

University of Stuttgart
Germany



Analytische Qualitätssicherung Baden-Württemberg

Proficiency Test 4/21

- TW S6 – X-ray contrast media in
drinking water-

amidotrizoic acid, iodipamide, iohexol, iomeprol, iopamidol, iopromide,
iothalamic acid, ioxaglic acid, ioxitalamic acid, gadolinium, gadolinium anomaly

Final report

provided by

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And

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 **IWW**

Stuttgart, in December 2021

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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:

- amidotrizoic acid
- iodipamide
- iohexol
- iomeprol
- iopamidol
- iopromide
- iothalamic acid
- ioxaglic acid
- ioxitalamic acid

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 x 1 sample for the determination of amidotrizoic acid, iodipamide, iohexol, iomeprol, iopamidol, iopromide, iothalamic acid, ioxaglic acid and ioxitalamic acid in 1000-ml-glass bottles with ground glass plugs.

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

3. Sample preparation

The samples for the determination of the X-ray contrast media 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 06.07.2021 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 [$\mu\text{g/l}$]	maximum expected upper limit [$\mu\text{g/l}$]
amidotrizoic acid	0.05	1 $\mu\text{g/l}$
iodipamide	0.05	1 $\mu\text{g/l}$
iohexol	0.05	1 $\mu\text{g/l}$
iomeprol	0.05	1 $\mu\text{g/l}$
iopamidol	0.05	1 $\mu\text{g/l}$
Iopromide	0.05	1 $\mu\text{g/l}$
iothalamic acid	0.05	1 $\mu\text{g/l}$
ioxaglic acid	0.05	1 $\mu\text{g/l}$
ioxitalamic acid	0.05	1 $\mu\text{g/l}$
gadolinium	0.005	0.1 $\mu\text{g/l}$

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 as average values in $\mu\text{g/l}$ with three significant digits.

6. Submission of the results

The deadline for the submission of results was on 02.08.2021.

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.

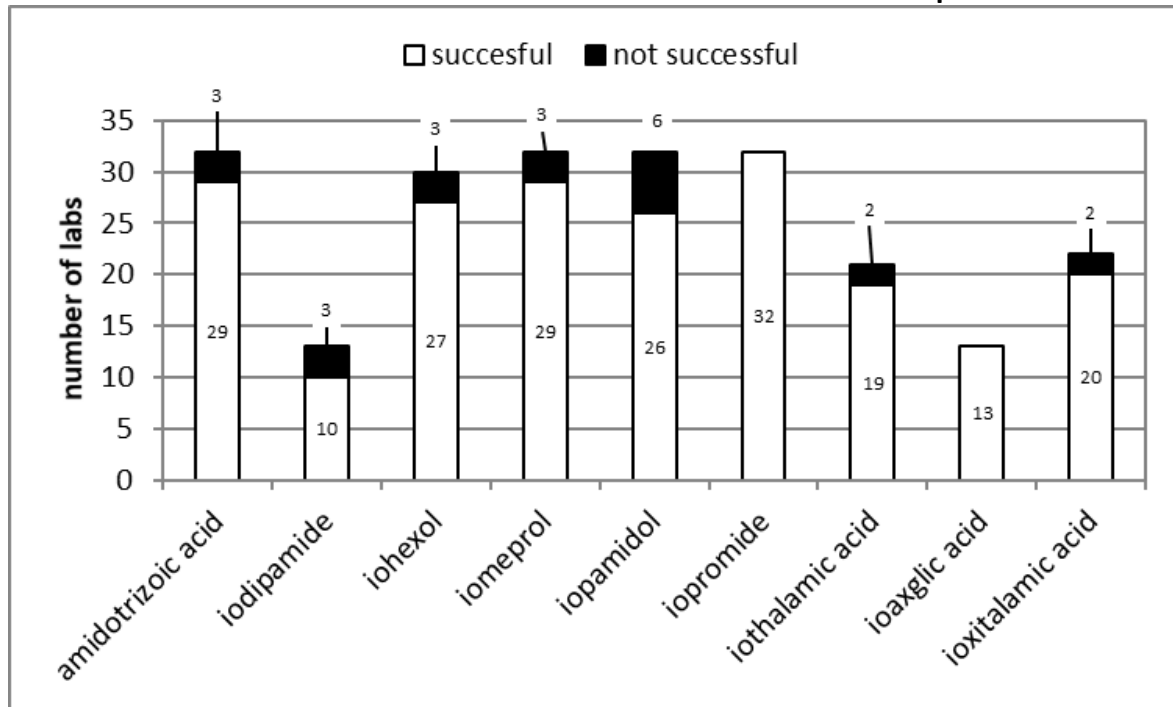
This PT was evaluated as follows:

Assigned value x_{pt}:	Reference value						
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:	<table style="border: none; width: 100%;"> <tr> <td style="border: none;">$z_u \leq 2,0$</td> <td style="border: none;">successful</td> </tr> <tr> <td style="border: none;">$2,0 < z_u < 3,0$</td> <td style="border: none;">questionable</td> </tr> <tr> <td style="border: none;">$z_u \geq 3,0$</td> <td style="border: none;">unsatisfactory</td> </tr> </table>	$ z_u \leq 2,0$	successful	$2,0 < z_u < 3,0$	questionable	$ z_u \geq 3,0$	unsatisfactory
$ z_u \leq 2,0$	successful						
$2,0 < z_u < 3,0$	questionable						
$ z_u \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:	32
Number of reported values	681
Number of accepted values:	610 (89,6 %)

Illustration of the successful 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	21 (65,6 %)
Number of valid values	681
Number of valid values with measurement uncertainties	441 (64,8 %)

Measurement uncertainties against the accreditation status

Accreditation status of the values	Number of values	Number of values with measurement uncertainty
accredited	498	381 (76,5 %)
not accredited	84	60 (71,4 %)
not specified	99	0

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 $z_U \leq 2,0$	384
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	93 (24,2 %)

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

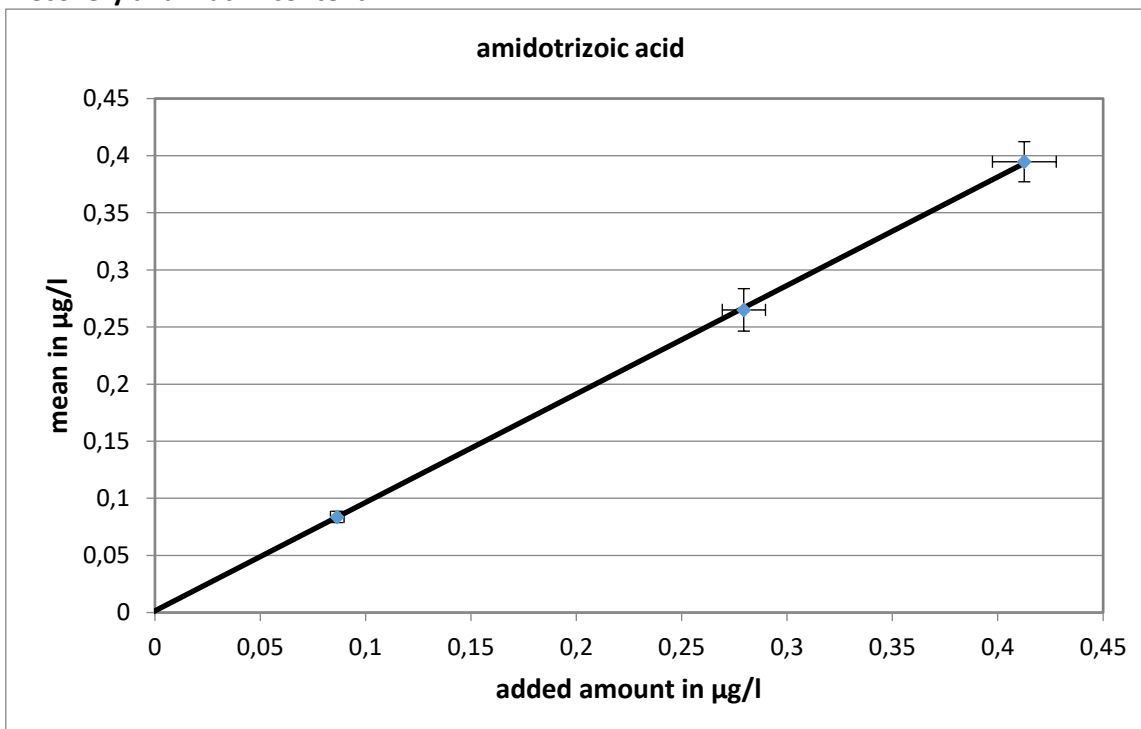
12. Internet

The report is available on the following webpage:
http://www.aqsbw.de/pdf/248/report_248.pdf

amidotrizoic acid

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	0,0865	3,71	0,0112	0,0112	12,97	0,1107	0,0654	27,92	-24,43	32	1	3	12,5
2	0,2795	3,67	0,0420	0,0420	15,04	0,3713	0,2011	32,86	-28,06	32	0	1	3,1
3	0,4126	3,67	0,0398	0,0398	9,64	0,4965	0,3367	20,34	-18,40	32	2	3	15,6
sum										96	3	7	10,4

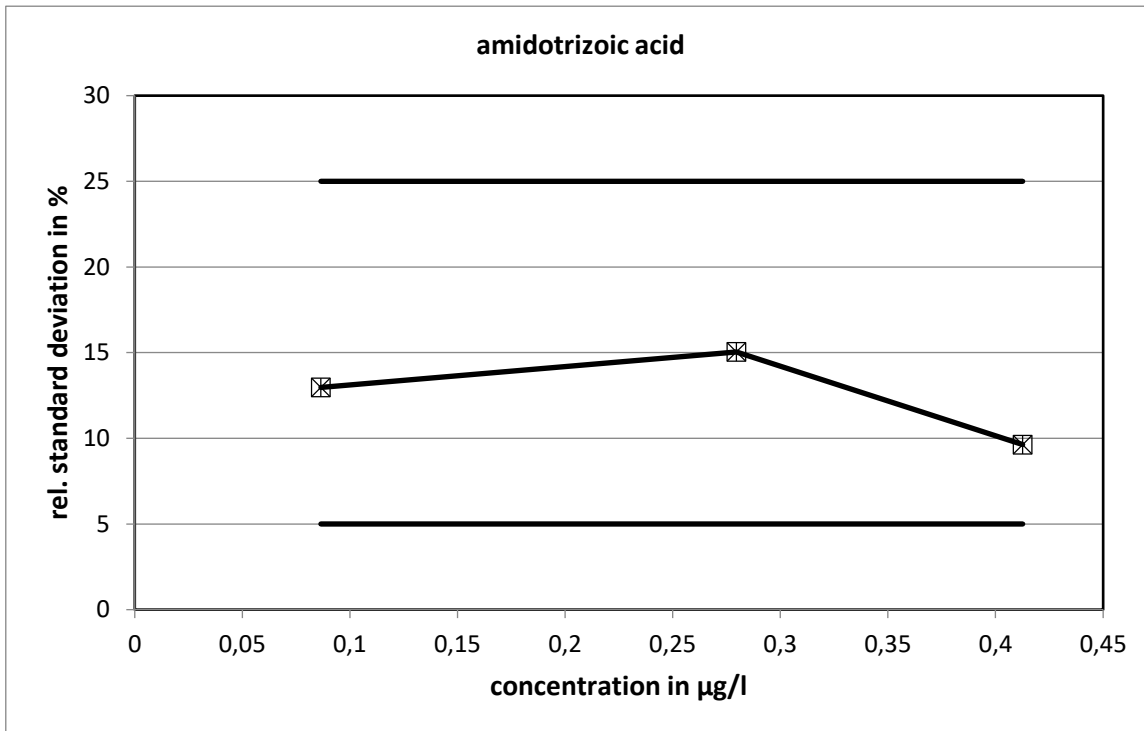
Recovery and matrix content



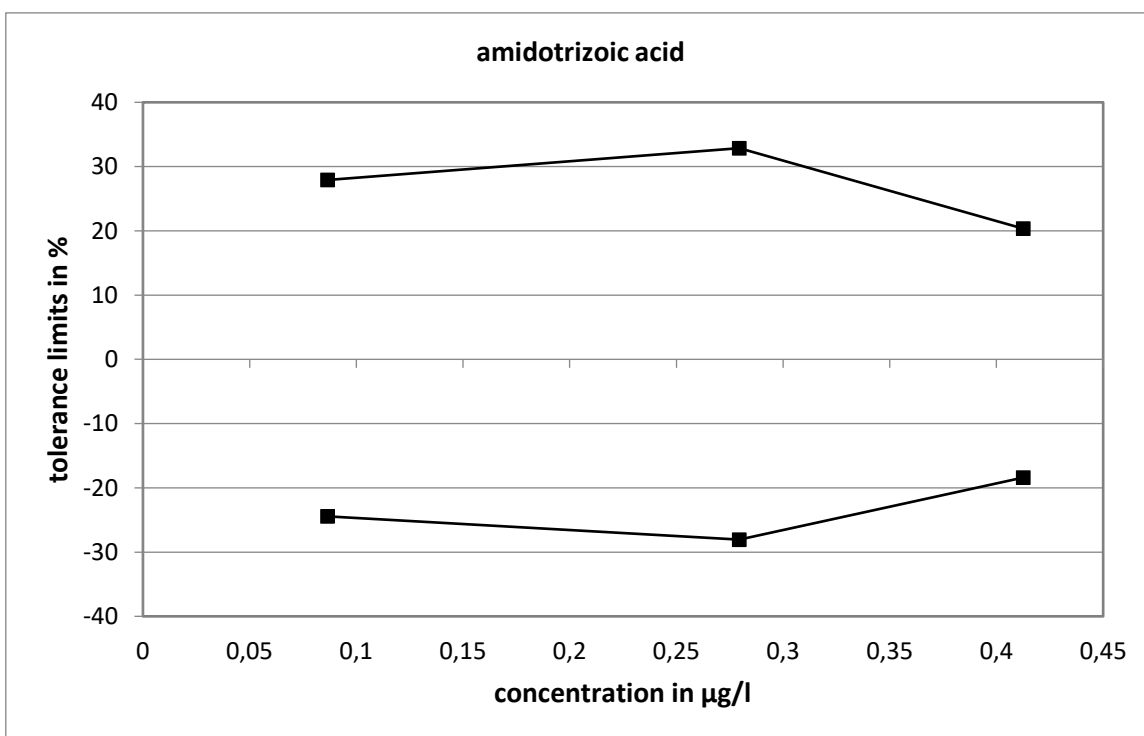
slope of the regression: 0,9497; recovery rate: 95 %

neg. x-axis intercept = matrix content: 0 µg/l

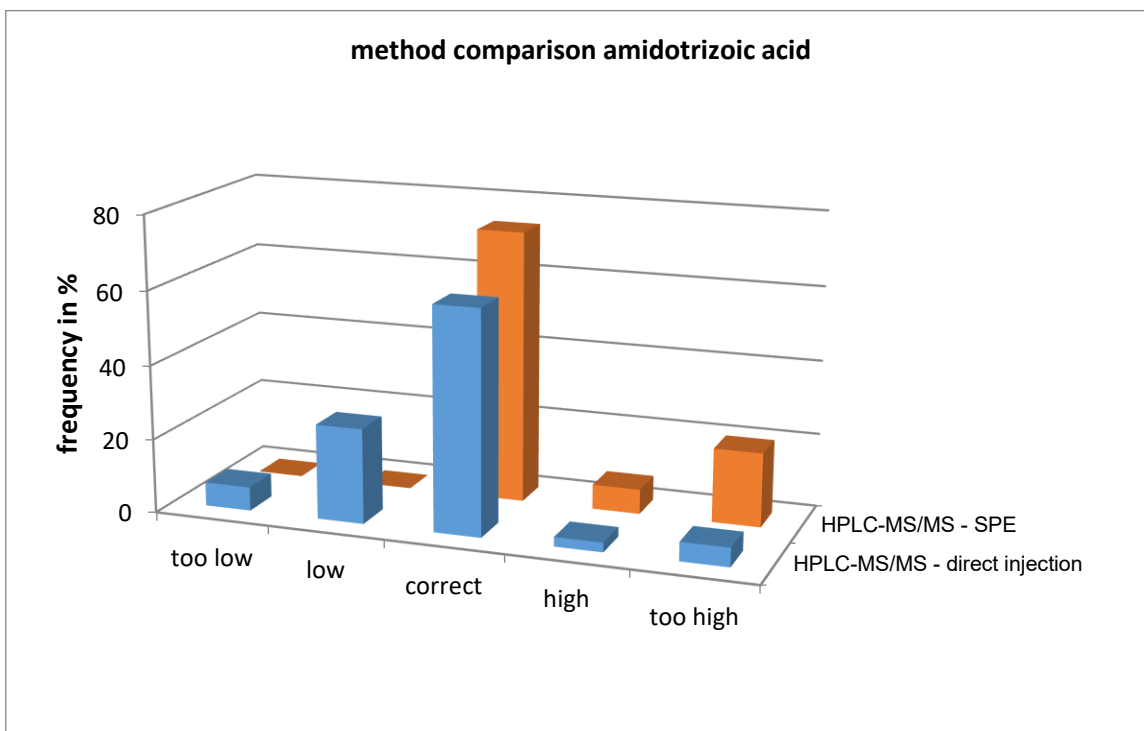
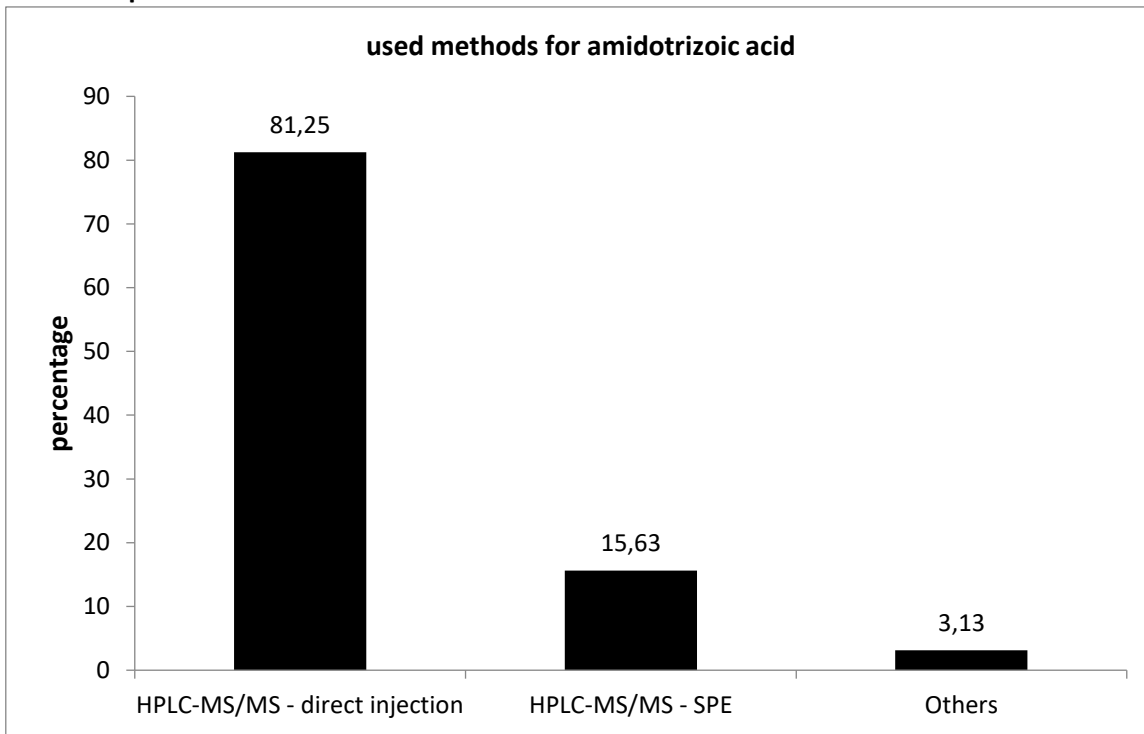
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



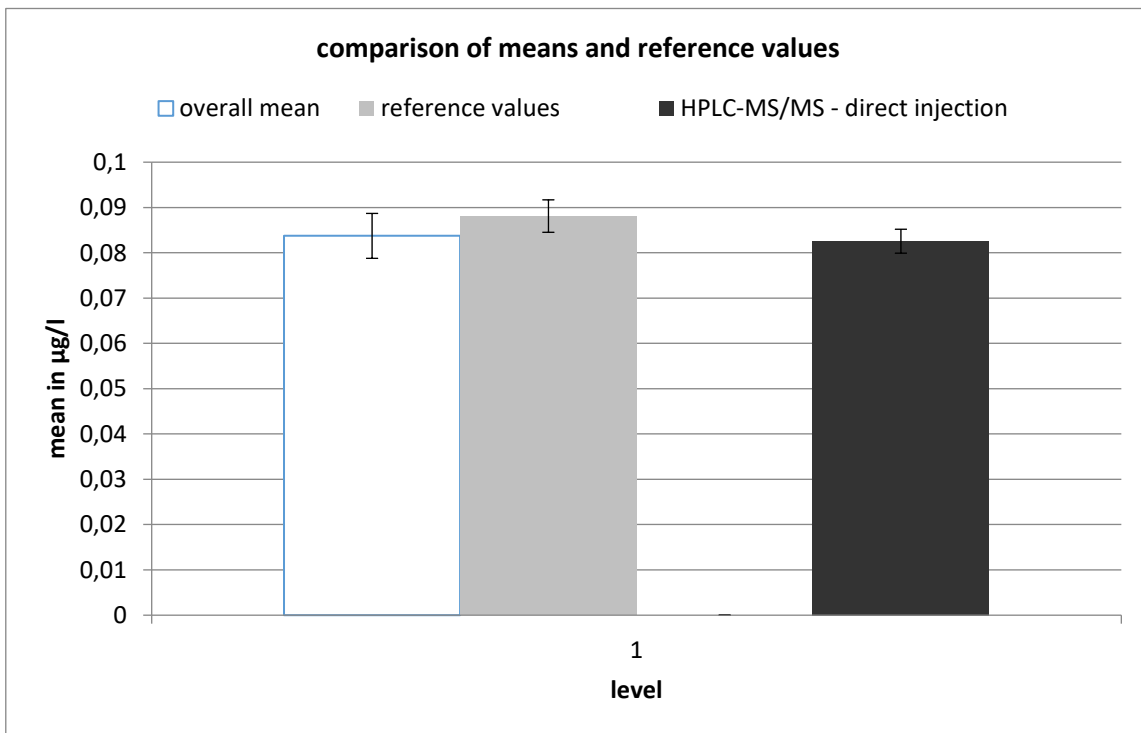
Method specific evaluation

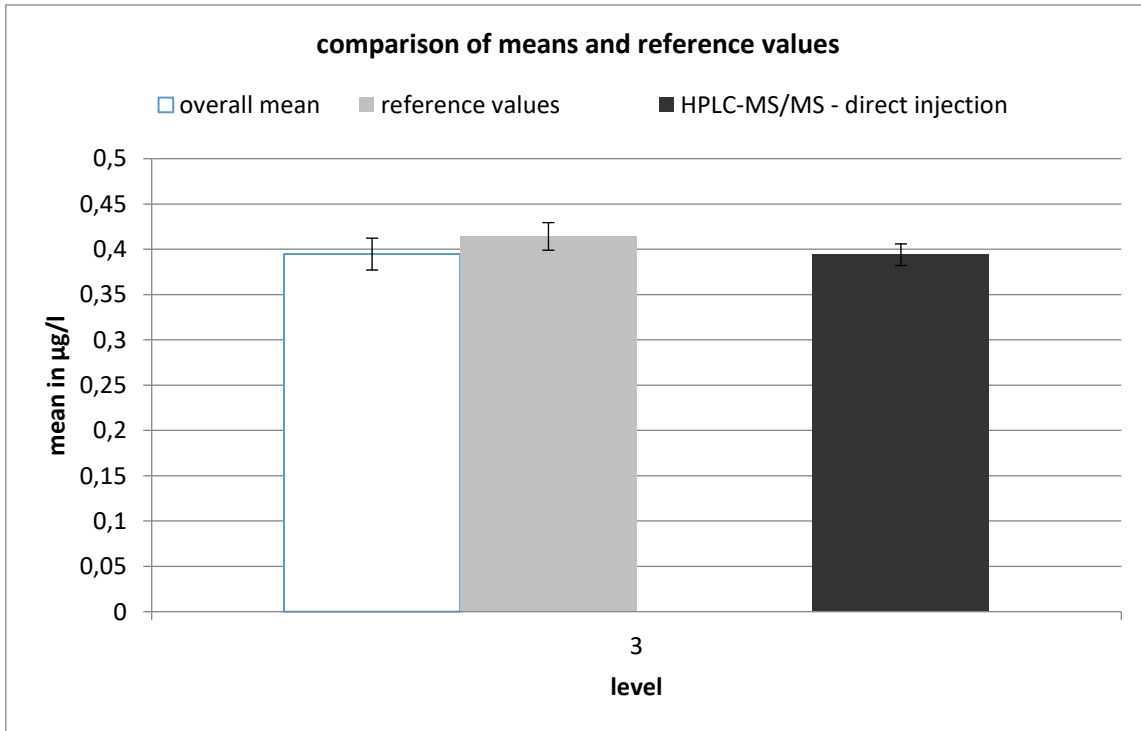
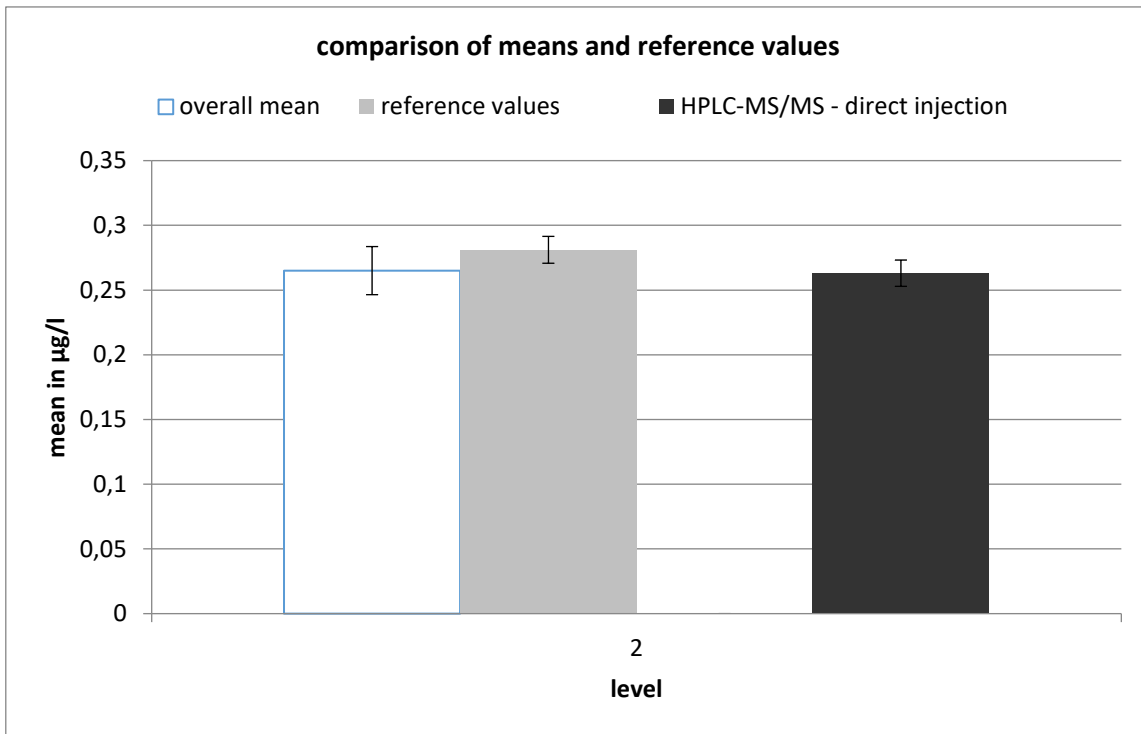


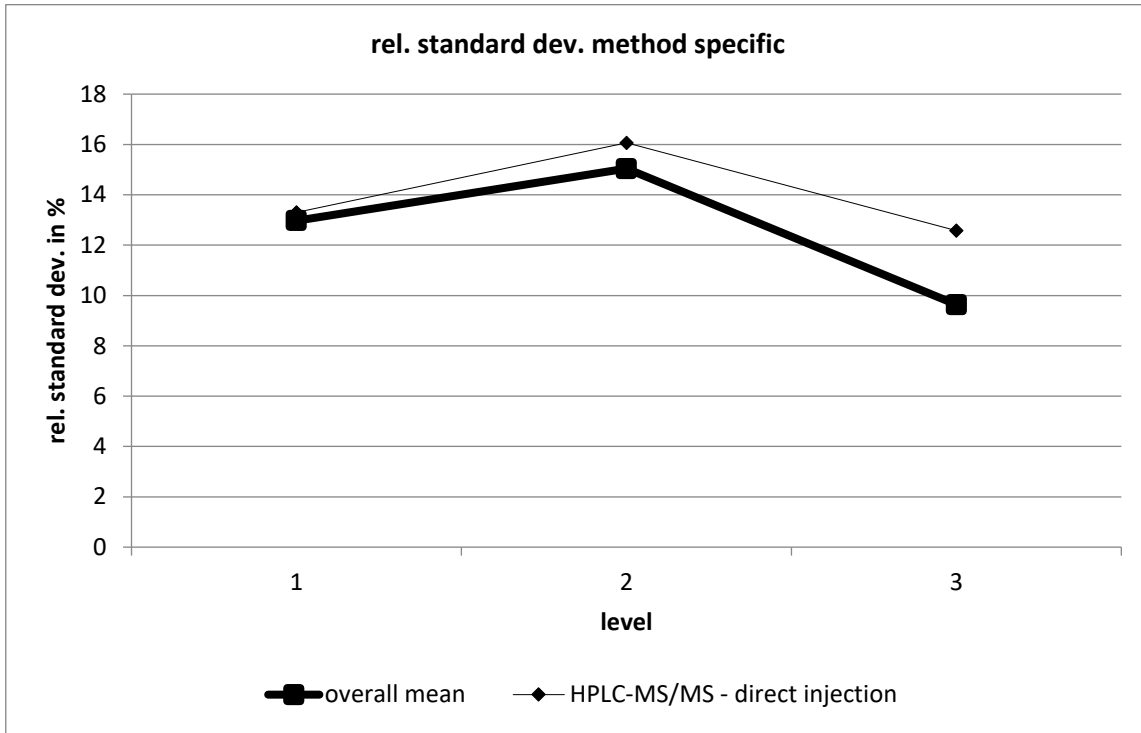
The application of HPLC-MS/MS - direct injection lead to rather lower values, whereas the application of SPE lead to a higher ratio of too high values.

