*	0.024	0.022	0.048	0.128	-0.19	S
H2		0.032	0.03	0.053	0.128	-0.168	S
H3		0.067	0.059	0.078	0.111	-0.099	S
H4		0.019	0.018	0.044	0.122	-0.203	S
H1	Cr *µg/l*	0.238	0.296	0.286	0.037	-1.284	S
H2		0.283	0.333	0.321	0.027	-1.432	S
H3		0.518	0.592	0.616	0.284	-0.344	S
H4		0.156	0.222	0.278	0.297	-0.41	Q
H1	Cu *µg/l*	0.343	0.333	0.32	0.113	0.206	S
H2		0.39	0.37	0.355	0.136	0.256	S
H3		0.828	0.814	0.785	0.206	0.209	S
H4		0.439	0.444	0.436	0.113	0.03	S
H1	Ni *µg/l*	0.368	0.444	0.399	0.12	-0.255	S
H2		0.151	0.222	0.508	1.733	-0.206	Q
H3		0.515	0.592	0.536	0.153	-0.141	S
H4		0.218	0.296	0.344	0.394	-0.32	Q
H1	Pb *µg/l*	0.301	0.37	0.357	0.056	-0.999	S
H2		0.549	0.592	0.589	0.228	-0.176	S
H3		1.135	1.18	1.151	0.703	-0.023	S
H4		0.269	0.333	0.315	0.088	-0.529	S
H1	Zn *µg/l*	5.107	3.52	4.654	6.481	0.07	Q
H2		2.652	1.85	1.861	0.312	2.536	Q
H3		9.076	6.29	6.478	2.495	1.041	Q
H4		4.744	2.78	3.025	1.276	1.347	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 51, TERA Environnement (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.352	0.333	0.353	0.031	-0.043	S
H2		0.272	0.259	0.272	0.024	-0.013	S
H3		0.574	0.555	0.561	0.033	0.399	S
H4		0.219	0.204	0.209	0.027	0.36	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.032	0.03	0.053	0.128	-0.167	S
H3		0.062	0.059	0.078	0.111	-0.144	S
H4		0.019	0.018	0.044	0.122	-0.203	S
H1	Cr *µg/l*	0.299	0.296	0.286	0.037	0.362	S
H2		0.33	0.333	0.321	0.027	0.339	S
H3		0.594	0.592	0.616	0.284	-0.076	S
H4		0.224	0.222	0.278	0.297	-0.181	S
H1	Cu *µg/l*	0.347	0.333	0.32	0.113	0.241	S
H2		0.389	0.37	0.355	0.136	0.249	S
H3		0.839	0.814	0.785	0.206	0.263	S
H4		0.466	0.444	0.436	0.113	0.268	S
H1	Ni *µg/l*	0.46	0.444	0.399	0.12	0.512	S
H2		0.26	0.222	0.508	1.733	-0.143	S
H3		0.686	0.592	0.536	0.153	0.979	S
H4		0.325	0.296	0.344	0.394	-0.049	S
H1	Pb *µg/l*	0.386	0.37	0.357	0.056	0.523	S
H2		0.602	0.592	0.589	0.228	0.057	S
H3		1.202	1.18	1.151	0.703	0.072	S
H4		0.354	0.333	0.315	0.088	0.44	S
H1	Zn *µg/l*	4.05	3.52	4.654	6.481	-0.093	S
H2		2.369	1.85	1.861	0.312	1.629	Q
H3		8.474	6.29	6.478	2.495	0.8	Q
H4		3.28	2.78	3.025	1.276	0.2	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 54, Central Research Laboratory; Division in Lublin (Poland)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.335	0.333	0.353	0.031	-0.594	S
H2		0.26	0.259	0.272	0.024	-0.518	S
H3		0.55	0.555	0.561	0.033	-0.331	S
H4		0.206	0.204	0.209	0.027	-0.116	S
H1	Cd *µg/l*	0.022	0.022	0.048	0.128	-0.201	S
H2		0.03	0.03	0.053	0.128	-0.182	S
H3		0.059	0.059	0.078	0.111	-0.171	S
H4		0.02	0.018	0.044	0.122	-0.195	S
H1	Cr *µg/l*	0.304	0.296	0.286	0.037	0.497	S
H2		0.32	0.333	0.321	0.027	-0.037	S
H3		0.588	0.592	0.616	0.284	-0.098	S
H4		0.225	0.222	0.278	0.297	-0.178	S
H1	Cu *µg/l*	-999	0.333	0.32	0.113		B
H2		-999	0.37	0.355	0.136		B
H3		0.805	0.814	0.785	0.206	0.098	S
H4		0.531	0.444	0.436	0.113	0.843	S
H1	Ni *µg/l*	0.449	0.444	0.399	0.12	0.42	S
H2		0.23	0.222	0.508	1.733	-0.16	S
H3		0.593	0.592	0.536	0.153	0.37	S
H4		0.322	0.296	0.344	0.394	-0.056	S
H1	Pb *µg/l*	0.366	0.37	0.357	0.056	0.165	S
H2		0.596	0.592	0.589	0.228	0.031	S
H3		1.18	1.18	1.151	0.703	0.041	S
H4		0.328	0.333	0.315	0.088	0.144	S
H1	Zn *µg/l*	3.4	3.52	4.654	6.481	-0.194	S
H2		-999	1.85	1.861	0.312		B
H3		6.43	6.29	6.478	2.495	-0.019	S
H4		2.94	2.78	3.025	1.276	-0.067	S

