

EMEP – 39th intercomparison of analytical methods - 2021

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	20.07	22	21.193	3.246	-0.346	S
B2		24.78	26.9	25.943	2.156	-0.539	S
B4		11.19	12.8	12.789	0.909	-1.759	S
B5		18	19.6	19.056	1.928	-0.547	S
B1	HNO ₃ <i>µg N/filter</i>	17.2	18	17.922	1.722	-0.549	S
B2		21.21	21.9	21.643	1.722	-0.251	S
B4		9.65	10.5	10.128	0.634	-0.753	S
B5		15.56	16	15.931	15.931	-0.365	S

¥ Reported values are blank corrected. Corrections are done by subtracting the blank value when a value was reported or 1/2MDL when MDL was reported.

* Z score is unitless

¤ EMEP quality norm; letters indicate:

S – Satisfactory: Results deviates less than ±20% of the expected value for SO₂ and HNO₃

Q – Questionable: Results deviates between ±20-40% of the expected value for SO₂ and HNO₃

U – Unsatisfactory: Results deviates more than ±40% of the expected value for SO₂ and for HNO₃

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

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	22.83	22	21.193	3.246	0.504	S
B2		27.5	26.9	25.943	2.156	0.722	S
B4		13.67	12.8	12.789	0.909	0.969	S
B5		20.66	19.6	19.056	1.928	0.832	S
B1	HNO ₃ <i>µg N/filter</i>	18.07	18	17.922	1.722	0.112	S
B2		21.7	21.9	21.643	1.722	0.033	S
B4		10.36	10.5	10.128	0.634	0.366	S
B5		15.96	16	15.931	15.931	0.029	S

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Laboratory 6, SGS France - EHS (France)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	22.58	22	21.193	3.246	0.427	S
B2		27.43	26.9	25.943	2.156	0.689	S
B4		12.78	12.8	12.789	0.909	-0.01	S
B5		19.6	19.6	19.056	1.928	0.282	S
B1	HNO ₃ <i>µg N/filter</i>	17.53	18	17.922	1.722	-0.298	S
B2		21.44	21.9	21.643	1.722	-0.118	S
B4		10.59	10.5	10.128	0.634	0.729	S
B5		15.83	16	15.931	15.931	-0.099	S

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Q – Questionable: Results deviates between ±20-40% of the expected value for SO₂ and HNO₃

U – Unsatisfactory: Results deviates more than ±40% of the expected value for SO₂ and for HNO₃

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Laboratory 8, Umweltbundesamt, Langen (Germany)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	22.3	22	21.193	3.246	0.341	S
B2		26.9	26.9	25.943	2.156	0.444	S
B4		12.8	12.8	12.789	0.909	0.012	S
B5		19.8	19.6	19.056	1.928	0.386	S
B1	HNO ₃ <i>µg N/filter</i>	17.59	18	17.922	1.722	-0.253	S
B2		21.29	21.9	21.643	1.722	-0.205	S
B4		10.19	10.5	10.128	0.634	0.098	S
B5		14.99	16	15.931	15.931	-0.926	S

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U – Unsatisfactory: Results deviates more than ±40% of the expected value for SO₂ and for HNO₃

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Laboratory 10, Air Quality Reference Centre (Hungary)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.489	22	21.193	3.246	0.091	S
B2		23.722	26.9	25.943	2.156	-1.03	S
B4		12.477	12.8	12.789	0.909	-0.343	S
B5		19.652	19.6	19.056	1.928	0.309	S
B1	HNO ₃ <i>µg N/filter</i>	16.961	18	17.922	1.722	-0.731	S
B2		21.166	21.9	21.643	1.722	-0.277	S
B4		9.54	10.5	10.128	0.634	-0.927	S
B5		15.635	16	15.931	15.931	-0.291	S

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.2	22	21.193	3.246	0.002	S
B2		26	26.9	25.943	2.156	0.026	S
B4		12.1	12.8	12.789	0.909	-0.758	S
B5		19	19.6	19.056	1.928	-0.029	S
B1	HNO ₃ <i>µg N/filter</i>	17.8	18	17.922	1.722	-0.093	S
B2		21.6	21.9	21.643	1.722	-0.025	S
B4		10.6	10.5	10.128	0.634	0.745	S
B5		15.9	16	15.931	15.931	-0.03	S

