

EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	17.43	20.13	21.098	9.467	-0.387	S
B4		10.6	12	13.156	8.388	-0.305	S
B5		16.47	18	18.307	7.99	-0.23	S
B6		14.69	16	17.305	9.234	-0.283	S
B3	HNO ₃ <i>µg N/filter</i>	8.37	8.18	8.638	6.19	-0.043	S
B4		8.67	9.82	10.697	9.316	-0.218	S
B5		13.56	14.7	14.041	6.723	-0.072	S
B6		11.12	13.1	14.586	12.217	-0.284	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	19.767	20.13	21.098	9.467	-0.141	S
B4		11.545	12	13.156	8.388	-0.192	S
B5		17.841	18	18.307	7.99	-0.058	S
B6		15.425	16	17.305	9.234	-0.204	S
B3	HNO ₃ <i>µg N/filter</i>	8.15	8.18	8.638	6.19	-0.079	S
B4		9.565	9.82	10.697	9.316	-0.122	S
B5		14.304	14.7	14.041	6.723	0.039	S
B6		12.964	13.1	14.586	12.217	-0.133	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	20.601	20.13	21.098	9.467	-0.053	S
B4		11.736	12	13.156	8.388	-0.169	S
B5		18.516	18	18.307	7.99	0.026	S
B6		15.966	16	17.305	9.234	-0.145	S
B3	HNO ₃ <i>µg N/filter</i>	7.7	8.18	8.638	6.19	-0.152	S
B4		9.499	9.82	10.697	9.316	-0.129	S
B5		14.527	14.7	14.041	6.723	0.072	S
B6		12.428	13.1	14.586	12.217	-0.177	S

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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 [¤]
B3	SO ₂ <i>µg S/filter</i>	21.05	20.13	21.098	9.467	-0.005	S
B4		12.25	12	13.156	8.388	-0.108	S
B5		18.35	18	18.307	7.99	0.005	S
B6		15.35	16	17.305	9.234	-0.212	S
B3	HNO ₃ <i>µg N/filter</i>	8.6	8.18	8.638	6.19	-0.006	S
B4		10.2	9.82	10.697	9.316	-0.053	S
B5		14.5	14.7	14.041	6.723	0.068	S
B6		13.4	13.1	14.586	12.217	-0.097	S

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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 [¤]
B3	SO ₂ <i>µg S/filter</i>	19.828	20.13	21.098	9.467	-0.134	S
B4		10.695	12	13.156	8.388	-0.293	S
B5		17.681	18	18.307	7.99	-0.078	S
B6		16.192	16	17.305	9.234	-0.121	S
B3	HNO ₃ <i>µg N/filter</i>	7.854	8.18	8.638	6.19	-0.127	S
B4		9.543	9.82	10.697	9.316	-0.124	S
B5		14.389	14.7	14.041	6.723	0.052	S
B6		13.566	13.1	14.586	12.217	-0.084	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	20.09	20.13	21.098	9.467	-0.106	S
B4		12.19	12	13.156	8.388	-0.115	S
B5		18.39	18	18.307	7.99	0.01	S
B6		16.09	16	17.305	9.234	-0.132	S
B3	HNO ₃ <i>µg N/filter</i>	8.59	8.18	8.638	6.19	-0.008	S
B4		10.69	9.82	10.697	9.316	-0.001	S
B5		14.79	14.7	14.041	6.723	0.111	S
B6		14.99	13.1	14.586	12.217	0.033	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	20.51	20.13	21.098	9.467	-0.062	S
B4		11.95	12	13.156	8.388	-0.144	S
B5		18.31	18	18.307	7.99	0	S
B6		16.7	16	17.305	9.234	-0.066	S
B3	HNO ₃ <i>µg N/filter</i>	9.01	8.18	8.638	6.19	0.06	S
B4		10.97	9.82	10.697	9.316	0.029	S
B5		15.34	14.7	14.041	6.723	0.193	S
B6		15	13.1	14.586	12.217	0.034	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	21.195	20.13	21.098	9.467	0.01	S
B4		13.195	12	13.156	8.388	0.005	S
B5		18.095	18	18.307	7.99	-0.026	S
B6		16.295	16	17.305	9.234	-0.109	S
B3	HNO ₃ <i>µg N/filter</i>	8.037	8.18	8.638	6.19	-0.097	S
B4		8.847	9.82	10.697	9.316	-0.199	S
B5		13.476	14.7	14.041	6.723	-0.084	S
B6		12.976	13.1	14.586	12.217	-0.132	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	2.575	20.13	21.098	9.467	-1.957	U
B4		1.365	12	13.156	8.388	-1.406	U
B5		1.927	18	18.307	7.99	-2.05	U
B6		1.839	16	17.305	9.234	-1.675	U
B3	HNO ₃ <i>µg N/filter</i>	0.468	8.18	8.638	6.19	-1.32	U
B4		0.621	9.82	10.697	9.316	-1.081	U
B5		0.886	14.7	14.041	6.723	-1.957	U
B6		0.876	13.1	14.586	12.217	-1.122	U

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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 [¤]
B3	SO ₂ <i>µg S/filter</i>	18.758	20.13	21.098	9.467	-0.247	S
B4		12.286	12	13.156	8.388	-0.104	S
B5		18.088	18	18.307	7.99	-0.027	S
B6		15.906	16	17.305	9.234	-0.152	S
B3	HNO ₃ <i>µg N/filter</i>	7.079	8.18	8.638	6.19	-0.252	S
B4		9.479	9.82	10.697	9.316	-0.131	S
B5		13.55	14.7	14.041	6.723	-0.073	S
B6		12.264	13.1	14.586	12.217	-0.19	S