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***** Z score in unitless

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S – Satisfactory: Your results deviates less than ±25% of the expected value for theoretical values of Pb, Ni, Cr and As <1 µg/l, Cd <0,5µg/l, Zn<10 µg/l and Cu<2 µg/l and less than ±15% of the expected value for theoretical values of Pb, Ni, Cr and As >1 µg/l, Cd >0,5µg/l, Zn>10 µg/l and Cu>2 µg/l

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.34	0.333	0.353	0.031	-0.432	S
H2		0.3	0.259	0.272	0.024	1.163	S
H3		0.52	0.555	0.561	0.033	-1.244	S
H4		0.21	0.204	0.209	0.027	0.03	S
H1	Cd *µg/l*	0.022	0.022	0.048	0.128	-0.201	S
H2		0.028	0.03	0.053	0.128	-0.198	S
H3		0.055	0.059	0.078	0.111	-0.207	S
H4		0.017	0.018	0.044	0.122	-0.219	S
H1	Cr *µg/l*	0.32	0.296	0.286	0.037	0.928	S
H2		0.33	0.333	0.321	0.027	0.339	S
H3		0.6	0.592	0.616	0.284	-0.055	S
H4		0.24	0.222	0.278	0.297	-0.127	S
H1	Cu *µg/l*	0.31	0.333	0.32	0.113	-0.087	S
H2		0.35	0.37	0.355	0.136	-0.038	S
H3		0.77	0.814	0.785	0.206	-0.073	S
H4		0.42	0.444	0.436	0.113	-0.138	S
H1	Ni *µg/l*	0.48	0.444	0.399	0.12	0.679	S
H2		0.23	0.222	0.508	1.733	-0.16	S
H3		0.58	0.592	0.536	0.153	0.285	S
H4		0.36	0.296	0.344	0.394	0.04	S
H1	Pb *µg/l*	0.39	0.37	0.357	0.056	0.594	S
H2		0.62	0.592	0.589	0.228	0.136	S
H3		1.23	1.18	1.151	0.703	0.112	S
H4		0.38	0.333	0.315	0.088	0.737	S
H1	Zn *µg/l*	3.2	3.52	4.654	6.481	-0.224	S
H2		1.76	1.85	1.861	0.312	-0.322	S
H3		5.45	6.29	6.478	2.495	-0.412	S
H4		2.7	2.78	3.025	1.276	-0.255	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.359	0.333	0.353	0.031	0.184	S
H2		0.287	0.259	0.272	0.024	0.617	S
H3		0.603	0.555	0.561	0.033	1.281	S
H4		0.224	0.204	0.209	0.027	0.543	S
H1	Cd *µg/l*	0.024	0.022	0.048	0.128	-0.186	S
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.062	0.059	0.078	0.111	-0.144	S
H4		0.02	0.018	0.044	0.122	-0.195	S
H1	Cr *µg/l*	0.293	0.296	0.286	0.037	0.2	S
H2		0.325	0.333	0.321	0.027	0.151	S
H3		0.577	0.592	0.616	0.284	-0.136	S
H4		0.224	0.222	0.278	0.297	-0.181	S
H1	Cu *µg/l*	0.343	0.333	0.32	0.113	0.206	S
H2		0.381	0.37	0.355	0.136	0.19	S
H3		0.824	0.814	0.785	0.206	0.19	S
H4		0.462	0.444	0.436	0.113	0.233	S
H1	Ni *µg/l*	0.446	0.444	0.399	0.12	0.395	S
H2		0.226	0.222	0.508	1.733	-0.163	S
H3		0.595	0.592	0.536	0.153	0.383	S
H4		0.305	0.296	0.344	0.394	-0.099	S
H1	Pb *µg/l*	0.368	0.37	0.357	0.056	0.2	S
H2		0.59	0.592	0.589	0.228	0.005	S
H3		11.911	1.18	1.151	0.703	15.295	U
H4		0.331	0.333	0.315	0.088	0.178	S
H1	Zn *µg/l*	40.652	3.52	4.654	6.481	5.554	U
H2		21.398	1.85	1.861	0.312	62.596	U
H3		71.911	6.29	6.478	2.495	26.223	U
H4		32.2	2.78	3.025	1.276	22.866	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.38	0.333	0.353	0.031	0.865	S
H2		0.281	0.259	0.272	0.024	0.365	S
H3		0.591	0.555	0.561	0.033	0.916	S
H4		0.22	0.204	0.209	0.027	0.397	S
H1	Cd *µg/l*	0.025	0.022	0.048	0.128	-0.178	S
H2		0.033	0.03	0.053	0.128	-0.159	S
H3		0.067	0.059	0.078	0.111	-0.099	S
H4		0.021	0.018	0.044	0.122	-0.186	S
H1	Cr *µg/l*	0.301	0.296	0.286	0.037	0.416	S