Comparison of means and reference values

level	Experimental Data			Reference Data		
	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,0837	0,0050	5,9	0,0881	0,0036	4,1
2	0,2650	0,0186	7,0	0,2811	0,0104	3,7
3	0,3947	0,0176	4,5	0,4142	0,0152	3,7





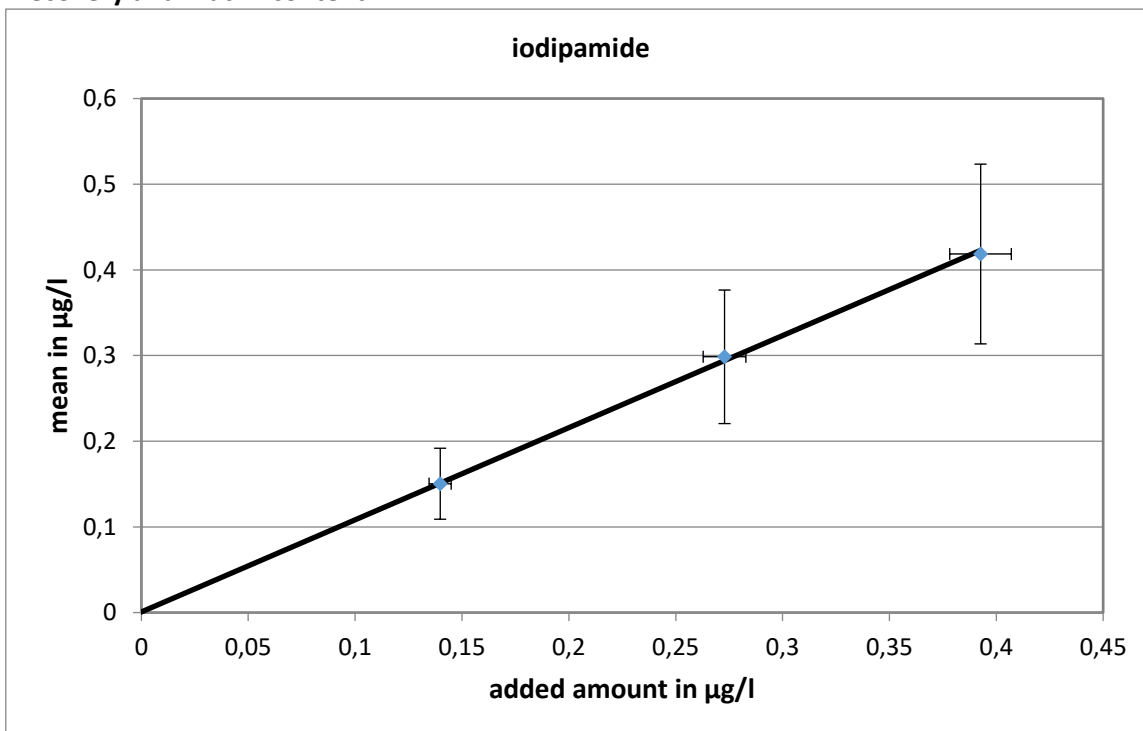


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,083	0,003	3,198	0,011	13,29	27	2	2	14,81
2	0,263	0,01	3,865	0,042	16,07	27	1	0	3,704
3	0,394	0,012	3,025	0,05	12,57	27	1	2	11,11

iodipamide

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	0,1397	3,71	0,0598	0,0349	25,00	0,2208	0,0766	57,99	-45,19	13	0	3	23,1
2	0,2728	3,67	0,1124	0,0682	25,00	0,4310	0,1496	57,99	-45,19	13	0	2	15,4
3	0,3926	3,67	0,1513	0,0982	25,00	0,6203	0,2152	57,99	-45,19	13	0	2	15,4
sum										39	0	7	17,9

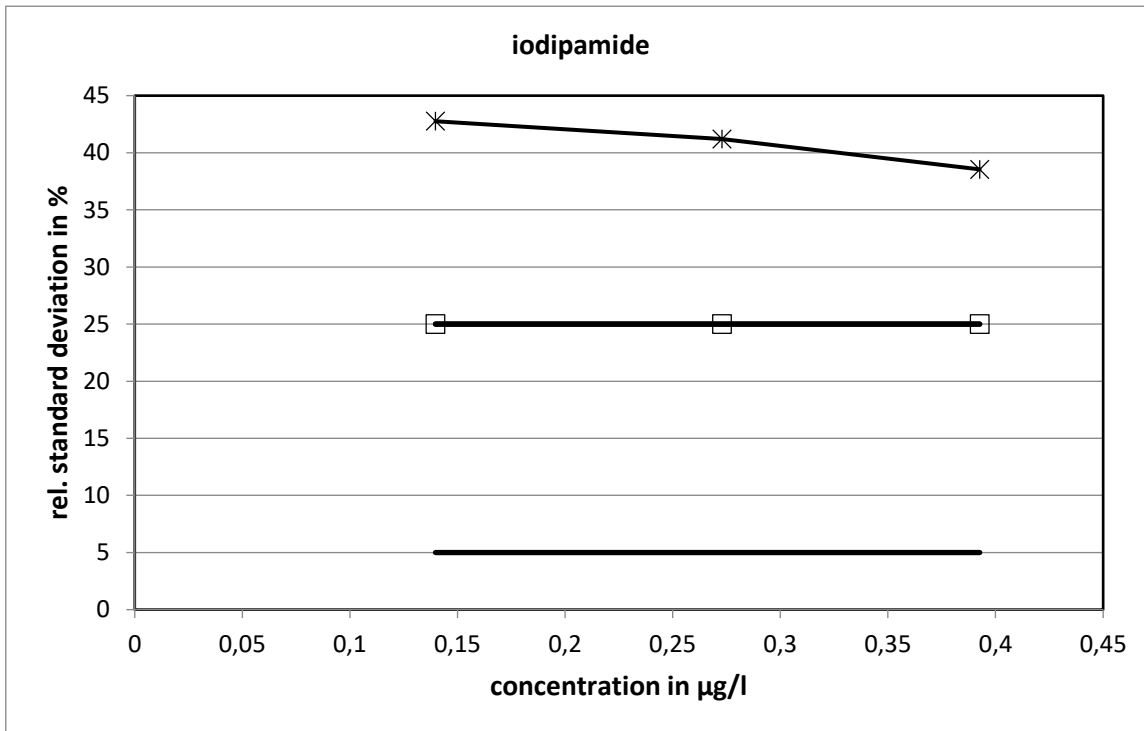
Recovery and matrix content



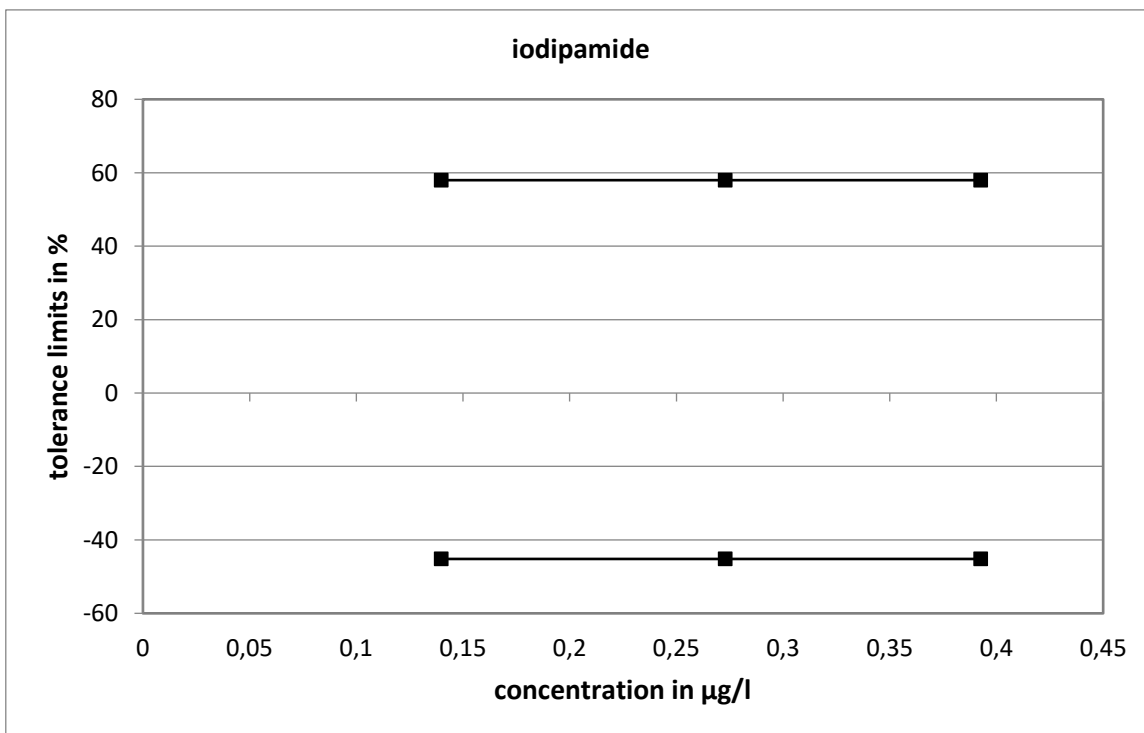
slope of the regression: 1,075; recovery rate: 107,5 %

neg. x-axis intercept = matrix content: 0 µg/l

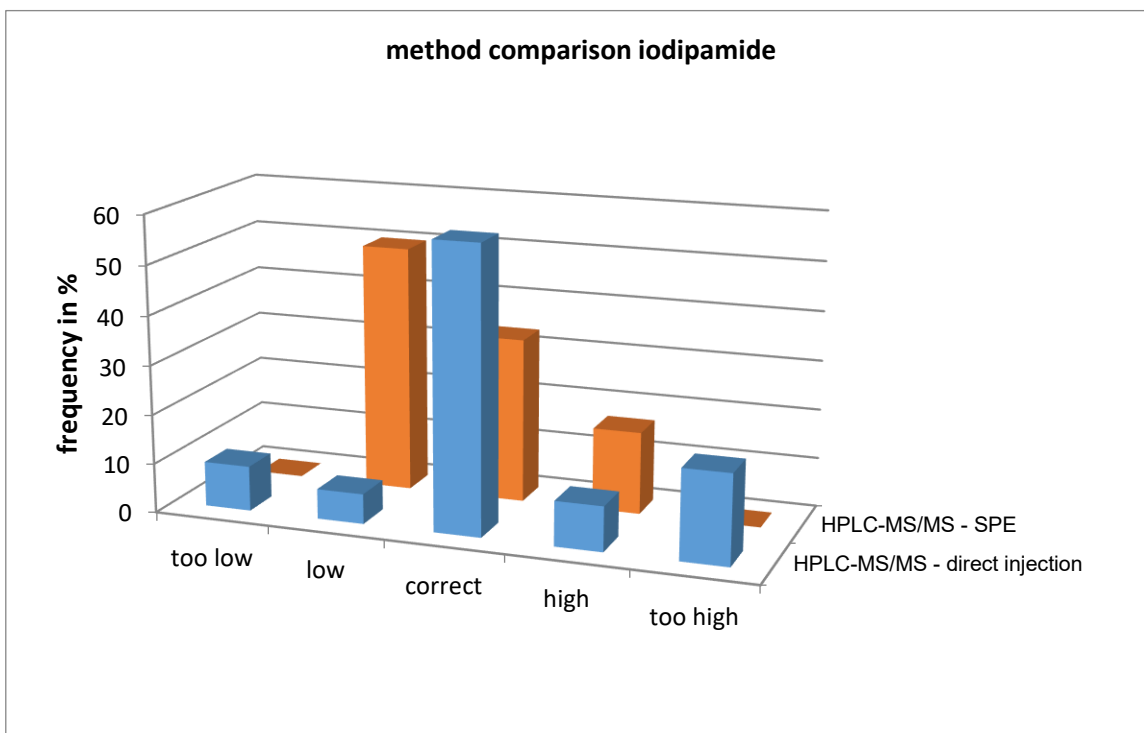
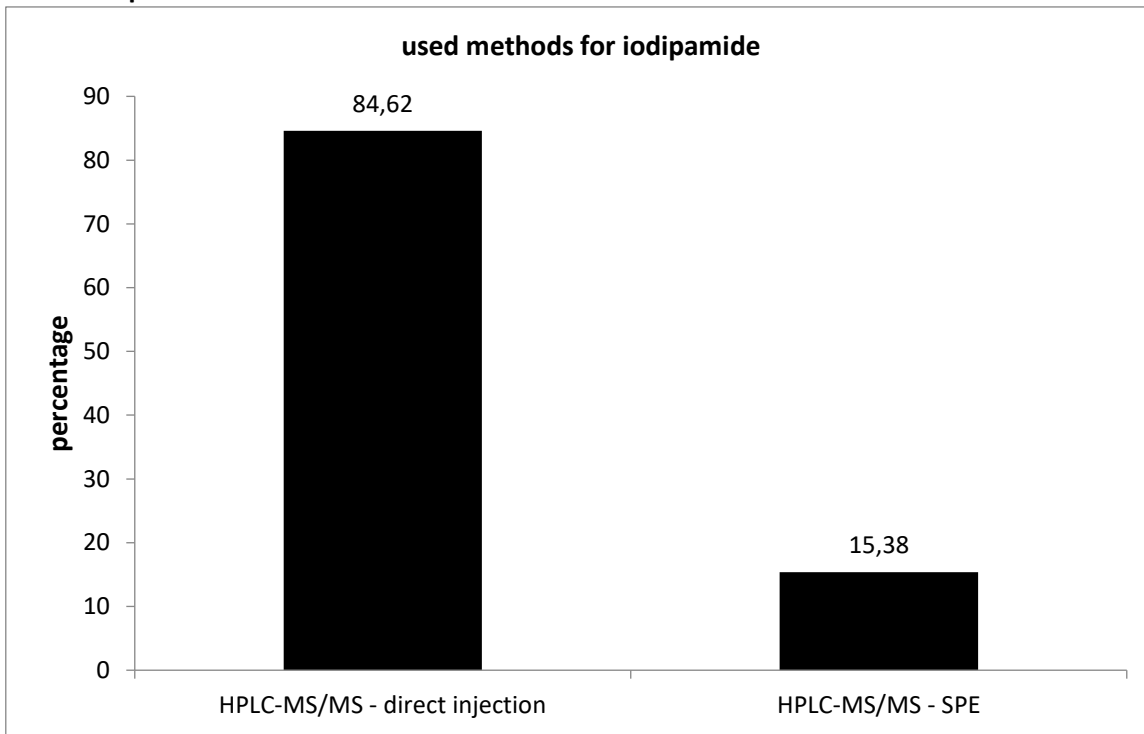
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method reached with all concentration levels the upper limit.



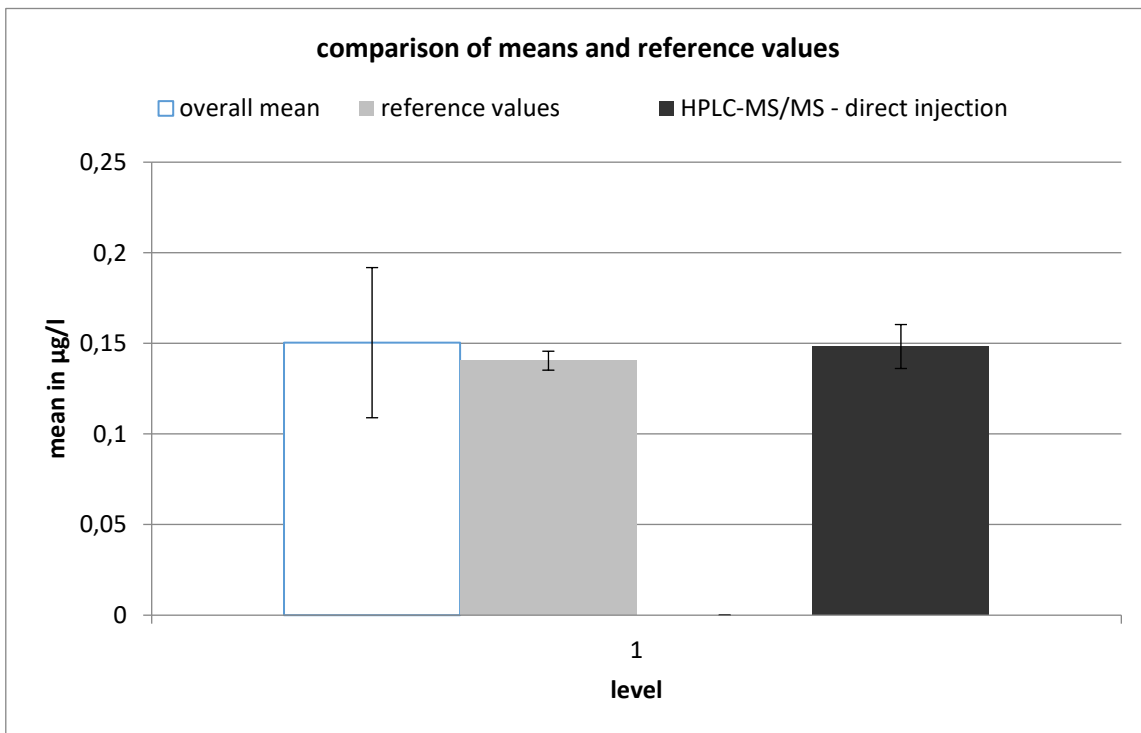
Method specific evaluation

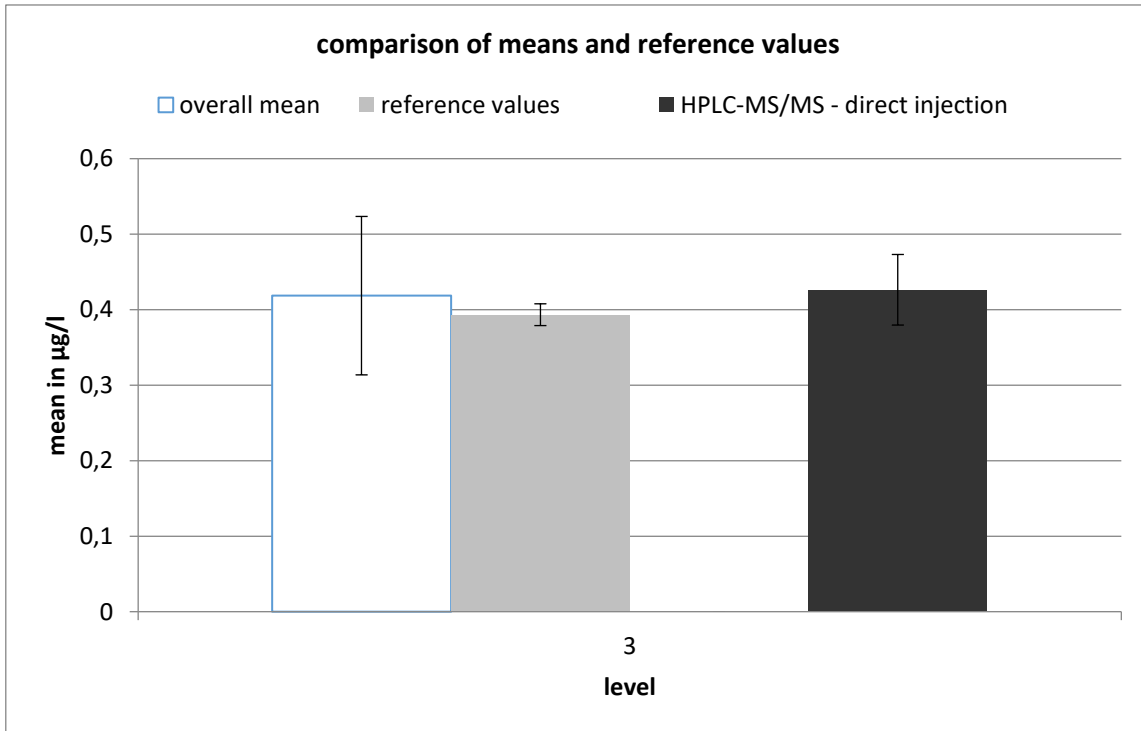
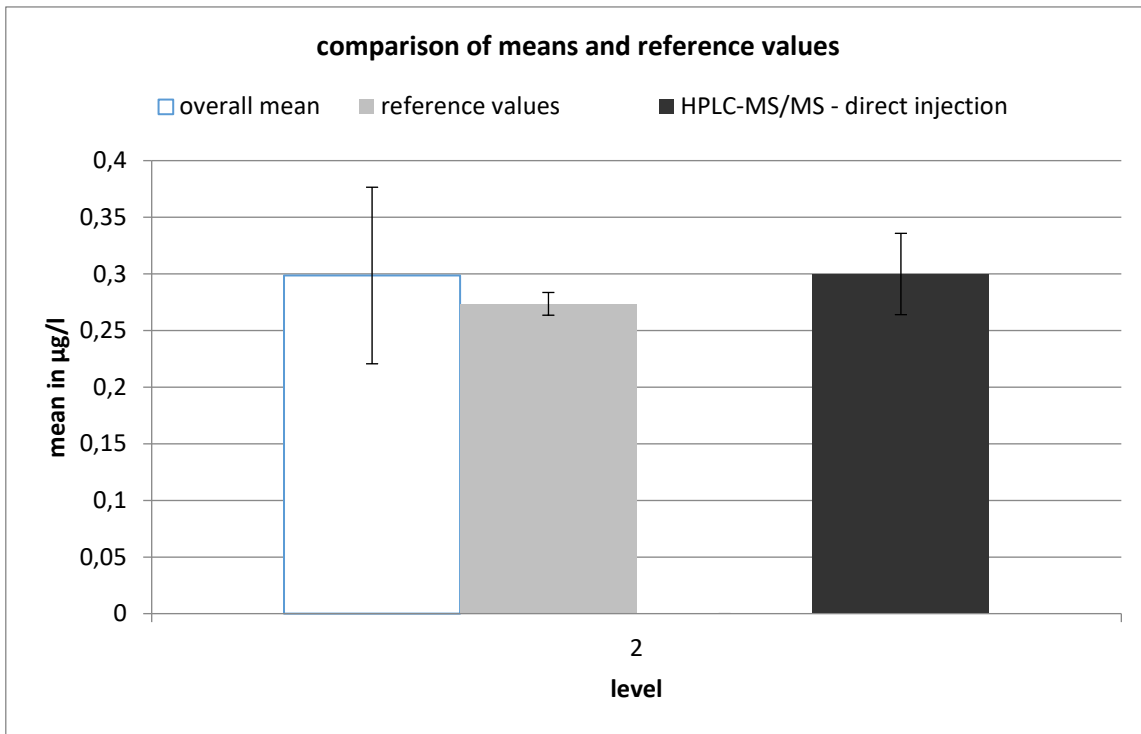


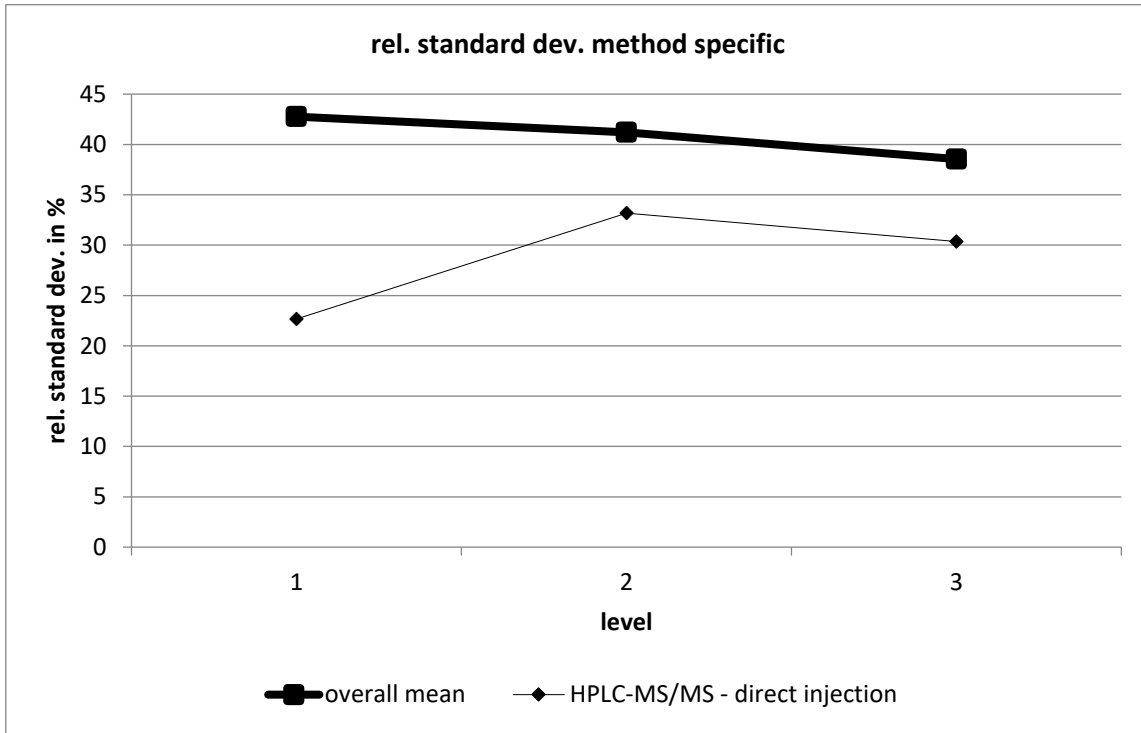
The application of HPLC-MS/MS - direct injection lead to rather high values, whereas the application of SPE lead to a higher ratio of rather lower values.

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	0,1504	0,0414	27,5	0,1405	0,0052	3,7
2	0,2986	0,0780	26,1	0,2735	0,0100	3,7
3	0,4185	0,1049	25,1	0,3933	0,0144	3,7





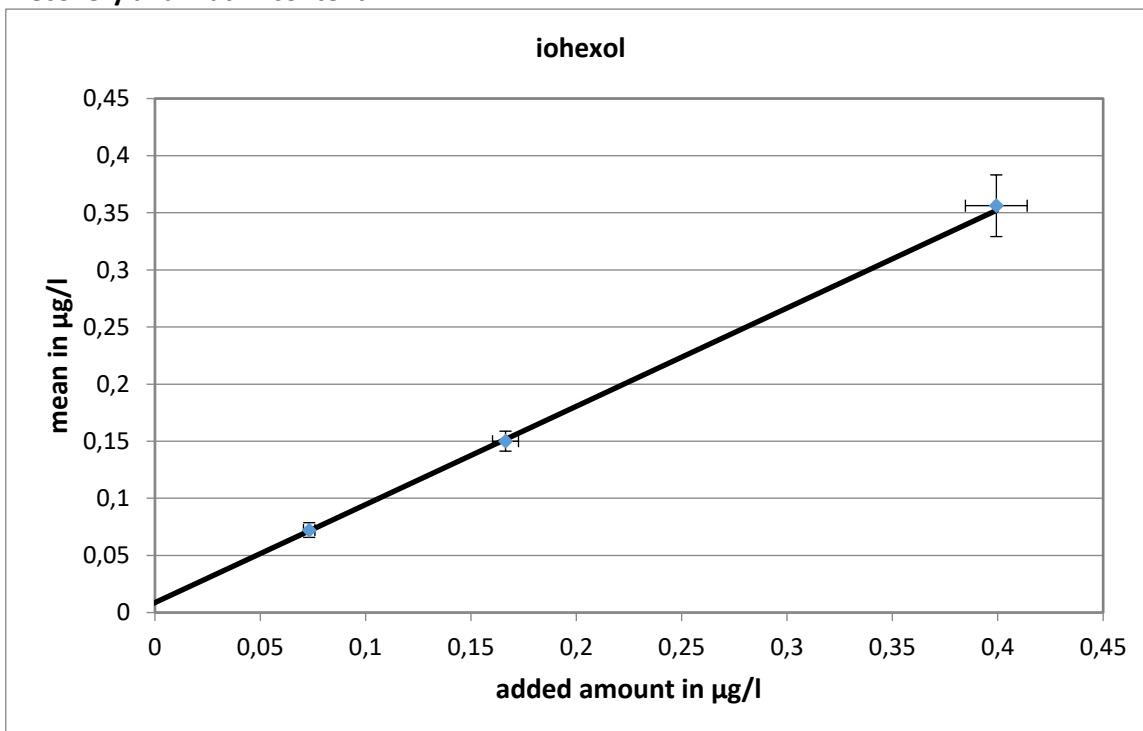


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,148	0,012	8,178	0,034	22,66	12	1	3	33,33
2	0,3	0,036	11,97	0,099	33,18	12	0	0	0
3	0,426	0,047	10,96	0,129	30,36	12	0	2	16,67

iohexol

level	assigned value [$\mu\text{g/l}$]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [$\mu\text{g/l}$]	standard deviation for proficiency assessment [$\mu\text{g/l}$]	standard deviation for proficiency assessment [%]	upper tolerance limit [$\mu\text{g/l}$]	lower tolerance limit [$\mu\text{g/l}$]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0732	3,71	0,0141	0,0141	19,26	0,1047	0,0472	43,08	-35,46	30	0	2	6,7
2	0,1664	3,71	0,0191	0,0191	11,51	0,2074	0,1302	24,68	-21,73	30	3	1	13,3
3	0,3993	3,67	0,0591	0,0591	14,81	0,5290	0,2893	32,50	-27,54	30	2	1	10,0
sum										90	5	4	10,0