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.6	22	21.193	3.246	0.125	S
B2		26.48	26.9	25.943	2.156	0.249	S
B4		12.65	12.8	12.789	0.909	-0.153	S
B5		19.72	19.6	19.056	1.928	0.345	S
B1	HNO ₃ <i>µg N/filter</i>	19.31	18	17.922	1.722	1.056	S
B2		22.84	21.9	21.643	1.722	0.695	S
B4		10.77	10.5	10.128	0.634	1.013	S
B5		17.4	16	15.931	15.931	1.445	S

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.7	22	21.193	3.246	0.156	S
B2		26.5	26.9	25.943	2.156	0.258	S
B4		12.7	12.8	12.789	0.909	-0.098	S
B5		19.5	19.6	19.056	1.928	0.23	S
B1	HNO ₃ <i>µg N/filter</i>	17.575	18	17.922	1.722	-0.264	S
B2		21.275	21.9	21.643	1.722	-0.213	S
B4		10.075	10.5	10.128	0.634	-0.083	S
B5		15.675	16	15.931	15.931	-0.252	S

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	49.1	22	21.193	3.246	8.598	U
B2		47.9	26.9	25.943	2.156	10.182	U
B4		14.1	12.8	12.789	0.909	1.442	S
B5		25.7	19.6	19.056	1.928	3.446	Q
B1	HNO ₃ <i>µg N/filter</i>	22.2	18	17.922	1.722	3.254	Q
B2		27.5	21.9	21.643	1.722	3.401	Q
B4		11.4	10.5	10.128	0.634	2.006	S
B5		18.5	16	15.931	15.931	2.527	S

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U – Unsatisfactory: Results deviates more than ±40% of the expected value for SO₂ and for HNO₃

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Laboratory 31, Slovak Hydrometeorological Institute (Slovakia)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.751	22	21.193	3.246	0.172	S
B2		26.065	26.9	25.943	2.156	0.056	S
B4		13.358	12.8	12.789	0.909	0.626	S
B5		20.193	19.6	19.056	1.928	0.59	S
B1	HNO ₃ <i>µg N/filter</i>	17.453	18	17.922	1.722	-0.357	S
B2		20.835	21.9	21.643	1.722	-0.469	S
B4		10.184	10.5	10.128	0.634	0.088	S
B5		15.881	16	15.931	15.931	-0.049	S

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U – Unsatisfactory: Results deviates more than ±40% of the expected value for SO₂ and for HNO₃

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EMEP – 39th intercomparison of analytical methods - 2021

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	19.84	22	21.193	3.246	-0.417	S
B2		25.04	26.9	25.943	2.156	-0.419	S
B4		12.8	12.8	12.789	0.909	0.012	S
B5		18.18	19.6	19.056	1.928	-0.454	S
B1	HNO ₃ <i>µg N/filter</i>	18.33	18	17.922	1.722	0.31	S
B2		19.87	21.9	21.643	1.722	-1.029	S
B4		9.5	10.5	10.128	0.634	-0.99	S
B5		16.83	16	15.931	15.931	0.884	S

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* Z score is unitless

¤ EMEP quality norm; letters indicate:

S – Satisfactory: Results deviates less than ±20% of the expected value for SO₂ and HNO₃

Q – Questionable: Results deviates between ±20-40% of the expected value for SO₂ and HNO₃

U – Unsatisfactory: Results deviates more than ±40% of the expected value for SO₂ and for HNO₃

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	20.605	22	21.193	3.246	-0.181	S
B2		24.843	26.9	25.943	2.156	-0.51	S
B4		11.811	12.8	12.789	0.909	-1.076	S
B5		18.769	19.6	19.056	1.928	-0.149	S
B1	HNO ₃ <i>µg N/filter</i>	16.891	18	17.922	1.722	-0.785	S
B2		20.96	21.9	21.643	1.722	-0.396	S
B4		9.759	10.5	10.128	0.634	-0.581	S
B5		15.298	16	15.931	15.931	-0.623	S