H2		0.337	0.333	0.321	0.027	0.603	S
H3		0.601	0.592	0.616	0.284	-0.052	S
H4		0.225	0.222	0.278	0.297	-0.178	S
H1	Cu *µg/l*	0.349	0.333	0.32	0.113	0.259	S
H2		0.377	0.37	0.355	0.136	0.161	S
H3		0.837	0.814	0.785	0.206	0.253	S
H4		0.454	0.444	0.436	0.113	0.162	S
H1	Ni *µg/l*	0.448	0.444	0.399	0.12	0.412	S
H2		0.229	0.222	0.508	1.733	-0.161	S
H3		0.593	0.592	0.536	0.153	0.37	S
H4		0.305	0.296	0.344	0.394	-0.099	S
H1	Pb *µg/l*	0.357	0.37	0.357	0.056	0.004	S
H2		0.568	0.592	0.589	0.228	-0.092	S
H3		1.121	1.18	1.151	0.703	-0.043	S
H4		0.319	0.333	0.315	0.088	0.041	S
H1	Zn *µg/l*	3.76	3.52	4.654	6.481	-0.138	S
H2		1.94	1.85	1.861	0.312	0.254	S
H3		6.51	6.29	6.478	2.495	0.013	S
H4		2.87	2.78	3.025	1.276	-0.121	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.352	0.333	0.353	0.031	-0.043	S
H2		0.261	0.259	0.272	0.024	-0.476	S
H3		0.567	0.555	0.561	0.033	0.186	S
H4		0.2	0.204	0.209	0.027	-0.336	S
H1	Cd *µg/l*	0.02	0.022	0.048	0.128	-0.215	S
H2		0.03	0.03	0.053	0.128	-0.182	S
H3		0.064	0.059	0.078	0.111	-0.126	S
H4		0.019	0.018	0.044	0.122	-0.203	S
H1	Cr *µg/l*	0.294	0.296	0.286	0.037	0.227	S
H2		0.325	0.333	0.321	0.027	0.151	S
H3		0.572	0.592	0.616	0.284	-0.154	S
H4		0.218	0.222	0.278	0.297	-0.201	S
H1	Cu *µg/l*	0.267	0.333	0.32	0.113	-0.469	S
H2		0.3	0.37	0.355	0.136	-0.405	S
H3		0.734	0.814	0.785	0.206	-0.248	S
H4		0.377	0.444	0.436	0.113	-0.518	S
H1	Ni *µg/l*	0.017	0.444	0.399	0.12	-3.182	U
H2		< 0.010	0.222	0.508	1.733	-0.29	U
H3		0.138	0.592	0.536	0.153	-2.608	U
H4		< 0.010	0.296	0.344	0.394	-0.861	U
H1	Pb *µg/l*	0.341	0.37	0.357	0.056	-0.283	S
H2		0.537	0.592	0.589	0.228	-0.228	S
H3		1.084	1.18	1.151	0.703	-0.095	S
H4		0.301	0.333	0.315	0.088	-0.164	S
H1	Zn *µg/l*	3.977	3.52	4.654	6.481	-0.104	S
H2		2.217	1.85	1.861	0.312	1.142	S
H3		6.661	6.29	6.478	2.495	0.073	S
H4		3.108	2.78	3.025	1.276	0.065	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 121, Landeslabor Schleswig-Holstein (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.31	0.333	0.353	0.031	-1.404	S
H2		0.229	0.259	0.272	0.024	-1.821	S
H3		0.501	0.555	0.561	0.033	-1.822	S
H4		< 0.200	0.204	0.209	0.027	-4.002	U
H1	Cd *µg/l*	< 0.050	0.022	0.048	0.128		B
H2		< 0.050	0.03	0.053	0.128		B
H3		0.058	0.059	0.078	0.111	-0.18	S
H4		< 0.050	0.018	0.044	0.122		B
H1	Cr *µg/l*	< 0.250	0.296	0.286	0.037	-4.332	U
H2		0.263	0.333	0.321	0.027	-2.186	S
H3		0.468	0.592	0.616	0.284	-0.521	S
H4		< 0.250	0.222	0.278	0.297		B
H1	Cu *µg/l*	0.306	0.333	0.32	0.113	-0.123	S
H2		0.335	0.37	0.355	0.136	-0.148	S
H3		0.715	0.814	0.785	0.206	-0.34	S
H4		0.401	0.444	0.436	0.113	-0.306	S
H1	Ni *µg/l*	0.295	0.444	0.399	0.12	-0.864	Q
H2		< 0.150	0.222	0.508	1.733	-0.25	U
H3		0.396	0.592	0.536	0.153	-0.92	Q
H4		0.191	0.296	0.344	0.394	-0.389	Q
H1	Pb *µg/l*	0.361	0.37	0.357	0.056	0.075	S
H2		0.57	0.592	0.589	0.228	-0.083	S
H3		1.13	1.18	1.151	0.703	-0.03	S
H4		0.324	0.333	0.315	0.088	0.098	S
H1	Zn *µg/l*	2.89	3.52	4.654	6.481	-0.272	S
H2		1.5	1.85	1.861	0.312	-1.155	S
H3		5.06	6.29	6.478	2.495	-0.568	S
H4		2.27	2.78	3.025	1.276	-0.592	S

