University of Stuttgart
Germany

Analytische Qualitätssicherung Baden-Württemberg

Proficiency Test 4/22

- TW S1 – sweeteners and benzotriazoles in drinking water -

acesulfam, cyclamate, saccharin, sucralose, 1H-benzotriazole, 4-methyl-1H-benzotriazole, 5-methylbenzotriazole, sum of methyl-1H-benzotriazoles

Final report

provided by
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and
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Stuttgart, in January 2023

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Version of the report	1	

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1. General

This PT was provided by AQS Baden-Württemberg in cooperation with IWW Water Center in Mülheim an der Ruhr and with the network “NORMAN” (Network of reference laboratories for monitoring of emerging environmental pollutants). In this round following parameters were to be determined:

- acesulfam
- cyclamate
- saccharin
- sucralose
- 1H-benzotriazole
- 4-methyl-1H-benzotriazole
- 5-methyl-1H-benzotriazole

The PT was executed and evaluated according to the requirements of DIN 38402-A45 and ISO/TS 20612.

2. PT design

Each participant received the following samples:

- 3 samples for the determination of acesulfam, cyclamate, saccharin, sucralose, 1-H-benzotriazole, 4-methyl-1H-benzotriazole, 5-methyl-1H-benzotriazole with at least 50 ml. Preservation by adding 40 mg/l sodium azide. The samples also contained acetonitrile as solubility promoter.

3 different concentration levels/batches were produced. All participants received the same samples.

3. Sample preparation

The samples for the determination of the sweeteners and benzotriazoles were based on a real ground water matrix. The ground water was used without treatment for the sample preparation.
The ground water was spiked with stock solutions and the concentrations covered drinking and ground water relevant ranges.

4. Sample distribution

The samples were dispatched on 17 May 2022 by express service

5. Analytical methods

The participants were free to choose a suitable method, but following limits of quantification were required:

parameter	**limit of quantification [µg/l]**
acesulfam	0,05 µg/l*
cyclamate	0,05 µg/l*
saccharin	0,05 µg/l*
sucralose	0,1 µg/l
1H-benzotriazole	0,05 µg/l
4-methyl-1H-benzotriazol	0,05 µg/l
5-methyl-1H-benzotriazol	0,05 µg/l

*concentration refers to the acid and not to the salt of the respective substance

The participants were informed that the samples had to be analysed in the own laboratory, with own personal and own equipment. Subcontracting of the analysis was not allowed.

The samples had to be analysed in duplicate over the complete method (sample preparation and measurement). The participants were asked to report the results in µg/l with three significant digits.

6. Submission of the results

The deadline for the submission of results was on 13 June 2022.

7. Basic principle of evaluation and assessment

The basic principle of the evaluation and assessment of the PTs from AQS Baden-Württemberg are described in the document „Evaluation of the PTs and information for the report“, which can be downloaded from www.aqsbw.de/pdf/ausw_berichte_v1_en.pdf.

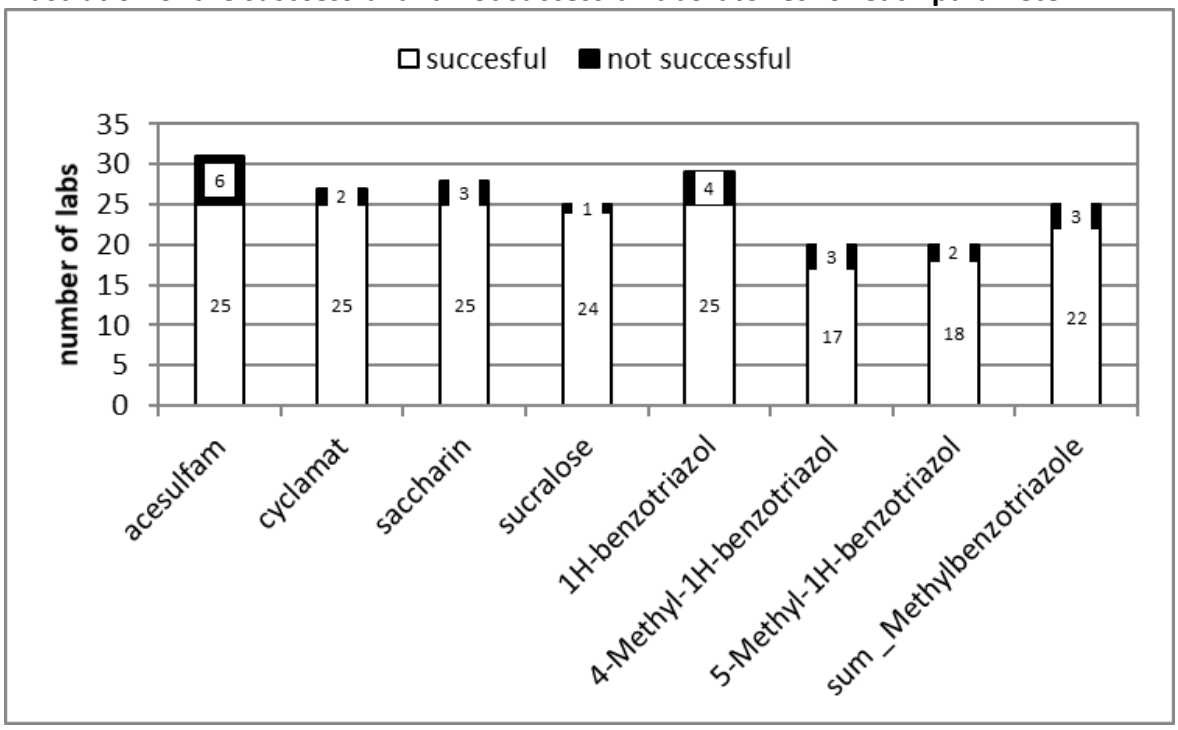
This PT was evaluated as follows:

Assigned value x_{pt}:	Sweeteners: Reference value from the formulation of the samples Benzotriazoles: Robust mean value from participants´results (Hampel estimator)
Standard deviation for proficiency assessment σ_{pt}:	Q method
Upper limit of σ_{pt}:	25 %
Lower limit of σ_{pt}:	5 %
Assessment:	z_U-Score
Classification of the single results:	$\lvert z_u \rvert \leq 2{,}0$ successful $2{,}0 < \lvert z_u \rvert < 3{,}0$ questionable $\lvert z_u \rvert \geq 3{,}0$ unsatisfactory
Parameter assessment:	A parameter was assessed as successful, if more than half of the values were correctly determined (2 out of 3 values are within the tolerance limits).

8. Evaluation

Number of participants:	33 1 laboratory did not report any results
Number of reported values	614
Number of accepted values:	544 (88,6 %)

Illustration of the susccessful and not successful laboratories for each parameter



9. Explanation for the appendices

The explanations for the appendices can be found in the document „Evaluation of the PTs and information for the report“, which can be downloaded from www.aqsbw.de/pdf/ausw_berichte_v1_en.pdf.

10. Measurement uncertainty

General:

Number of labs with valid values	32
Number of labs with valid values and reported measurement uncertainties	22 (68,8 %)
Number of valid values	614
Number of valid values with measurement uncertainties	419 (68,2 %)

Measurement uncertainties against the accreditation status

Accreditation status of the values	Number of values	Number of values with measurement uncertainty
accredited	506	356 (70,4 %)
not accredited	21	15 (71,4 %)
not specified	87	48 (55,2 %)

Interpretation of the reported measurement uncertainties:
If measurement uncertainties are underestimated values assessed as "satisfactory" in the PT ($|z_U| \leq 2$), will have a large ζ-score. $|\zeta| > 2$ means that the "own" requirements (defined in terms of estimated uncertainty) are not fulfilled.

Number of values with reported measurement uncertainty having a $|z_U| \leq 2{,}0$	380
Number of values with a magnitude of ζ-scores > 2 The own requirements of the laboratory are not fulfilled and the estimation of the measurement uncertainty is too low	33 (8,7 %)

11. Traceable reference values

The explanations about traceable reference values can be found in the document „Evaluation of the PTs and information for the report", which can be downloaded from www.aqsbw.de/pdf/ausw_berichte_v1_en.pdf

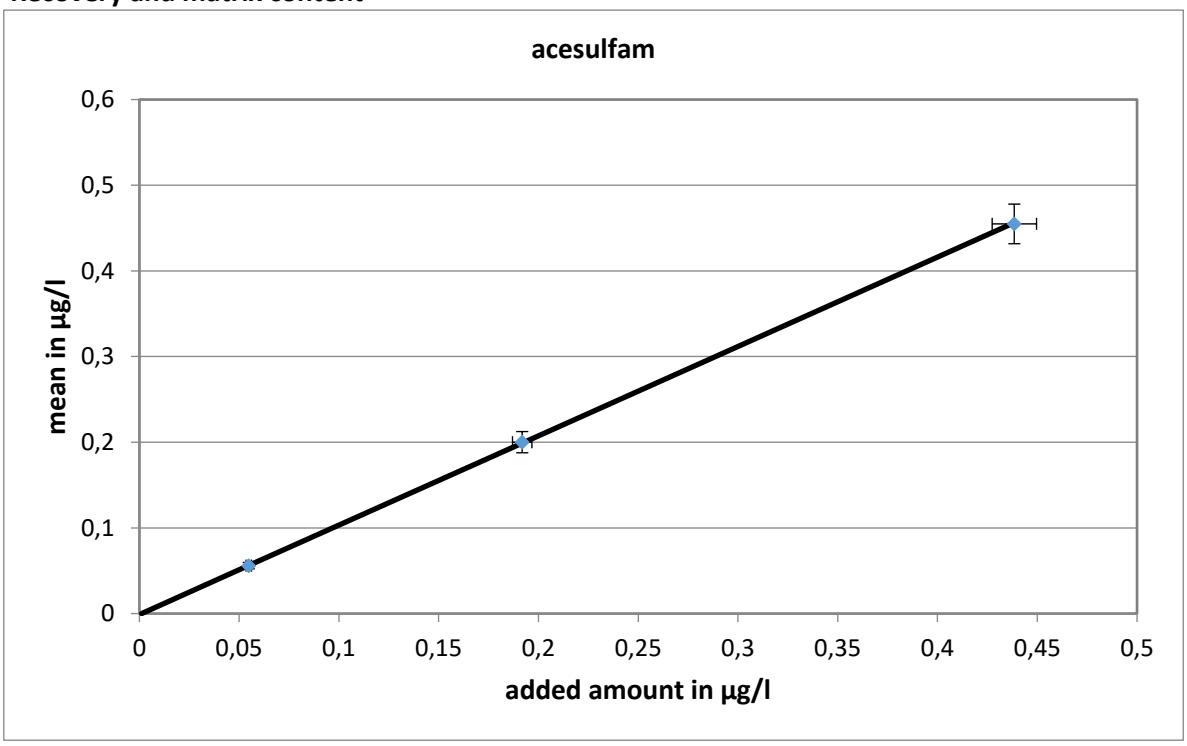
12. Internet

The report is available on the following webpage:
http://www.aqsbw/pdf/269/report_269.pdf

acesulfam

level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0548	3,25	0,0083	0,0083	15,22	0,0729	0,0392	33,07	-28,50	31	2	4	19,4
2	0,1918	2,60	0,0276	0,0276	14,36	0,2513	0,1400	30,99	-27,01	31	2	2	12,9
3	0,4385	2,55	0,0515	0,0515	11,75	0,5481	0,3406	24,99	-22,32	31	2	2	12,9
									sum	93	6	8	15,1

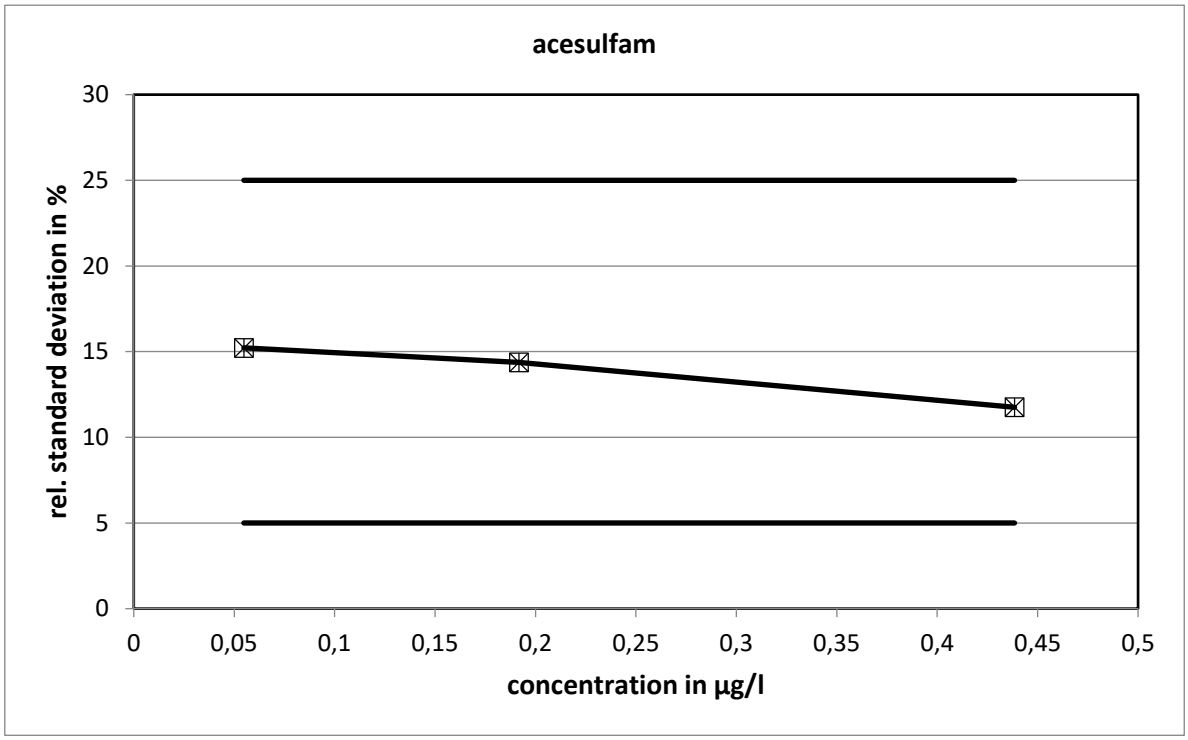
Recovery and matrix content

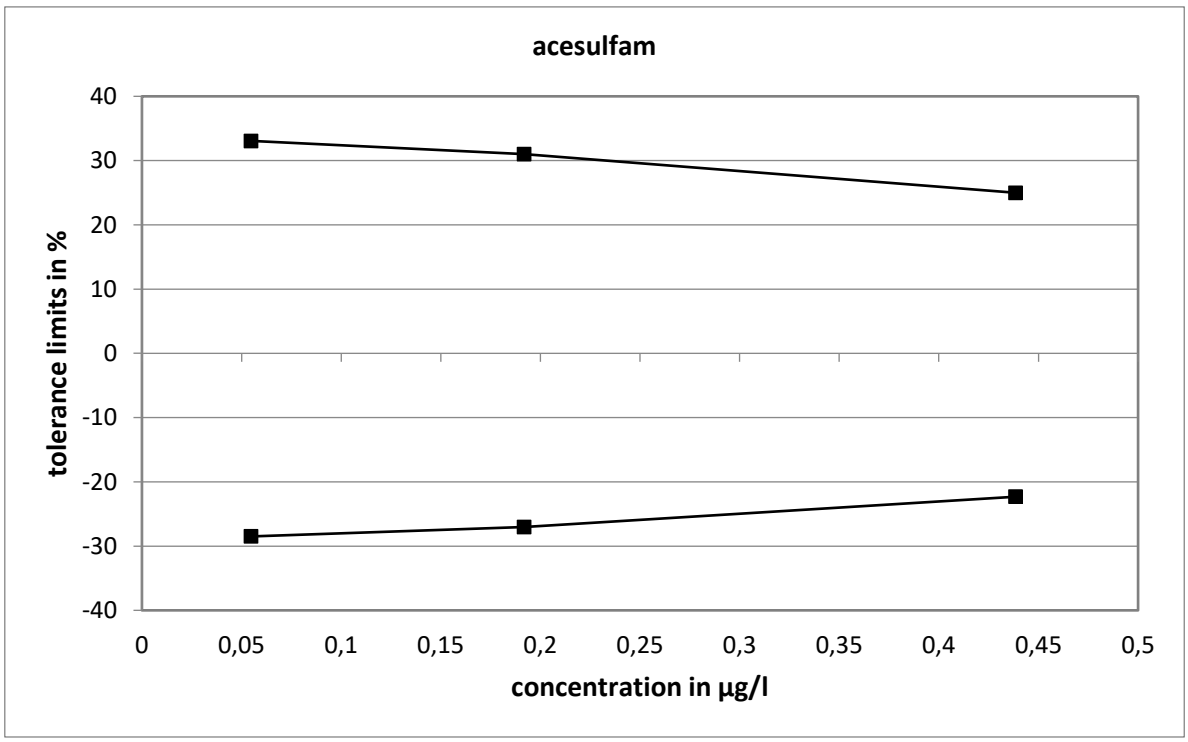


calculated matrix content: 0 µg/l

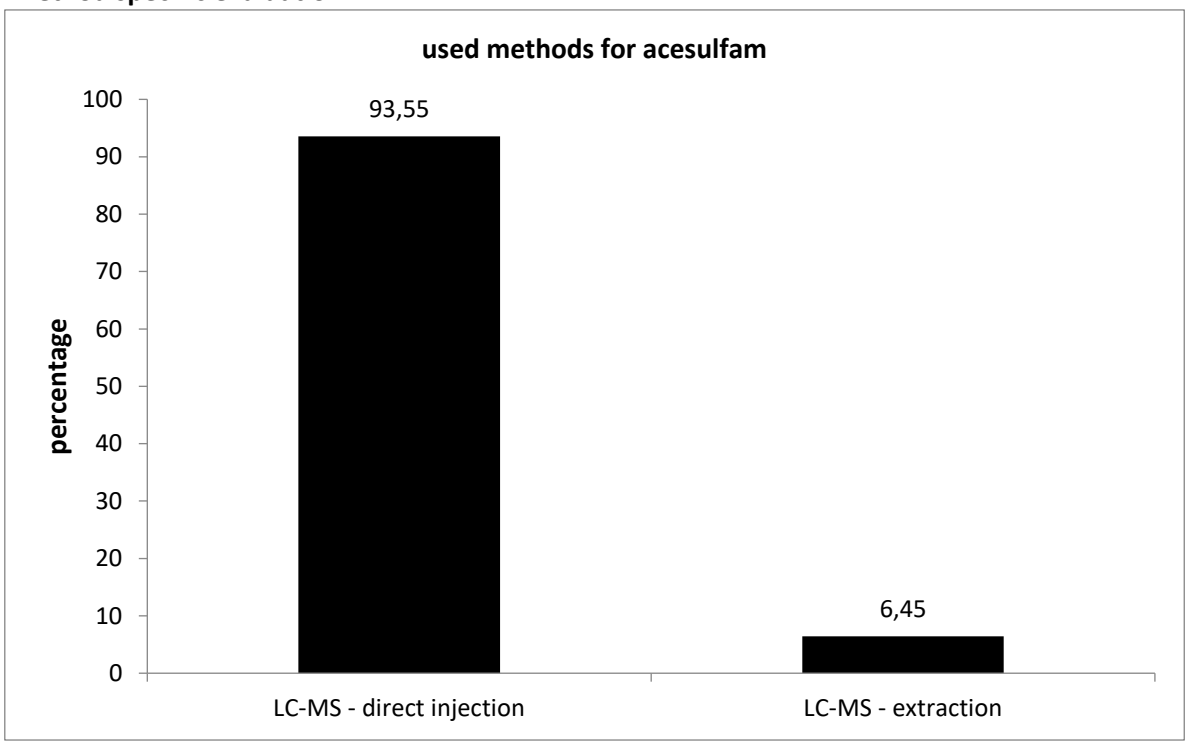
average recovery: 104,3 %

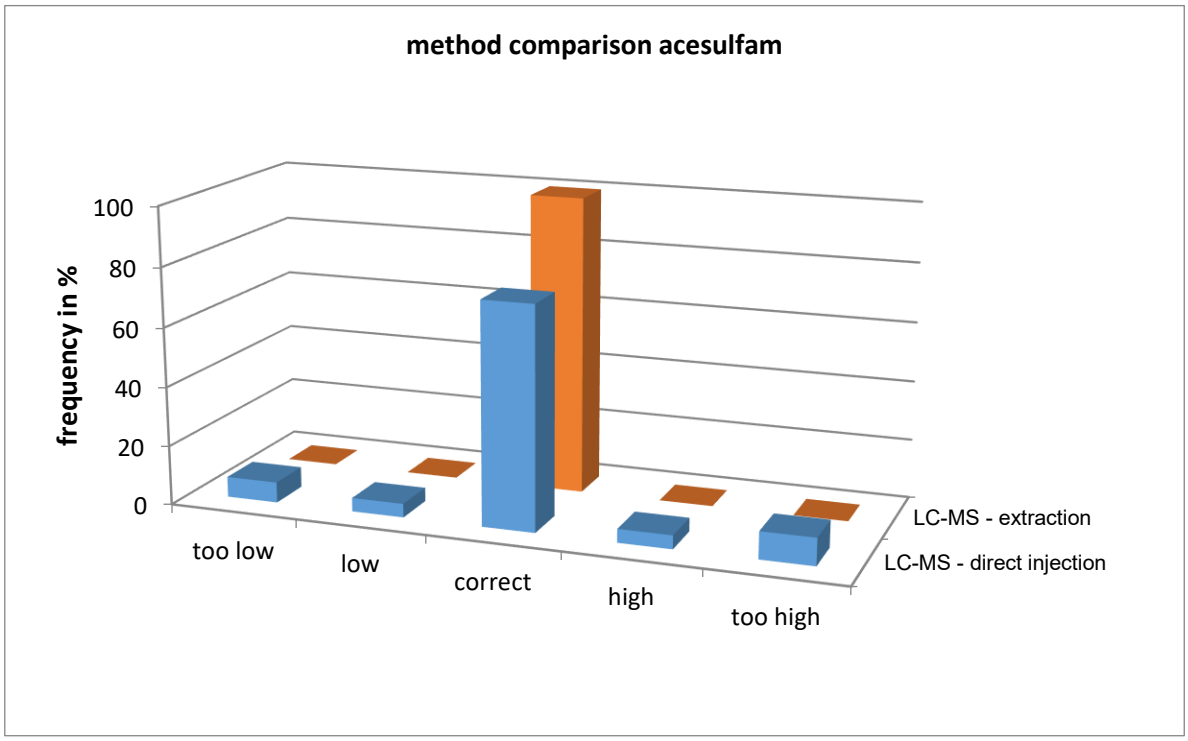
Relative standard deviation and tolerance limits





Method specific evaluation

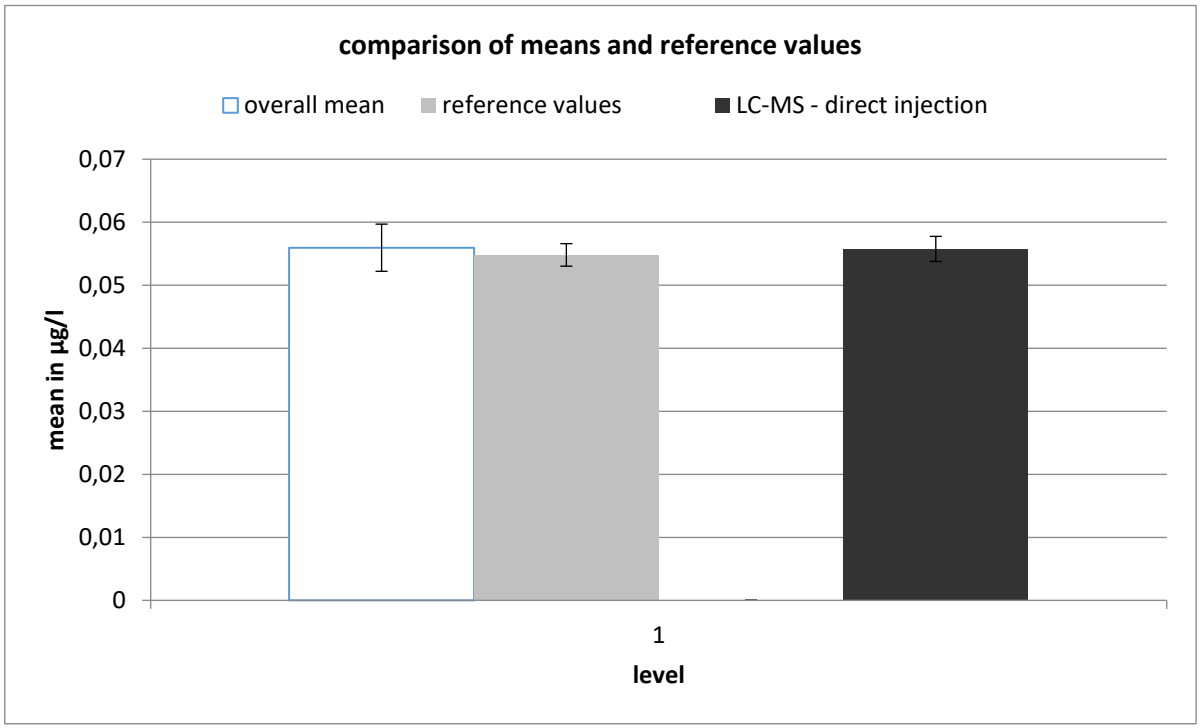


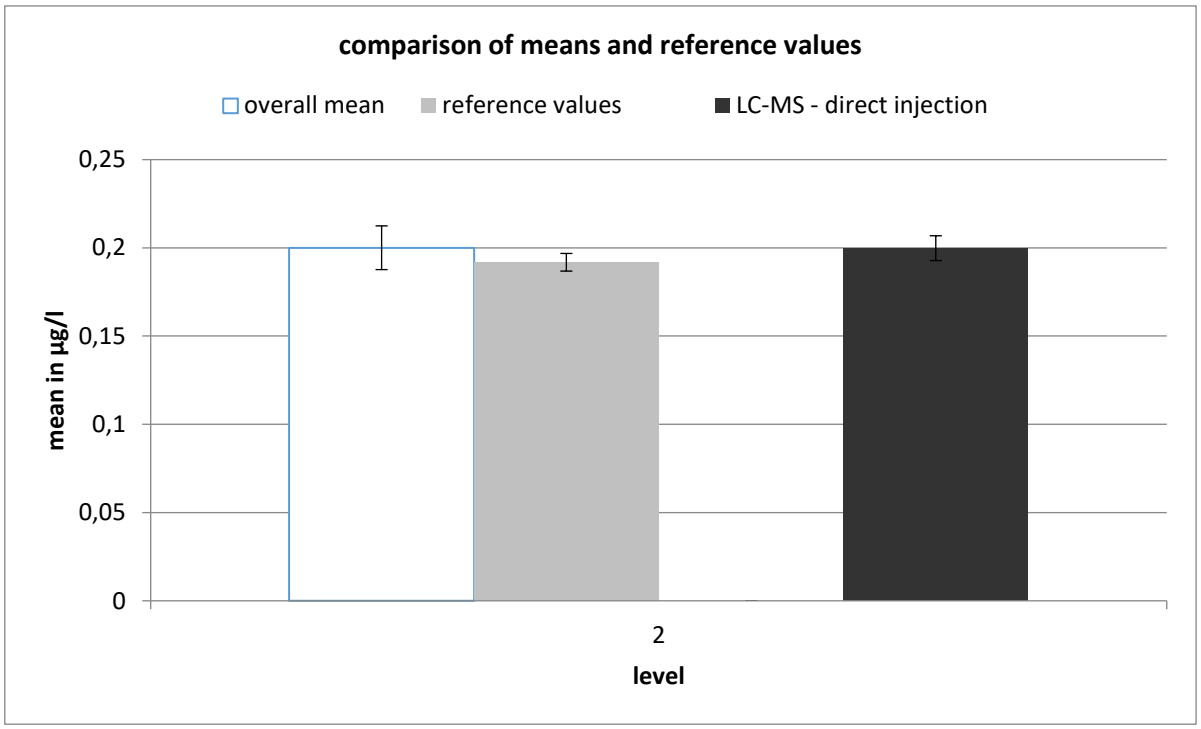


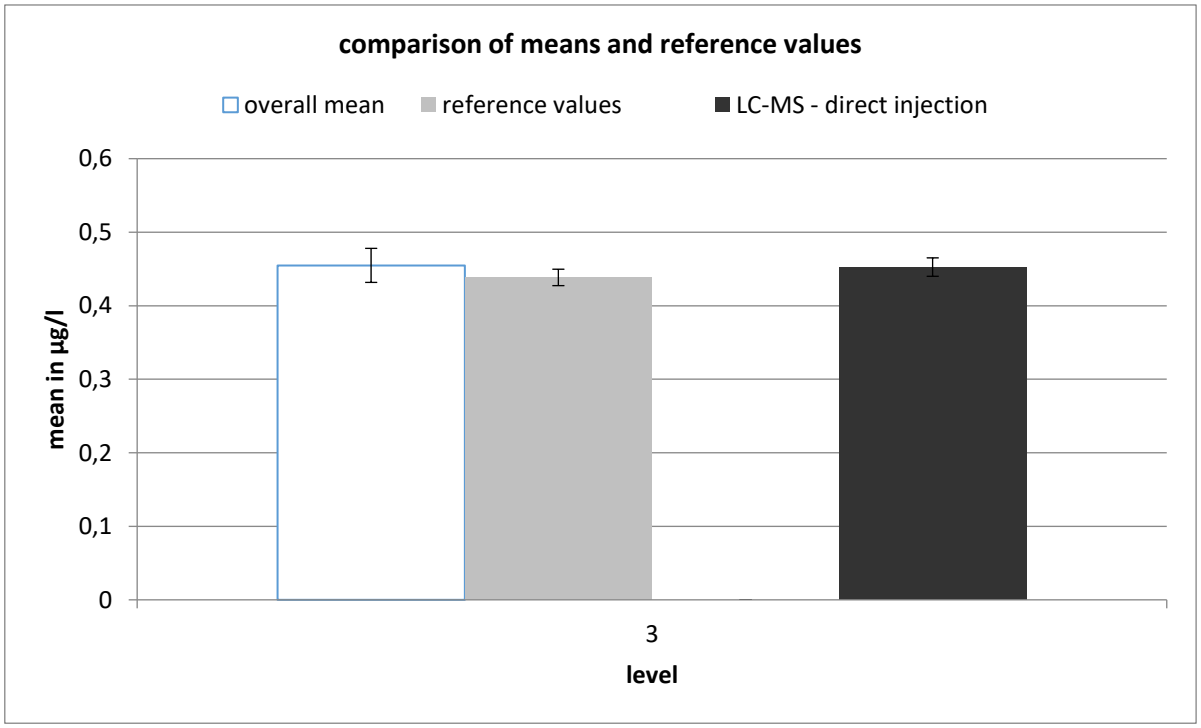
The differences between the methods were not significant.

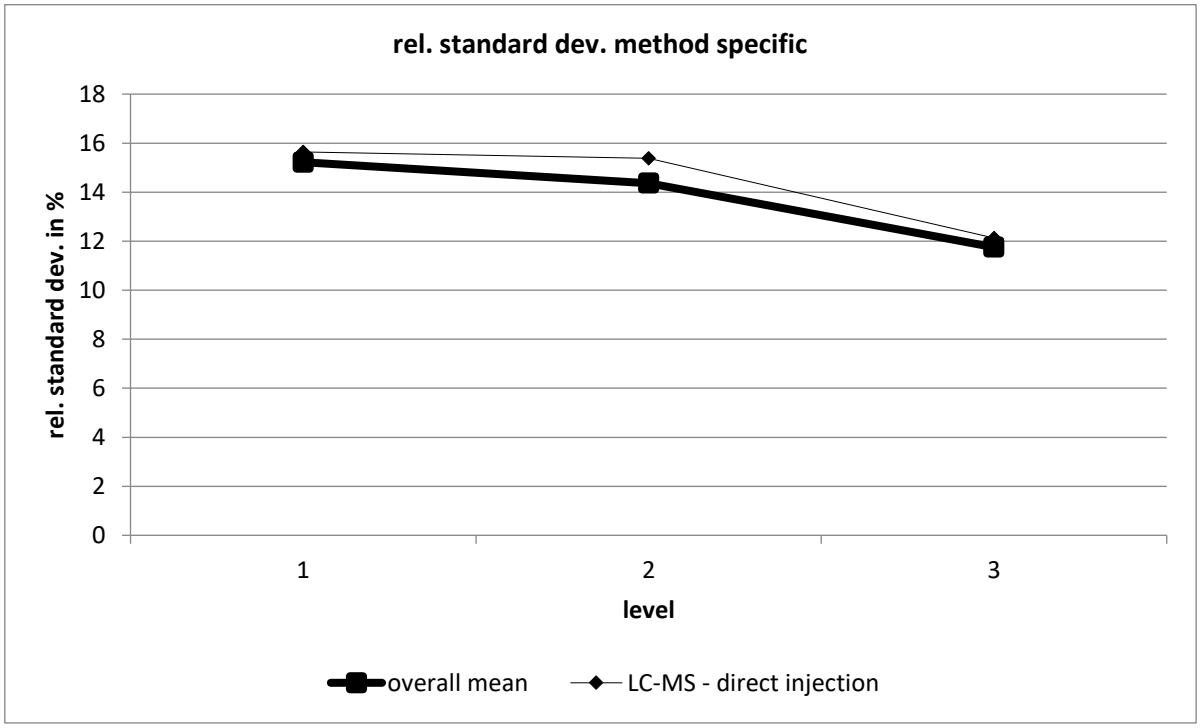
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,0560	0,0037	6,7	0,0548	0,0018	3,3
2	0,2001	0,0124	6,2	0,1918	0,0050	2,6
3	0,4548	0,0231	5,1	0,4385	0,0112	2,5




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,6
0,5
0,4
0,3
0,2
0,1
0
mean in µg/l
3
level

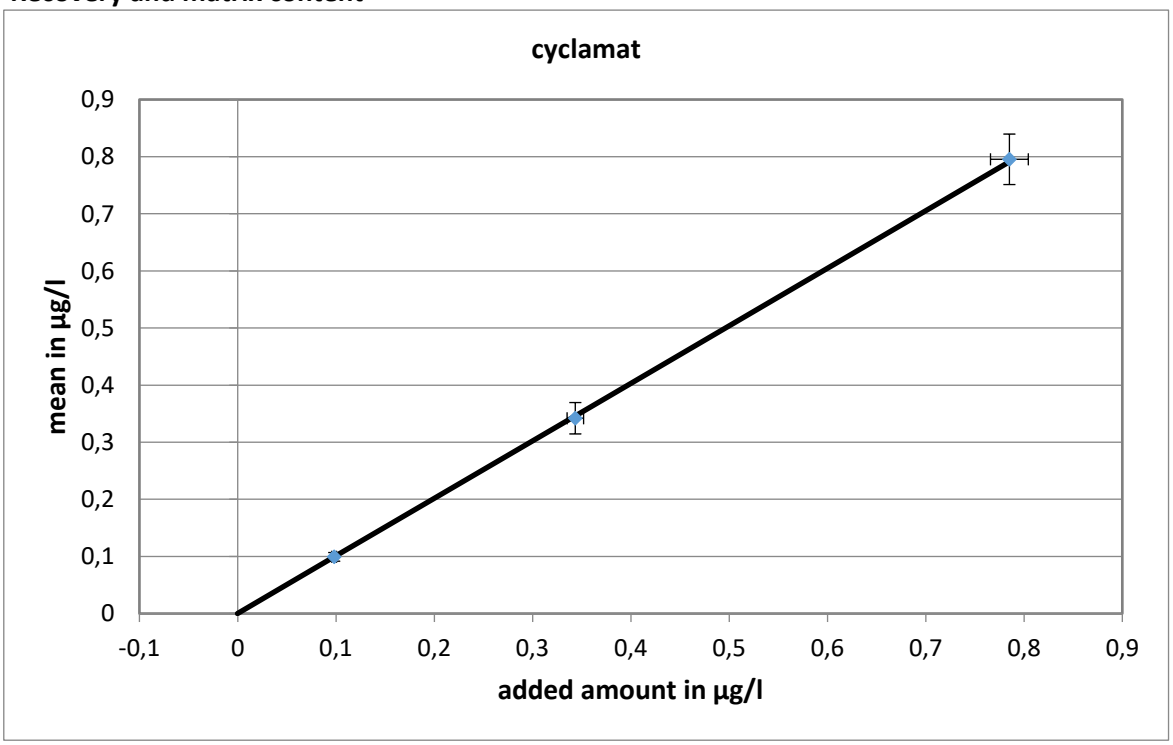


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,0558	0,002	3,569	0,0087	15,639	30	3	4	23,33
2	0,1998	0,007	3,511	0,0307	15,387	30	3	1	13,33
3	0,4525	0,0125	2,768	0,0549	12,128	30	3	1	13,33

cyclamat

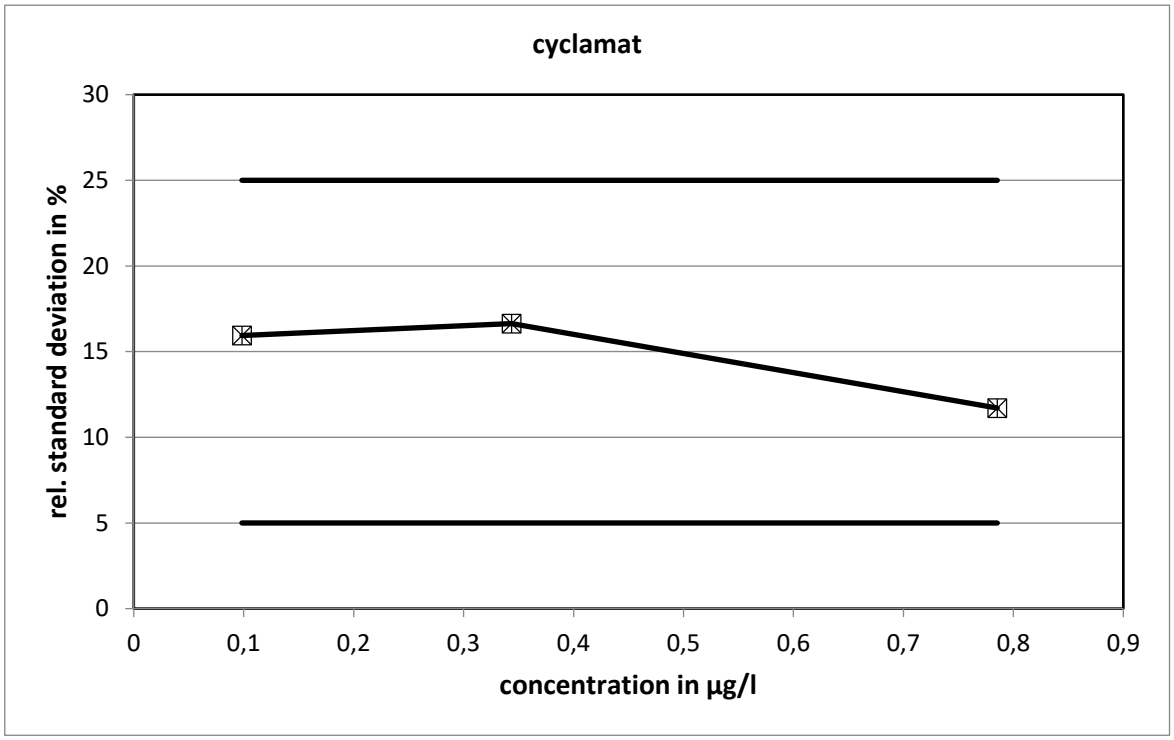
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0984	2,46	0,0157	0,0157	15,94	0,1326	0,0691	34,82	-29,75	27	1	3	14,8
2	0,3437	2,45	0,0572	0,0572	16,64	0,4694	0,2374	36,55	-30,94	27	1	1	7,4
3	0,7853	2,45	0,0919	0,0919	11,71	0,9811	0,6109	24,93	-22,21	27	0	2	7,4
									sum	81	2	6	9,9

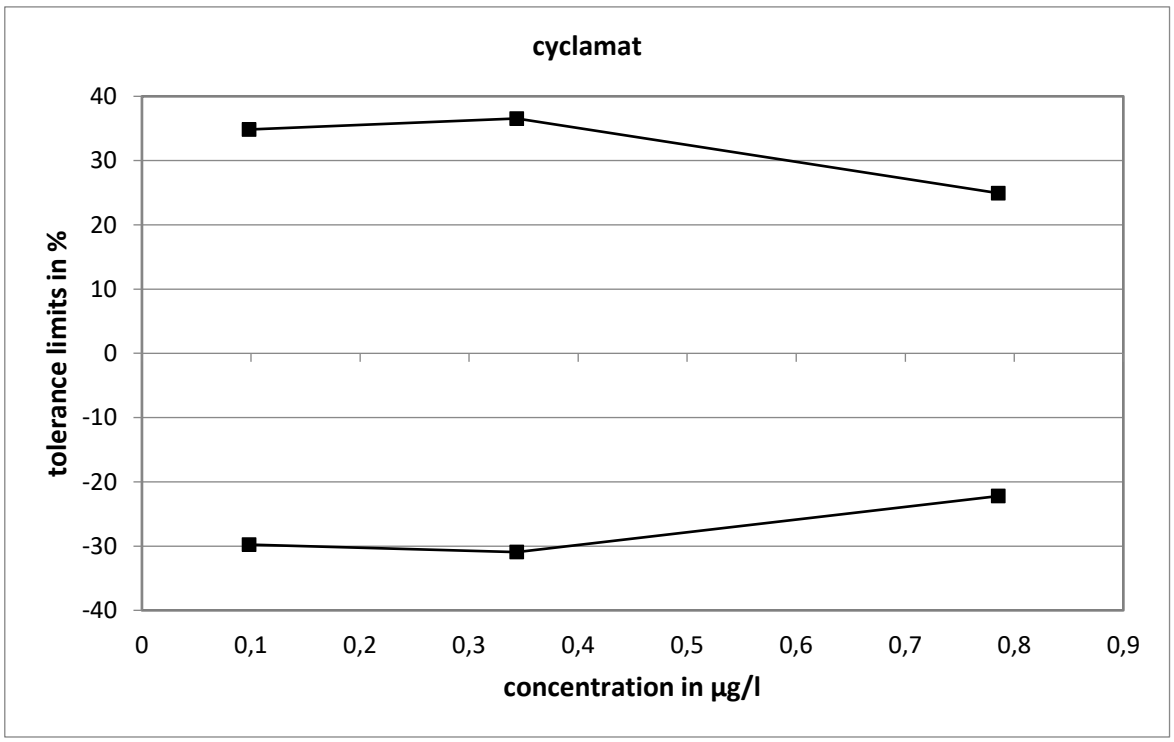
Recovery and matrix content



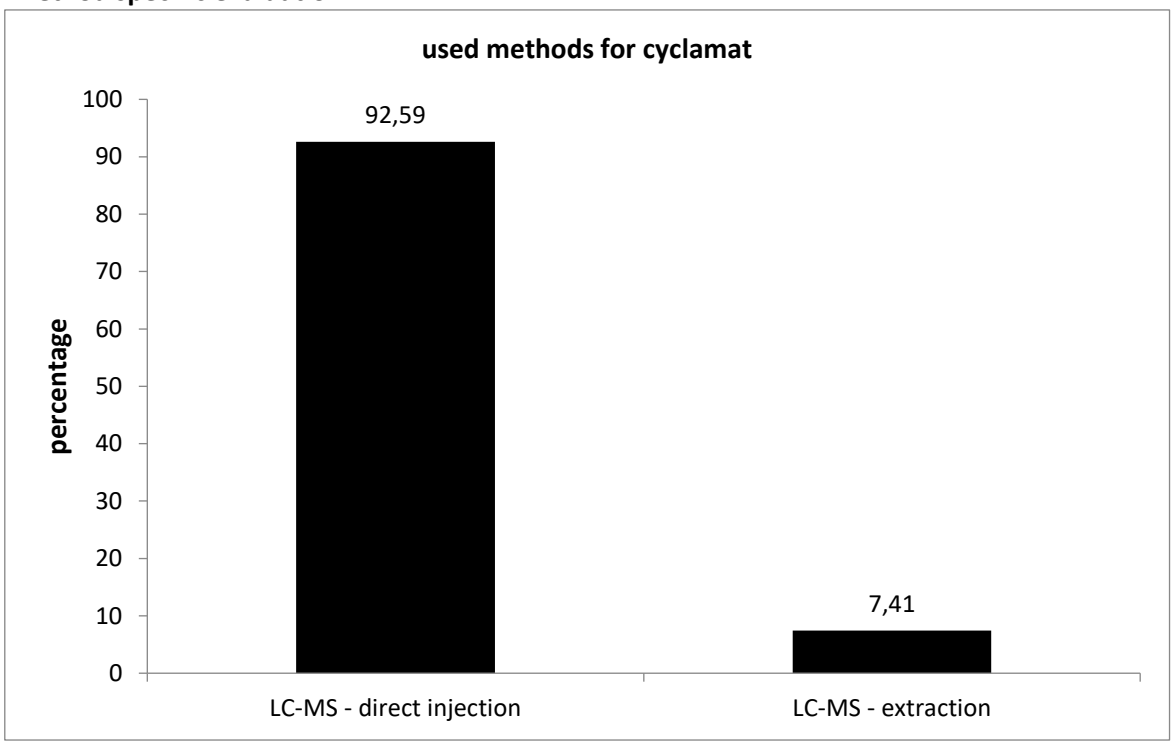
calculated matrix content: 0,0002 µg/l, expanded uncertainty of the matrix content: 100 %
average recovery: 100,7 %

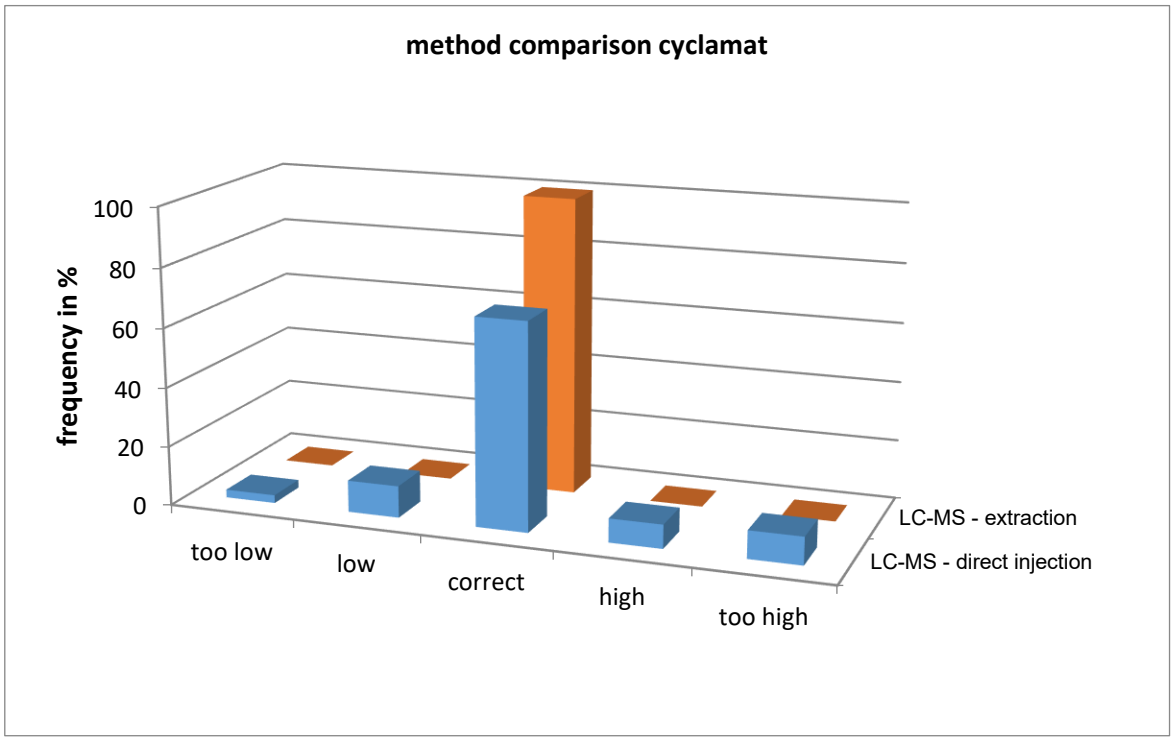
Relative standard deviation and tolerance limits





Method specific evaluation

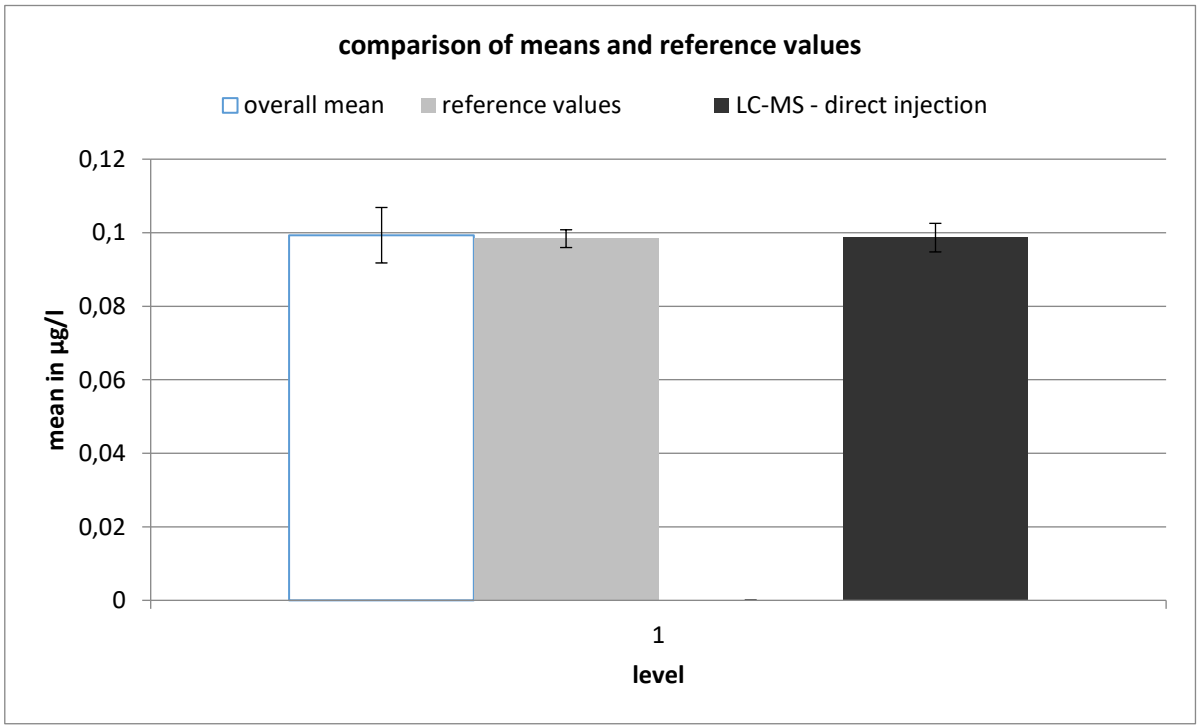


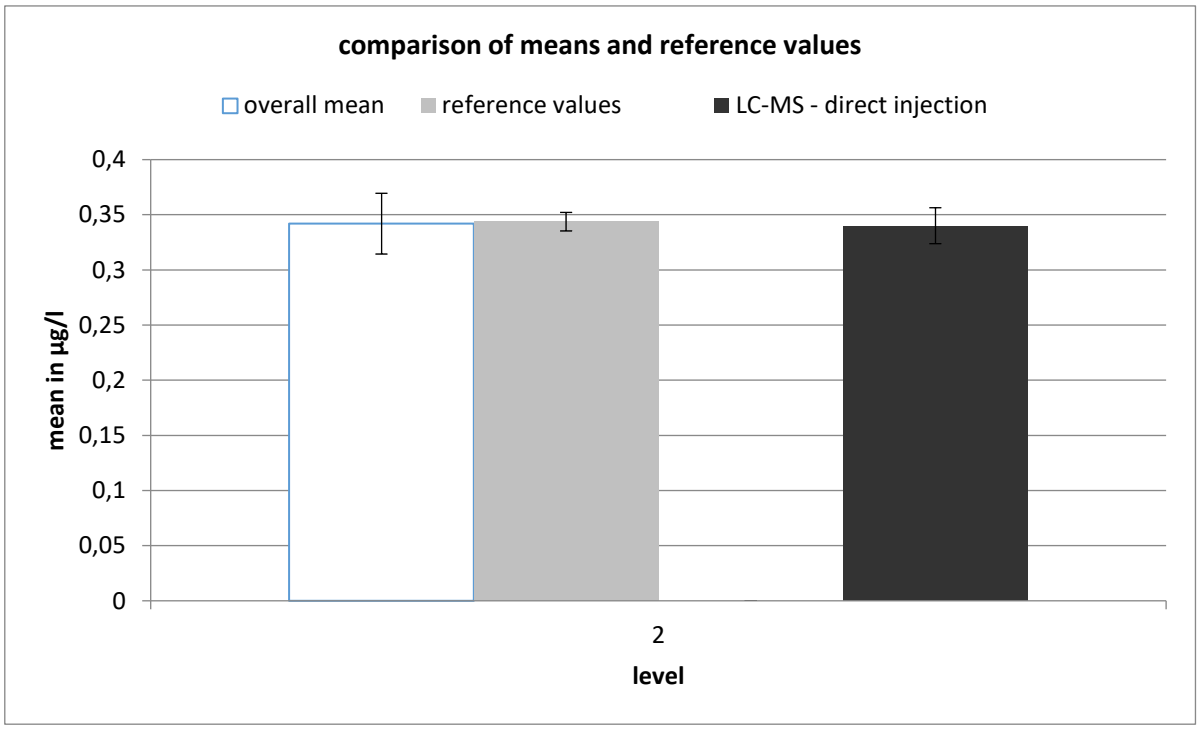


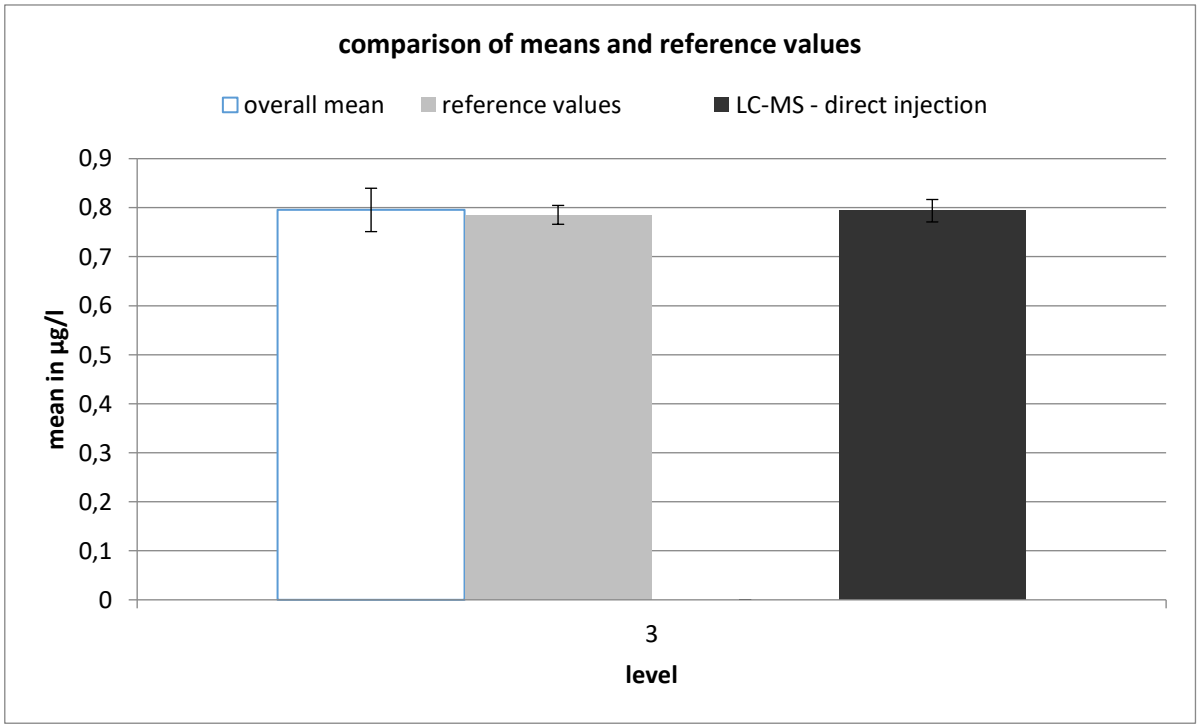
The differences between the methods were not significant.

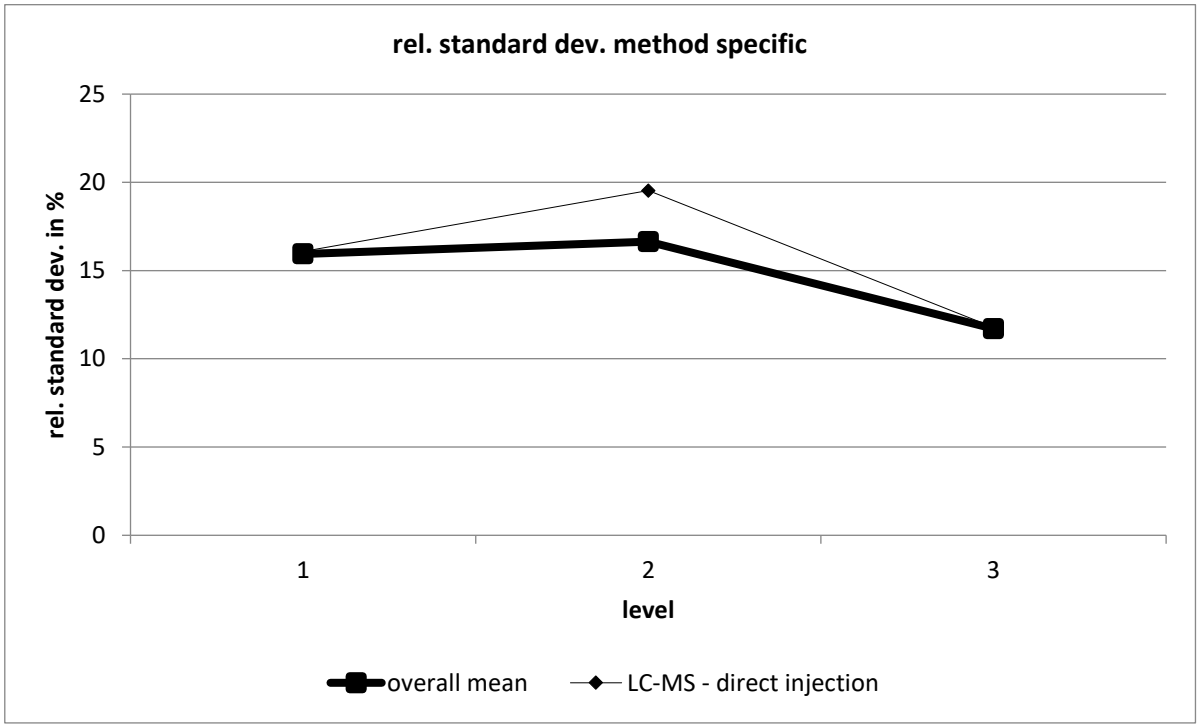
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,0993	0,0075	7,6	0,0984	0,0024	2,5
2	0,3419	0,0275	8,0	0,3437	0,0084	2,4
3	0,7954	0,0442	5,6	0,7853	0,0192	2,4




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
mean in µg/l
3
level

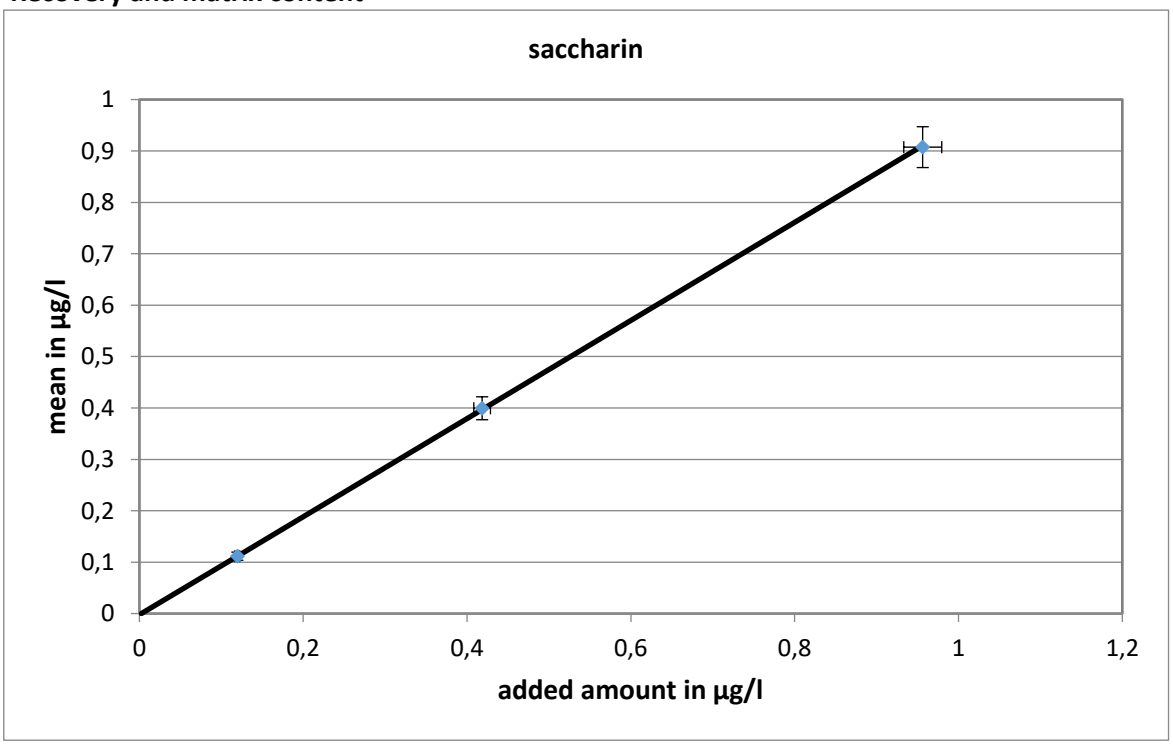


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,0987	0,0039	3,944	0,0159	16,088	26	1	4	19,23
2	0,3401	0,0163	4,789	0,0664	19,537	26	1	1	7,692
3	0,7937	0,0229	2,889	0,0935	11,784	26	1	1	7,692

saccharin

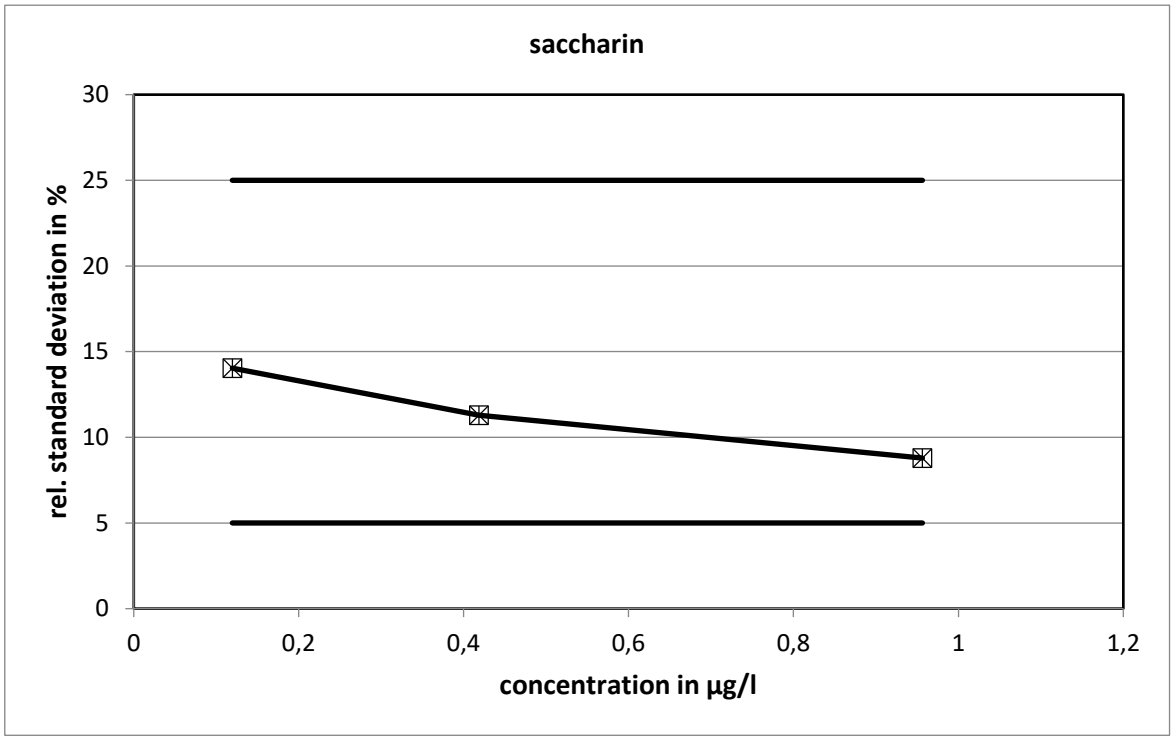
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,1195	3,13	0,0168	0,0168	14,03	0,1560	0,0881	30,51	-26,27	28	1	2	10,7
2	0,4184	2,49	0,0472	0,0472	11,29	0,5192	0,3289	24,08	-21,40	28	3	1	14,3
3	0,9564	2,44	0,0841	0,0841	8,79	1,133	0,7953	18,47	-16,84	28	2	0	7,1
									sum	84	6	3	10,7