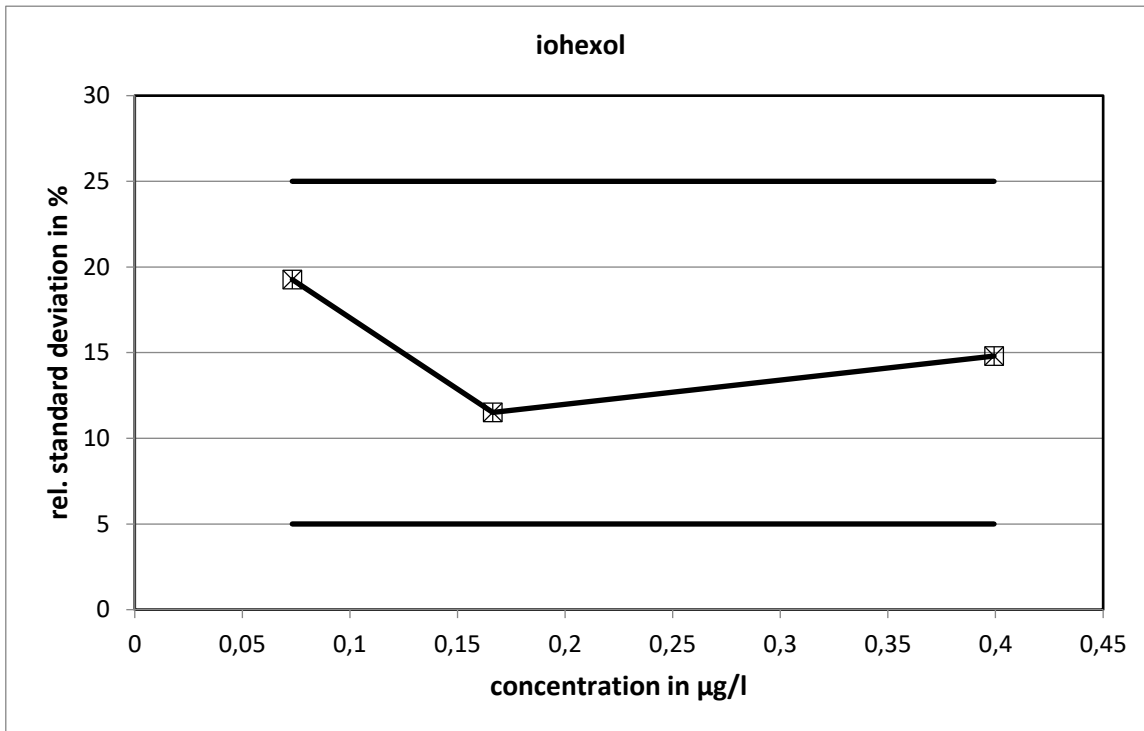
Recovery and matrix content



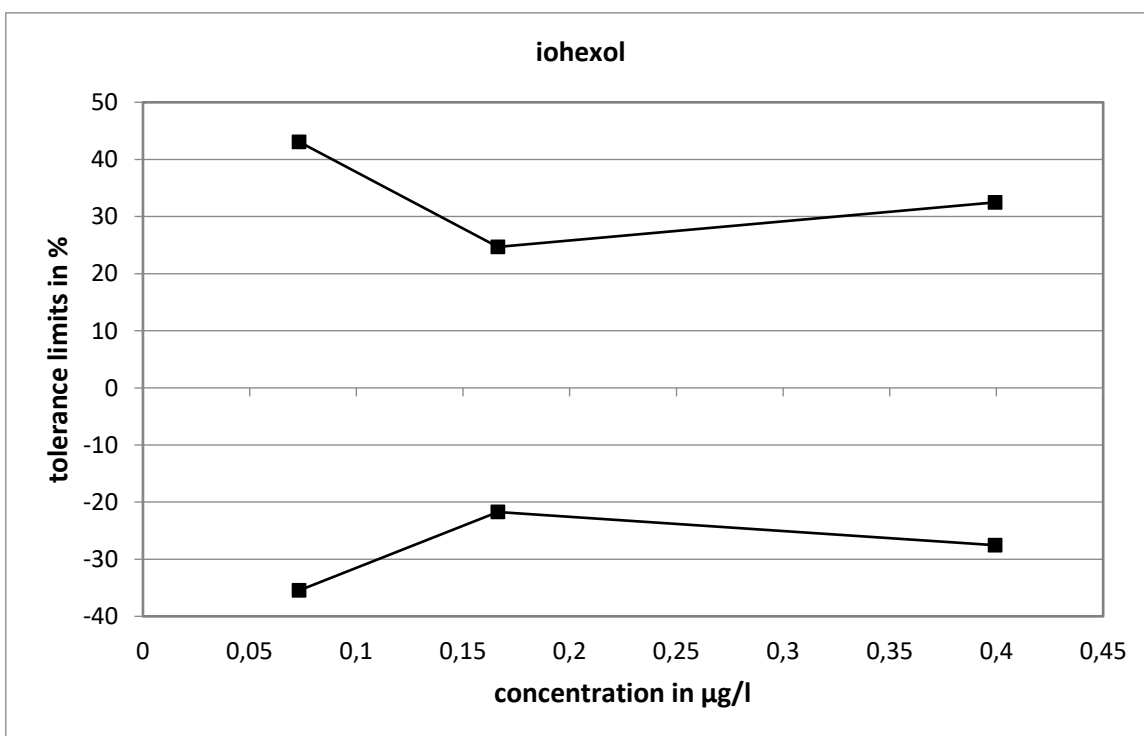
slope of the regression: 0,8598; recovery rate: 86 %

neg. x-axis intercept = matrix content: 0 $\mu\text{g/l}$

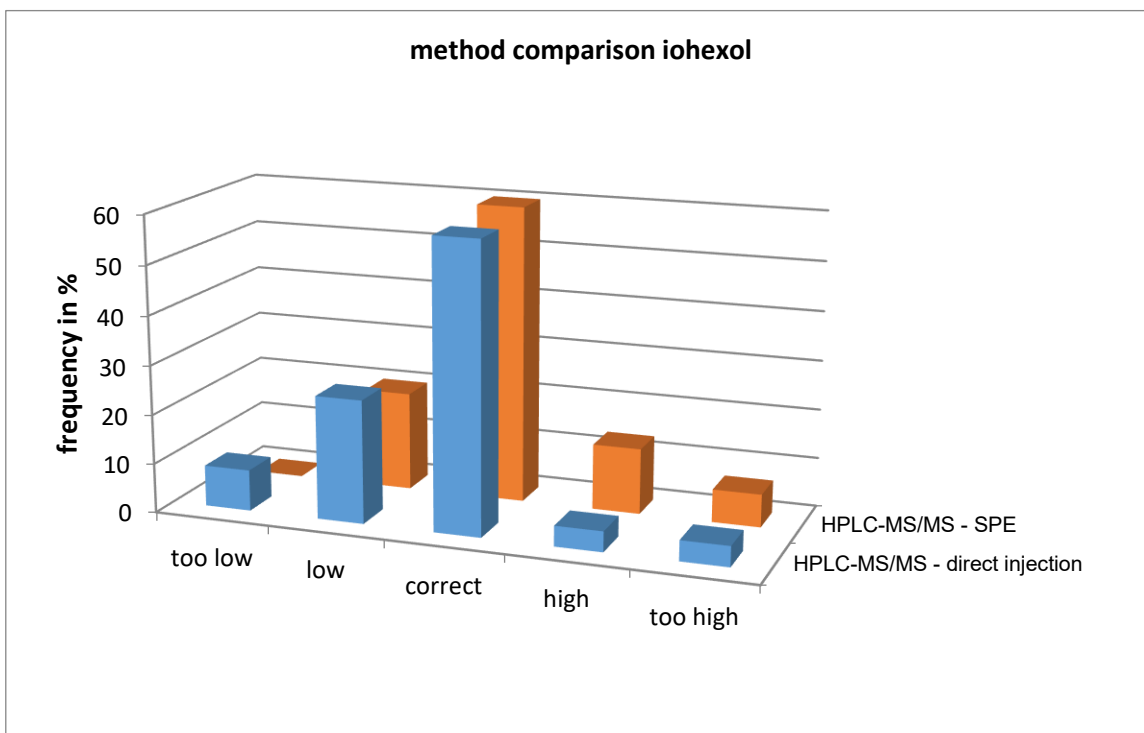
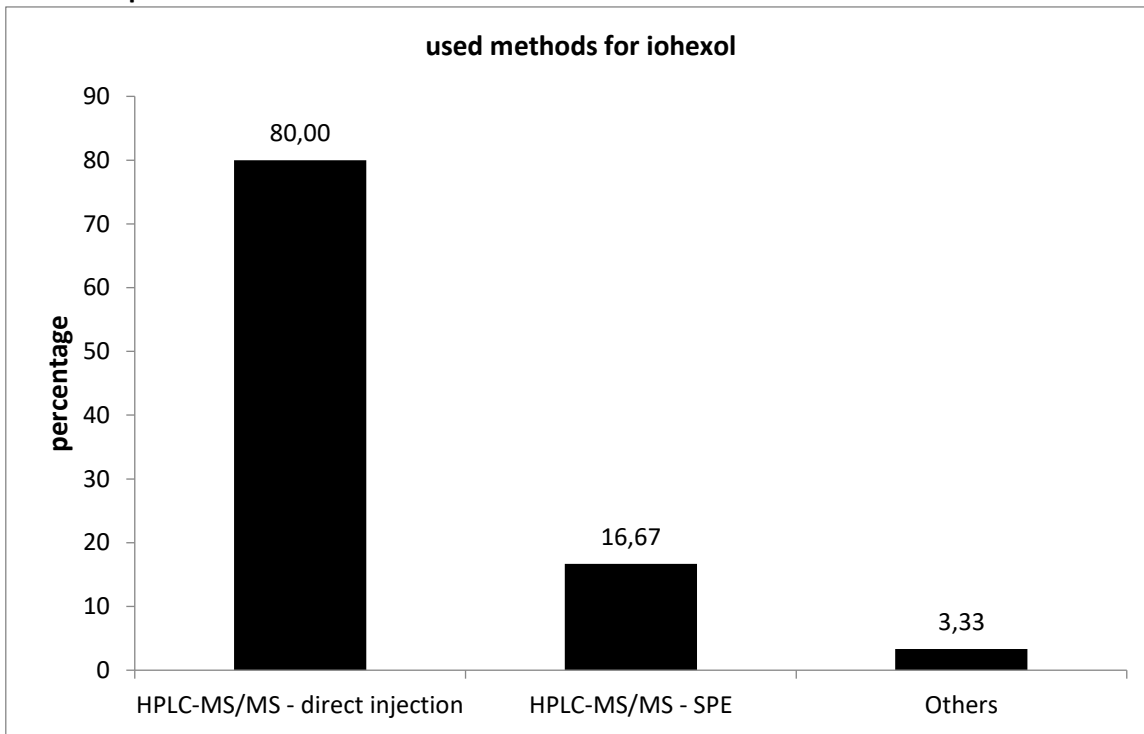
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



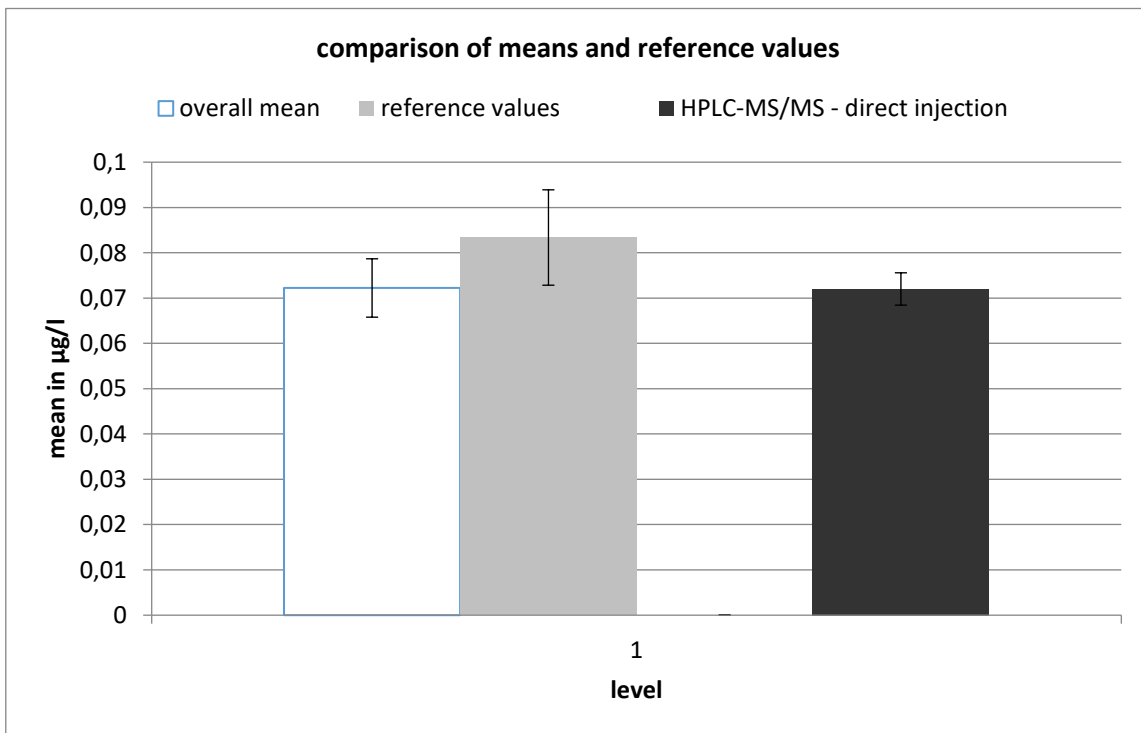
Method specific evaluation

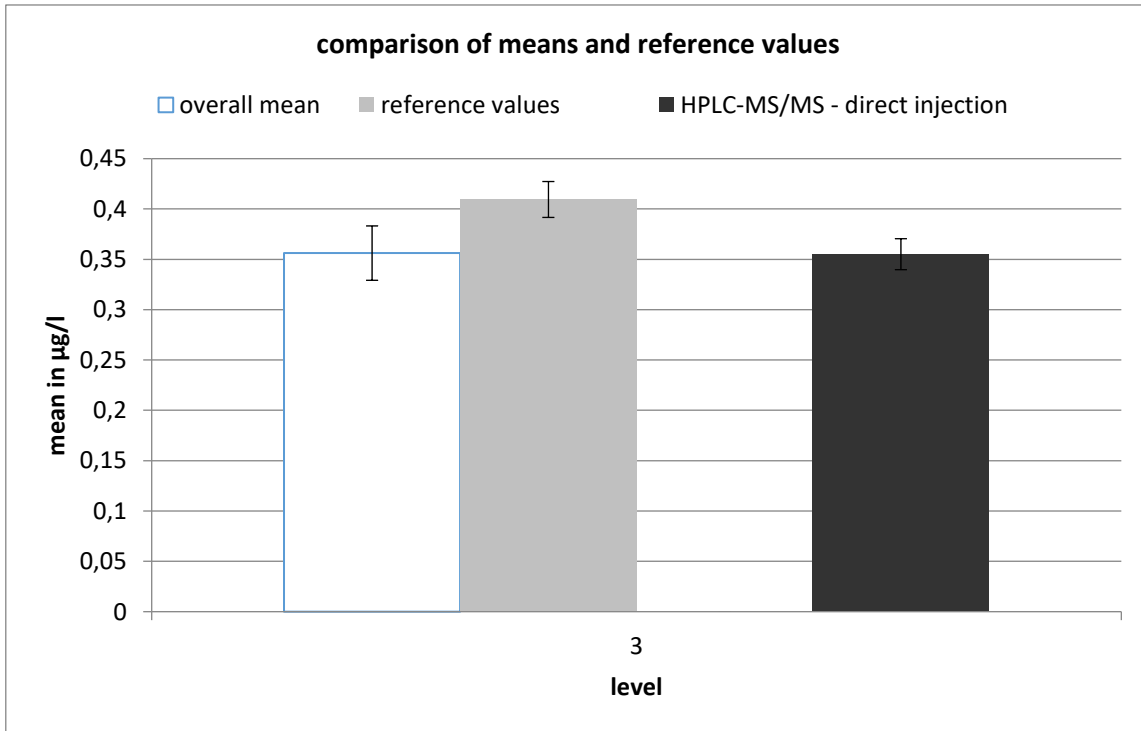
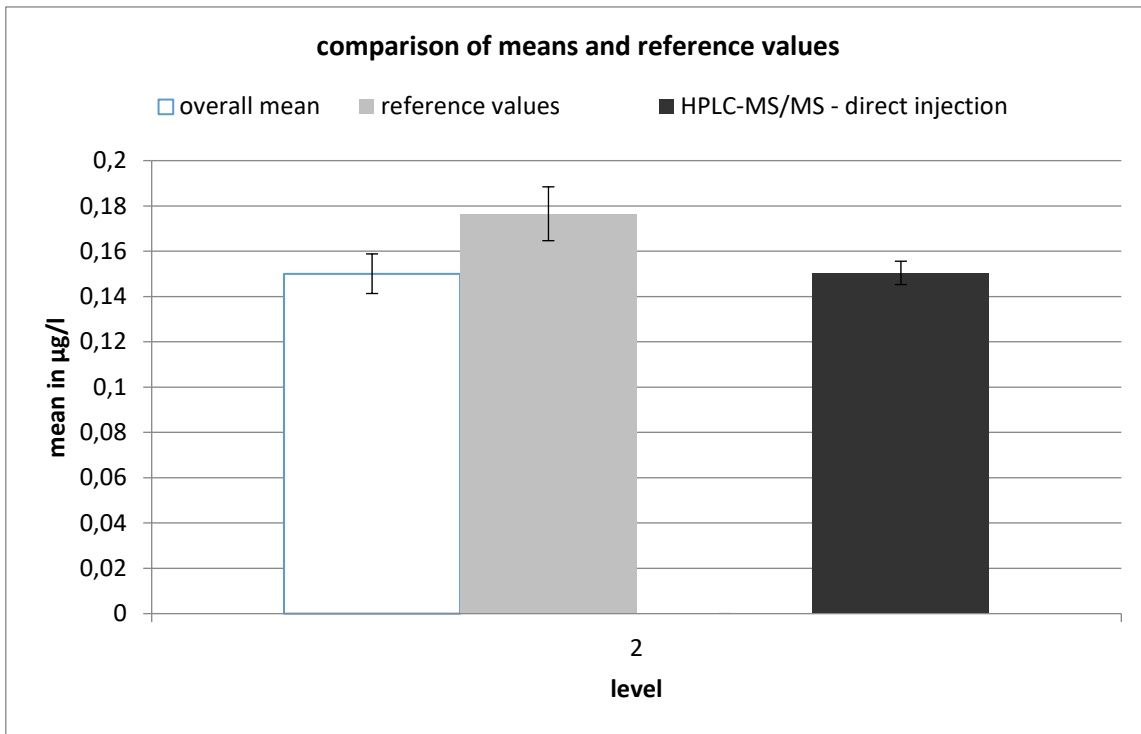


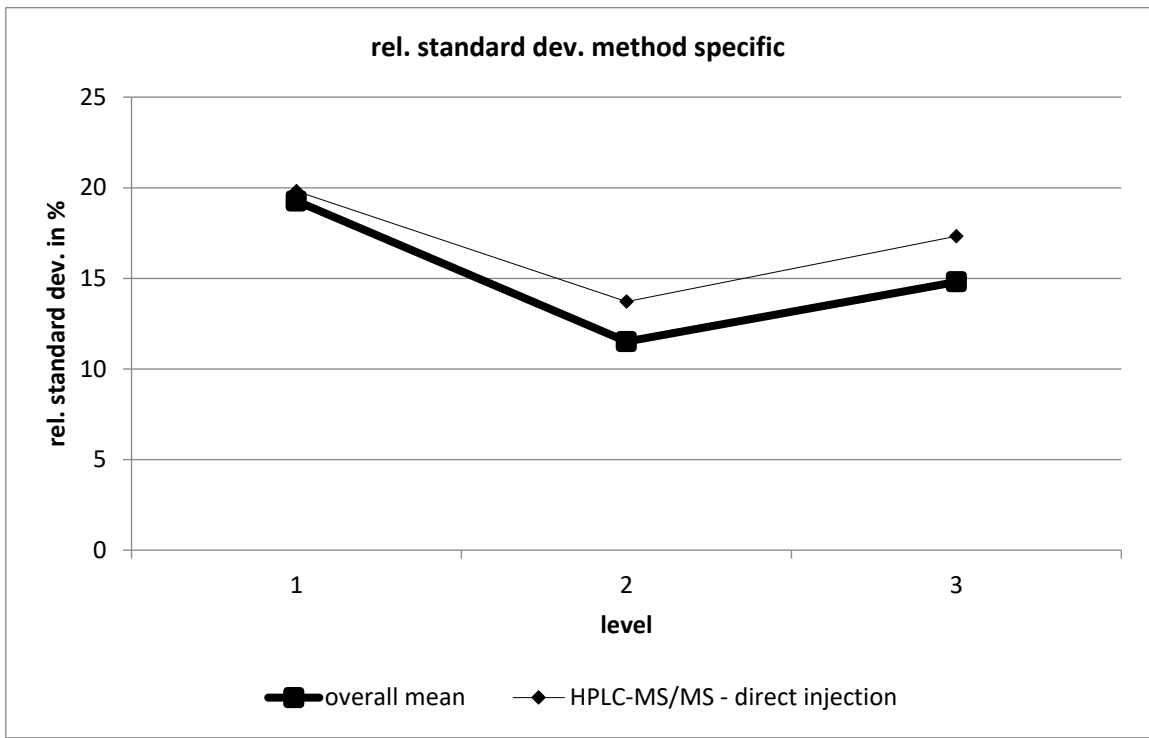
The values determined with HPLC-MS/MS - direct injection showed a higher ratio of low values.

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	0,0722	0,0064	8,9	0,0834	0,0105	12,6
2	0,1501	0,0087	5,8	0,1765	0,0119	6,7
3	0,3562	0,0270	7,6	0,4094	0,0178	4,4





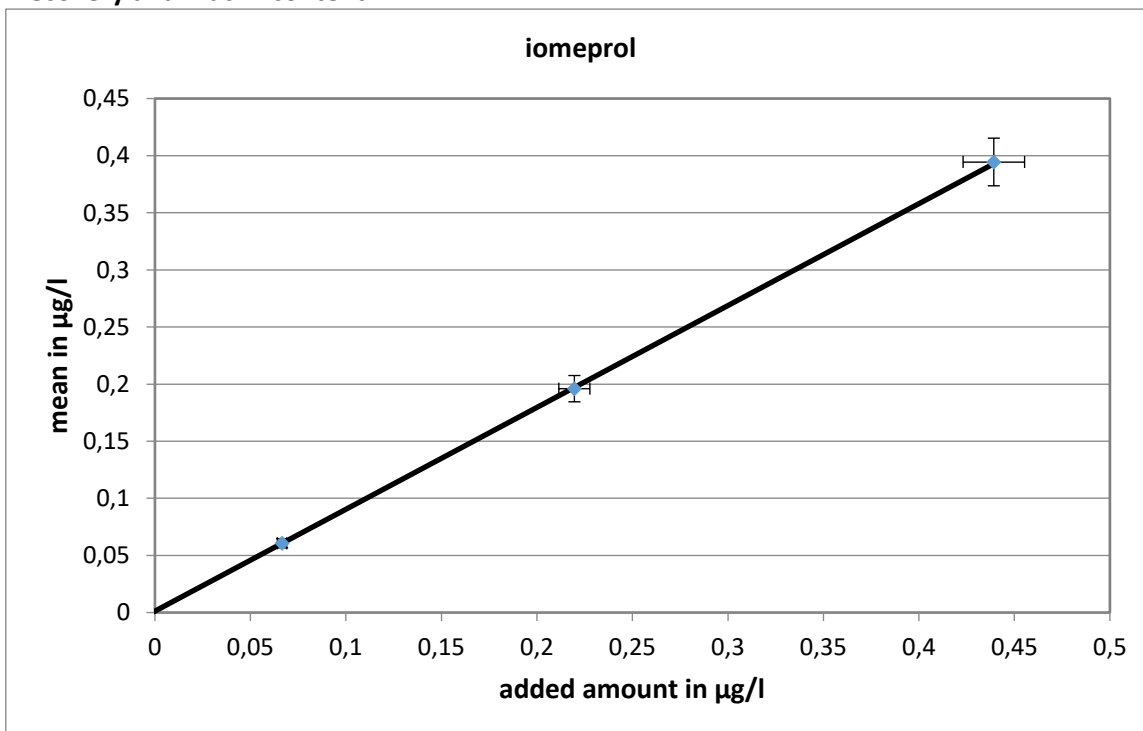


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,072	0,004	4,952	0,014	19,81	25	0	2	8
2	0,15	0,005	3,428	0,021	13,71	25	0	2	8
3	0,355	0,015	4,33	0,061	17,32	25	0	1	4

iomeprol

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	0,0665	3,71	0,0092	0,0092	13,77	0,0865	0,0494	29,95	-25,77	32	1	3	12,5
2	0,2196	3,71	0,0261	0,0261	11,88	0,2757	0,1705	25,55	-22,38	32	2	3	15,6
3	0,4392	3,67	0,0472	0,0472	10,76	0,5400	0,3497	22,96	-20,37	32	3	1	12,5
sum										96	6	7	13,5

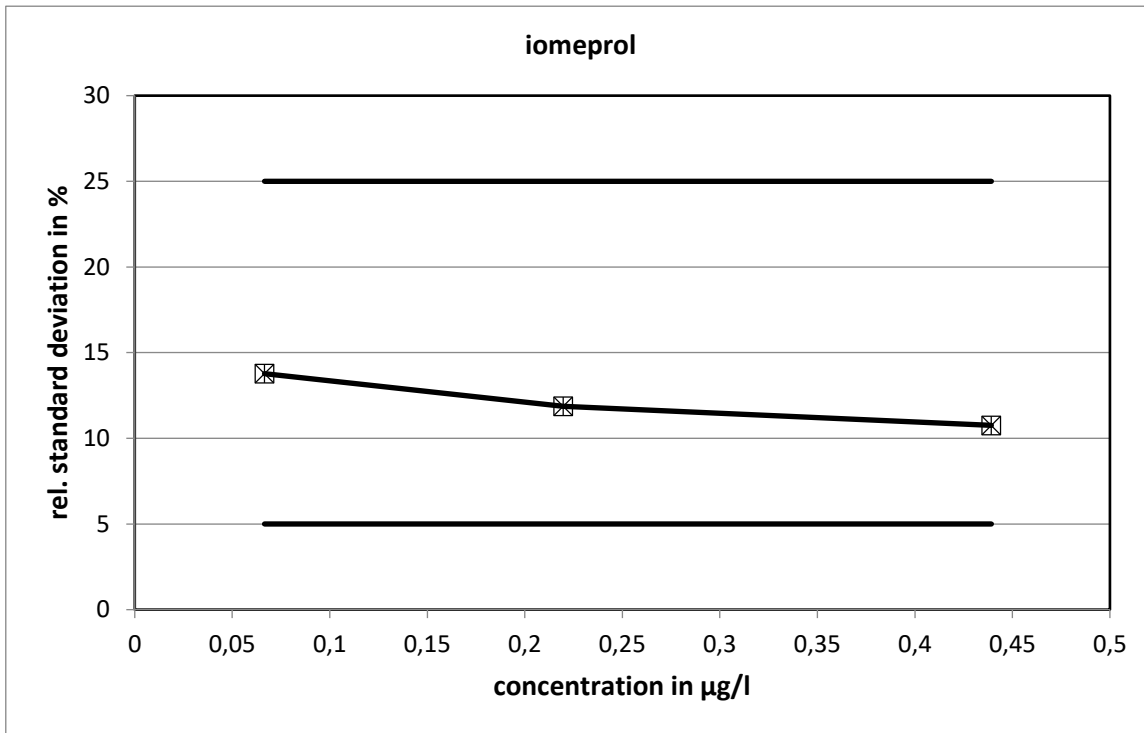
Recovery and matrix content



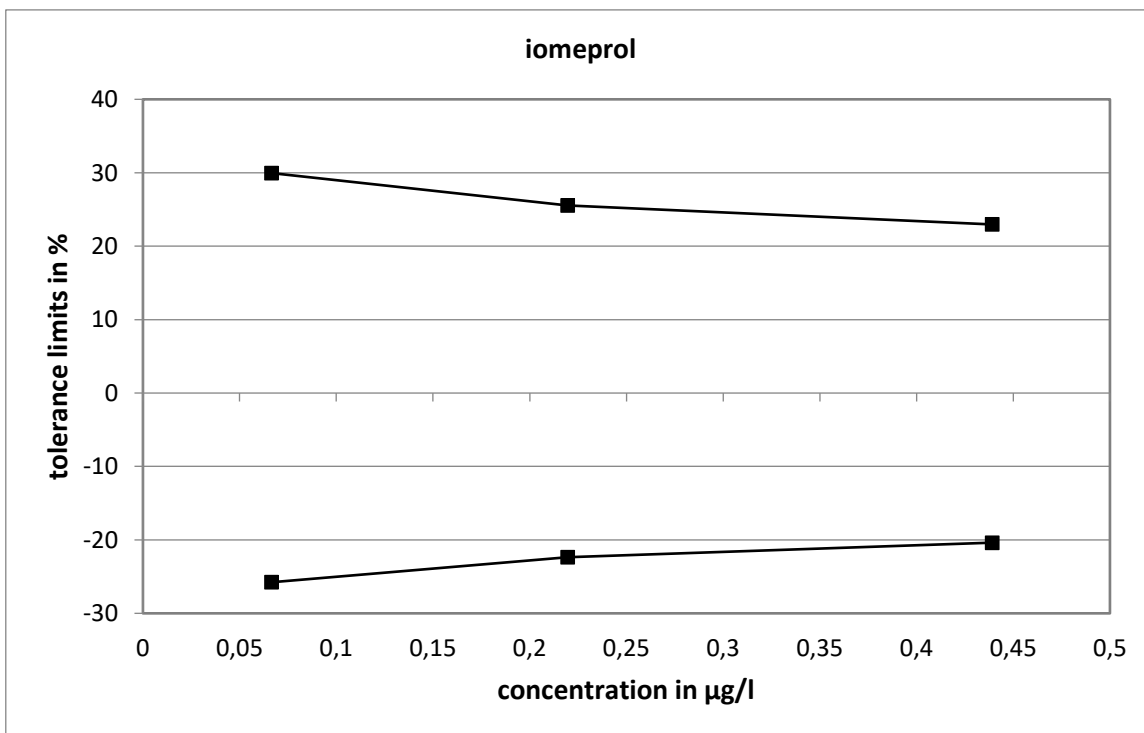
slope of the regression: 0,892; recovery rate: 89,2 %

neg. x-axis intercept = matrix content: 0 µg/l

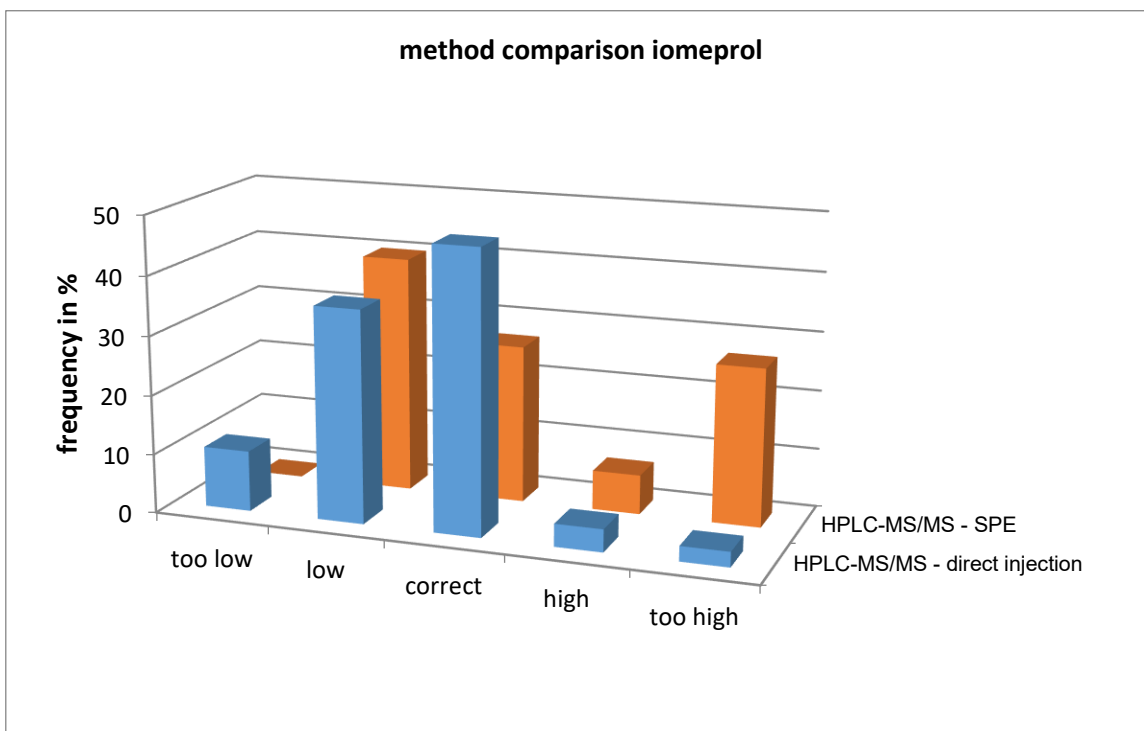
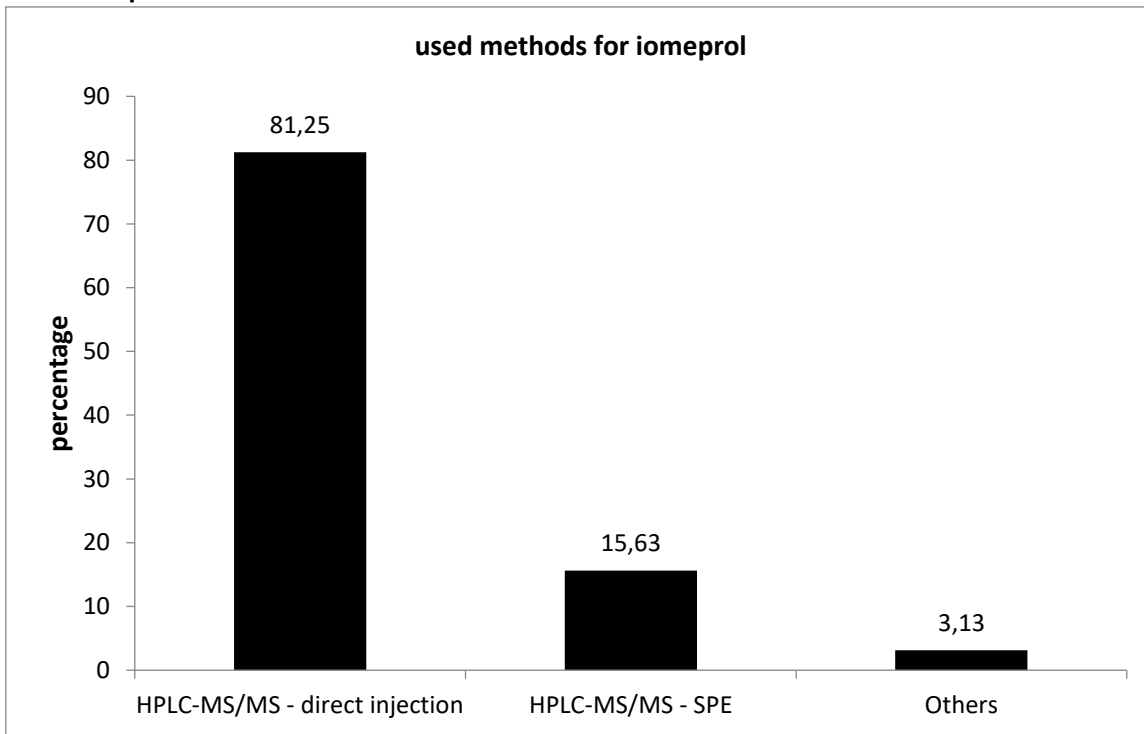
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