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***** Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 125, Bayerisches Landesamt für Umwelt (Germany)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.367	0.333	0.353	0.031	0.444	S
H2		0.279	0.259	0.272	0.024	0.281	S
H3		0.579	0.555	0.561	0.033	0.551	S
H4		0.246	0.204	0.209	0.027	1.35	S
H1	Cd *µg/l*	0.025	0.022	0.048	0.128	-0.177	S
H2		0.03	0.03	0.053	0.128	-0.185	S
H3		0.06	0.059	0.078	0.111	-0.158	S
H4		0.02	0.018	0.044	0.122	-0.194	S
H1	Cr *µg/l*	0.294	0.296	0.286	0.037	0.227	S
H2		0.321	0.333	0.321	0.027	0	S
H3		0.591	0.592	0.616	0.284	-0.087	S
H4		0.228	0.222	0.278	0.297	-0.168	S
H1	Cu *µg/l*	0.348	0.333	0.32	0.113	0.25	S
H2		0.374	0.37	0.355	0.136	0.139	S
H3		0.833	0.814	0.785	0.206	0.234	S
H4		0.453	0.444	0.436	0.113	0.153	S
H1	Ni *µg/l*	0.461	0.444	0.399	0.12	0.52	S
H2		0.215	0.222	0.508	1.733	-0.169	S
H3		0.623	0.592	0.536	0.153	0.566	S
H4		0.301	0.296	0.344	0.394	-0.11	S
H1	Pb *µg/l*	0.376	0.37	0.357	0.056	0.344	S
H2		0.58	0.592	0.589	0.228	-0.039	S
H3		1.16	1.18	1.151	0.703	0.013	S
H4		0.329	0.333	0.315	0.088	0.155	S
H1	Zn *µg/l*	3.61	3.52	4.654	6.481	-0.161	S
H2		1.97	1.85	1.861	0.312	0.351	S
H3		6.46	6.29	6.478	2.495	-0.007	S
H4		2.95	2.78	3.025	1.276	-0.059	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 129, Ecole Nationale d'Ingenieurs de Sfax (Tunisia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	-999	0.333	0.353	0.031		B
H2		-999	0.259	0.272	0.024		B
H3		-999	0.555	0.561	0.033		B
H4		-999	0.204	0.209	0.027		B
H1	Cd *µg/l*	5	0.022	0.048	0.128	38.539	U
H2		5	0.03	0.053	0.128	38.667	U
H3		5	0.059	0.078	0.111	44.518	U
H4		5	0.018	0.044	0.122	40.559	U
H1	Cr *µg/l*	2.22	0.296	0.286	0.037	52.182	U
H2		8.37	0.333	0.321	0.027	303.351	U
H3		12.79	0.592	0.616	0.284	42.912	U
H4		13.3	0.222	0.278	0.297	43.827	U
H1	Cu *µg/l*	1.63	0.333	0.32	0.113	11.642	U
H2		3.9	0.37	0.355	0.136	26.047	U
H3		5	0.814	0.785	0.206	20.495	U
H4		1.62	0.444	0.436	0.113	10.468	U
H1	Ni *µg/l*	10	0.444	0.399	0.12	80.061	U
H2		10	0.222	0.508	1.733	5.477	U
H3		10	0.592	0.536	0.153	61.939	U
H4		10	0.296	0.344	0.394	24.5	U
H1	Pb *µg/l*	1.22	0.37	0.357	0.056	15.455	U
H2		6.91	0.592	0.589	0.228	27.774	U
H3		4.95	1.18	1.151	0.703	5.4	U
H4		15.85	0.333	0.315	0.088	177.143	U
H1	Zn *µg/l*	490	3.52	4.654	6.481	74.888	U
H2		18.34	1.85	1.861	0.312	52.799	U
H3		18.75	6.29	6.478	2.495	4.918	U
H4		9.585	2.78	3.025	1.276	5.141	U