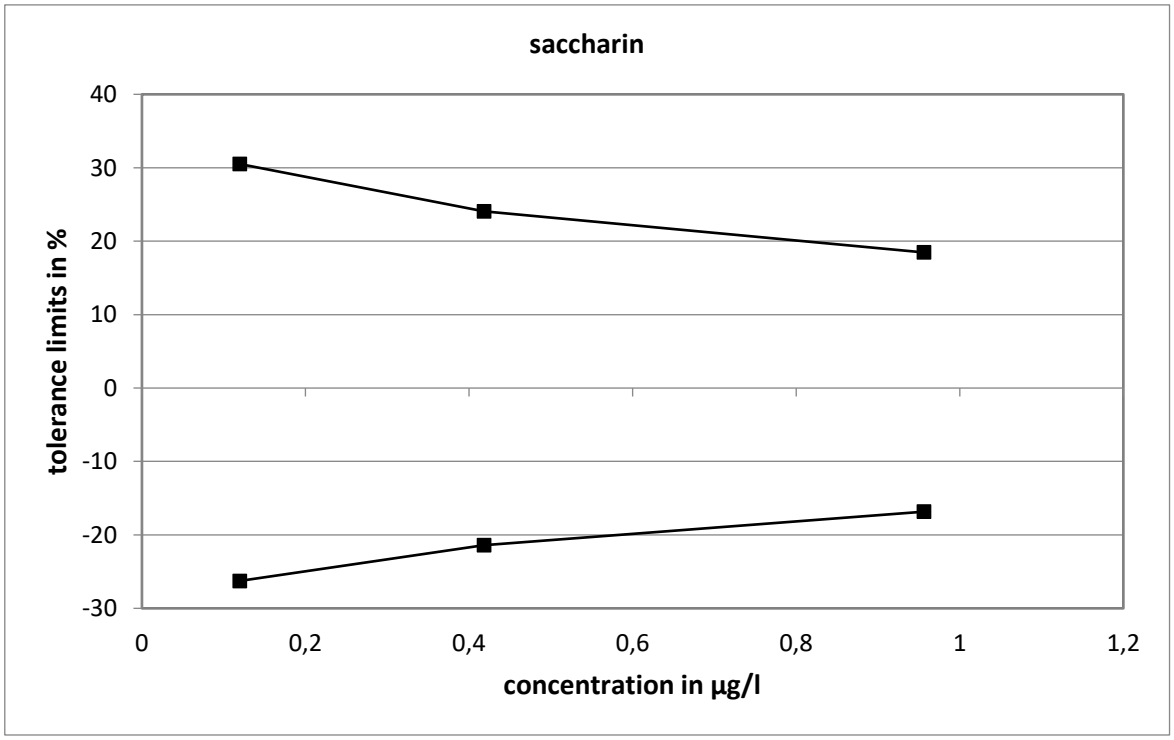
Recovery and matrix content



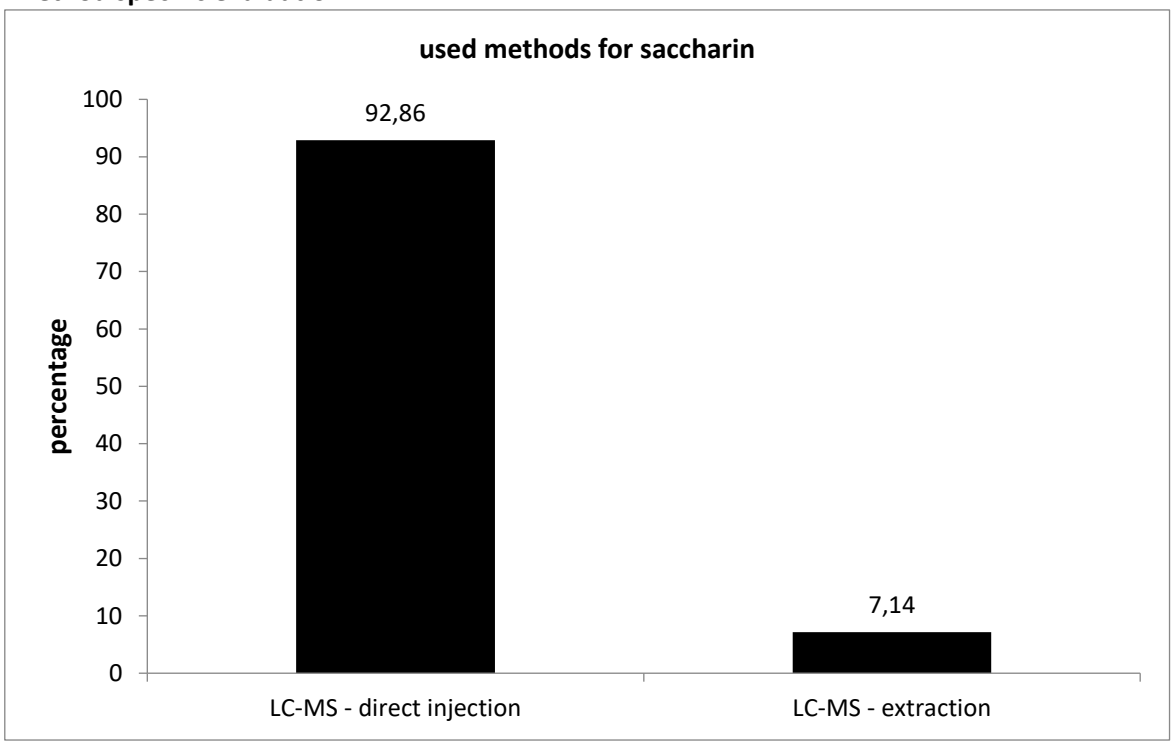
calculated matrix content: 0 µg/l
average recovery: 95,4 %

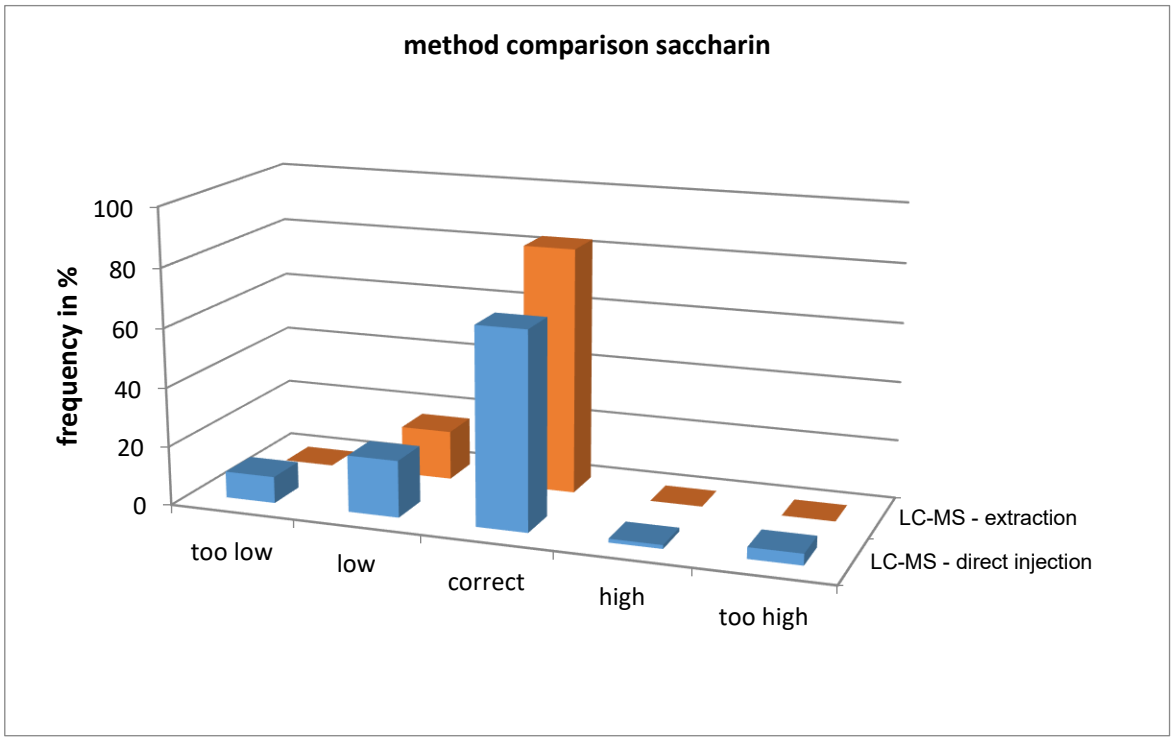
Relative standard deviation and tolerance limits





Method specific evaluation

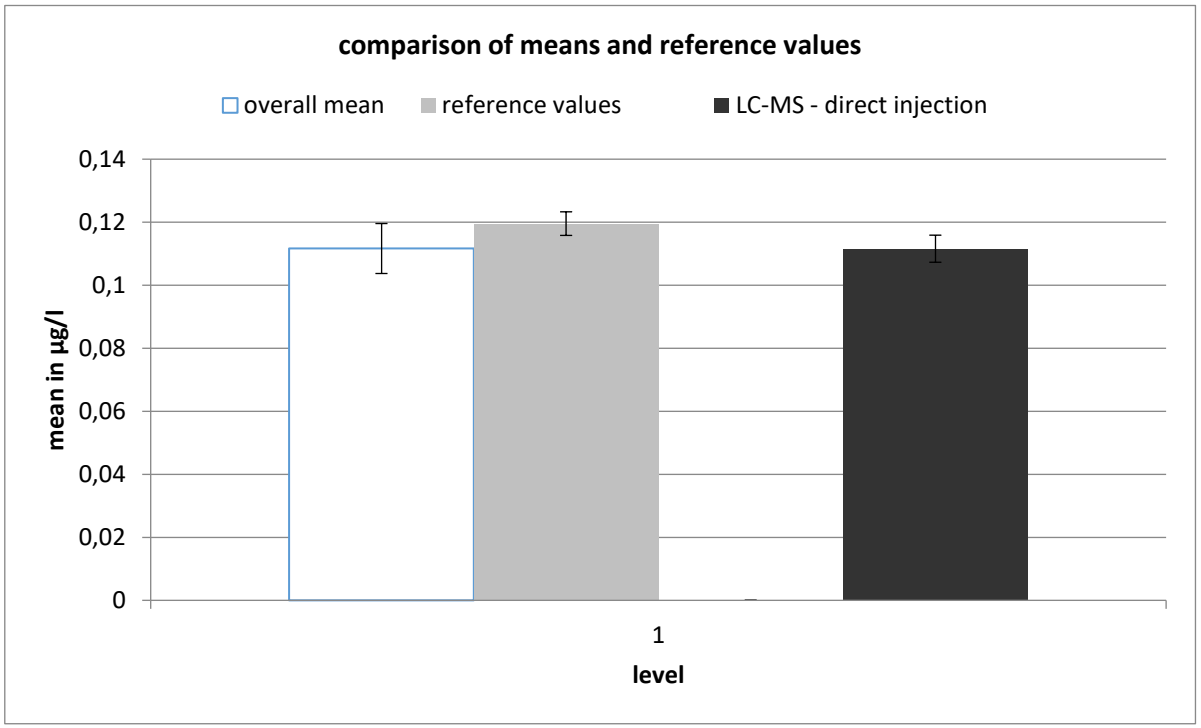


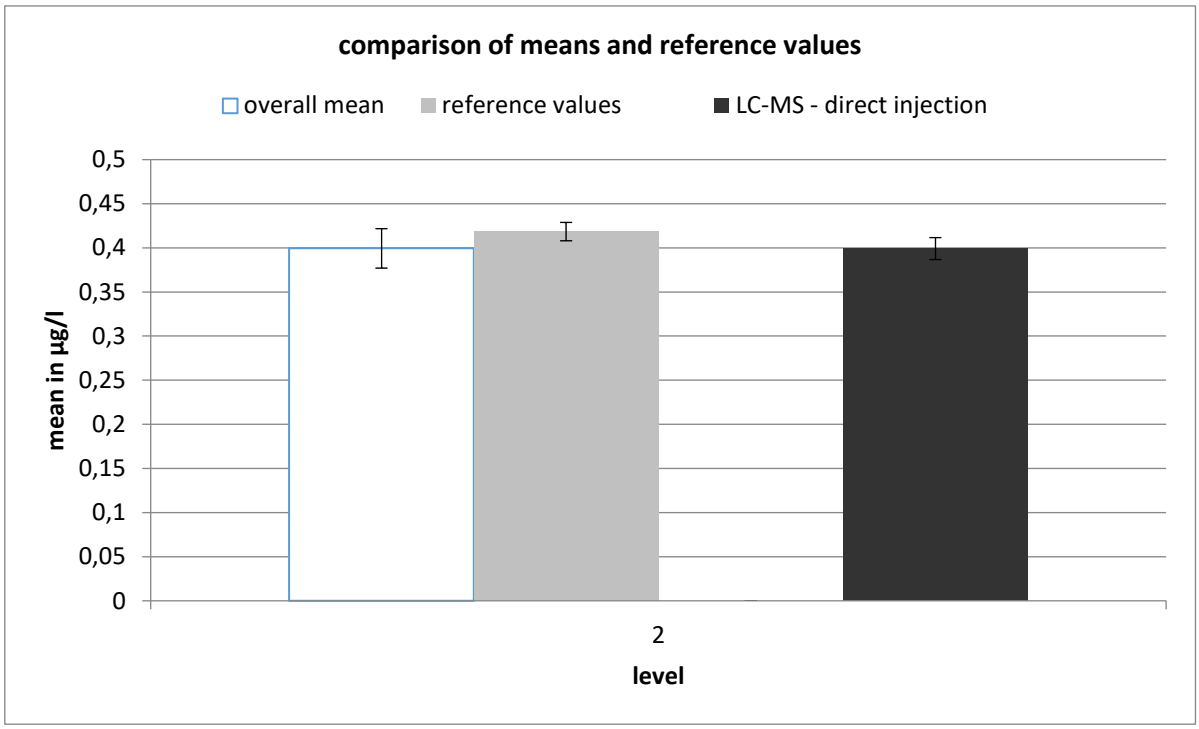


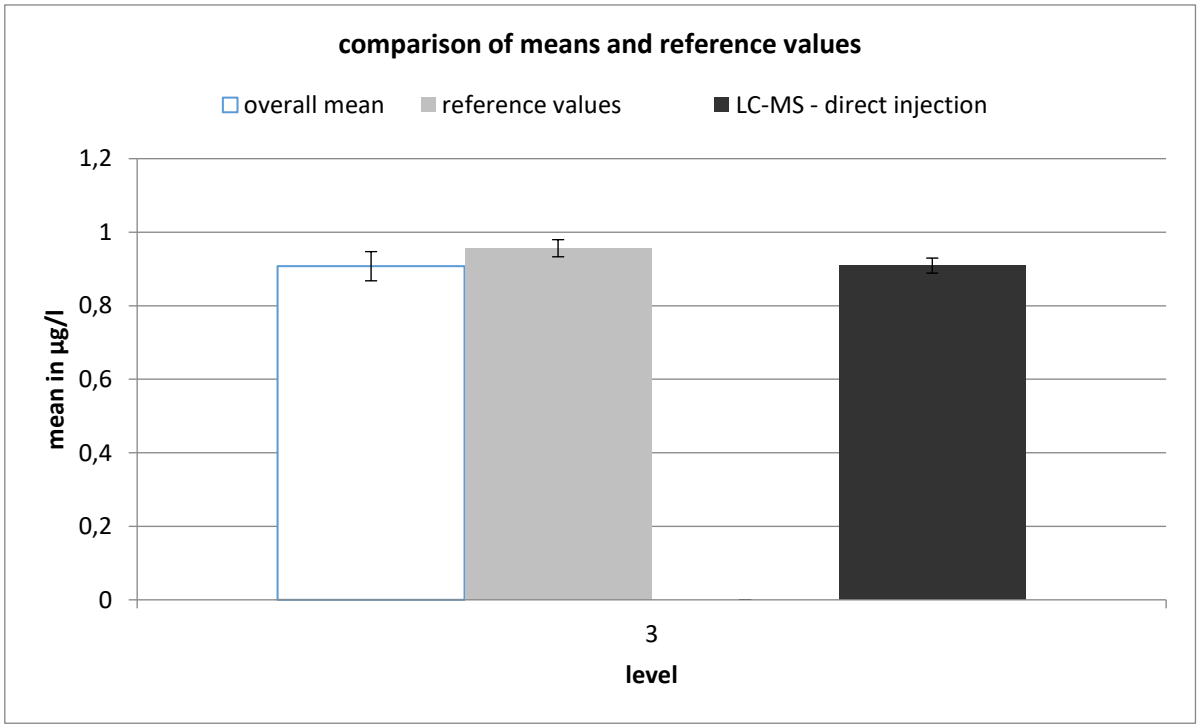
The differences between the methods were not significant.

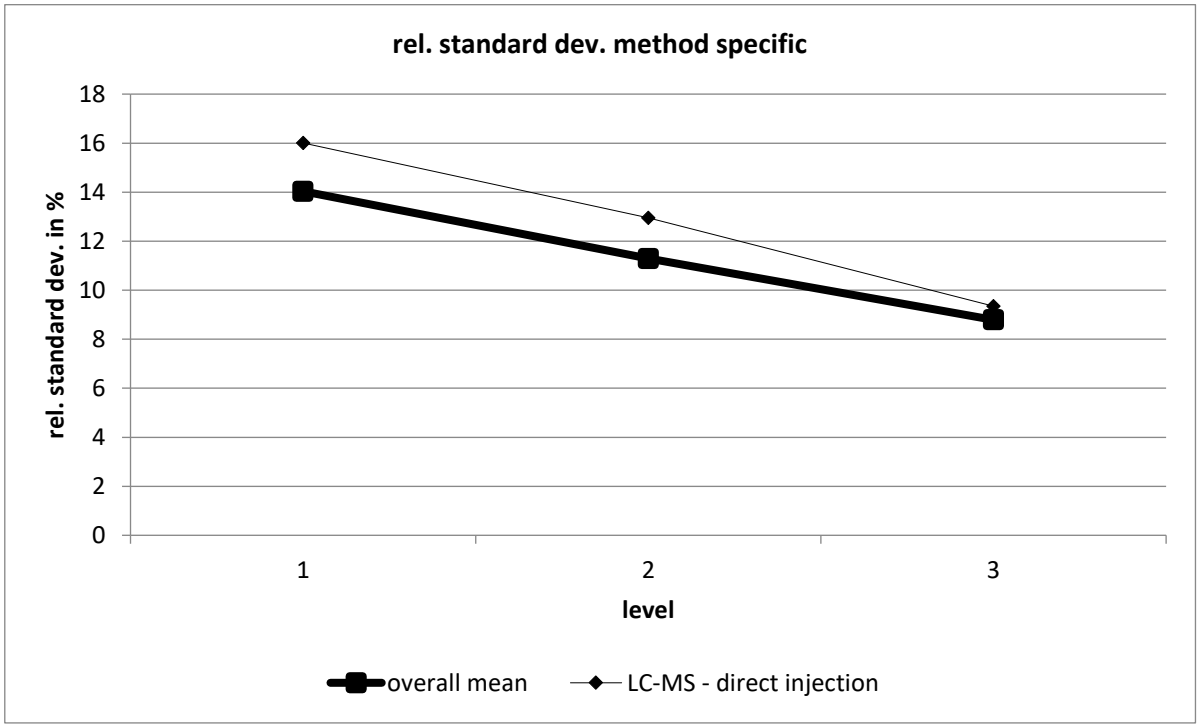
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,1116	0,0079	7,1	0,1195	0,0037	3,1
2	0,3994	0,0223	5,6	0,4184	0,0104	2,5
3	0,9074	0,0397	4,4	0,9564	0,0233	2,4




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,5
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
1,2
1
0,8
0,6
0,4
0,2
0
mean in µg/l
3
level

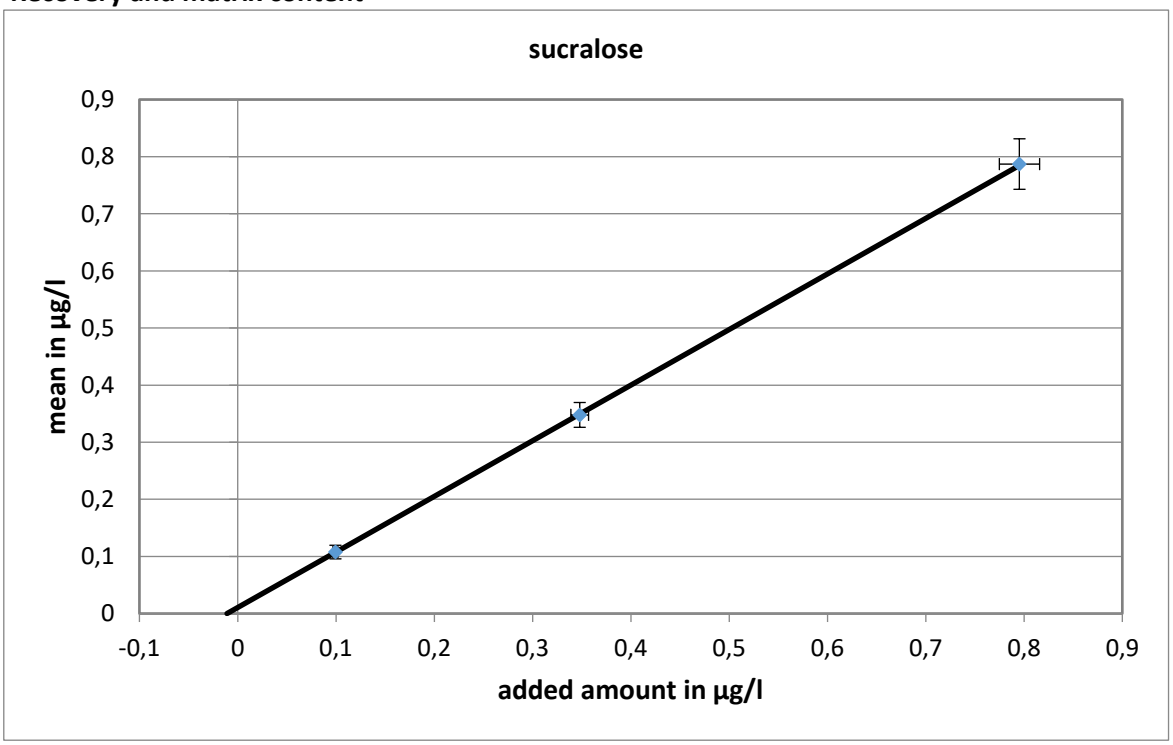


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,1116	0,0043	3,85	0,0179	16,005	27	0	3	11,11
2	0,3992	0,0124	3,117	0,0517	12,956	27	1	1	7,407
3	0,9092	0,0204	2,249	0,085	9,348	27	2	0	7,407

sucralose

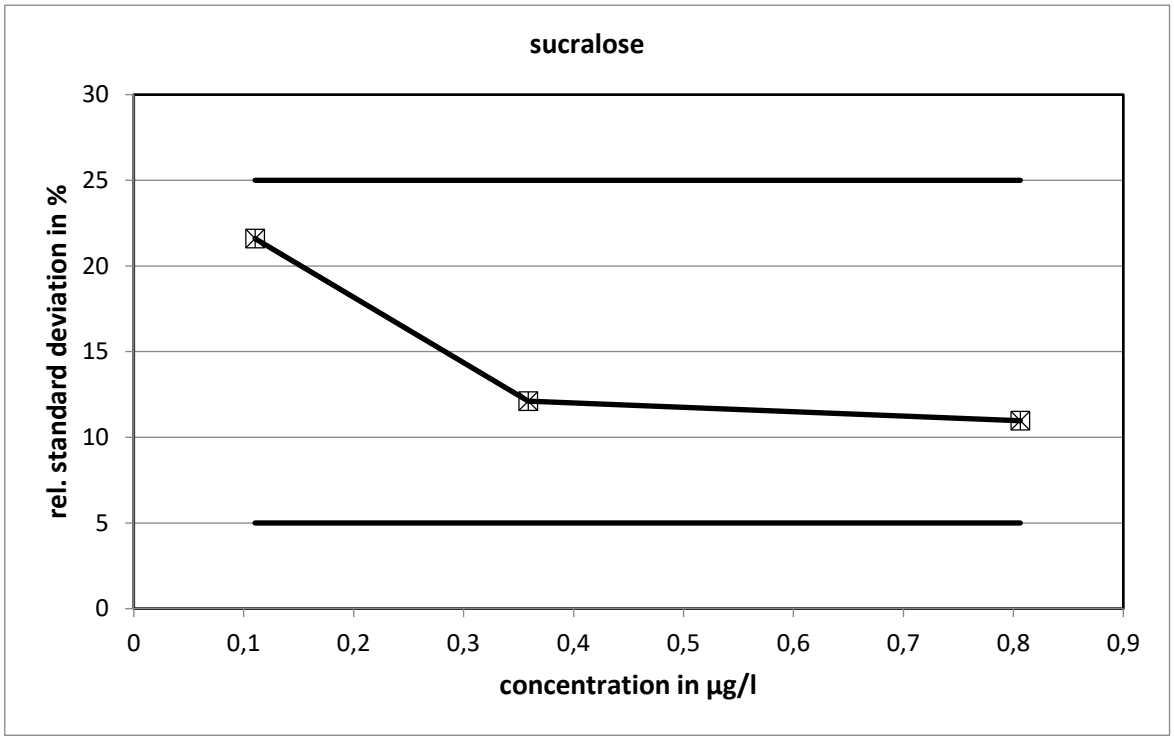
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,1103	10,17	0,0238	0,0238	21,60	0,1646	0,0669	49,13	-39,40	25	0	2	8,0
2	0,3589	3,94	0,0435	0,0435	12,11	0,4519	0,2768	25,92	-22,89	25	1	0	4,0
3	0,8063	2,88	0,0884	0,0884	10,97	0,9942	0,6383	23,31	-20,84	25	3	1	16,0
									sum	75	4	3	9,3

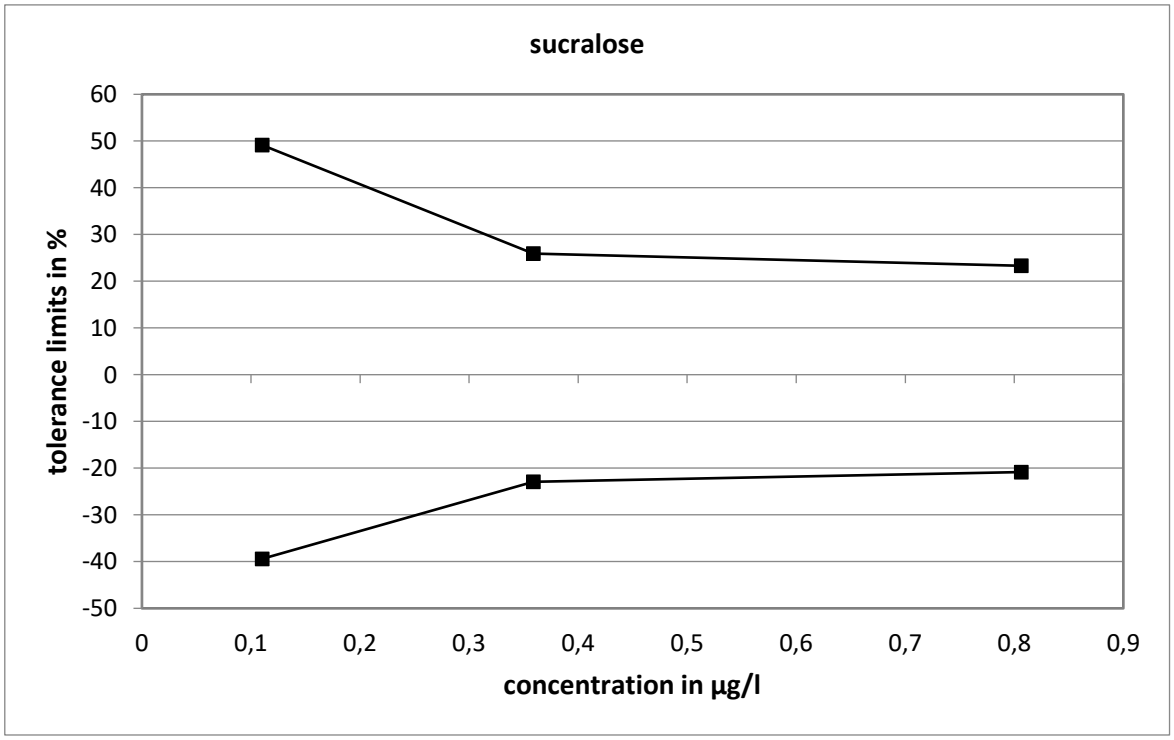
Recovery and matrix content



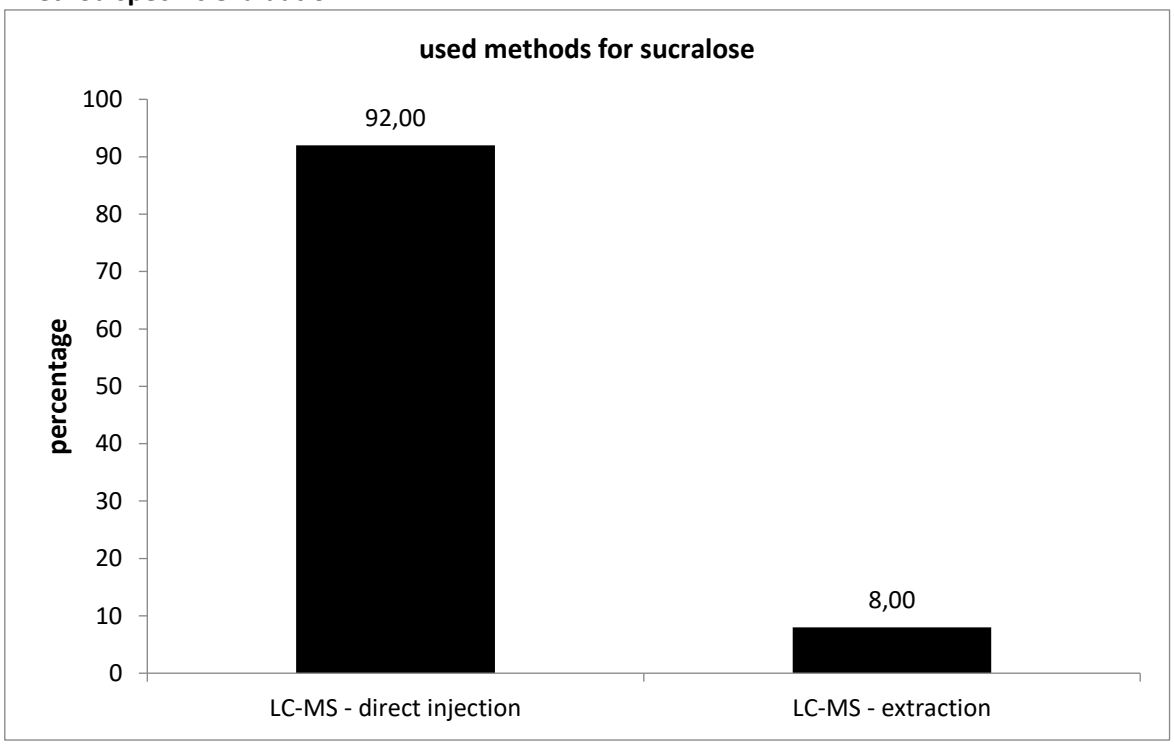
calculated matrix content: 0,011 µg/l, expanded uncertainty of the matrix content: 100 %
average recovery: 97,3 %

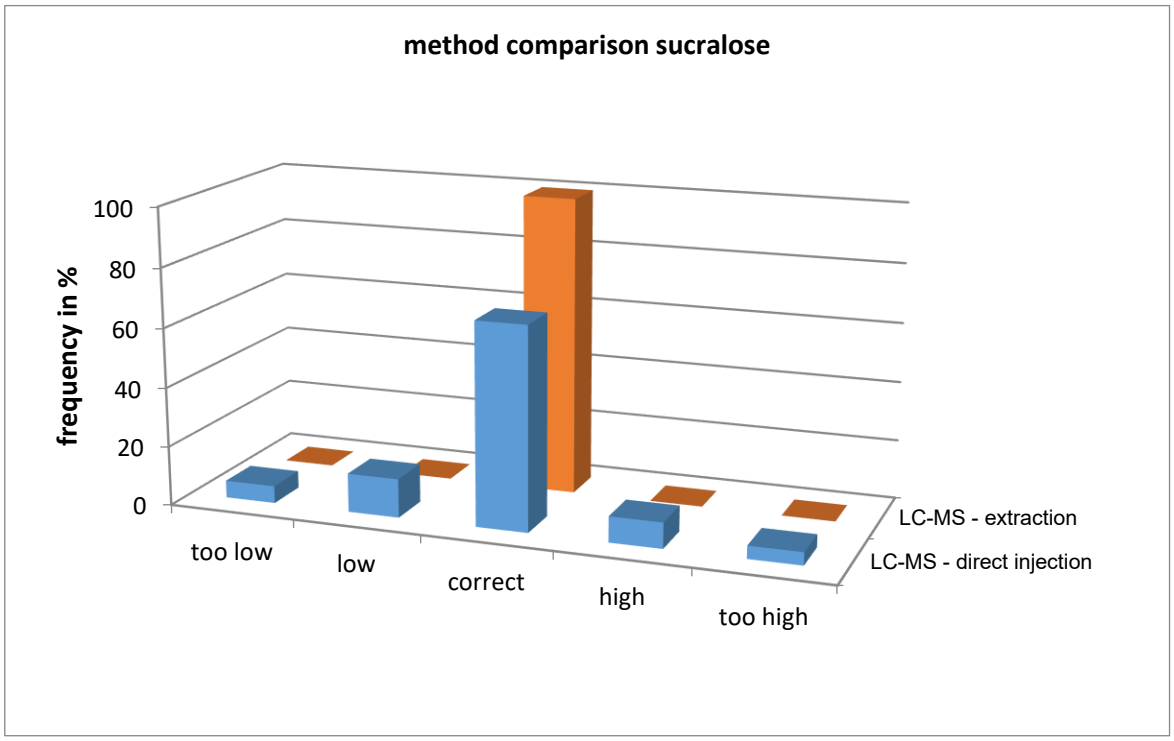
Relative standard deviation and tolerance limits





Method specific evaluation

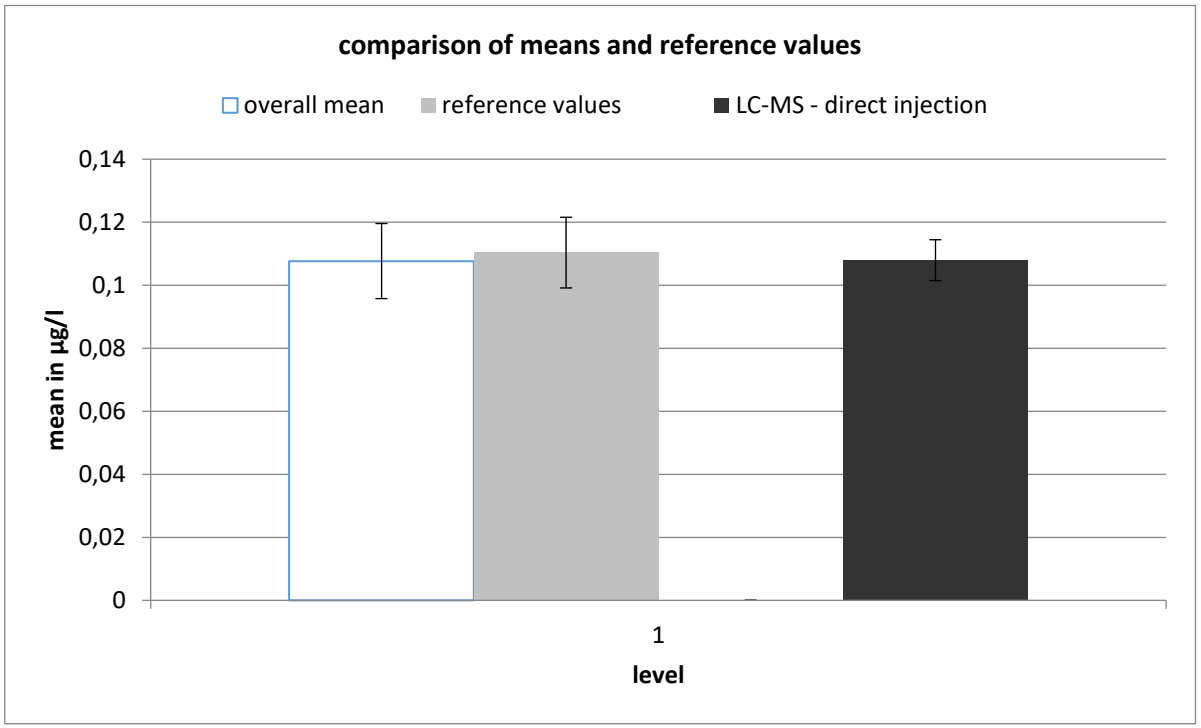


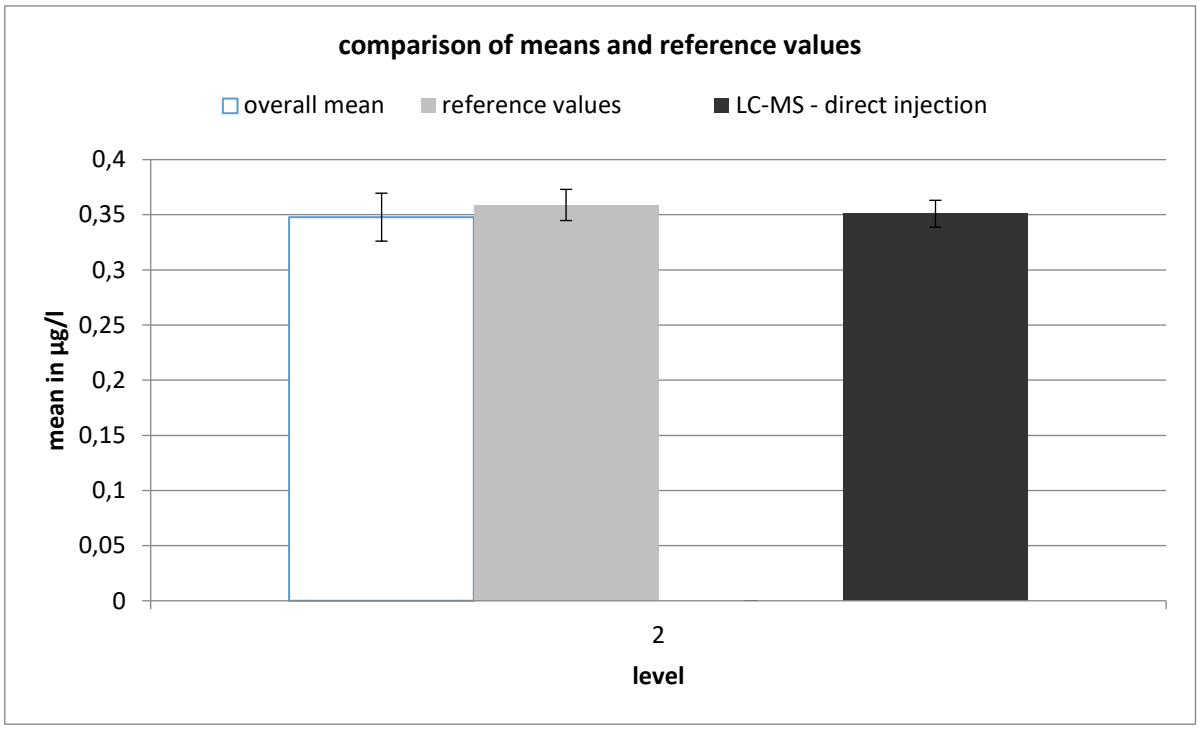


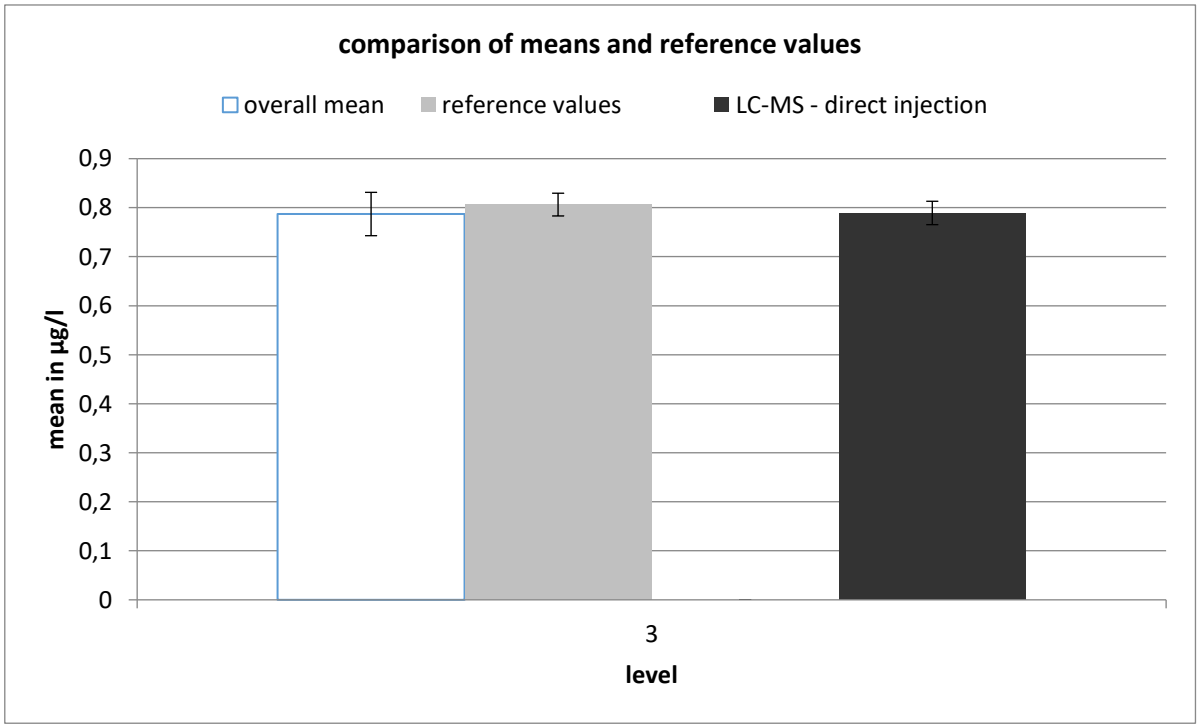
The differences between the methods were not significant.

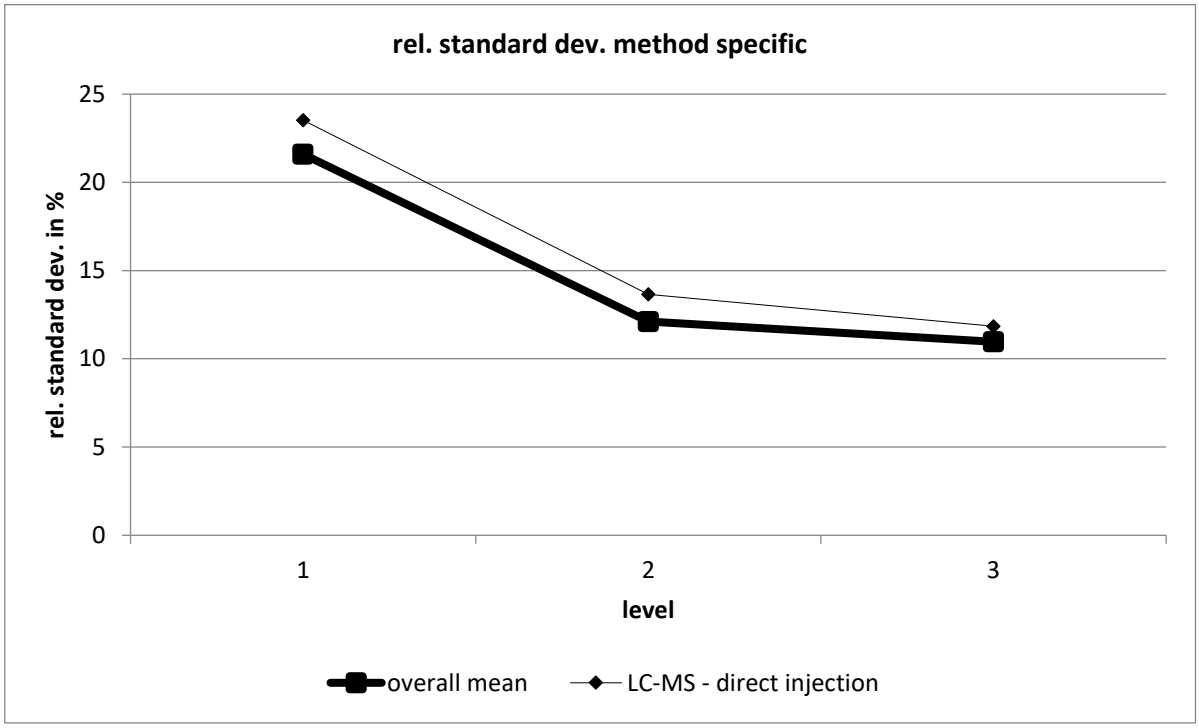
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,1077	0,0119	11,1	0,1103	0,0112	10,2
2	0,3478	0,0217	6,2	0,3589	0,0141	3,9
3	0,7871	0,0442	5,6	0,8063	0,0232	2,9




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
mean in µg/l
3
level

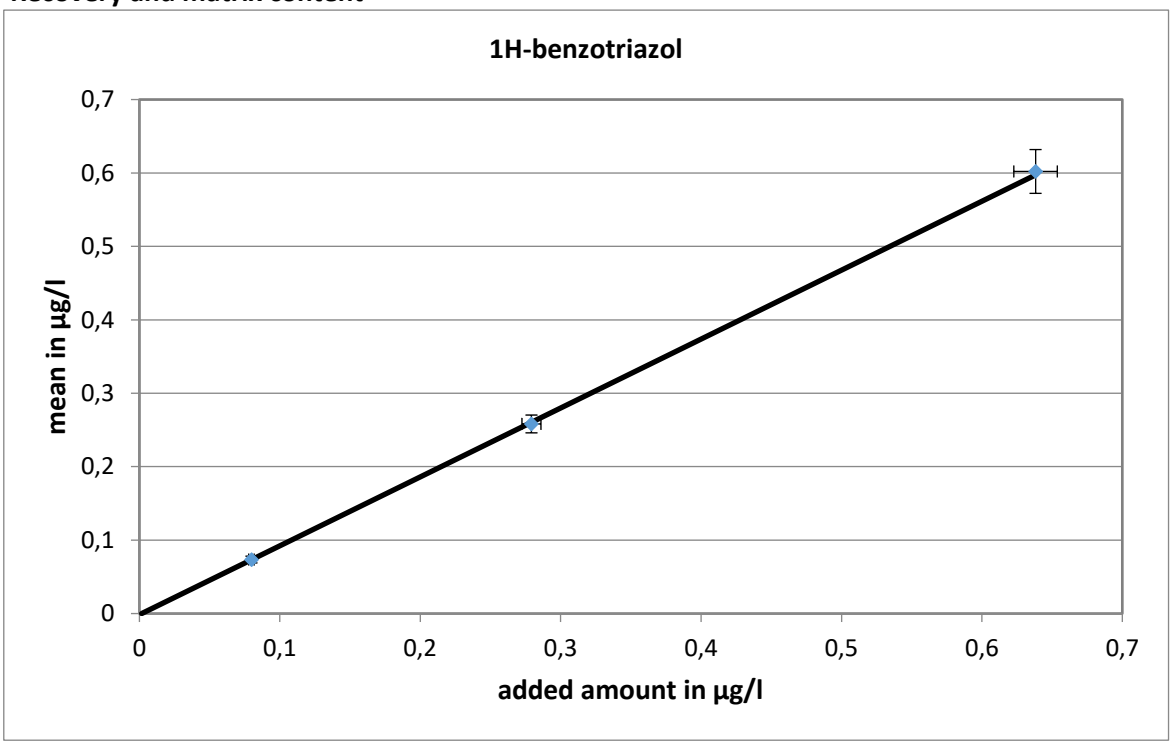


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,108	0,0065	6,002	0,0254	23,521	24	0	3	12,5
2	0,3509	0,0122	3,483	0,0479	13,649	24	1	1	8,333
3	0,7892	0,0239	3,023	0,0935	11,846	24	2	1	12,5

1H-benzotriazol

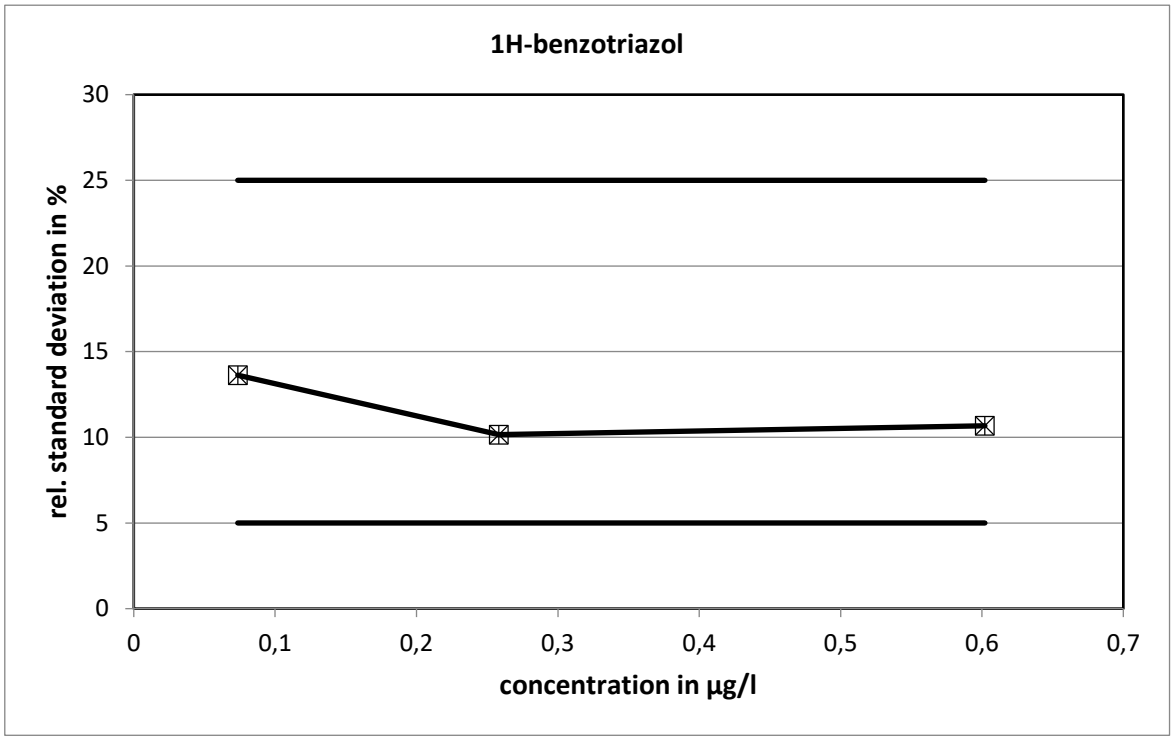
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0736	6,33	0,0100	0,0100	13,63	0,0952	0,0547	29,37	-25,64	29	1	2	10,3
2	0,2582	4,72	0,0262	0,0262	10,16	0,3136	0,2082	21,45	-19,39	29	2	2	13,8
3	0,6021	4,95	0,0642	0,0642	10,67	0,7381	0,4797	22,60	-20,32	29	0	2	6,9
									sum	87	3	6	10,3

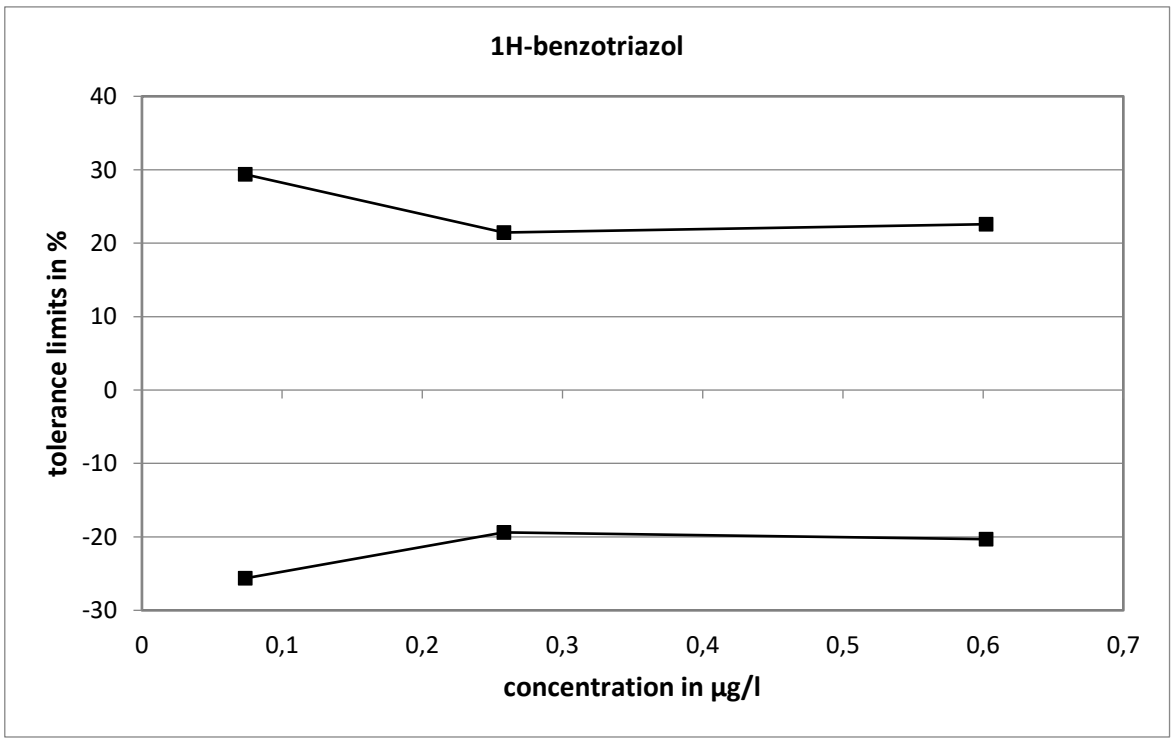
Recovery and matrix content



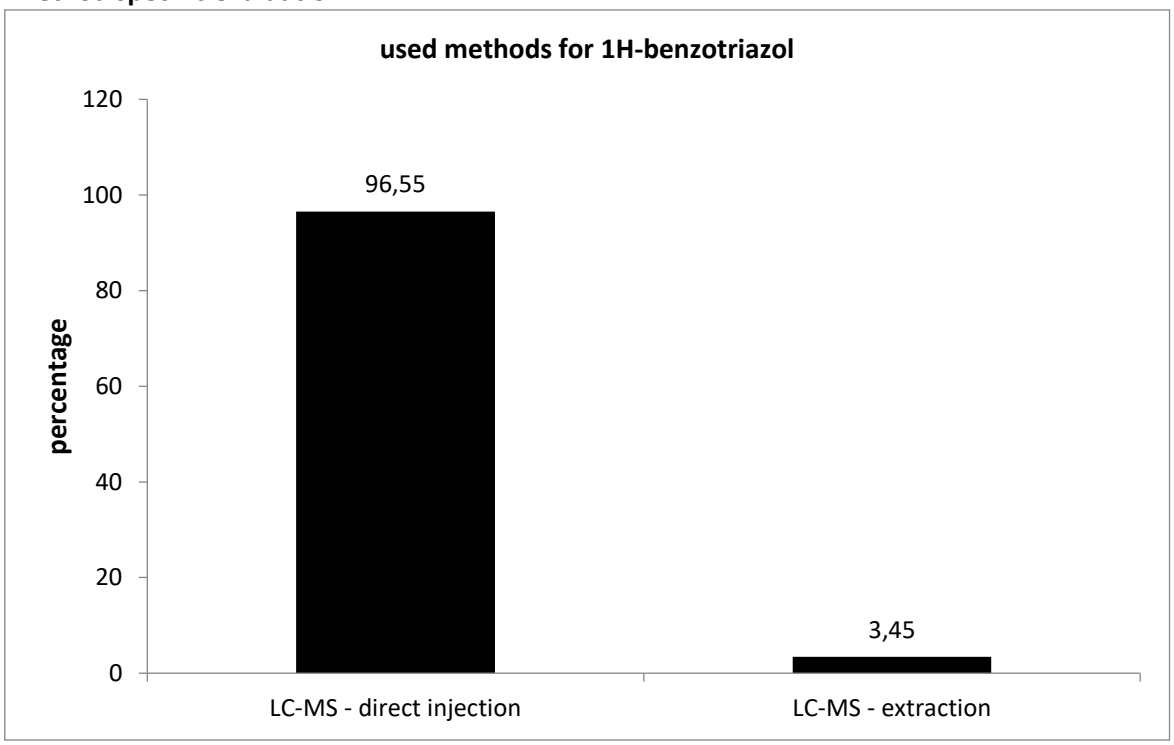
calculated matrix content: 0 µg/l
average recovery: 93,8 %

Relative standard deviation and tolerance limits





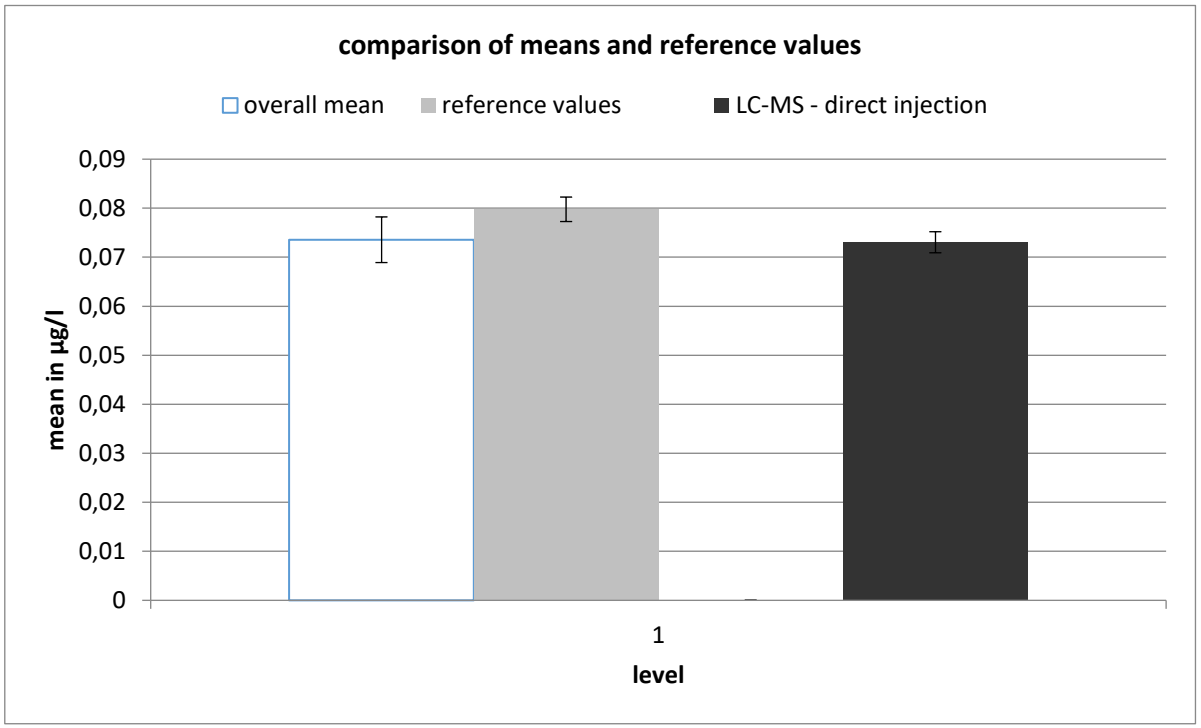
Method specific evaluation

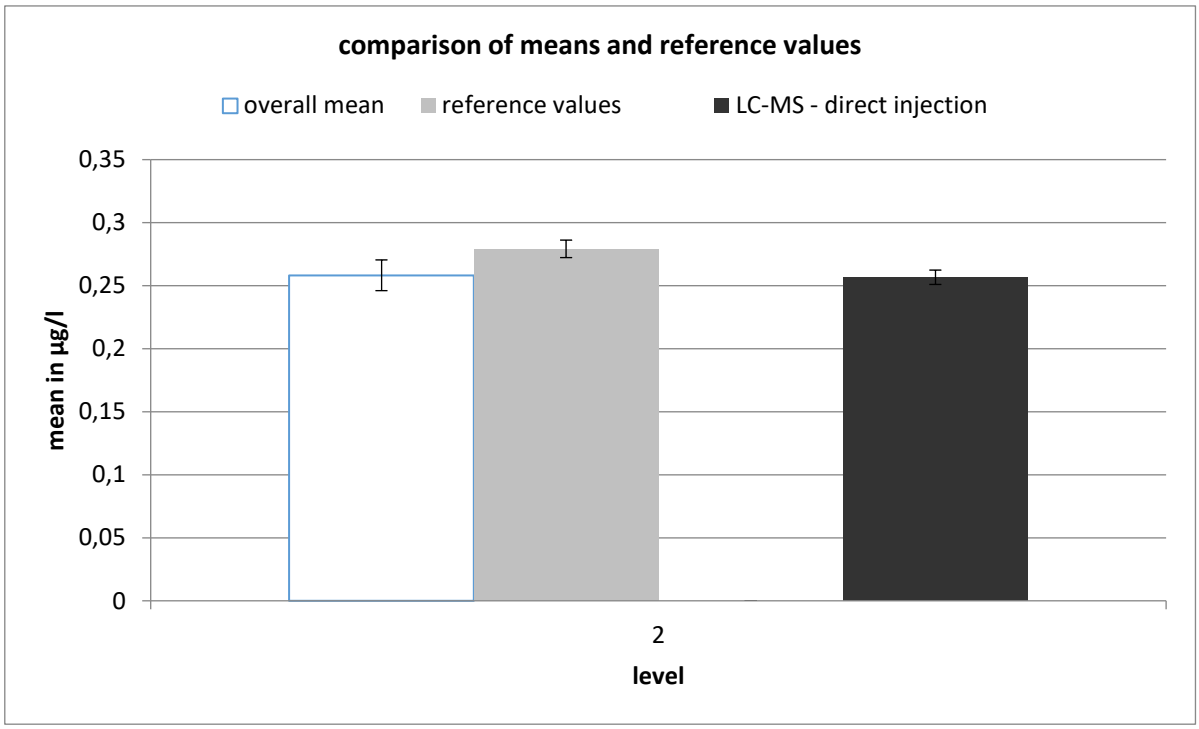


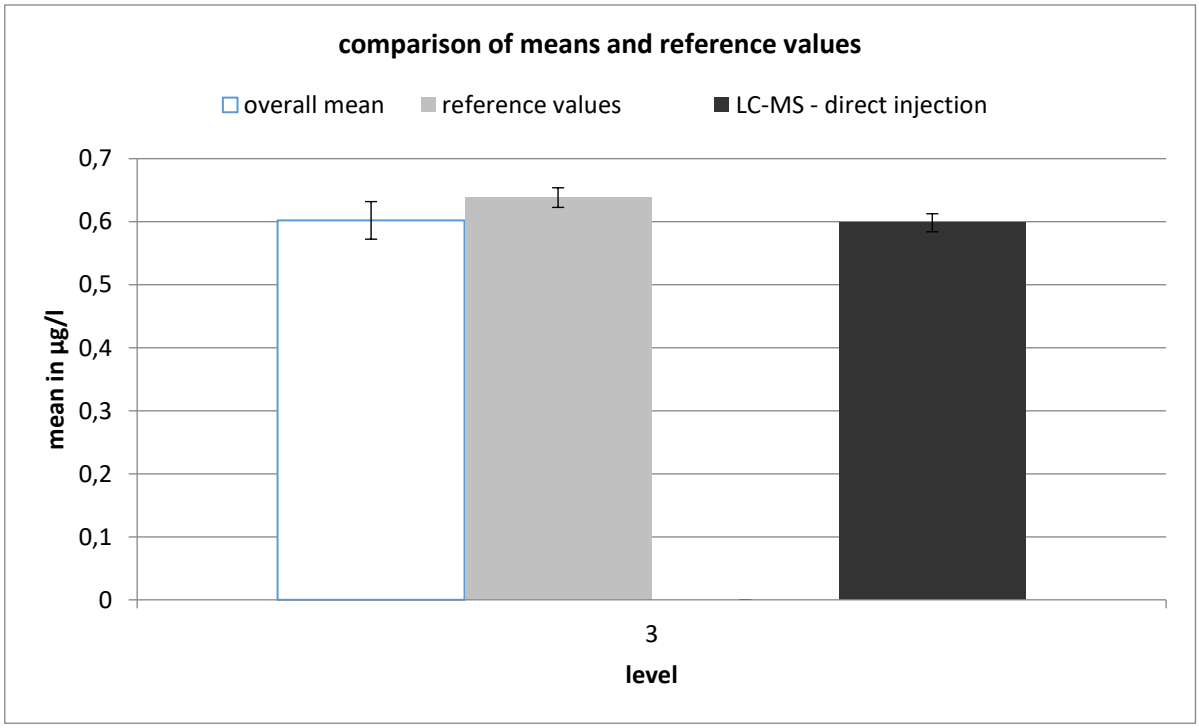
There is no method comparison, because almost all used LC-MS - direct injection.