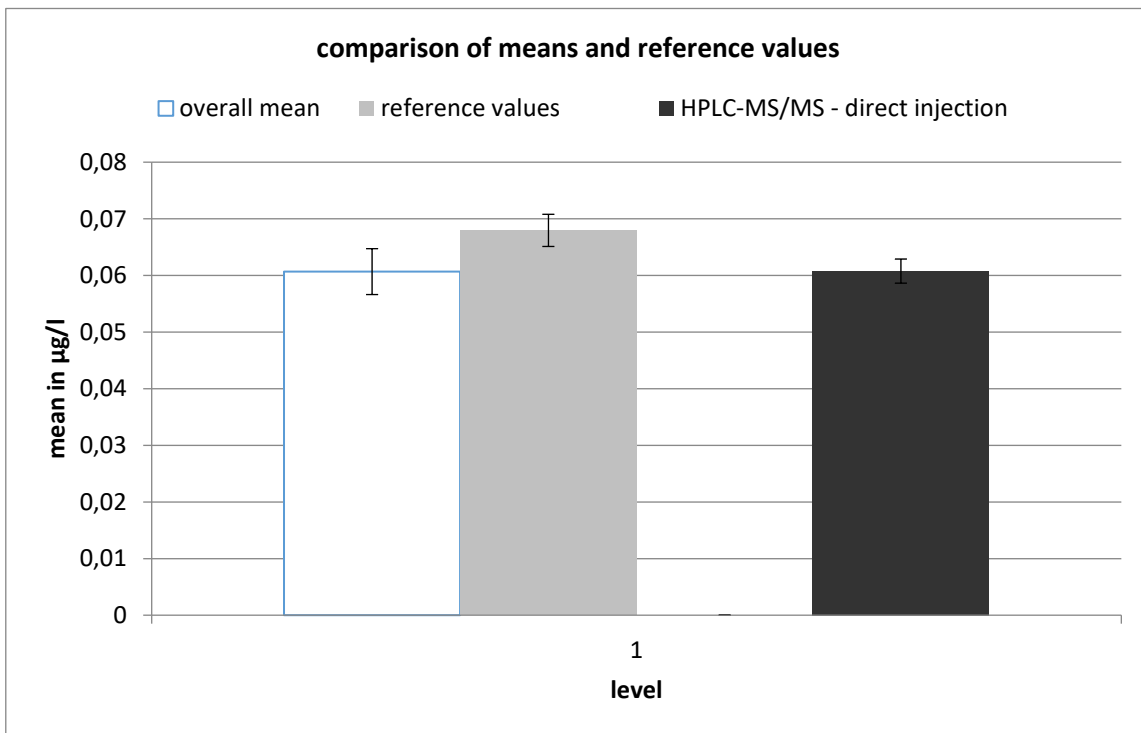
Method specific evaluation

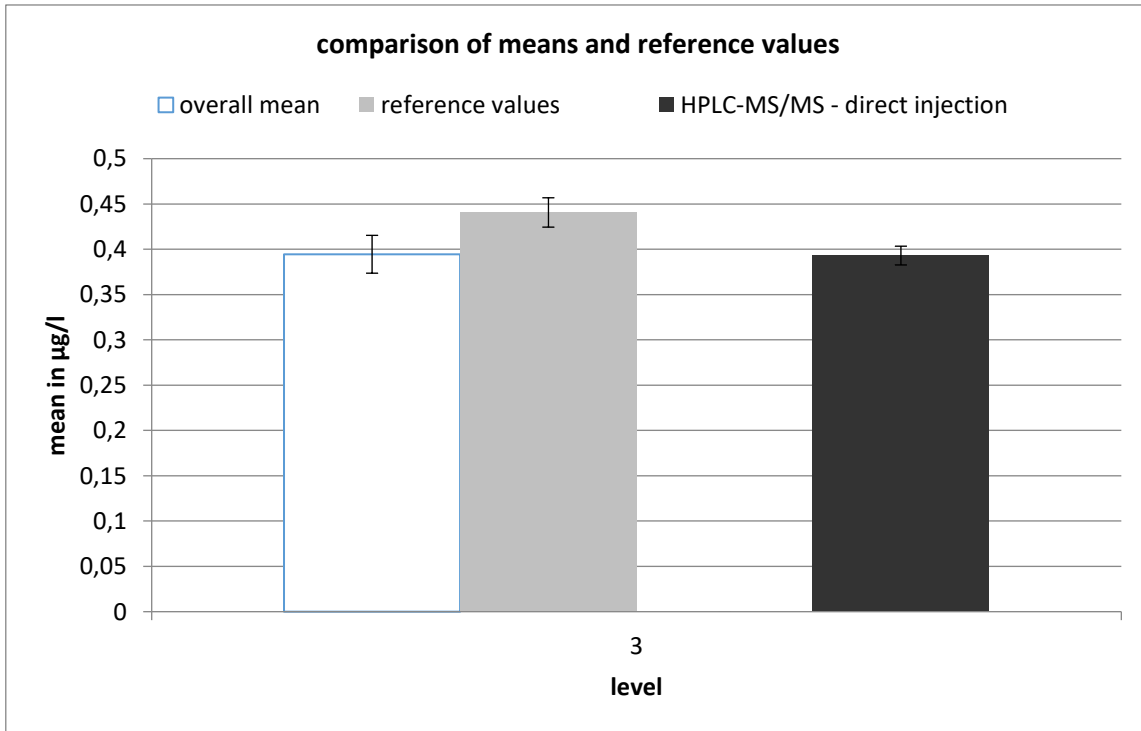
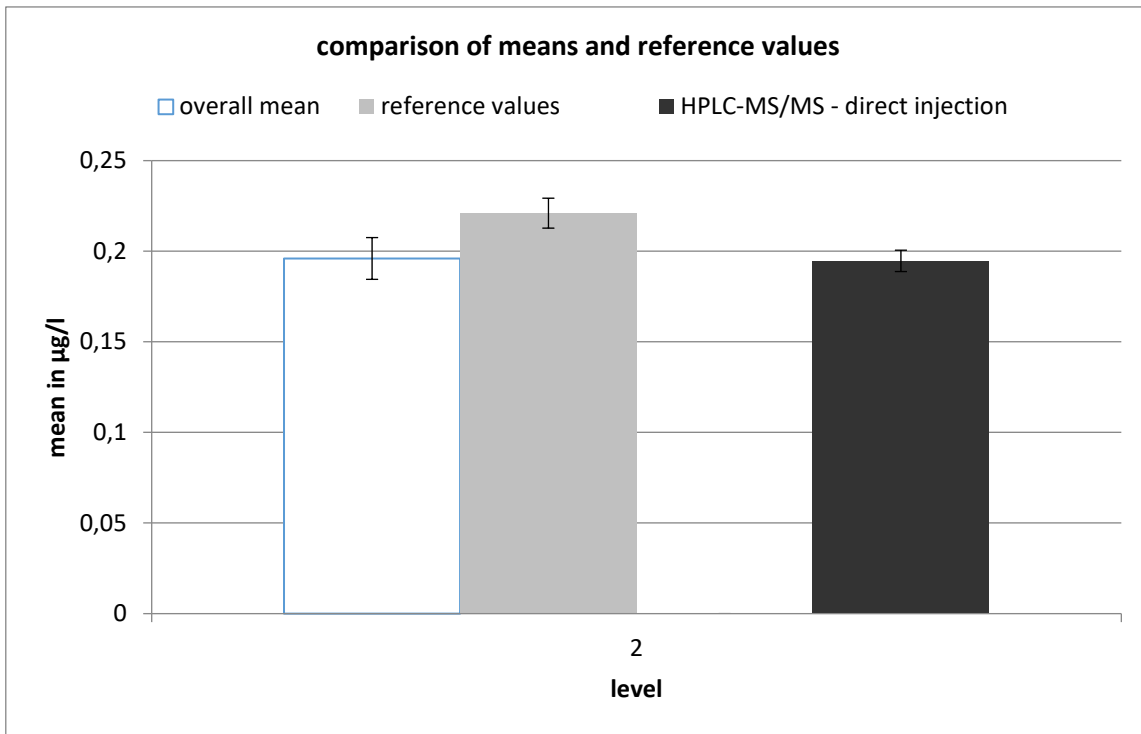


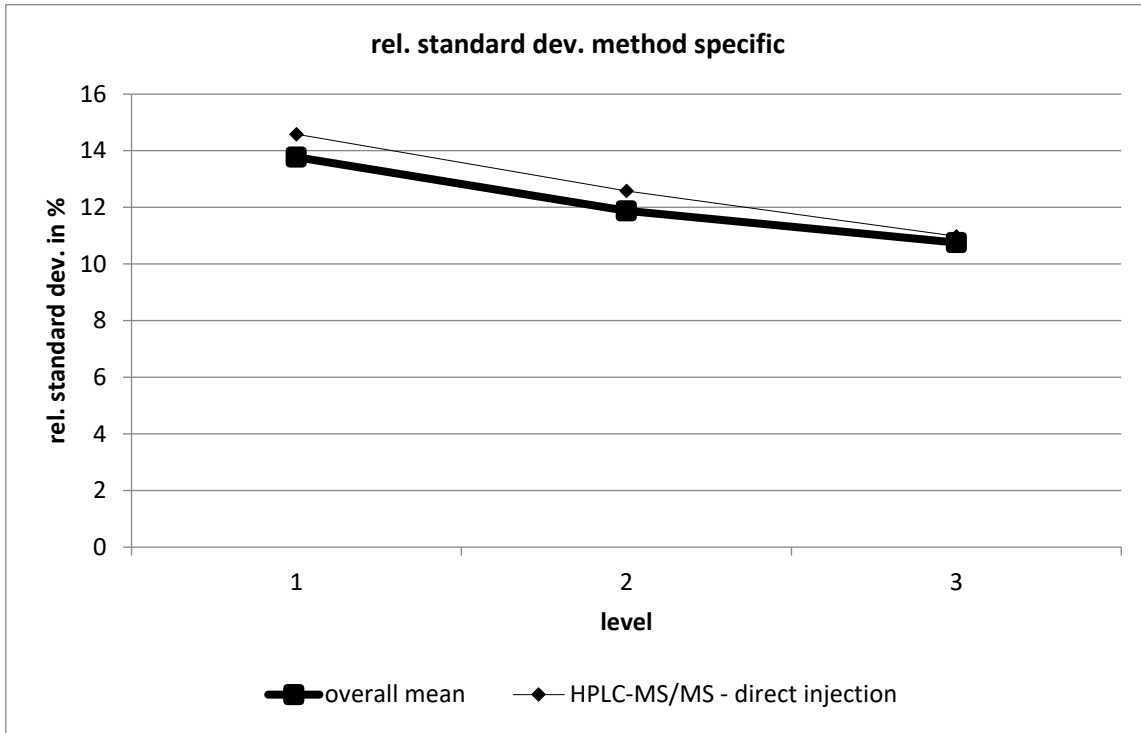
The application of HPLC-MS/MS - direct injection lead to a high ratio of low values, whereas the values determined with SPE showed a very broad statistical distribution.

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	0,0607	0,0041	6,7	0,0680	0,0028	4,2
2	0,1960	0,0115	5,9	0,2210	0,0083	3,7
3	0,3945	0,0209	5,3	0,4406	0,0162	3,7





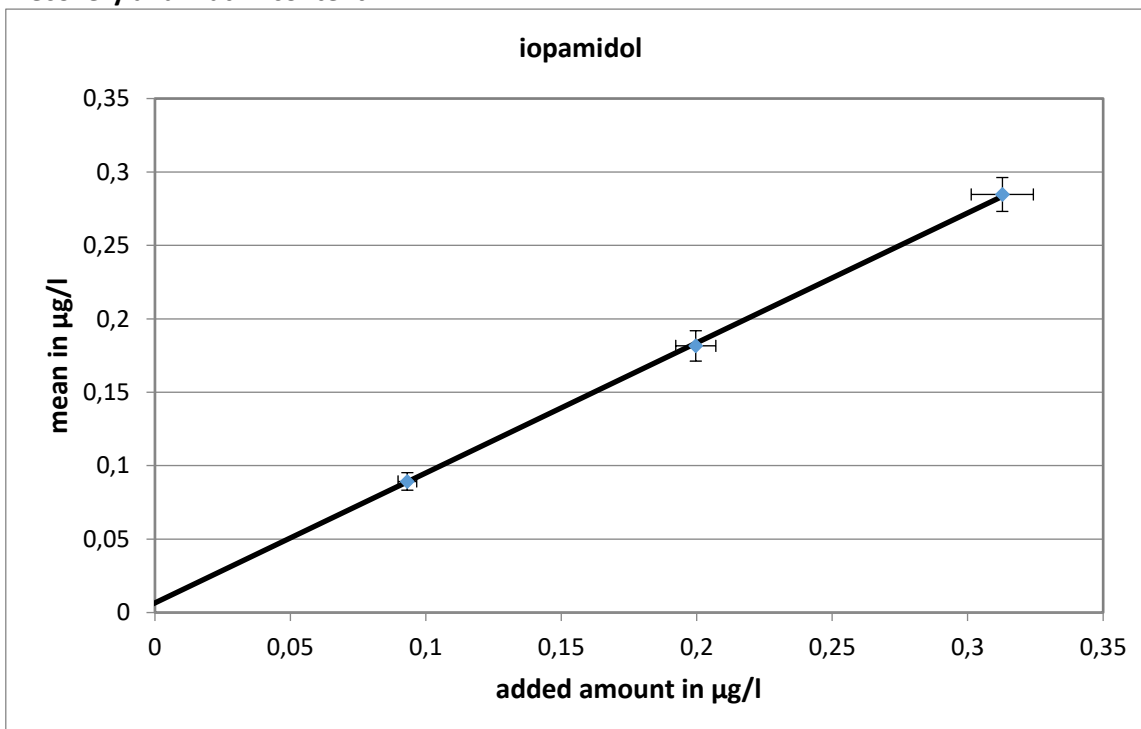


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,061	0,002	3,508	0,009	14,58	27	1	1	7,407
2	0,195	0,006	3,026	0,024	12,58	27	1	2	11,11
3	0,393	0,01	2,641	0,043	10,98	27	1	1	7,407

iopamidol

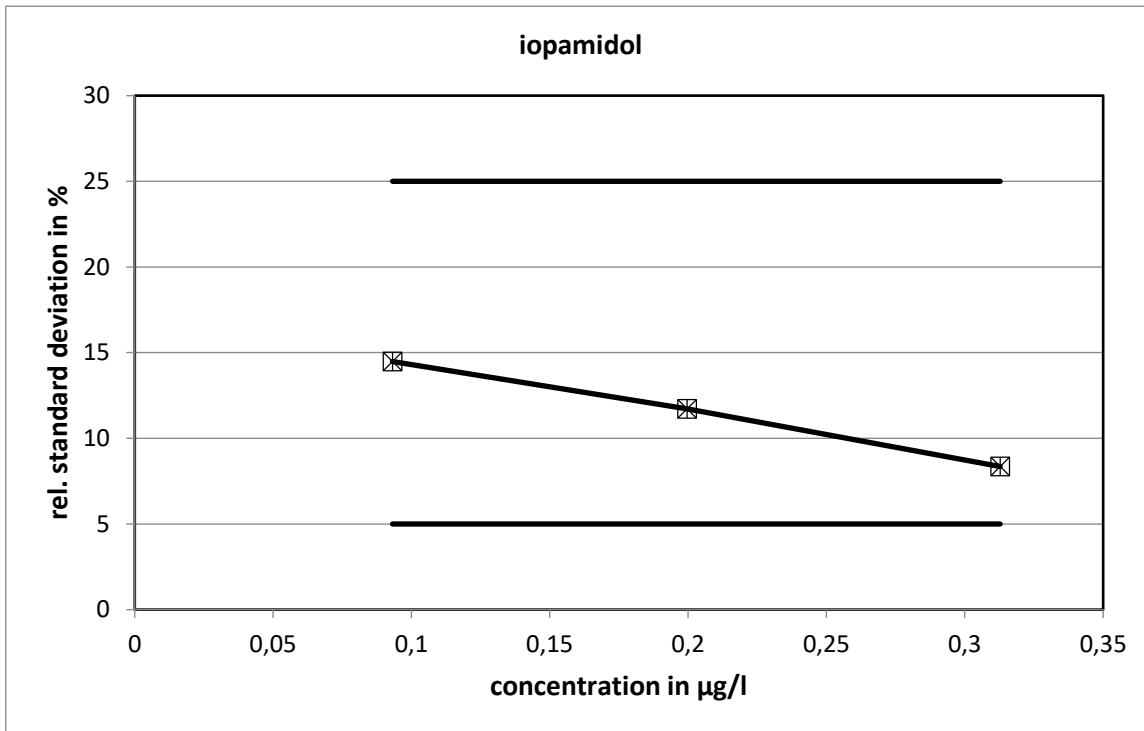
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0932	3,71	0,0135	0,0135	14,48	0,1225	0,0679	31,50	-27,09	32	0	0	0,0
2	0,1996	3,71	0,0234	0,0234	11,71	0,2498	0,1555	25,13	-22,10	32	2	4	18,8
3	0,3128	3,67	0,0261	0,0261	8,35	0,3676	0,2627	17,54	-16,01	32	6	1	21,9
sum										96	8	5	13,5

Recovery and matrix content

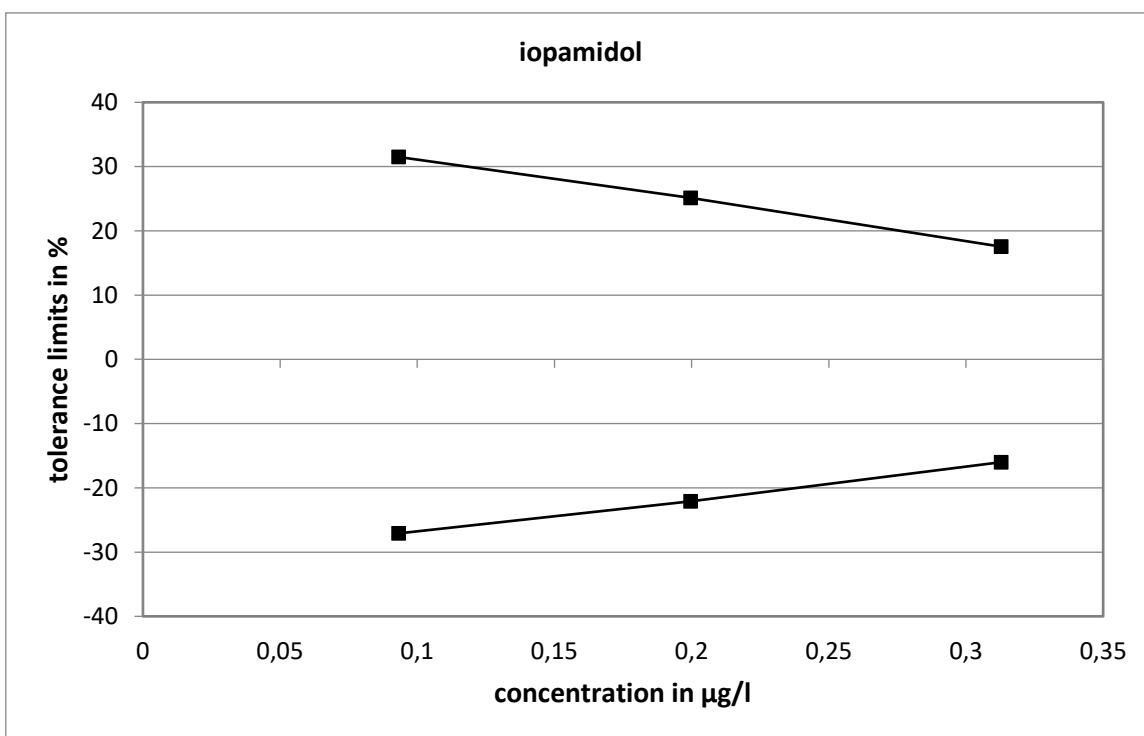


slope of the regression: 0,885; recovery rate: 88,5 %
 neg. x-axis intercept = matrix content: 0 µg/l

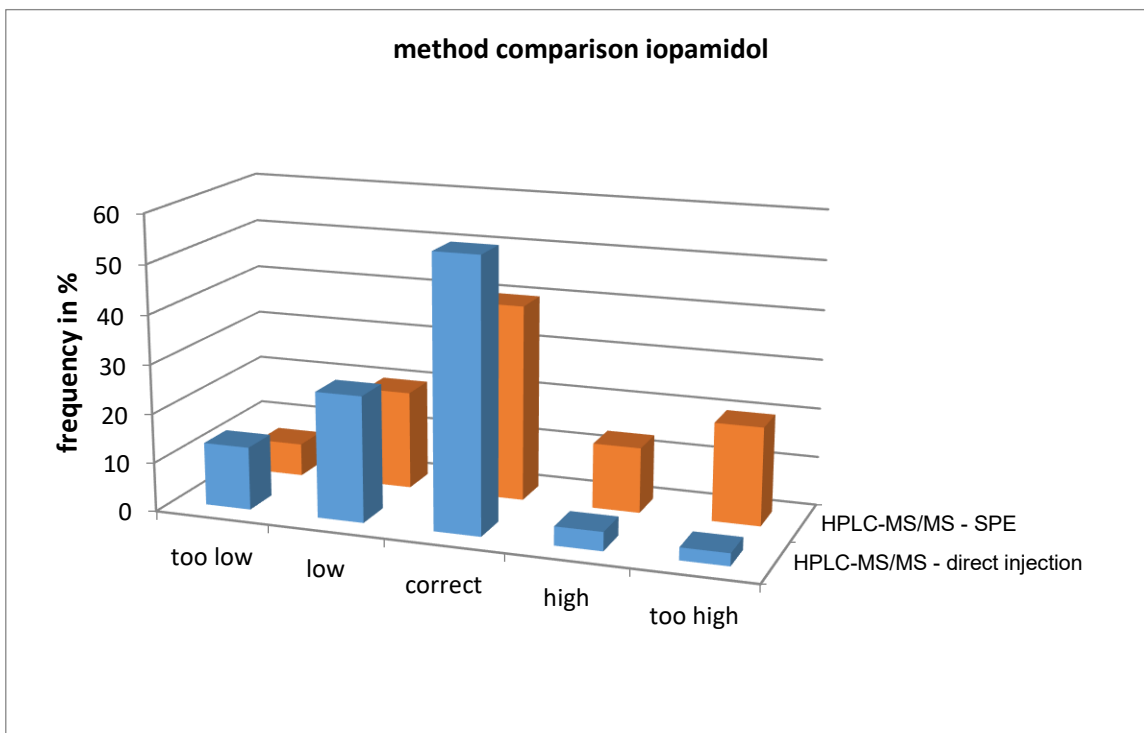
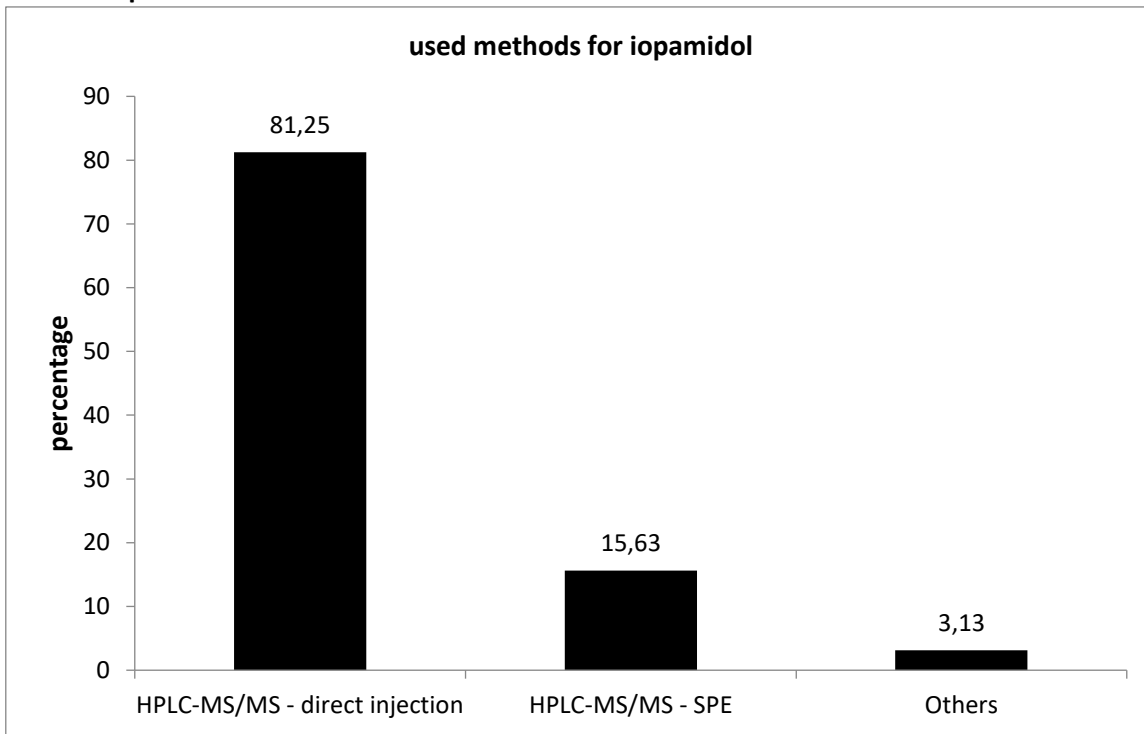
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



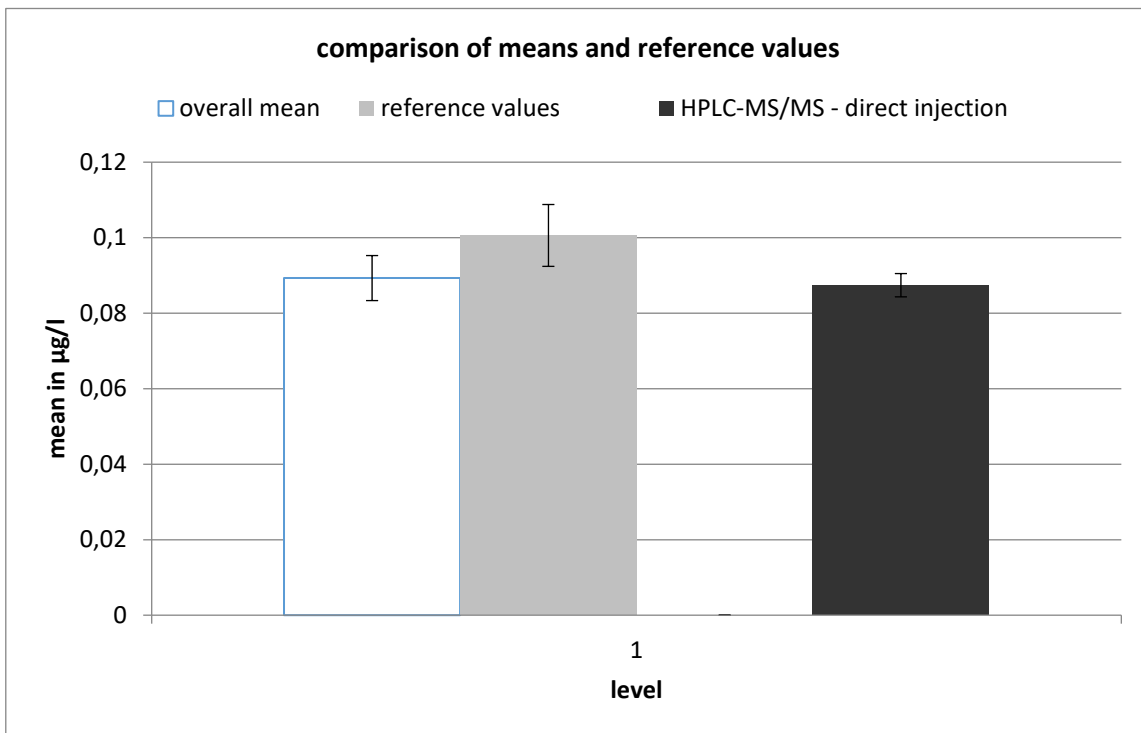
Method specific evaluation

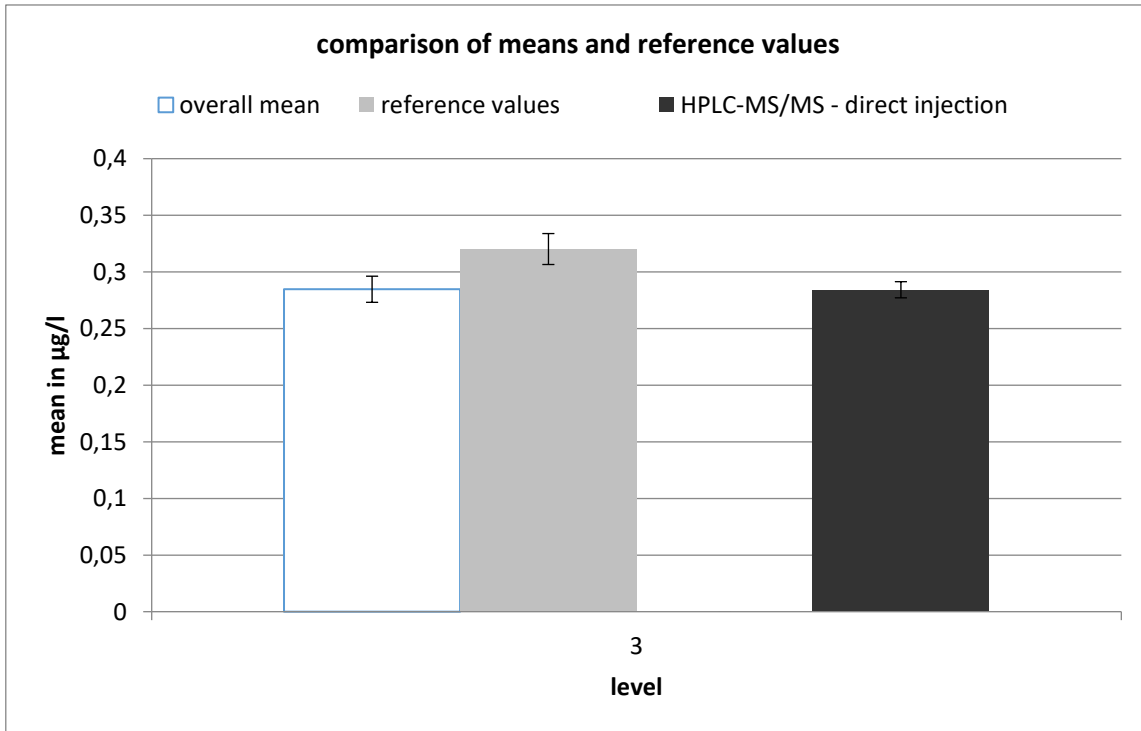
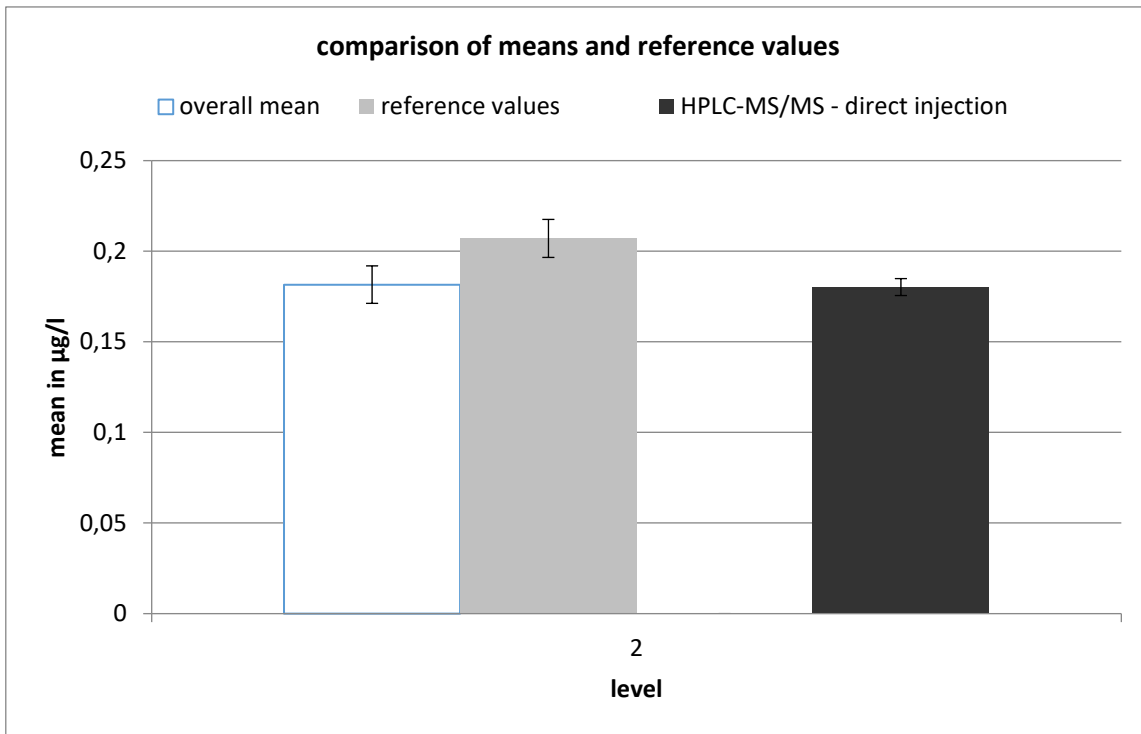


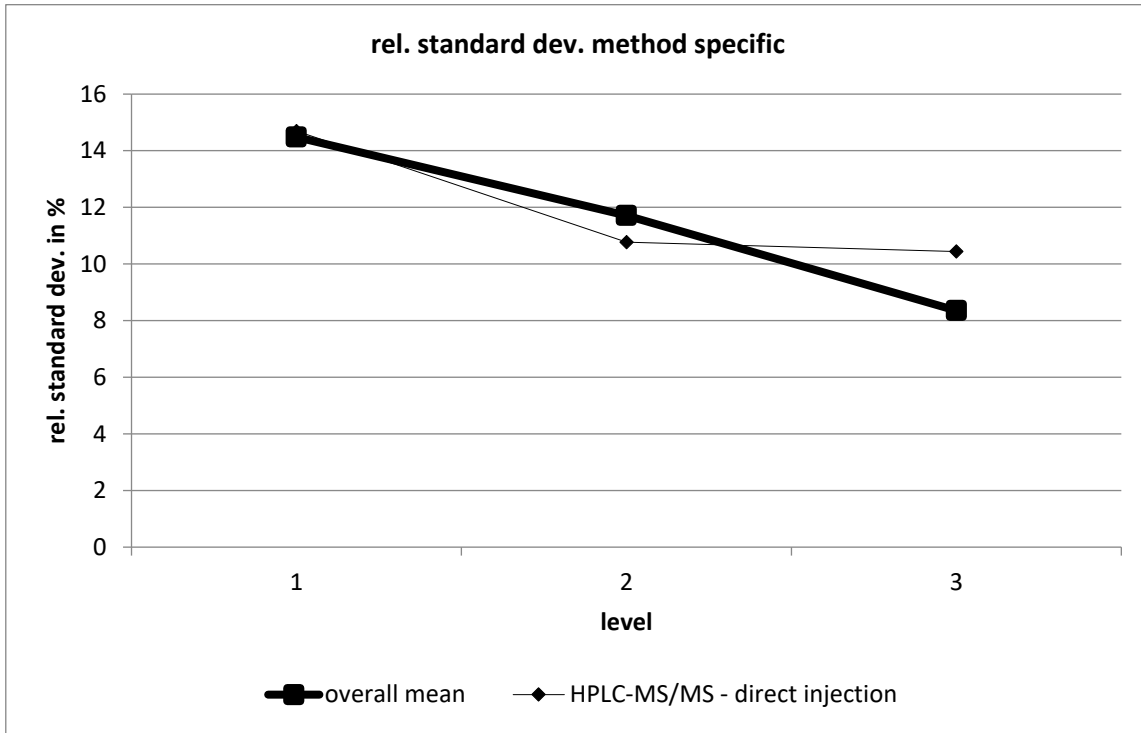
The application of HPLC-MS/MS - direct injection lead to a rather higher ratio of low values, whereas the values determined with SPE showed a very broad statistical distribution.