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.331	0.333	0.353	0.031	-0.723	S
H2		0.261	0.259	0.272	0.024	-0.476	S
H3		0.588	0.555	0.561	0.033	0.825	S
H4		0.209	0.204	0.209	0.027	-0.006	S
H1	Cd *µg/l*	0.026	0.022	0.048	0.128	-0.17	S
H2		0.031	0.03	0.053	0.128	-0.176	S
H3		0.061	0.059	0.078	0.111	-0.151	S
H4		0.022	0.018	0.044	0.122	-0.179	S
H1	Cr *µg/l*	0.293	0.296	0.286	0.037	0.2	S
H2		0.323	0.333	0.321	0.027	0.076	S
H3		0.58	0.592	0.616	0.284	-0.126	S
H4		0.217	0.222	0.278	0.297	-0.205	S
H1	Cu *µg/l*	0.36	0.333	0.32	0.113	0.357	S
H2		0.4	0.37	0.355	0.136	0.33	S
H3		0.874	0.814	0.785	0.206	0.433	S
H4		0.485	0.444	0.436	0.113	0.436	S
H1	Ni *µg/l*	0.458	0.444	0.399	0.12	0.495	S
H2		0.262	0.222	0.508	1.733	-0.142	S
H3		0.621	0.592	0.536	0.153	0.553	S
H4		0.33	0.296	0.344	0.394	-0.036	S
H1	Pb *µg/l*	0.372	0.37	0.357	0.056	0.272	S
H2		0.606	0.592	0.589	0.228	0.075	S
H3		1.2	1.18	1.151	0.703	0.069	S
H4		0.344	0.333	0.315	0.088	0.326	S
H1	Zn *µg/l*	3.45	3.52	4.654	6.481	-0.186	S
H2		1.76	1.85	1.861	0.312	-0.322	S
H3		6.15	6.29	6.478	2.495	-0.131	S
H4		2.65	2.78	3.025	1.276	-0.294	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 146, Luxembourg Institute of Science and Technology (LIST) (Luxembourg)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.337	0.333	0.353	0.031	-0.529	S
H2		0.266	0.259	0.272	0.024	-0.266	S
H3		0.564	0.555	0.561	0.033	0.095	S
H4		< 0.252	0.204	0.209	0.027		B
H1	Cd *µg/l*	< 0.026	0.022	0.048	0.128		B
H2		0.031	0.03	0.053	0.128	-0.175	S
H3		0.059	0.059	0.078	0.111	-0.171	S
H4		< 0.026	0.018	0.044	0.122		B
H1	Cr *µg/l*	0.29	0.296	0.286	0.037	0.119	S
H2		0.326	0.333	0.321	0.027	0.189	S
H3		0.572	0.592	0.616	0.284	-0.154	S
H4		0.214	0.222	0.278	0.297	-0.215	S
H1	Cu *µg/l*	0.329	0.333	0.32	0.113	0.082	S
H2		0.356	0.37	0.355	0.136	0.006	S
H3		0.789	0.814	0.785	0.206	0.02	S
H4		0.417	0.444	0.436	0.113	-0.165	S
H1	Ni *µg/l*	0.447	0.444	0.399	0.12	0.404	S
H2		0.229	0.222	0.508	1.733	-0.161	S
H3		0.582	0.592	0.536	0.153	0.298	S
H4		0.291	0.296	0.344	0.394	-0.135	S
H1	Pb *µg/l*	0.365	0.37	0.357	0.056	0.147	S
H2		0.582	0.592	0.589	0.228	-0.031	S
H3		1.151	1.18	1.151	0.703	0	S
H4		0.323	0.333	0.315	0.088	0.087	S
H1	Zn *µg/l*	3.627	3.52	4.654	6.481	-0.158	S
H2		1.978	1.85	1.861	0.312	0.376	S
H3		6.435	6.29	6.478	2.495	-0.017	S
H4		2.832	2.78	3.025	1.276	-0.151	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	-999	0.333	0.353	0.031		B
H2		-999	0.259	0.272	0.024		B
H3		-999	0.555	0.561	0.033		B
H4		-999	0.204	0.209	0.027		B
H1	Cd *µg/l*	< 0.500	0.022	0.048	0.128		B
H2		< 0.500	0.03	0.053	0.128		B
H3		< 0.500	0.059	0.078	0.111		B
H4		< 0.500	0.018	0.044	0.122		B
H1	Cr *µg/l*	-999	0.296	0.286	0.037		B
H2		-999	0.333	0.321	0.027		B
H3		-999	0.592	0.616	0.284		B
H4		-999	0.222	0.278	0.297		B
H1	Cu *µg/l*	< 9.000	0.333	0.32	0.113		B
H2		< 9.000	0.37	0.355	0.136		B
H3		< 9.000	0.814	0.785	0.206		B
H4		< 9.000	0.444	0.436	0.113		B
H1	Ni *µg/l*	-999	0.444	0.399	0.12		B
H2		-999	0.222	0.508	1.733		B
H3		-999	0.592	0.536	0.153		B
H4		-999	0.296	0.344	0.394		B
H1	Pb *µg/l*	< 10.000	0.37	0.357	0.056		B
H2		< 10.000	0.592	0.589	0.228		B
H3		< 10.000	1.18	1.151	0.703		B
H4		< 10.000	0.333	0.315	0.088		B
H1	Zn *µg/l*	3.53	3.52	4.654	6.481	-0.173	S
H2		2.058	1.85	1.861	0.312	0.633	S
H3		6.134	6.29	6.478	2.495	-0.138	S
H4		2.856	2.78	3.025	1.276	-0.132	S

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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://emep-ccc.nilu.no/intercomparison

EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 169, Lancaster Environment Centre, United Kingdom Centre for Ecology and Hydrology (United Kingdom)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.368	0.333	0.353	0.031	0.476	S
H2		0.263	0.259	0.272	0.024	-0.392	S
H3		0.579	0.555	0.561	0.033	0.551	S
H4		0.211	0.204	0.209	0.027	0.067	S
H1	Cd *µg/l*	0.023	0.022	0.048	0.128	-0.194	S
H2		0.034	0.03	0.053	0.128	-0.151	S
H3		0.063	0.059	0.078	0.111	-0.135	S
H4		0.018	0.018	0.044	0.122	-0.211	S
H1	Cr *µg/l*	0.303	0.296	0.286	0.037	0.47	S
H2		0.34	0.333	0.321	0.027	0.716	S
H3		0.584	0.592	0.616	0.284	-0.112	S
H4		0.234	0.222	0.278	0.297	-0.147	S
H1	Cu *µg/l*	0.341	0.333	0.32	0.113	0.188	S
H2		0.383	0.37	0.355	0.136	0.205	S
H3		0.825	0.814	0.785	0.206	0.195	S
H4		0.453	0.444	0.436	0.113	0.153	S
H1	Ni *µg/l*	0.462	0.444	0.399	0.12	0.529	S
H2		0.227	0.222	0.508	1.733	-0.162	S
H3		0.61	0.592	0.536	0.153	0.481	S
H4		0.313	0.296	0.344	0.394	-0.079	S
H1	Pb *µg/l*	0.37	0.37	0.357	0.056	0.236	S
H2		0.585	0.592	0.589	0.228	-0.017	S
H3		1.17	1.18	1.151	0.703	0.027	S
H4		0.333	0.333	0.315	0.088	0.201	S
H1	Zn *µg/l*	3.62	3.52	4.654	6.481	-0.16	S
H2		1.71	1.85	1.861	0.312	-0.482	S
H3		6.83	6.29	6.478	2.495	0.141	S
H4		2.81	2.78	3.025	1.276	-0.168	S

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***** Z score in unitless

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 171, IMT Nord Europe (France)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As µg/l	0.315	0.333	0.353	0.031	-1.242	S
H2		0.241	0.259	0.272	0.024	-1.316	S
H3		0.525	0.555	0.561	0.033	-1.092	S
H4		0.195	0.204	0.209	0.027	-0.52	S
H1	Cd µg/l	0.021	0.022	0.048	0.128	-0.209	S
H2		0.028	0.03	0.053	0.128	-0.198	S
H3		0.057	0.059	0.078	0.111	-0.189	S
H4		0.018	0.018	0.044	0.122	-0.211	S
H1	Cr µg/l	0.295	0.296	0.286	0.037	0.254	S
H2		0.328	0.333	0.321	0.027	0.264	S
H3		0.58	0.592	0.616	0.284	-0.126	S
H4		0.224	0.222	0.278	0.297	-0.181	S
H1	Cu µg/l	0.318	0.333	0.32	0.113	-0.016	S
H2		0.355	0.37	0.355	0.136	-0.001	S
H3		0.775	0.814	0.785	0.206	-0.048	S
H4		0.431	0.444	0.436	0.113	-0.041	S
H1	Ni µg/l	0.436	0.444	0.399	0.12	0.312	S
H2		0.214	0.222	0.508	1.733	-0.17	S
H3		0.57	0.592	0.536	0.153	0.219	S
H4		0.29	0.296	0.344	0.394	-0.137	S
H1	Pb µg/l	0.349	0.37	0.357	0.056	-0.14	S
H2		0.563	0.592	0.589	0.228	-0.114	S
H3		1.11	1.18	1.151	0.703	-0.058	S
H4		0.32	0.333	0.315	0.088	0.053	S
H1	Zn µg/l	3.172	3.52	4.654	6.481	-0.229	S
H2		1.618	1.85	1.861	0.312	-0.777	S
H3		5.687	6.29	6.478	2.495	-0.317	S
H4		2.552	2.78	3.025	1.276	-0.371	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 178, Limnological Institute Russian Academy of Sciences (Russian Federation)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.334	0.333	0.353	0.031	-0.626	S
H2		0.263	0.259	0.272	0.024	-0.392	S
H3		0.543	0.555	0.561	0.033	-0.544	S
H4		0.2	0.204	0.209	0.027	-0.336	S
H1	Cd *µg/l*	0.027	0.022	0.048	0.128	-0.163	S
H2		0.022	0.03	0.053	0.128	-0.245	Q
H3		0.052	0.059	0.078	0.111	-0.234	S
H4		0.019	0.018	0.044	0.122	-0.203	S
H1	Cr *µg/l*	0.282	0.296	0.286	0.037	-0.097	S
H2		0.266	0.333	0.321	0.027	-2.073	S
H3		0.542	0.592	0.616	0.284	-0.26	S
H4		0.201	0.222	0.278	0.297	-0.258	S
H1	Cu *µg/l*	0.313	0.333	0.32	0.113	-0.061	S
H2		0.305	0.37	0.355	0.136	-0.368	S
H3		0.748	0.814	0.785	0.206	-0.18	S
H4		0.372	0.444	0.436	0.113	-0.563	S
H1	Ni *µg/l*	0.403	0.444	0.399	0.12	0.037	S
H2		0.123	0.222	0.508	1.733	-0.222	Q
H3		0.53	0.592	0.536	0.153	-0.042	S
H4		0.177	0.296	0.344	0.394	-0.424	Q
H1	Pb *µg/l*	0.368	0.37	0.357	0.056	0.2	S
H2		0.625	0.592	0.589	0.228	0.158	S
H3		1.124	1.18	1.151	0.703	-0.039	S
H4		0.339	0.333	0.315	0.088	0.269	S
H1	Zn *µg/l*	3.29	3.52	4.654	6.481	-0.21	S
H2		1.82	1.85	1.861	0.312	-0.13	S
H3		5.72	6.29	6.478	2.495	-0.304	S
H4		2.83	2.78	3.025	1.276	-0.153	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 183, Public health institute Uzice (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	-999	0.333	0.353	0.031		B
H2		-999	0.259	0.272	0.024		B
H3		-999	0.555	0.561	0.033		B
H4		-999	0.204	0.209	0.027		B
H1	Cd *µg/l*	0.024	0.022	0.048	0.128	-0.186	S
H2		0.021	0.03	0.053	0.128	-0.253	Q
H3		0.056	0.059	0.078	0.111	-0.198	S
H4		0.013	0.018	0.044	0.122	-0.252	Q
H1	Cr *µg/l*	0.277	0.296	0.286	0.037	-0.232	S
H2		0.323	0.333	0.321	0.027	0.076	S
H3		0.574	0.592	0.616	0.284	-0.147	S
H4		0.263	0.222	0.278	0.297	-0.05	S
H1	Cu *µg/l*	0.493	0.333	0.32	0.113	1.539	Q
H2		0.517	0.37	0.355	0.136	1.19	Q
H3		1.104	0.814	0.785	0.206	1.551	Q
H4		0.598	0.444	0.436	0.113	1.435	Q
H1	Ni *µg/l*	0.463	0.444	0.399	0.12	0.537	S
H2		0.24	0.222	0.508	1.733	-0.155	S
H3		0.72	0.592	0.536	0.153	1.201	S
H4		0.332	0.296	0.344	0.394	-0.031	S
H1	Pb *µg/l*	0.398	0.37	0.357	0.056	0.738	S
H2		0.385	0.592	0.589	0.228	-0.896	Q
H3		1.224	1.18	1.151	0.703	0.104	S
H4		0.229	0.333	0.315	0.088	-0.985	Q
H1	Zn *µg/l*	3.23	3.52	4.654	6.481	-0.22	S
H2		1.88	1.85	1.861	0.312	0.062	S
H3		5.98	6.29	6.478	2.495	-0.2	S
H4		2.67	2.78	3.025	1.276	-0.278	S