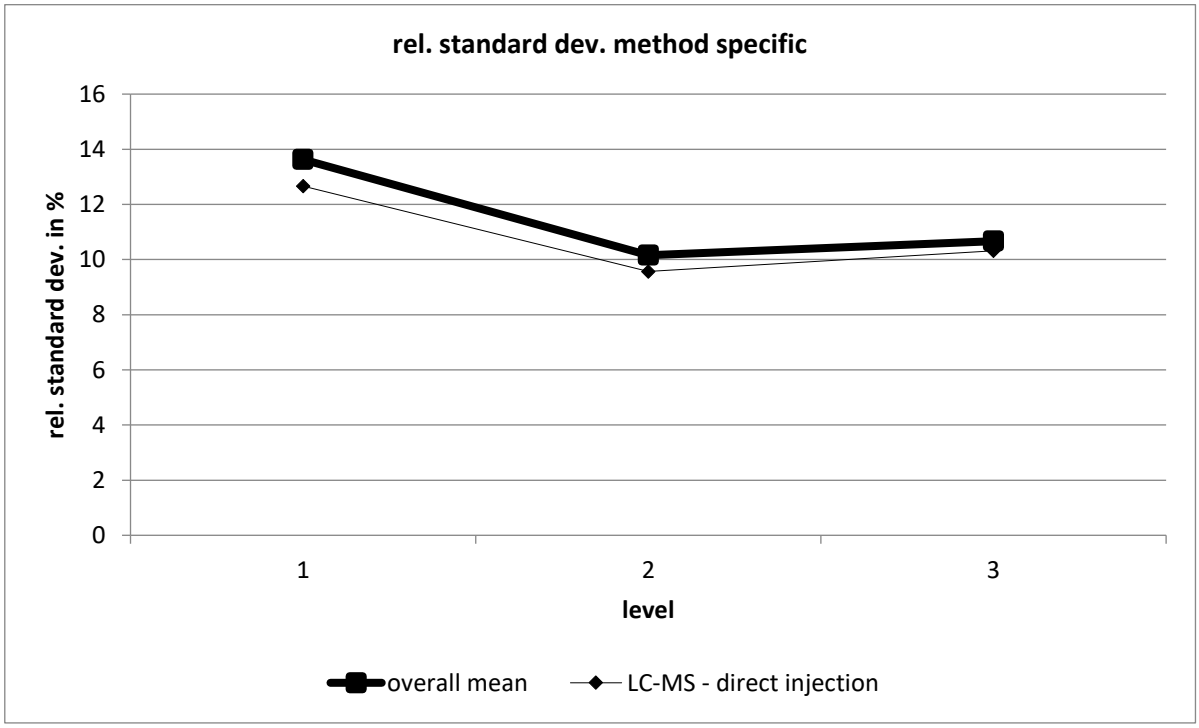
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,0736	0,0047	6,3	0,0798	0,0025	3,1
2	0,2582	0,0122	4,7	0,2792	0,0070	2,5
3	0,6021	0,0298	5,0	0,6382	0,0156	2,4




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
mean in µg/l
3
level

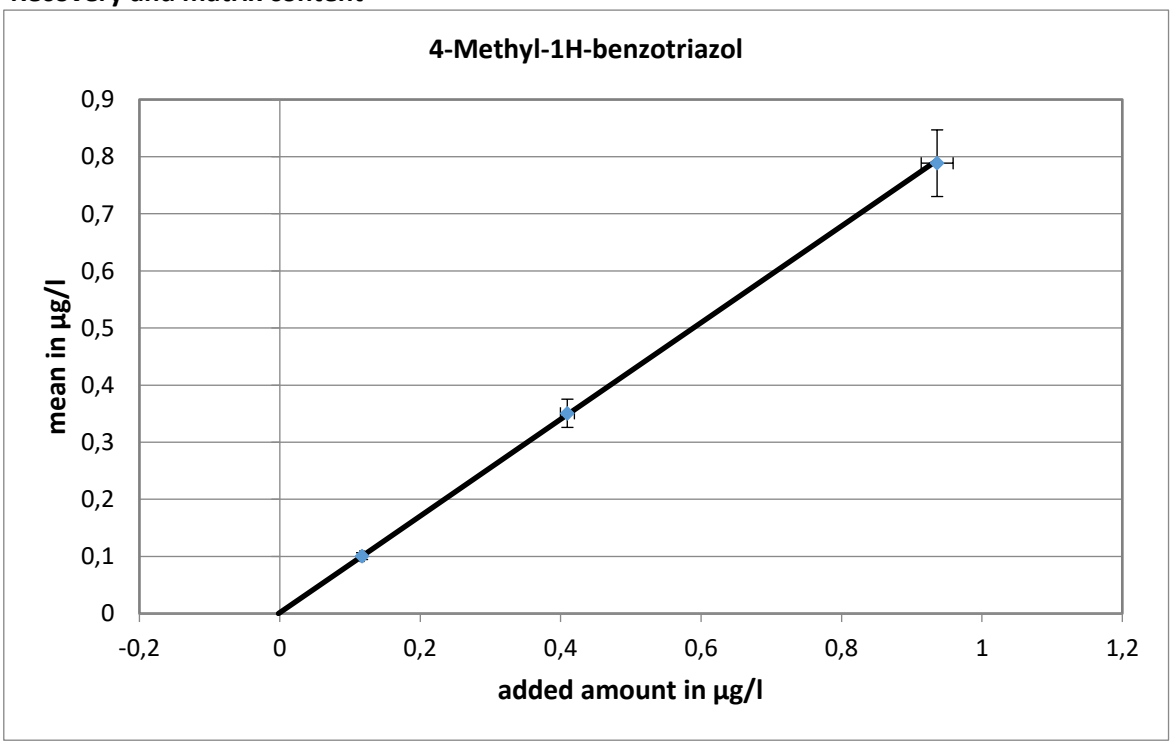


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,073	0,0021	2,939	0,0093	12,663	29	1	3	13,79
2	0,2567	0,0057	2,221	0,0246	9,5685	29	2	3	17,24
3	0,5983	0,0143	2,394	0,0617	10,314	29	1	2	10,34

4-Methyl-1H-benzotriazol

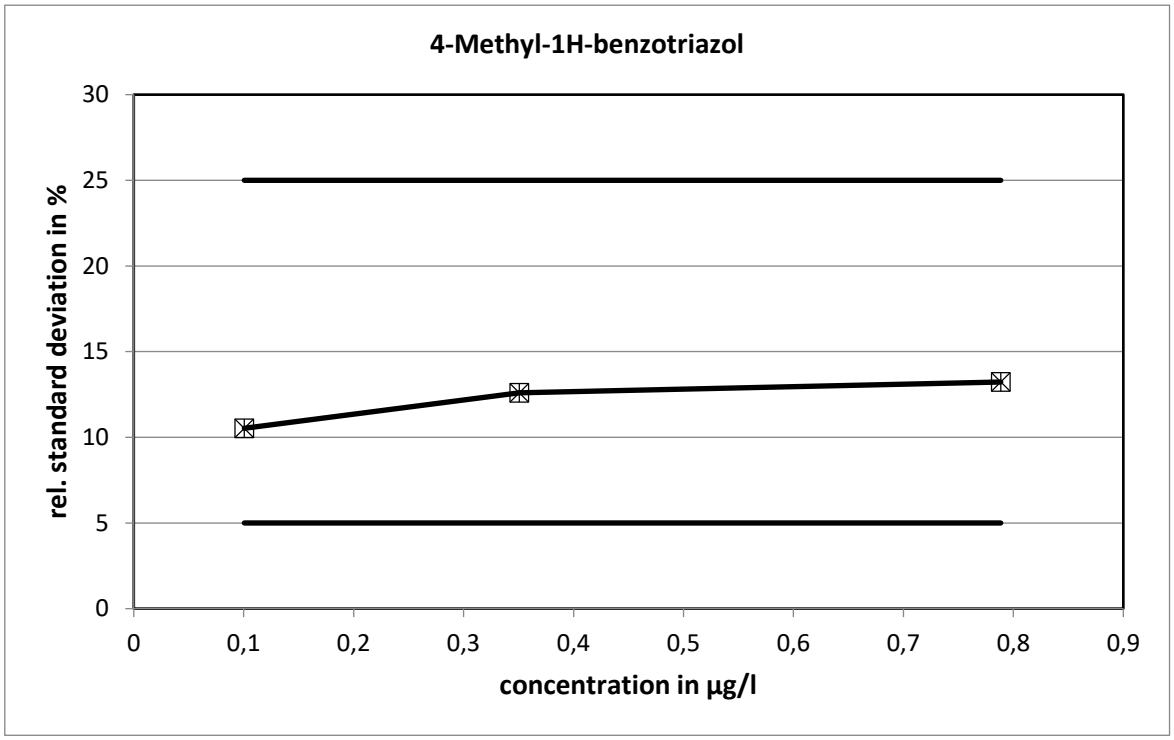
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,1006	5,89	0,0106	0,0106	10,53	0,1230	0,0804	22,28	-20,06	20	2	2	20,0
2	0,3507	7,05	0,0442	0,0442	12,61	0,4454	0,2671	27,01	-23,82	20	3	0	15,0
3	0,7885	7,39	0,1043	0,1043	13,23	1,013	0,5919	28,44	-24,93	20	1	1	10,0
									sum	60	6	3	15,0

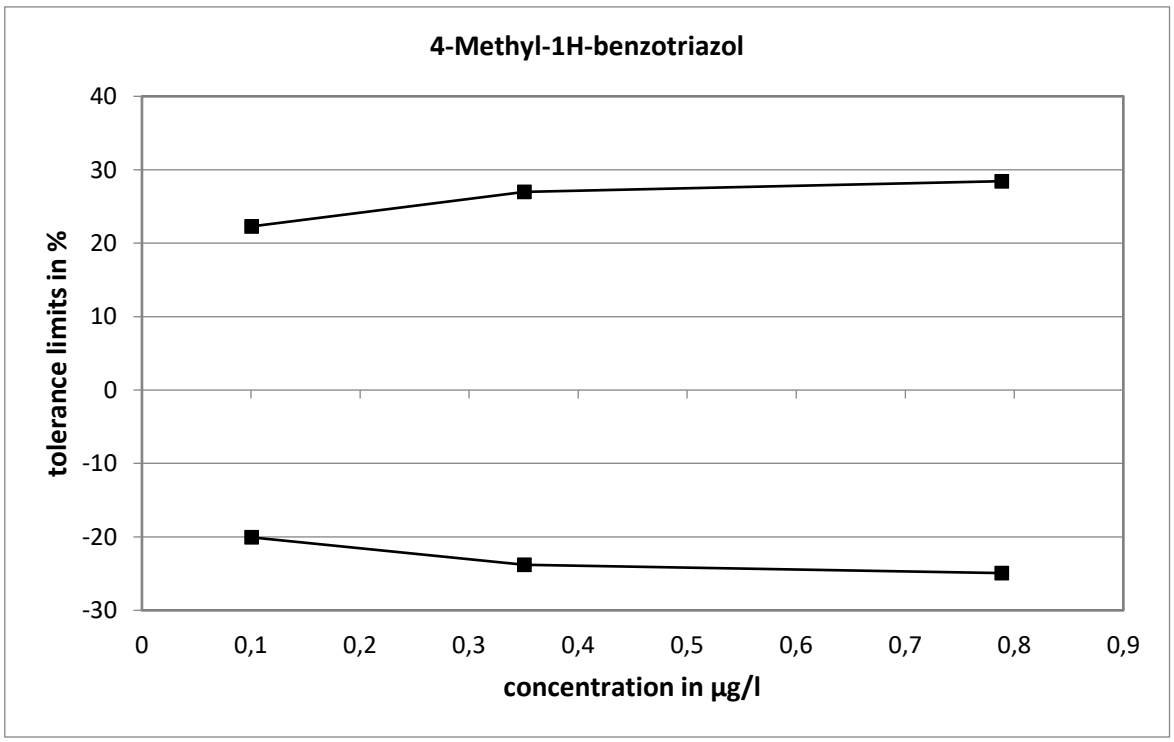
Recovery and matrix content



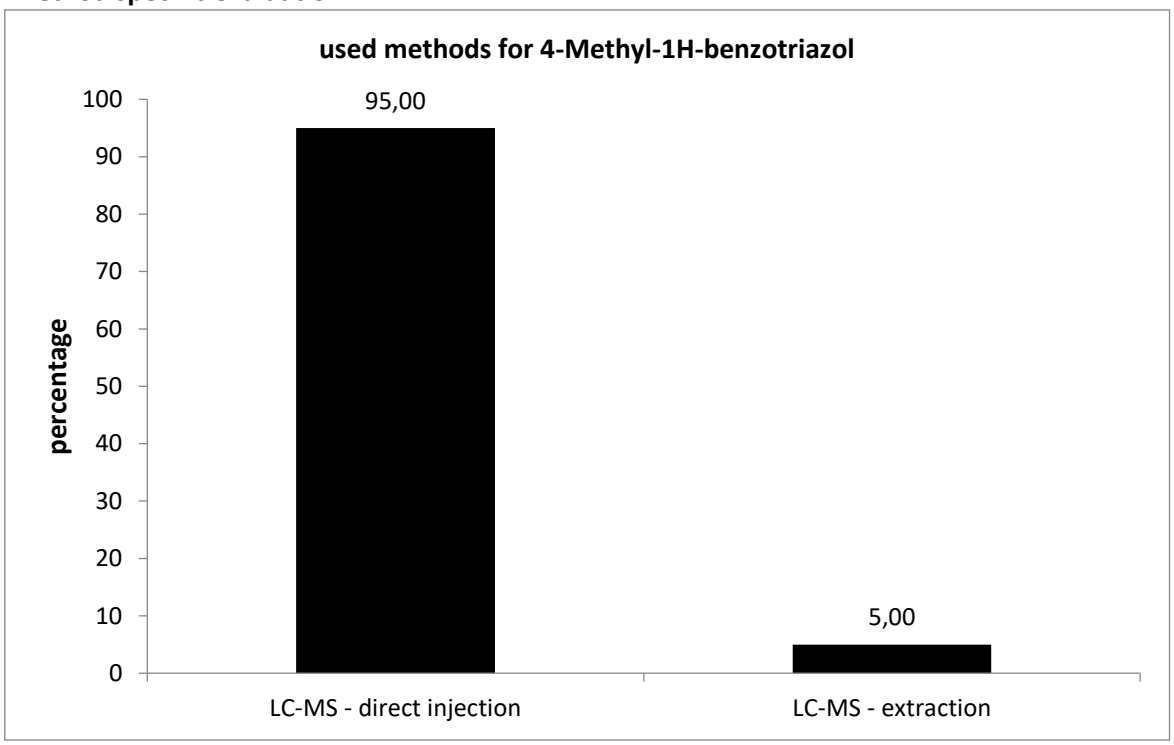
calculated matrix content: 0,002 µg/l, expanded uncertainty of the matrix content: 100 %
average recovery: 84,6 %

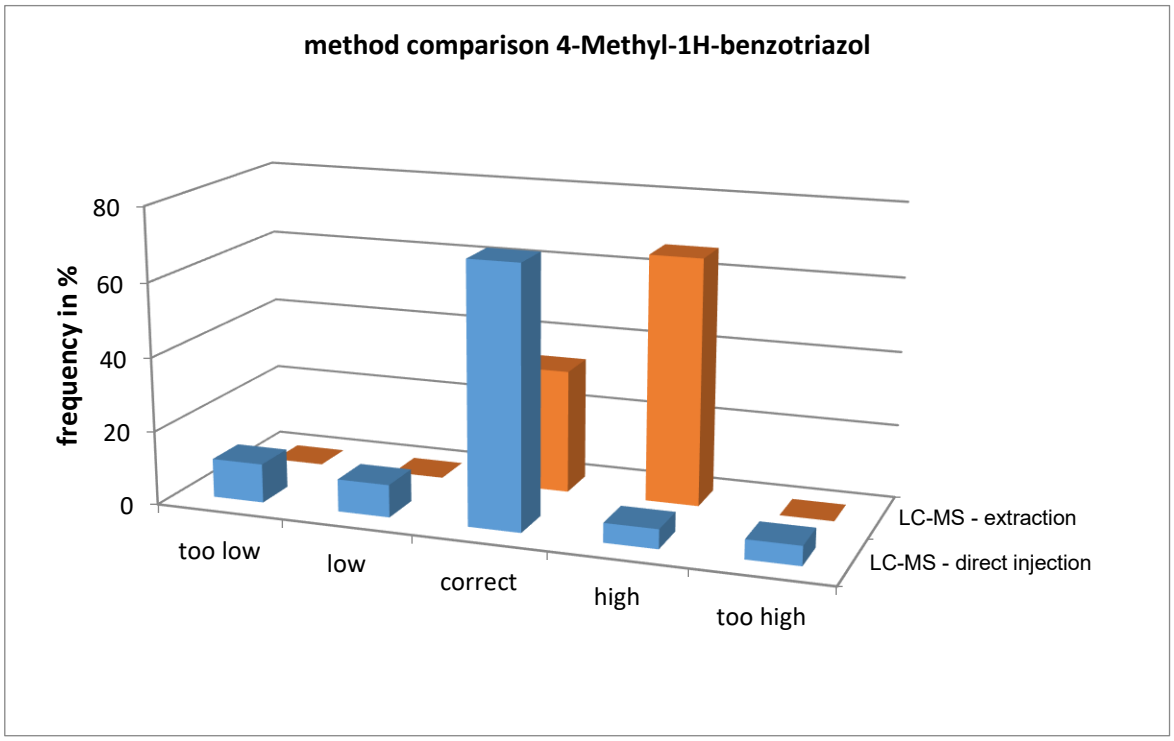
Relative standard deviation and tolerance limits





Method specific evaluation

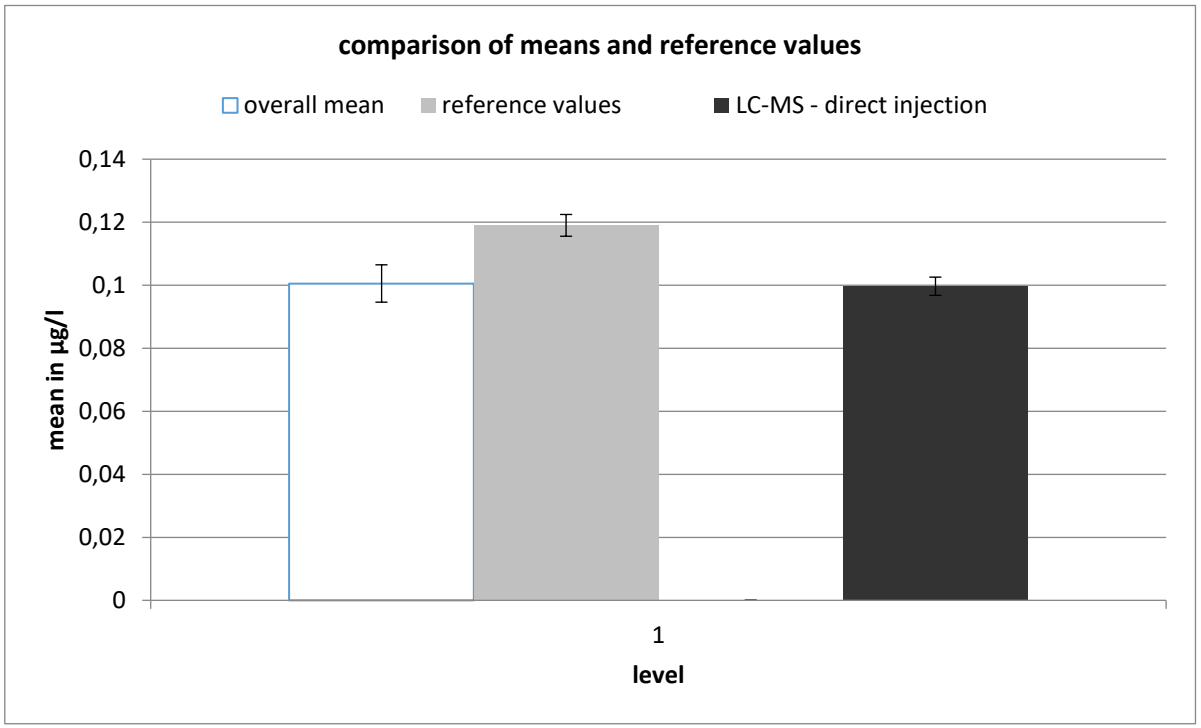


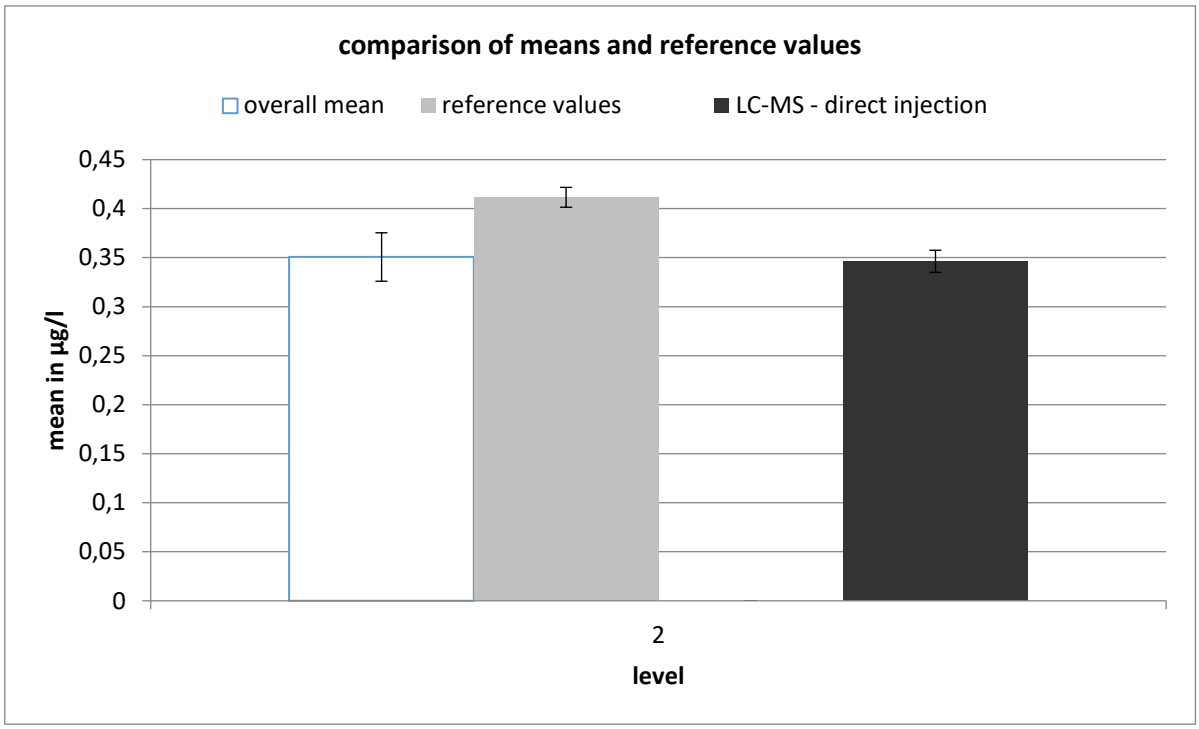


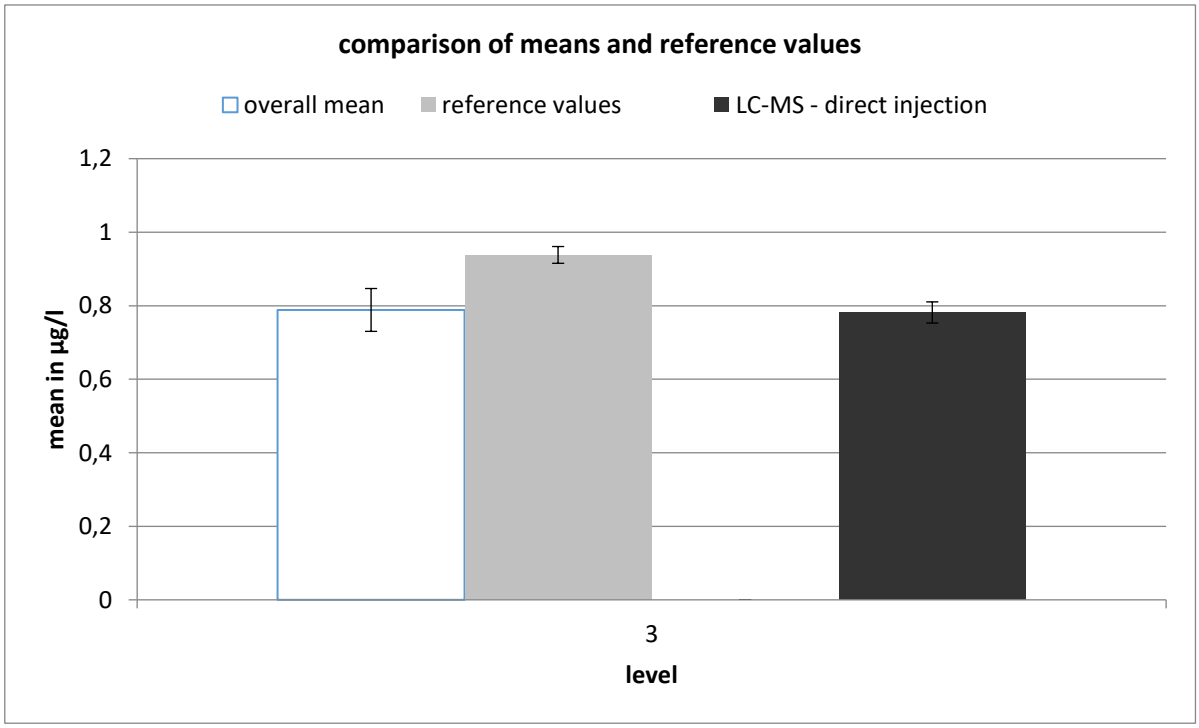
The differences between the methods were not significant, because only few laboratories used LC-MS - extraction.

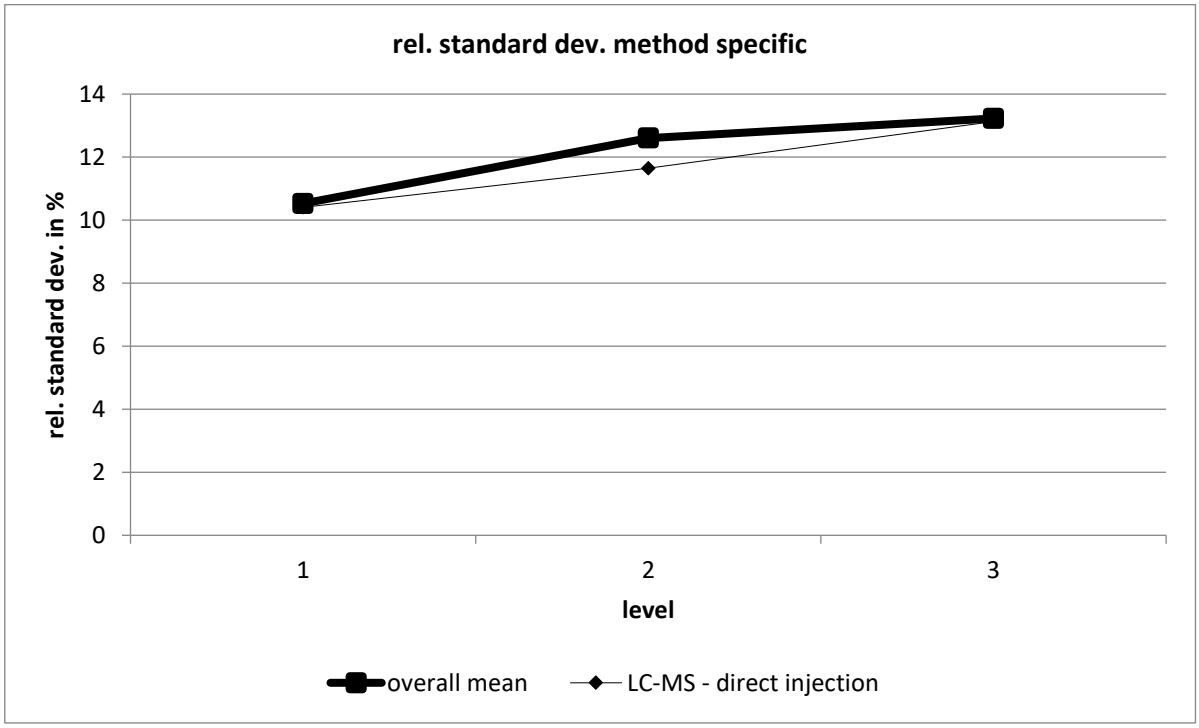
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,1006	0,0059	5,9	0,1190	0,0035	2,9
2	0,3507	0,0247	7,0	0,4116	0,0101	2,5
3	0,7885	0,0583	7,4	0,9382	0,0228	2,4




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
1,2
1
0,8
0,6
0,4
0,2
0
mean in µg/l
3
level

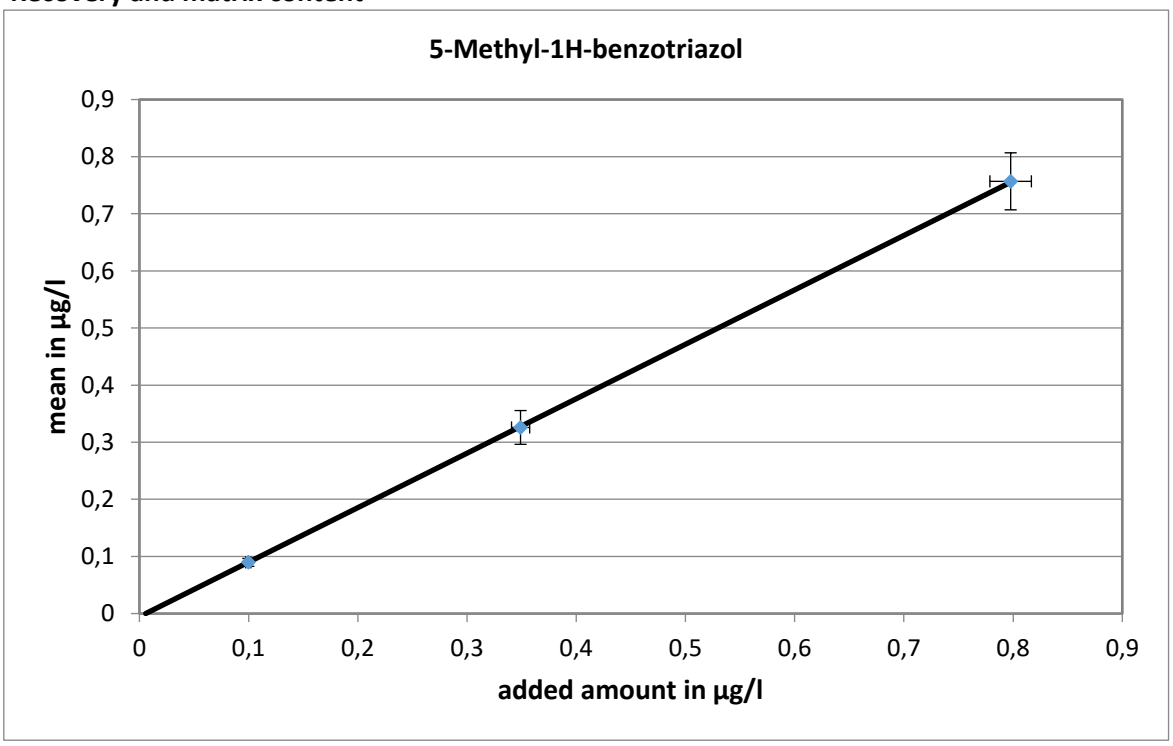


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,0997	0,0029	2,909	0,0104	10,408	20	2	3	25
2	0,3463	0,0113	3,254	0,0403	11,643	20	3	2	25
3	0,7817	0,0287	3,67	0,1026	13,129	20	1	1	10

5-Methyl-1H-benzotriazol

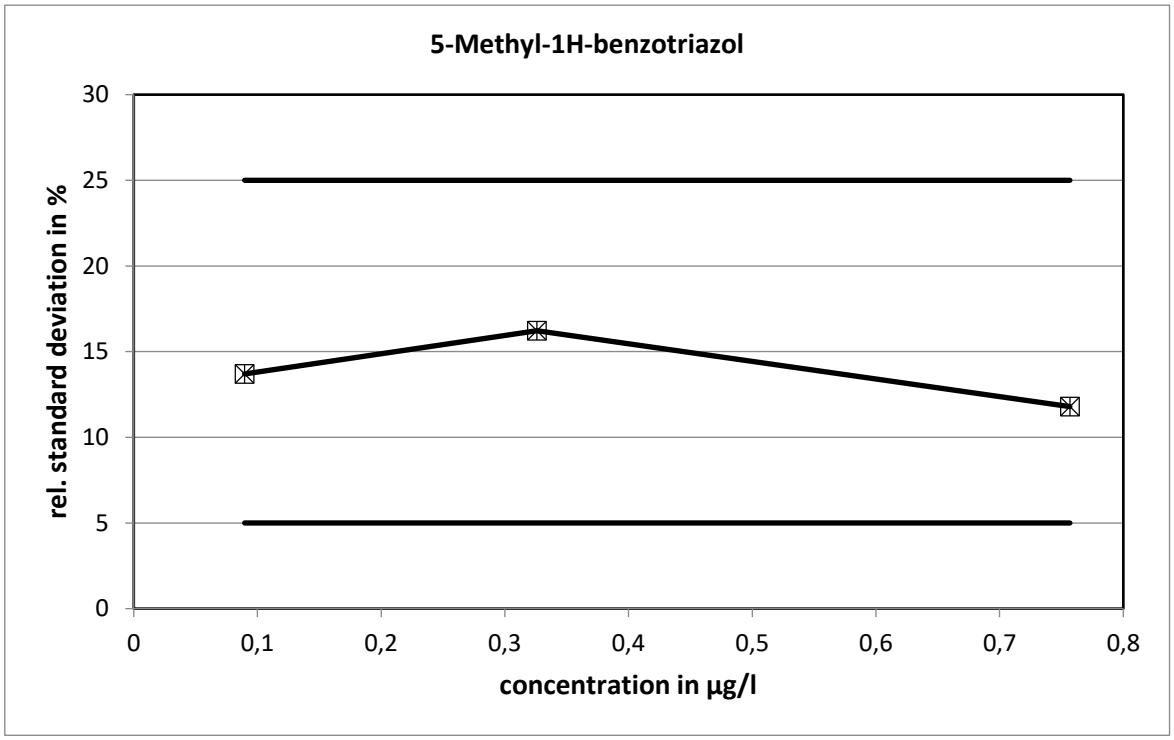
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0897	7,66	0,0123	0,0123	13,70	0,1162	0,0666	29,55	-25,78	20	0	1	5,0
2	0,3259	9,07	0,0529	0,0529	16,22	0,4416	0,2274	35,52	-30,22	20	2	0	10,0
3	0,7568	6,59	0,0892	0,0892	11,79	0,9471	0,5876	25,14	-22,35	20	1	0	5,0
									sum	60	3	1	6,7

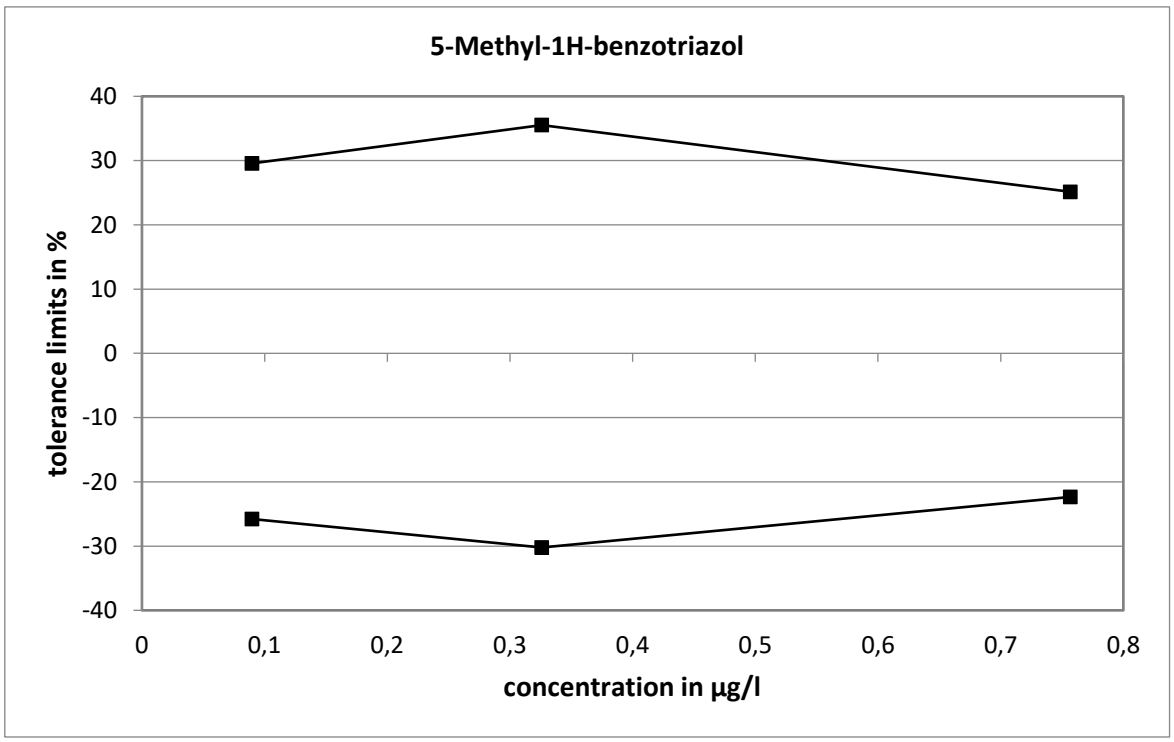
Recovery and matrix content



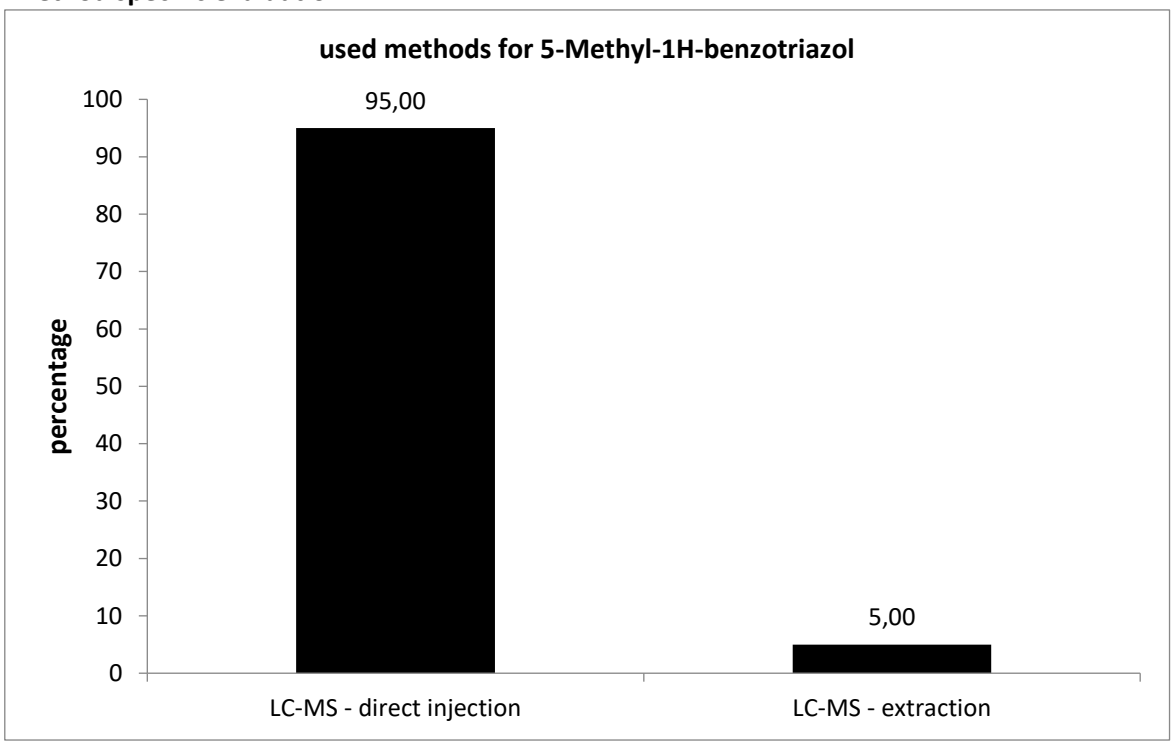
calculated matrix content: 0 µg/l
average recovery: 95,4 %

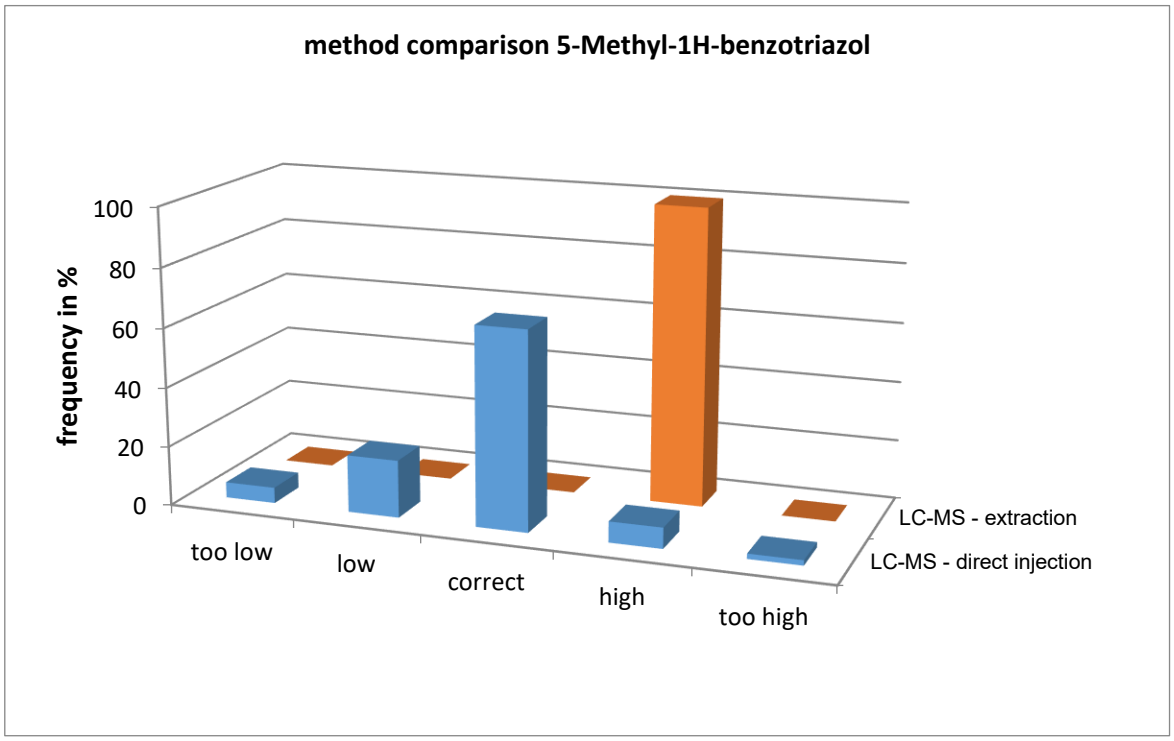
Relative standard deviation and tolerance limits





Method specific evaluation

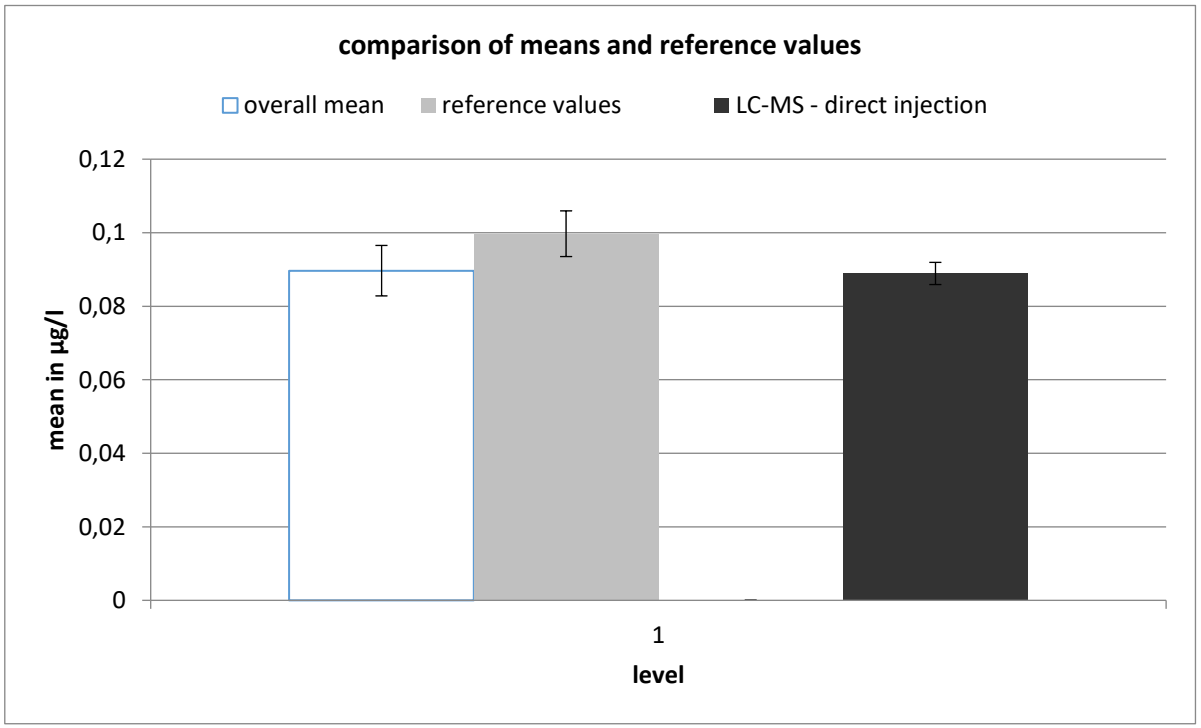


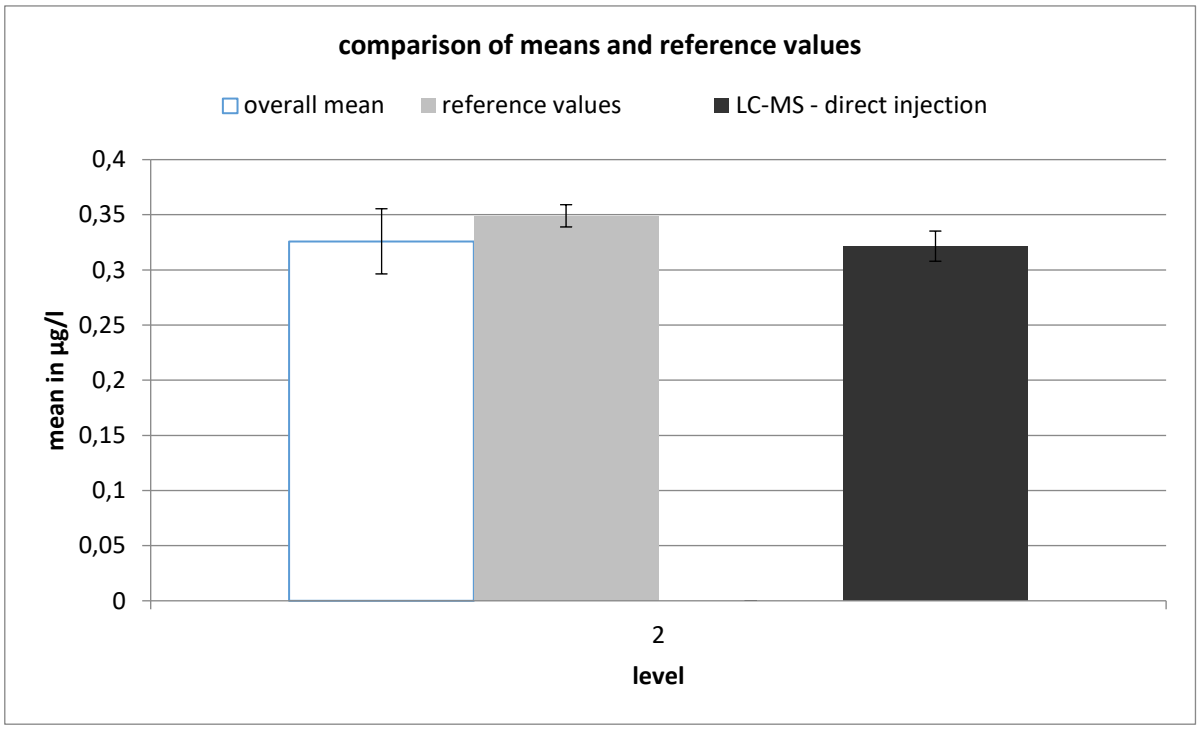


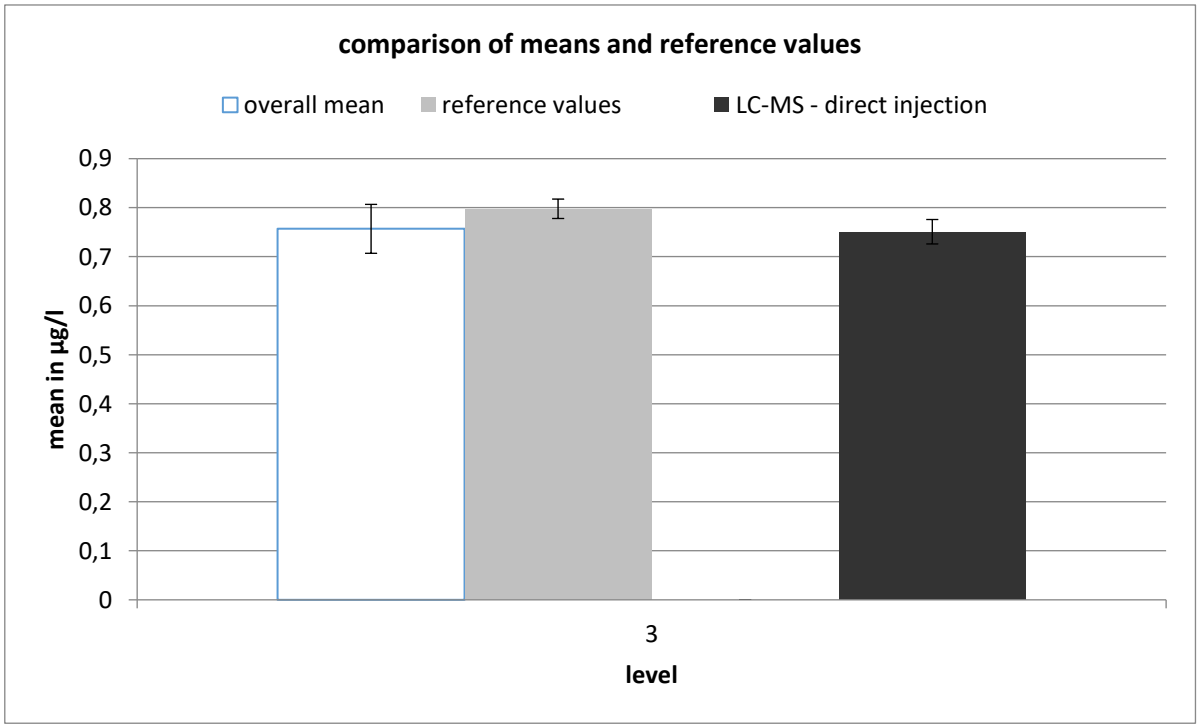
The differences between the methods were not significant, because only few laboratories used LC-MS - extraction.

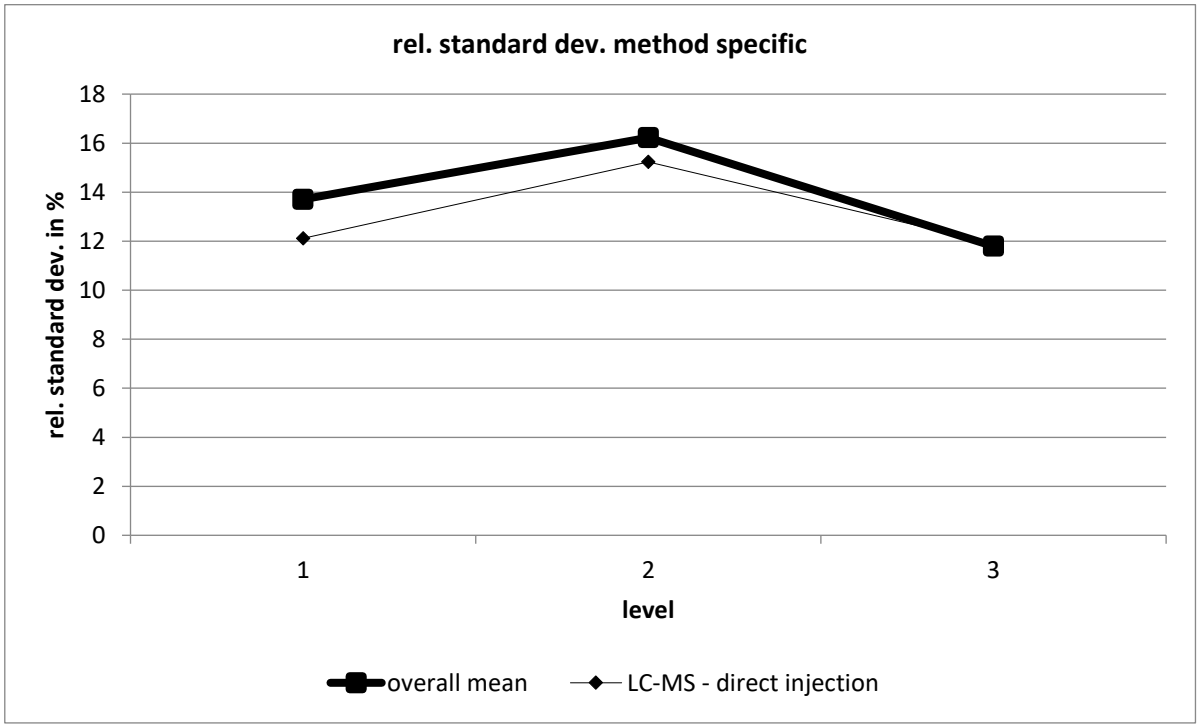
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,0897	0,0069	7,7	0,0997	0,0062	6,2
2	0,3259	0,0296	9,1	0,3490	0,0101	2,9
3	0,7568	0,0499	6,6	0,7978	0,0198	2,5




comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
mean in µg/l
2
level


comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
mean in µg/l
3
level

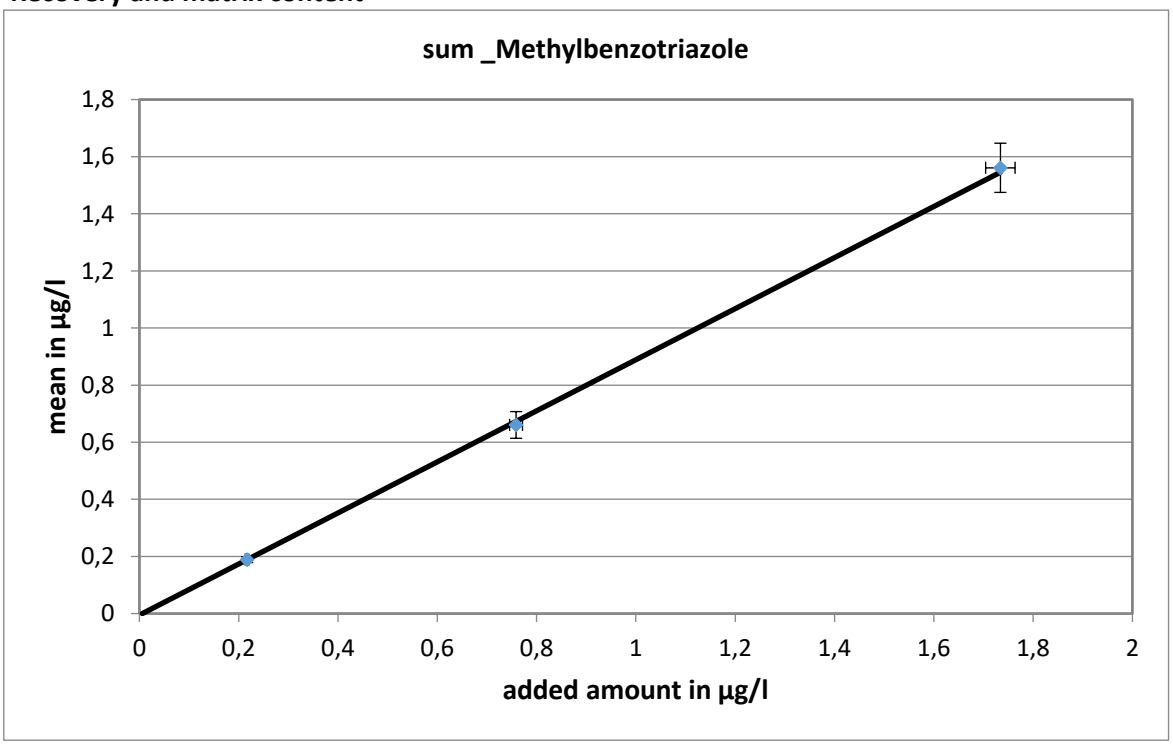


LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,0889	0,003	3,388	0,0108	12,12	20	0	2	10
2	0,3216	0,0137	4,258	0,049	15,232	20	2	1	15
3	0,7509	0,025	3,326	0,0894	11,901	20	1	0	5

sum _Methylbenzotriazole

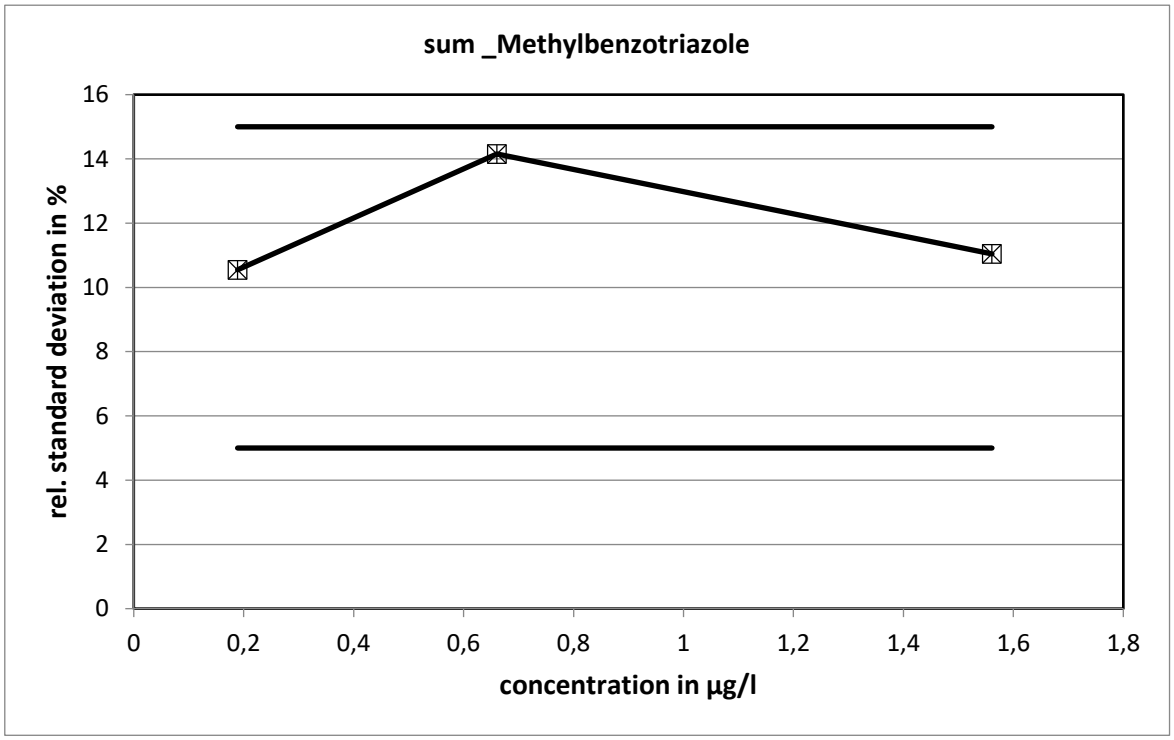
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,1889	5,38	0,0199	0,0199	10,55	0,2311	0,1510	22,33	-20,10	24	3	1	16,7
2	0,6605	7,08	0,0935	0,0935	14,15	0,8626	0,4849	30,61	-26,58	25	4	0	16,0
3	1,561	5,52	0,1724	0,1724	11,05	1,927	1,233	23,45	-21,00	25	2	0	8,0
									sum	74	9	1	13,5

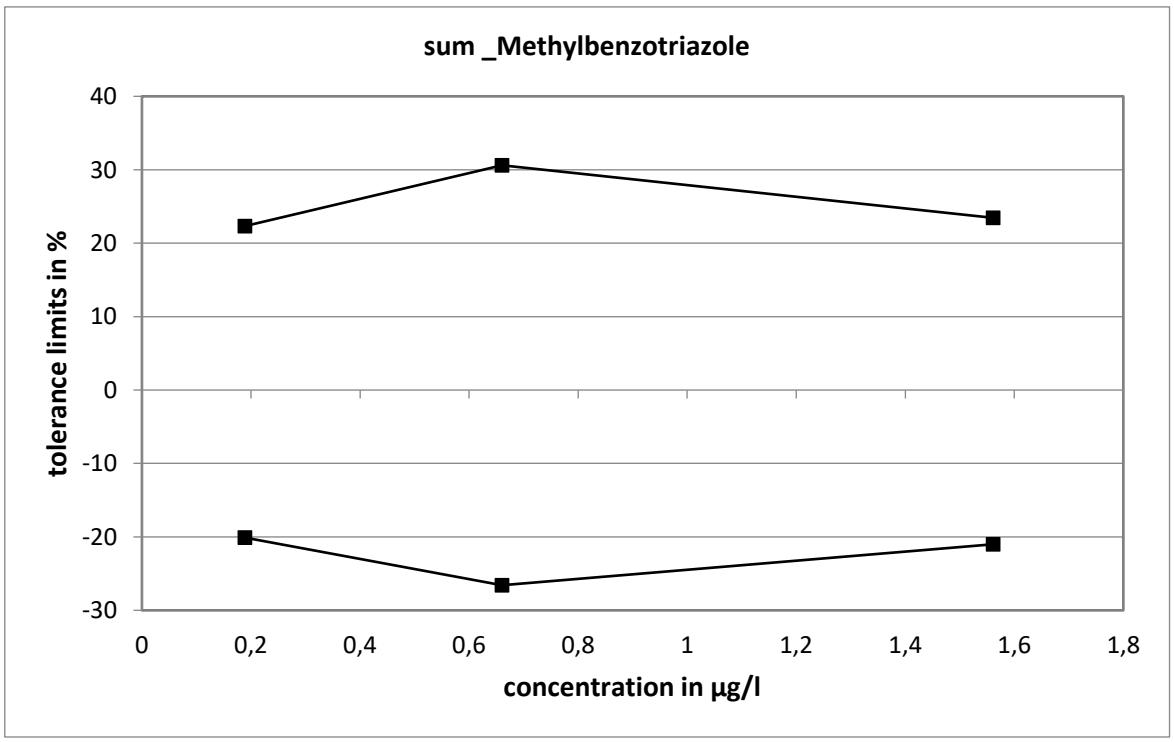
Recovery and matrix content



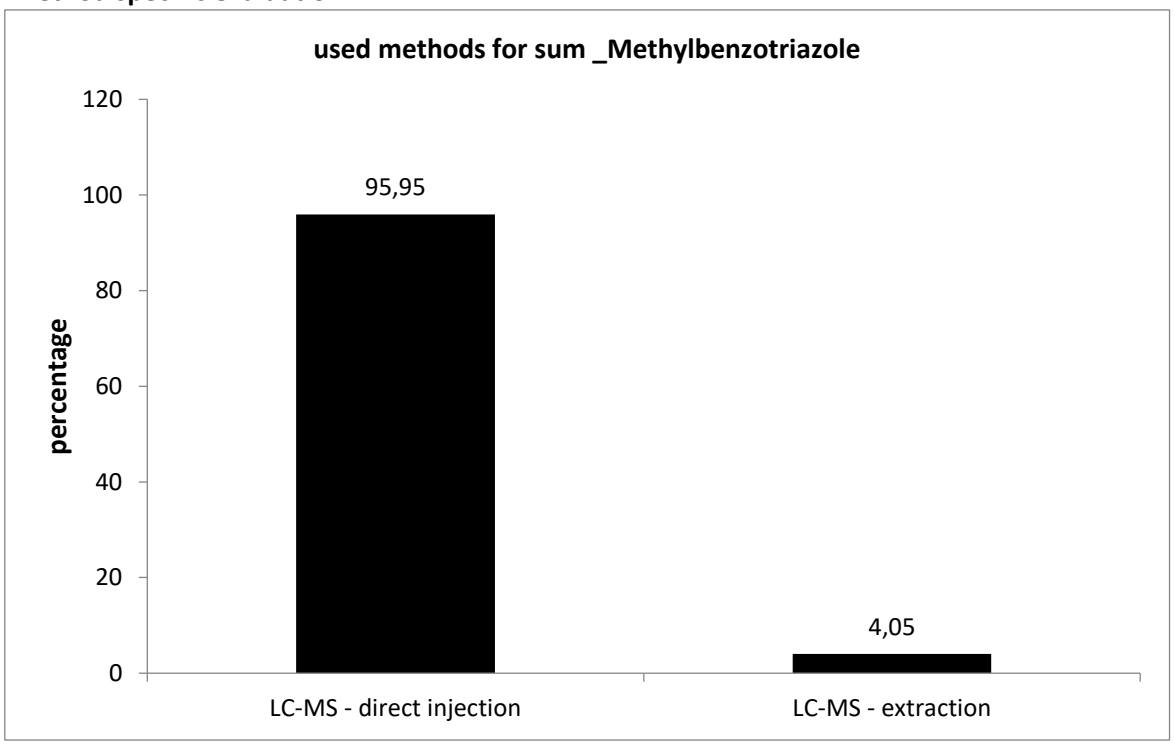
calculated matrix content: 0 µg/l
average recovery: 89,4 %

Relative standard deviation and tolerance limits





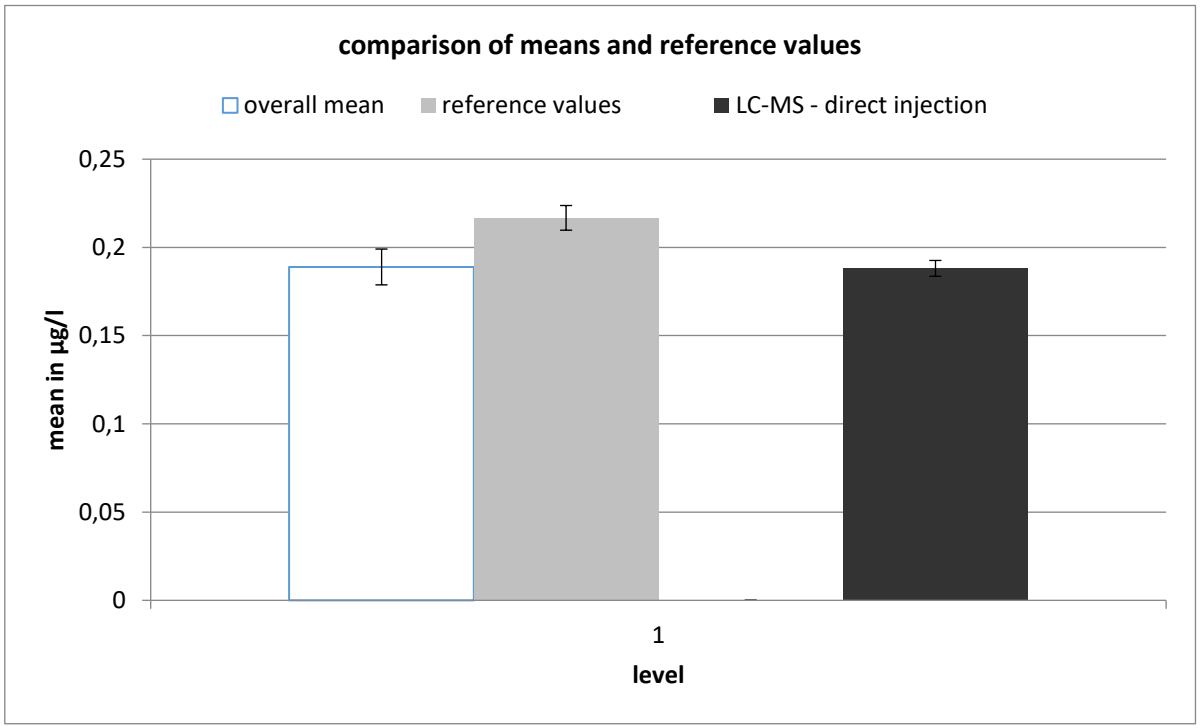
Method specific evaluation

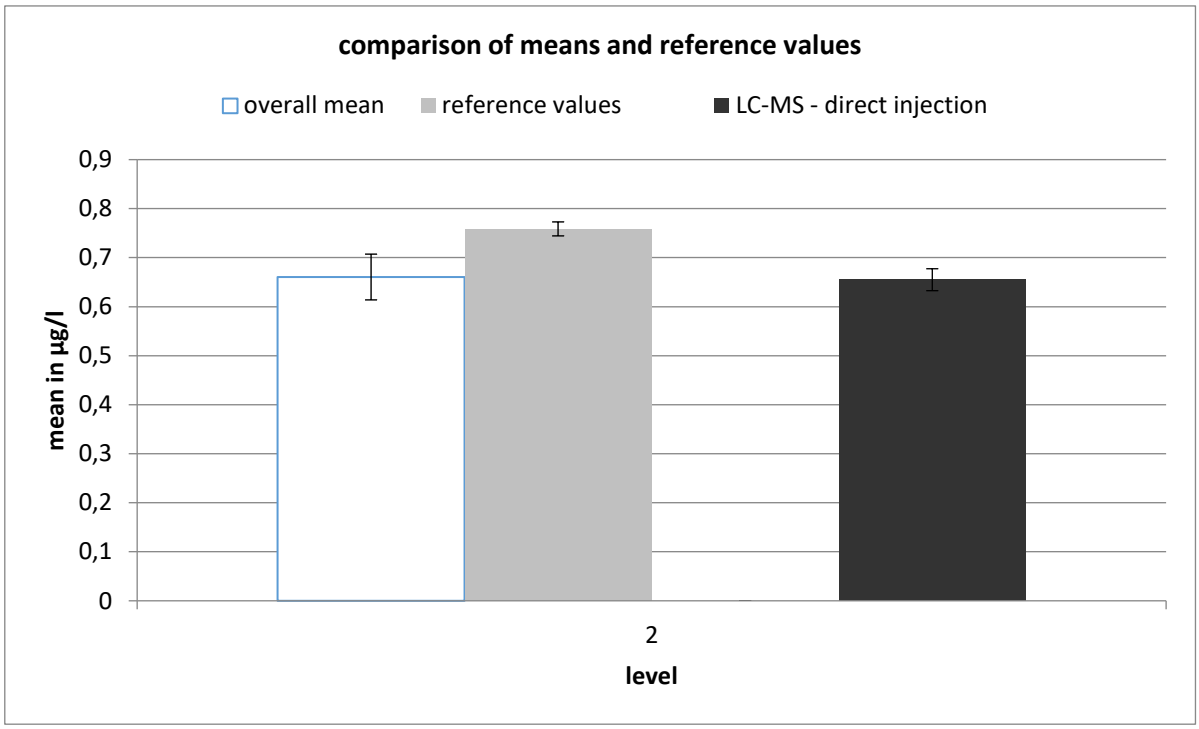


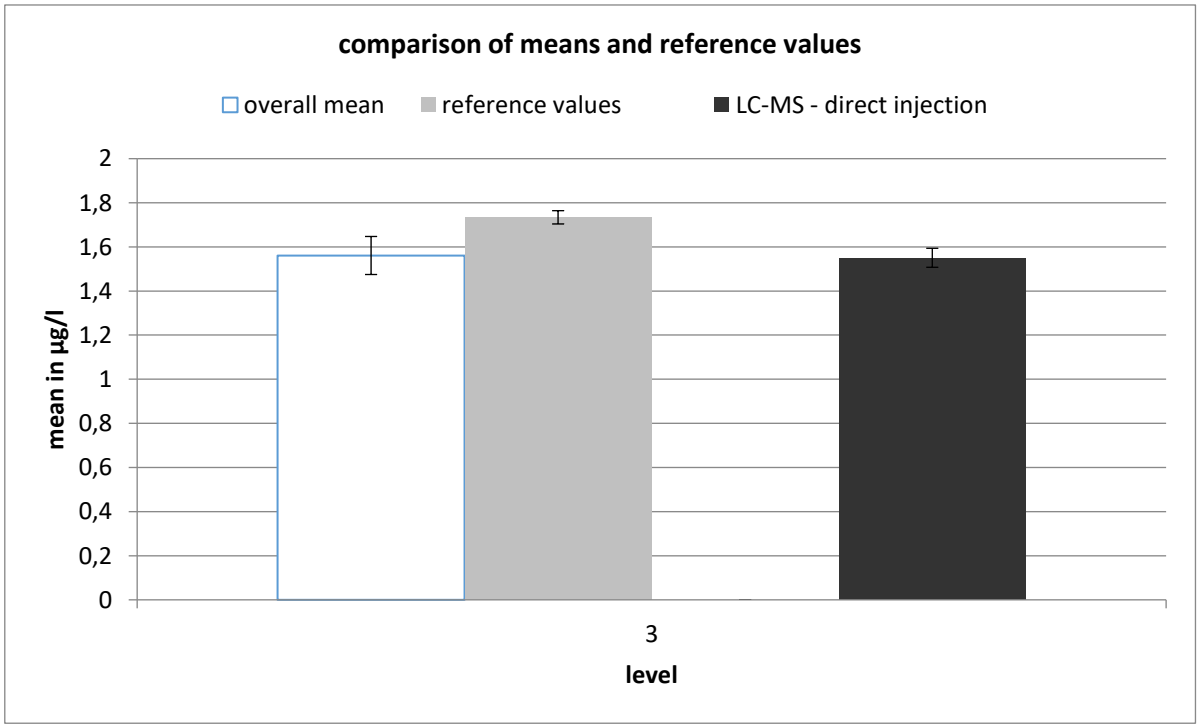
There is no method comparison, because almost all used LC-MS - direct injection.