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	0,0893	0,0060	6,7	0,1006	0,0082	8,1
2	0,1816	0,0103	5,7	0,2071	0,0105	5,1
3	0,2847	0,0115	4,1	0,3202	0,0137	4,3





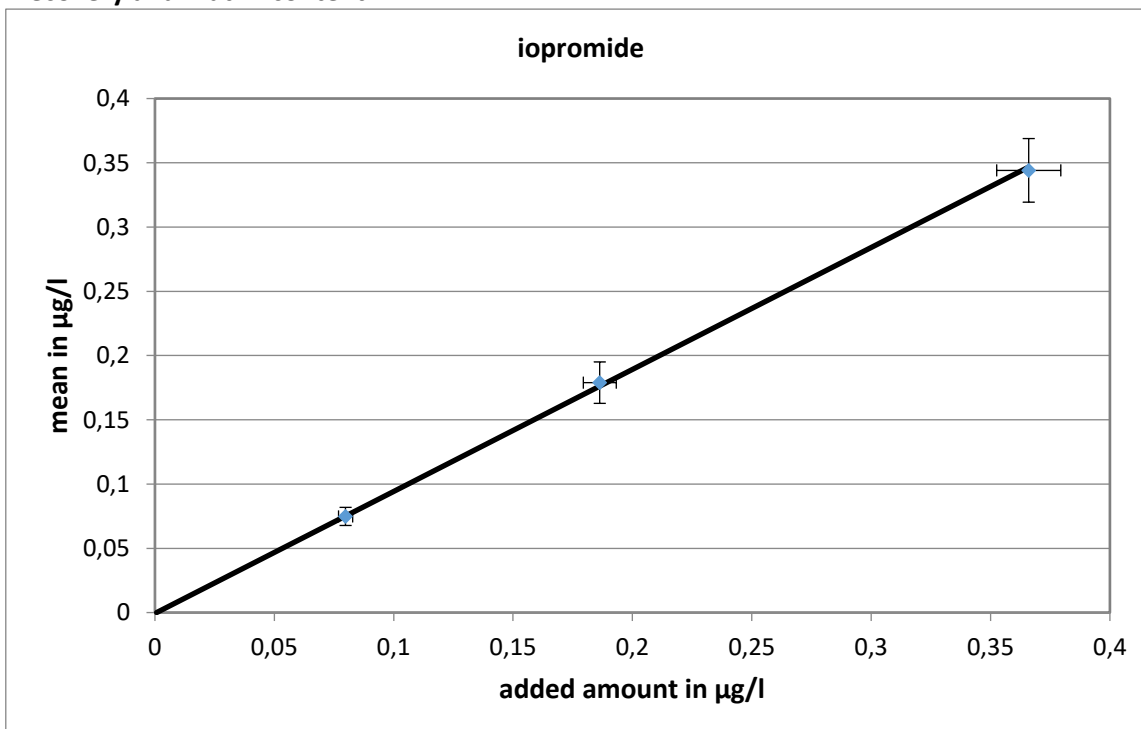


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,087	0,003	3,535	0,013	14,7	27	1	1	7,407
2	0,18	0,005	2,592	0,019	10,77	27	2	2	14,81
3	0,284	0,007	2,511	0,03	10,44	27	2	0	7,407

iopromide

level	assigned value [$\mu\text{g/l}$]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [$\mu\text{g/l}$]	standard deviation for proficiency assessment [$\mu\text{g/l}$]	standard deviation for proficiency assessment [%]	upper tolerance limit [$\mu\text{g/l}$]	lower tolerance limit [$\mu\text{g/l}$]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0799	3,81	0,0159	0,0159	19,97	0,1159	0,0507	45,19	-36,54	32	0	3	9,4
2	0,1863	3,73	0,0364	0,0364	19,55	0,2682	0,1195	43,96	-35,89	32	0	0	0,0
3	0,3660	3,67	0,0560	0,0560	15,30	0,4887	0,2617	33,51	-28,49	32	1	2	9,4
sum										96	1	5	6,3

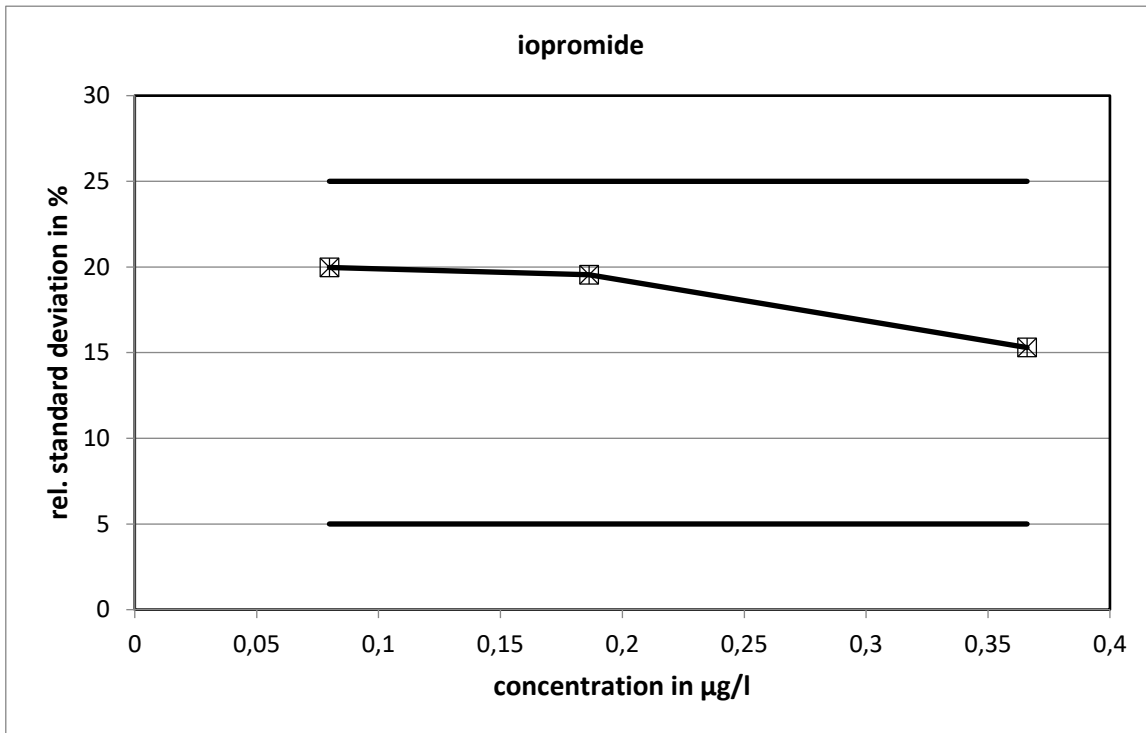
Recovery and matrix content



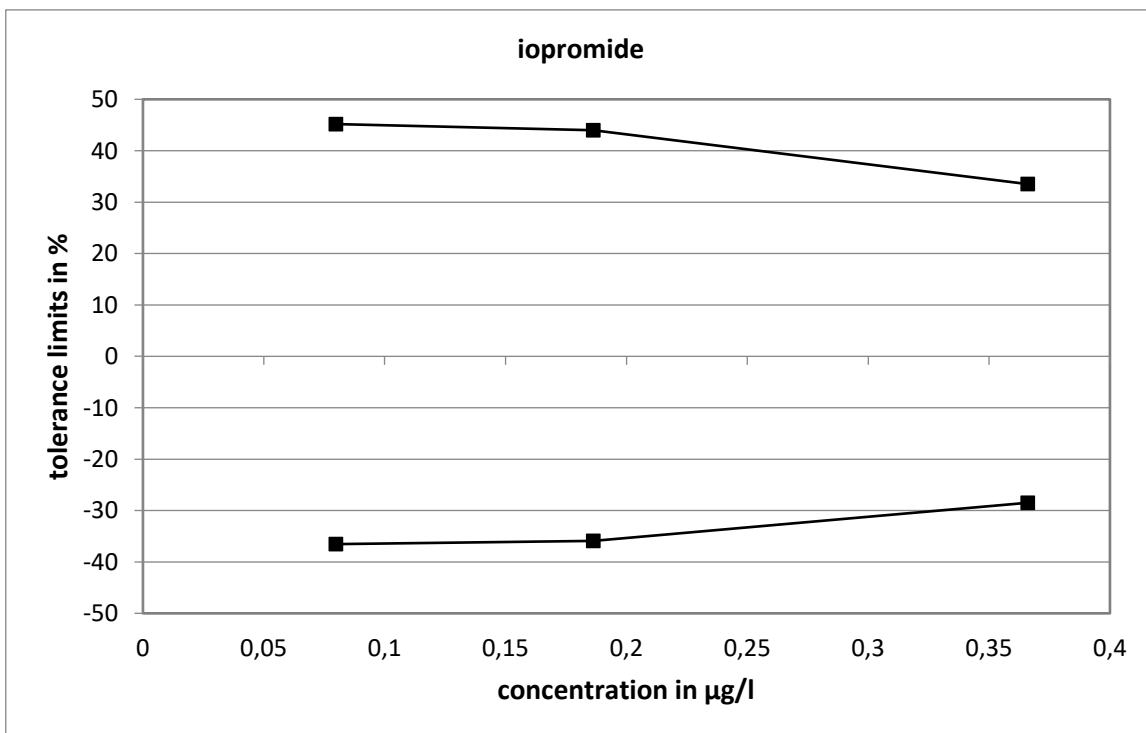
slope of the regression: 0,949; recovery rate: 94,9 %

neg. x-axis intercept = matrix content: 0 $\mu\text{g/l}$

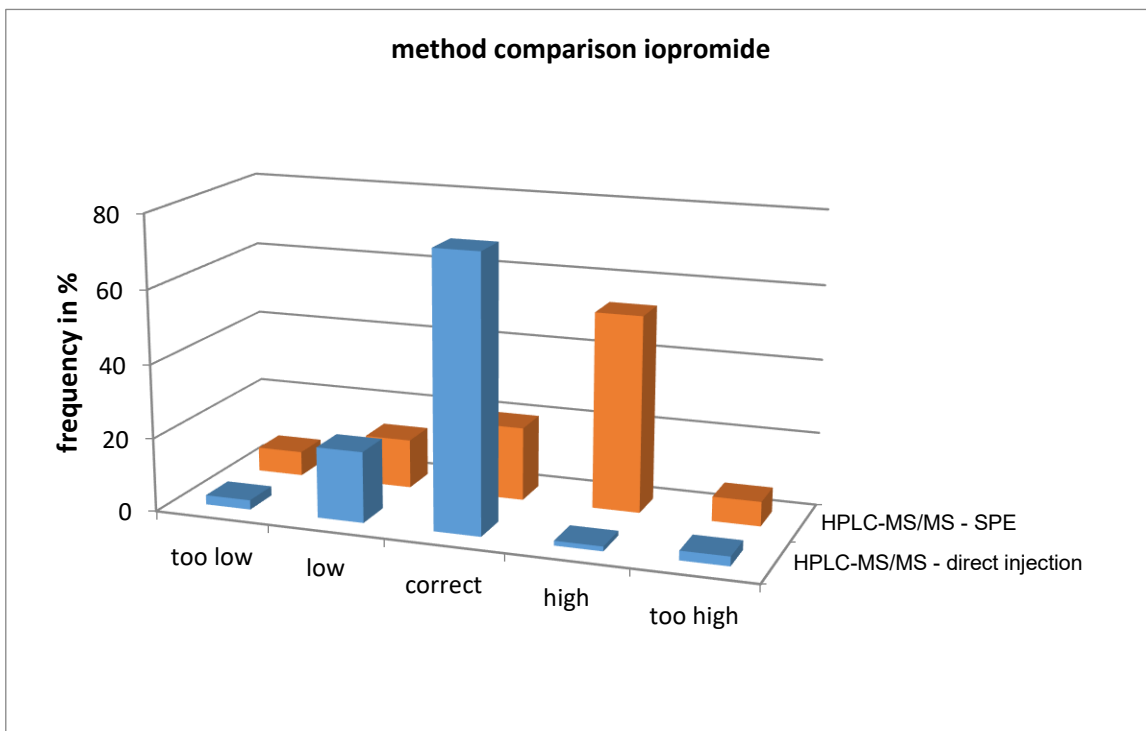
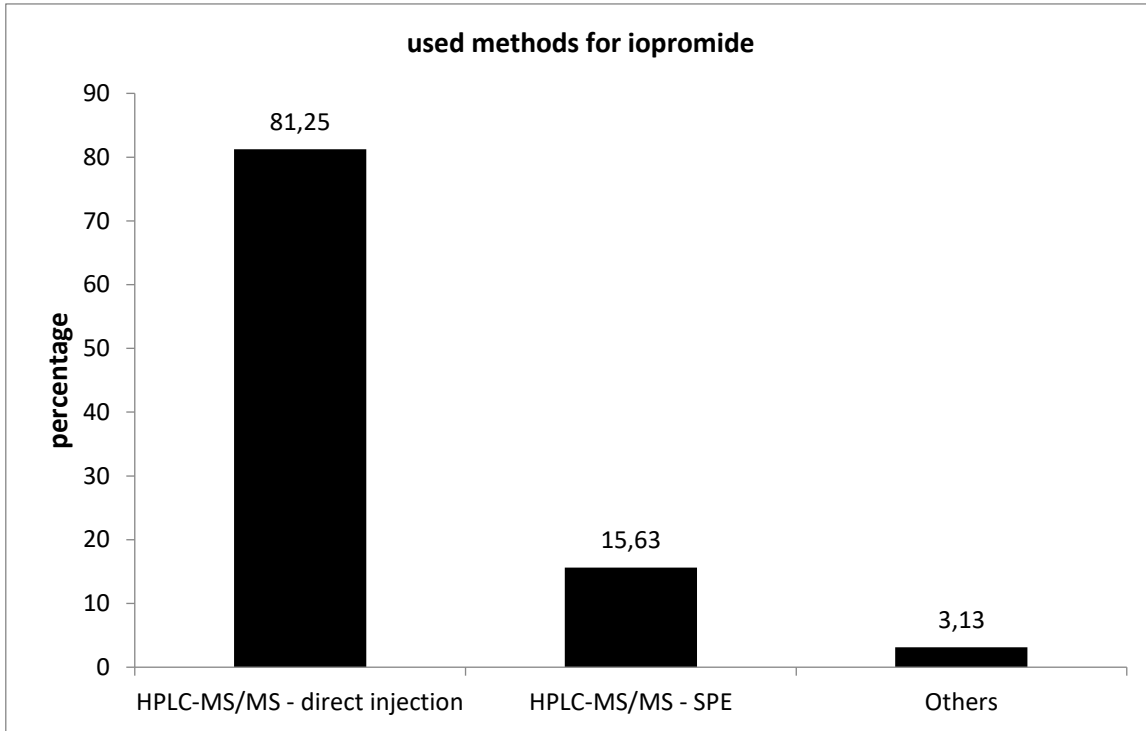
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



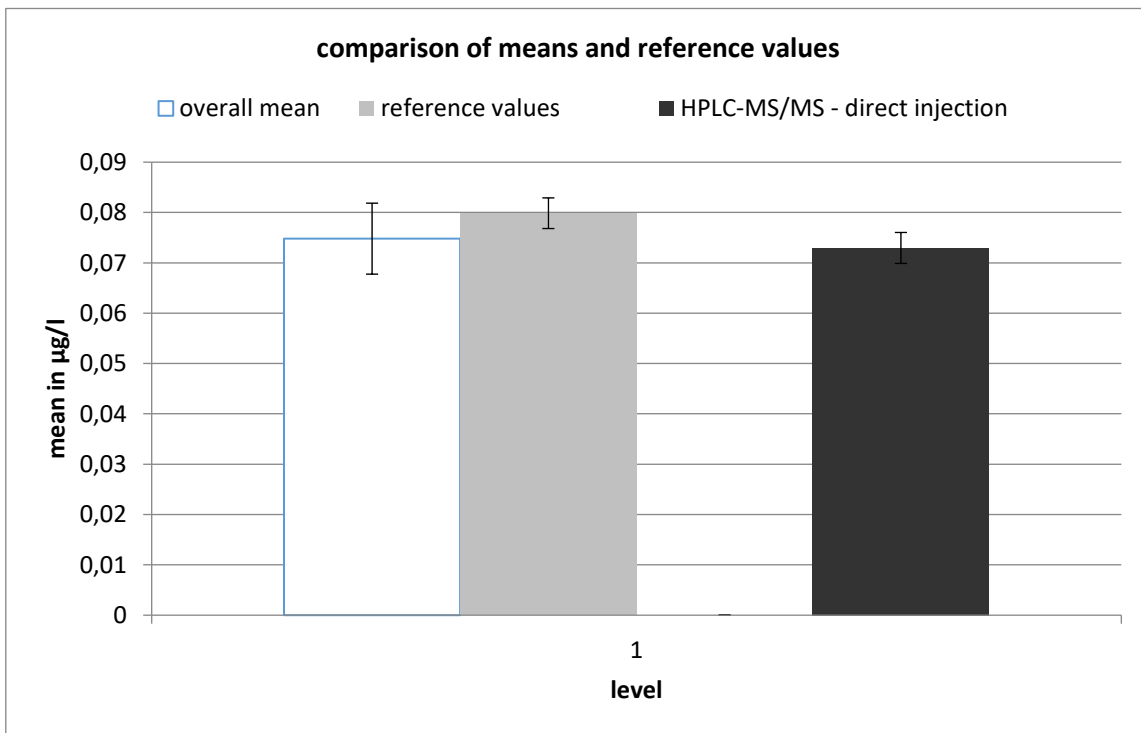
Method specific evaluation

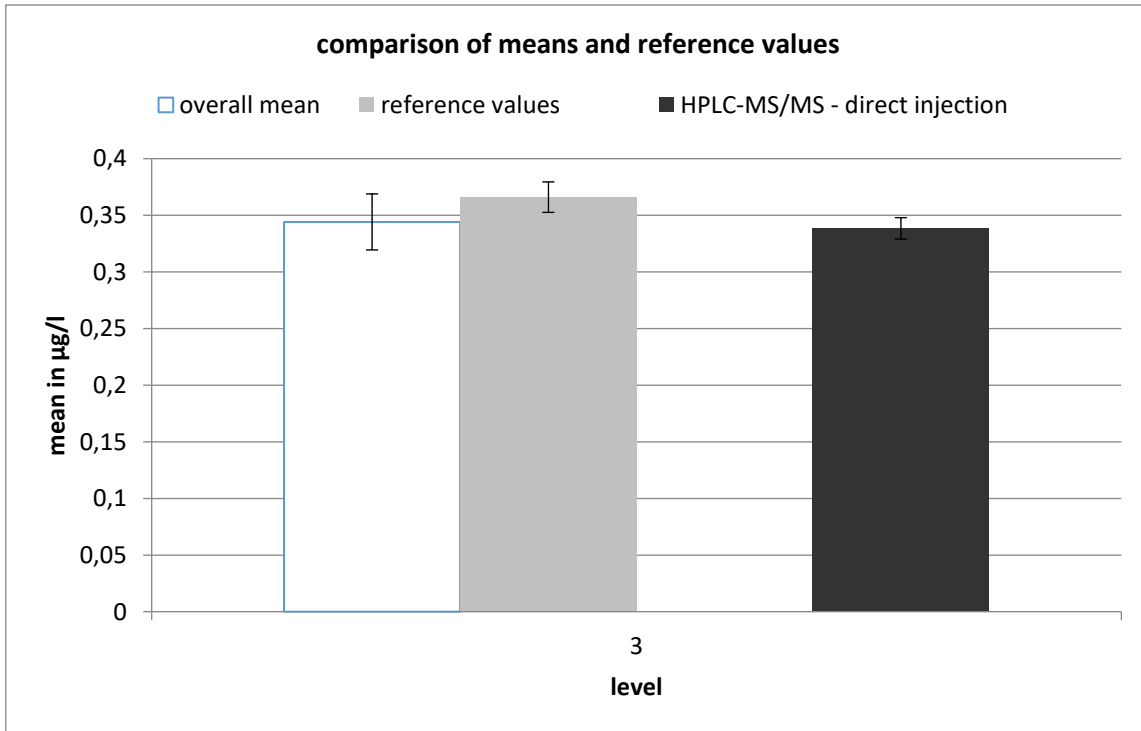
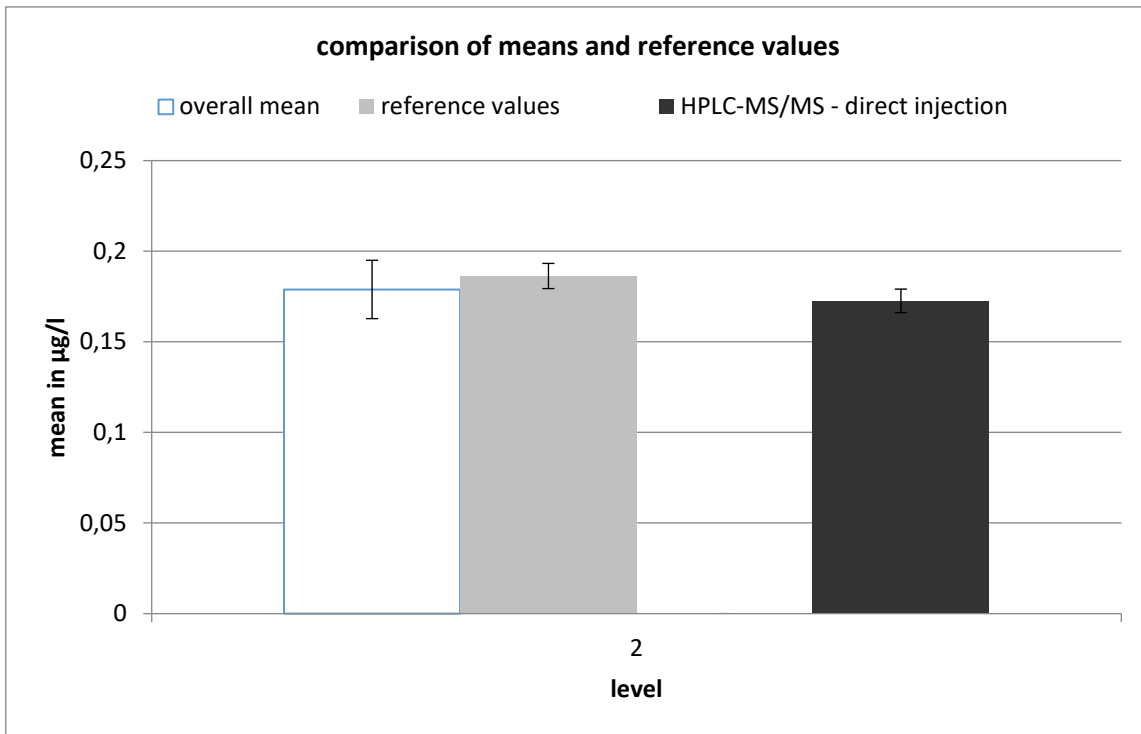


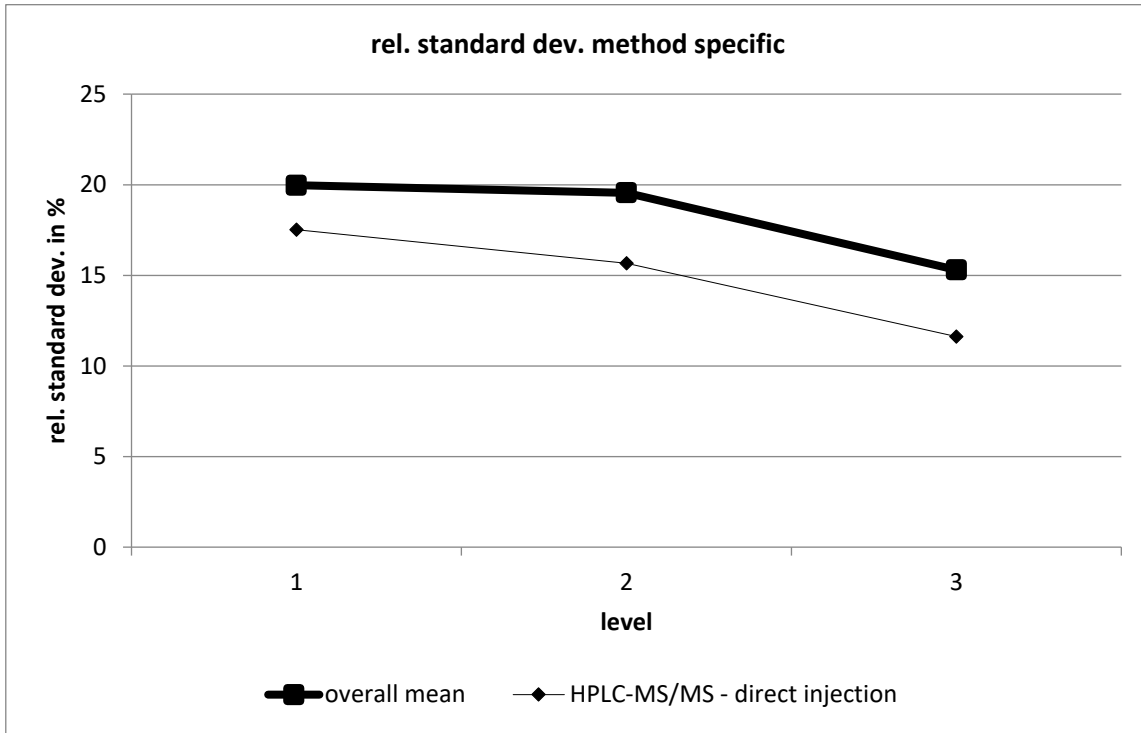
The values determined with HPLC-MS/MS-direct injection showed a high ratio of high values.