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 189, Institute of Public Health - Kikinda (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	-999	0.333	0.353	0.031		B
H2		-999	0.259	0.272	0.024		B
H3		-999	0.555	0.561	0.033		B
H4		-999	0.204	0.209	0.027		B
H1	Cd *µg/l*	< 0.400	0.022	0.048	0.128		B
H2		< 0.400	0.03	0.053	0.128		B
H3		< 0.400	0.059	0.078	0.111		B
H4		< 0.400	0.018	0.044	0.122		B
H1	Cr *µg/l*	< 2.000	0.296	0.286	0.037		B
H2		< 2.000	0.333	0.321	0.027		B
H3		< 2.000	0.592	0.616	0.284		B
H4		< 2.000	0.222	0.278	0.297		B
H1	Cu *µg/l*	-999	0.333	0.32	0.113		B
H2		-999	0.37	0.355	0.136		B
H3		-999	0.814	0.785	0.206		B
H4		-999	0.444	0.436	0.113		B
H1	Ni *µg/l*	< 2.000	0.444	0.399	0.12		B
H2		< 2.000	0.222	0.508	1.733		B
H3		< 2.000	0.592	0.536	0.153		B
H4		< 2.000	0.296	0.344	0.394		B
H1	Pb *µg/l*	< 5.000	0.37	0.357	0.056		B
H2		< 5.000	0.592	0.589	0.228		B
H3		< 5.000	1.18	1.151	0.703		B
H4		< 5.000	0.333	0.315	0.088		B
H1	Zn *µg/l*	< 4.000	3.52	4.654	6.481		B
H2		< 4.000	1.85	1.861	0.312		B
H3		< 4.000	6.29	6.478	2.495	-1.795	U
H4		< 4.000	2.78	3.025	1.276		B

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

Laboratory 203, The Public Health Institute Vranje (Republic of Serbia)

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.365	0.333	0.353	0.031	0.379	S
H2		0.14	0.259	0.272	0.024	-5.561	Q
H3		0.375	0.555	0.561	0.033	-5.655	Q
H4		0.082	0.204	0.209	0.027	-4.661	U
H1	Cd *µg/l*	< 0.100	0.022	0.048	0.128		B
H2		< 0.100	0.03	0.053	0.128		B
H3		< 0.100	0.059	0.078	0.111		B
H4		< 0.100	0.018	0.044	0.122		B
H1	Cr *µg/l*	< 1.000	0.296	0.286	0.037		B
H2		< 1.000	0.333	0.321	0.027		B
H3		< 1.000	0.592	0.616	0.284		B
H4		< 1.000	0.222	0.278	0.297		B
H1	Cu *µg/l*	< 2.000	0.333	0.32	0.113		B
H2		< 2.000	0.37	0.355	0.136		B
H3		< 2.000	0.814	0.785	0.206		B
H4		< 2.000	0.444	0.436	0.113		B
H1	Ni *µg/l*	< 1.000	0.444	0.399	0.12		B
H2		< 1.000	0.222	0.508	1.733		B
H3		< 1.000	0.592	0.536	0.153		B
H4		< 1.000	0.296	0.344	0.394		B
H1	Pb *µg/l*	< 1.000	0.37	0.357	0.056		B
H2		< 1.000	0.592	0.589	0.228		B
H3		< 1.000	1.18	1.151	0.703	-0.926	U
H4		< 1.000	0.333	0.315	0.088		B
H1	Zn *µg/l*	< 20.000	3.52	4.654	6.481		B
H2		< 20.000	1.85	1.861	0.312		B
H3		< 20.000	6.29	6.478	2.495		B
H4		< 20.000	2.78	3.025	1.276		B