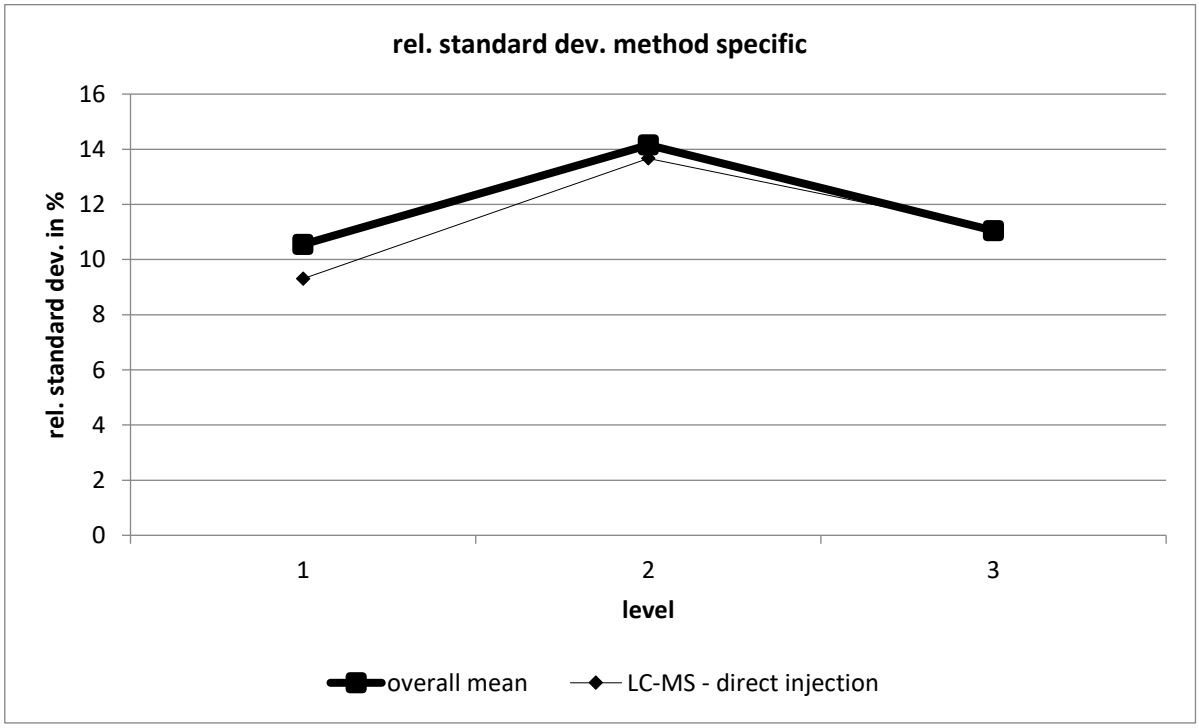
Comparison of means and reference values

level	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,1889	0,0102	5,4	0,2167	0,0070	3,2
2	0,6605	0,0467	7,1	0,7586	0,0142	1,9
3	1,561	0,086	5,5	1,734	0,030	1,7

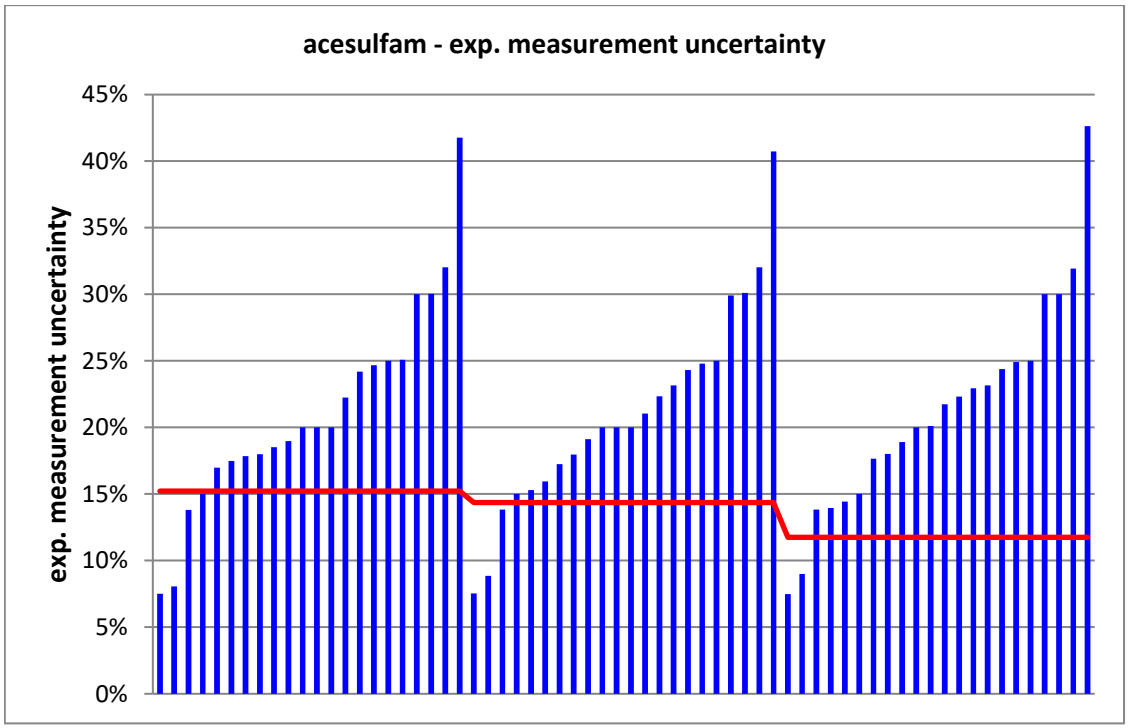


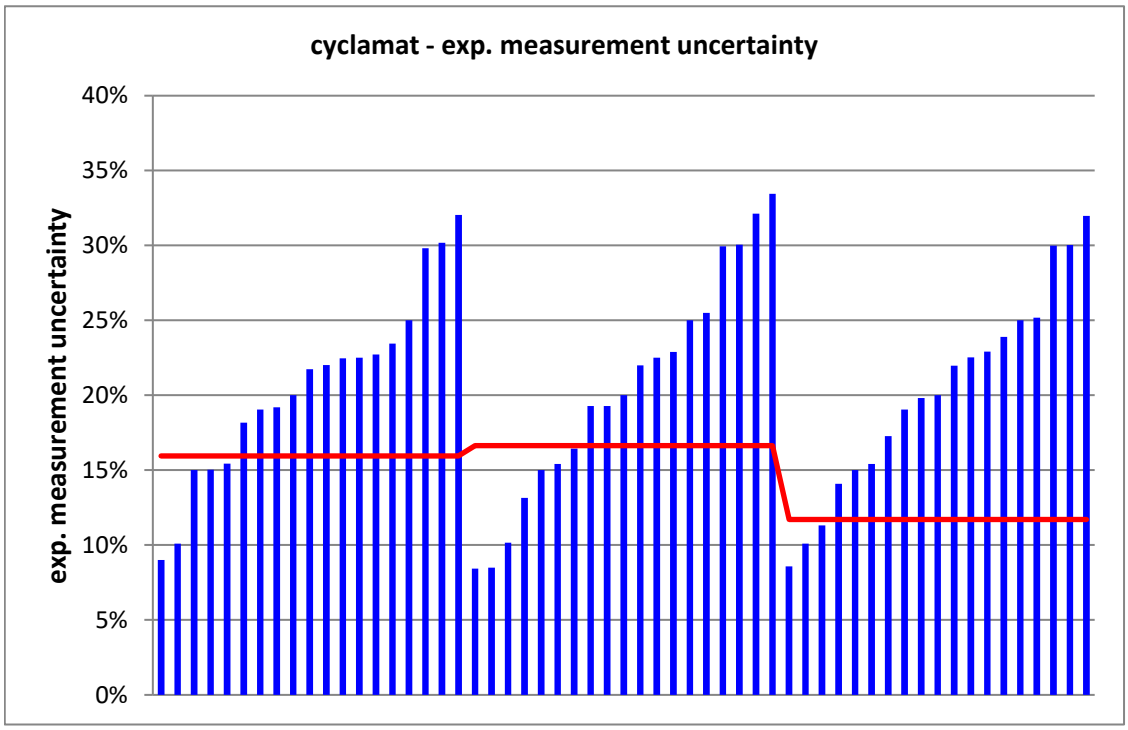

comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
mean in µg/l
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
2
level

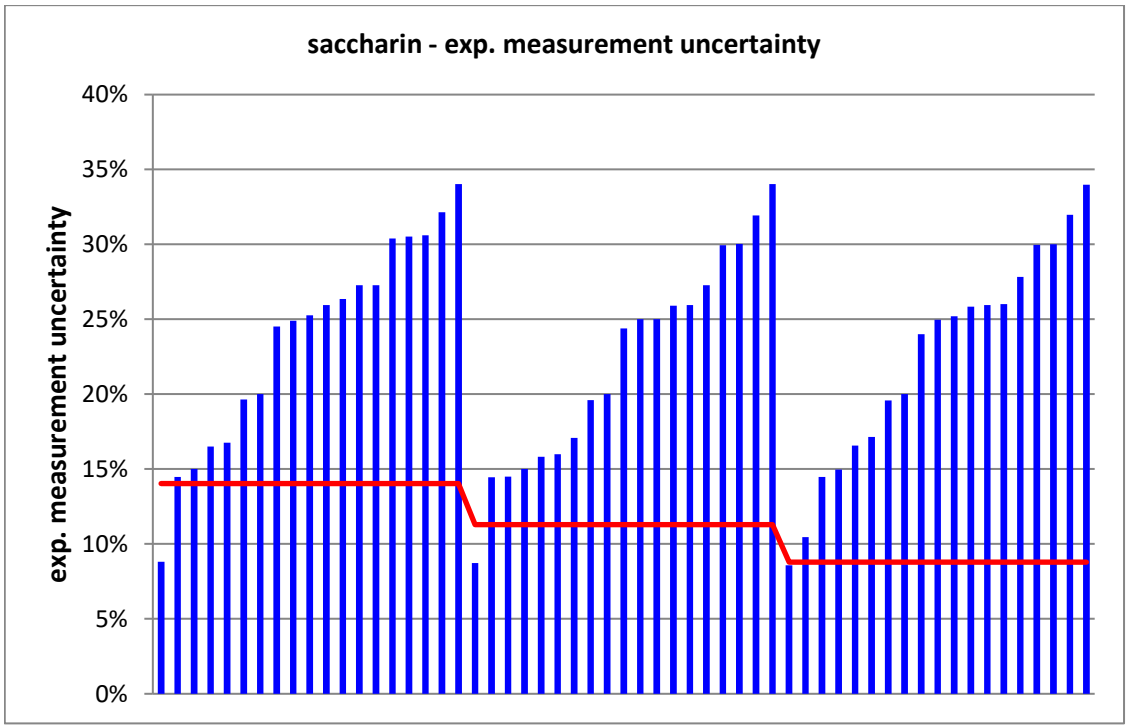

comparison of means and reference values
overall mean
reference values
LC-MS - direct injection
mean in µg/l
2
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
3
level

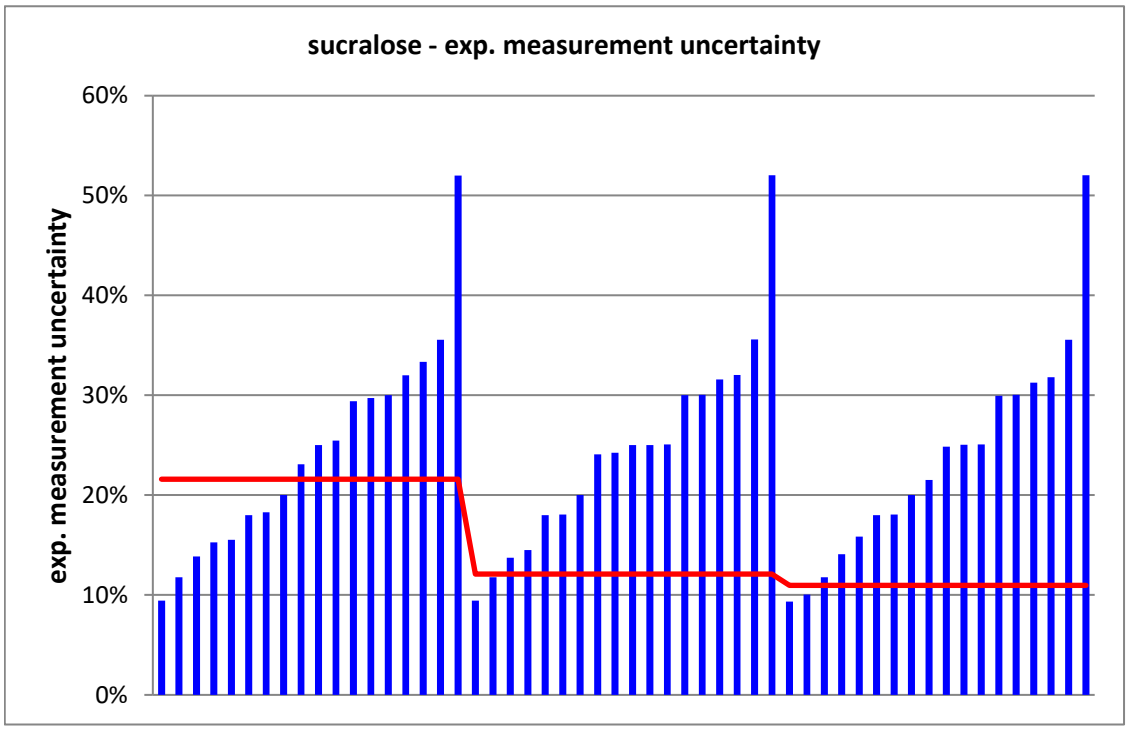


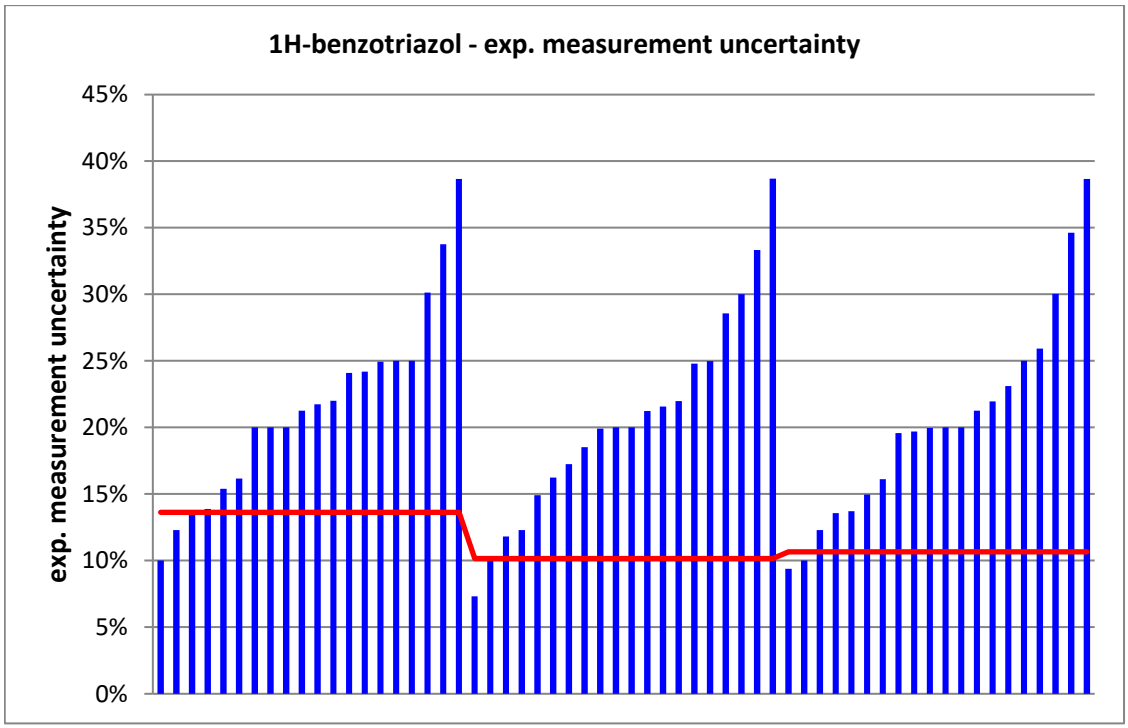
LC-MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,1881	0,0045	2,375	0,0175	9,3063	24	3	2	20,83
2	0,655	0,0224	3,417	0,0895	13,667	25	4	0	16
3	1,5506	0,0431	2,777	0,1723	11,109	25	3	0	12

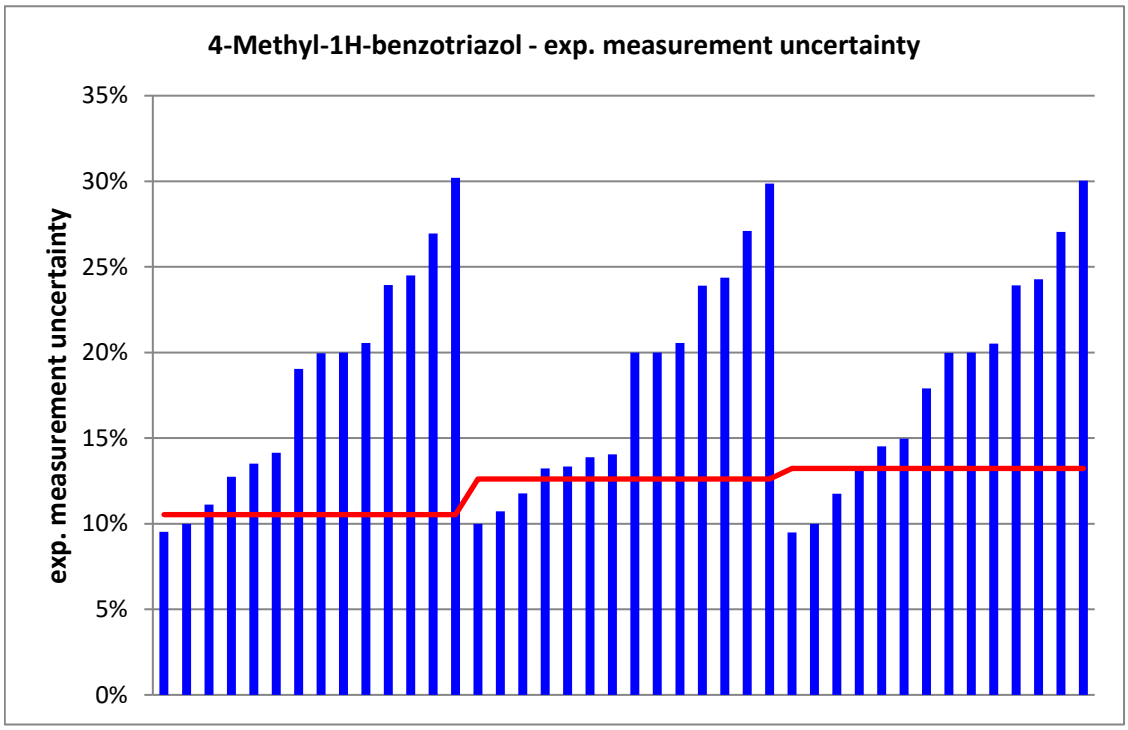

acesulfam - exp. measurement uncertainty
exp. measurement uncertainty
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%

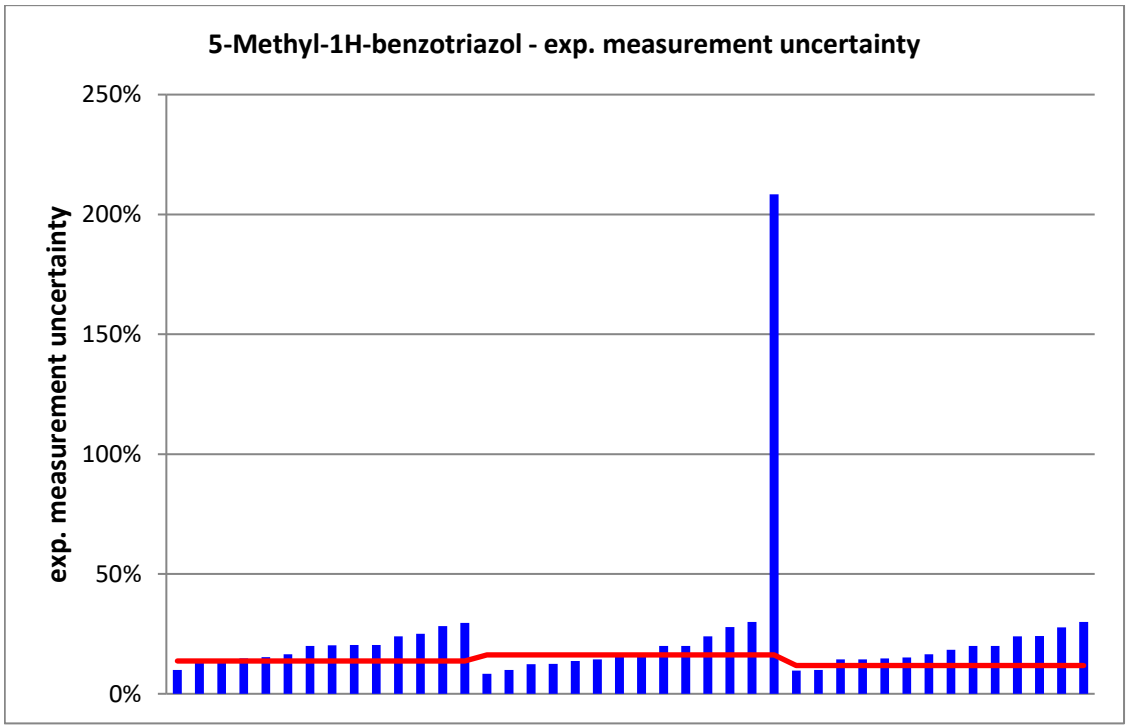

cyclamat - exp. measurement uncertainty
exp. measurement uncertainty
40%
35%
30%
25%
20%
15%
10%
5%
0%

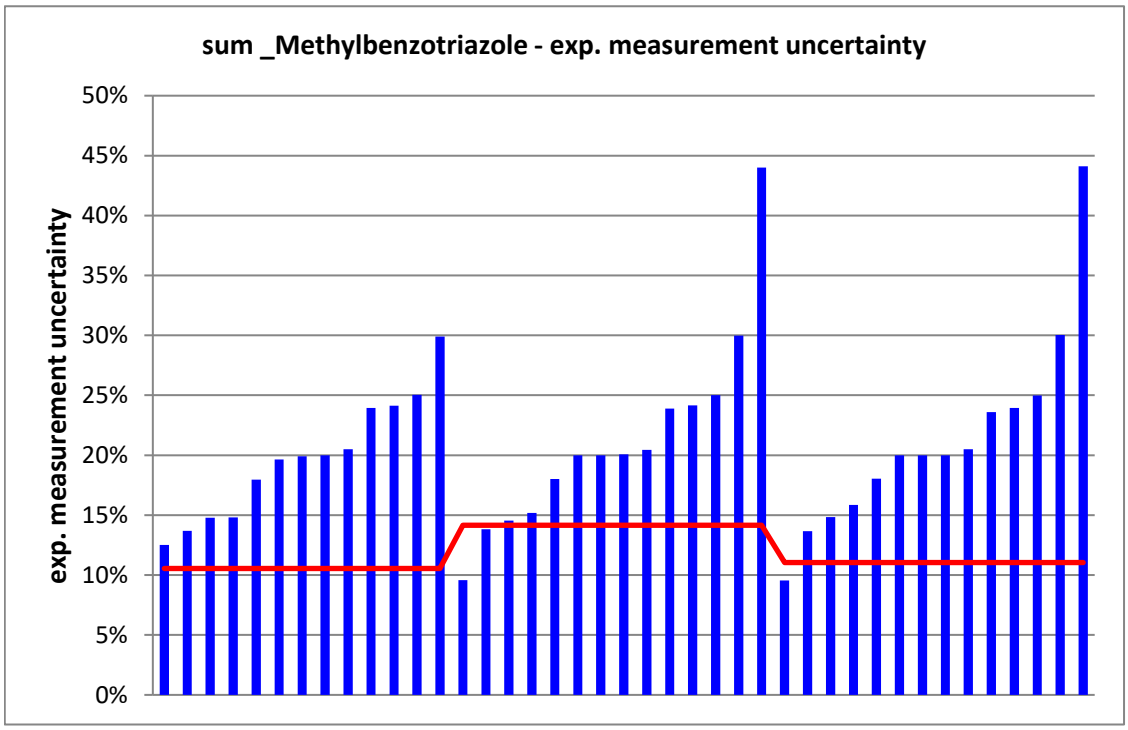

saccharin - exp. measurement uncertainty
exp. measurement uncertainty
40%
35%
30%
25%
20%
15%
10%
5%
0%


sucralose - exp. measurement uncertainty
exp. measurement uncertainty
60%
50%
40%
30%
20%
10%
0%


1H-benzotriazol - exp. measurement uncertainty
exp. measurement uncertainty
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%


4-Methyl-1H-benzotriazol - exp. measurement uncertainty
exp. measurement uncertainty
35%
30%
25%
20%
15%
10%
5%
0%

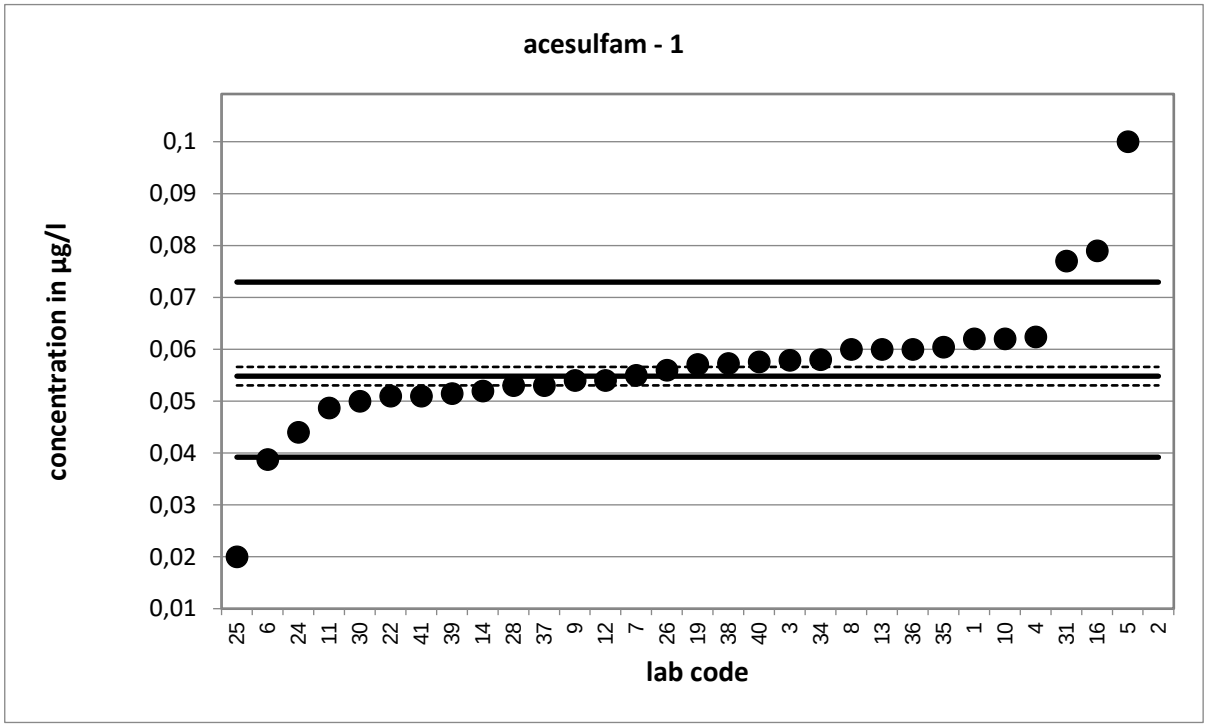

5-Methyl-1H-benzotriazol - exp. measurement uncertainty
exp. measurement uncertainty
250%
200%
150%
100%
50%
0%


sum _Methylbenzotriazole - exp. measurement uncertainty
exp. measurement uncertainty
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%

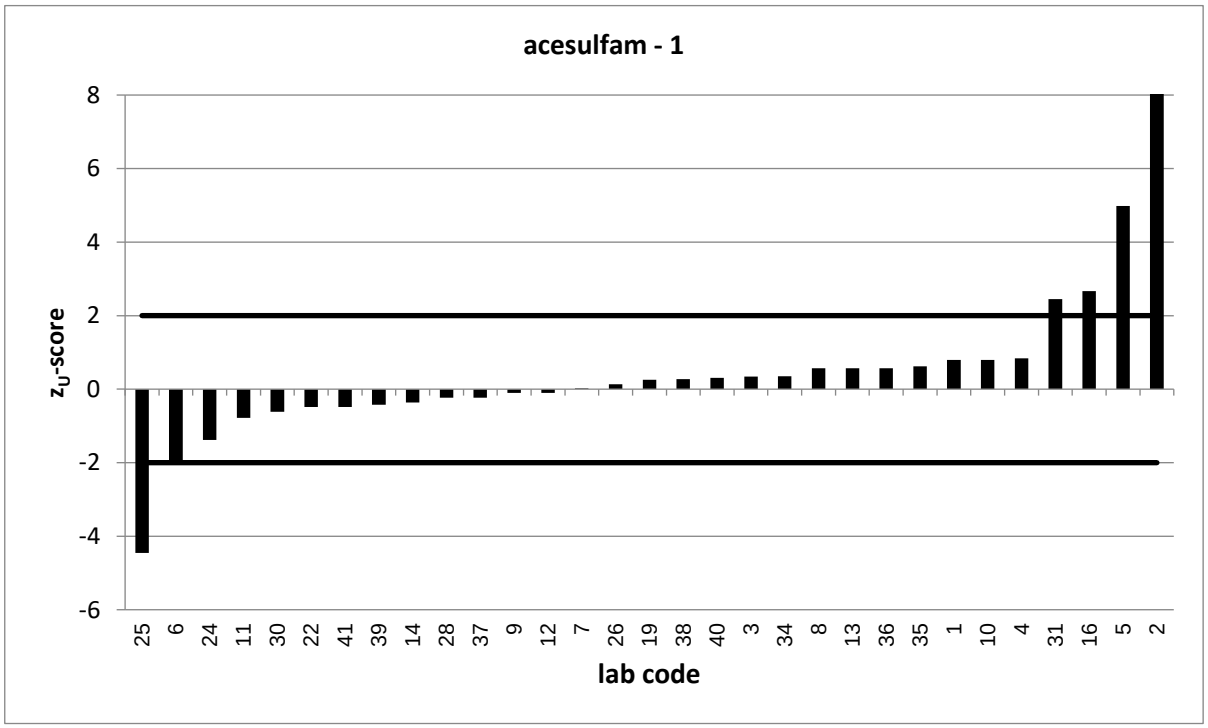
PT 4/22 - TW S1		acesulfam - 1			
assigned value [µg/l]*			0,05481	± 0,00178	
upper tolerance limit [µg/l]			0,07294		
lower tolerance limit [µg/l]			0,03919		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,062	0,005	2,7	0,8	s
2	0,226	0,04	8,7	18,9	u
3	0,0579	0,008	0,8	0,3	s
4	0,0624	0,012	1,2	0,8	s
5	0,1			5,0	u
6	0,0388			-2,1	q
7	0,055	0,011	0,0	0,0	s
8	0,06			0,6	s
9	0,054	0,008	-0,2	-0,1	s
10	0,062	0,015	1,0	0,8	s
11	0,0487	0,016	-0,8	-0,8	s
12	0,054	0,01	-0,2	-0,1	s
13	0,06	0,018	0,6	0,6	s
14	0,052	0,013	-0,4	-0,4	s
16	0,079	0,033	1,5	2,7	q
19	0,0571	0,013	0,4	0,3	s
22	0,051			-0,5	s
24	0,044			-1,4	s
25	0,02			-4,5	u
26	0,056	0,01	0,2	0,1	s
28	0,053	0,013	-0,3	-0,2	s
30	0,05	0,01	-0,9	-0,6	s
31	0,077	0,019	2,3	2,4	q
34	0,058	0,011	0,6	0,4	s
35	0,0604	0,005	2,3	0,6	s
36	0,06			0,6	s
37	0,053	0,009	-0,4	-0,2	s
38	0,0573			0,3	s
39	0,0515			-0,4	s
40	0,0576	0,017	0,3	0,3	s
41	0,051	0,009	-0,8	-0,5	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

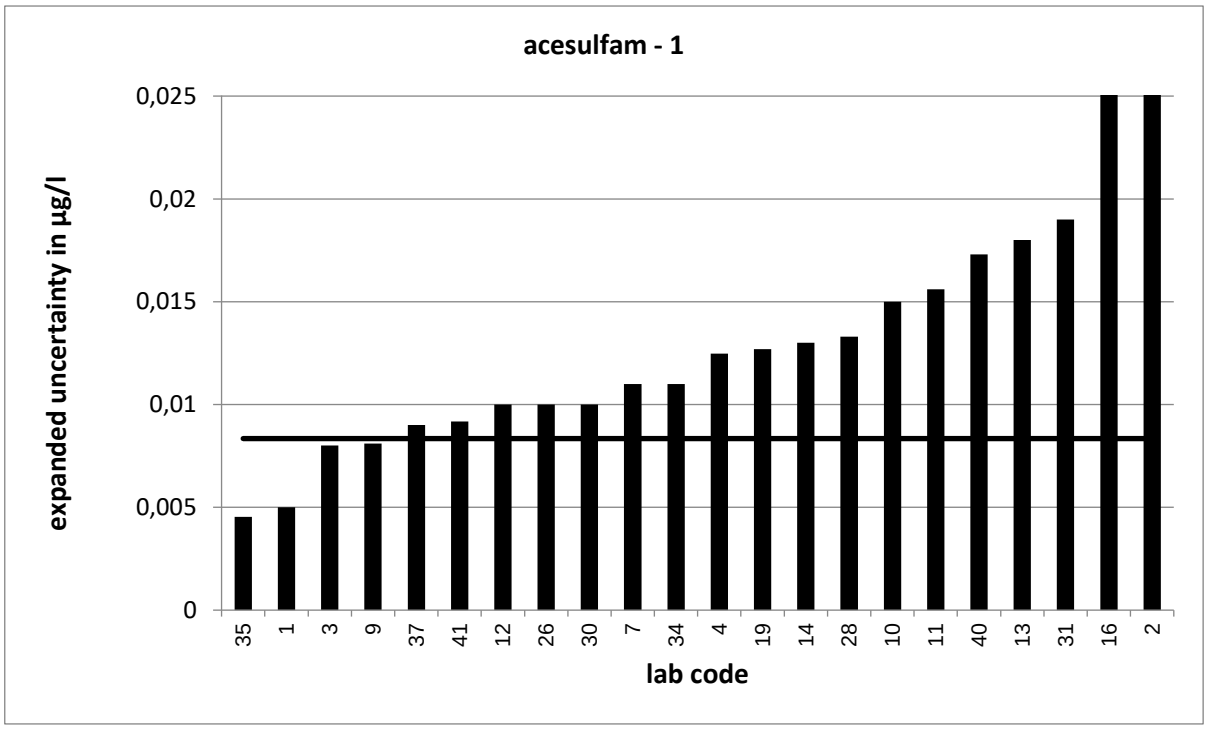
** s = satisfactory, q = questionable, u = unsatisfactory



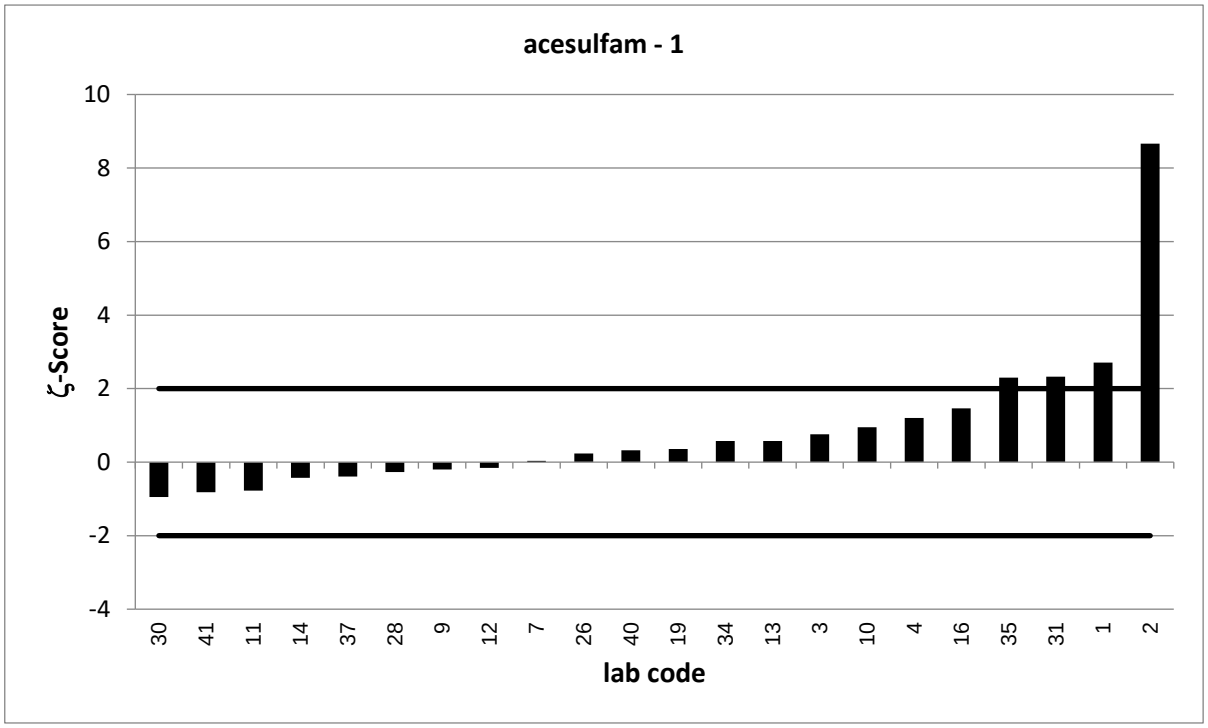
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



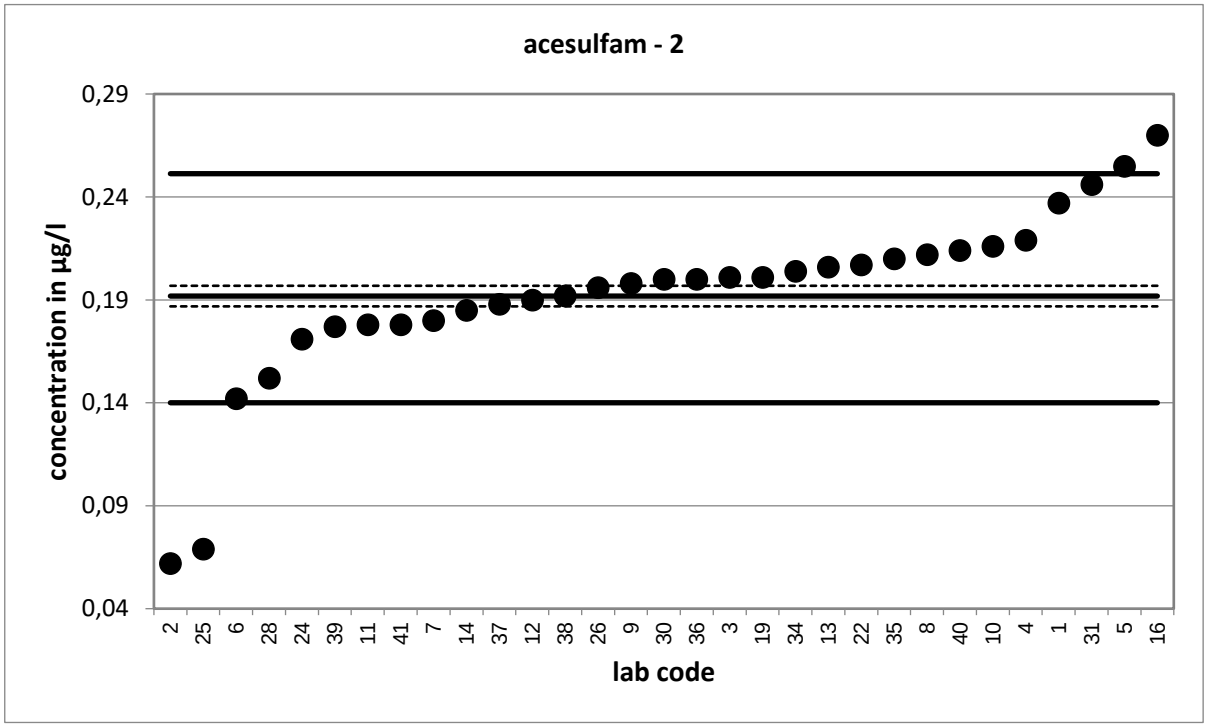
Strongly deviating values are not correctly shown in the diagram.



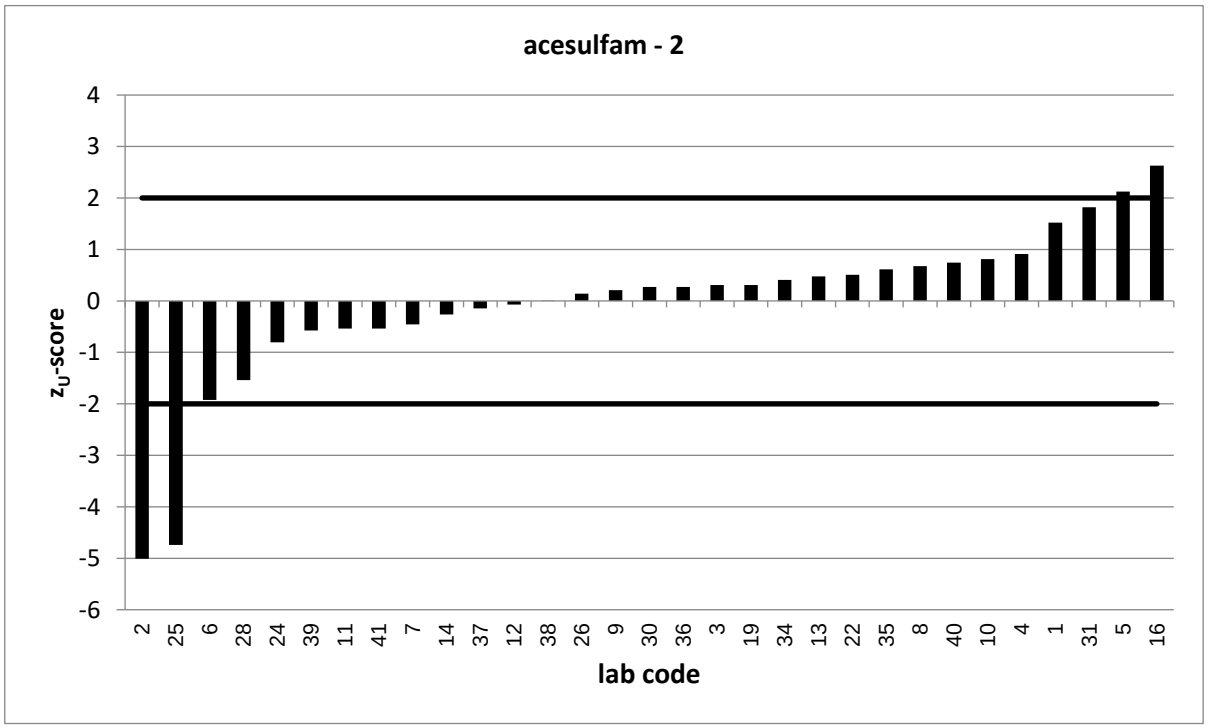
PT 4/22 - TW S1		acesulfam - 2			
assigned value [µg/l]*			0,1918	± 0,005	
upper tolerance limit [µg/l]			0,2513		
lower tolerance limit [µg/l]			0,14		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,237	0,021	4,2	1,5	s
2	0,062	0,011	-22,0	-5,0	u
3	0,201	0,028	0,6	0,3	s
4	0,219	0,044	1,2	0,9	s
5	0,255			2,1	q
6	0,142			-1,9	s
7	0,18	0,036	-0,7	-0,5	s
8	0,212			0,7	s
9	0,198	0,03	0,4	0,2	s
10	0,216	0,05	1,0	0,8	s
11	0,178	0,057	-0,5	-0,5	s
12	0,19	0,04	-0,1	-0,1	s
13	0,206	0,062	0,5	0,5	s
14	0,185	0,045	-0,3	-0,3	s
16	0,27	0,11	1,4	2,6	q
19	0,201	0,045	0,4	0,3	s
22	0,207			0,5	s
24	0,171			-0,8	s
25	0,069			-4,7	u
26	0,196	0,03	0,3	0,1	s
28	0,152	0,038	-2,1	-1,5	s
30	0,2	0,04	0,4	0,3	s
31	0,246	0,061	1,8	1,8	s
34	0,204	0,039	0,6	0,4	s
35	0,21	0,016	2,2	0,6	s
36	0,2			0,3	s
37	0,188	0,03	-0,3	-0,1	s
38	0,192			0,0	s
39	0,177			-0,6	s
40	0,214	0,064	0,7	0,7	s
41	0,178	0,032	-0,9	-0,5	s

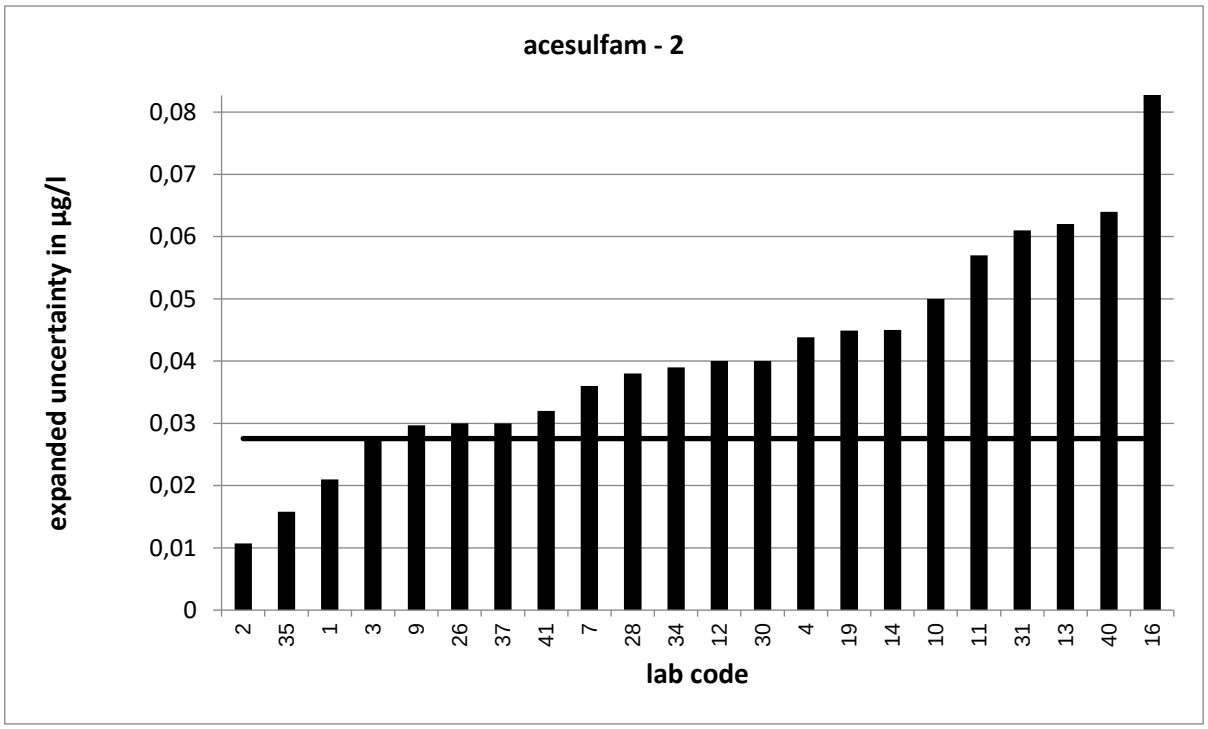
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

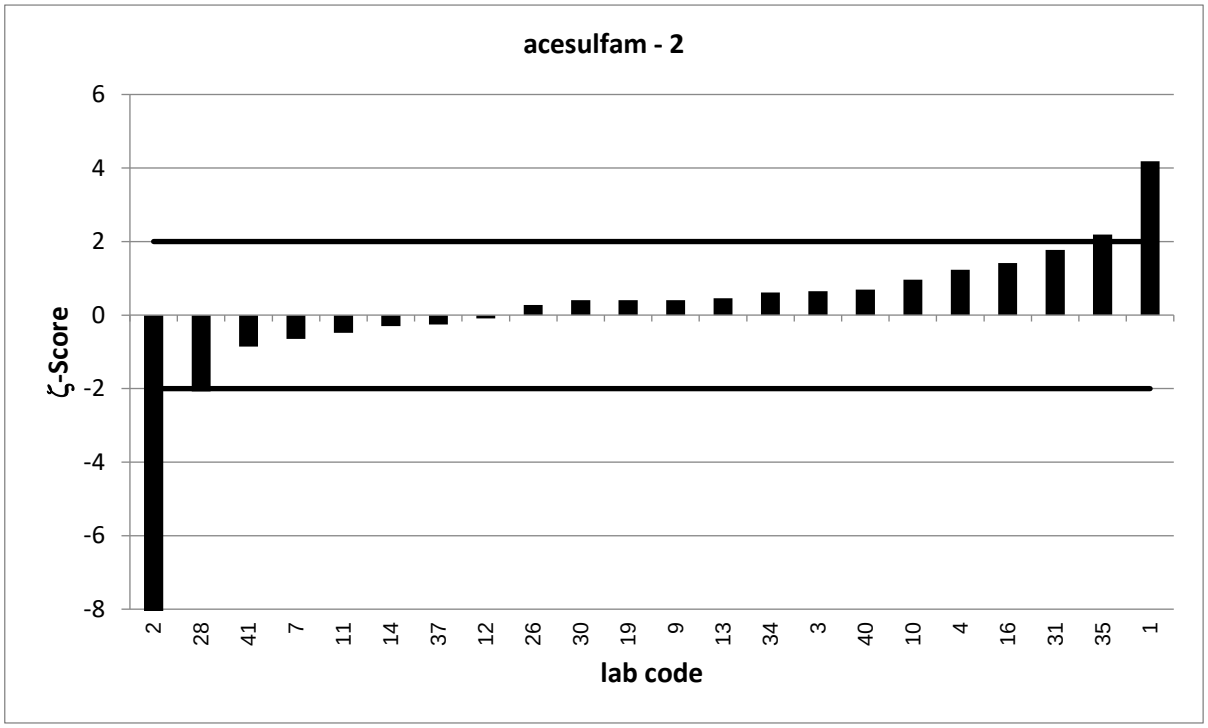


Strongly deviating values are not shown in the diagram.





Strongly deviating values are not correctly shown in the diagram.

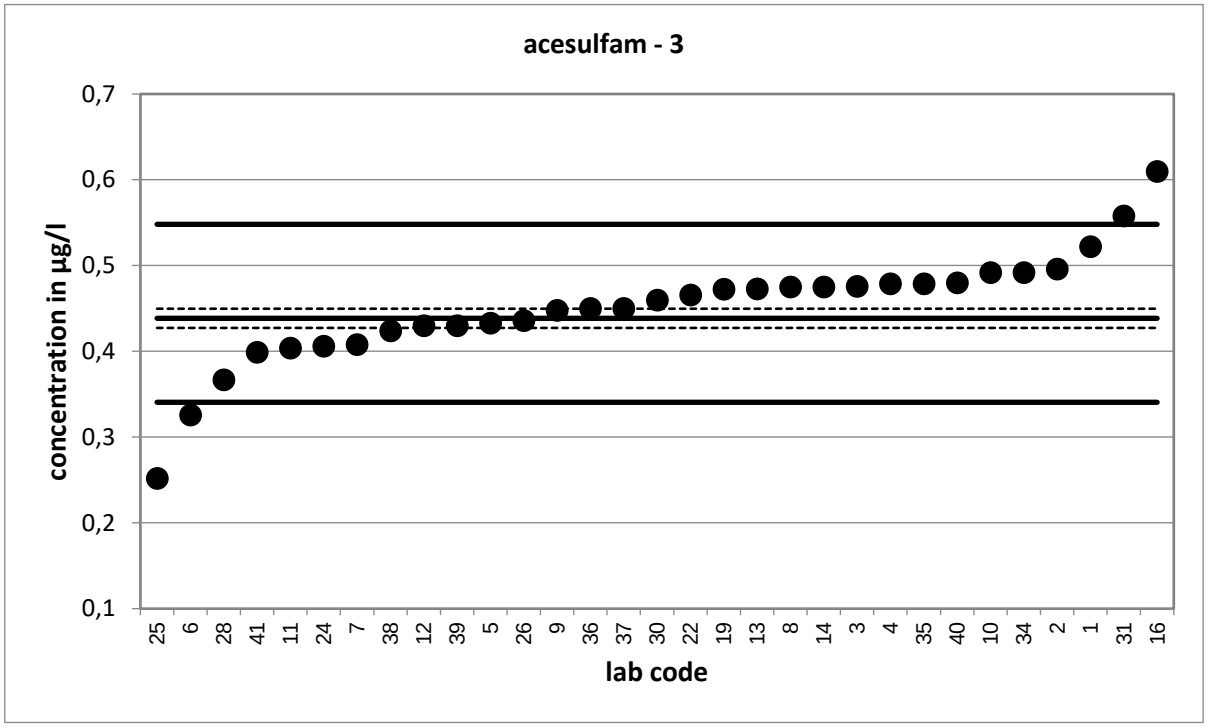


Strongly deviating values are not correctly shown in the diagram.

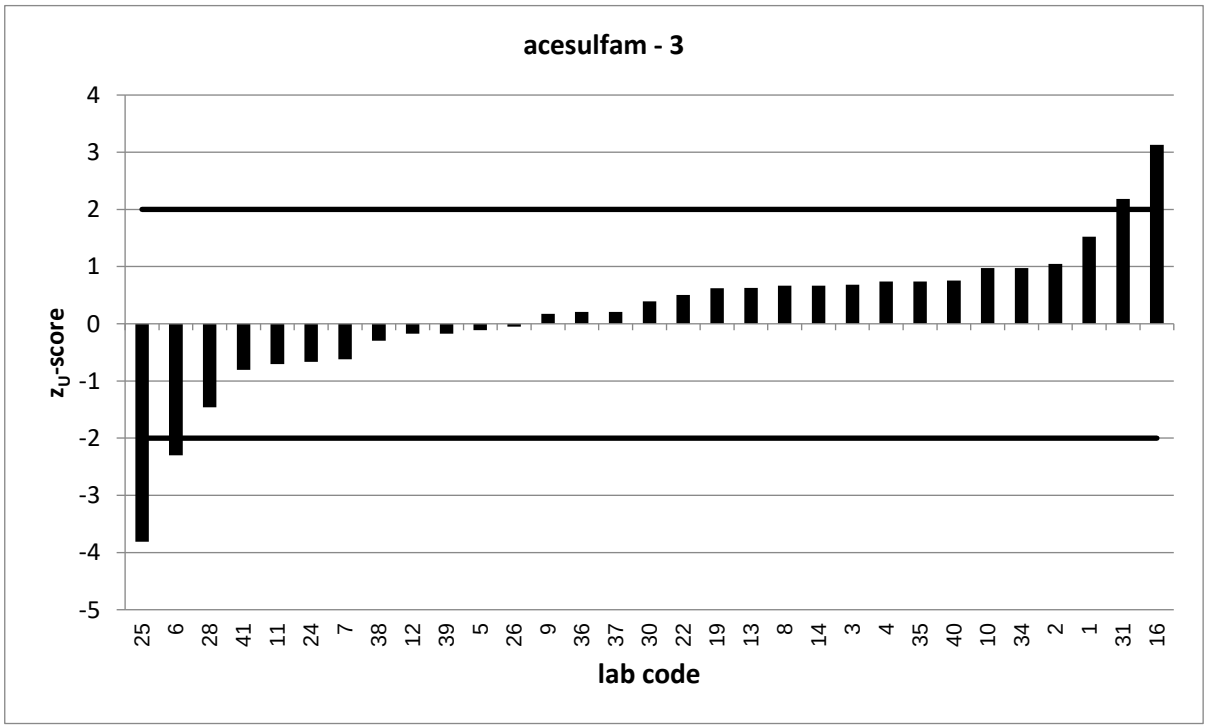
PT 4/22 - TW S1		acesulfam - 3			
assigned value [µg/l]*			0,4385	± 0,0112	
upper tolerance limit [µg/l]			0,5481		
lower tolerance limit [µg/l]			0,3406		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,522	0,047	3,5	1,5	s
2	0,496	0,088	1,3	1,0	s
3	0,476	0,066	1,1	0,7	s
4	0,479	0,096	0,8	0,7	s
5	0,433			-0,1	s
6	0,326			-2,3	q
7	0,408	0,082	-0,7	-0,6	s
8	0,475			0,7	s
9	0,448	0,067	0,3	0,2	s
10	0,492	0,12	0,9	1,0	s
11	0,404	0,129	-0,5	-0,7	s
12	0,43	0,06	-0,3	-0,2	s
13	0,473	0,142	0,5	0,6	s
14	0,475	0,11	0,7	0,7	s
16	0,61	0,26	1,3	3,1	u
19	0,4725	0,106	0,6	0,6	s
22	0,466			0,5	s
24	0,406			-0,7	s
25	0,252			-3,8	u
26	0,436	0,1	0,0	-0,1	s
28	0,367	0,092	-1,5	-1,5	s
30	0,46	0,1	0,4	0,4	s
31	0,558	0,139	1,7	2,2	q
34	0,492	0,093	1,1	1,0	s
35	0,479	0,036	2,2	0,7	s
36	0,45			0,2	s
37	0,45	0,065	0,3	0,2	s
38	0,424			-0,3	s
39	0,43			-0,2	s
40	0,48	0,144	0,6	0,8	s
41	0,399	0,072	-1,1	-0,8	s

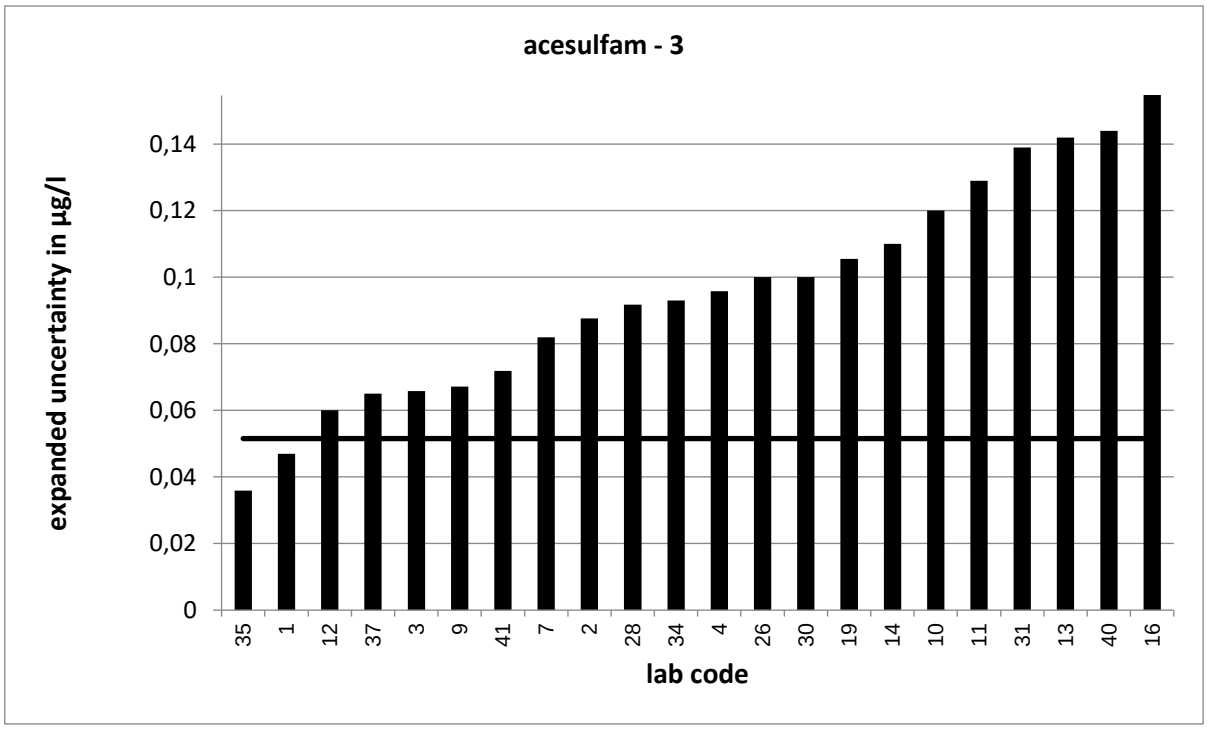
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

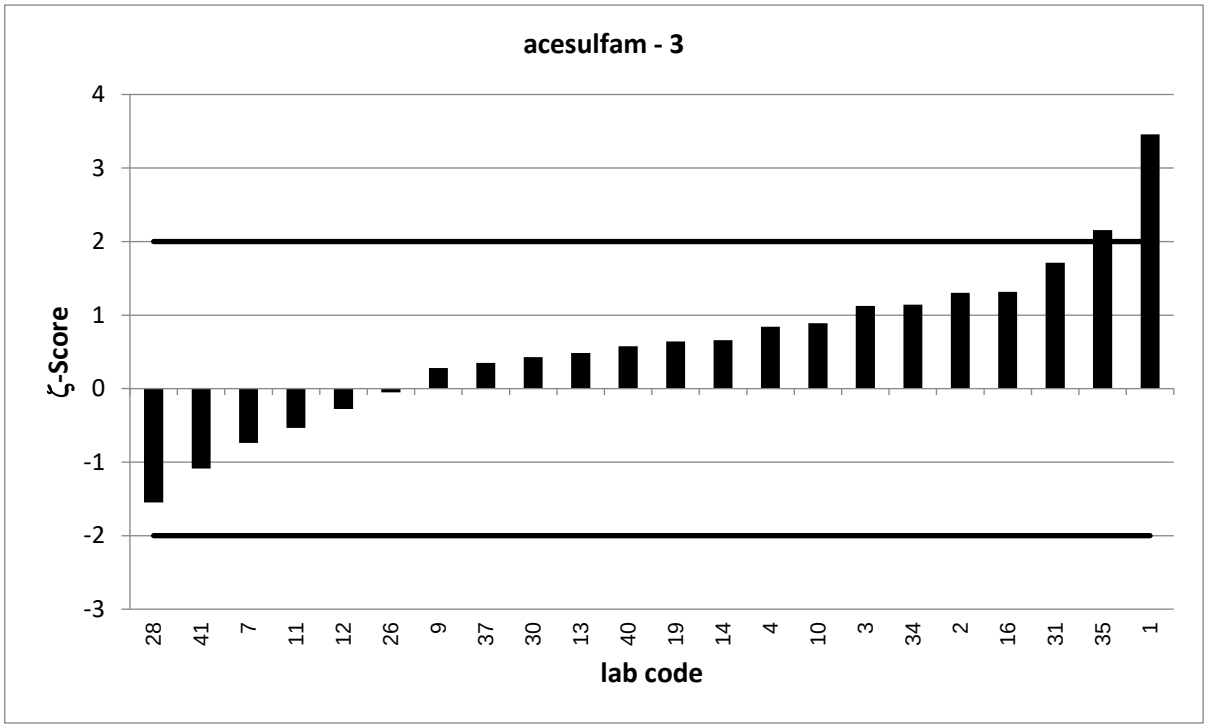


Strongly deviating values are not shown in the diagram.