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	0,0748	0,0070	9,4	0,0799	0,0030	3,8
2	0,1789	0,0161	9,0	0,1863	0,0069	3,7
3	0,3441	0,0247	7,2	0,3660	0,0134	3,7





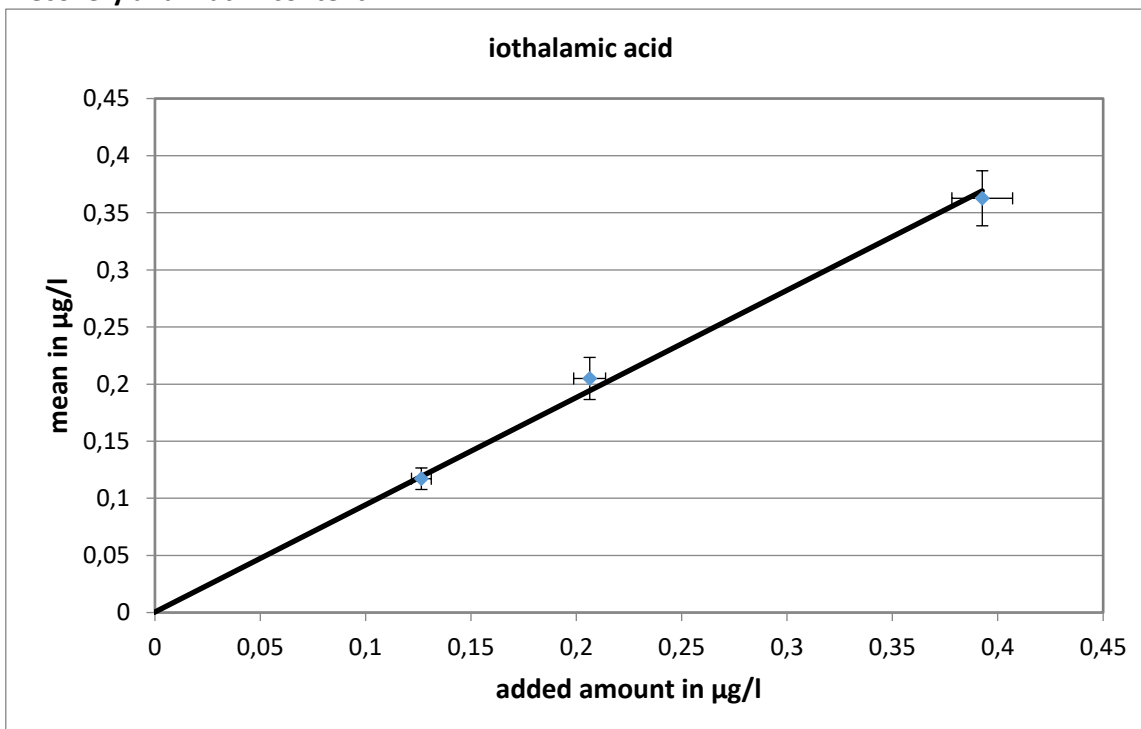


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,073	0,003	4,214	0,013	17,52	27	1	1	7,407
2	0,173	0,007	3,77	0,027	15,67	27	1	0	3,704
3	0,338	0,009	2,795	0,039	11,62	27	2	1	11,11

iothalamic acid

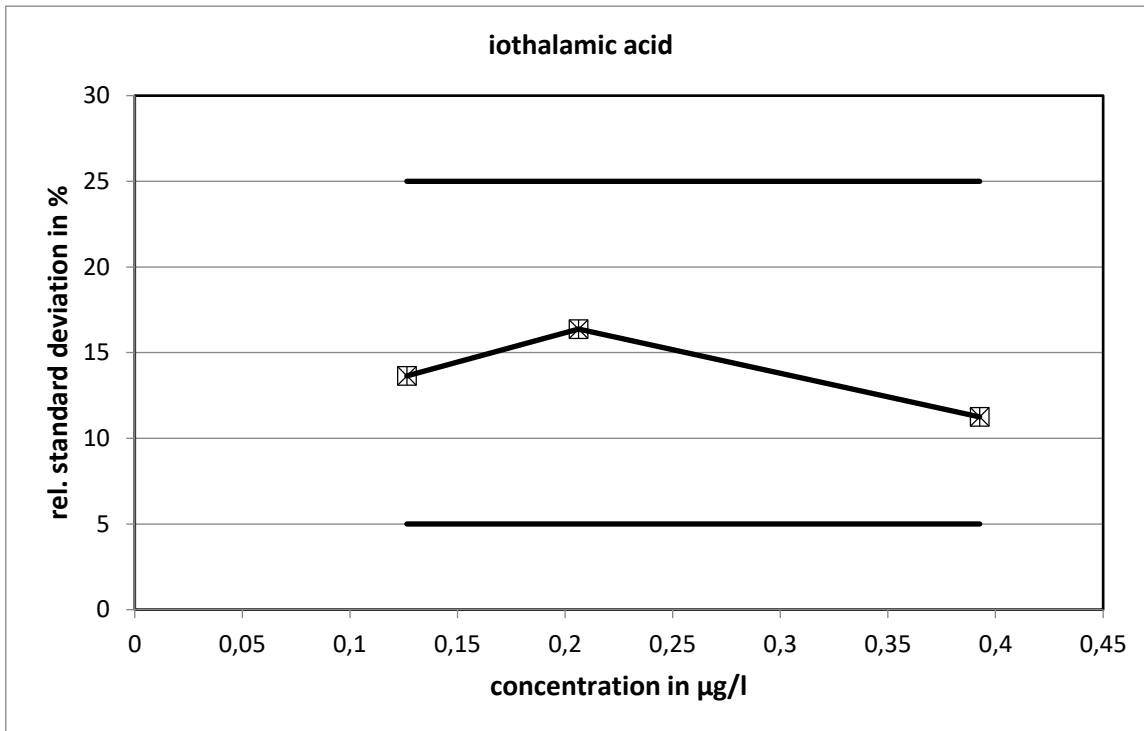
level	assigned value [µg/l]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [µg/l]	standard deviation for proficiency assessment [µg/l]	standard deviation for proficiency assessment [%]	upper tolerance limit [µg/l]	lower tolerance limit [µg/l]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,1264	3,71	0,0172	0,0172	13,63	0,1638	0,0941	29,58	-25,55	21	0	2	9,5
2	0,2063	3,67	0,0338	0,0338	16,38	0,2804	0,1434	35,92	-30,48	21	0	2	9,5
3	0,3926	3,67	0,0442	0,0442	11,25	0,4870	0,3090	24,04	-21,29	21	1	0	4,8
sum										63	1	4	7,9

Recovery and matrix content

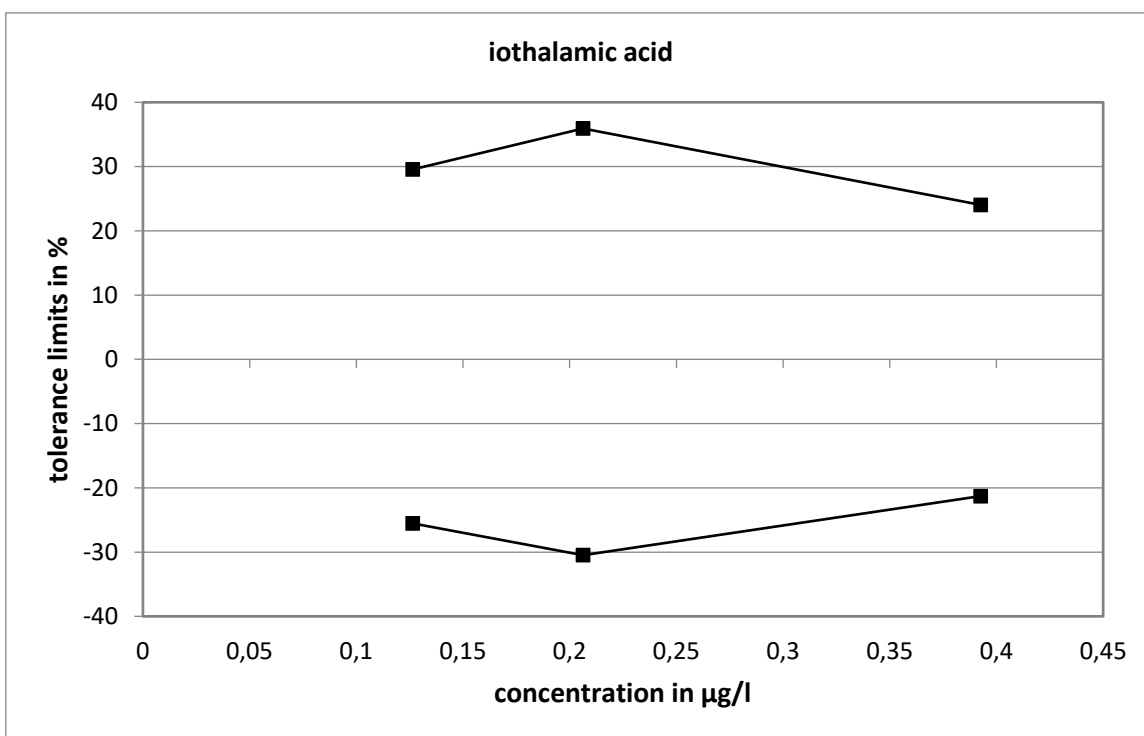


slope of the regression: 0,939; recovery rate: 93,9 %
 neg. x-axis intercept = matrix content: 0 µg/l

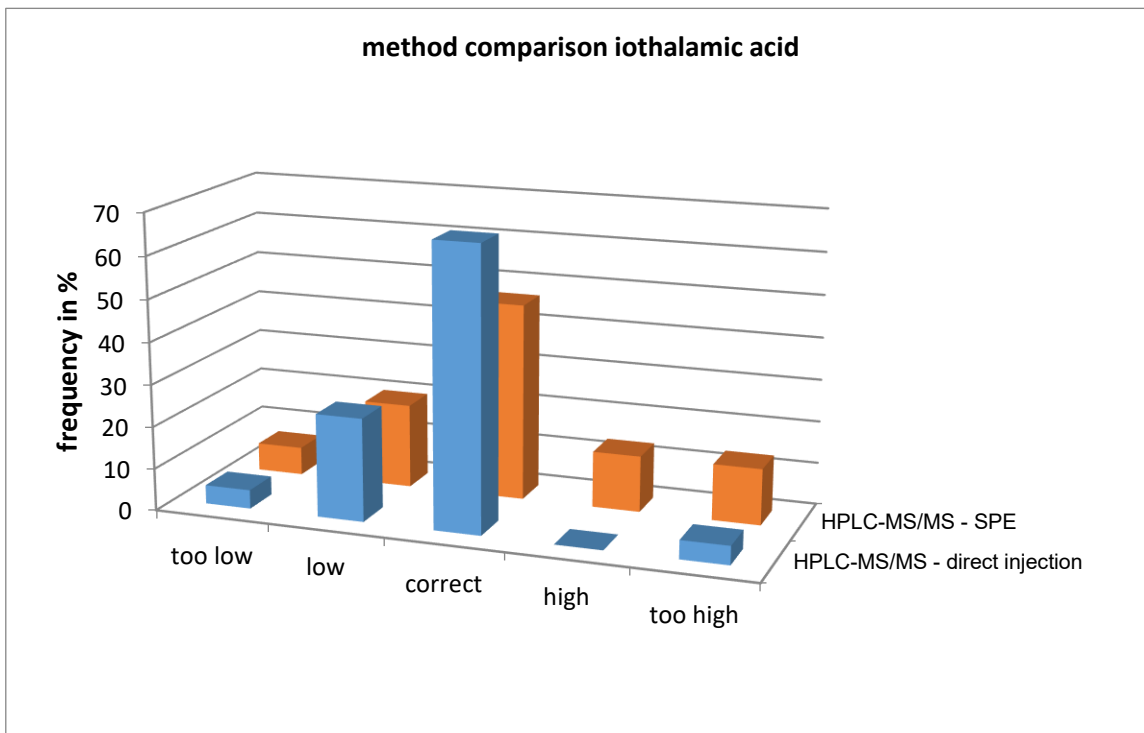
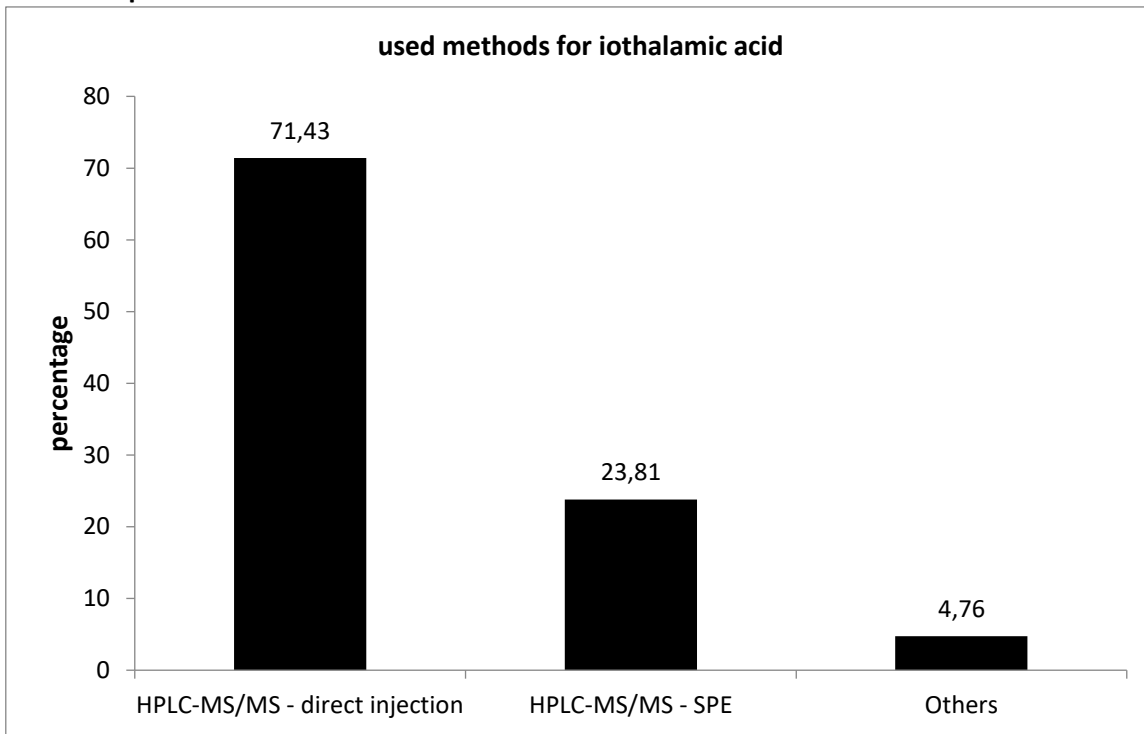
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



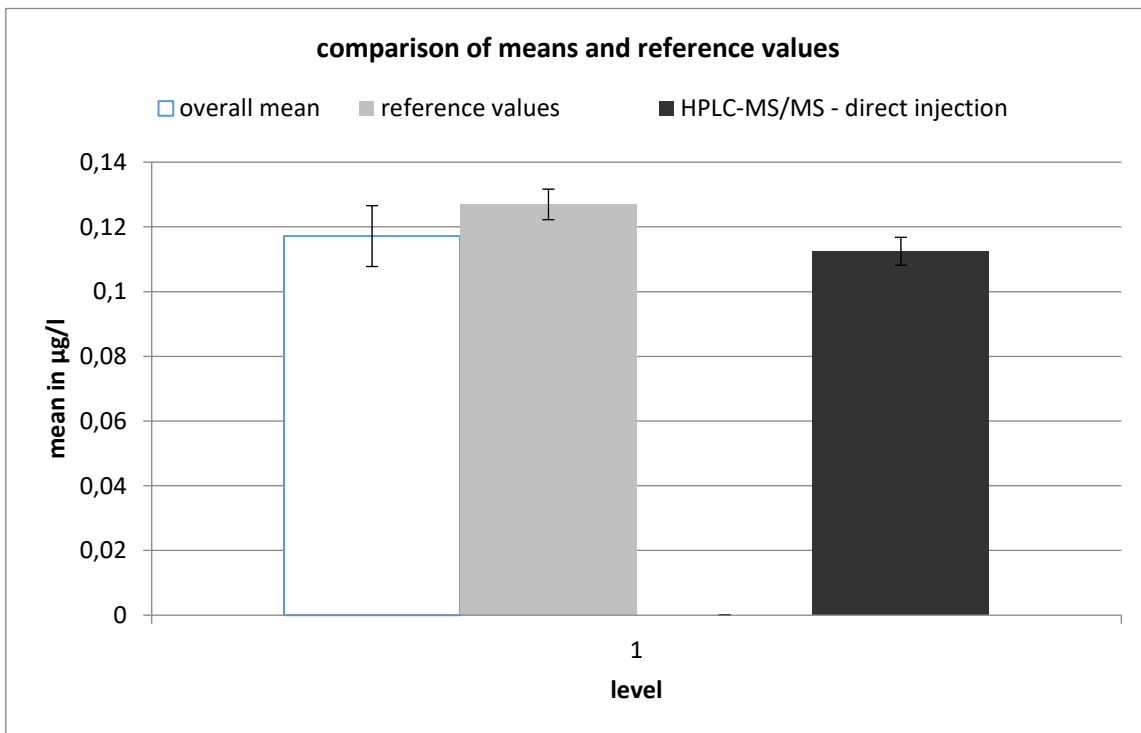
Method specific evaluation

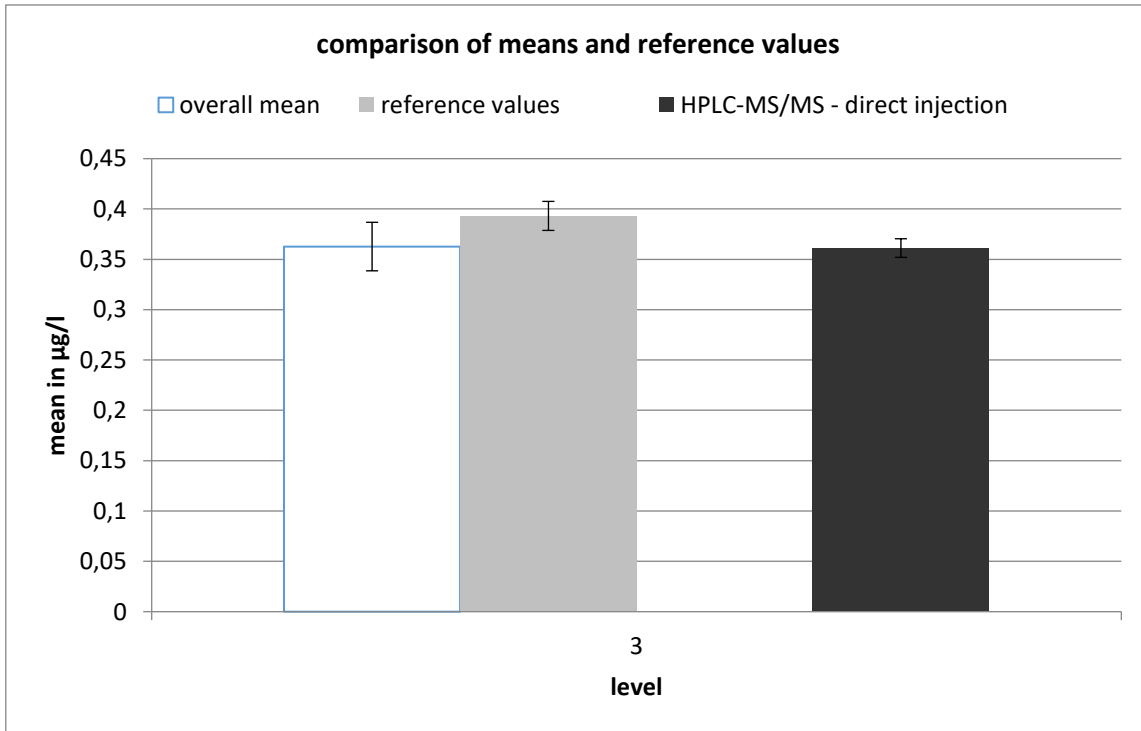
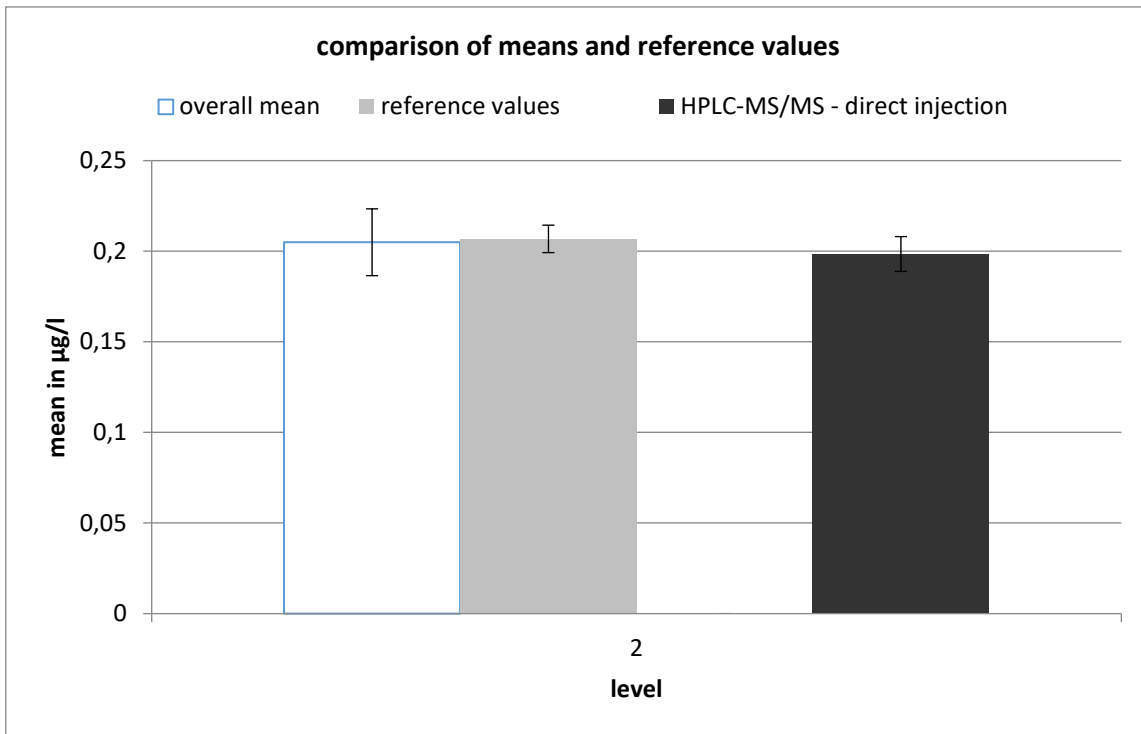


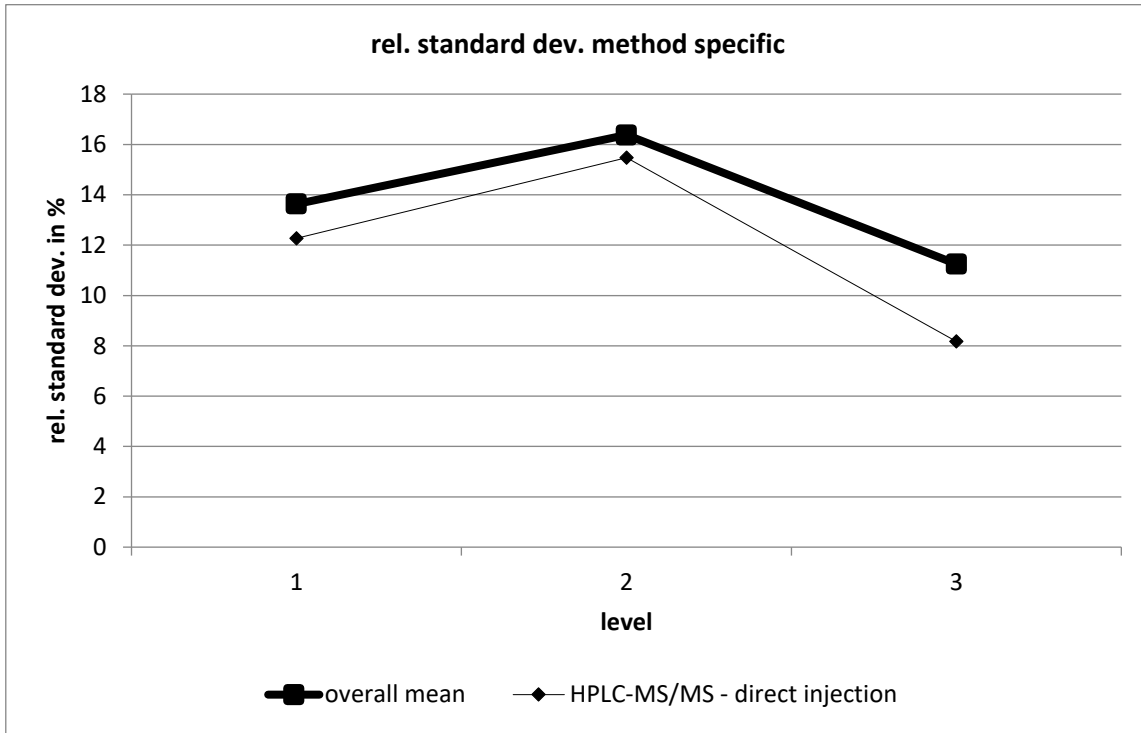
The values determined with HPLC-MS/MS - direct injection showed a higher ratio of low values.

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	0,1172	0,0094	8,0	0,1270	0,0047	3,7
2	0,2049	0,0184	9,0	0,2068	0,0076	3,7
3	0,3627	0,0241	6,6	0,3931	0,0144	3,7





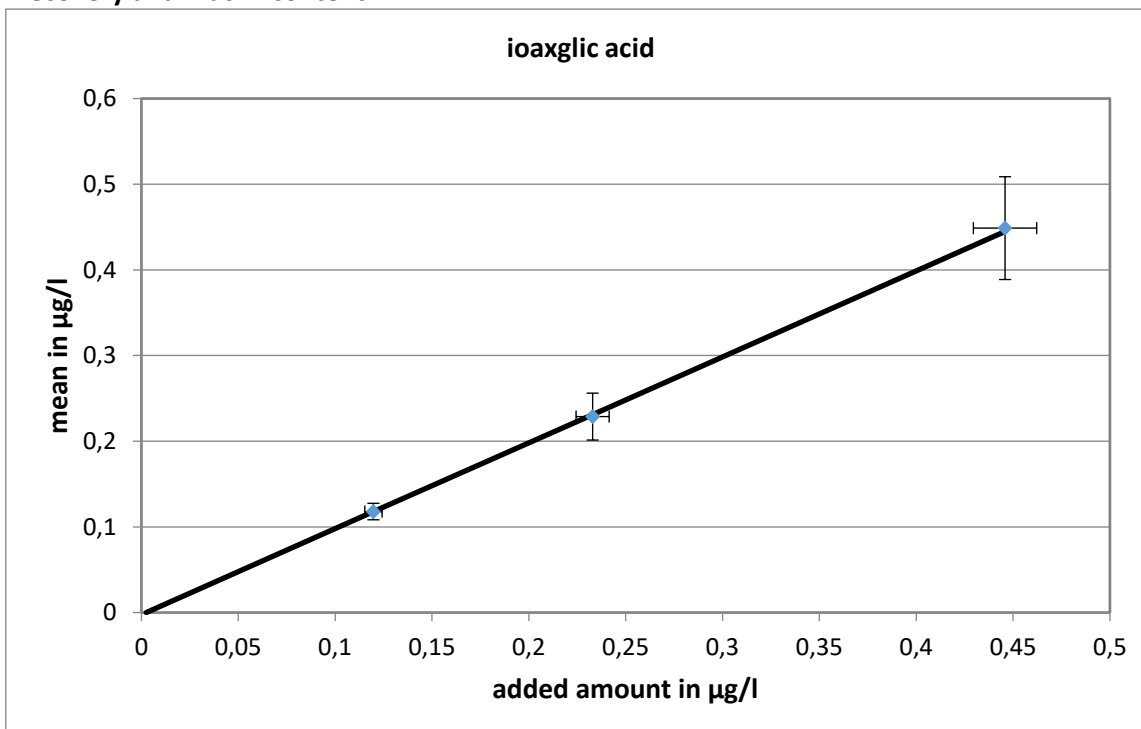


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,112	0,004	3,833	0,014	12,27	16	0	2	12,5
2	0,198	0,01	4,836	0,031	15,48	16	0	2	12,5
3	0,361	0,009	2,554	0,03	8,171	16	1	0	6,25

ioaxglic acid

level	assigned value [$\mu\text{g/l}$]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [$\mu\text{g/l}$]	standard deviation for proficiency assessment [$\mu\text{g/l}$]	standard deviation for proficiency assessment [%]	upper tolerance limit [$\mu\text{g/l}$]	lower tolerance limit [$\mu\text{g/l}$]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,1198	4,25	0,0139	0,0139	11,59	0,1494	0,0935	24,71	-21,97	13	0	1	7,7
2	0,2329	3,82	0,0395	0,0395	16,95	0,3199	0,1596	37,36	-31,46	13	0	0	0,0
3	0,4459	3,71	0,0865	0,0865	19,41	0,6391	0,2864	43,34	-35,76	13	0	0	0,0
sum										39	0	1	2,6