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EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	16.035	20.13	21.098	9.467	-0.535	Q
B4		10.395	12	13.156	8.388	-0.329	S
B5		15.155	18	18.307	7.99	-0.394	S
B6		12.925	16	17.305	9.234	-0.474	S
B3	HNO ₃ <i>µg N/filter</i>	7.02	8.18	8.638	6.19	-0.261	S
B4		8.05	9.82	10.697	9.316	-0.284	S
B5		12.89	14.7	14.041	6.723	-0.171	S
B6		12.69	13.1	14.586	12.217	-0.155	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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EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	21.673	20.13	21.098	9.467	0.061	S
B4		12.071	12	13.156	8.388	-0.129	S
B5		21.016	18	18.307	7.99	0.339	S
B6		17.154	16	17.305	9.234	-0.016	S
B3	HNO ₃ <i>µg N/filter</i>	8.961	8.18	8.638	6.19	0.052	S
B4		8.702	9.82	10.697	9.316	-0.214	S
B5		16.947	14.7	14.041	6.723	0.432	S
B6		17.241	13.1	14.586	12.217	0.217	Q

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EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	29.863	20.13	21.098	9.467	0.926	U
B4		17.841	12	13.156	8.388	0.559	U
B5		14.547	18	18.307	7.99	-0.471	S
B6		24.803	16	17.305	9.234	0.812	U
B3	HNO ₃ <i>µg N/filter</i>	31.484	8.18	8.638	6.19	3.691	U
B4		46.22	9.82	10.697	9.316	3.813	U
B5		33.96	14.7	14.041	6.723	2.963	U
B6		60.47	13.1	14.586	12.217	3.756	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	18.735	20.13	21.098	9.467	-0.25	S
B4		10.365	12	13.156	8.388	-0.333	S
B5		16.405	18	18.307	7.99	-0.238	S
B6		15.355	16	17.305	9.234	-0.211	S
B3	HNO ₃ <i>µg N/filter</i>	8.035	8.18	8.638	6.19	-0.097	S
B4		9.715	9.82	10.697	9.316	-0.105	S
B5		14.415	14.7	14.041	6.723	0.056	S
B6		12.995	13.1	14.586	12.217	-0.13	S

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EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	20.174	20.13	21.098	9.467	-0.098	S
B4		11.994	12	13.156	8.388	-0.139	S
B5		17.823	18	18.307	7.99	-0.06	S
B6		15.424	16	17.305	9.234	-0.204	S
B3	HNO ₃ <i>µg N/filter</i>	8.58	8.18	8.638	6.19	-0.009	S
B4		10.2	9.82	10.697	9.316	-0.053	S
B5		15.81	14.7	14.041	6.723	0.263	S
B6		13.55	13.1	14.586	12.217	-0.085	S

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EMEP – 38th intercomparison of analytical methods

Laboratory 158, Asia Center for Air Pollution Research (ACAP) (Japan)

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	18.7	20.13	21.098	9.467	-0.253	S
B4		10.27	12	13.156	8.388	-0.344	S
B5		17.44	18	18.307	7.99	-0.108	S
B6		15.68	16	17.305	9.234	-0.176	S
B3	HNO ₃ <i>µg N/filter</i>	8.295	8.18	8.638	6.19	-0.055	S
B4		9.785	9.82	10.697	9.316	-0.098	S
B5		15.555	14.7	14.041	6.723	0.225	S
B6		12.865	13.1	14.586	12.217	-0.141	S

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EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	778.18	20.13	21.098	9.467	79.97	U
B4		761.87	12	13.156	8.388	89.261	U
B5		611.53	18	18.307	7.99	74.247	U
B6		548.99	16	17.305	9.234	57.581	U
B3	HNO ₃ <i>µg N/filter</i>	415.175	8.18	8.638	6.19	65.68	U
B4		520.775	9.82	10.697	9.316	54.75	U
B5		677.075	14.7	14.041	6.723	98.615	U
B6		543.065	13.1	14.586	12.217	43.258	U

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EMEP – 38th intercomparison of analytical methods

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 [¤]
B3	SO ₂ <i>µg S/filter</i>	19.455	20.13	21.098	9.467	-0.174	S
B4		11.515	12	13.156	8.388	-0.196	S
B5		17.305	18	18.307	7.99	-0.125	S
B6		15.255	16	17.305	9.234	-0.222	S
B3	HNO ₃ <i>µg N/filter</i>	7.97	8.18	8.638	6.19	-0.108	S
B4		10.34	9.82	10.697	9.316	-0.038	S
B5		13.18	14.7	14.041	6.723	-0.128	S
B6		12.43	13.1	14.586	12.217	-0.176	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 [¤]
B3	SO ₂ <i>µg S/filter</i>	53.33	20.13	21.098	9.467	3.405	U
B4		44.54	12	13.156	8.388	3.742	U
B5		46.16	18	18.307	7.99	3.486	U
B6		50.45	16	17.305	9.234	3.59	U
B3	HNO ₃ <i>µg N/filter</i>	1.275	8.18	8.638	6.19	-1.189	U
B4		1.445	9.82	10.697	9.316	-0.993	U
B5		0.665	14.7	14.041	6.723	-1.99	U
B6		0.725	13.1	14.586	12.217	-1.135	U

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