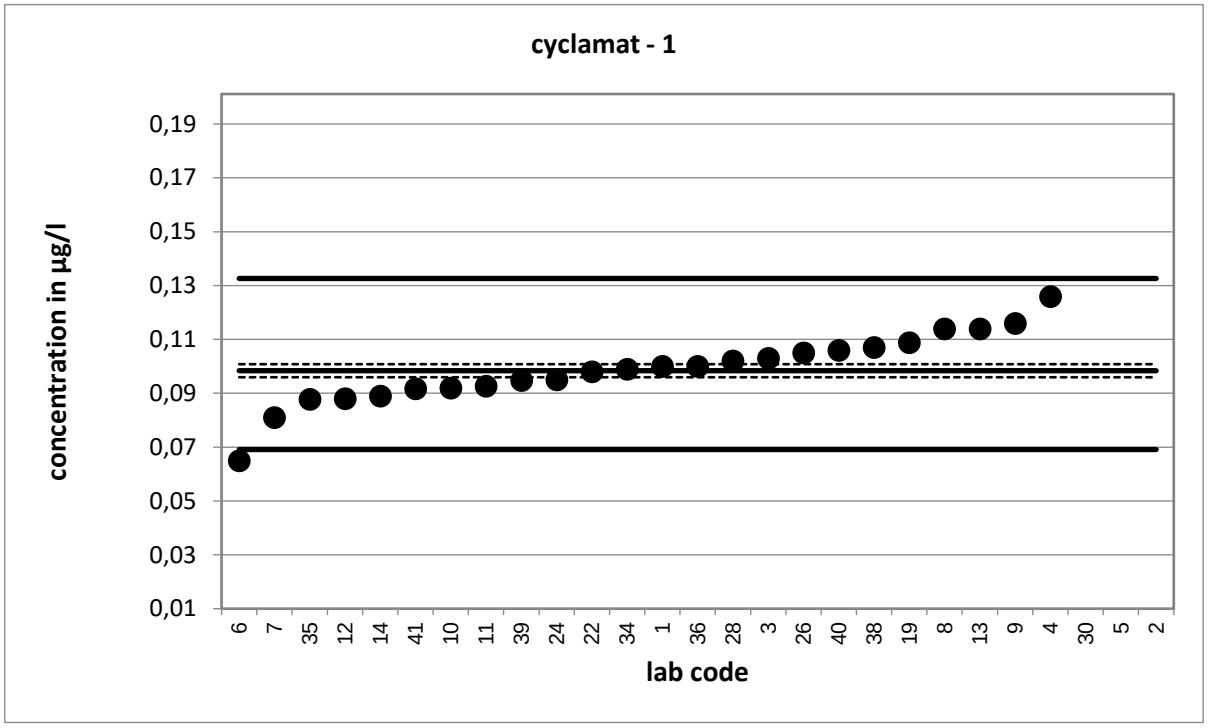
Strongly deviating values are not correctly shown in the diagram.



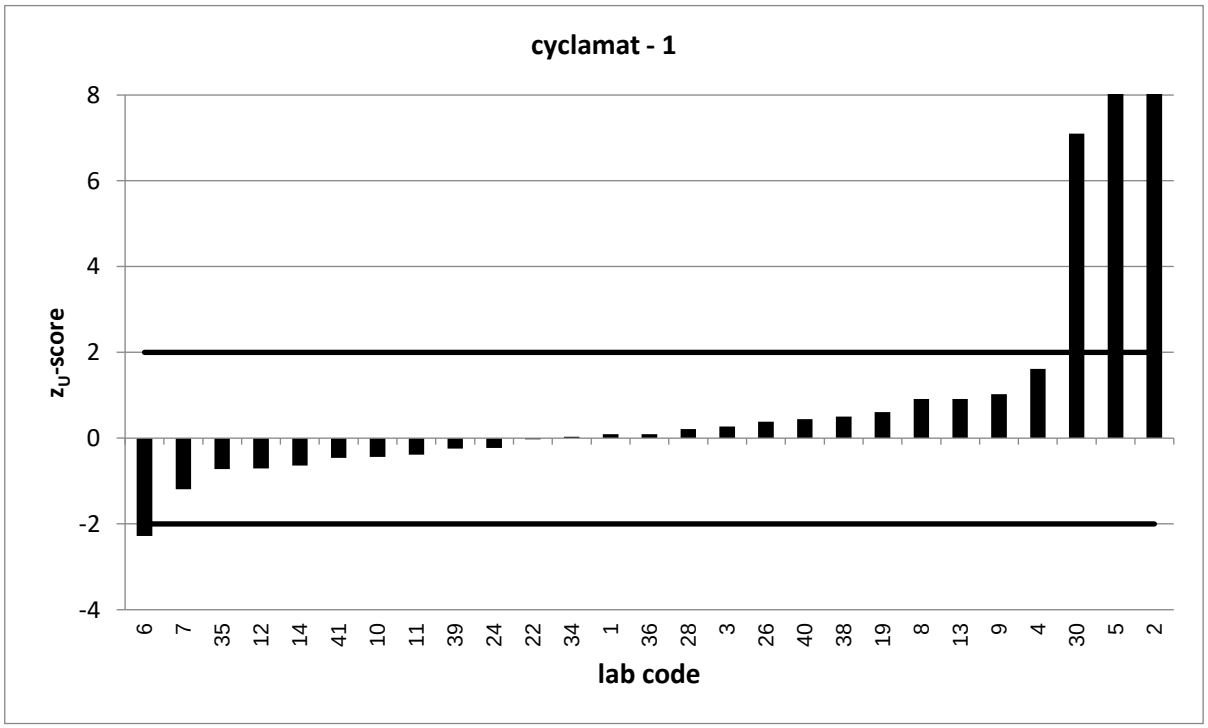
PT 4/22 - TW S1		cyclamat - 1			
assigned value [µg/l]*		0,09838	± 0,00242		
upper tolerance limit [µg/l]		0,1326			
lower tolerance limit [µg/l]		0,06911			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,1	0,009	0,3	0,1	s
2	0,344	0,052	9,5	14,3	u
3	0,103	0,016	0,6	0,3	s
4	0,126	0,025	2,2	1,6	s
5	0,323			13,1	u
6	0,065			-2,3	q
7	0,081	0,019	-1,8	-1,2	s
8	0,114			0,9	s
9	0,116	0,017	2,0	1,0	s
10	0,092	0,02	-0,6	-0,4	s
11	0,0927	0,03	-0,4	-0,4	s
12	0,088	0,02	-1,0	-0,7	s
13	0,114	0,034	0,9	0,9	s
14	0,089	0,02	-0,9	-0,6	s
19	0,1088	0,025	0,8	0,6	s
22	0,098			0,0	s
24	0,095			-0,2	s
26	0,105	0,02	0,7	0,4	s
28	0,102	0,026	0,3	0,2	s
30	0,22	0,04	6,1	7,1	u
34	0,099	0,019	0,1	0,0	s
35	0,0878	0,009	-2,3	-0,7	s
36	0,1			0,1	s
38	0,107			0,5	s
39	0,0948			-0,2	s
40	0,106	0,032	0,5	0,4	s
41	0,0917	0,02	-0,7	-0,5	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

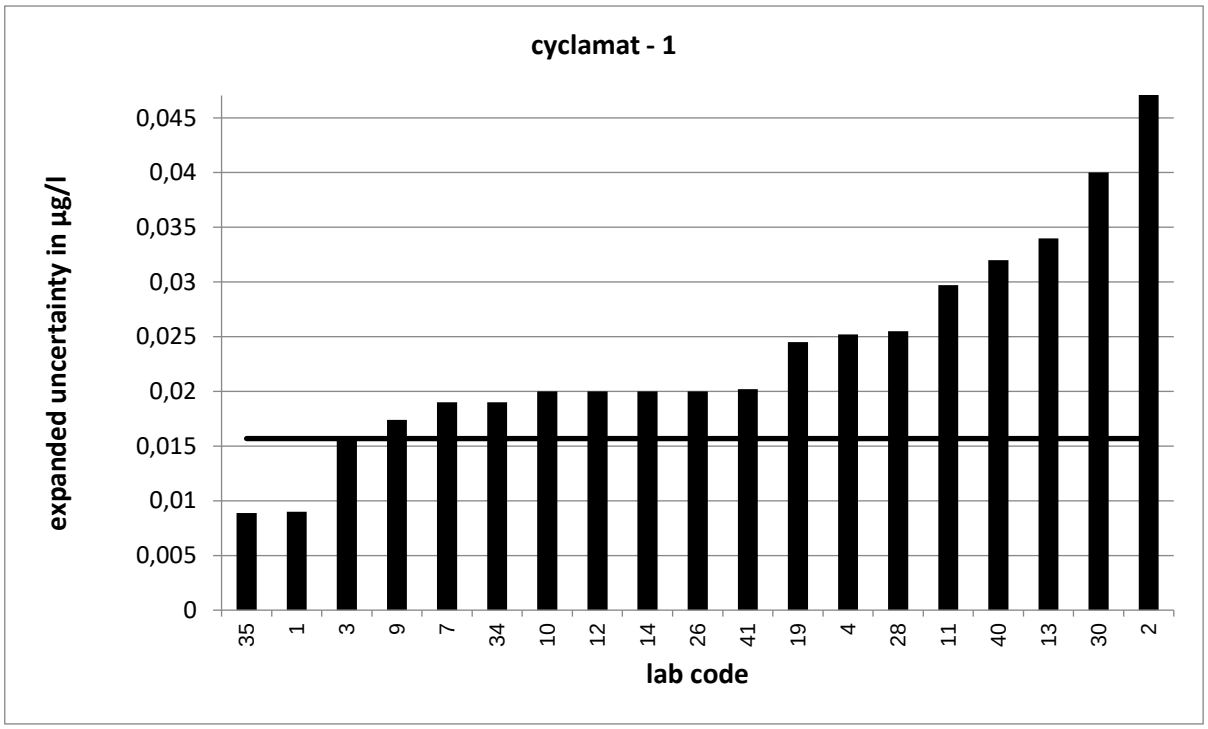
** s = satisfactory, q = questionable, u = unsatisfactory



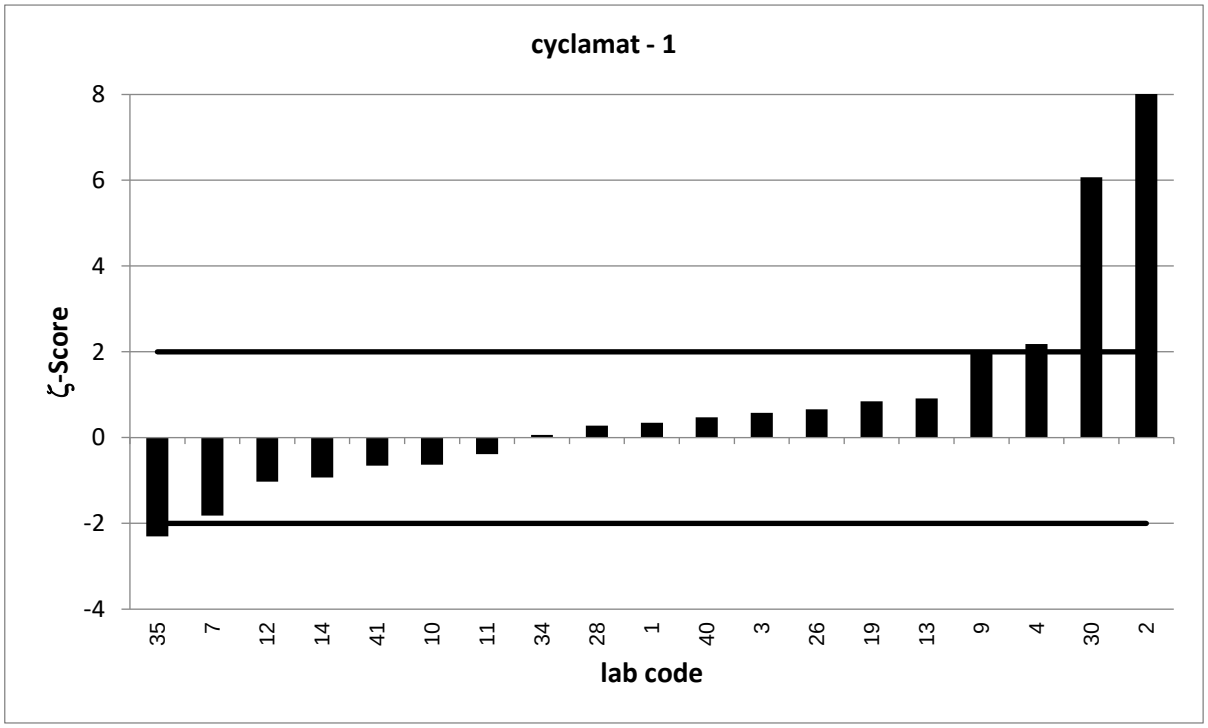
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.

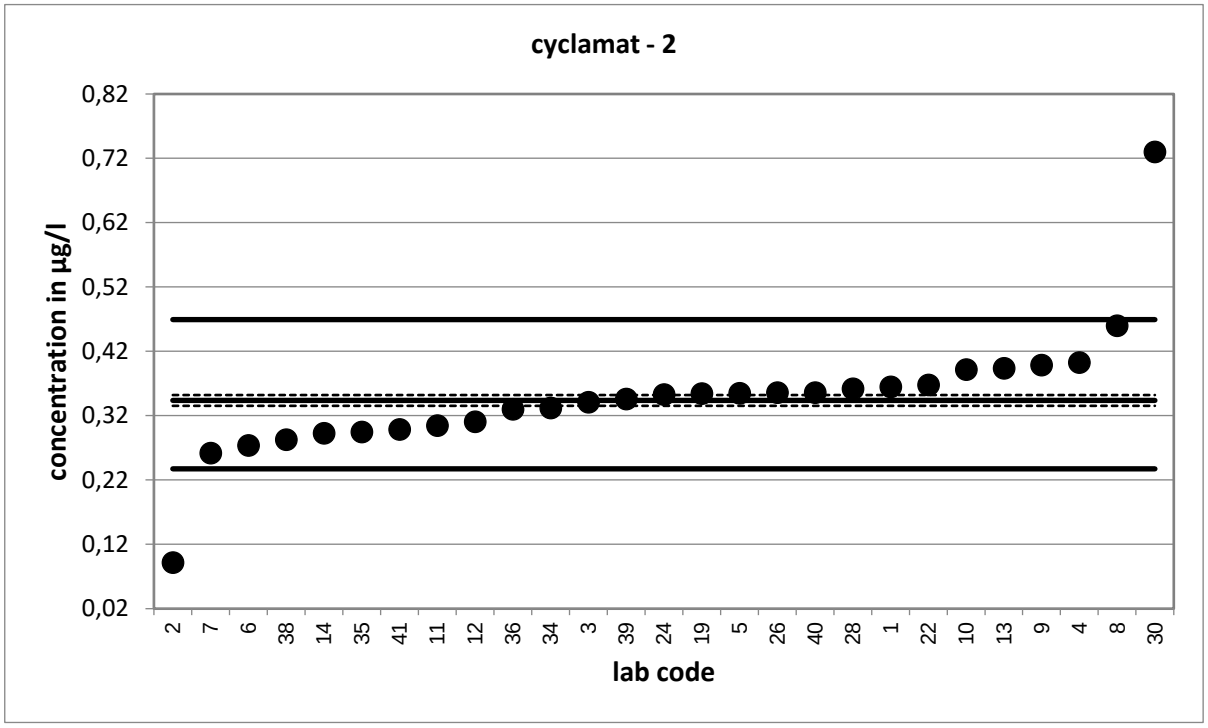


Strongly deviating values are not correctly shown in the diagram.

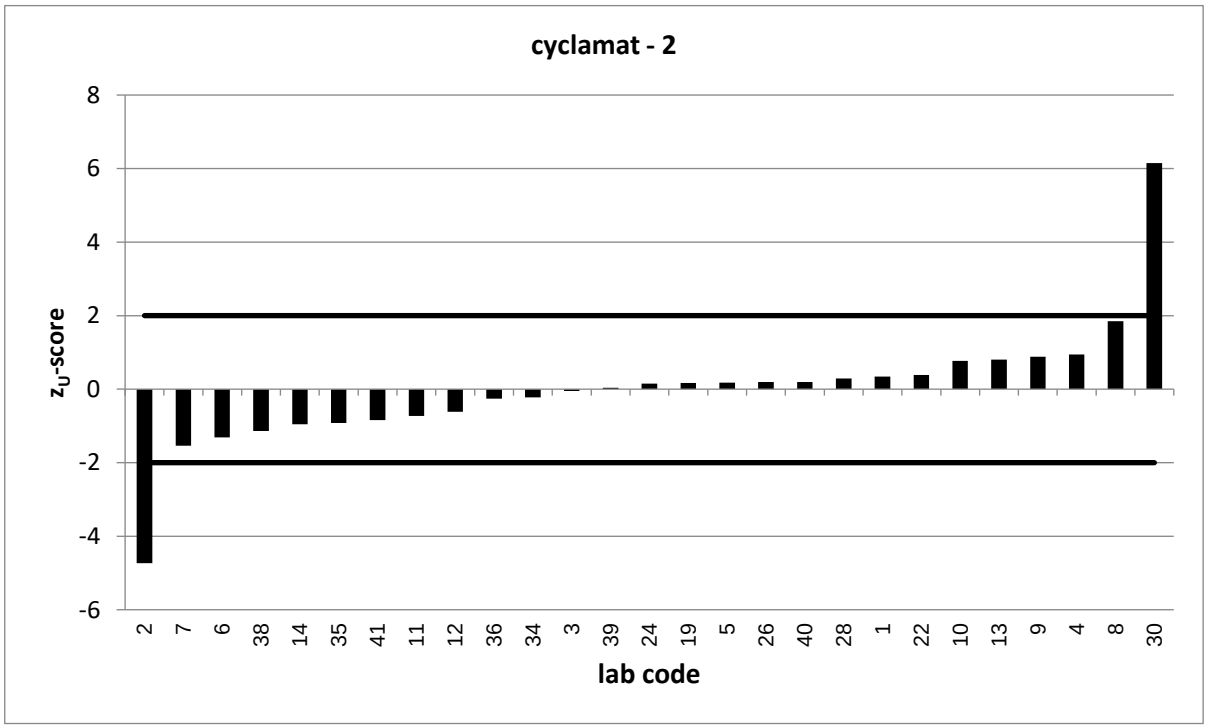
PT 4/22 - TW S1		cyclamat - 2			
assigned value [µg/l]*			0,3437	± 0,0084	
upper tolerance limit [µg/l]			0,4694		
lower tolerance limit [µg/l]			0,2374		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,365	0,031	1,3	0,3	s
2	0,092	0,012	-34,2	-4,7	u
3	0,341	0,053	-0,1	-0,1	s
4	0,403	0,081	1,5	0,9	s
5	0,355			0,2	s
6	0,274			-1,3	s
7	0,262	0,06	-2,7	-1,5	s
8	0,46			1,9	s
9	0,399	0,06	1,8	0,9	s
10	0,392	0,1	1,0	0,8	s
11	0,305	0,098	-0,8	-0,7	s
12	0,311	0,06	-1,1	-0,6	s
13	0,394	0,118	0,9	0,8	s
14	0,293	0,098	-1,0	-1,0	s
19	0,3544	0,08	0,3	0,2	s
22	0,368			0,4	s
24	0,353			0,1	s
26	0,356	0,03	0,8	0,2	s
28	0,362	0,091	0,4	0,3	s
30	0,73	0,12	6,4	6,1	u
34	0,332	0,064	-0,4	-0,2	s
35	0,295	0,03	-3,1	-0,9	s
36	0,33			-0,3	s
38	0,283			-1,1	s
39	0,346			0,0	s
40	0,356	0,107	0,2	0,2	s
41	0,299	0,066	-1,3	-0,8	s

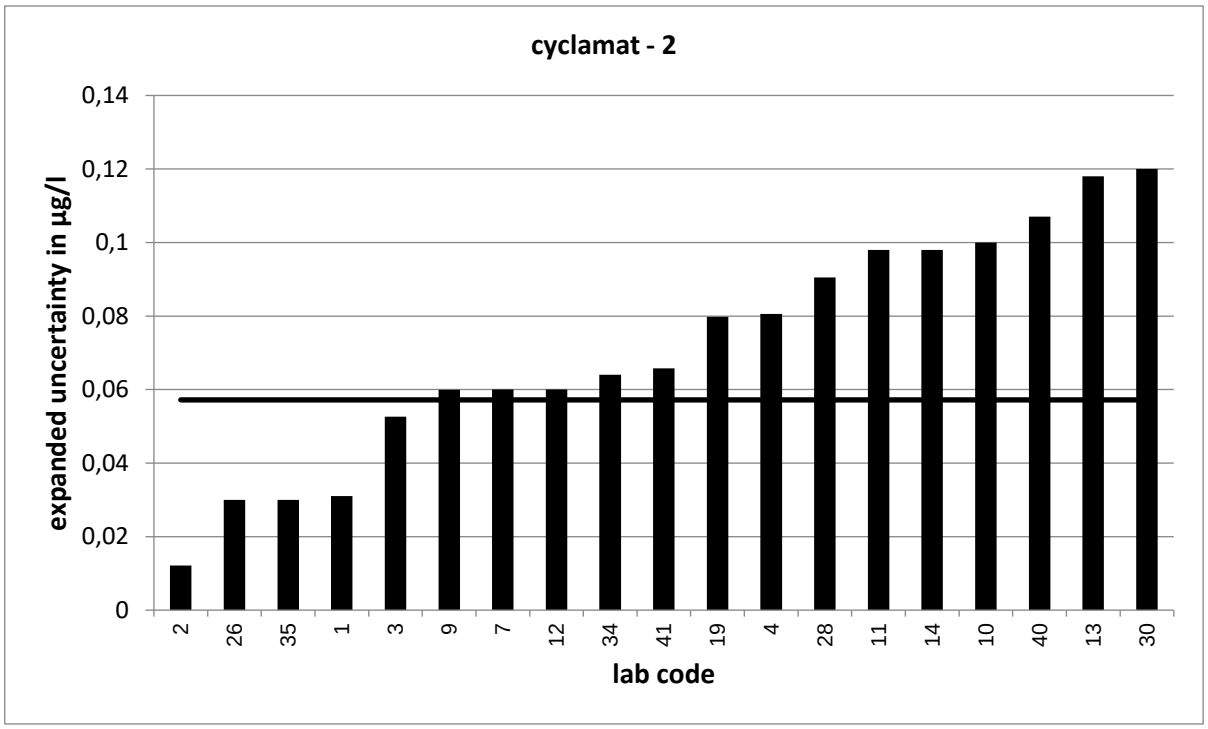
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

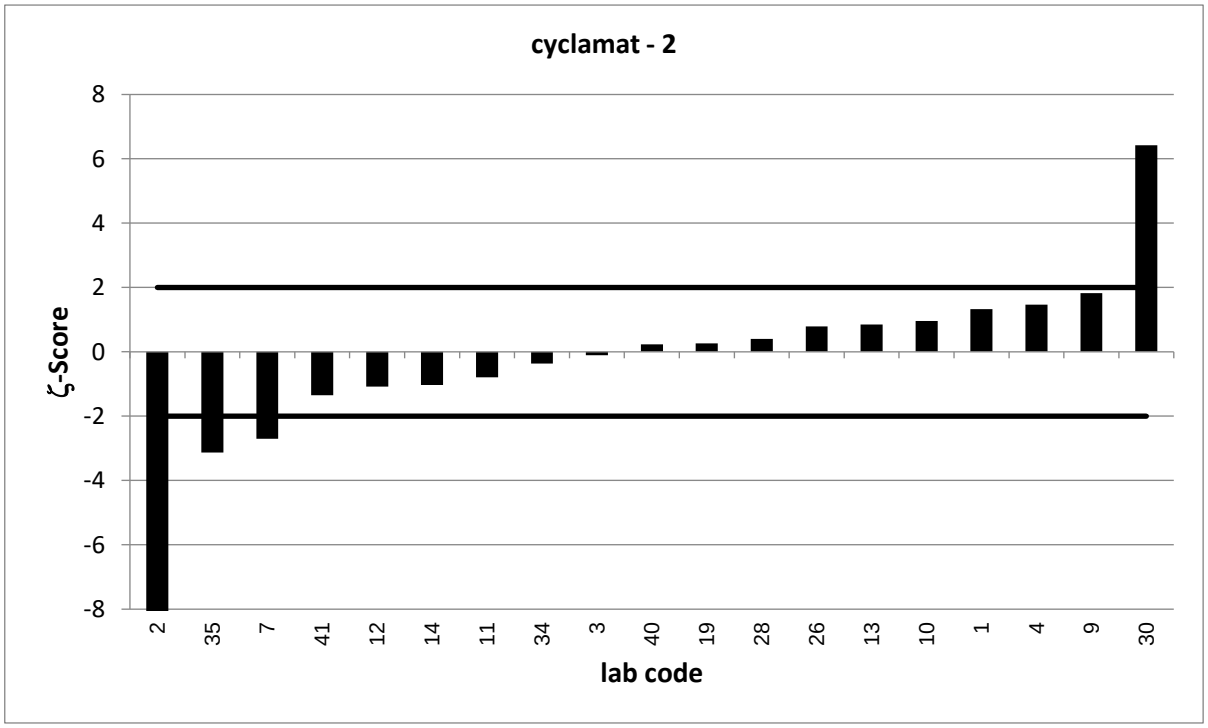
** s = satisfactory, q = questionable, u = unsatisfactory



Strongly deviating values are not shown in the diagram.





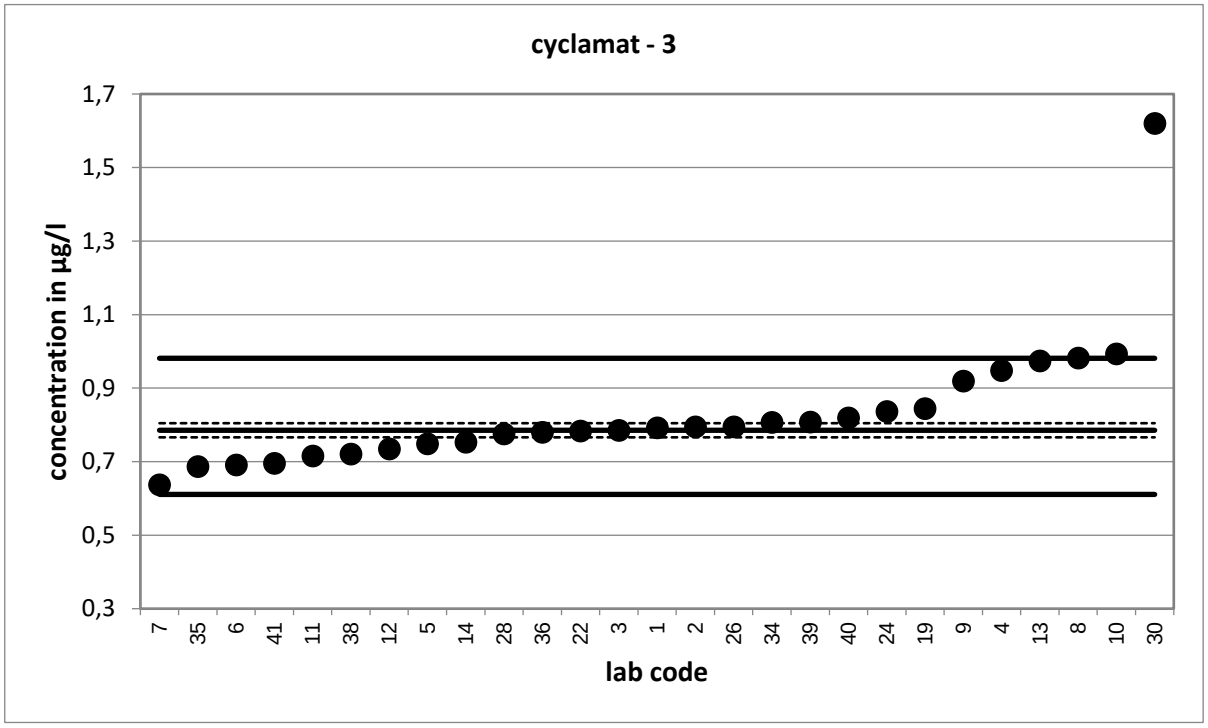


Strongly deviating values are not correctly shown in the diagram.

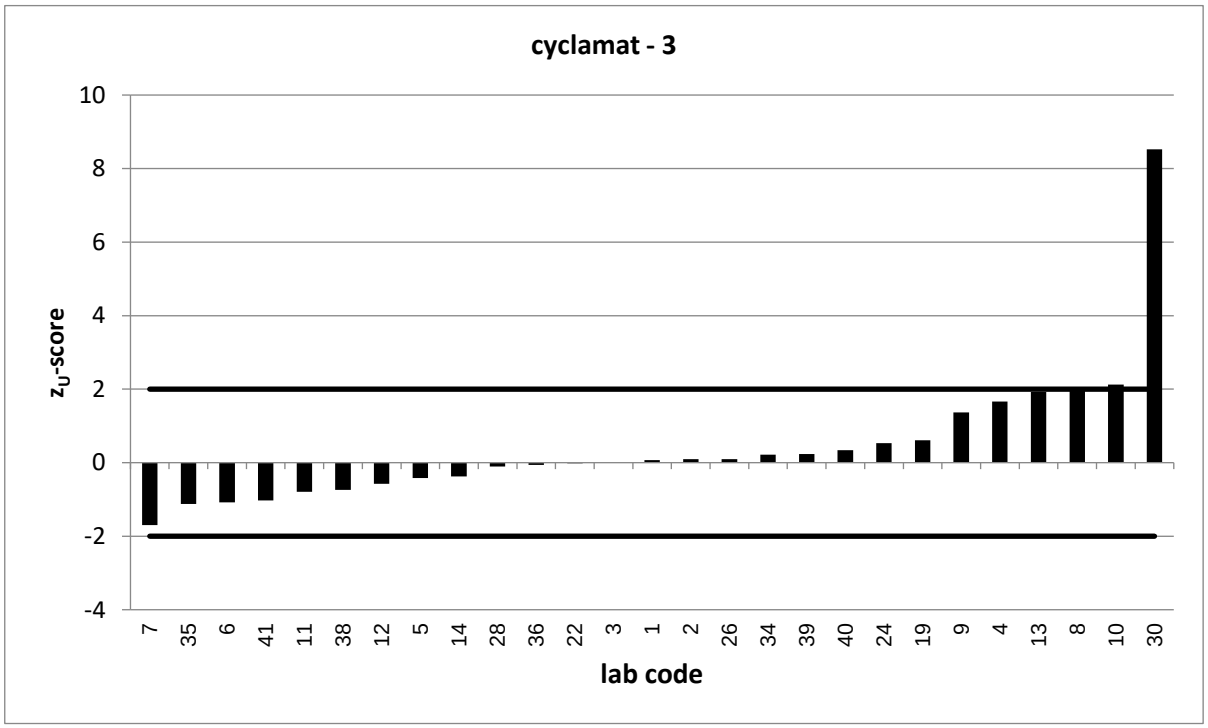
PT 4/22 - TW S1		cyclamat - 3			
assigned value [µg/l]*			0,7853	± 0,0192	
upper tolerance limit [µg/l]			0,9811		
lower tolerance limit [µg/l]			0,6109		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,792	0,068	0,2	0,1	s
2	0,795	0,112	0,2	0,1	s
3	0,785	0,121	0,0	0,0	s
4	0,948	0,19	1,7	1,7	s
5	0,749			-0,4	s
6	0,691			-1,1	s
7	0,637	0,146	-2,0	-1,7	s
8	0,982			2,0	s
9	0,919	0,138	1,9	1,4	s
10	0,993	0,25	1,7	2,1	q
11	0,716	0,229	-0,6	-0,8	s
12	0,735	0,14	-0,7	-0,6	s
13	0,974	0,292	1,3	1,9	s
14	0,753	0,18	-0,4	-0,4	s
19	0,8448	0,19	0,6	0,6	s
22	0,784			0,0	s
24	0,837			0,5	s
26	0,795	0,09	0,2	0,1	s
28	0,776	0,194	-0,1	-0,1	s
30	1,62	0,28	5,9	8,5	u
34	0,807	0,16	0,3	0,2	s
35	0,687	0,069	-2,7	-1,1	s
36	0,78			-0,1	s
38	0,721			-0,7	s
39	0,808			0,2	s
40	0,819	0,246	0,3	0,3	s
41	0,696	0,153	-1,2	-1,0	s

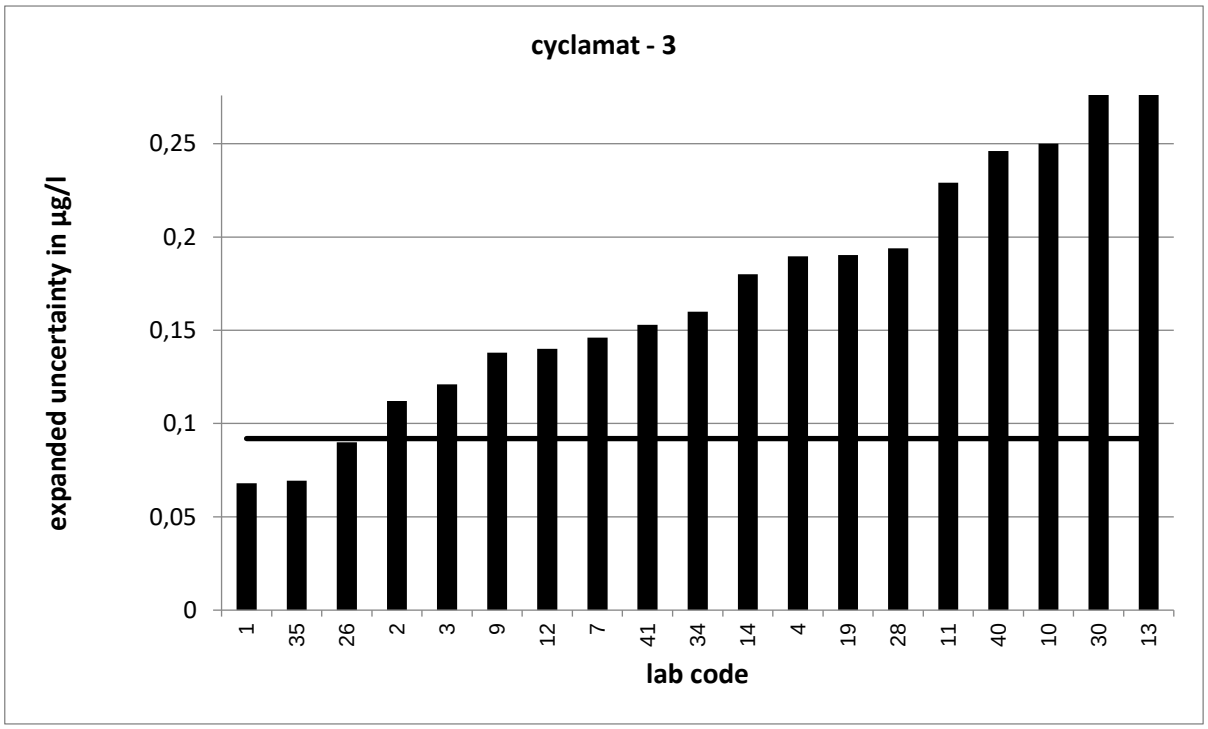
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

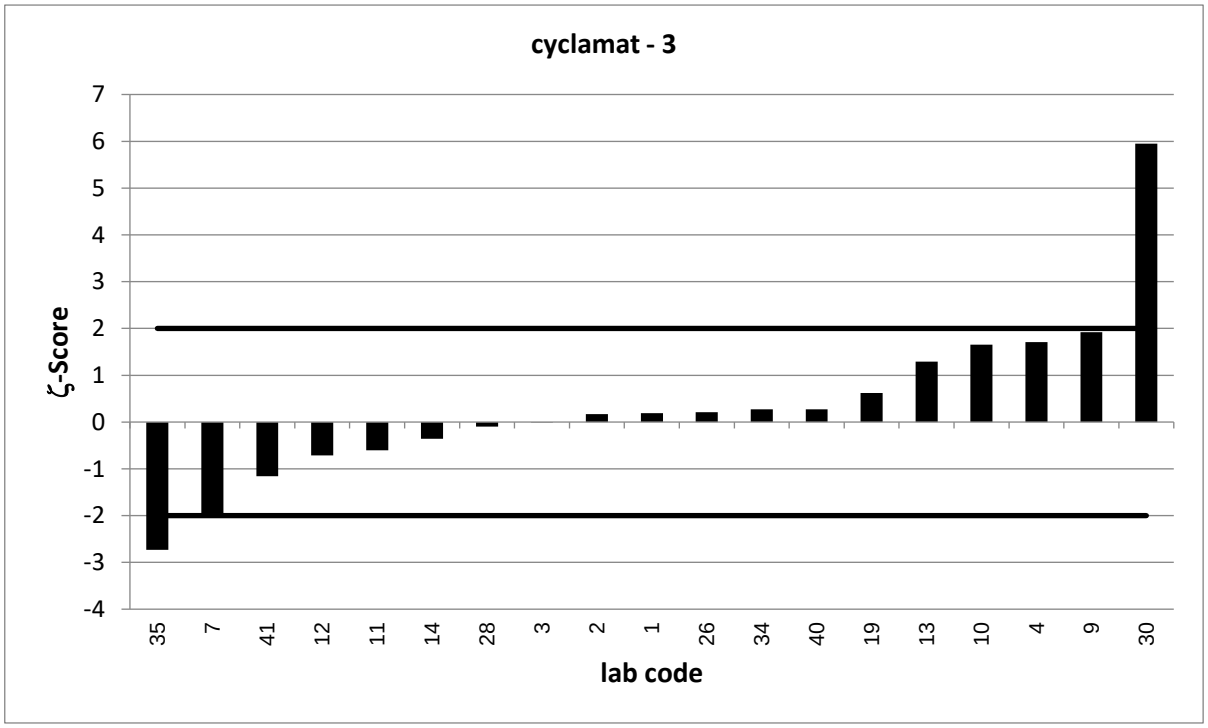


Strongly deviating values are not shown in the diagram.





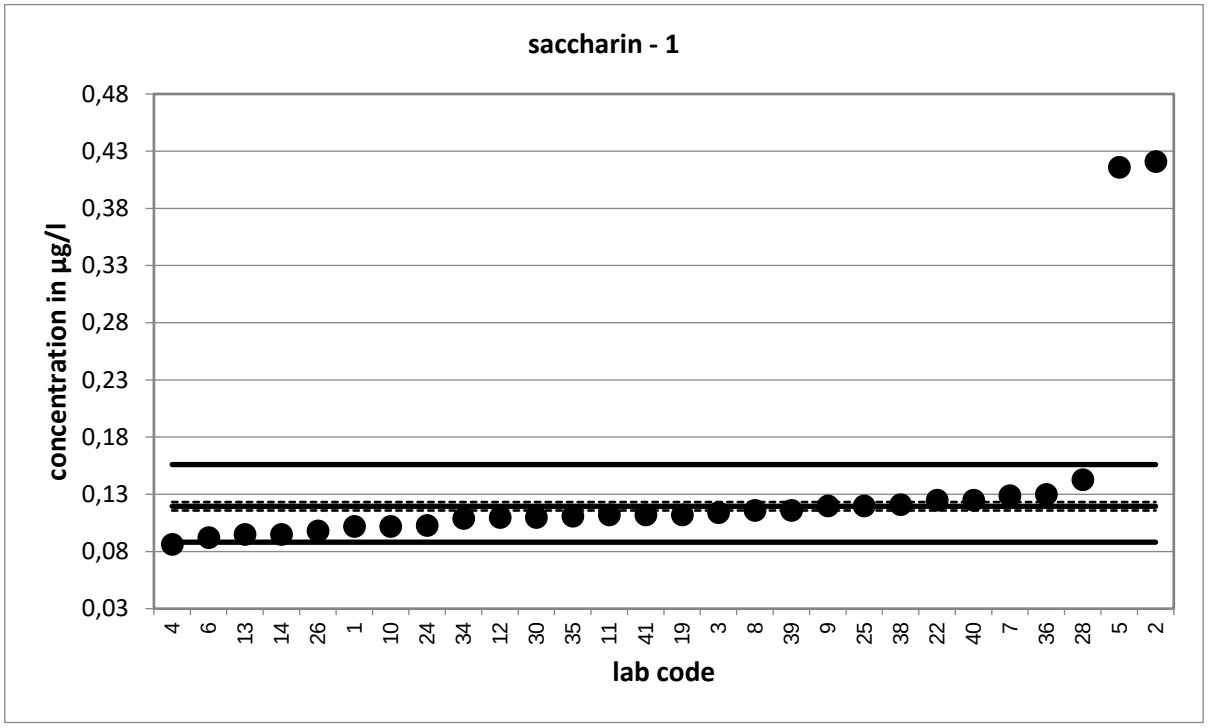
Strongly deviating values are not correctly shown in the diagram.



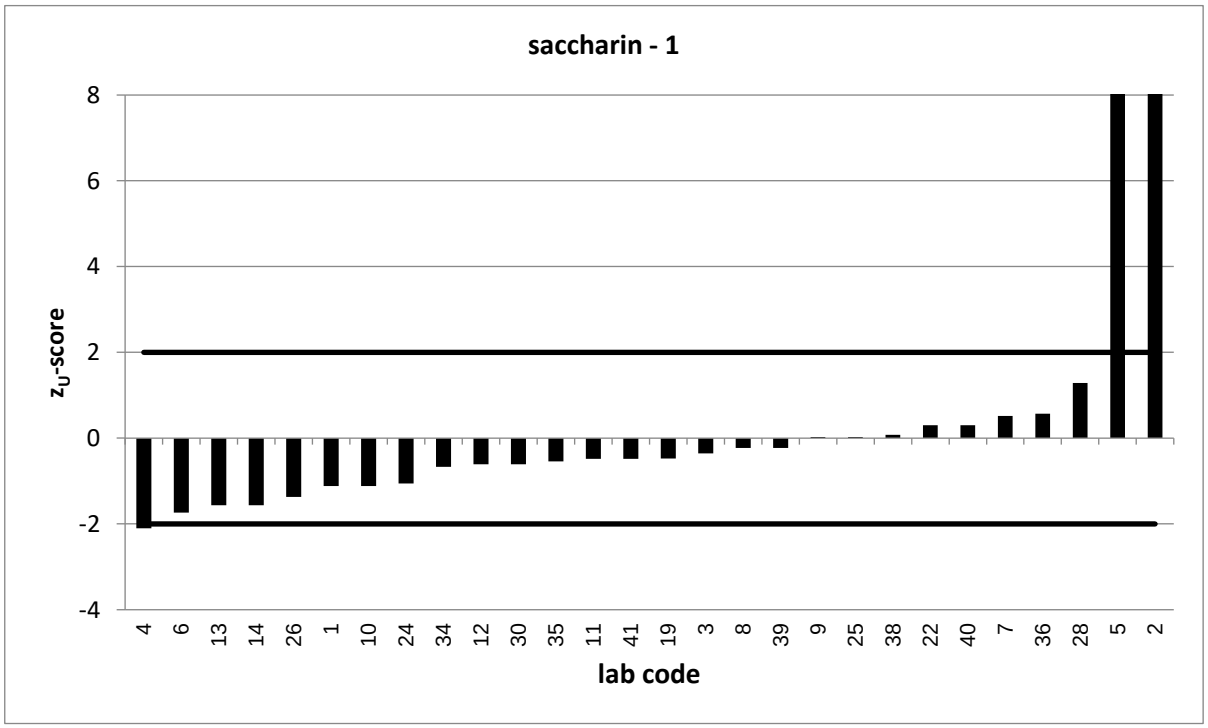
PT 4/22 - TW S1		saccharin - 1			
assigned value [µg/l]*			0,1195	± 0,0037	
upper tolerance limit [µg/l]			0,156		
lower tolerance limit [µg/l]			0,08815		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,102	0,009	-3,6	-1,1	s
2	0,421	0,071	8,5	16,5	u
3	0,114	0,017	-0,7	-0,4	s
4	0,0865	0,017	-3,7	-2,1	q
5	0,416			16,3	u
6	0,0923			-1,7	s
7	0,129	0,034	0,6	0,5	s
8	0,116			-0,2	s
9	0,12	0,018	0,0	0,0	s
10	0,102	0,025	-1,4	-1,1	s
11	0,112	0,036	-0,4	-0,5	s
12	0,11	0,03	-0,6	-0,6	s
13	0,095	0,029	-1,7	-1,6	s
14	0,095	0,024	-2,0	-1,6	s
19	0,1121	0,029	-0,5	-0,5	s
22	0,125			0,3	s
24	0,103			-1,1	s
25	0,12			0,0	s
26	0,098	0,03	-1,4	-1,4	s
28	0,143	0,036	1,3	1,3	s
30	0,11	0,03	-0,6	-0,6	s
34	0,109	0,018	-1,1	-0,7	s
35	0,111	0,022	-0,8	-0,5	s
36	0,13			0,6	s
38	0,121			0,1	s
39	0,116			-0,2	s
40	0,125	0,038	0,3	0,3	s
41	0,112	0,038	-0,4	-0,5	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

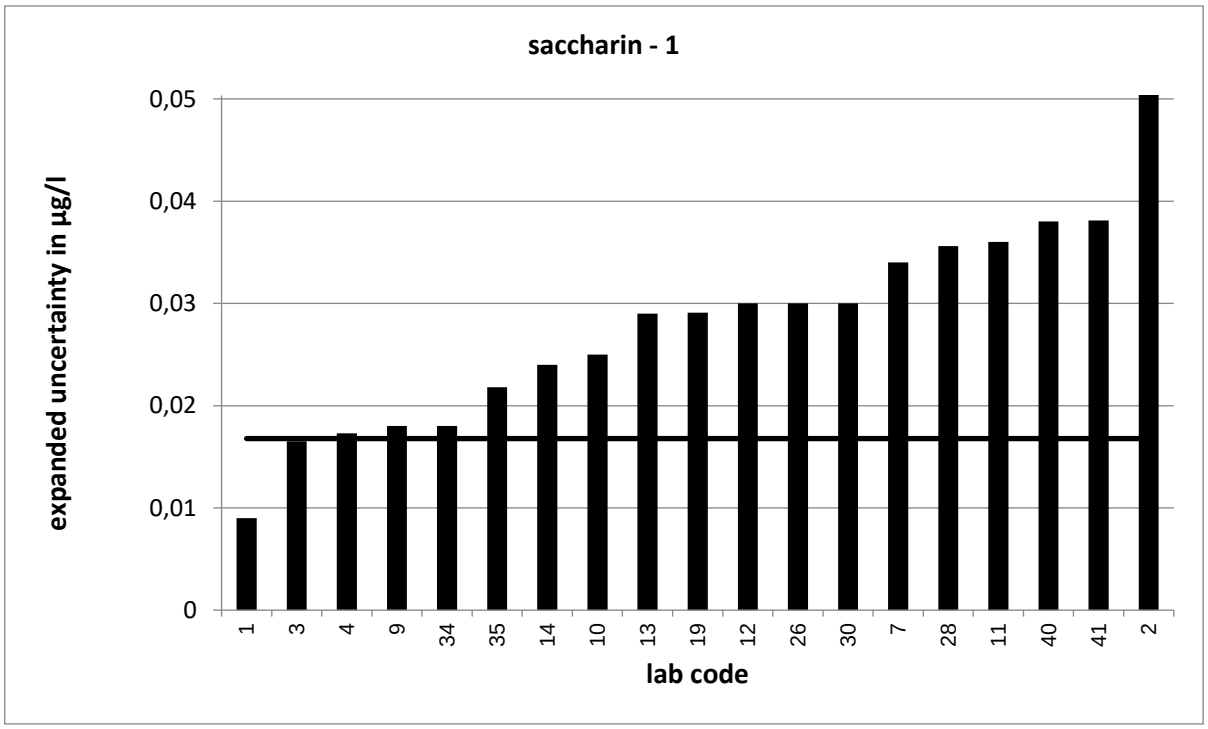
** s = satisfactory, q = questionable, u = unsatisfactory



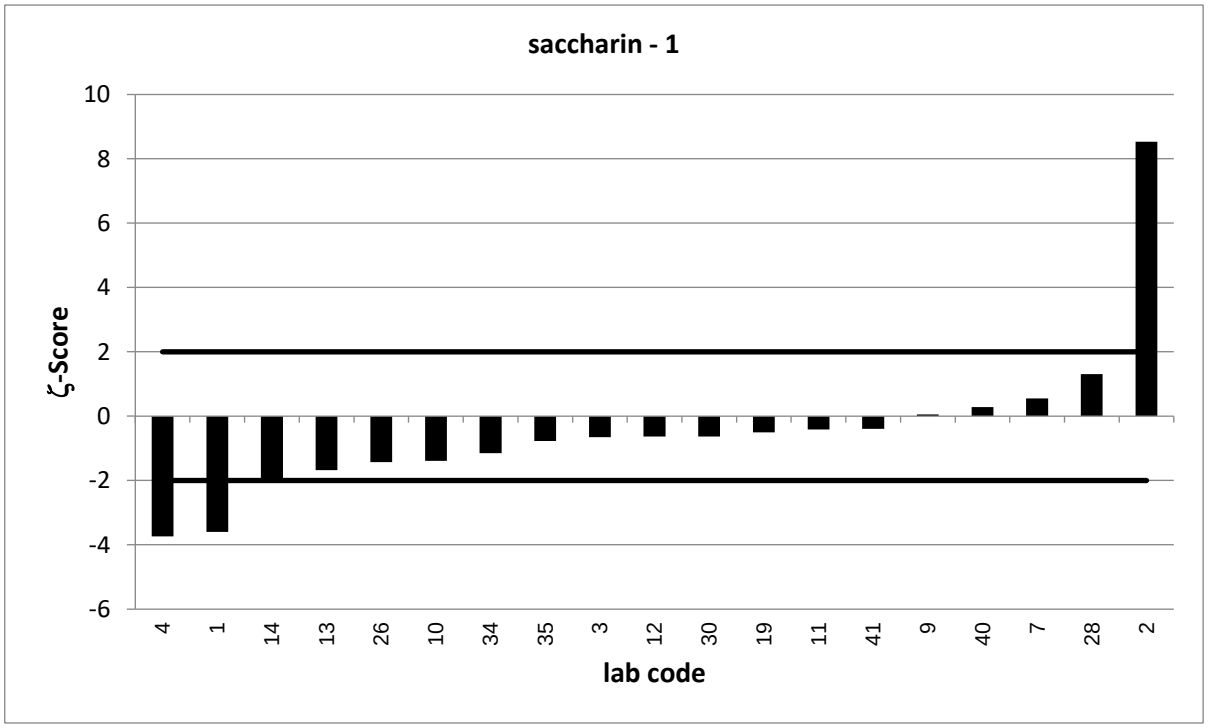
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



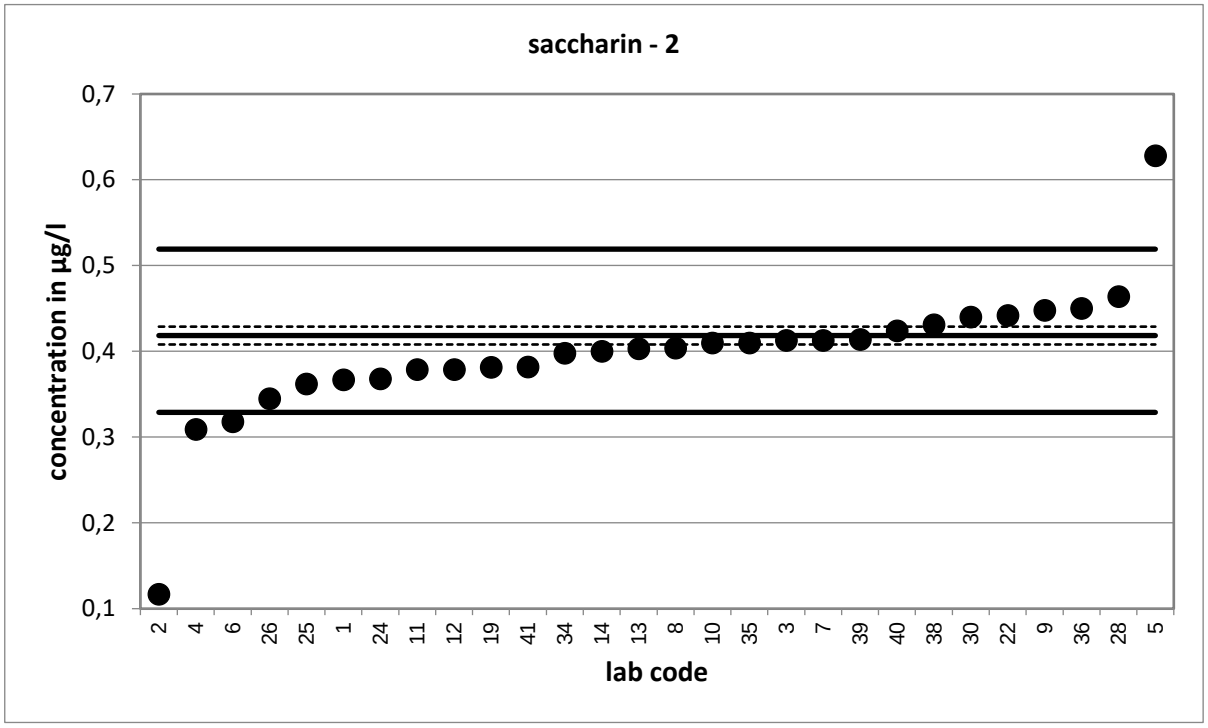
Strongly deviating values are not correctly shown in the diagram.



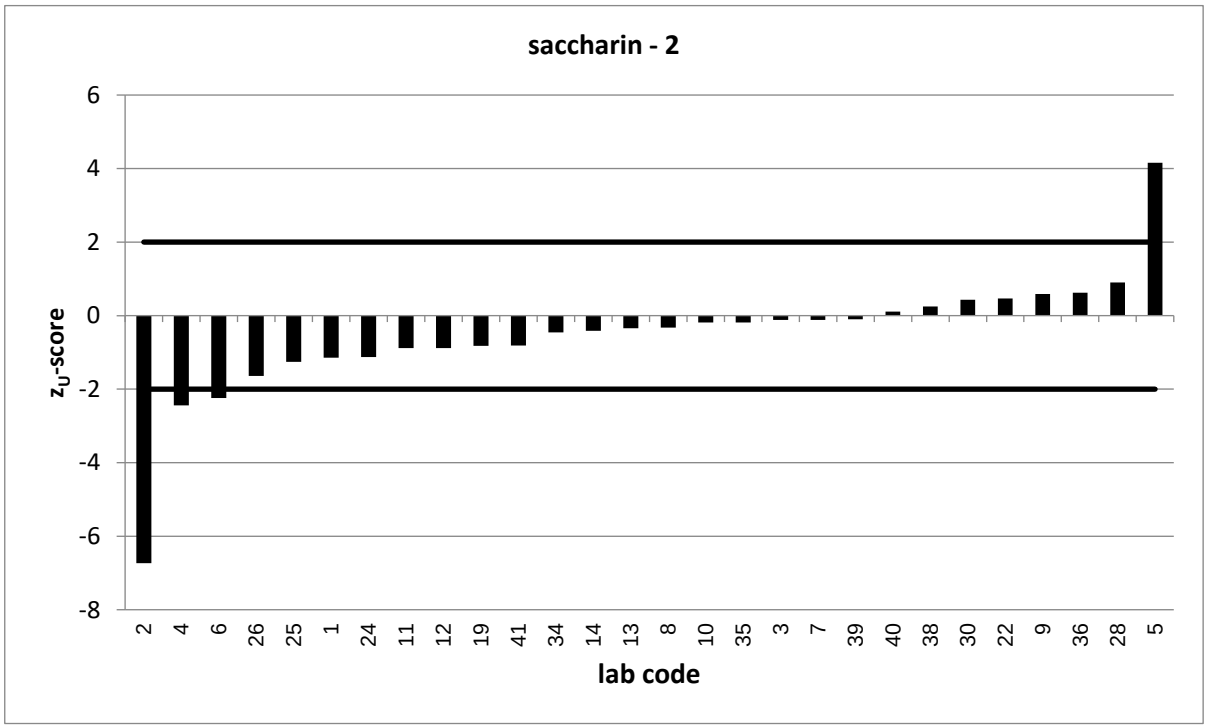
PT 4/22 - TW S1		saccharin - 2			
assigned value [µg/l]*			0,4184	± 0,0104	
upper tolerance limit [µg/l]			0,5192		
lower tolerance limit [µg/l]			0,3289		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,367	0,032	-3,1	-1,1	s
2	0,117	0,019	-28,2	-6,7	u
3	0,413	0,06	-0,2	-0,1	s
4	0,309	0,062	-3,5	-2,4	q
5	0,628			4,2	u
6	0,318			-2,2	q
7	0,413	0,107	-0,1	-0,1	s
8	0,404			-0,3	s
9	0,448	0,067	0,9	0,6	s
10	0,41	0,1	-0,2	-0,2	s
11	0,379	0,121	-0,6	-0,9	s
12	0,379	0,06	-1,3	-0,9	s
13	0,403	0,121	-0,3	-0,3	s
14	0,4	0,1	-0,4	-0,4	s
19	0,3815	0,099	-0,7	-0,8	s
22	0,442			0,5	s
24	0,368			-1,1	s
25	0,362			-1,3	s
26	0,345	0,05	-2,9	-1,6	s
28	0,464	0,116	0,8	0,9	s
30	0,44	0,12	0,4	0,4	s
34	0,398	0,068	-0,6	-0,5	s
35	0,41	0,08	-0,2	-0,2	s
36	0,45			0,6	s
38	0,431			0,3	s
39	0,414			-0,1	s
40	0,424	0,127	0,1	0,1	s
41	0,382	0,13	-0,6	-0,8	s

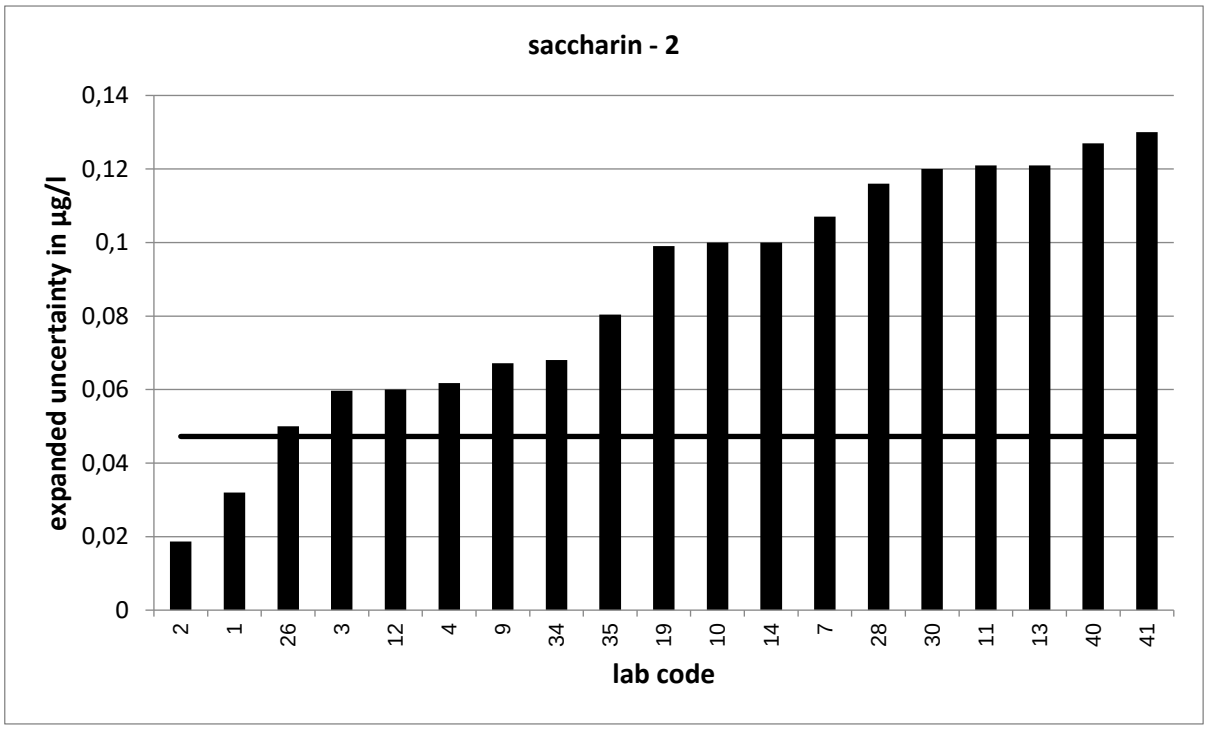
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

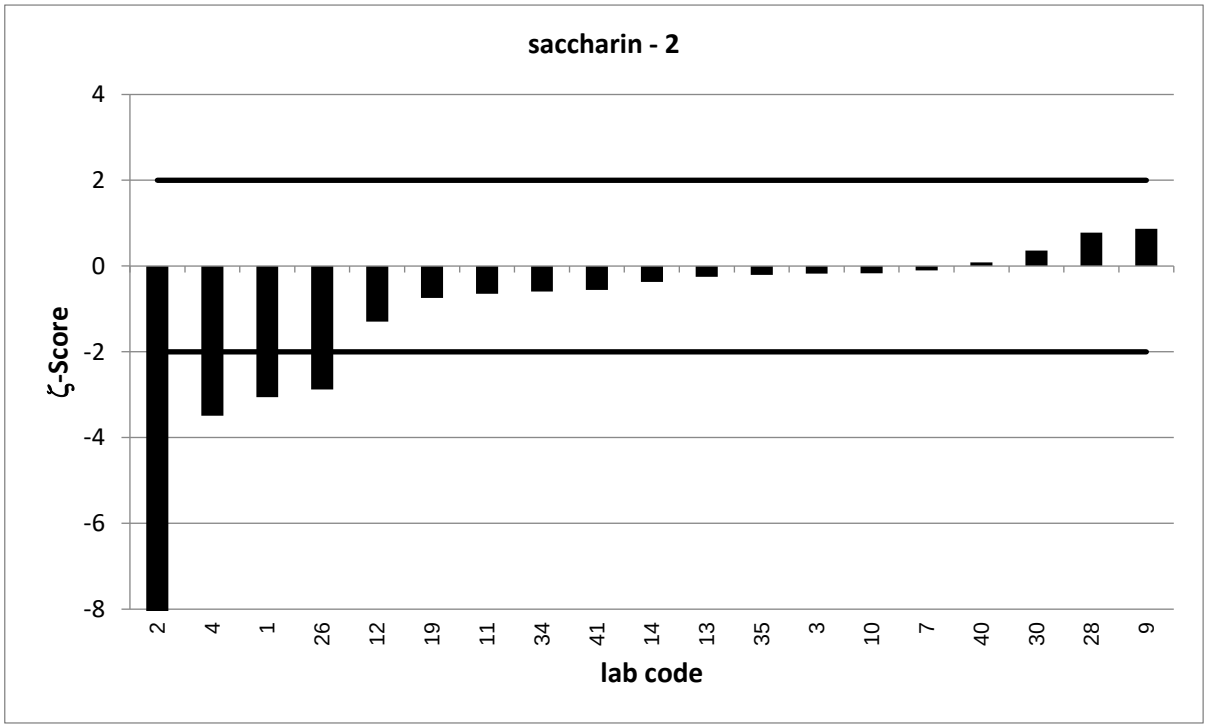
** s = satisfactory, q = questionable, u = unsatisfactory



Strongly deviating values are not shown in the diagram.





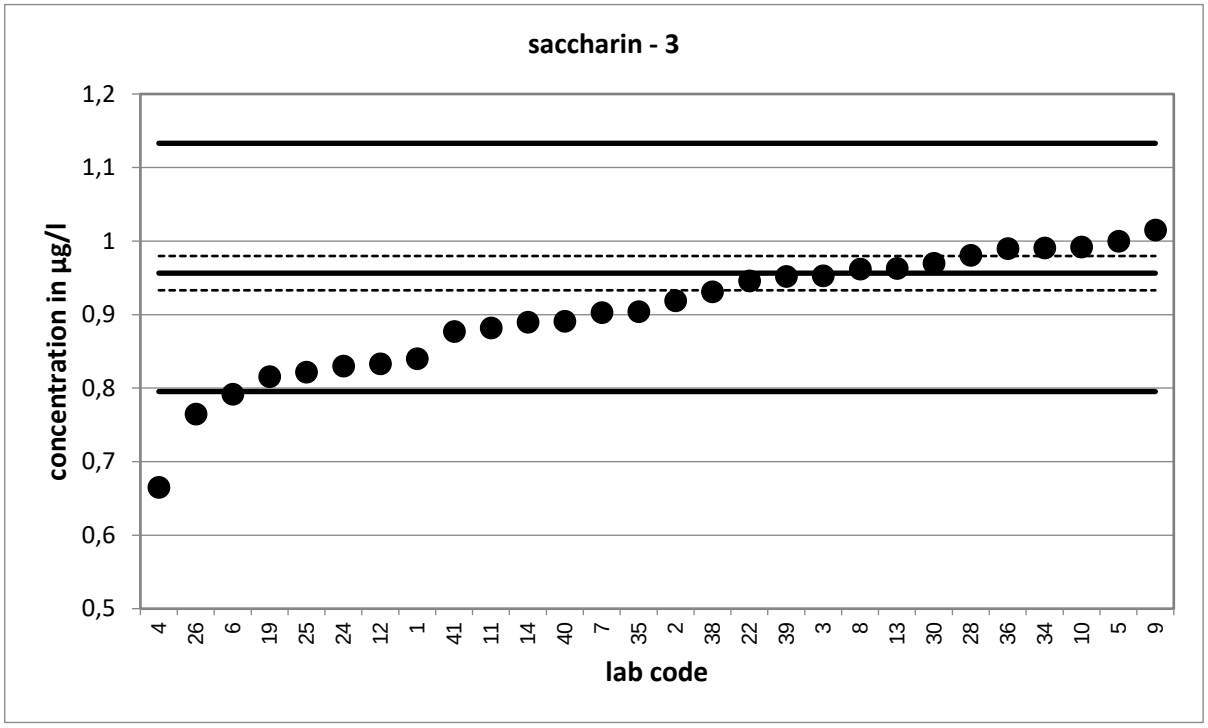


Strongly deviating values are not correctly shown in the diagram.