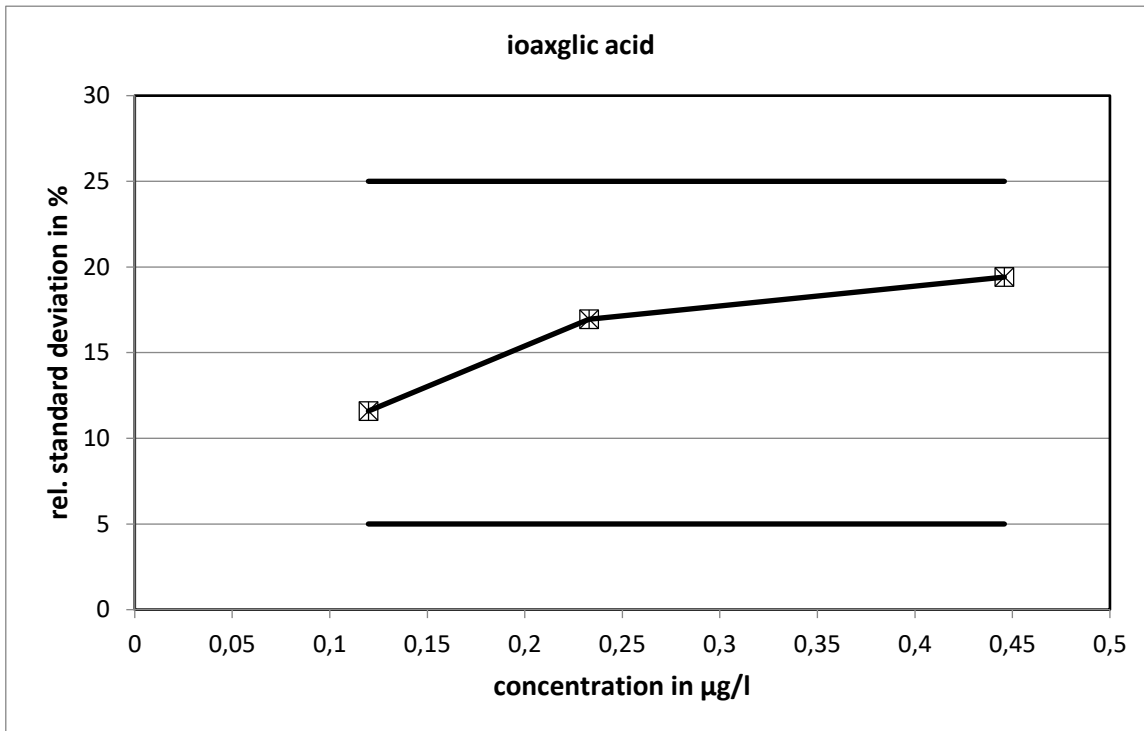
Recovery and matrix content



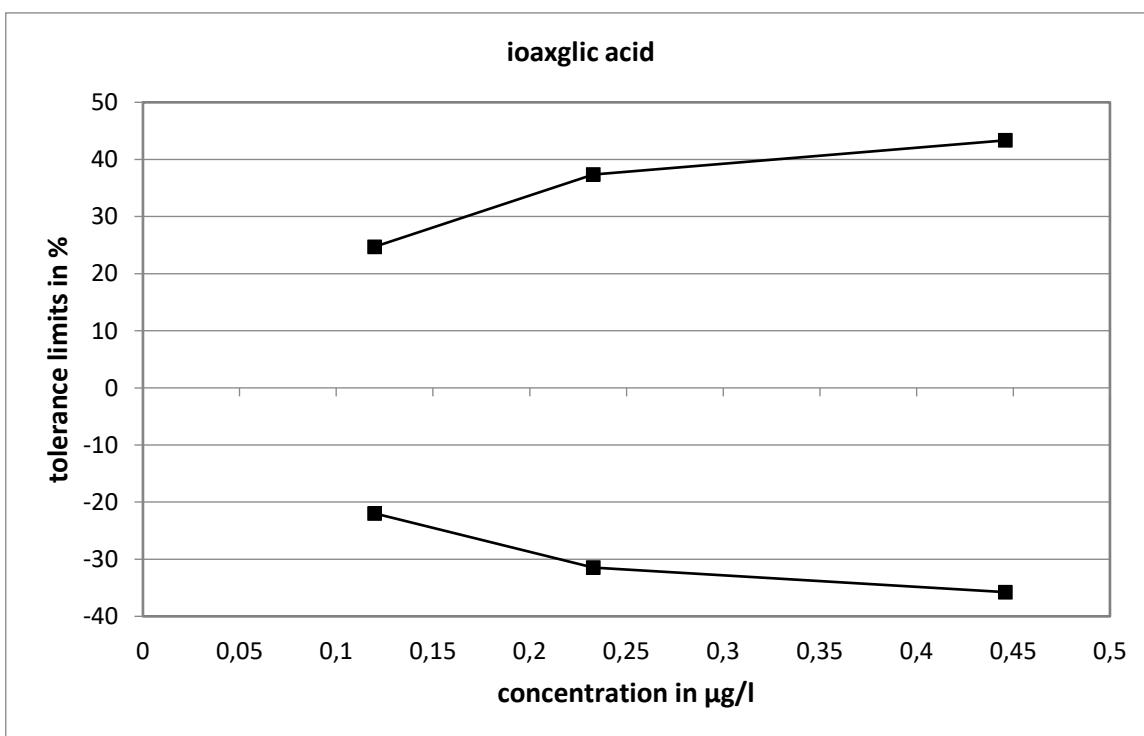
slope of the regression: 1,003; recovery rate: 100,3 %

neg. x-axis intercept = matrix content: 0 $\mu\text{g/l}$

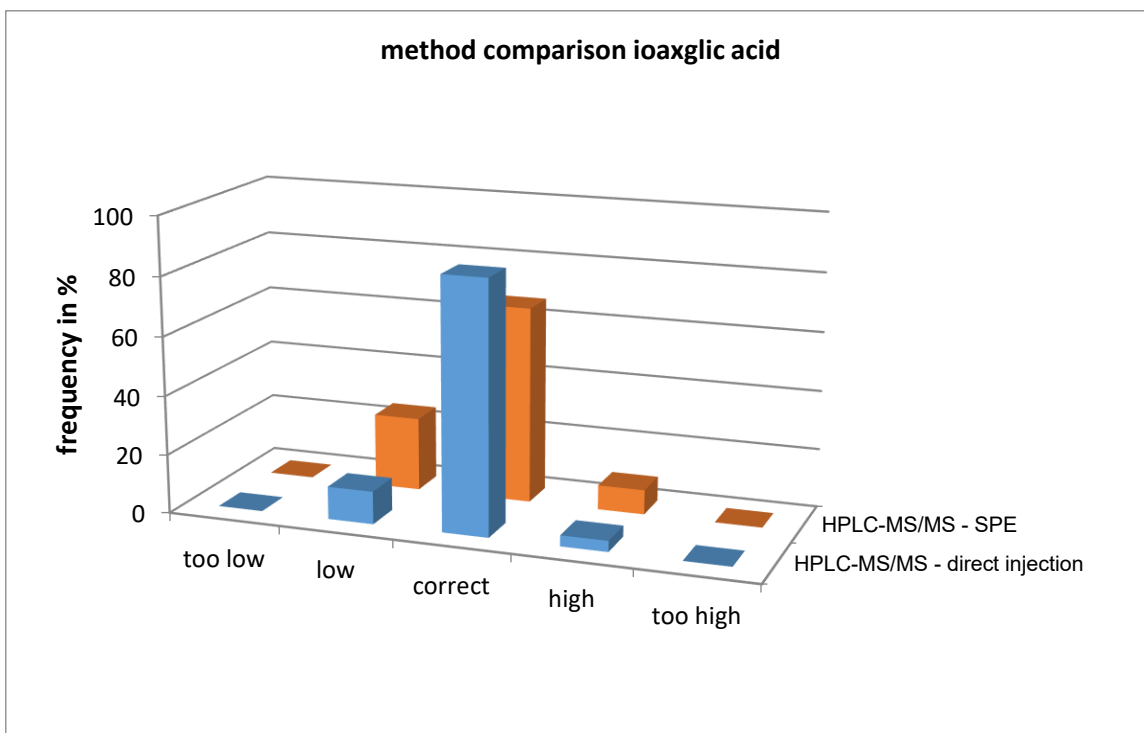
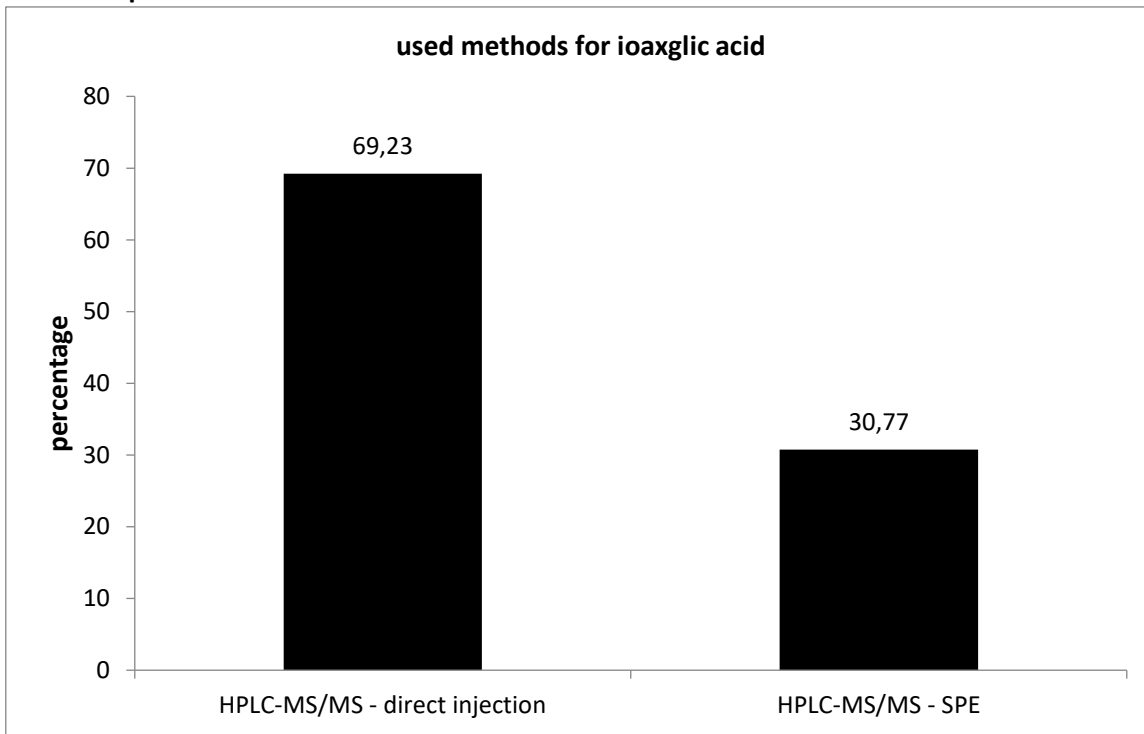
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



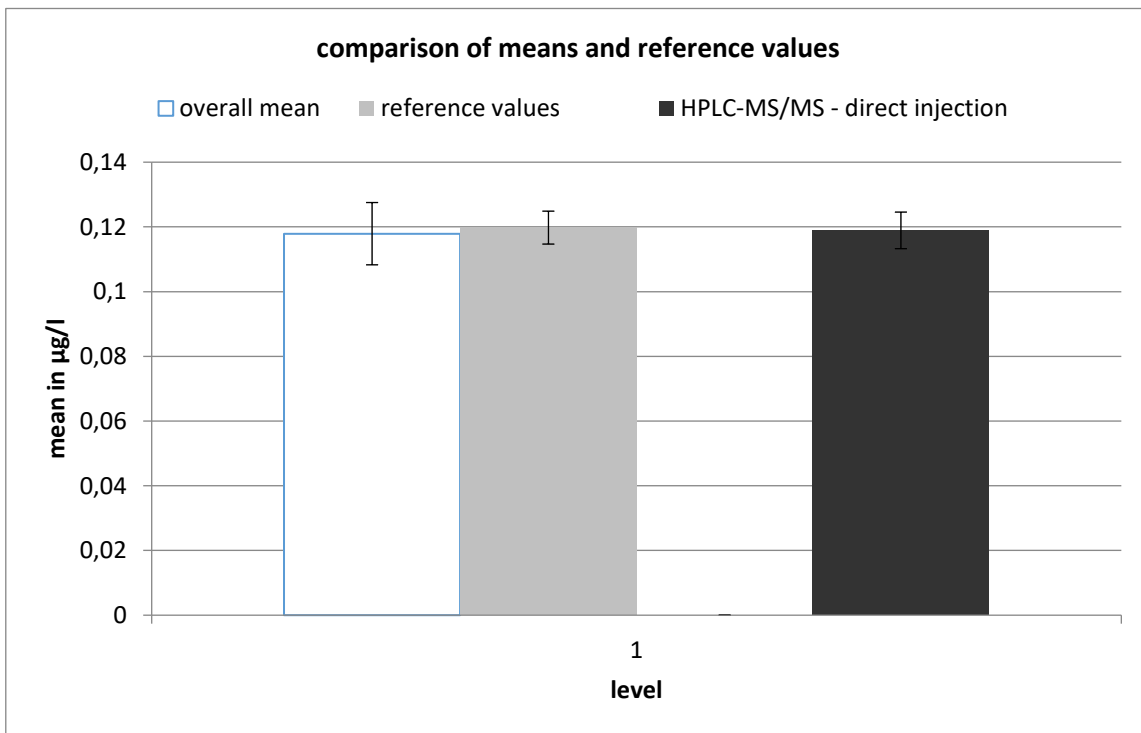
Method specific evaluation

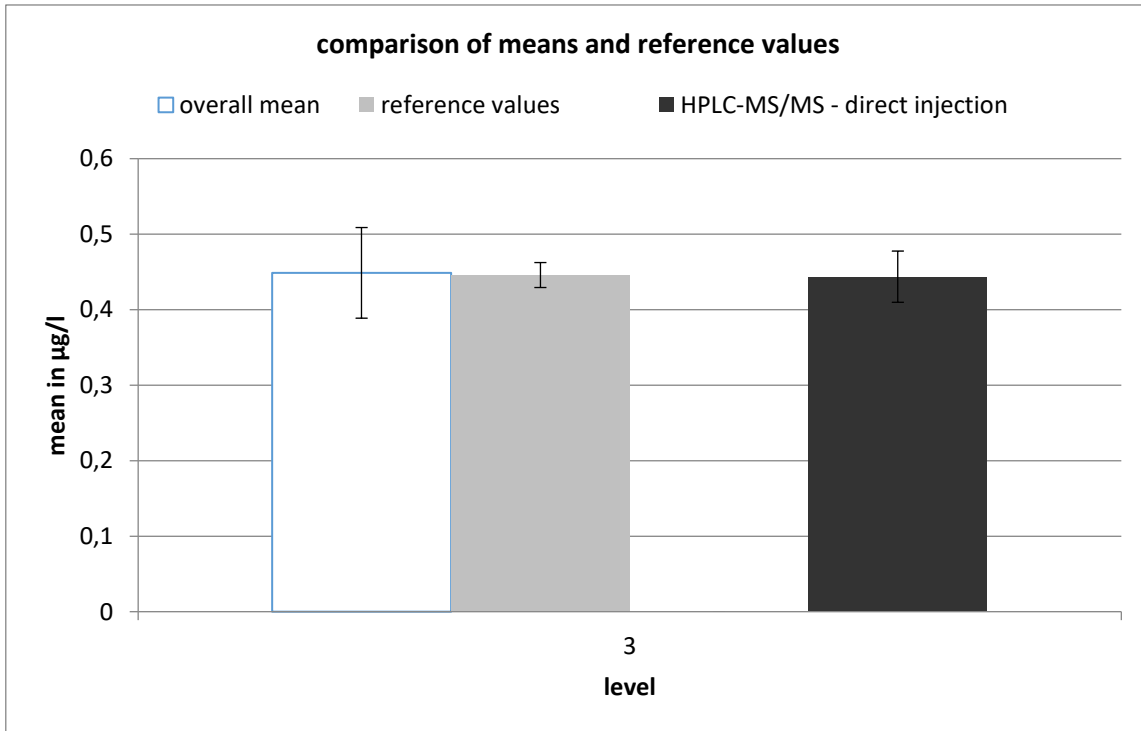
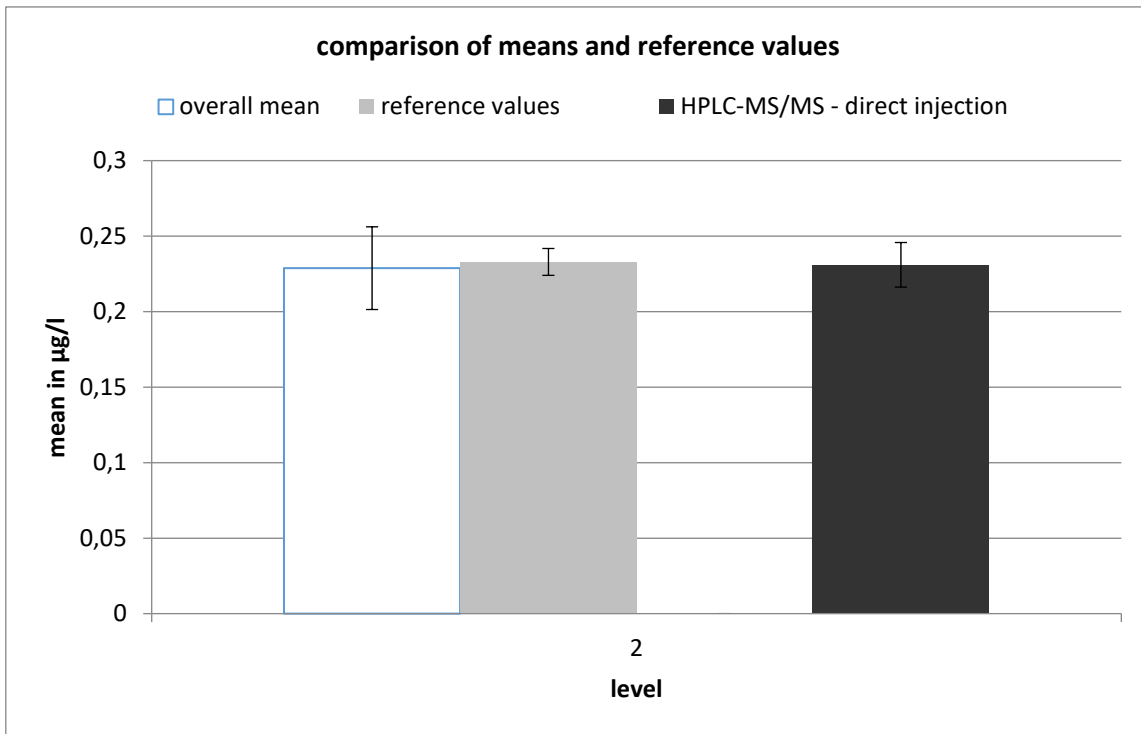


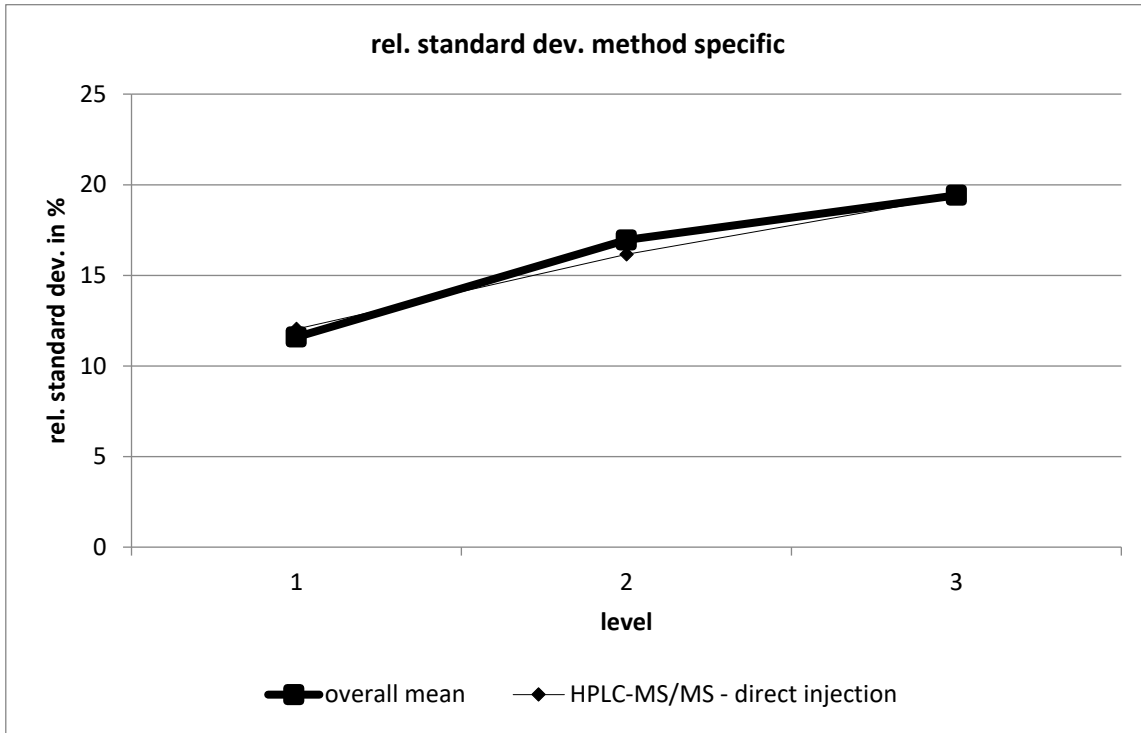
The values determined with HPLC-MS/MS - direct injection showed the closest statistical distribution.

Comparison of means and reference values

level	Experimental Data			Reference Data		
	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,1179	0,0096	8,2	0,1198	0,0051	4,2
2	0,2288	0,0274	12,0	0,2329	0,0089	3,8
3	0,4488	0,0600	13,4	0,4459	0,0165	3,7





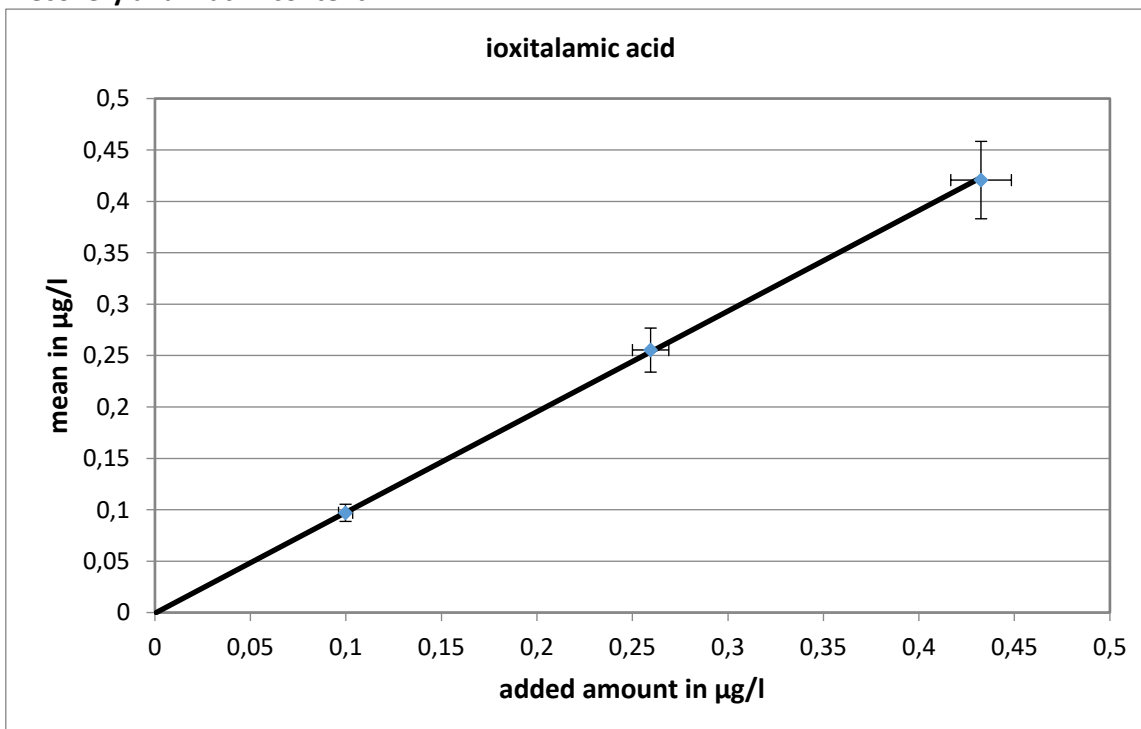


HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,119	0,006	4,758	0,014	12,04	10	0	1	10
2	0,231	0,015	6,386	0,037	16,16	10	0	0	0
3	0,444	0,034	7,651	0,086	19,36	10	1	0	10

ioxitalamic acid

level	assigned value [$\mu\text{g/l}$]	expanded uncertainty of the assigned value [%]	standard deviation, calculated using robust statistics [$\mu\text{g/l}$]	standard deviation for proficiency assessment [$\mu\text{g/l}$]	standard deviation for proficiency assessment [%]	upper tolerance limit [$\mu\text{g/l}$]	lower tolerance limit [$\mu\text{g/l}$]	upper tolerance limit [%]	lower tolerance limit [%]	number of results	out below	out above	out [%]
1	0,0998	3,77	0,0157	0,0157	15,72	0,1342	0,0706	34,40	-29,28	22	1	1	9,1
2	0,2595	3,68	0,0402	0,0402	15,49	0,3473	0,1845	33,82	-28,90	22	1	1	9,1
3	0,4326	3,67	0,0706	0,0706	16,33	0,5878	0,3012	35,89	-30,36	22	0	1	4,5
sum										66	2	3	7,6

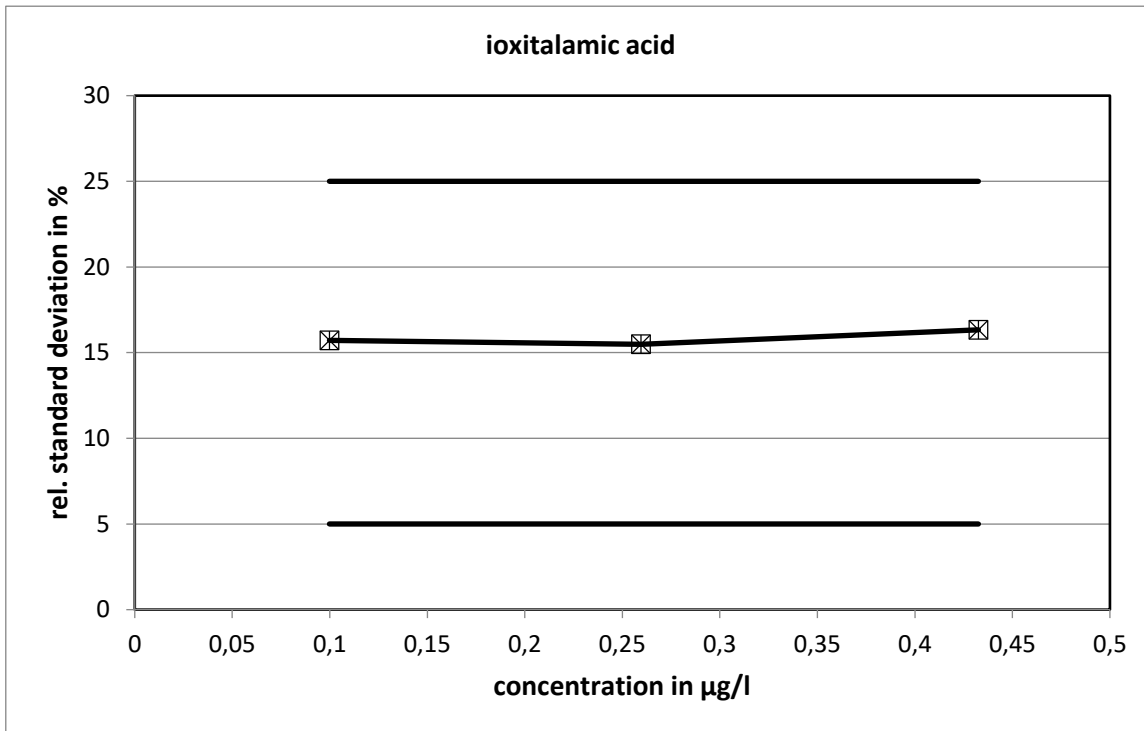
Recovery and matrix content



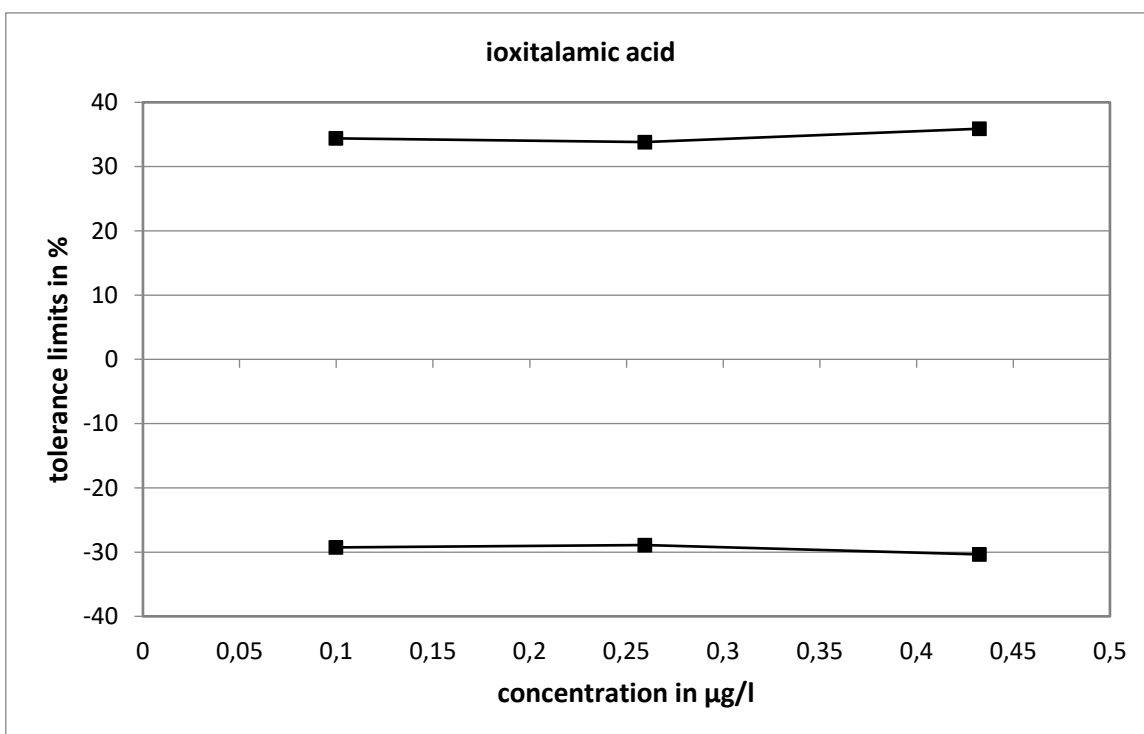
slope of the regression: 0,9798; recovery rate: 98 %

neg. x-axis intercept = matrix content: 0 $\mu\text{g/l}$

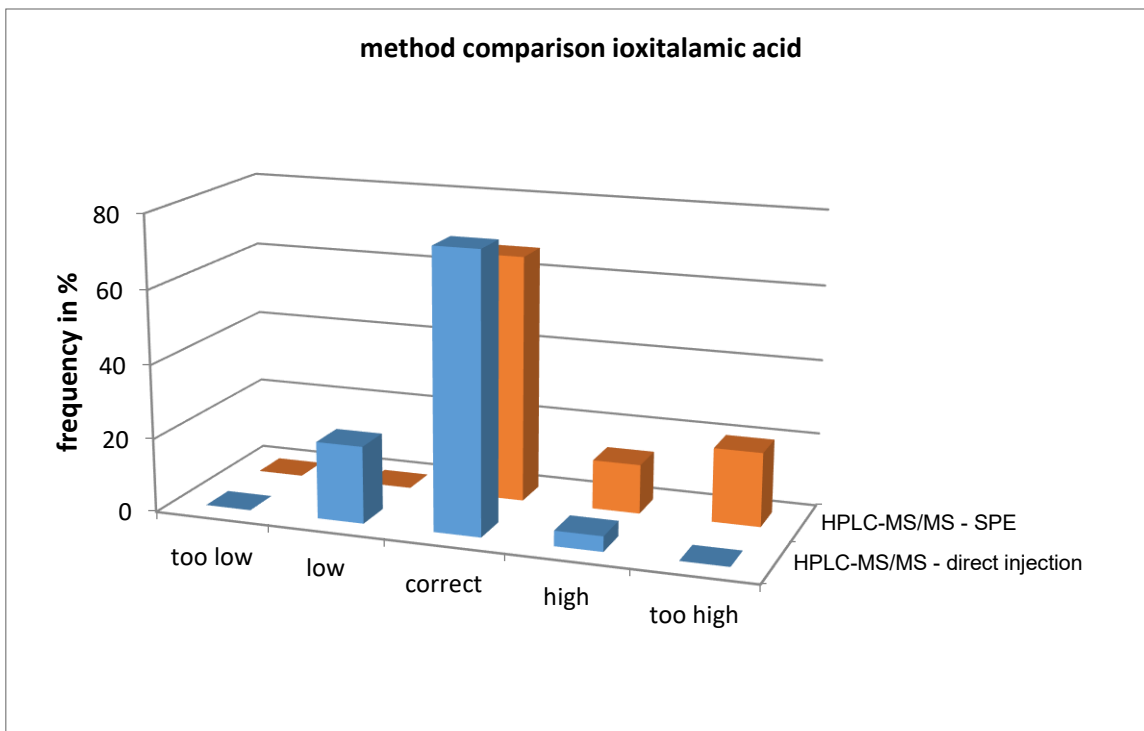
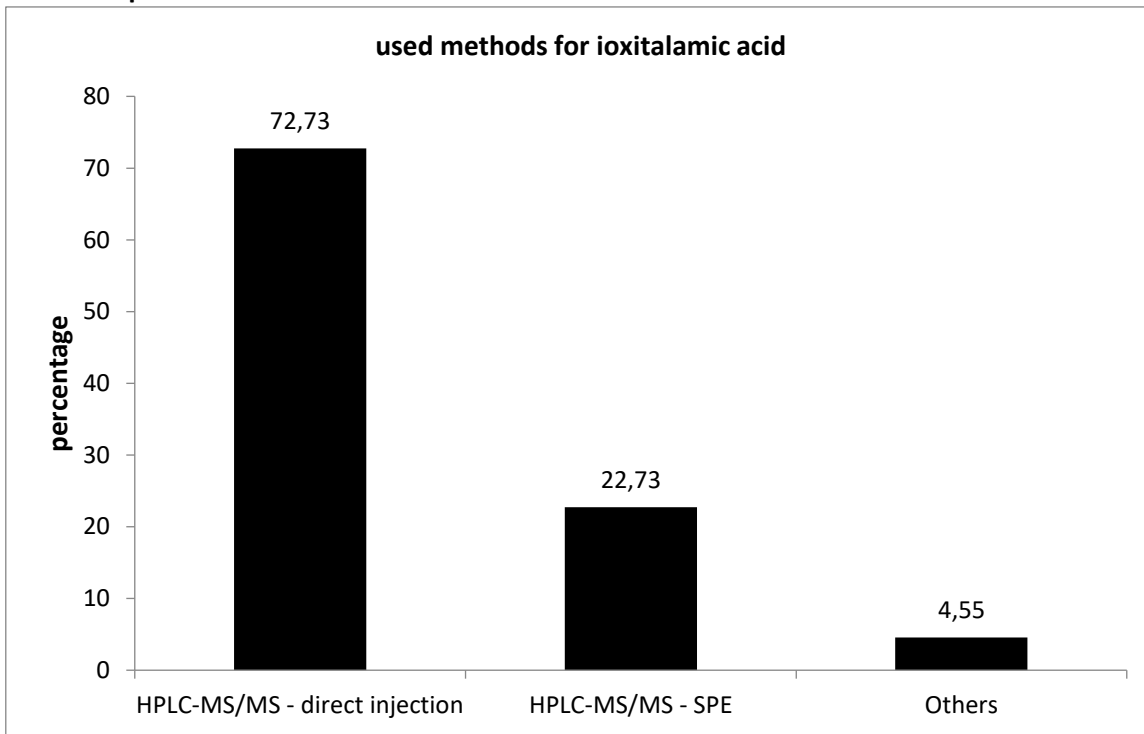
Relative standard deviation and tolerance limits



The relative standard deviations calculated with the Q-method did not reach the limits.