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Laboratory 34, Ministry of Environment and Urbanisation (Turkey)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	30	22	21.193	3.246	2.713	Q
B2		31.032	26.9	25.943	2.156	2.36	S
B4		16.971	12.8	12.789	0.909	4.599	Q
B5		23.45	19.6	19.056	1.928	2.279	S
B1	HNO ₃ <i>µg N/filter</i>	33.065	18	17.922	1.722	11.52	U
B2		36.171	21.9	21.643	1.722	8.436	U
B4		22.876	10.5	10.128	0.634	20.1	U
B5		30.774	16	15.931	15.931	14.601	U

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	20.51	22	21.193	3.246	-0.21	S
B2		25.54	26.9	25.943	2.156	-0.187	S
B4		11.93	12.8	12.789	0.909	-0.945	S
B5		18.5	19.6	19.056	1.928	-0.288	S
B1	HNO ₃ <i>µg N/filter</i>	17.315	18	17.922	1.722	-0.462	S
B2		21.395	21.9	21.643	1.722	-0.144	S
B4		10.285	10.5	10.128	0.634	0.248	S
B5		15.765	16	15.931	15.931	-0.163	S

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

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.3	22	21.193	3.246	0.033	S
B2		25.98	26.9	25.943	2.156	0.017	S
B4		12.54	12.8	12.789	0.909	-0.274	S
B5		19.3	19.6	19.056	1.928	0.127	S
B1	HNO ₃ <i>µg N/filter</i>	18.41	18	17.922	1.722	0.371	S
B2		22.1	21.9	21.643	1.722	0.266	S
B4		10.46	10.5	10.128	0.634	0.524	S
B5		16.25	16	15.931	15.931	0.314	S

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Laboratory 178, Laboratory of Hydrochemistry and Atmospheric Chemistry an EANET Monitoring
Laboratory (Russian Federation)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	17.41	22	21.193	3.246	-1.165	Q
B2		20.59	26.9	25.943	2.156	-2.482	Q
B4		9.66	12.8	12.789	0.909	-3.441	Q
B5		14.61	19.6	19.056	1.928	-2.305	Q
B1		HNO ₃ <i>µg N/filter</i>	16.685	18	17.922	1.722	-0.941
B2	19.805		21.9	21.643	1.722	-1.067	S
B4	8.625		10.5	10.128	0.634	-2.369	S
B5	13.925		16	15.931	15.931	-1.973	S

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Laboratory 200, FUB AG (Switzerland)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	21.99	22	21.193	3.246	0.246	S
B2		26.69	26.9	25.943	2.156	0.346	S
B4		12.77	12.8	12.789	0.909	-0.021	S
B5		19.45	19.6	19.056	1.928	0.205	S
B1	HNO ₃ <i>µg N/filter</i>	17.435	18	17.922	1.722	-0.371	S
B2		21.295	21.9	21.643	1.722	-0.202	S
B4		10.055	10.5	10.128	0.634	-0.115	S
B5		15.495	16	15.931	15.931	-0.429	S

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Laboratory 201, Public Health Institute "Timok" (Republic of Serbia)

Sulphur dioxide and nitric acid on impregnated filters (B-samples)

Sample name	Determinand	Reported value [¥]	Expected value	Mean value	Standard deviation	Z score [*]	EMEP quality norm [¤]
B1	SO ₂ <i>µg S/filter</i>	13.1	22	21.193	3.246	-2.493	U
B2		10.19	26.9	25.943	2.156	-7.305	U
B4		14.95	12.8	12.789	0.909	2.376	S
B5		15.56	19.6	19.056	1.928	-1.813	Q
B1	HNO ₃ <i>µg N/filter</i>	-999	18	17.922	1.722		B
B2		-999	21.9	21.643	1.722		B
B4		-999	10.5	10.128	0.634		B
B5		-999	16	15.931	15.931		B

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