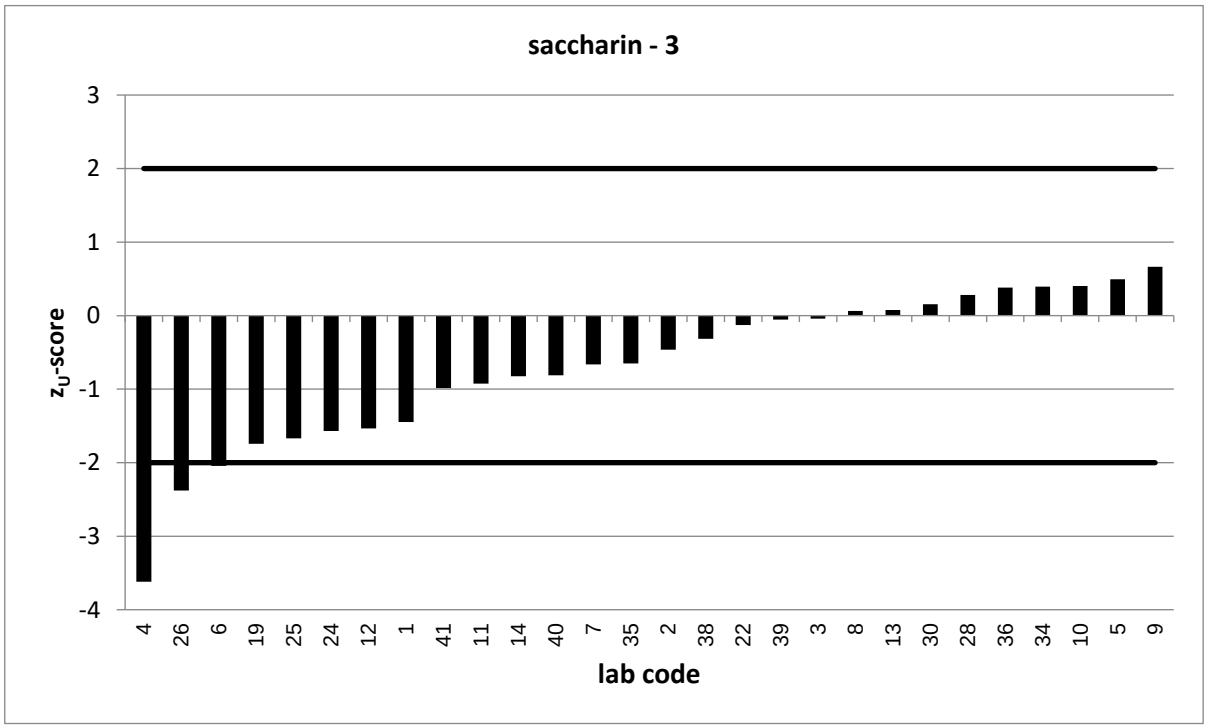
PT 4/22 - TW S1		saccharin - 3			
assigned value [µg/l]*			0,9564	± 0,0233	
upper tolerance limit [µg/l]			1,133		
lower tolerance limit [µg/l]			0,7953		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,84	0,072	-3,1	-1,4	s
2	0,919	0,152	-0,5	-0,5	s
3	0,953	0,138	0,0	0,0	s
4	0,665	0,133	-4,3	-3,6	u
5	1			0,5	s
6	0,792			-2,0	s
7	0,903	0,235	-0,5	-0,7	s
8	0,962			0,1	s
9	1,015	0,152	0,8	0,7	s
10	0,992	0,25	0,3	0,4	s
11	0,882	0,282	-0,5	-0,9	s
12	0,833	0,2	-1,2	-1,5	s
13	0,963	0,289	0,0	0,1	s
14	0,89	0,23	-0,6	-0,8	s
19	0,816	0,212	-1,3	-1,7	s
22	0,946			-0,1	s
24	0,83			-1,6	s
25	0,822			-1,7	s
26	0,765	0,08	-4,6	-2,4	q
28	0,981	0,245	0,2	0,3	s
30	0,97	0,27	0,1	0,2	s
34	0,991	0,17	0,4	0,4	s
35	0,904	0,177	-0,6	-0,7	s
36	0,99			0,4	s
38	0,931			-0,3	s
39	0,952			-0,1	s
40	0,891	0,267	-0,5	-0,8	s
41	0,877	0,298	-0,5	-1,0	s

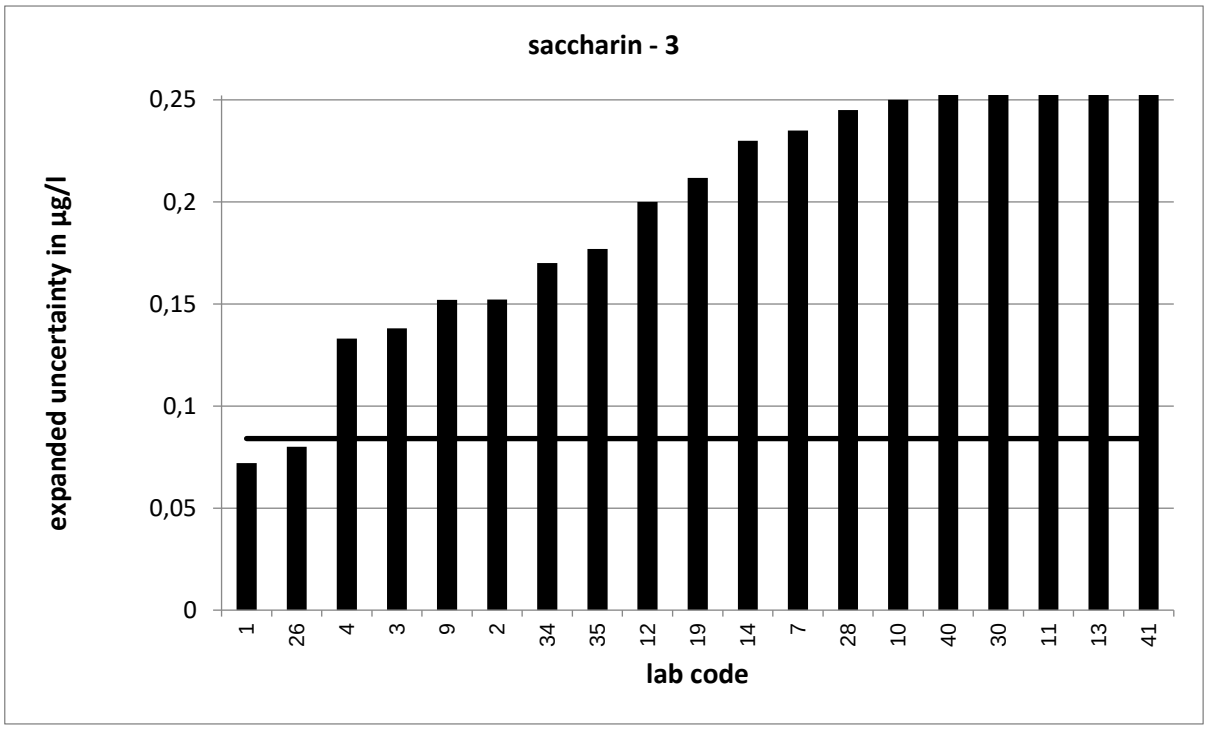
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

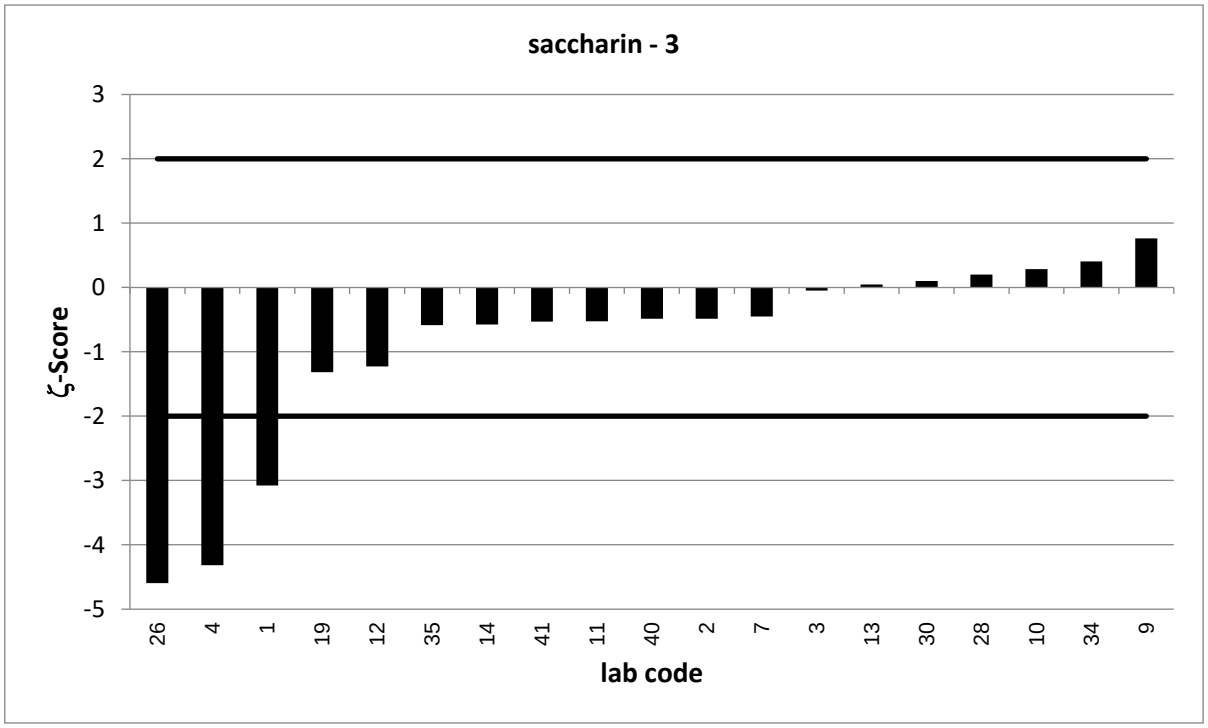


Strongly deviating values are not shown in the diagram.





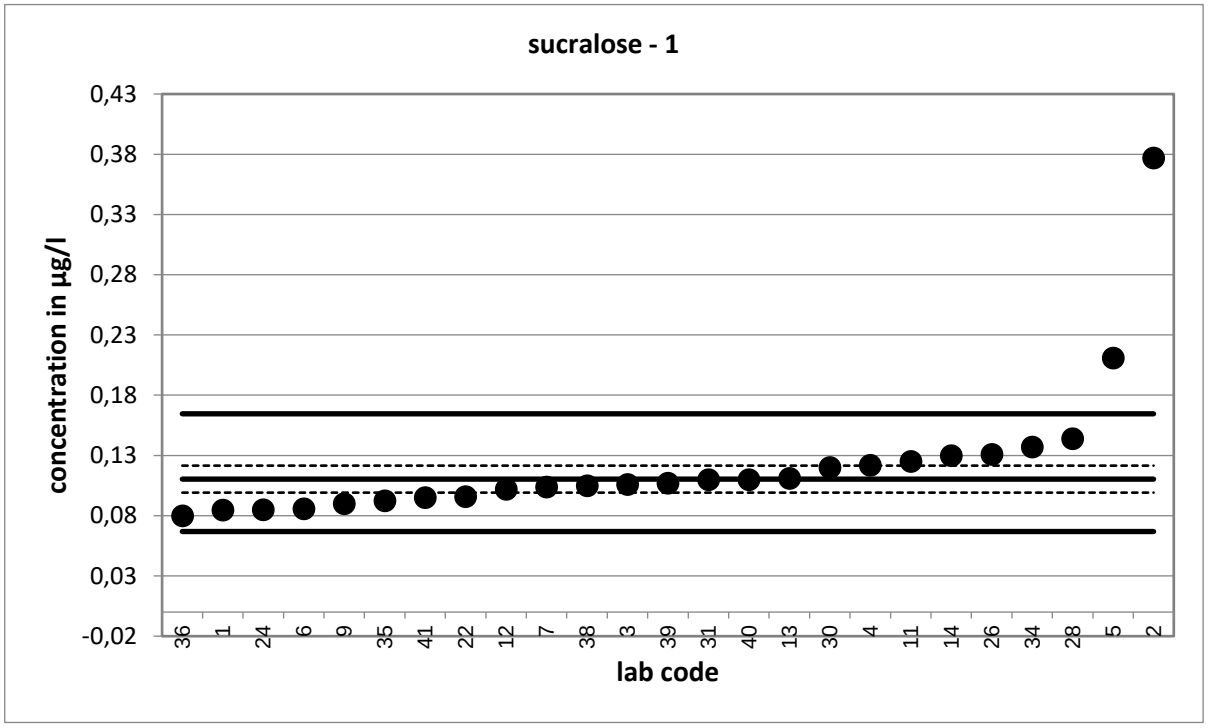
Strongly deviating values are not correctly shown in the diagram.



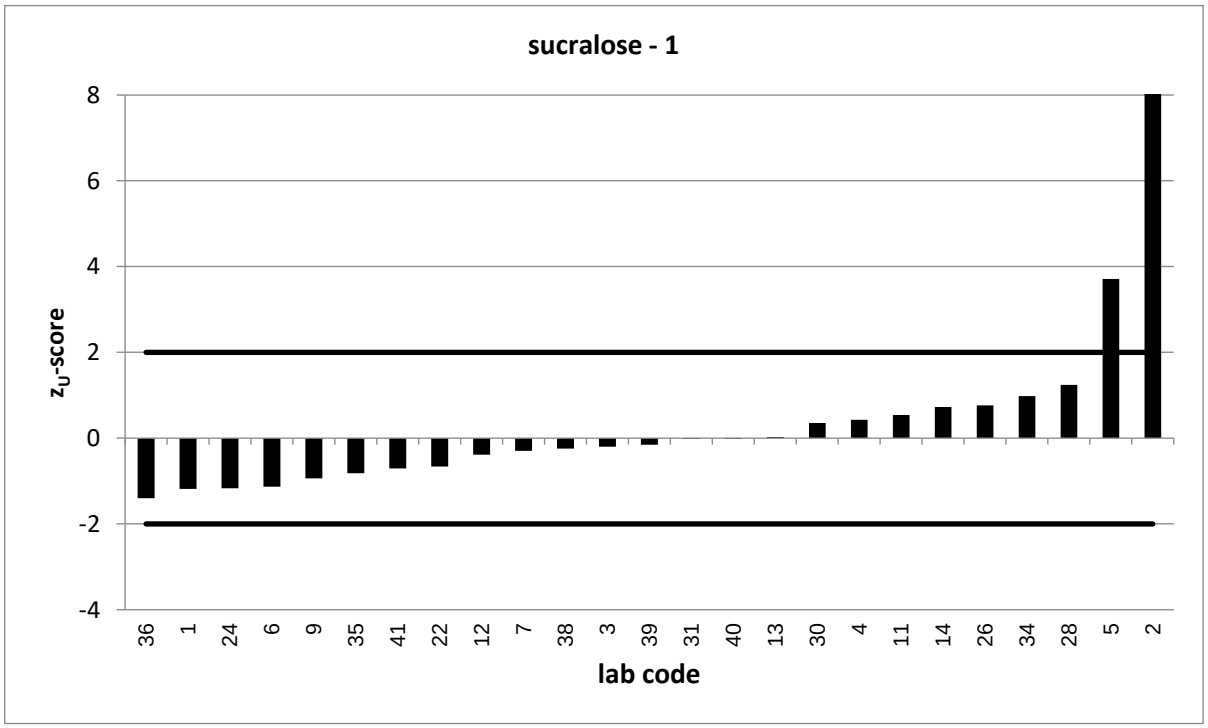
PT 4/22 - TW S1		sucralose - 1			
assigned value [µg/l]*			0,1103	± 0,0112	
upper tolerance limit [µg/l]			0,1646		
lower tolerance limit [µg/l]			0,06687		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,0847	0,008	-3,7	-1,2	s
2	0,377	0,059	8,9	9,8	u
3	0,106	0,013	-0,5	-0,2	s
4	0,122	0,024	0,9	0,4	s
5	0,211			3,7	u
6	0,0857			-1,1	s
7	0,104	0,019	-0,6	-0,3	s
9	0,09	0,016	-2,1	-0,9	s
11	0,125	0,04	0,7	0,5	s
12	0,102	0,03	-0,5	-0,4	s
13	0,111	0,033	0,0	0,0	s
14	0,13	0,03	1,2	0,7	s
22	0,096			-0,7	s
24	0,085			-1,2	s
26	0,131	0,02	1,8	0,8	s
28	0,144	0,036	1,8	1,2	s
30	0,12	0,04	0,5	0,4	s
31	0,11	0,028	0,0	0,0	s
34	0,137	0,019	2,4	1,0	s
35	0,0925	0,033	-1,0	-0,8	s
36	0,08			-1,4	s
38	0,105			-0,2	s
39	0,107			-0,2	s
40	0,11	0,033	0,0	0,0	s
41	0,095	0,049	-0,6	-0,7	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

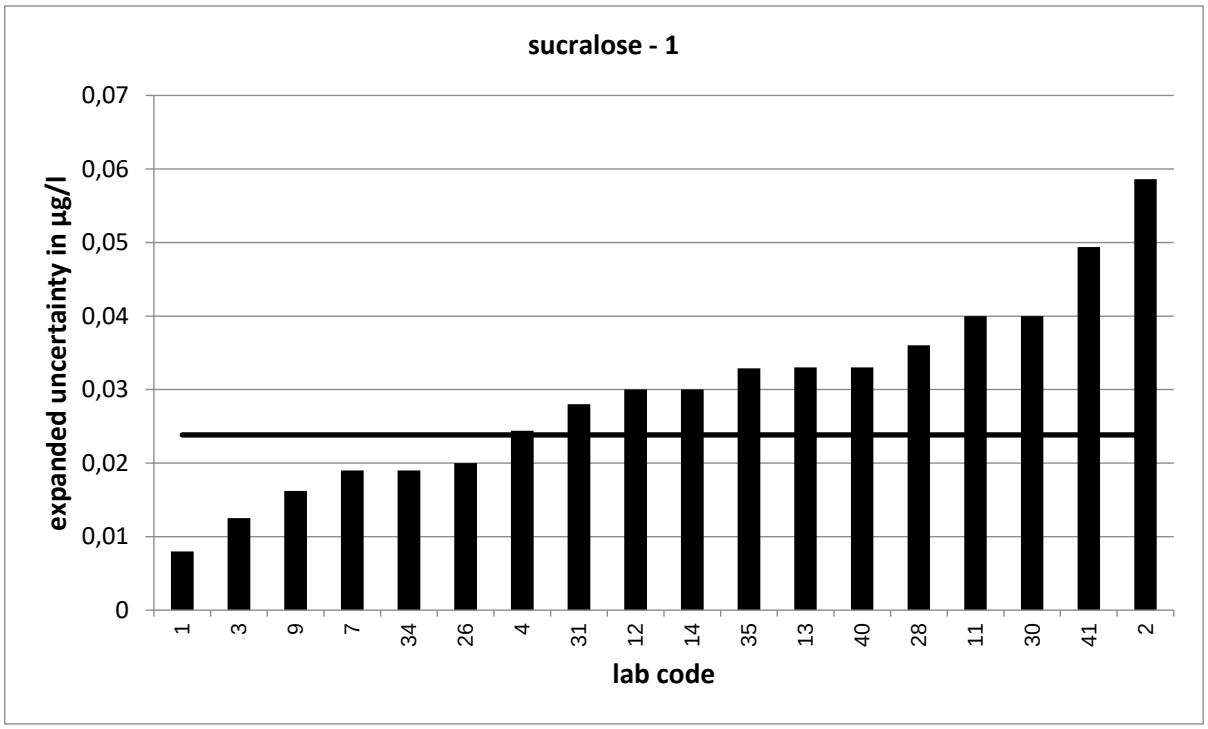
** s = satisfactory, q = questionable, u = unsatisfactory

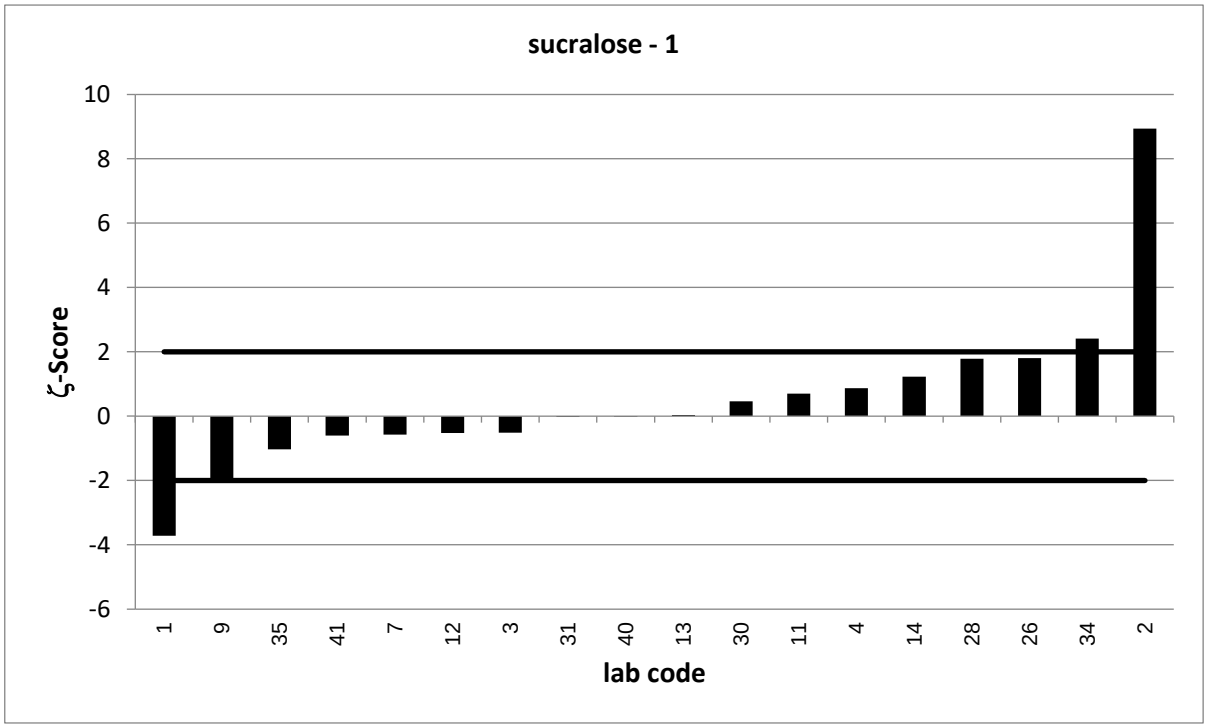


Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.

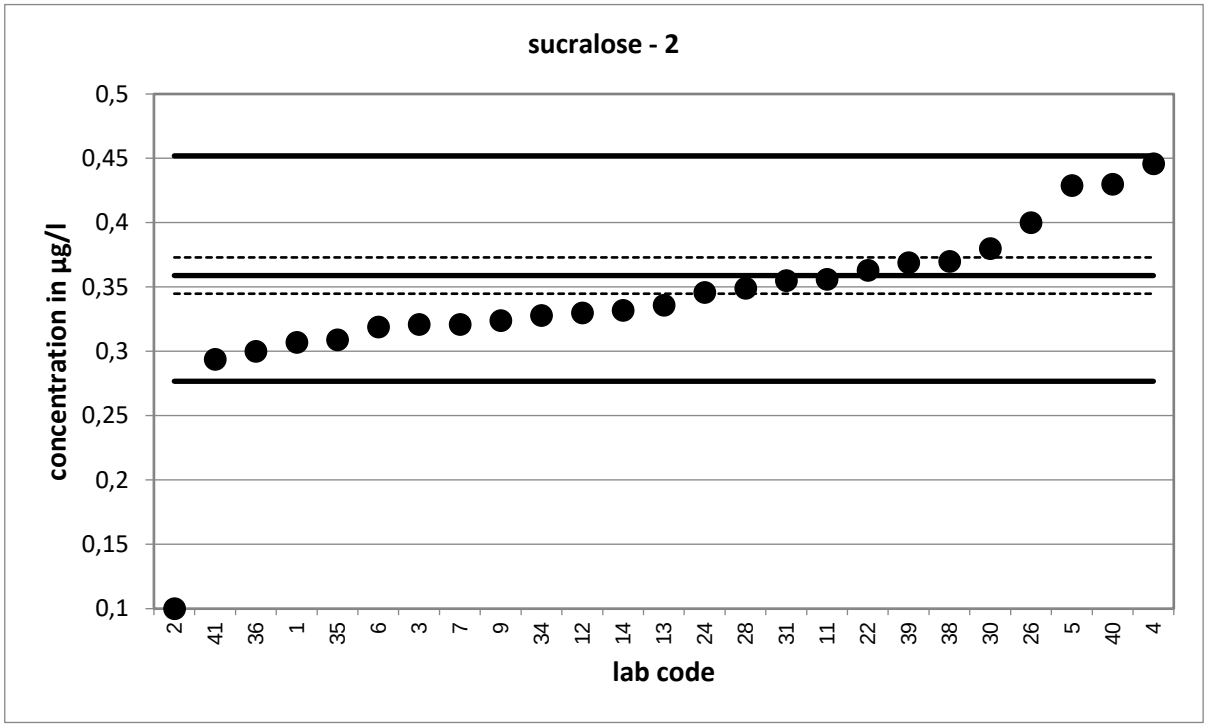

sucralose - 1
expanded uncertainty in µg/l
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0
1 3 9 7 34 26 4 31 12 14 35 13 40 28 11 30 41 2
lab code


sucralose - 1
ζ-Score
10
8
6
4
2
0
-2
-4
-6
1 9 35 41 7 12 3 31 40 13 30 11 4 14 28 26 34 2
lab code

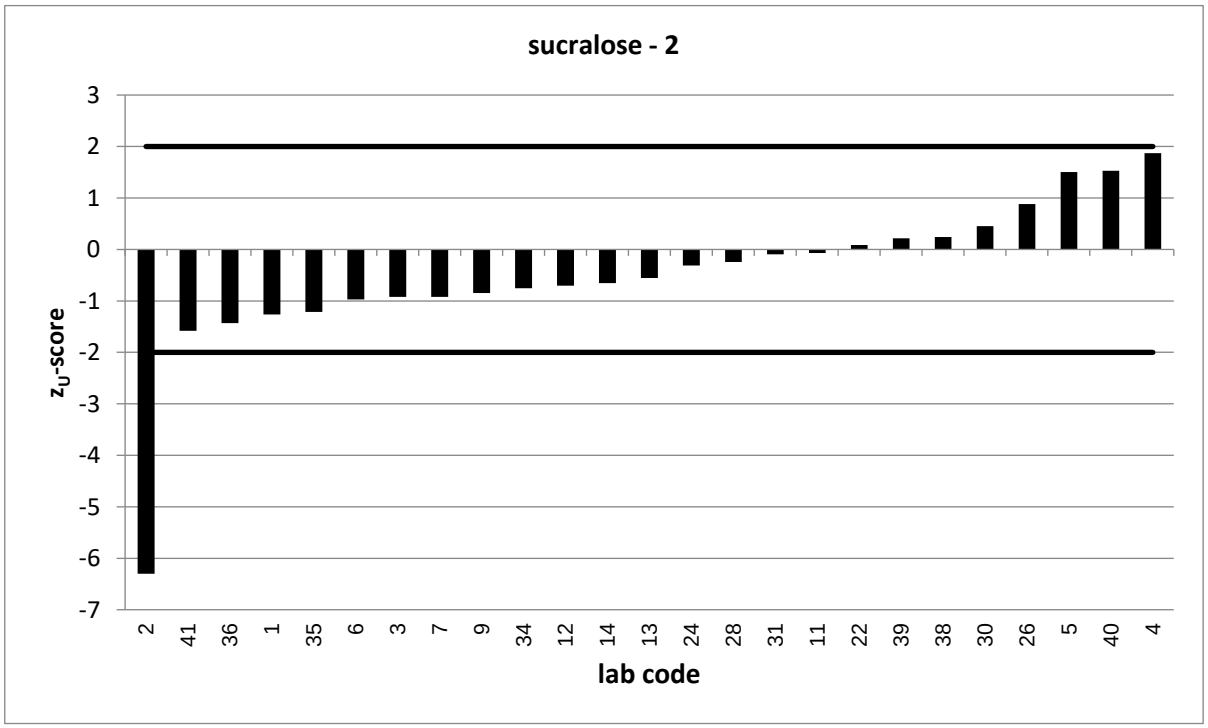
PT 4/22 - TW S1		sucralose - 2			
assigned value [µg/l]*			0,3589	± 0,0141	
upper tolerance limit [µg/l]			0,4519		
lower tolerance limit [µg/l]			0,2768		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,307	0,029	-3,2	-1,3	s
2	0,1	0,015	-25,6	-6,3	u
3	0,321	0,038	-1,9	-0,9	s
4	0,446	0,089	1,9	1,9	s
5	0,429			1,5	s
6	0,319			-1,0	s
7	0,321	0,058	-1,3	-0,9	s
9	0,324	0,058	-1,2	-0,8	s
11	0,356	0,114	-0,1	-0,1	s
12	0,33	0,08	-0,7	-0,7	s
13	0,336	0,101	-0,4	-0,6	s
14	0,332	0,08	-0,7	-0,7	s
22	0,363			0,1	s
24	0,346			-0,3	s
26	0,4	0,1	0,8	0,9	s
28	0,349	0,087	-0,2	-0,2	s
30	0,38	0,12	0,3	0,5	s
31	0,355	0,089	-0,1	-0,1	s
34	0,328	0,045	-1,3	-0,8	s
35	0,309	0,11	-0,9	-1,2	s
36	0,3			-1,4	s
38	0,37			0,2	s
39	0,369			0,2	s
40	0,43	0,129	1,1	1,5	s
41	0,294	0,153	-0,8	-1,6	s

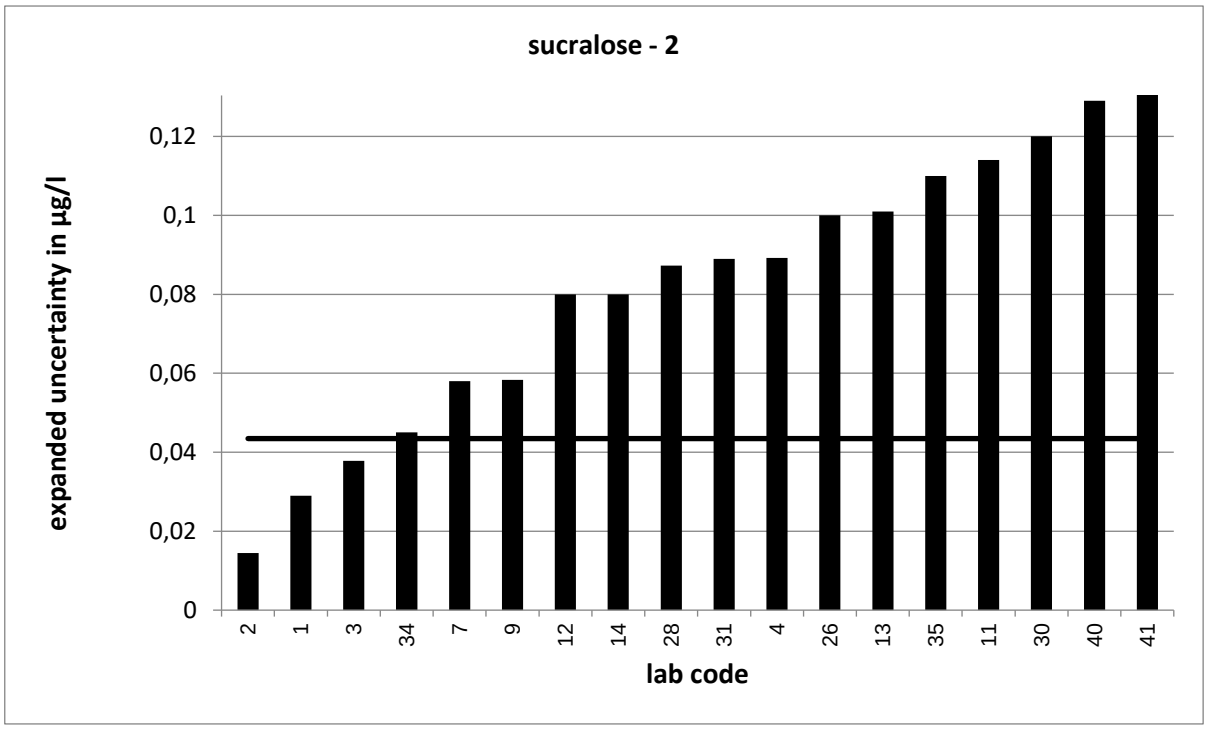
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

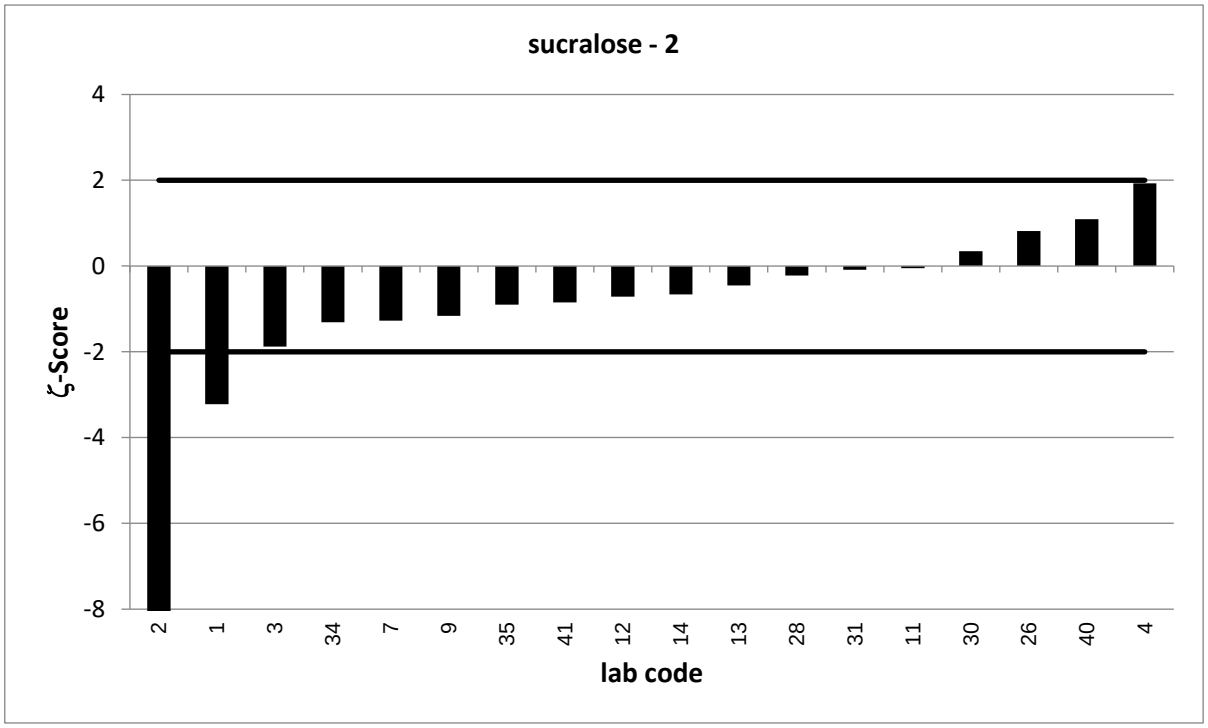


Strongly deviating values are not shown in the diagram.





Strongly deviating values are not correctly shown in the diagram.

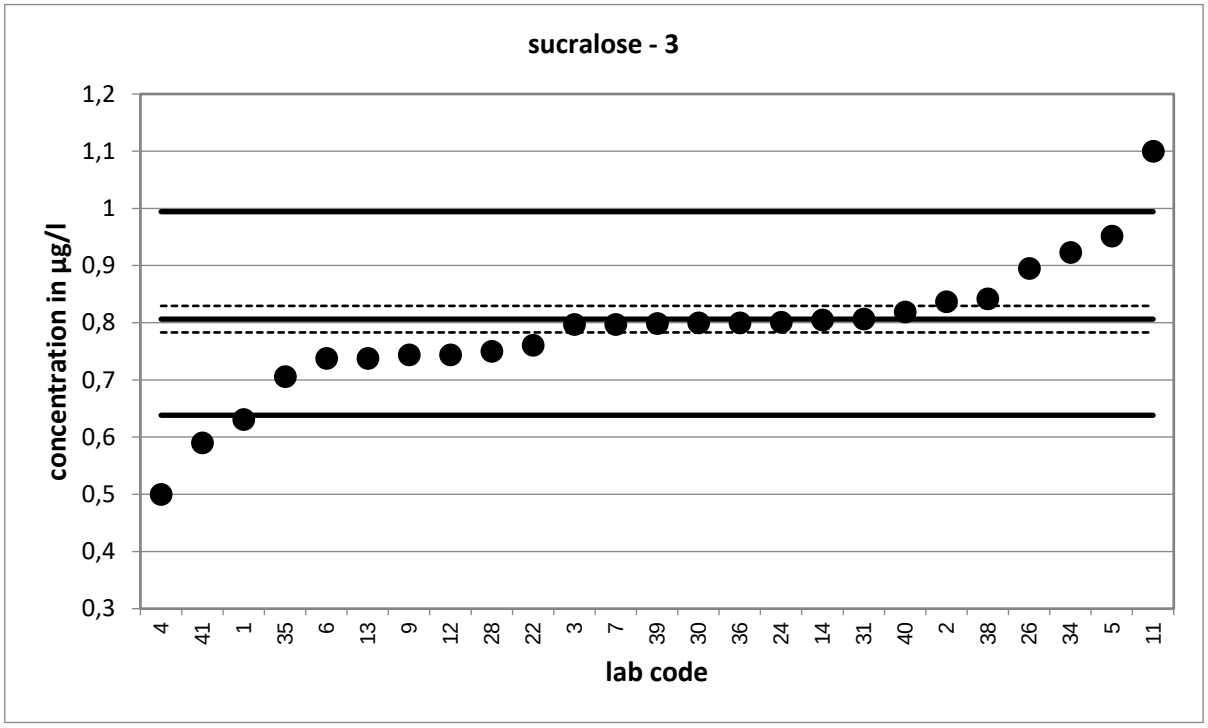


Strongly deviating values are not correctly shown in the diagram.

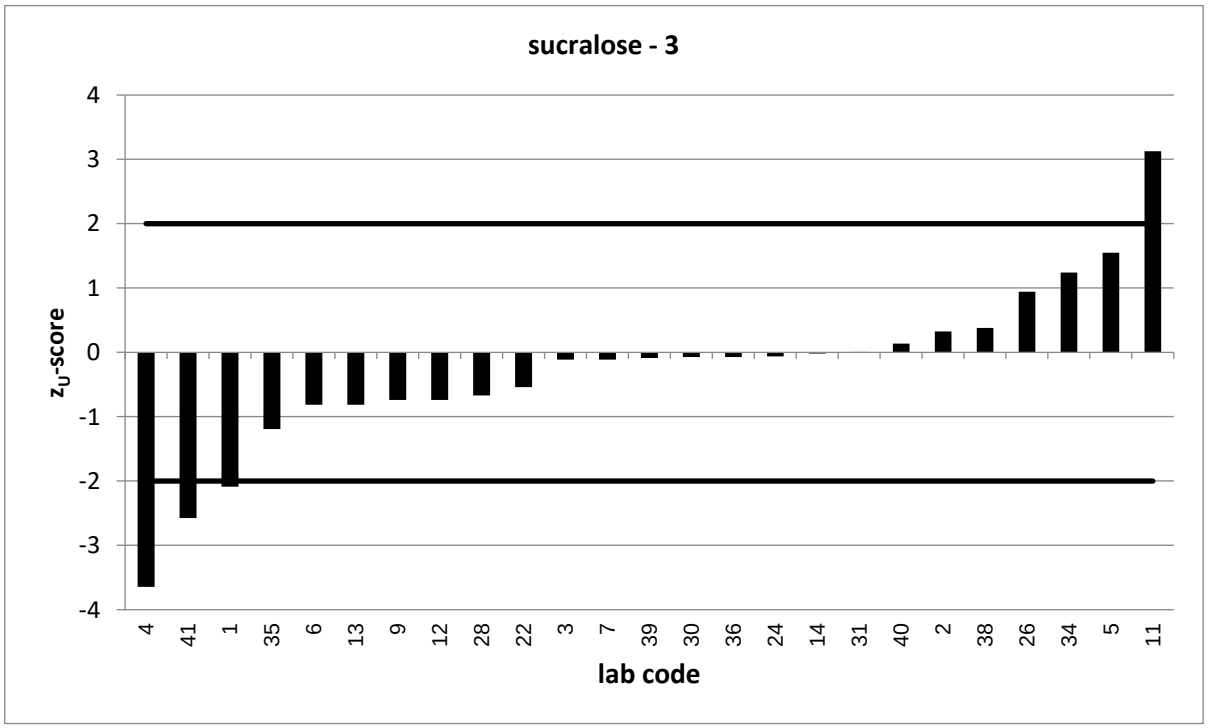
PT 4/22 - TW S1		sucralose - 3			
assigned value [µg/l]*			0,8063	± 0,0232	
upper tolerance limit [µg/l]			0,9942		
lower tolerance limit [µg/l]			0,6383		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,631	0,059	-5,5	-2,1	q
2	0,837	0,133	0,5	0,3	s
3	0,797	0,094	-0,2	-0,1	s
4	0,5	0,1	-6,0	-3,6	u
5	0,952			1,6	s
6	0,738			-0,8	s
7	0,797	0,144	-0,1	-0,1	s
9	0,744	0,134	-0,9	-0,7	s
11	1,1	0,35	1,7	3,1	u
12	0,744	0,16	-0,8	-0,7	s
13	0,738	0,221	-0,6	-0,8	s
14	0,805	0,2	0,0	0,0	s
22	0,761			-0,5	s
24	0,801			-0,1	s
26	0,895	0,09	1,9	0,9	s
28	0,75	0,188	-0,6	-0,7	s
30	0,8	0,25	-0,1	-0,1	s
31	0,807	0,202	0,0	0,0	s
34	0,923	0,13	1,8	1,2	s
35	0,706	0,251	-0,8	-1,2	s
36	0,8			-0,1	s
38	0,842			0,4	s
39	0,799			-0,1	s
40	0,819	0,246	0,1	0,1	s
41	0,59	0,307	-1,4	-2,6	q

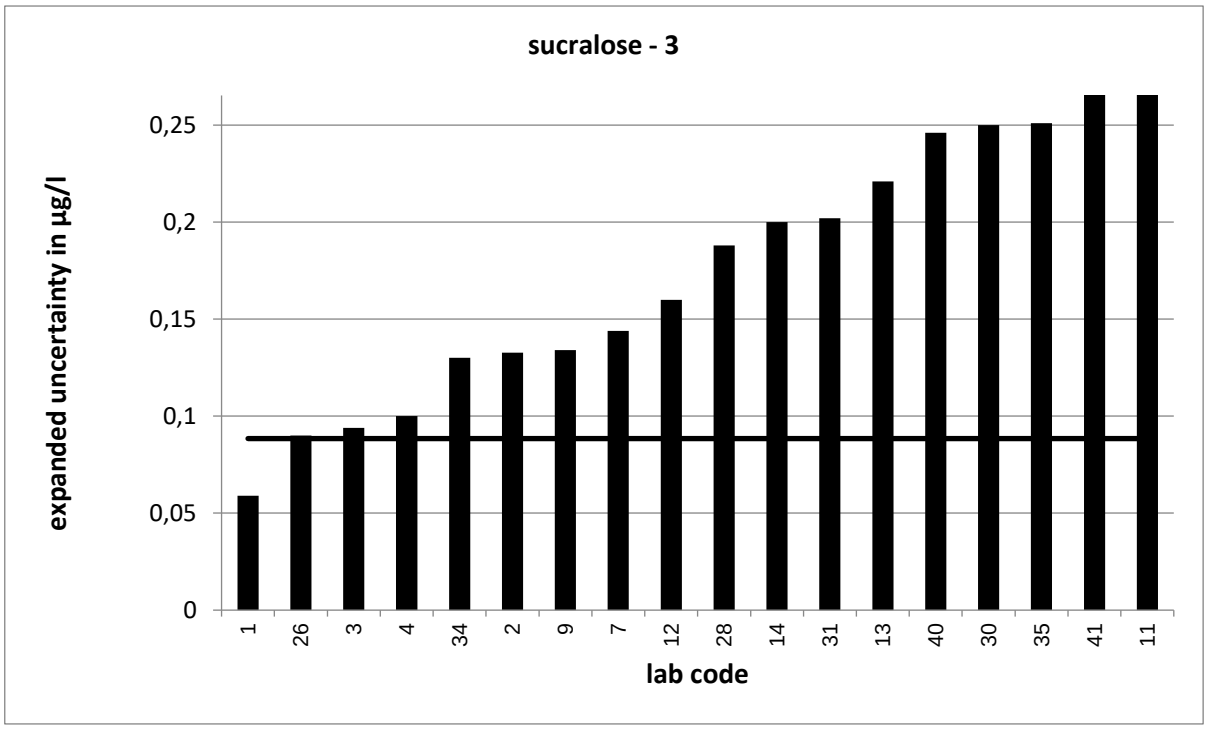
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

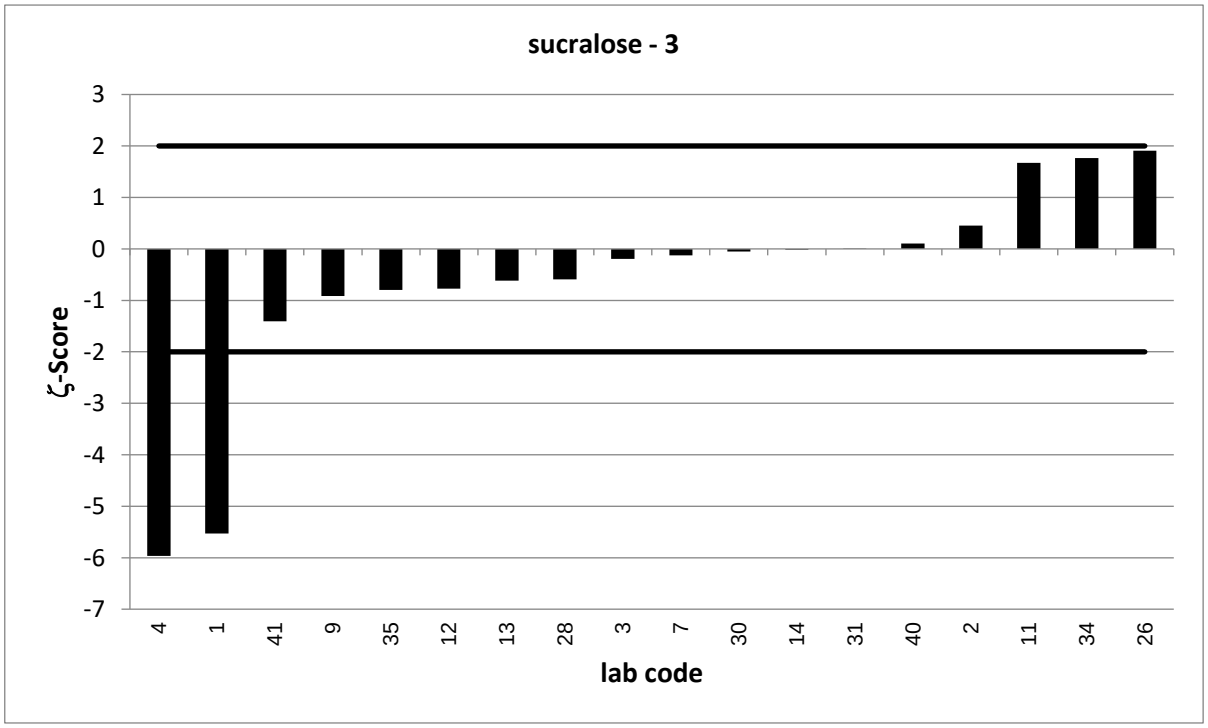


Strongly deviating values are not shown in the diagram.





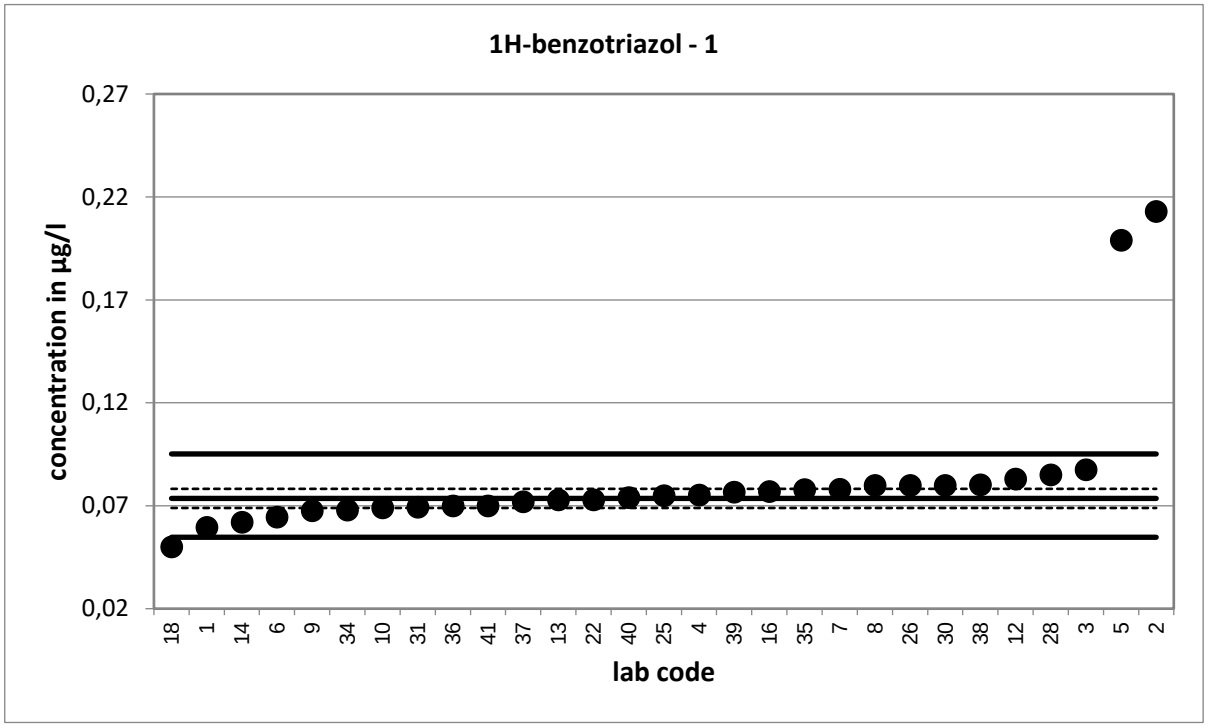
Strongly deviating values are not correctly shown in the diagram.



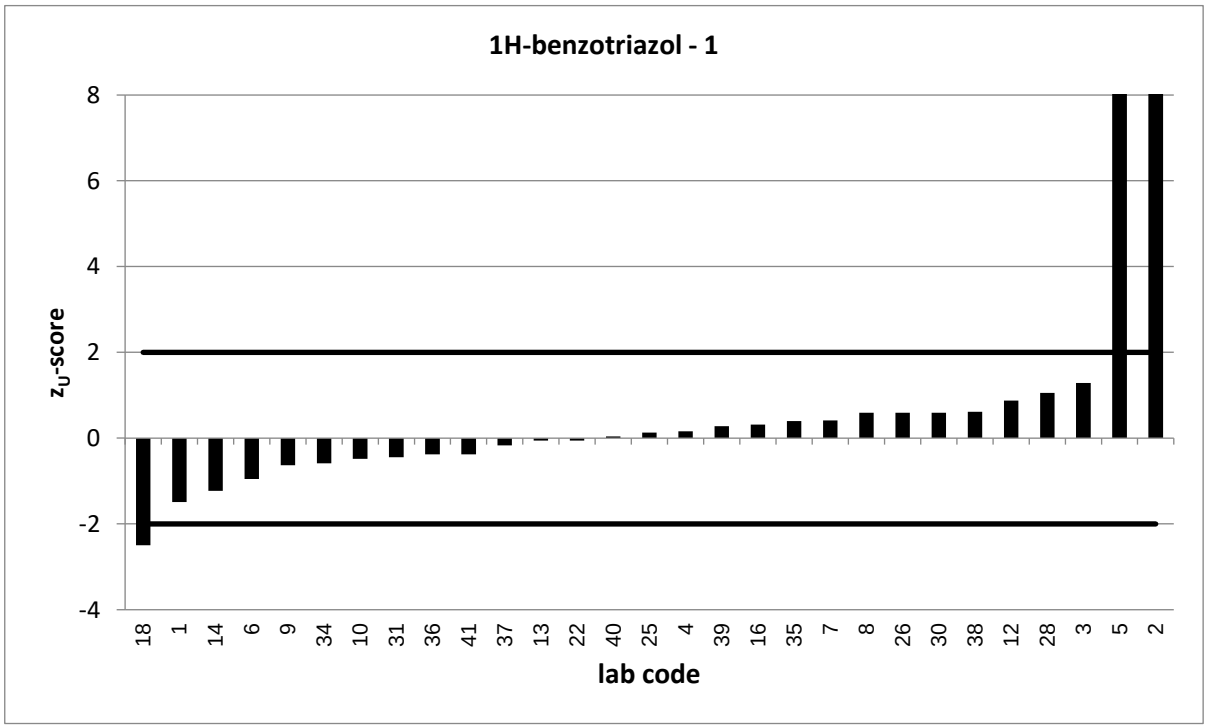
PT 4/22 - TW S1		1H-benzotriazol - 1			
assigned value [µg/l]*		0,07356	± 0,00465		
upper tolerance limit [µg/l]		0,09517			
lower tolerance limit [µg/l]		0,0547			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,0595	0,023	-1,2	-1,5	s
2	0,213	0,029	9,5	12,9	u
3	0,0875	0,019	1,5	1,3	s
4	0,0753	0,015	0,2	0,2	s
5	0,199			11,6	u
6	0,0646			-1,0	s
7	0,078	0,012	0,7	0,4	s
8	0,08			0,6	s
9	0,0676	0,007	-1,5	-0,6	s
10	0,069	0,015	-0,6	-0,5	s
12	0,083	0,02	0,9	0,9	s
13	0,073	0,022	0,0	-0,1	s
14	0,062	0,015	-1,5	-1,2	s
16	0,077	0,026	0,3	0,3	s
18	0,05			-2,5	q
22	0,073			-0,1	s
25	0,075			0,1	s
26	0,08	0,02	0,6	0,6	s
28	0,085	0,017	1,3	1,1	s
30	0,08	0,02	0,6	0,6	s
31	0,0694	0,017	-0,5	-0,4	s
34	0,068	0,011	-0,9	-0,6	s
35	0,0779	0,01	0,8	0,4	s
36	0,07			-0,4	s
37	0,072	0,01	-0,3	-0,2	s
38	0,0802			0,6	s
39	0,0766			0,3	s
40	0,074	0,015	0,1	0,0	s
41	0,07	0,015	-0,4	-0,4	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

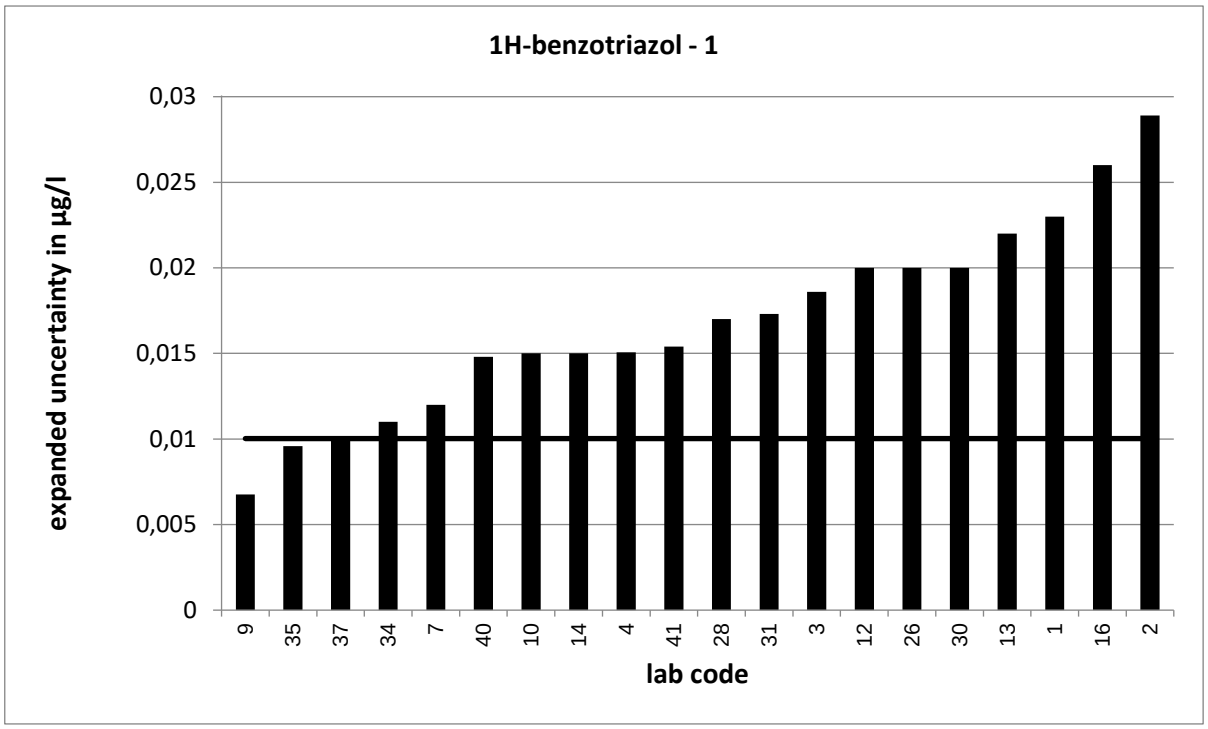
** s = satisfactory, q = questionable, u = unsatisfactory



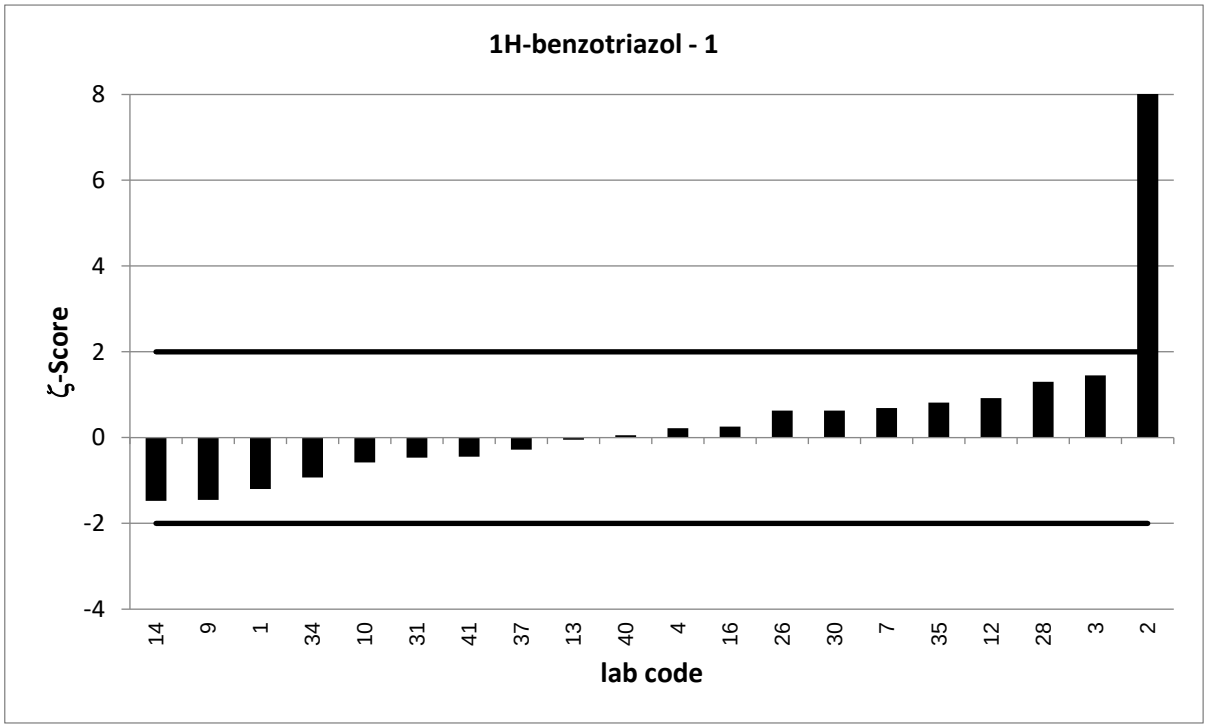
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.

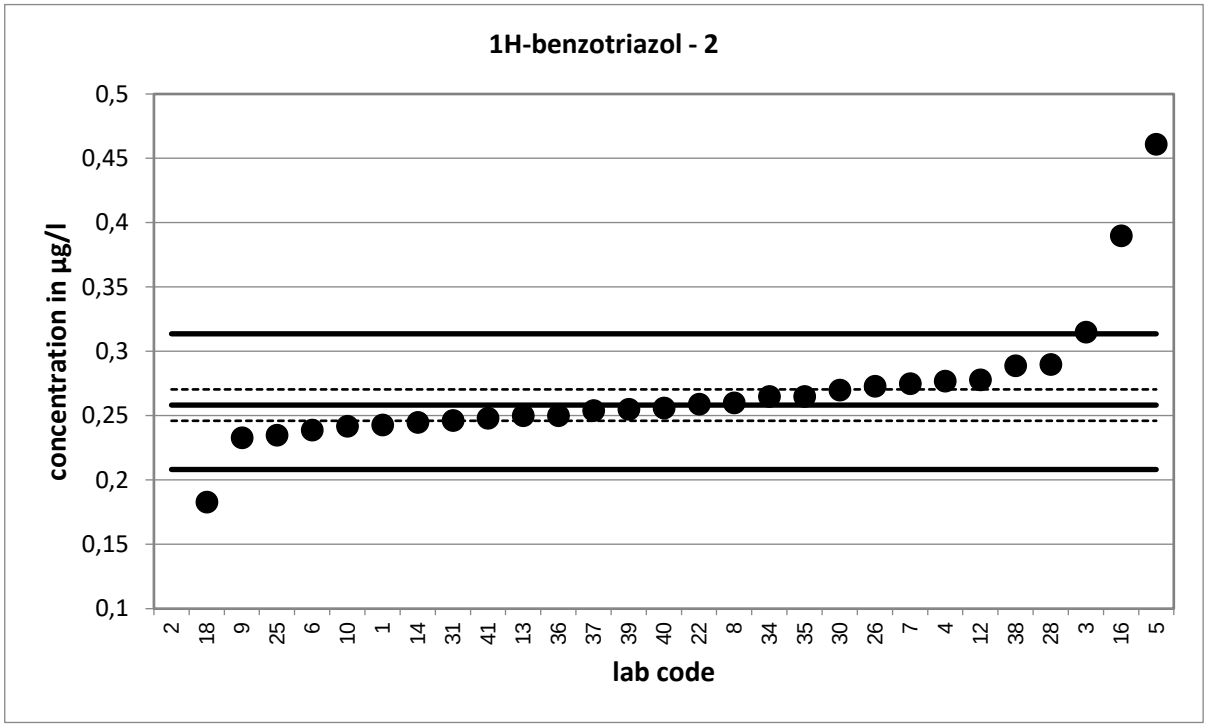


Strongly deviating values are not correctly shown in the diagram.