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***** Z score in unitless

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S – Satisfactory: Your results deviates less than ±25% of the expected value for theoretical values of Pb, Ni, Cr and As <1 µg/l, Cd <0,5µg/l, Zn<10 µg/l and Cu<2 µg/l and less than ±15% of the expected value for theoretical values of Pb, Ni, Cr and As >1 µg/l, Cd >0,5µg/l, Zn>10 µg/l and Cu>2 µg/l

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.39	0.333	0.353	0.031	1.189	S
H2		0.306	0.259	0.272	0.024	1.416	S
H3		0.563	0.555	0.561	0.033	0.064	S
H4		0.221	0.204	0.209	0.027	0.433	S
H1	Cd *µg/l*	0.024	0.022	0.048	0.128	-0.186	S
H2		0.033	0.03	0.053	0.128	-0.159	S
H3		0.072	0.059	0.078	0.111	-0.053	S
H4		0.022	0.018	0.044	0.122	-0.178	S
H1	Cr *µg/l*	0.285	0.296	0.286	0.037	-0.016	S
H2		0.338	0.333	0.321	0.027	0.641	S
H3		0.583	0.592	0.616	0.284	-0.115	S
H4		0.211	0.222	0.278	0.297	-0.225	S
H1	Cu *µg/l*	0.166	0.333	0.32	0.113	-1.367	U
H2		0.168	0.37	0.355	0.136	-1.375	U
H3		0.613	0.814	0.785	0.206	-0.836	S
H4		0.239	0.444	0.436	0.113	-1.738	Q
H1	Ni *µg/l*	0.391	0.444	0.399	0.12	-0.063	S
H2		0.182	0.222	0.508	1.733	-0.188	S
H3		0.513	0.592	0.536	0.153	-0.154	S
H4		0.26	0.296	0.344	0.394	-0.214	S
H1	Pb *µg/l*	0.222	0.37	0.357	0.056	-2.413	Q
H2		0.325	0.592	0.589	0.228	-1.16	Q
H3		0.735	1.18	1.151	0.703	-0.592	U
H4		0.177	0.333	0.315	0.088	-1.578	Q
H1	Zn *µg/l*	2.891	3.52	4.654	6.481	-0.272	S
H2		1.228	1.85	1.861	0.312	-2.027	Q
H3		5.579	6.29	6.478	2.495	-0.36	S
H4		1.986	2.78	3.025	1.276	-0.814	Q

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EMEP – Analytical intercomparison of heavy metals in precipitation 2024

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

Heavy metals in precipitation (H-samples)

Sample name	Determinand	Reported value	Expected value	Mean value	Standard deviation	Z score *	EMEP quality norm ¤
H1	As *µg/l*	0.346	0.333	0.353	0.031	-0.24	S
H2		0.277	0.259	0.272	0.024	0.197	S
H3		0.592	0.555	0.561	0.033	0.931	S
H4		0.219	0.204	0.209	0.027	0.364	S
H1	Cd *µg/l*	0.025	0.022	0.048	0.128	-0.178	S
H2		0.032	0.03	0.053	0.128	-0.167	S
H3		0.063	0.059	0.078	0.111	-0.133	S
H4		0.019	0.018	0.044	0.122	-0.204	S
H1	Cr *µg/l*	0.295	0.296	0.286	0.037	0.251	S
H2		0.352	0.333	0.321	0.027	1.176	S
H3		0.645	0.592	0.616	0.284	0.105	S
H4		0.244	0.222	0.278	0.297	-0.115	S
H1	Cu *µg/l*	0.346	0.333	0.32	0.113	0.233	S
H2		0.399	0.37	0.355	0.136	0.32	S
H3		0.929	0.814	0.785	0.206	0.699	S
H4		0.497	0.444	0.436	0.113	0.54	S
H1	Ni *µg/l*	0.487	0.444	0.399	0.12	0.734	S
H2		0.249	0.222	0.508	1.733	-0.149	S
H3		0.648	0.592	0.536	0.153	0.729	S
H4		0.344	0.296	0.344	0.394	-0.001	S
H1	Pb *µg/l*	0.394	0.37	0.357	0.056	0.657	S
H2		0.637	0.592	0.589	0.228	0.212	S
H3		1.239	1.18	1.151	0.703	0.125	S
H4		0.354	0.333	0.315	0.088	0.444	S
H1	Zn *µg/l*	4.109	3.52	4.654	6.481	-0.084	S
H2		2.214	1.85	1.861	0.312	1.132	S
H3		7.169	6.29	6.478	2.495	0.277	S
H4		3.274	2.78	3.025	1.276	0.195	S

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