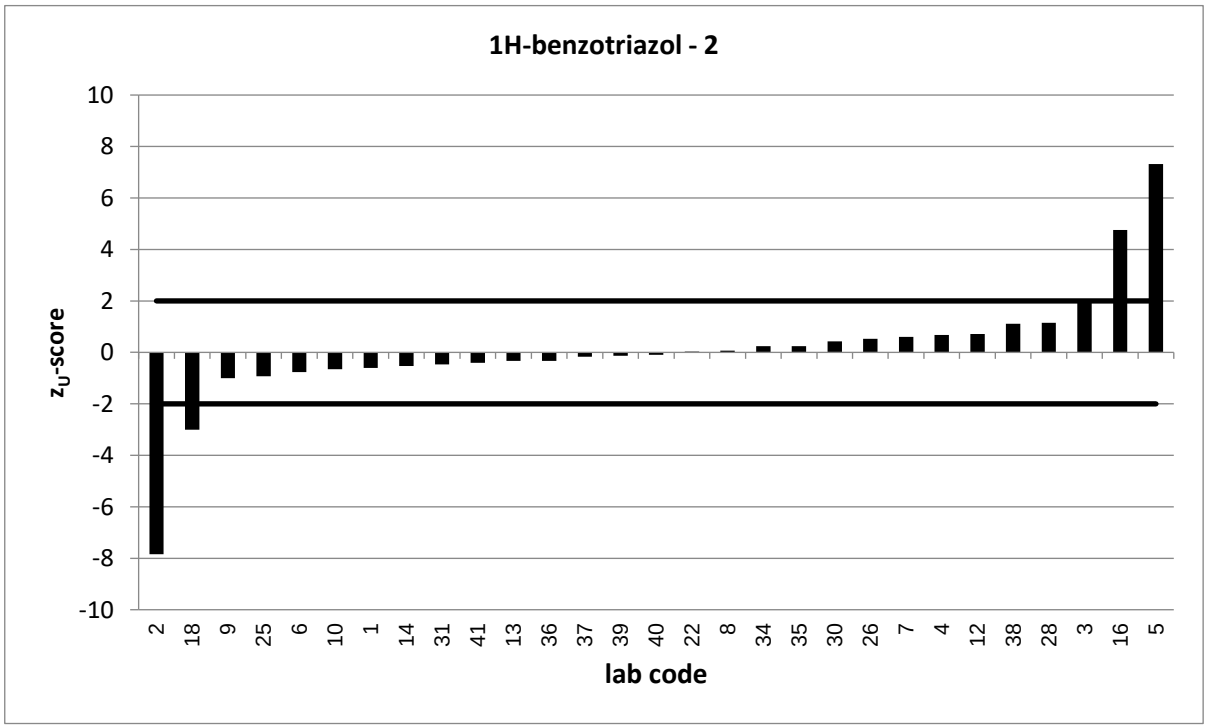
PT 4/22 - TW S1		1H-benzotriazol - 2			
assigned value [µg/l]*		0,2582	± 0,0122		
upper tolerance limit [µg/l]		0,3136			
lower tolerance limit [µg/l]		0,2082			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,243	0,094	-0,3	-0,6	s
2	0,062	0,011	-24,2	-7,8	u
3	0,315	0,067	1,7	2,0	s
4	0,277	0,055	0,7	0,7	s
5	0,461			7,3	u
6	0,239			-0,8	s
7	0,275	0,041	0,8	0,6	s
8	0,26			0,1	s
9	0,233	0,023	-1,9	-1,0	s
10	0,242	0,06	-0,5	-0,6	s
12	0,278	0,06	0,6	0,7	s
13	0,25	0,075	-0,2	-0,3	s
14	0,245	0,07	-0,4	-0,5	s
16	0,39	0,13	2,0	4,8	u
18	0,183			-3,0	u
22	0,259			0,0	s
25	0,235			-0,9	s
26	0,273	0,02	1,3	0,5	s
28	0,29	0,058	1,1	1,1	s
30	0,27	0,05	0,5	0,4	s
31	0,2465	0,062	-0,4	-0,5	s
34	0,265	0,043	0,3	0,2	s
35	0,265	0,033	0,4	0,2	s
36	0,25			-0,3	s
37	0,254	0,03	-0,3	-0,2	s
38	0,289			1,1	s
39	0,255			-0,1	s
40	0,256	0,051	-0,1	-0,1	s
41	0,248	0,055	-0,4	-0,4	s

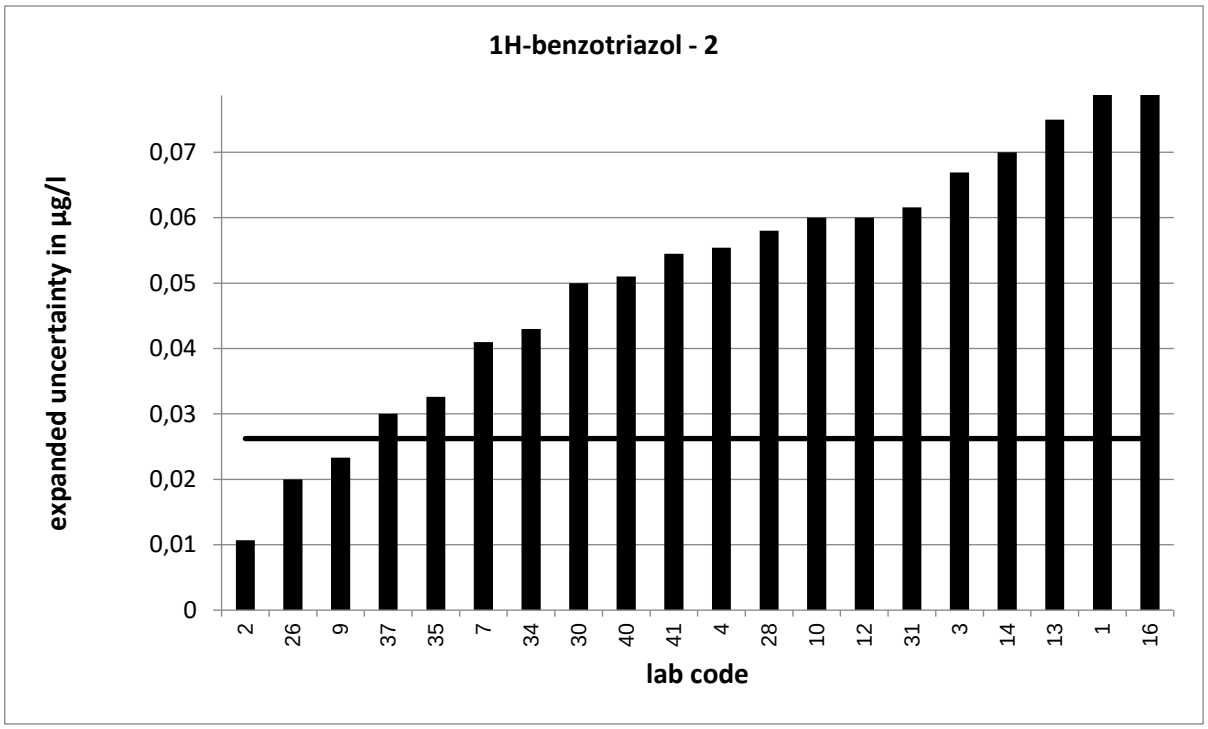
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

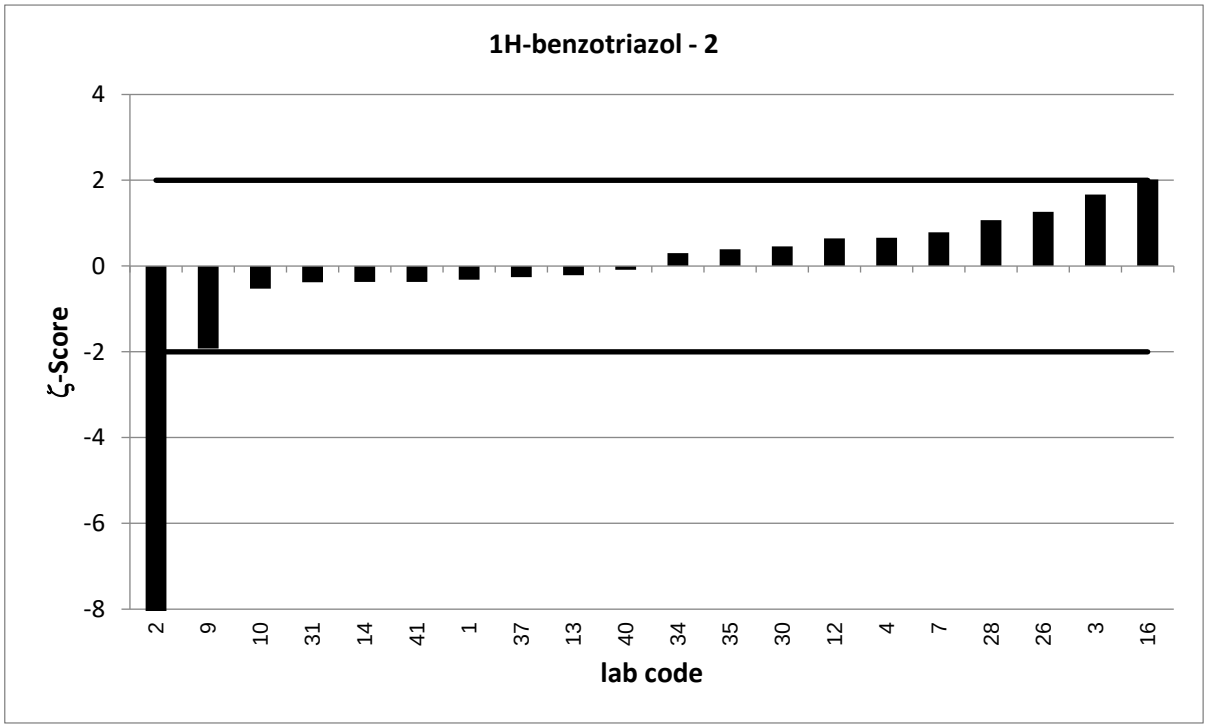


Strongly deviating values are not shown in the diagram.





Strongly deviating values are not correctly shown in the diagram.

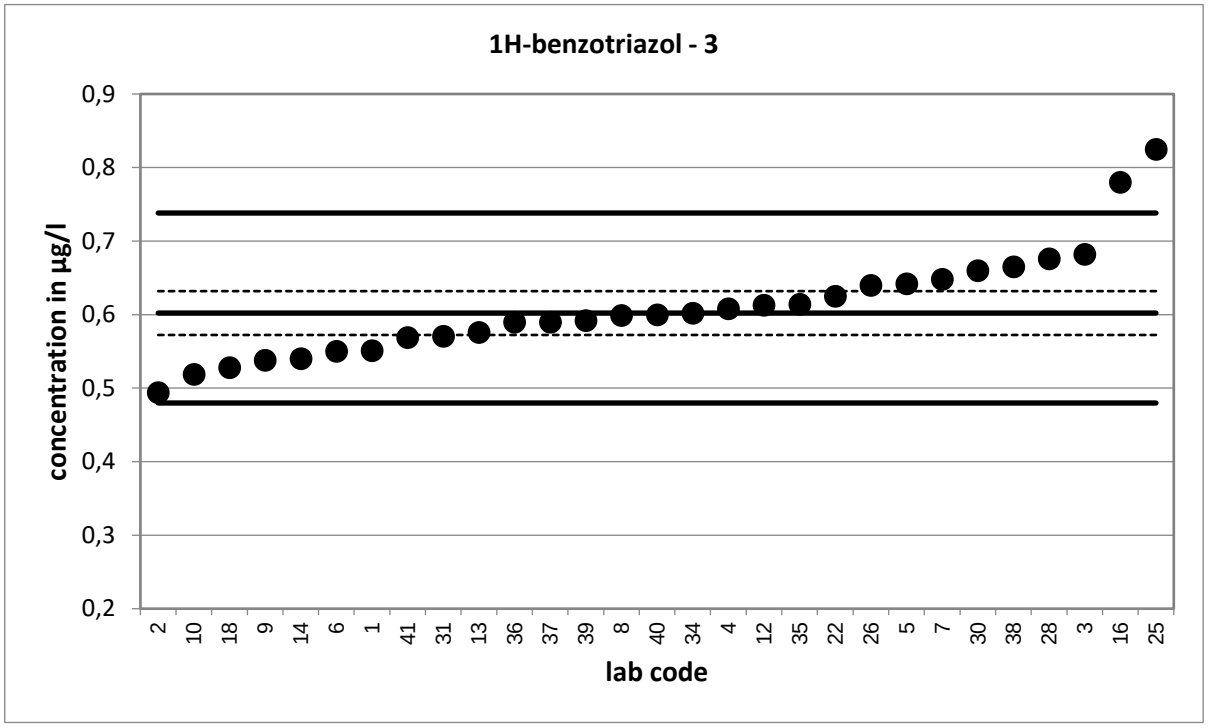


Strongly deviating values are not correctly shown in the diagram.

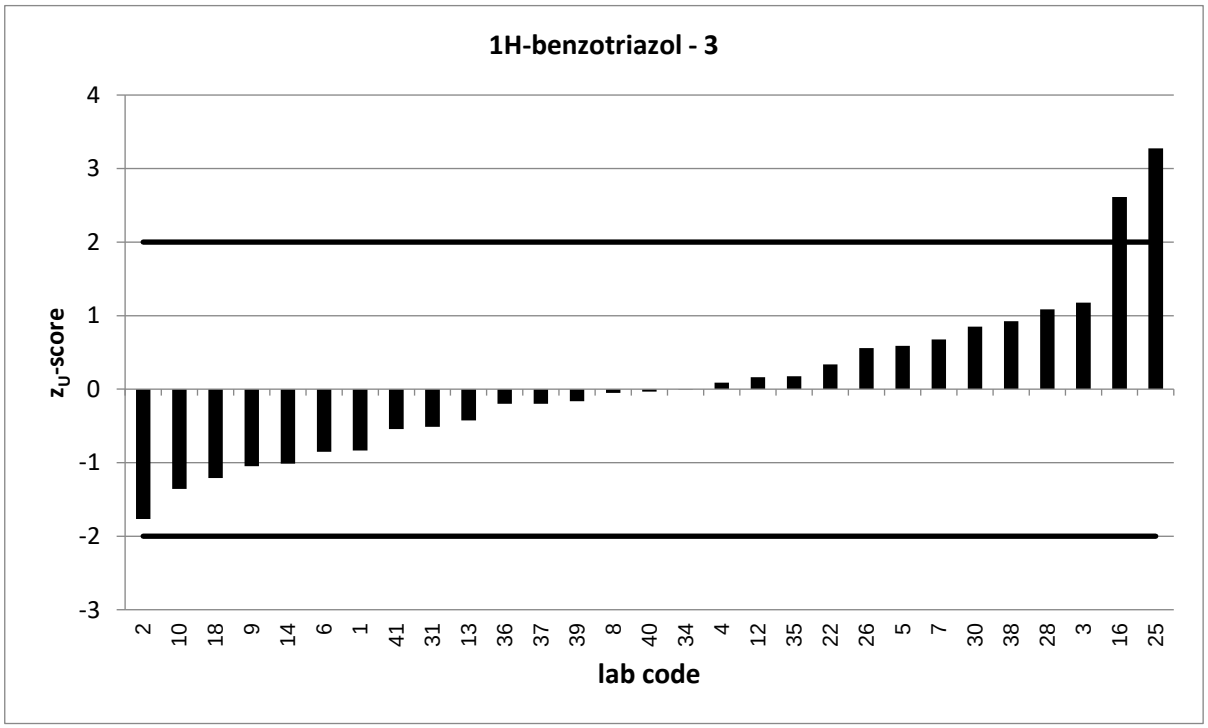
PT 4/22 - TW S1		1H-benzotriazol - 3			
assigned value [µg/l]*		0,6021	± 0,0298		
upper tolerance limit [µg/l]		0,7381			
lower tolerance limit [µg/l]		0,4797			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,551	0,213	-0,5	-0,8	s
2	0,494	0,068	-2,9	-1,8	s
3	0,682	0,145	1,1	1,2	s
4	0,608	0,122	0,1	0,1	s
5	0,642			0,6	s
6	0,55			-0,9	s
7	0,648	0,097	0,9	0,7	s
8	0,599			-0,1	s
9	0,538	0,054	-2,1	-1,0	s
10	0,519	0,12	-1,3	-1,4	s
12	0,613	0,12	0,2	0,2	s
13	0,576	0,173	-0,3	-0,4	s
14	0,54	0,14	-0,9	-1,0	s
16	0,78	0,27	1,3	2,6	q
18	0,528			-1,2	s
22	0,625			0,3	s
25	0,825			3,3	u
26	0,64	0,06	1,1	0,6	s
28	0,676	0,135	1,1	1,1	s
30	0,66	0,13	0,9	0,9	s
31	0,5708	0,143	-0,4	-0,5	s
34	0,602	0,097	0,0	0,0	s
35	0,614	0,076	0,3	0,2	s
36	0,59			-0,2	s
37	0,59	0,08	-0,3	-0,2	s
38	0,665			0,9	s
39	0,592			-0,2	s
40	0,6	0,12	0,0	0,0	s
41	0,569	0,125	-0,5	-0,5	s

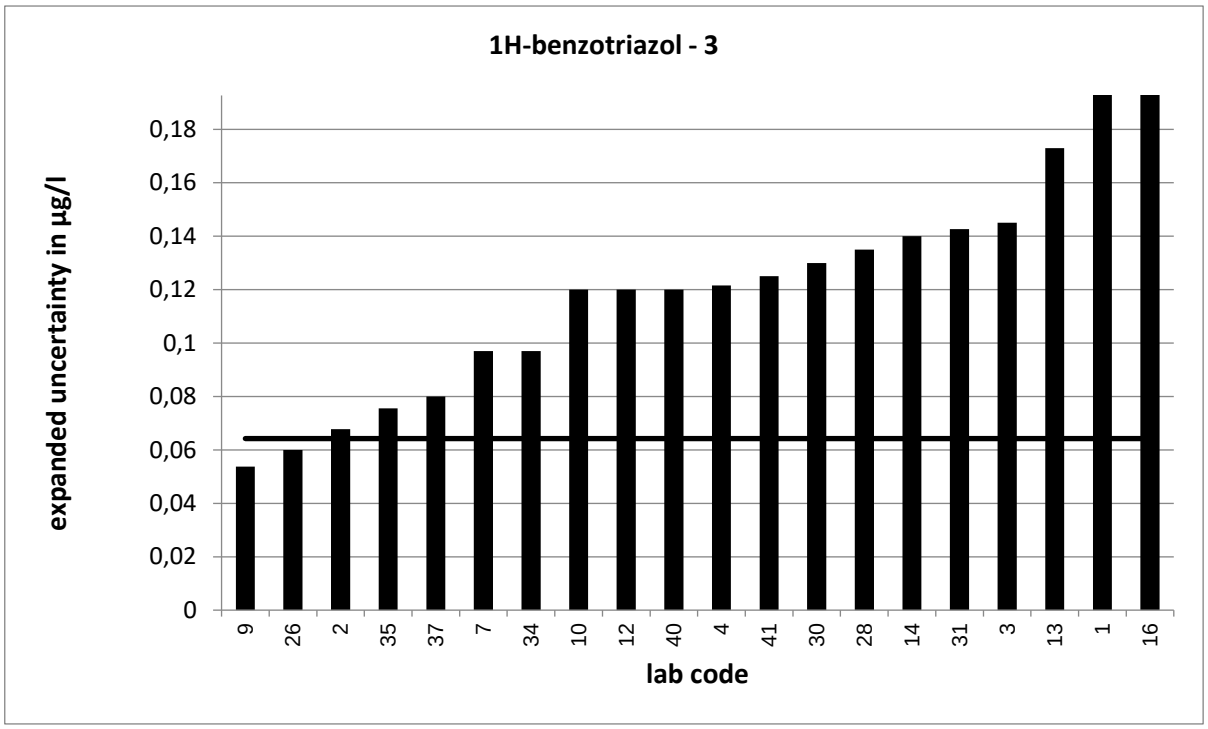
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

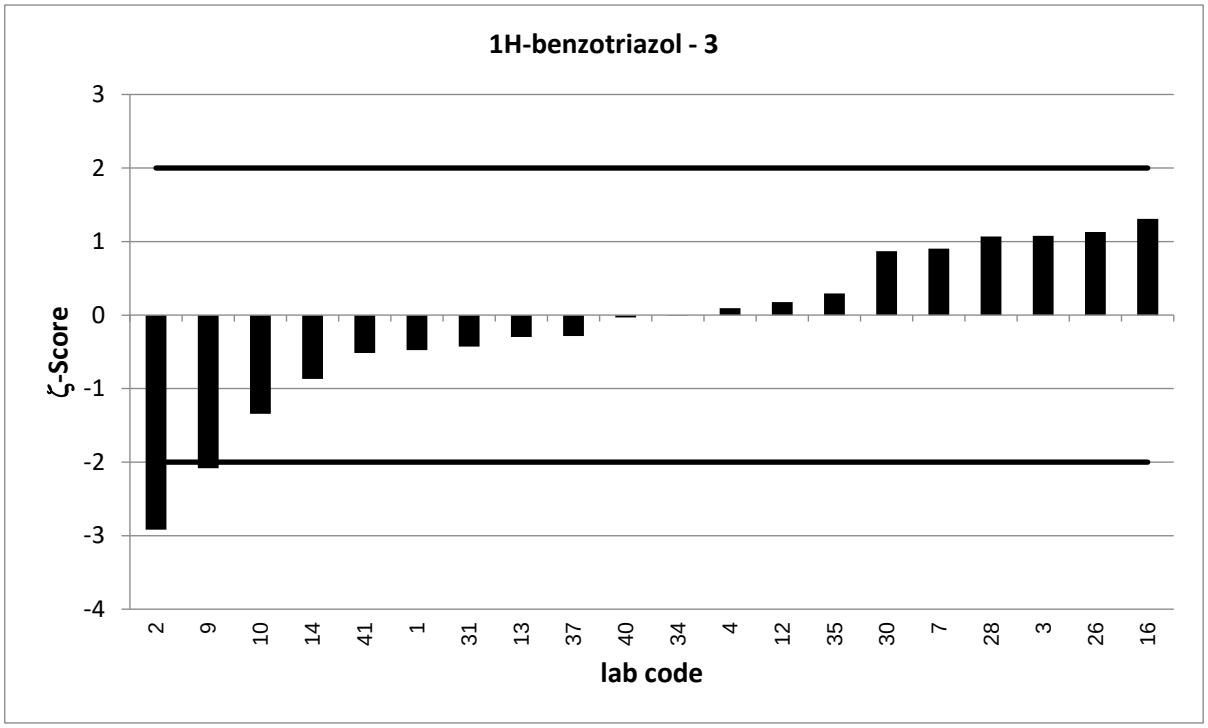


Strongly deviating values are not shown in the diagram.





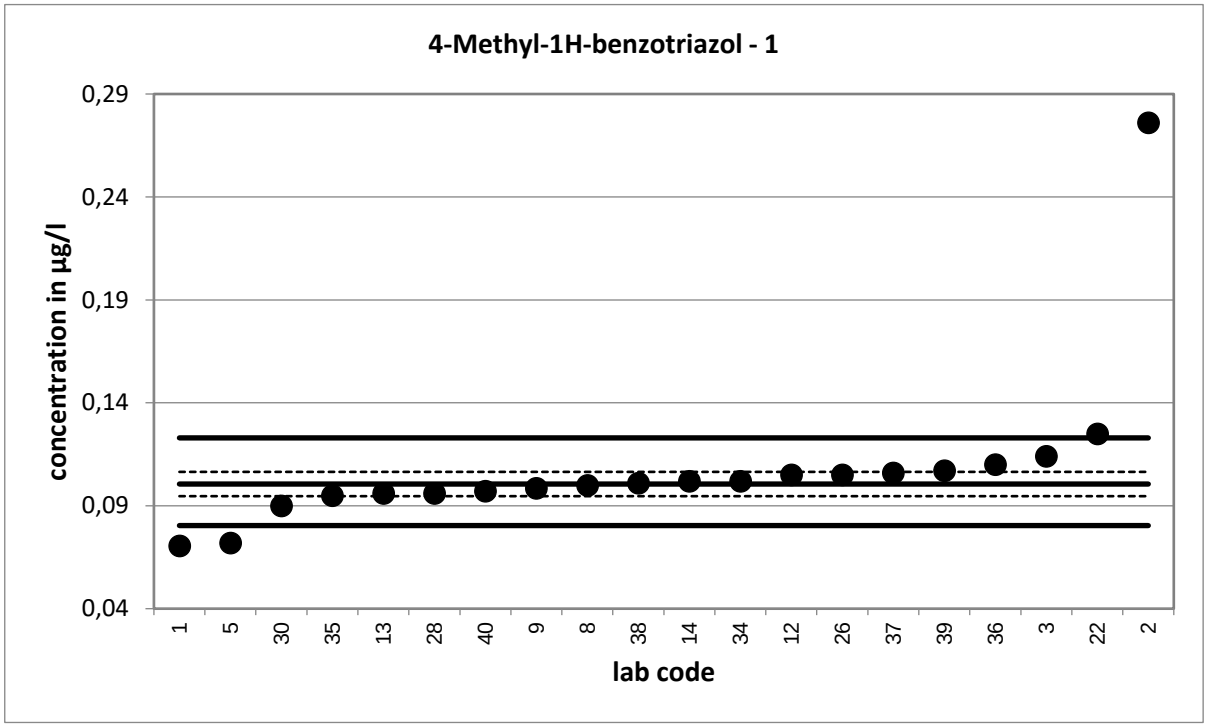
Strongly deviating values are not correctly shown in the diagram.



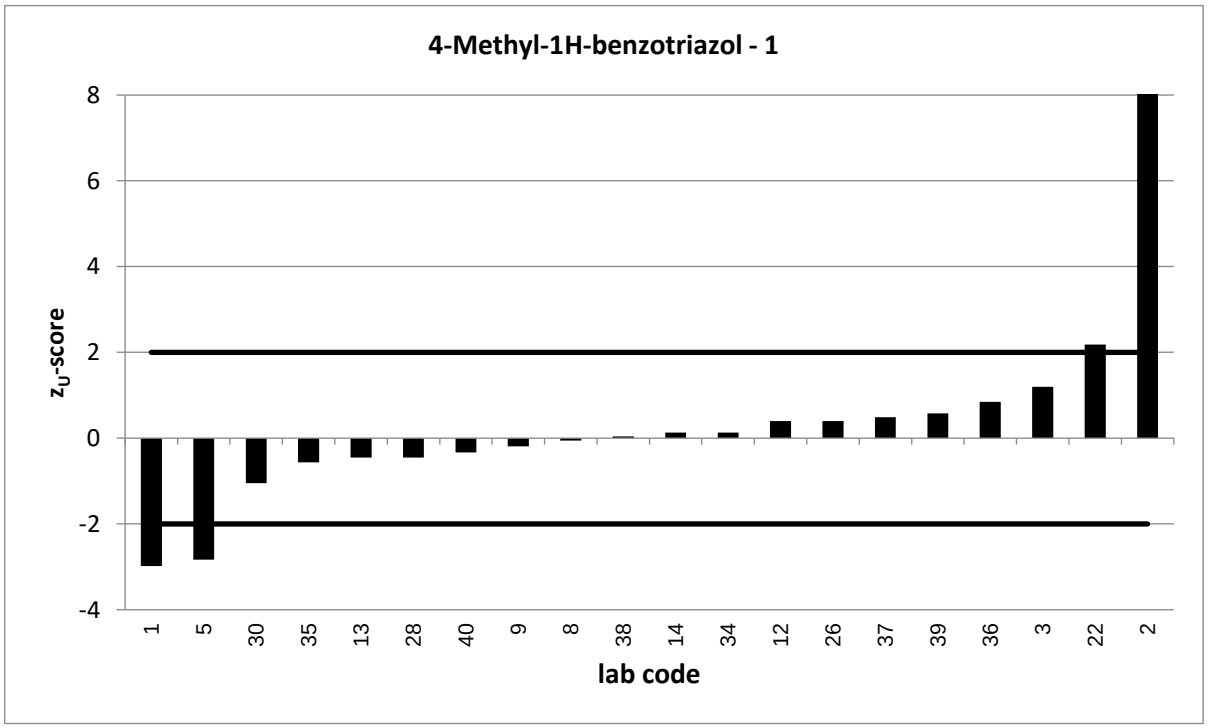
PT 4/22 - TW S1		4-Methyl-1H-benzotriazol - 1			
assigned value [µg/l]*		0,1006	± 0,0059		
upper tolerance limit [µg/l]		0,123			
lower tolerance limit [µg/l]		0,08038			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,0705	0,019	-3,0	-3,0	u
2	0,276	0,037	9,3	15,7	u
3	0,114	0,027	1,0	1,2	s
5	0,072			-2,8	q
8	0,1			-0,1	s
9	0,0986	0,01	-0,3	-0,2	s
12	0,105	0,02	0,4	0,4	s
13	0,096	0,029	-0,3	-0,5	s
14	0,102	0,025	0,1	0,1	s
22	0,125			2,2	q
26	0,105	0,01	0,8	0,4	s
28	0,096	0,019	-0,5	-0,5	s
30	0,09	0,01	-1,8	-1,0	s
34	0,102	0,013	0,2	0,1	s
35	0,0949	0,02	-0,6	-0,6	s
36	0,11			0,8	s
37	0,106	0,015	0,7	0,5	s
38	0,101			0,0	s
39	0,107			0,6	s
40	0,0972	0,019	-0,3	-0,3	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

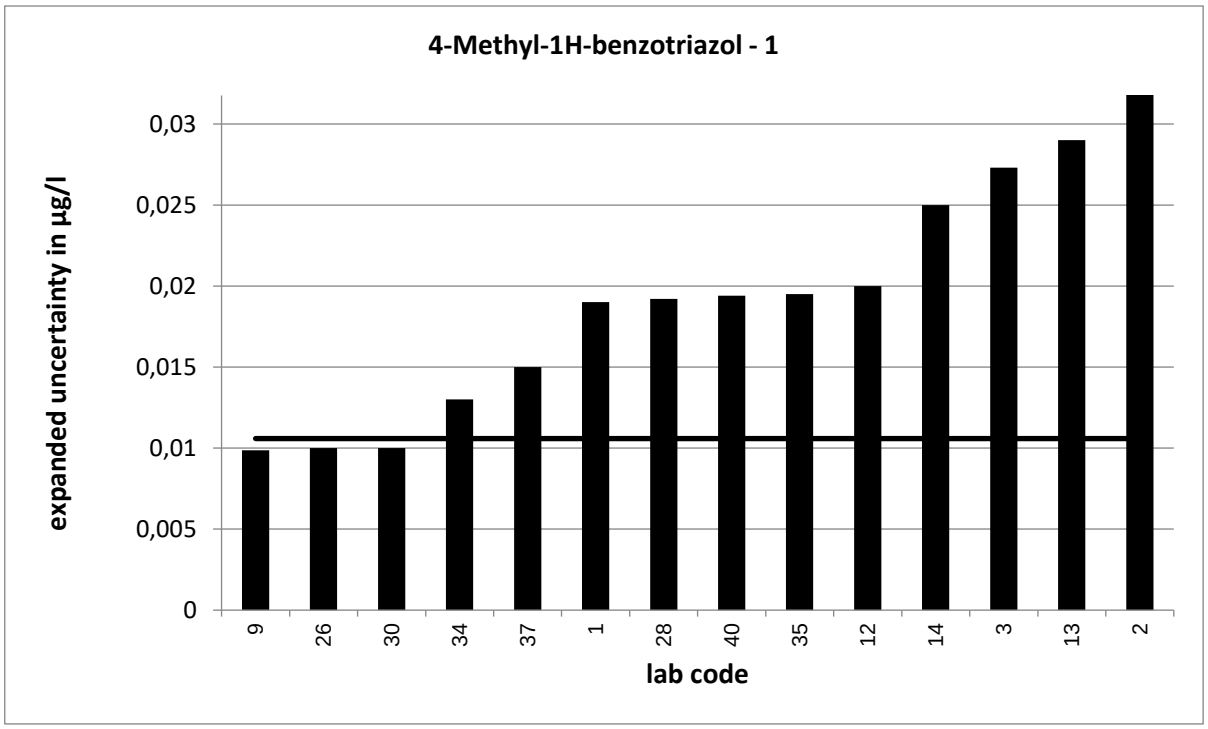
** s = satisfactory, q = questionable, u = unsatisfactory



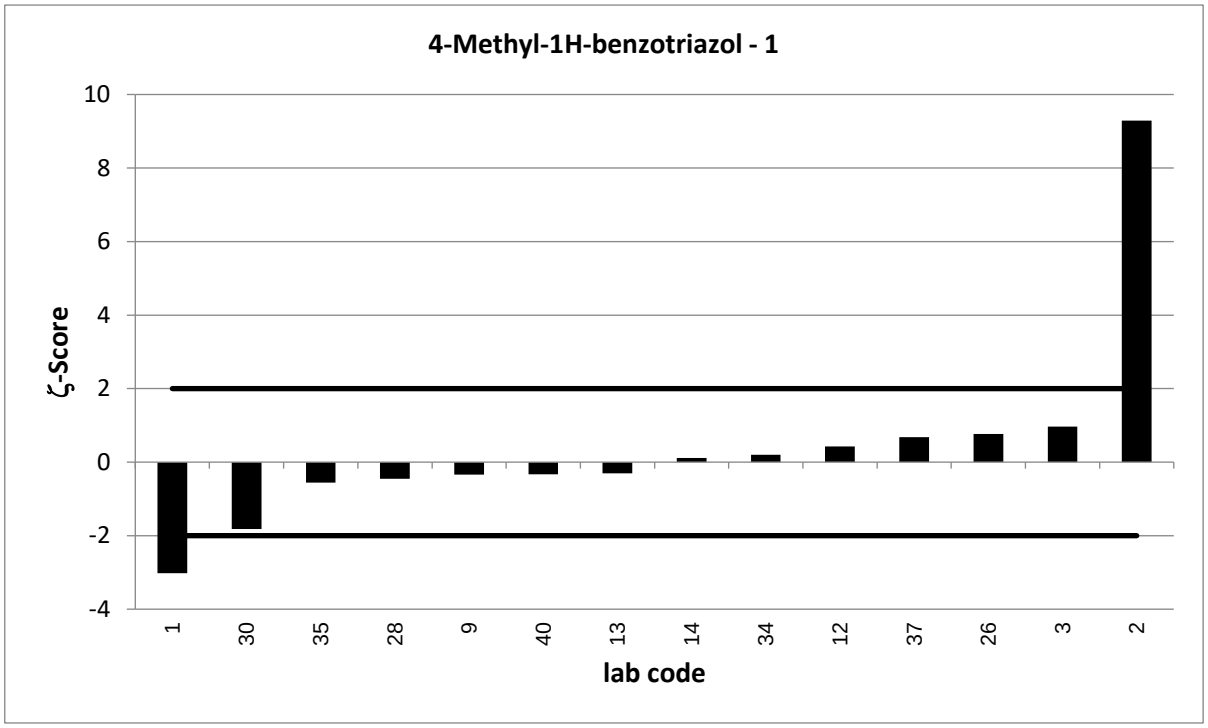
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



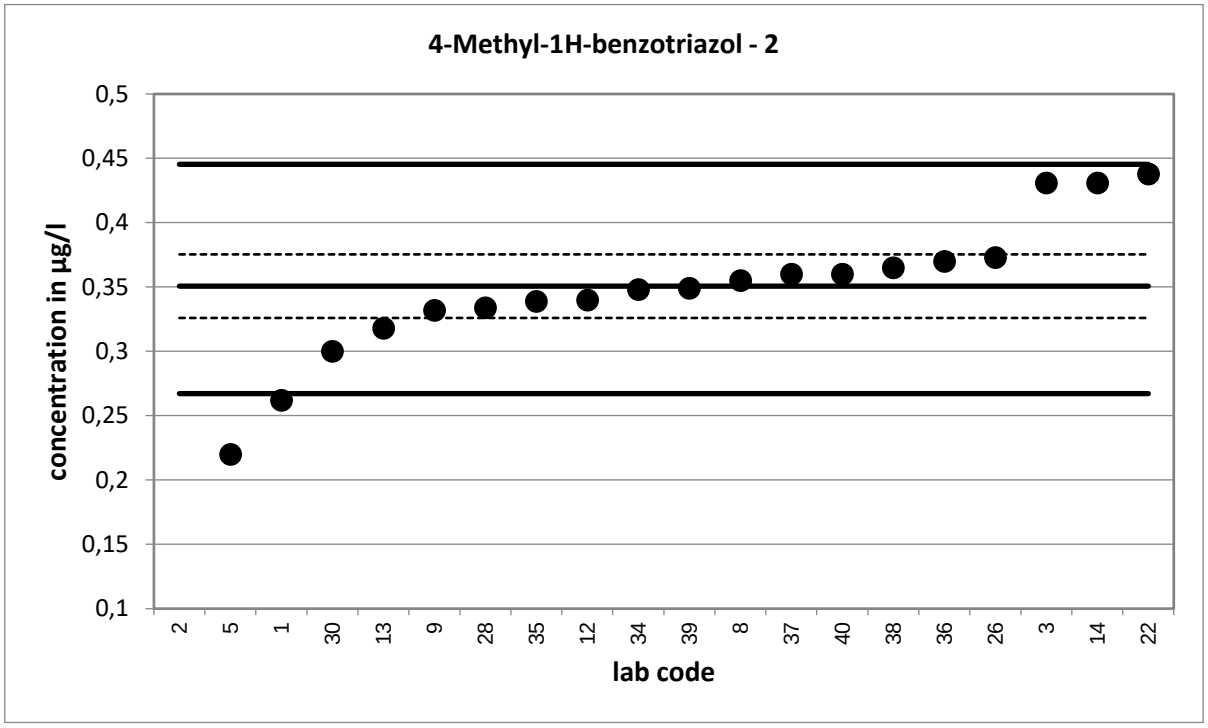
Strongly deviating values are not correctly shown in the diagram.



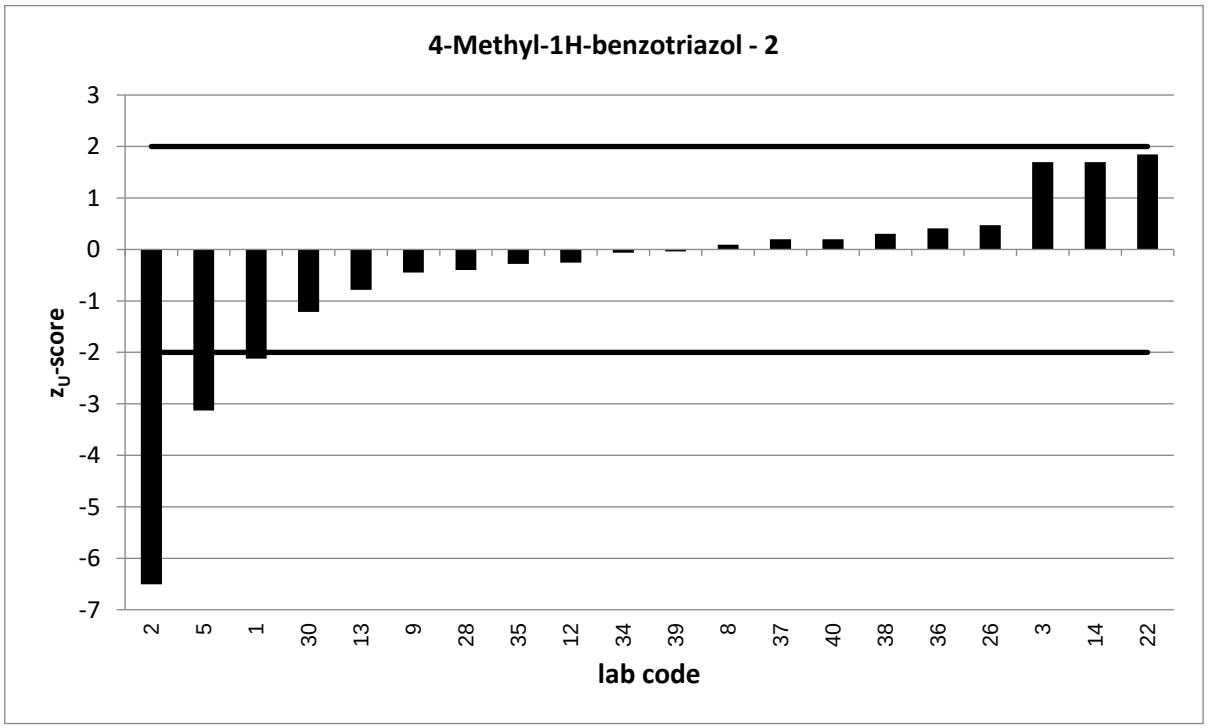
PT 4/22 - TW S1		4-Methyl-1H-benzotriazol - 2			
assigned value [µg/l]*		0,3507	± 0,0247		
upper tolerance limit [µg/l]		0,4454			
lower tolerance limit [µg/l]		0,2671			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,262	0,071	-2,4	-2,1	q
2	0,079	0,011	-20,1	-6,5	u
3	0,431	0,103	1,5	1,7	s
5	0,22			-3,1	u
8	0,355			0,1	s
9	0,332	0,033	-0,9	-0,4	s
12	0,34	0,04	-0,5	-0,3	s
13	0,318	0,095	-0,7	-0,8	s
14	0,431	0,105	1,5	1,7	s
22	0,438			1,8	s
26	0,373	0,04	1,0	0,5	s
28	0,334	0,067	-0,5	-0,4	s
30	0,3	0,04	-2,2	-1,2	s
34	0,348	0,046	-0,1	-0,1	s
35	0,339	0,07	-0,3	-0,3	s
36	0,37			0,4	s
37	0,36	0,05	0,3	0,2	s
38	0,365			0,3	s
39	0,349			0,0	s
40	0,36	0,072	0,2	0,2	s

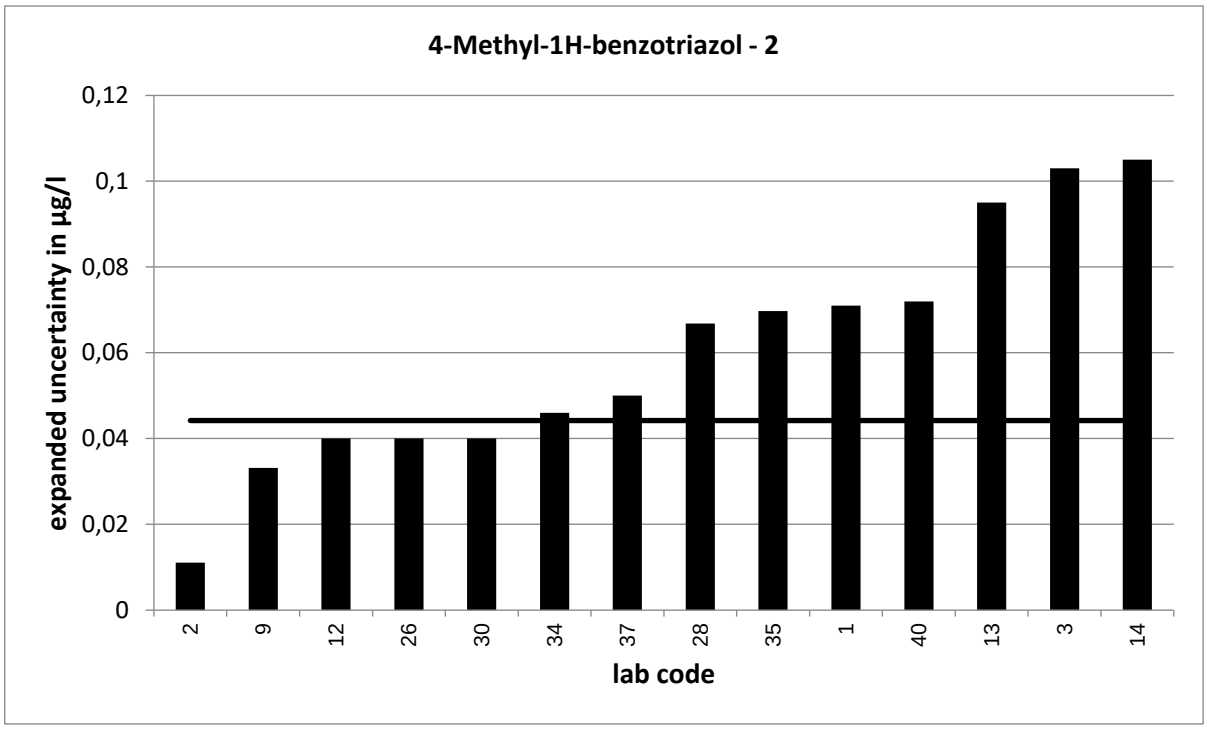
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

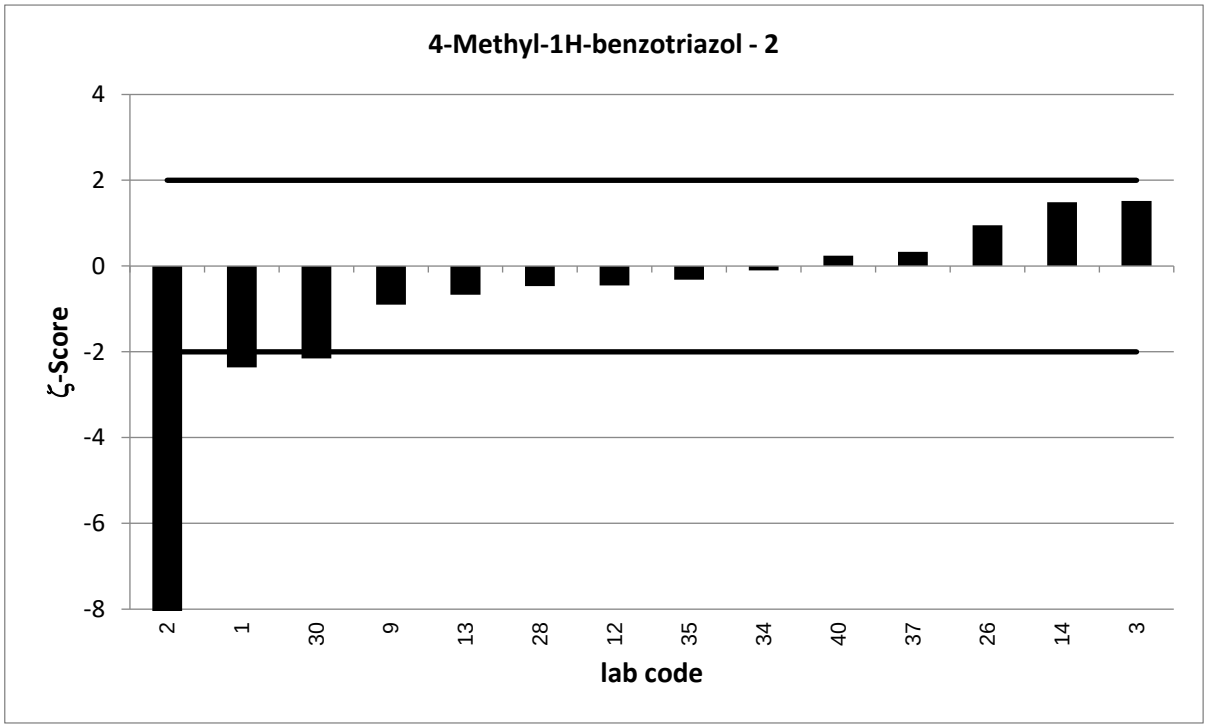
** s = satisfactory, q = questionable, u = unsatisfactory



Strongly deviating values are not shown in the diagram.





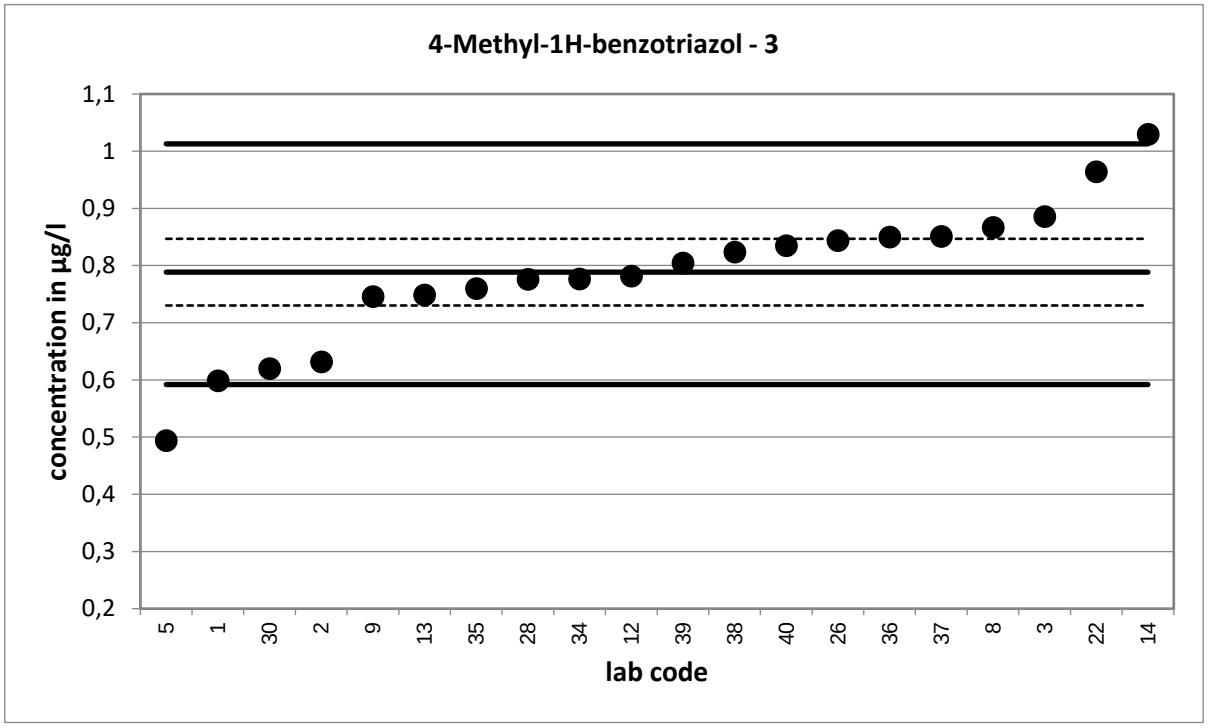


Strongly deviating values are not correctly shown in the diagram.

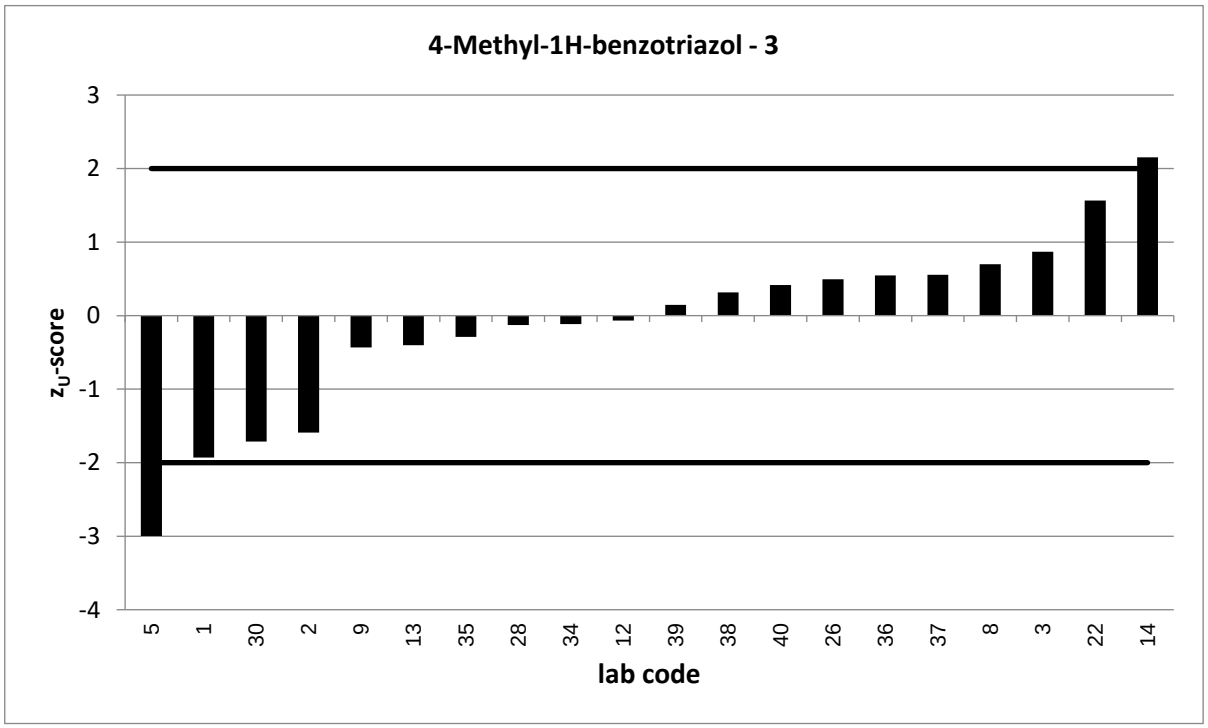
PT 4/22 - TW S1		4-Methyl-1H-benzotriazol - 3			
assigned value [µg/l]*		0,7885	± 0,0583		
upper tolerance limit [µg/l]		1,013			
lower tolerance limit [µg/l]		0,5919			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,599	0,162	-2,2	-1,9	s
2	0,632	0,095	-2,8	-1,6	s
3	0,886	0,212	0,9	0,9	s
5	0,494			-3,0	u
8	0,867			0,7	s
9	0,746	0,075	-0,9	-0,4	s
12	0,782	0,14	-0,1	-0,1	s
13	0,749	0,225	-0,3	-0,4	s
14	1,03	0,25	1,9	2,2	q
22	0,964			1,6	s
26	0,844	0,08	1,1	0,5	s
28	0,776	0,155	-0,2	-0,1	s
30	0,62	0,09	-3,1	-1,7	s
34	0,777	0,102	-0,2	-0,1	s
35	0,76	0,156	-0,3	-0,3	s
36	0,85			0,5	s
37	0,851	0,1	1,1	0,6	s
38	0,824			0,3	s
39	0,805			0,1	s
40	0,835	0,167	0,5	0,4	s

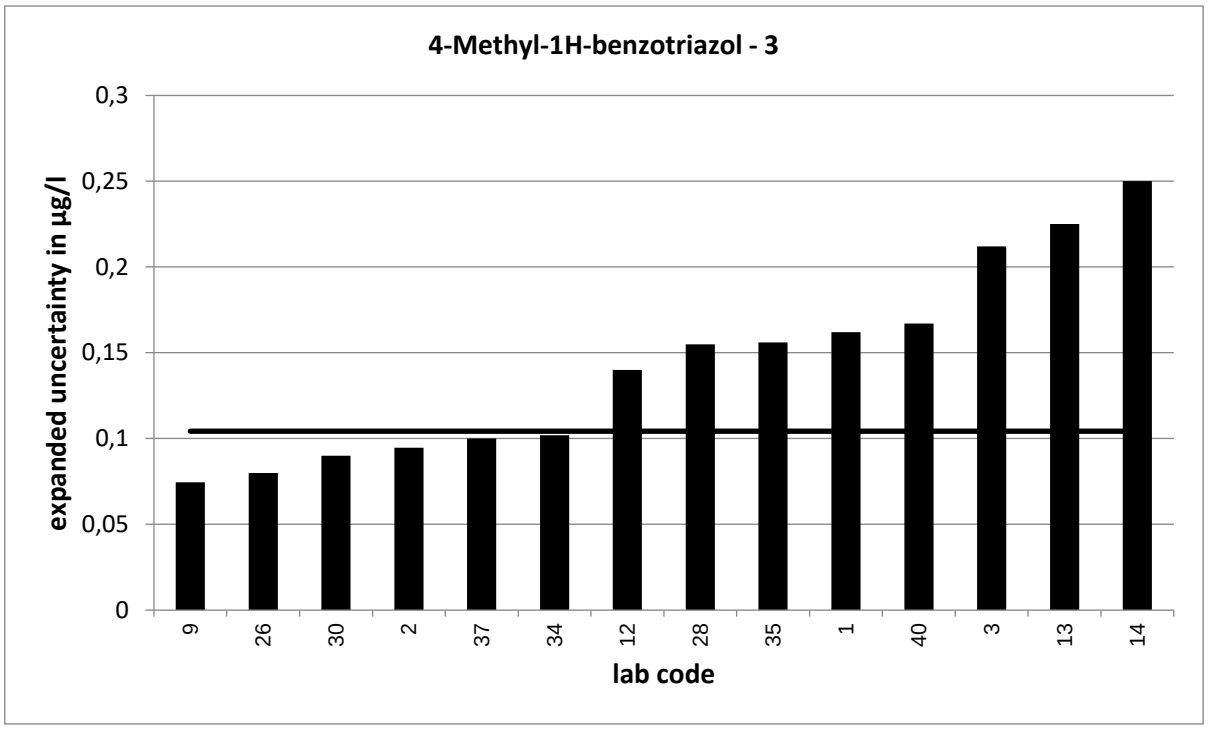
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

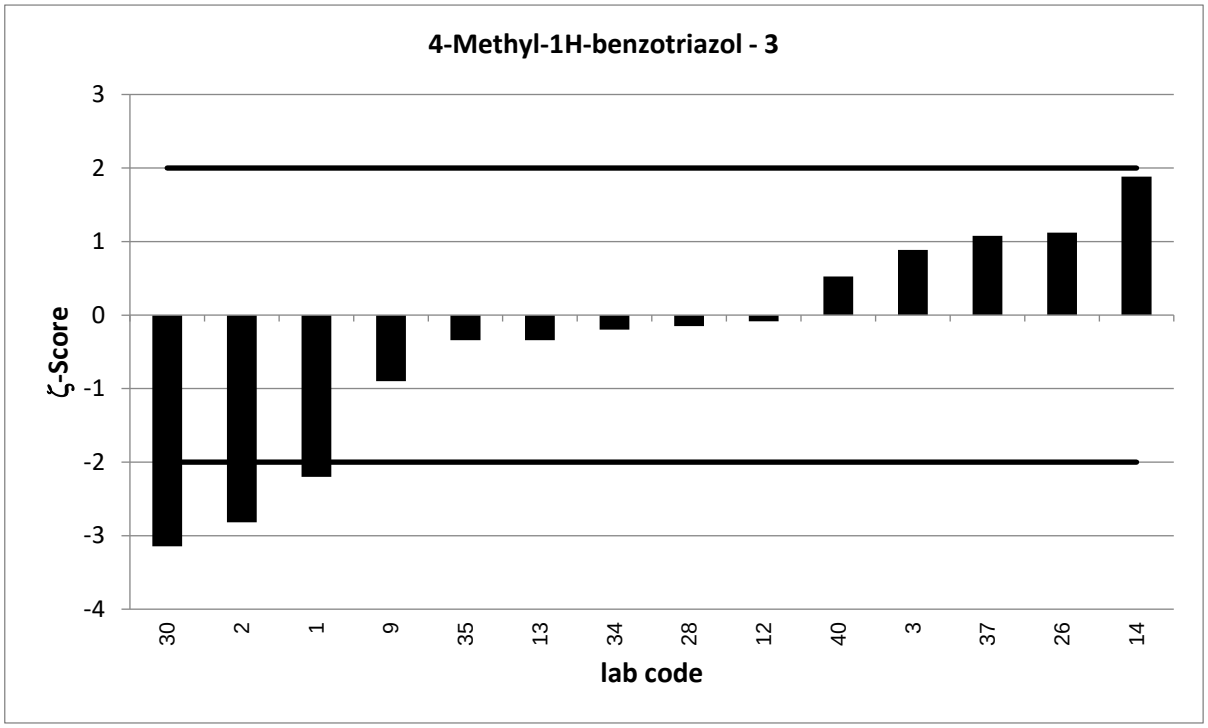
** s = satisfactory, q = questionable, u = unsatisfactory



Strongly deviating values are not shown in the diagram.



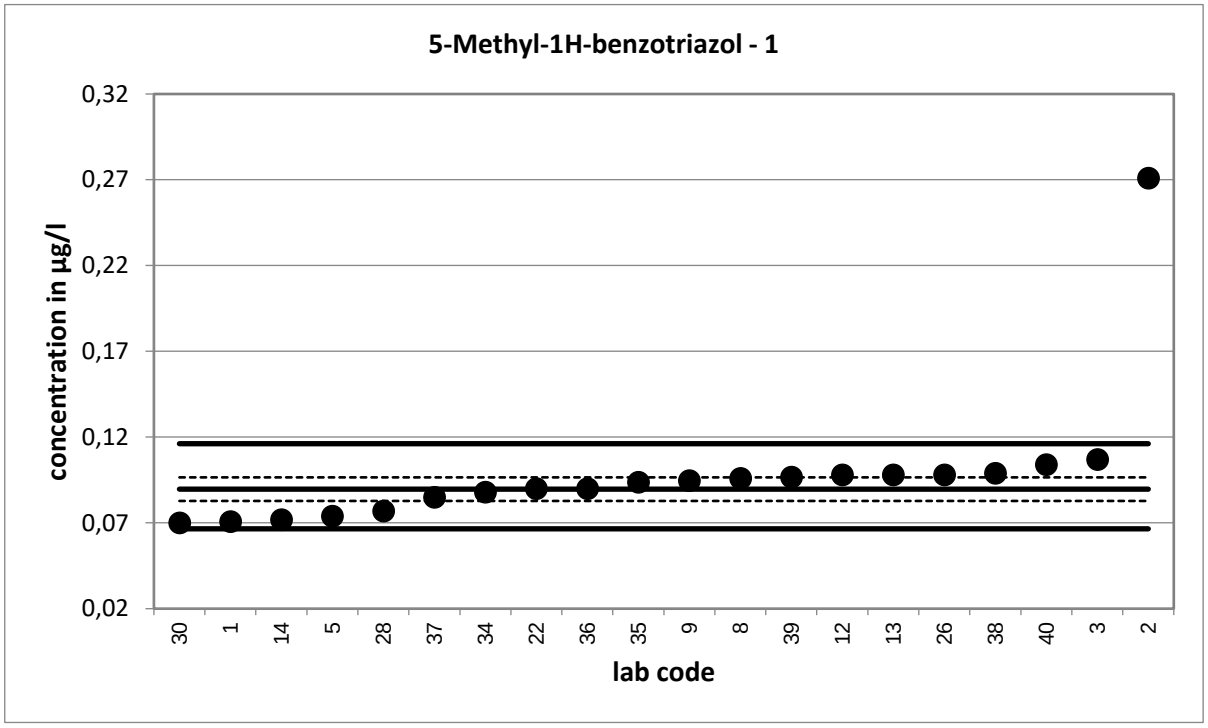

4-Methyl-1H-benzotriazol - 3
expanded uncertainty in µg/l
0,3
0,25
0,2
0,15
0,1
0,05
0
9
26
30
2
37
34
12
28
35
1
40
3
13
14
lab code


4-Methyl-1H-benzotriazol - 3
ζ-Score
3
2
1
0
-1
-2
-3
-4
30
2
1
9
35
13
34
28
12
40
3
37
26
14
lab code

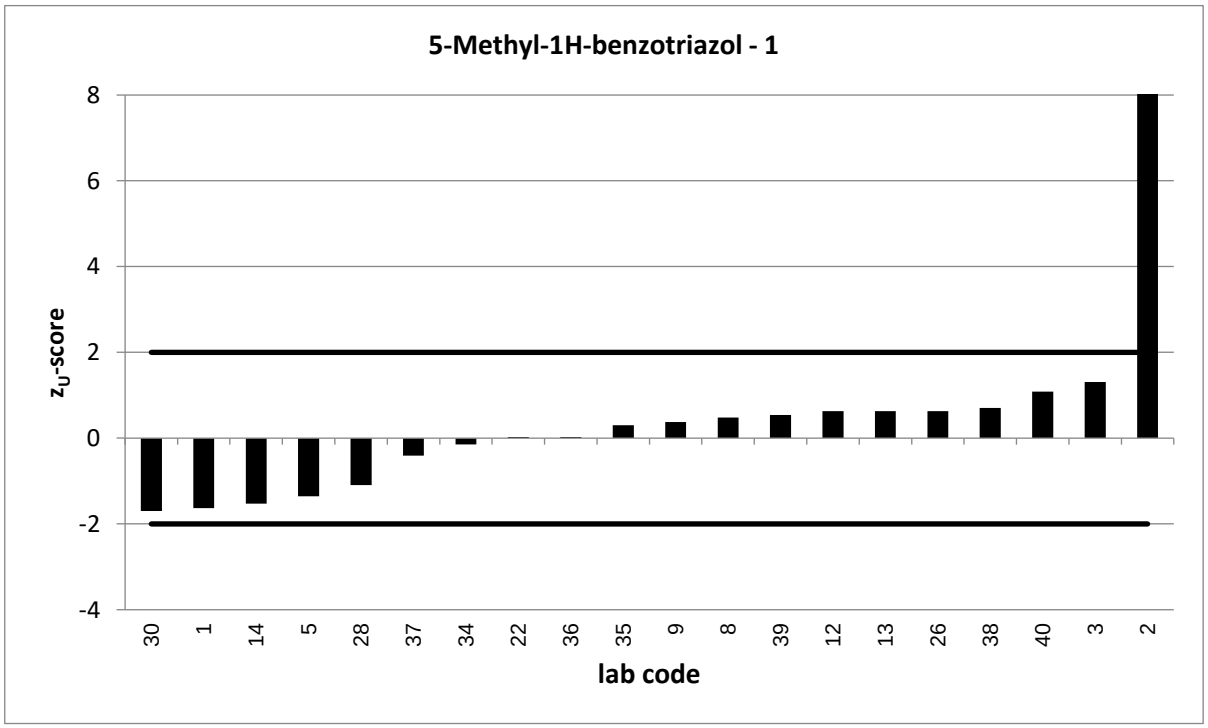
PT 4/22 - TW S1		5-Methyl-1H-benzotriazol - 1			
assigned value [µg/l]*		0,08967	± 0,00687		
upper tolerance limit [µg/l]		0,1162			
lower tolerance limit [µg/l]		0,06655			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,0708	0,02	-1,8	-1,6	s
2	0,271	0,037	9,7	13,7	u
3	0,107	0,026	1,3	1,3	s
5	0,074			-1,4	s
8	0,096			0,5	s
9	0,0947	0,009	0,9	0,4	s
12	0,098	0,02	0,8	0,6	s
13	0,098	0,029	0,6	0,6	s
14	0,072	0,018	-1,8	-1,5	s
22	0,09			0,0	s
26	0,098	0,02	0,8	0,6	s
28	0,077	0,015	-1,5	-1,1	s
30	0,07	0,01	-3,2	-1,7	s
34	0,088	0,013	-0,2	-0,1	s
35	0,0937	0,015	0,5	0,3	s
36	0,09			0,0	s
37	0,085	0,013	-0,6	-0,4	s
38	0,099			0,7	s
39	0,0968			0,5	s
40	0,104	0,021	1,3	1,1	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

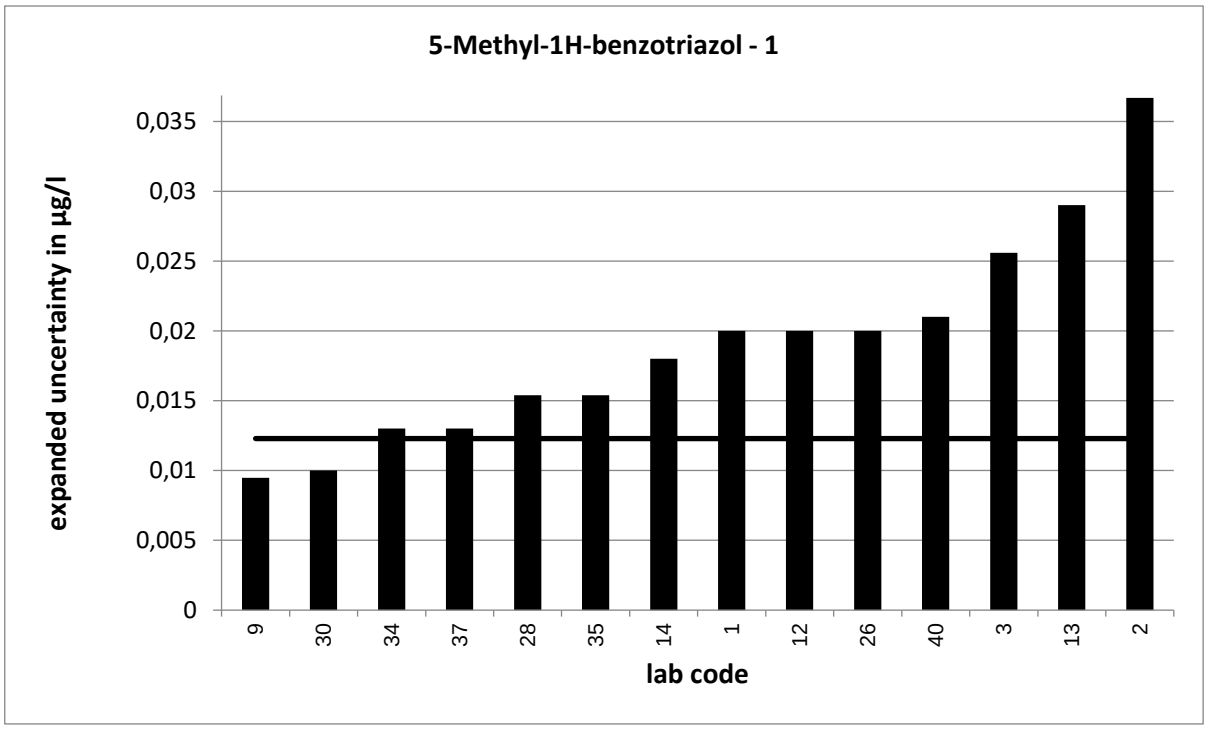
** s = satisfactory, q = questionable, u = unsatisfactory



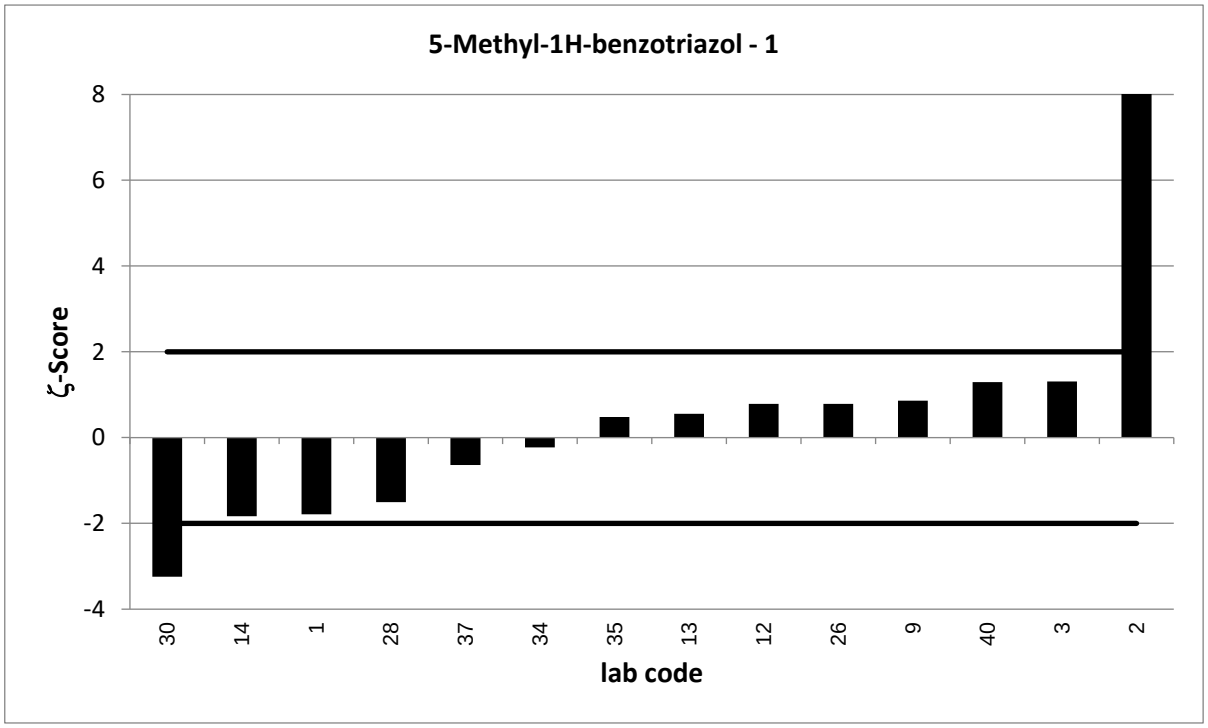
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.

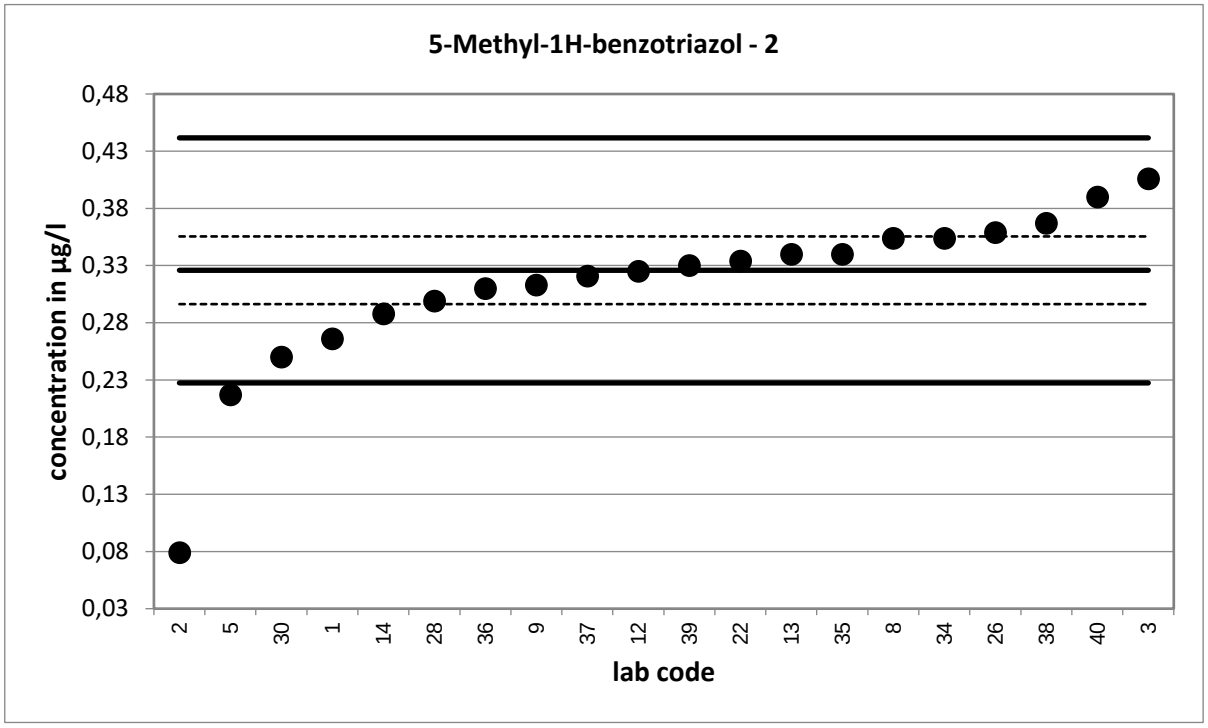


Strongly deviating values are not correctly shown in the diagram.

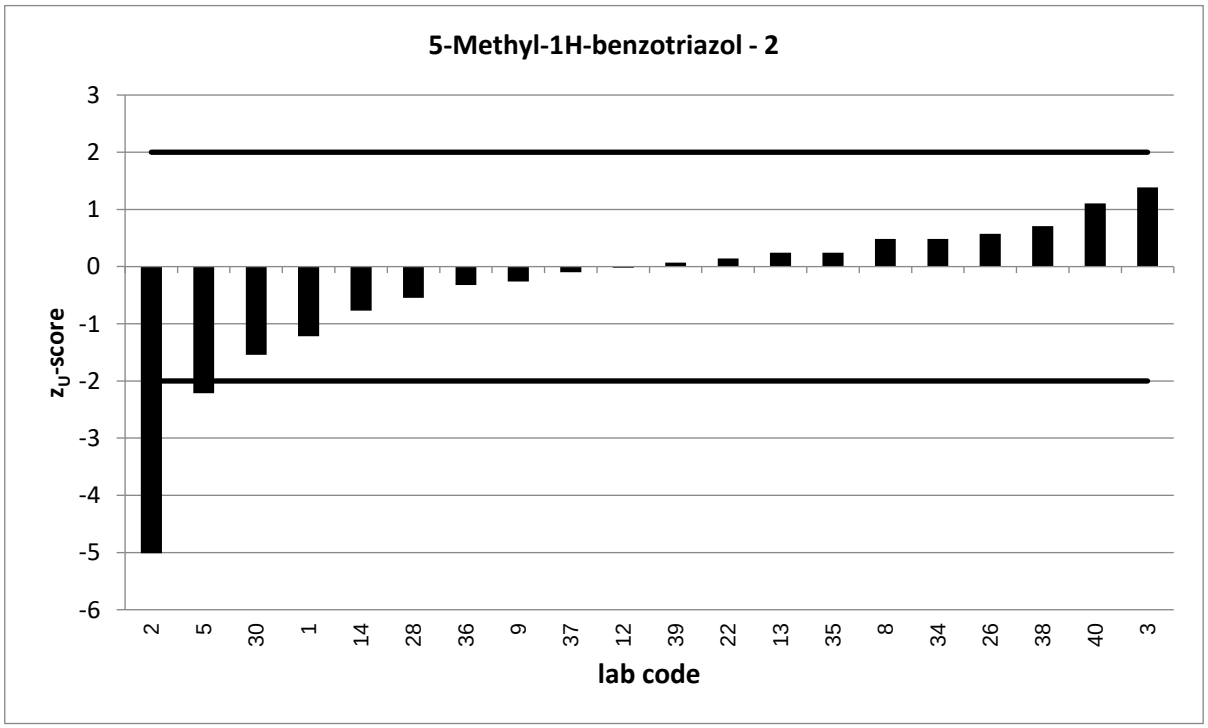
PT 4/22 - TW S1		5-Methyl-1H-benzotriazol - 2			
assigned value [µg/l]*		0,3259	± 0,0296		
upper tolerance limit [µg/l]		0,4416			
lower tolerance limit [µg/l]		0,2274			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,266	0,074	-1,5	-1,2	s
2	0,079	0,011	-15,7	-5,0	u
3	0,406	0,097	1,6	1,4	s
5	0,217			-2,2	q
8	0,354			0,5	s
9	0,313	0,031	-0,6	-0,3	s
12	0,325	0,04	0,0	0,0	s
13	0,34	0,102	0,3	0,2	s
14	0,288	0,6	-0,1	-0,8	s
22	0,334			0,1	s
26	0,359	0,03	1,6	0,6	s
28	0,299	0,06	-0,8	-0,5	s
30	0,25	0,04	-3,1	-1,5	s
34	0,354	0,051	1,0	0,5	s
35	0,34	0,056	0,4	0,2	s
36	0,31			-0,3	s
37	0,321	0,04	-0,2	-0,1	s
38	0,367			0,7	s
39	0,33			0,1	s
40	0,39	0,078	1,5	1,1	s

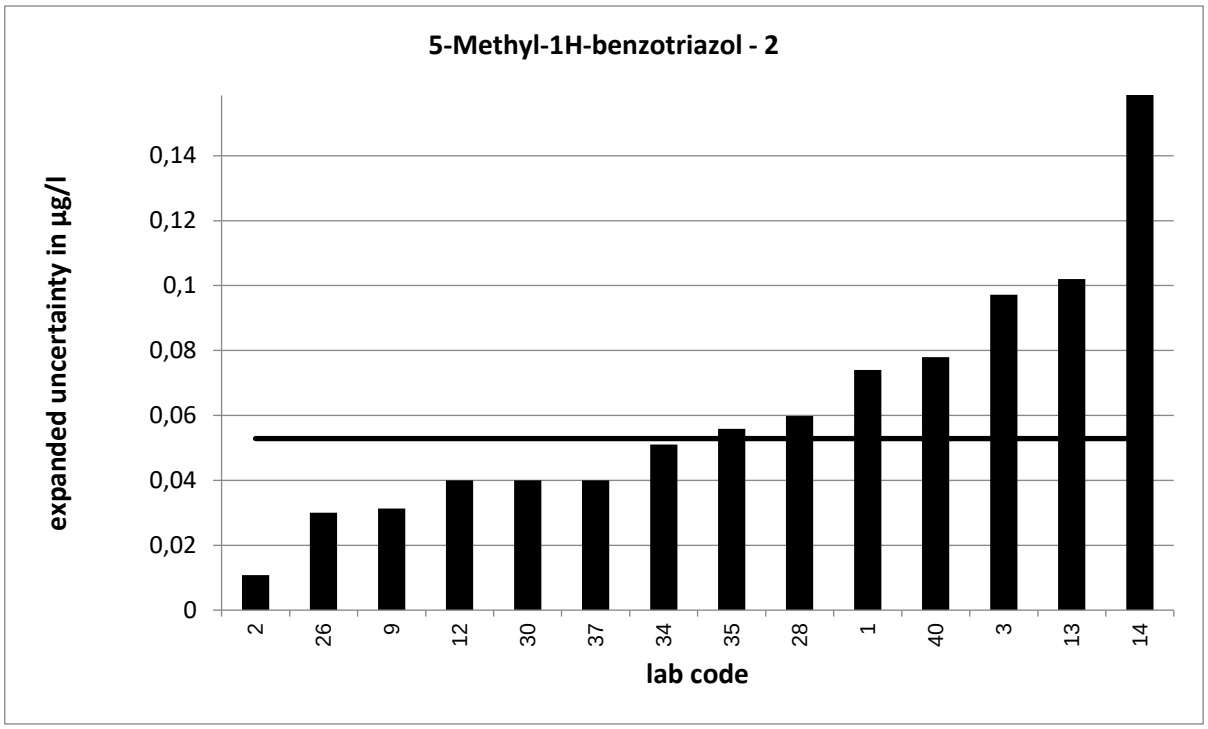
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

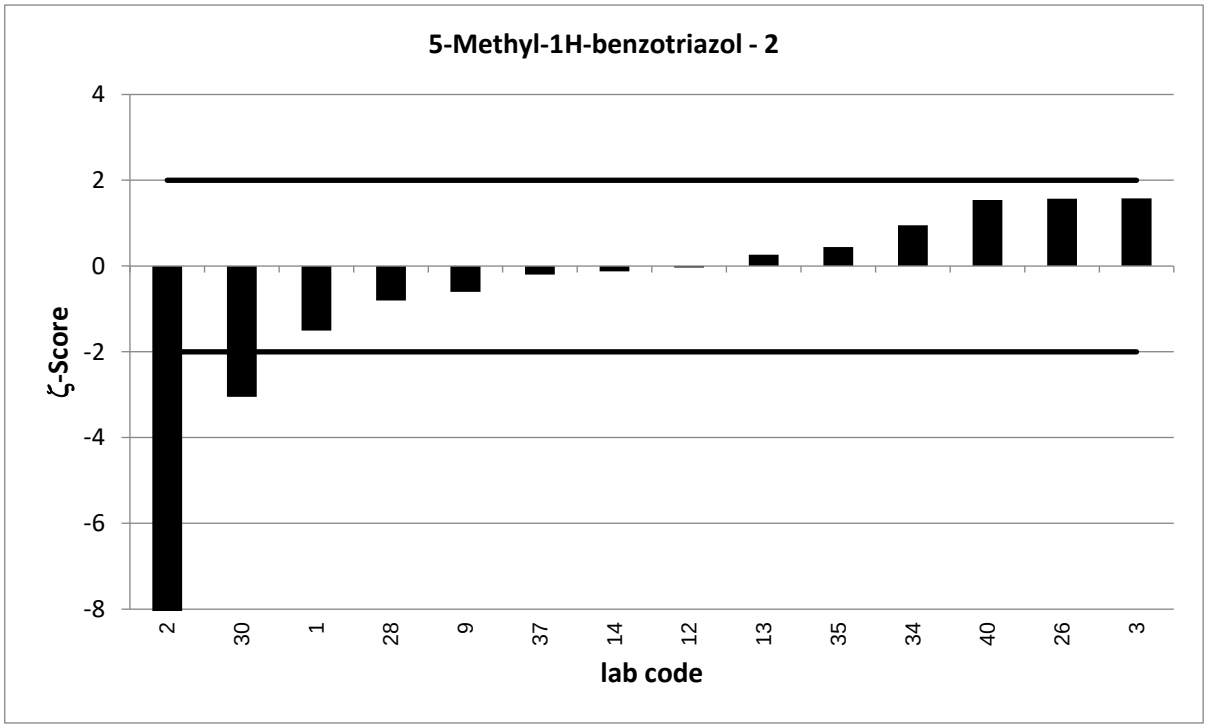


Strongly deviating values are not shown in the diagram.





Strongly deviating values are not correctly shown in the diagram.

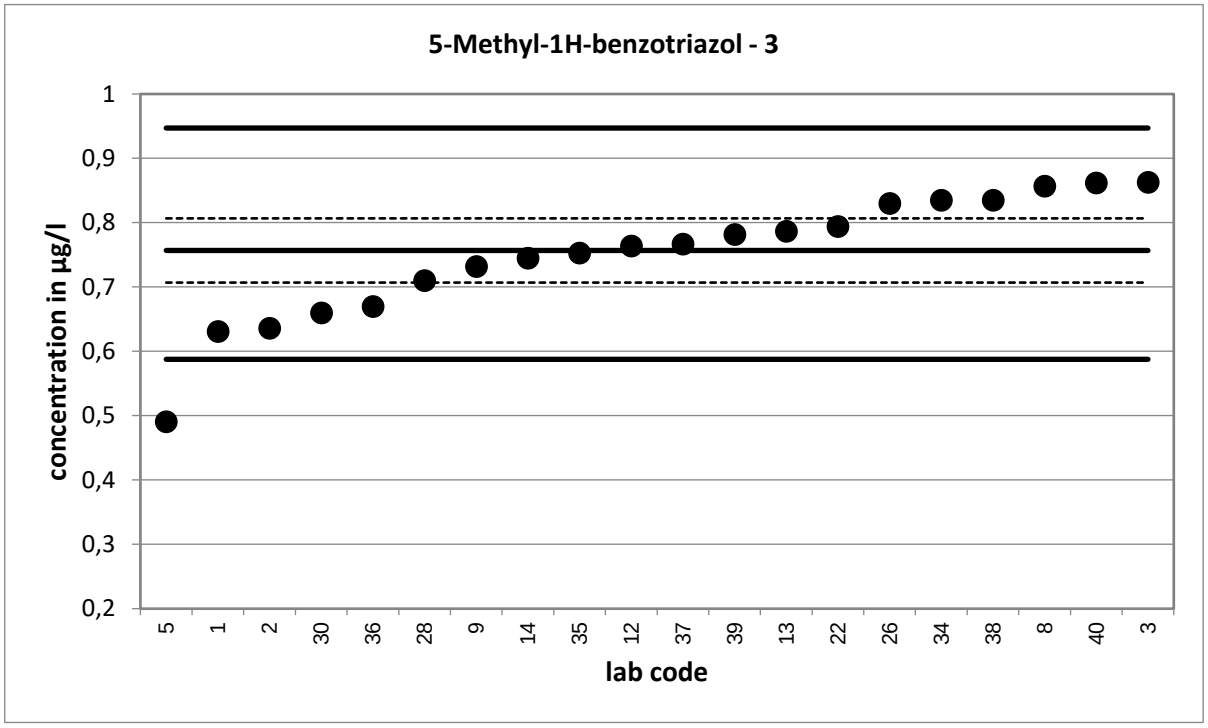


Strongly deviating values are not correctly shown in the diagram.

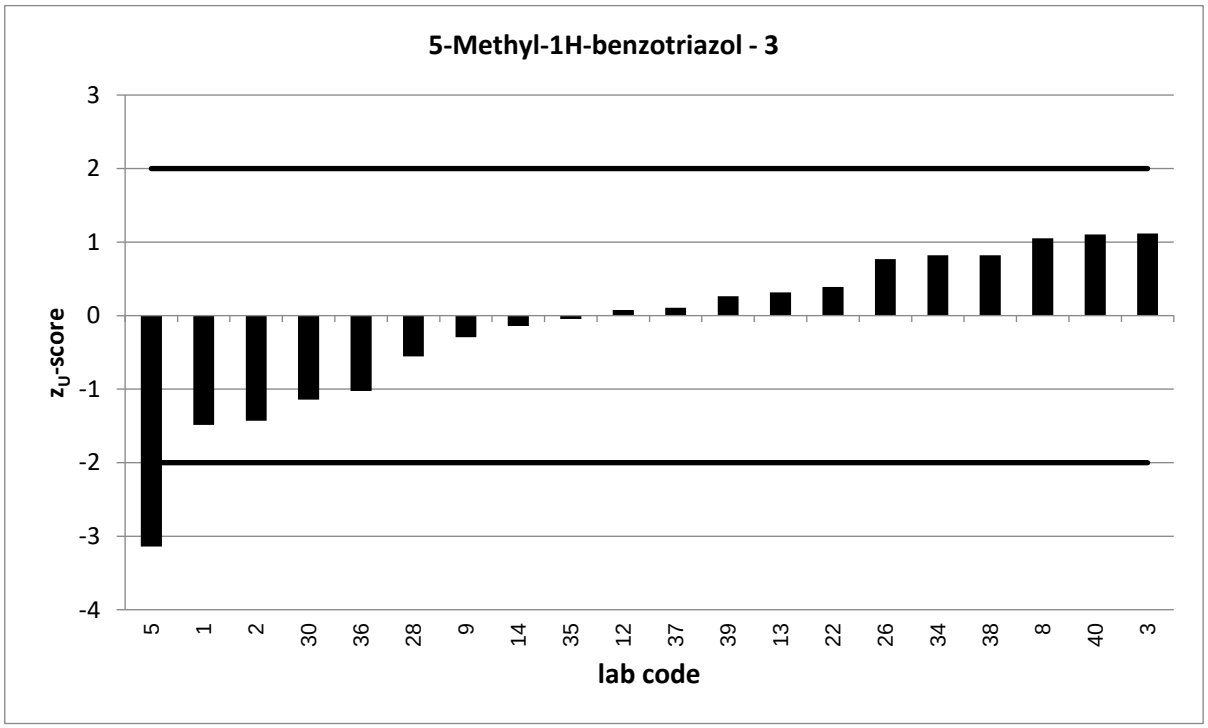
PT 4/22 - TW S1		5-Methyl-1H-benzotriazol - 3			
assigned value [µg/l]*		0,7568	± 0,0499		
upper tolerance limit [µg/l]		0,9471			
lower tolerance limit [µg/l]		0,5876			
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,631	0,175	-1,4	-1,5	s
2	0,636	0,094	-2,3	-1,4	s
3	0,863	0,207	1,0	1,1	s
5	0,491			-3,1	u
8	0,857			1,1	s
9	0,732	0,073	-0,6	-0,3	s
12	0,764	0,14	0,1	0,1	s
13	0,787	0,236	0,3	0,3	s
14	0,745	0,18	-0,1	-0,1	s
22	0,794			0,4	s
26	0,83	0,08	1,6	0,8	s
28	0,71	0,142	-0,6	-0,6	s
30	0,66	0,1	-1,7	-1,1	s
34	0,835	0,12	1,2	0,8	s
35	0,753	0,124	-0,1	0,0	s
36	0,67			-1,0	s
37	0,767	0,11	0,2	0,1	s
38	0,835			0,8	s
39	0,782			0,3	s
40	0,862	0,172	1,2	1,1	s

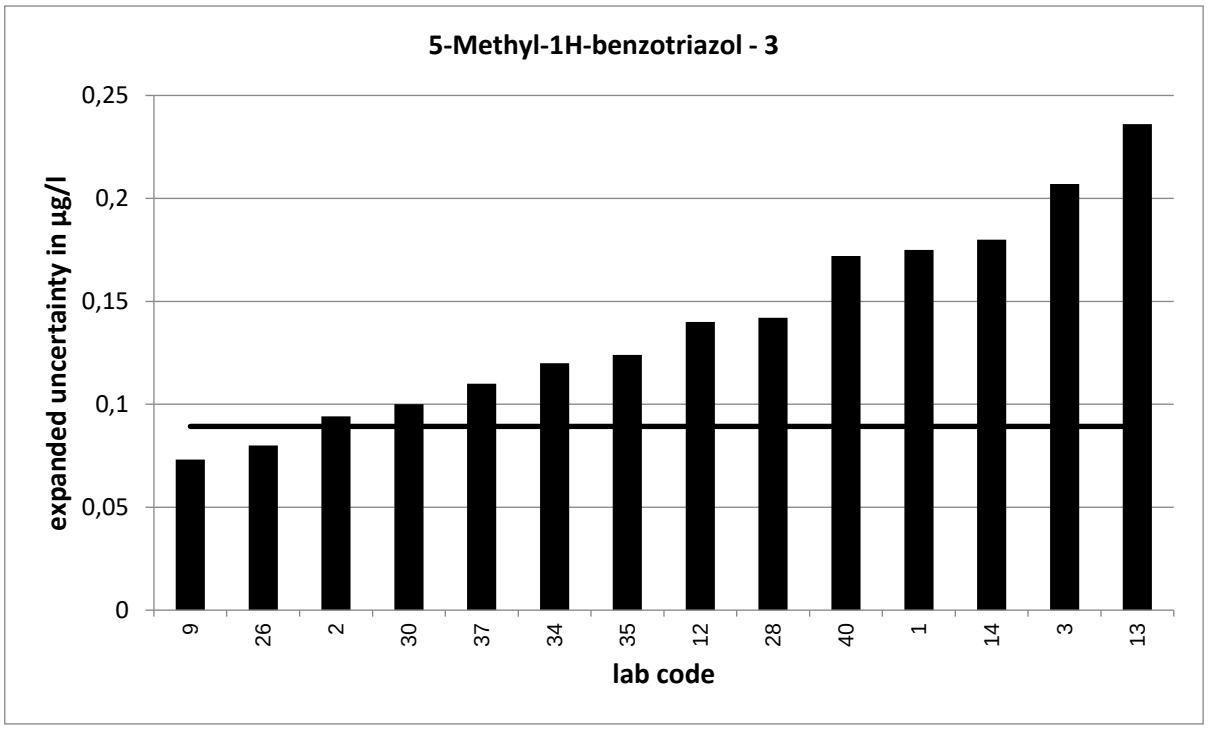
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

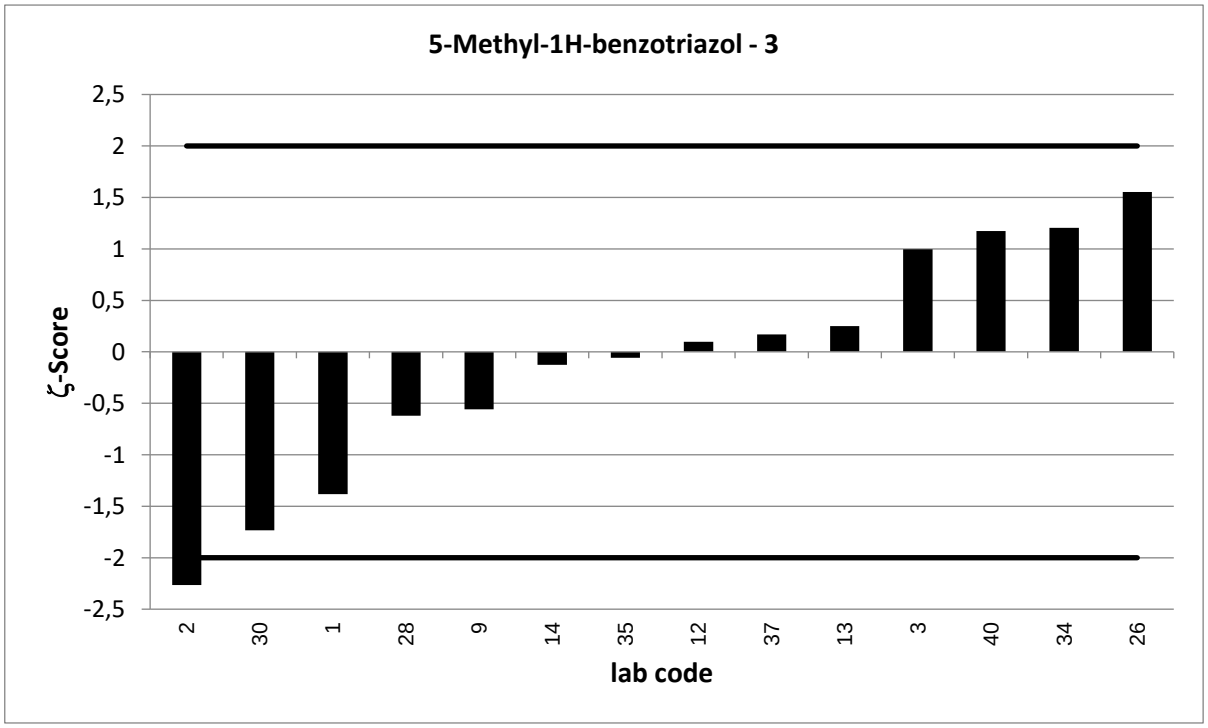
** s = satisfactory, q = questionable, u = unsatisfactory



Strongly deviating values are not shown in the diagram.



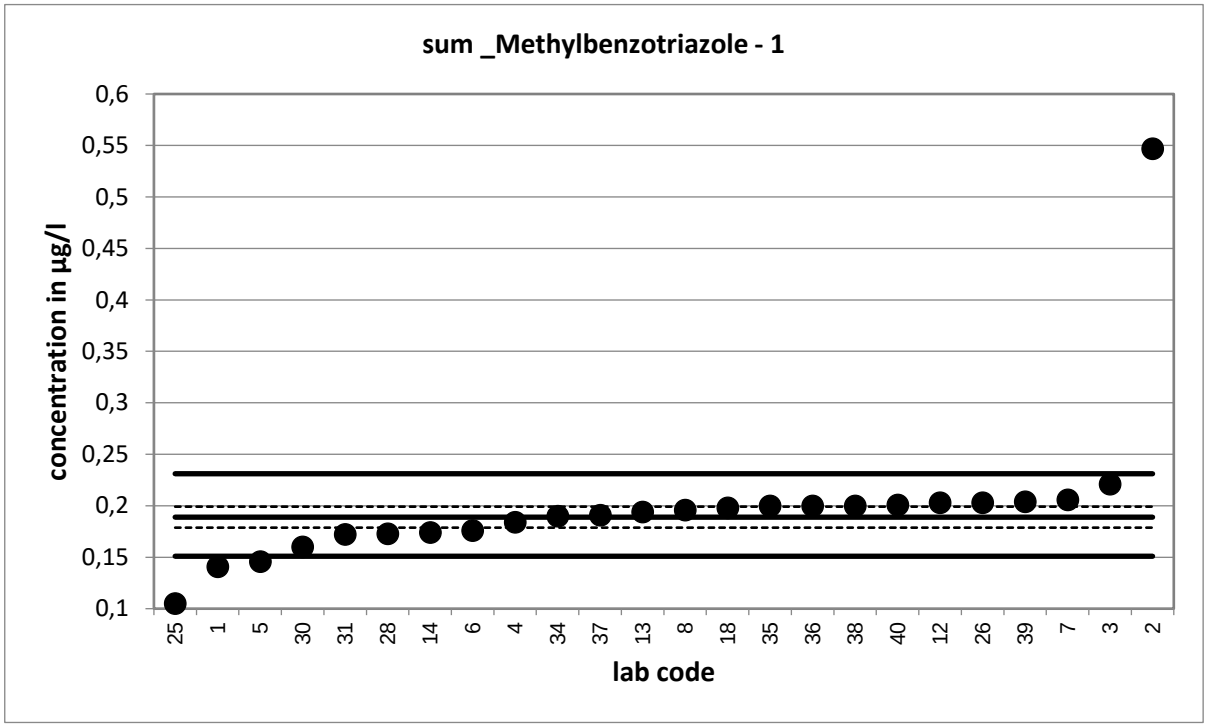

5-Methyl-1H-benzotriazol - 3
expanded uncertainty in µg/l
0,25
0,2
0,15
0,1
0,05
0
9
26
2
30
37
34
35
12
28
40
1
14
3
13
lab code


5-Methyl-1H-benzotriazol - 3
ζ-Score
2,5
2
1,5
1
0,5
0
-0,5
-1
-1,5
-2
-2,5
2
30
1
28
9
14
35
12
37
13
3
40
34
26
lab code

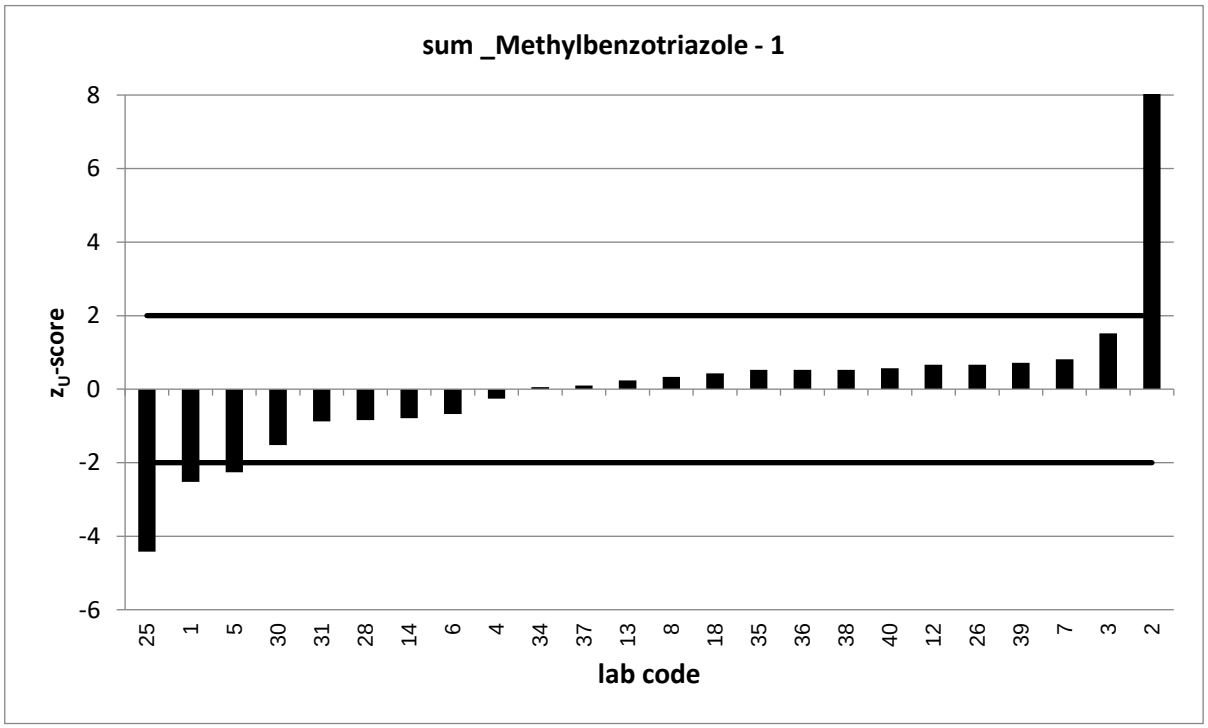
PT 4/22 - TW S1		sum _Methylbenzotriazole - 1			
assigned value [µg/l]*			0,1889	± 0,0102	
upper tolerance limit [µg/l]			0,2311		
lower tolerance limit [µg/l]			0,151		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,141			-2,5	q
2	0,547	0,081	8,8	17,0	u
3	0,221	0,053	1,2	1,5	s
4	0,184	0,037	-0,3	-0,3	s
5	0,146			-2,3	q
6	0,176			-0,7	s
7	0,206	0,037	0,9	0,8	s
8	0,196			0,3	s
12	0,203			0,7	s
13	0,194	0,058	0,2	0,2	s
14	0,174	0,042	-0,7	-0,8	s
18	0,198			0,4	s
25	0,105			-4,4	u
26	0,203	0,03	0,9	0,7	s
28	0,173	0,034	-0,9	-0,8	s
30	0,16	0,02	-2,6	-1,5	s
31	0,1722	0,043	-0,8	-0,9	s
34	0,19	0,026	0,1	0,1	s
35	0,2	0,041	0,5	0,5	s
36	0,2			0,5	s
37	0,191			0,1	s
38	0,2			0,5	s
39	0,204			0,7	s
40	0,201	0,04	0,6	0,6	s

* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

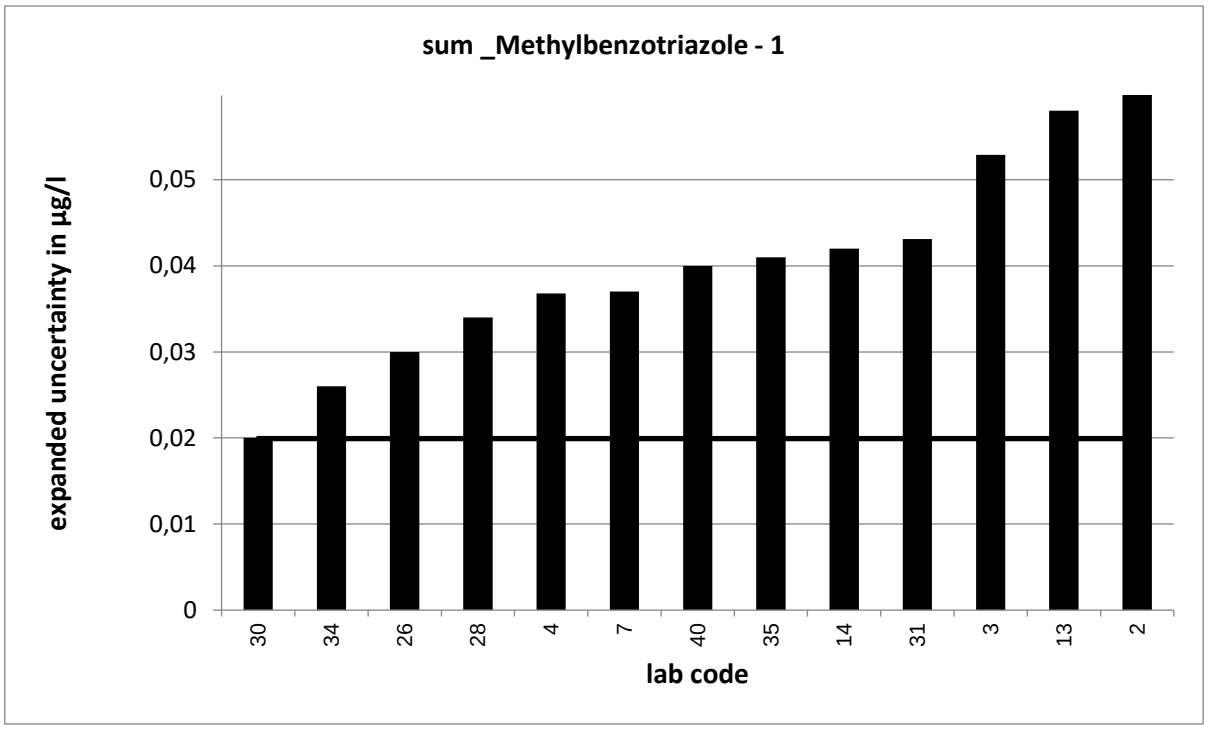
** s = satisfactory, q = questionable, u = unsatisfactory



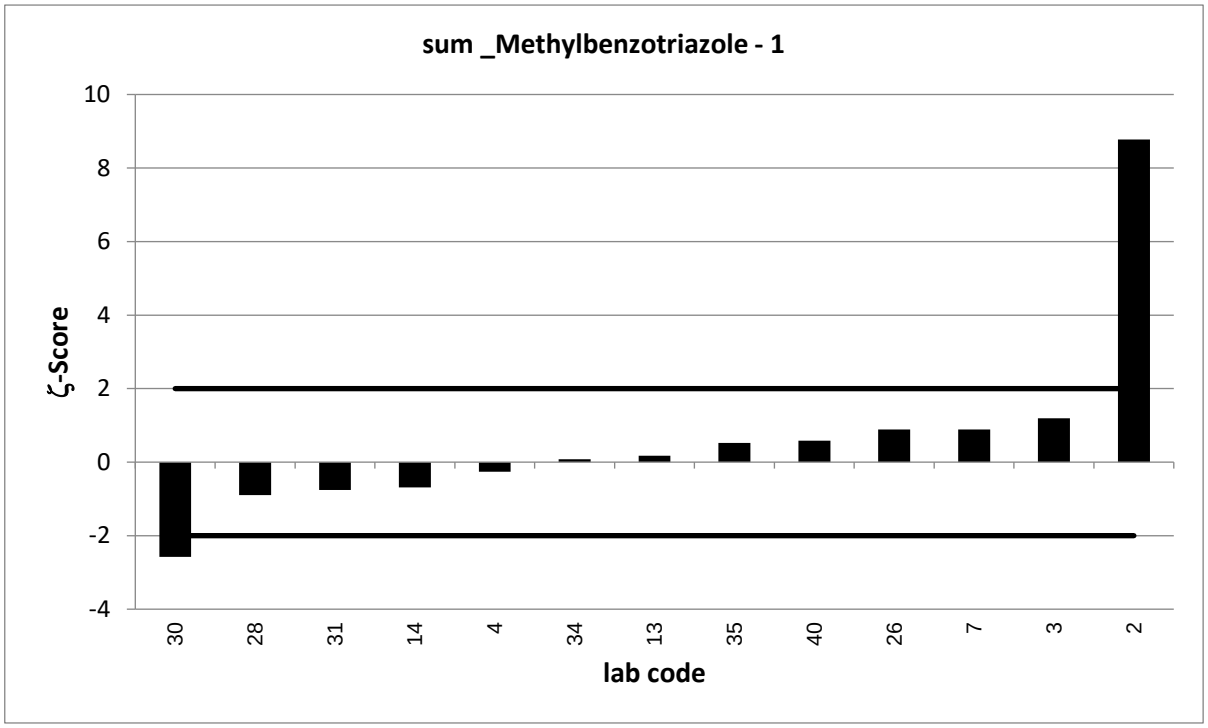
Strongly deviating values are not shown in the diagram.



Strongly deviating values are not correctly shown in the diagram.



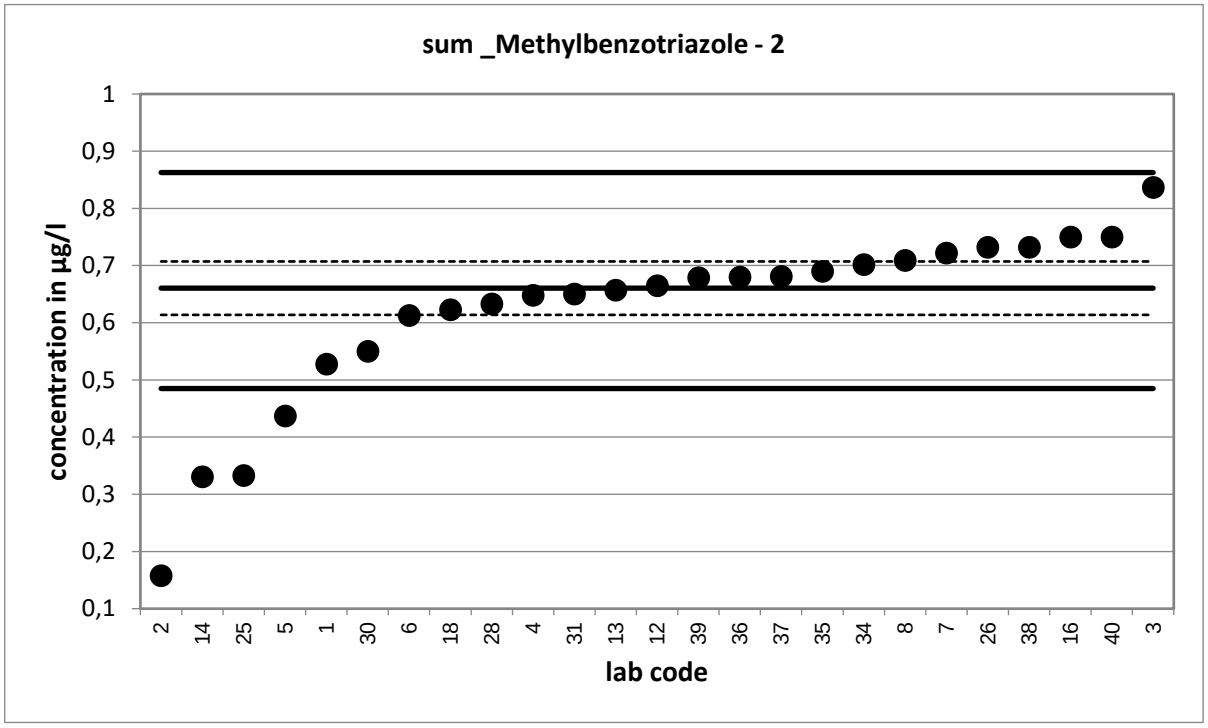
Strongly deviating values are not correctly shown in the diagram.



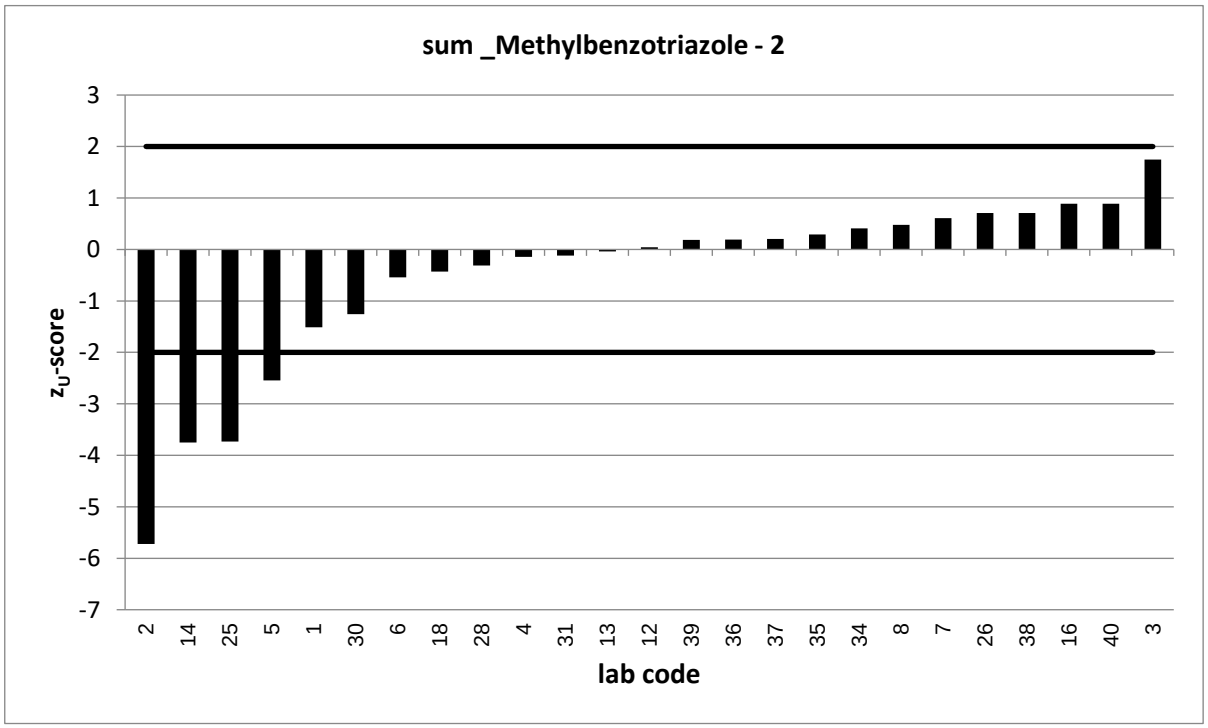
PT 4/22 - TW S1		sum _Methylbenzotriazole - 2			
assigned value [µg/l]*			0,6605	± 0,0467	
upper tolerance limit [µg/l]			0,8626		
lower tolerance limit [µg/l]			0,4849		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	0,528			-1,5	s
2	0,158	0,024	-19,1	-5,7	u
3	0,837	0,2	1,7	1,7	s
4	0,648	0,13	-0,2	-0,1	s
5	0,437			-2,5	q
6	0,613			-0,5	s
7	0,722	0,13	0,9	0,6	s
8	0,709			0,5	s
12	0,665			0,0	s
13	0,657	0,197	0,0	0,0	s
14	0,331	0,08	-7,1	-3,8	u
16	0,75	0,33	0,5	0,9	s
18	0,623			-0,4	s
25	0,333			-3,7	u
26	0,732	0,07	1,7	0,7	s
28	0,633	0,127	-0,4	-0,3	s
30	0,55	0,08	-2,4	-1,3	s
31	0,6503	0,163	-0,1	-0,1	s
34	0,702	0,097	0,8	0,4	s
35	0,69	0,141	0,4	0,3	s
36	0,68			0,2	s
37	0,681			0,2	s
38	0,732			0,7	s
39	0,679			0,2	s
40	0,75	0,15	1,1	0,9	s

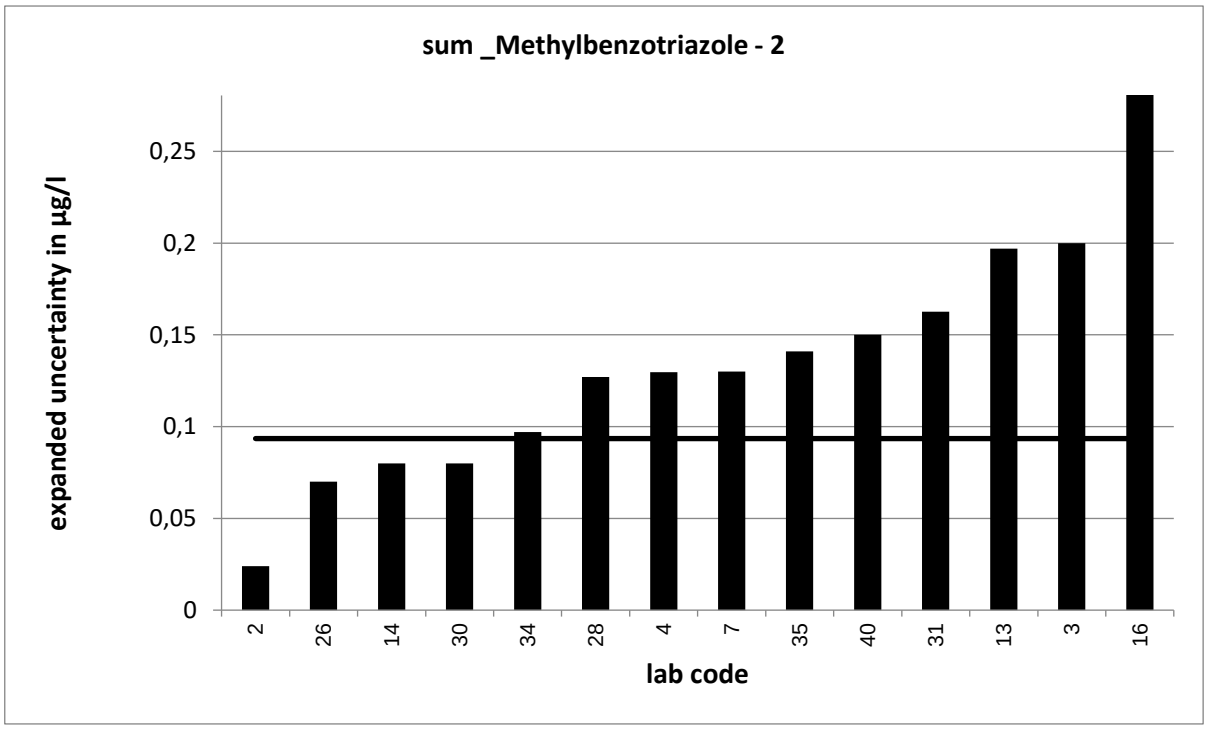
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory

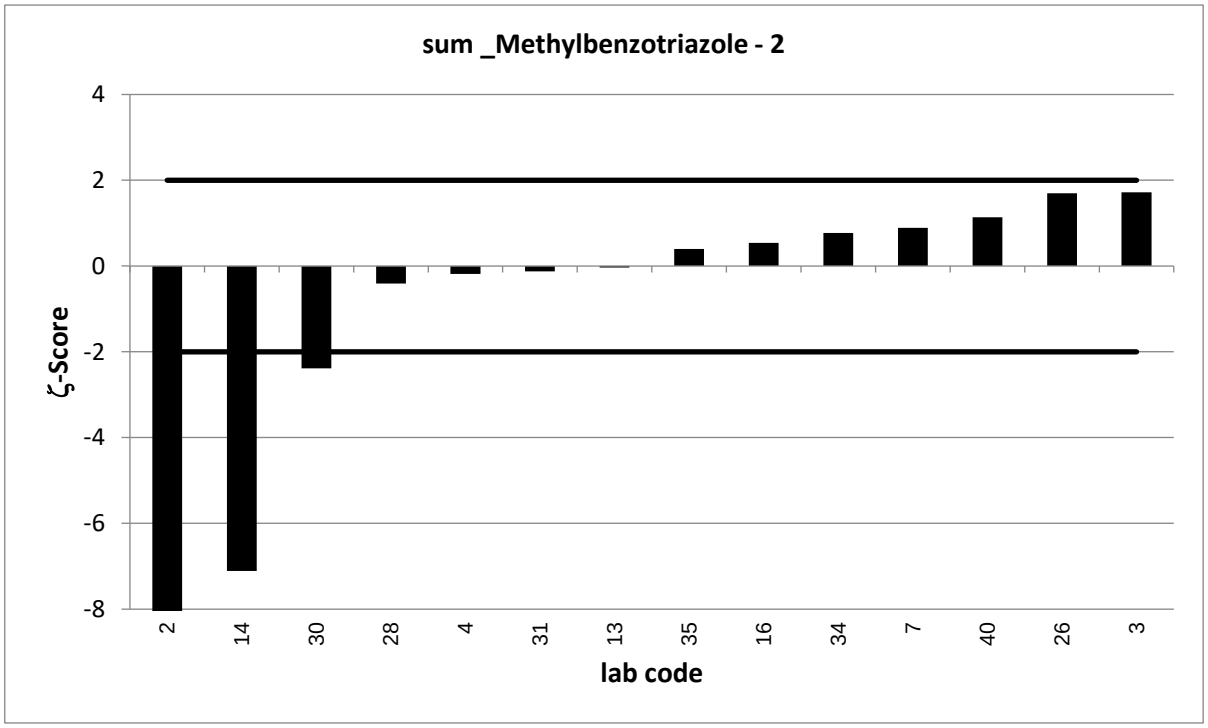


Strongly deviating values are not shown in the diagram.





Strongly deviating values are not correctly shown in the diagram.

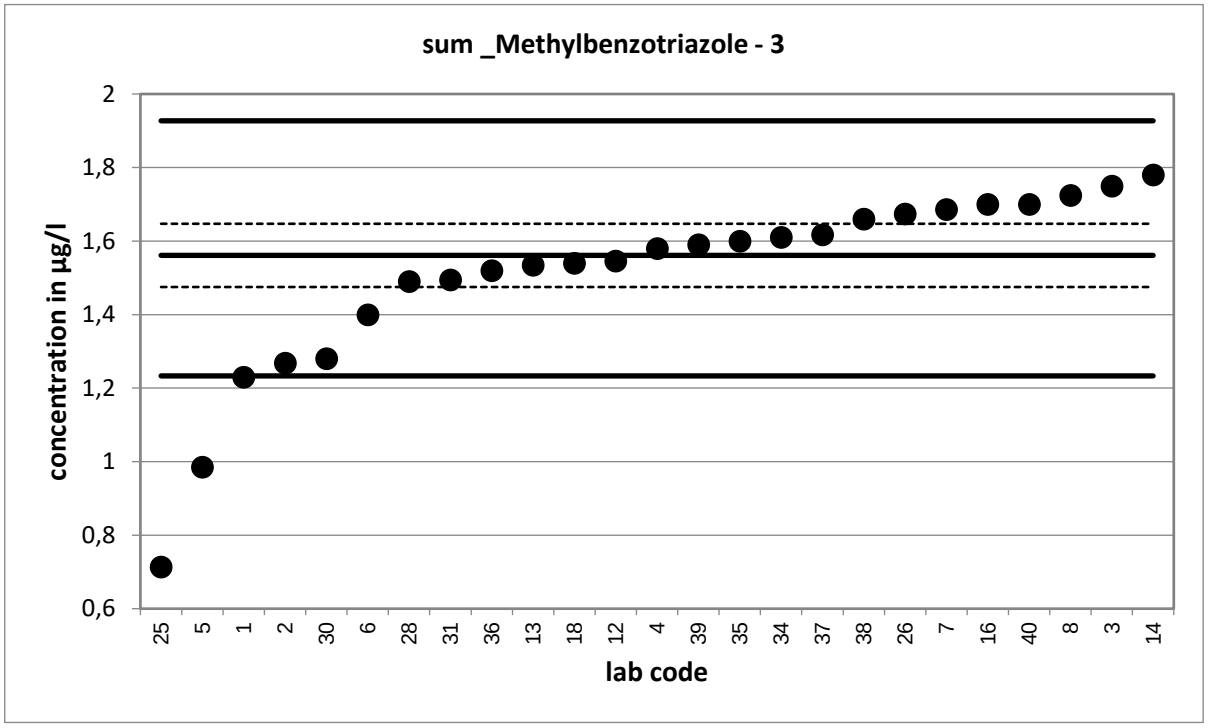


Strongly deviating values are not correctly shown in the diagram.

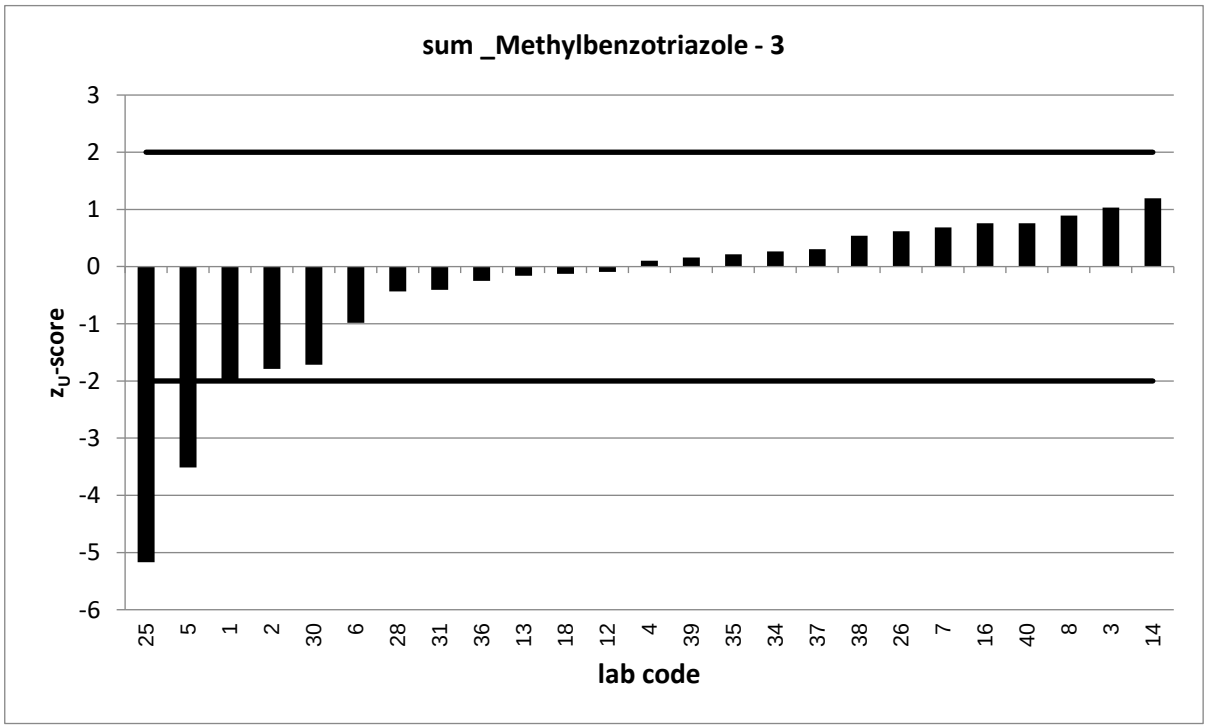
PT 4/22 - TW S1		sum _Methylbenzotriazole - 3			
assigned value [µg/l]*			1,561	± 0,086	
upper tolerance limit [µg/l]			1,927		
lower tolerance limit [µg/l]			1,233		
lab code	result [µg/l]	±	z-score	z_U-score	assessm.**
1	1,23			-2,0	s
2	1,268	0,201	-2,7	-1,8	s
3	1,75	0,419	0,9	1,0	s
4	1,58	0,316	0,1	0,1	s
5	0,985			-3,5	u
6	1,4			-1,0	s
7	1,686	0,304	0,8	0,7	s
8	1,724			0,9	s
12	1,546			-0,1	s
13	1,535	0,461	-0,1	-0,2	s
14	1,78	0,42	1,0	1,2	s
16	1,7	0,75	0,4	0,8	s
18	1,54			-0,1	s
25	0,714			-5,2	u
26	1,674	0,16	1,2	0,6	s
28	1,49	0,298	-0,5	-0,4	s
30	1,28	0,19	-2,7	-1,7	s
31	1,4945	0,374	-0,3	-0,4	s
34	1,61	0,22	0,4	0,3	s
35	1,6	0,328	0,2	0,2	s
36	1,52			-0,3	s
37	1,617			0,3	s
38	1,66			0,5	s
39	1,59			0,2	s
40	1,7	0,34	0,8	0,8	s

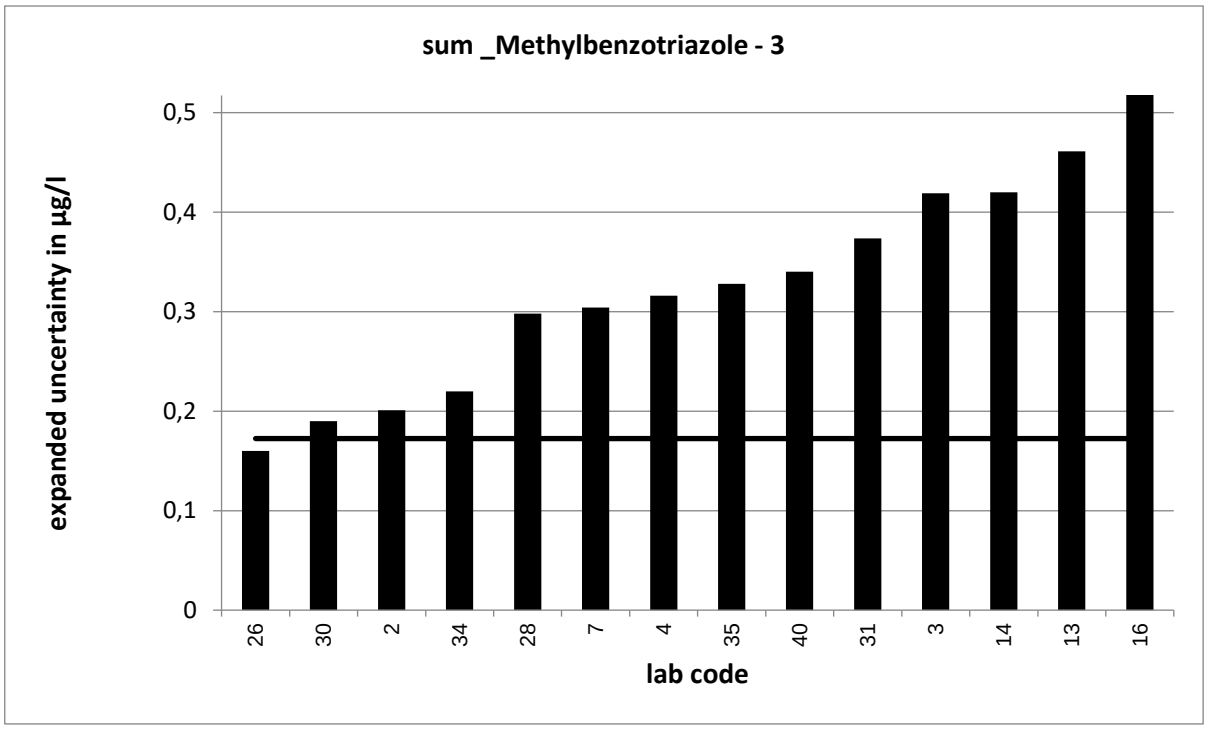
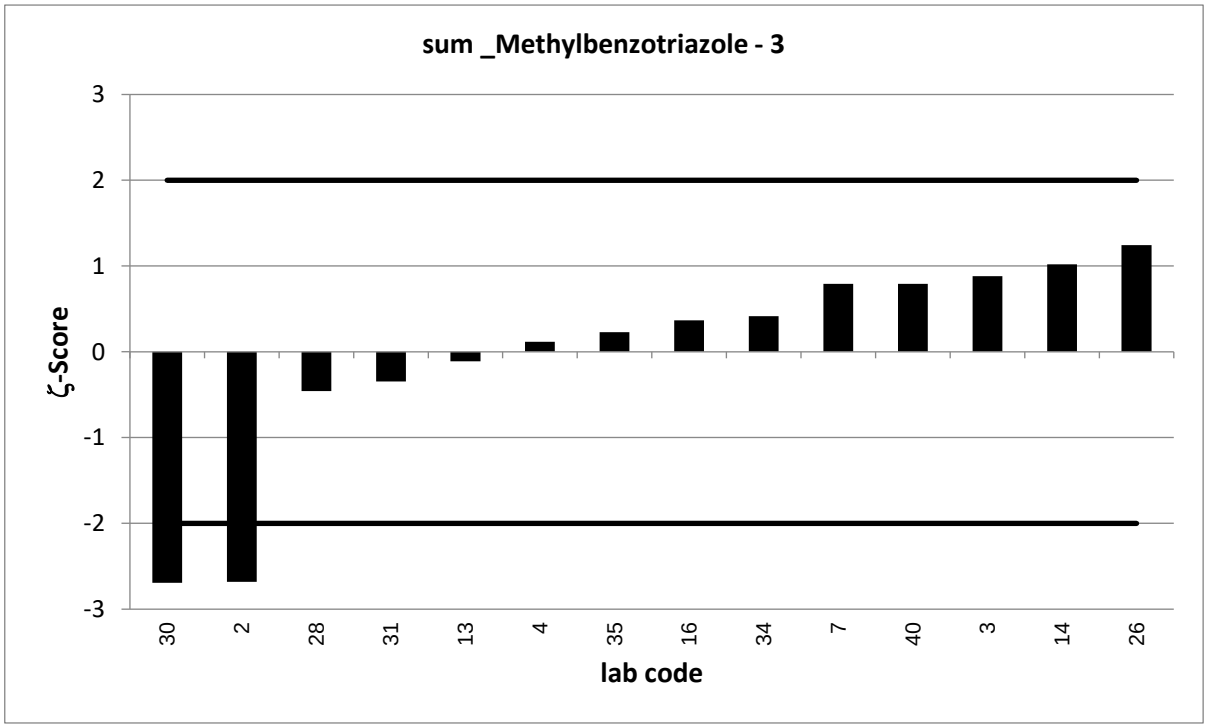
* The stated uncertainty of the assigned value is the expanded uncertainty with a coverage factor k=2 corresponding to a confidence level of about 95%

** s = satisfactory, q = questionable, u = unsatisfactory



Strongly deviating values are not shown in the diagram.





Strongly deviating values are not correctly shown in the diagram.