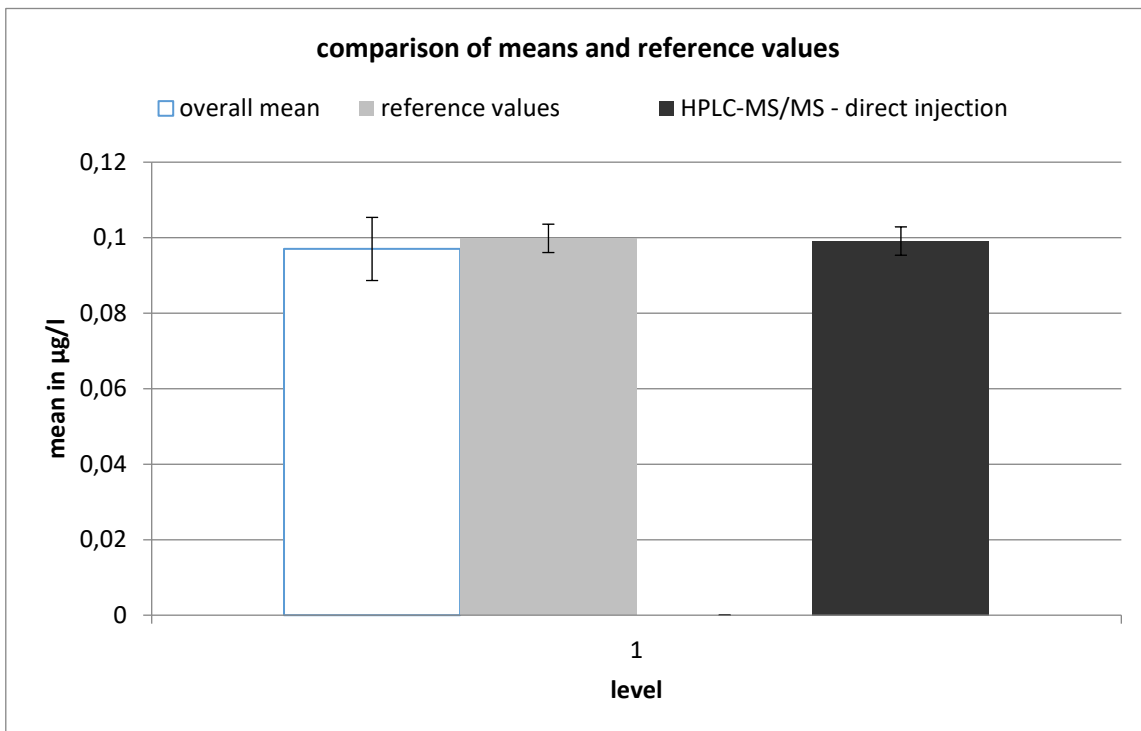
Method specific evaluation

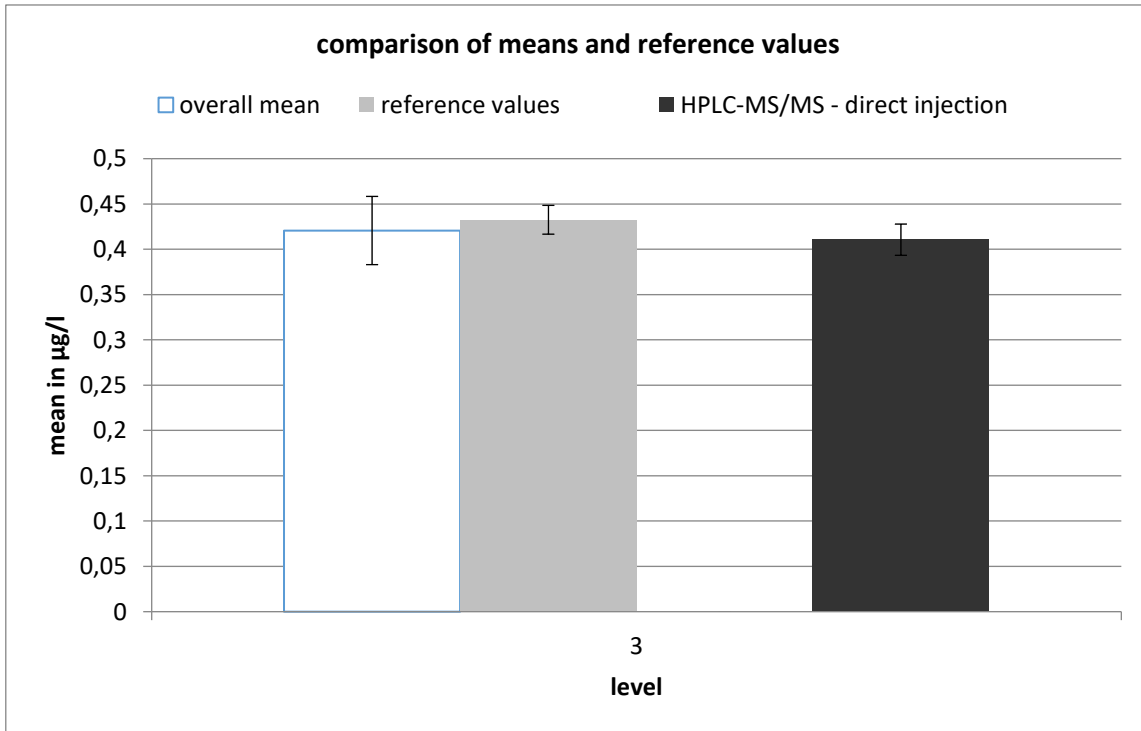
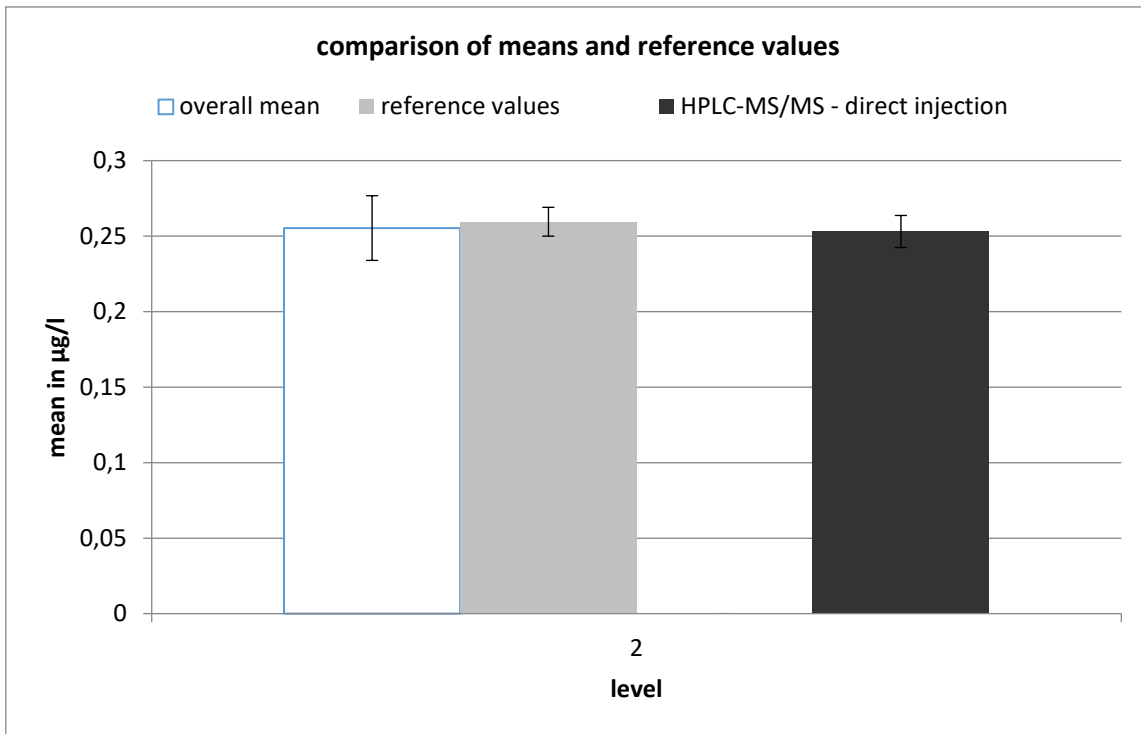


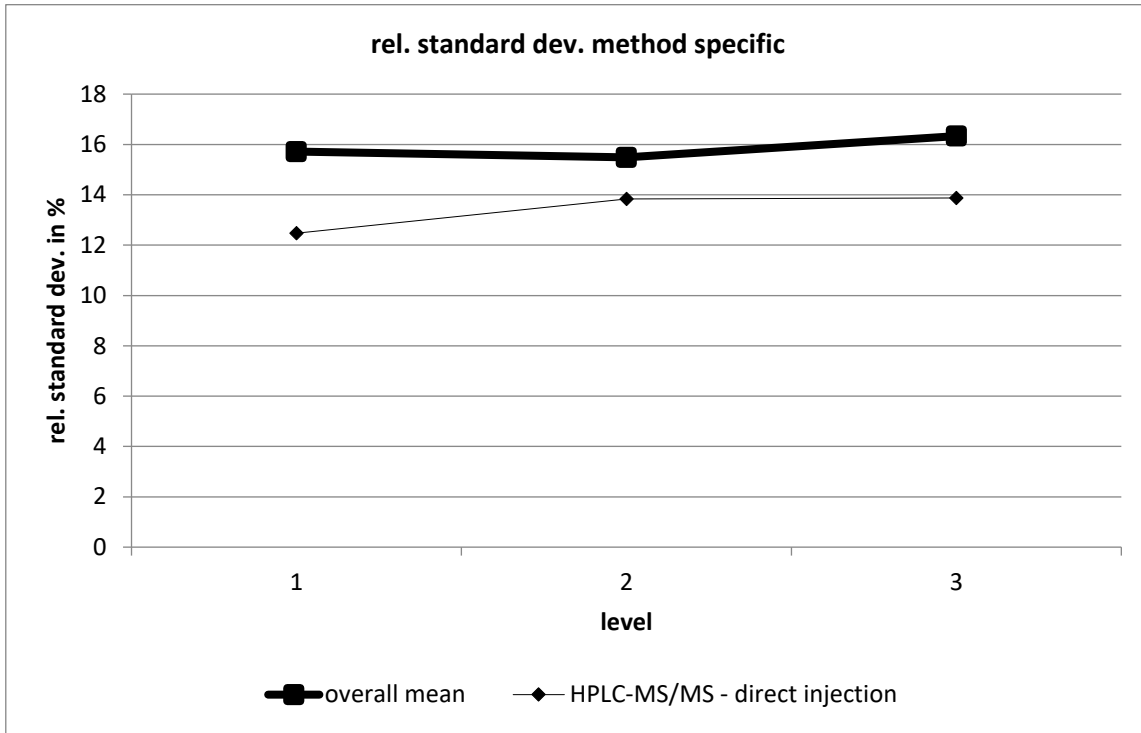
The values determined with HPLC-MS/MS - direct injection showed a rather higher ratio of low values, whereas the values determined with SPE were rather high or too high.

Comparison of means and reference values

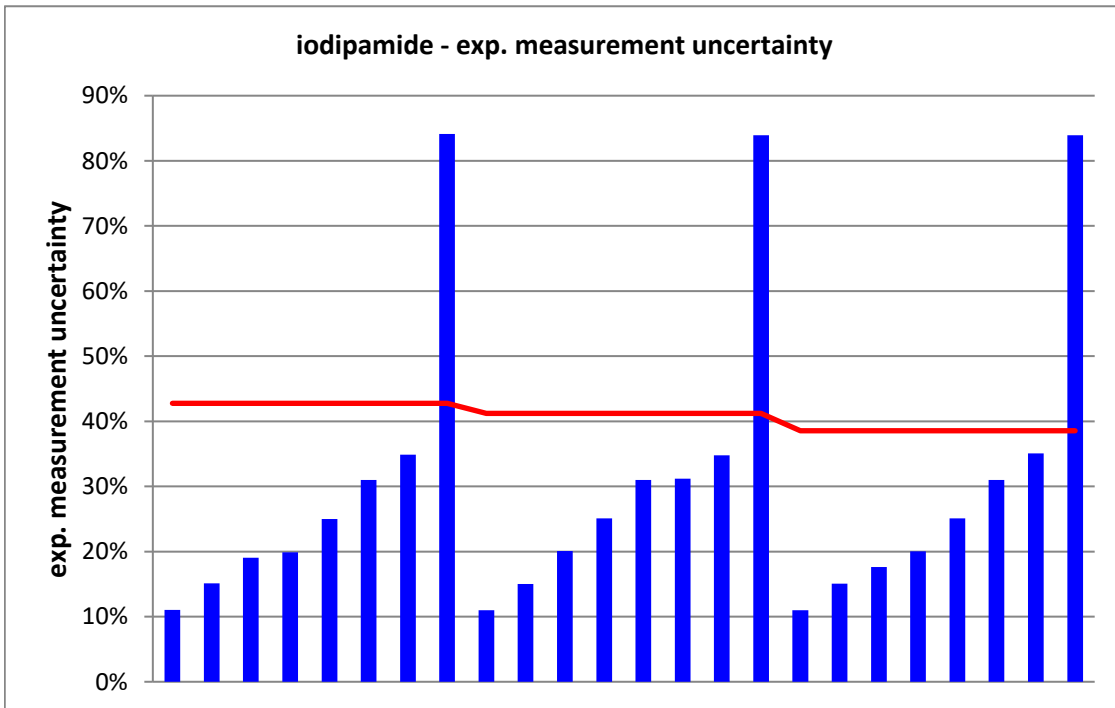
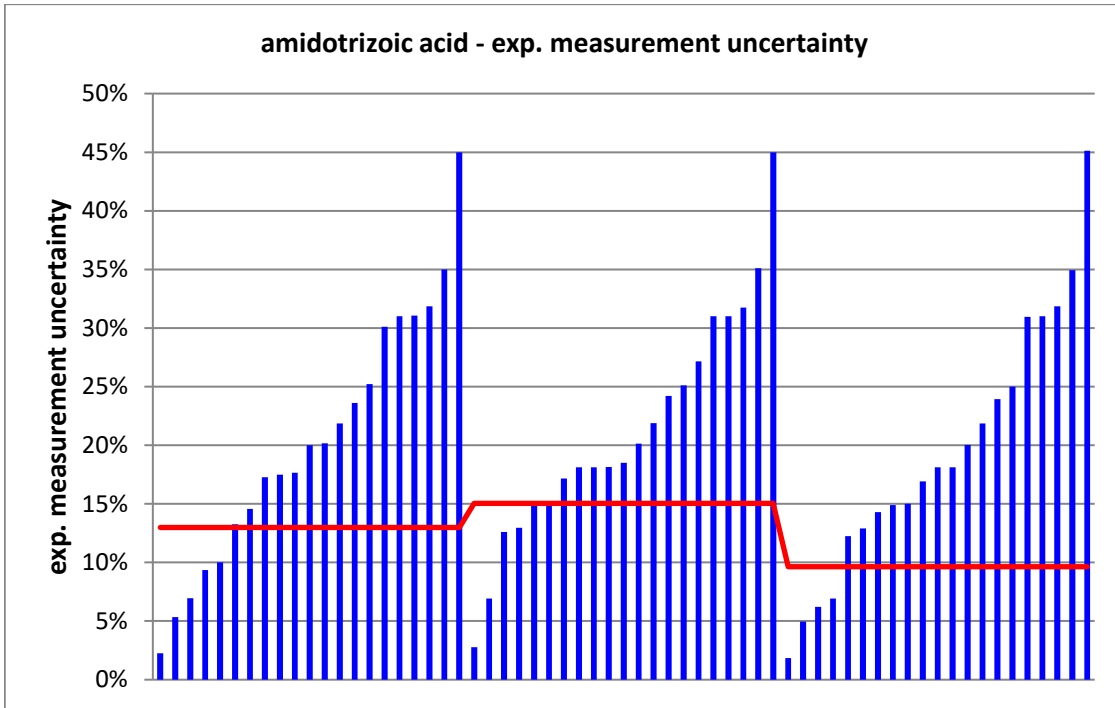
level	mean [µg/l]			reference value [µg/l]		
	mean [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]	reference value [µg/l]	exp. uncertainty [µg/l]	exp. uncertainty [%]
1	0,0970	0,0084	8,6	0,0998	0,0038	3,8
2	0,2553	0,0214	8,4	0,2595	0,0095	3,7
3	0,4207	0,0377	9,0	0,4326	0,0159	3,7

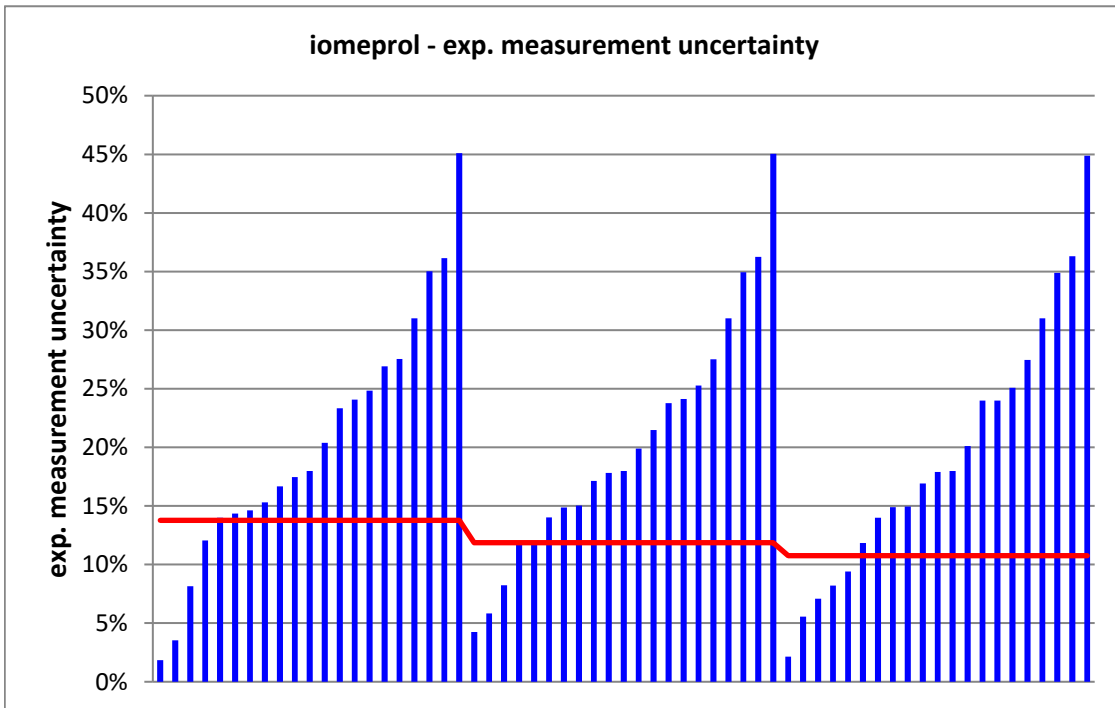
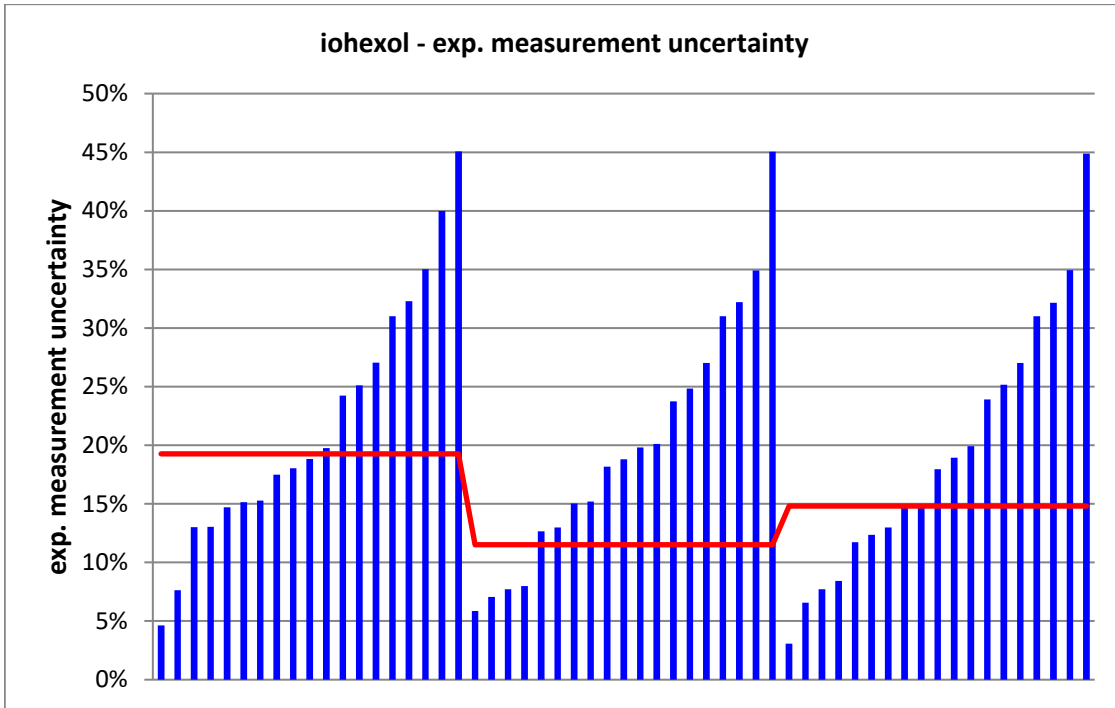


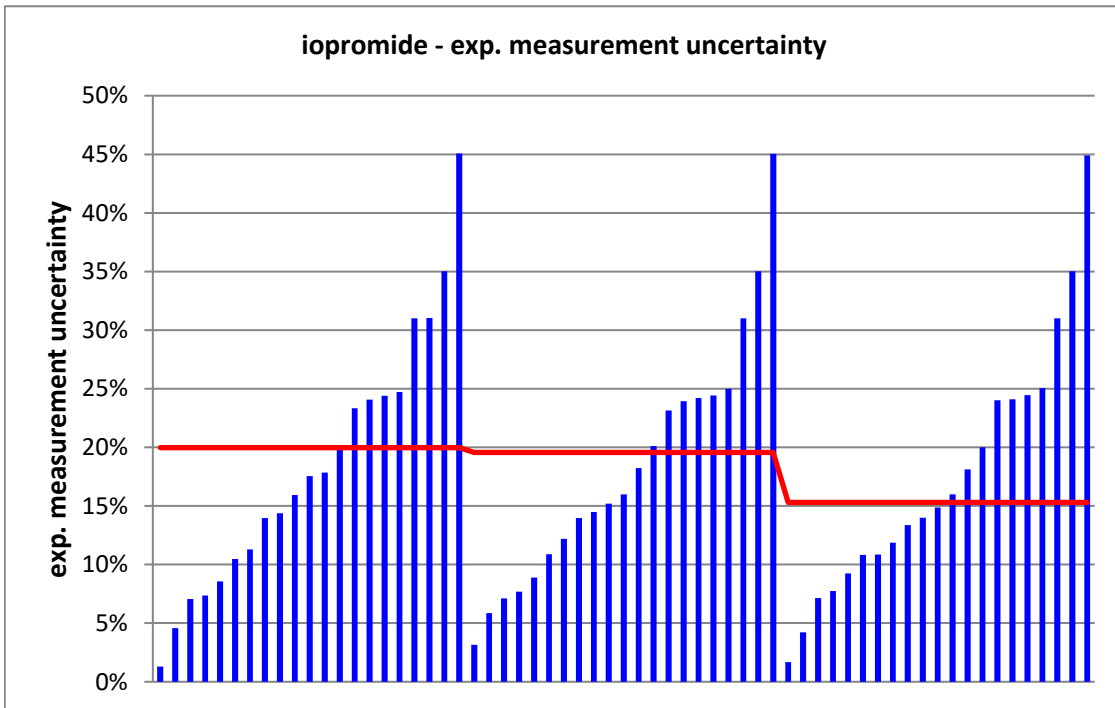
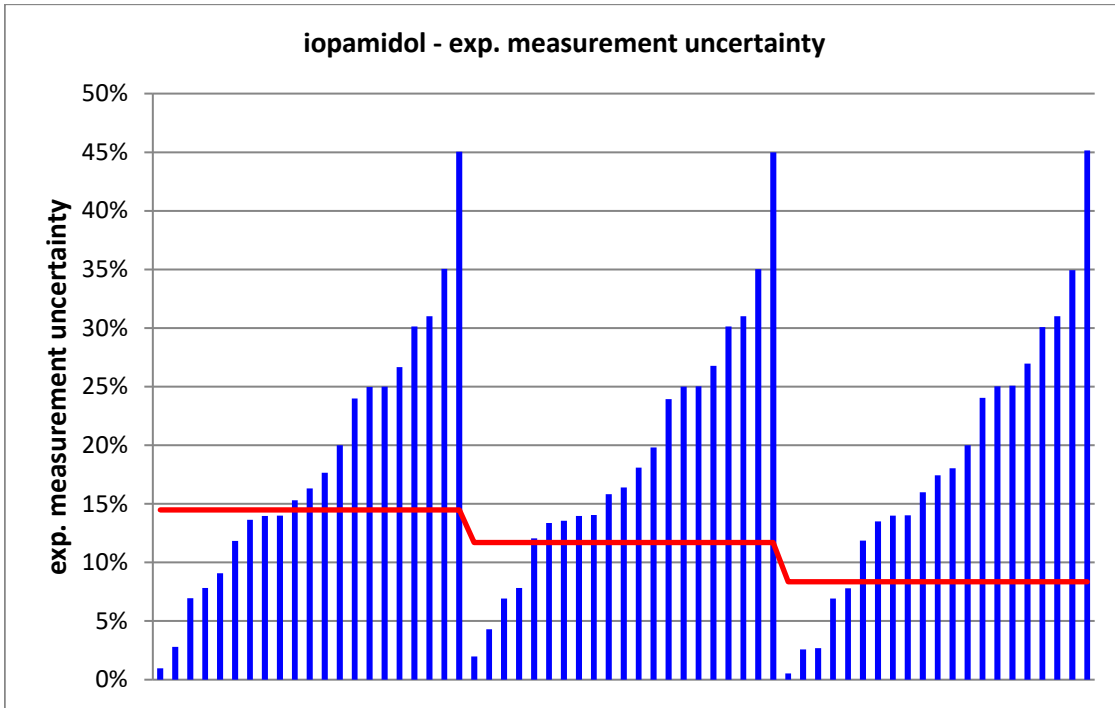


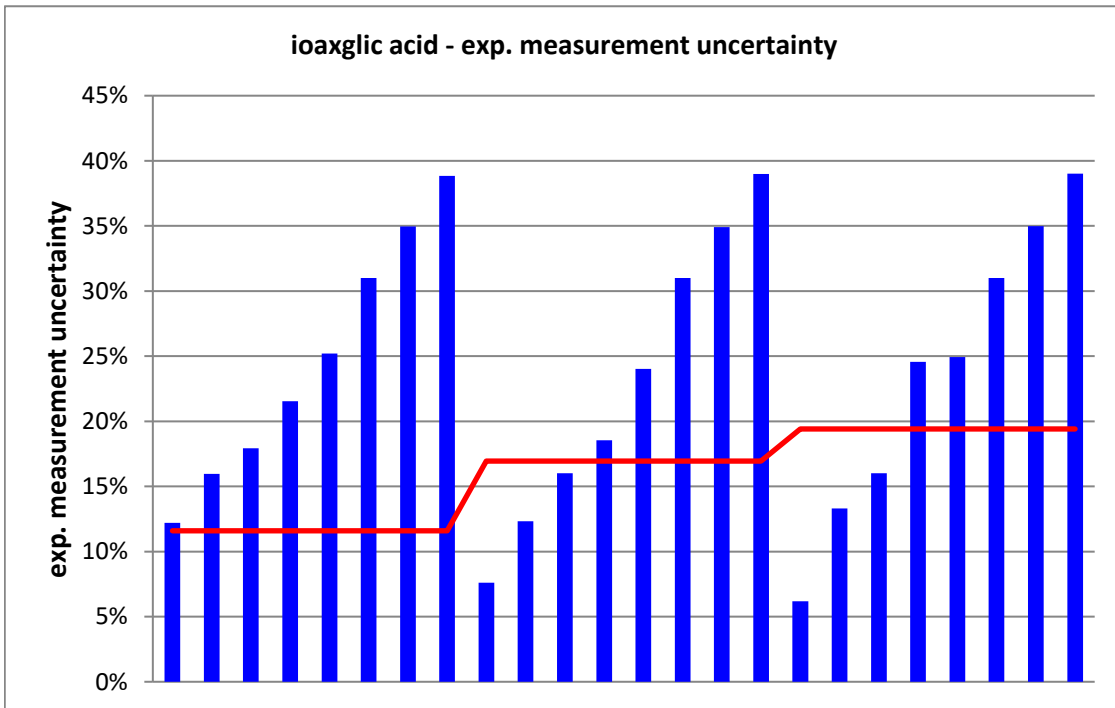
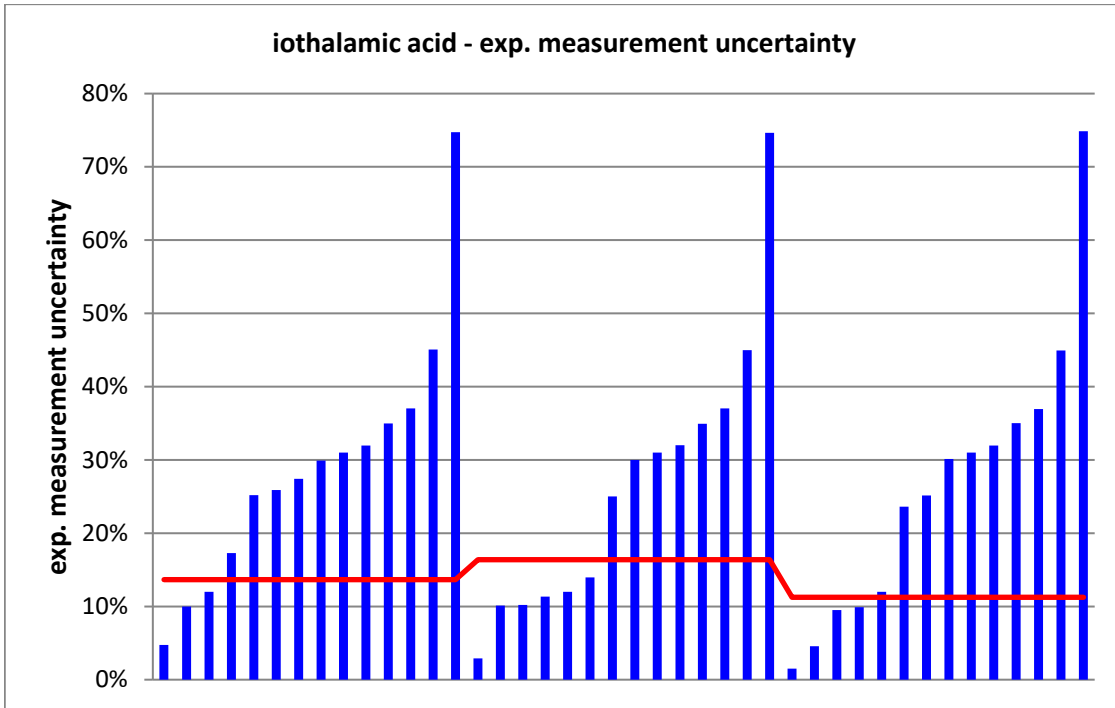


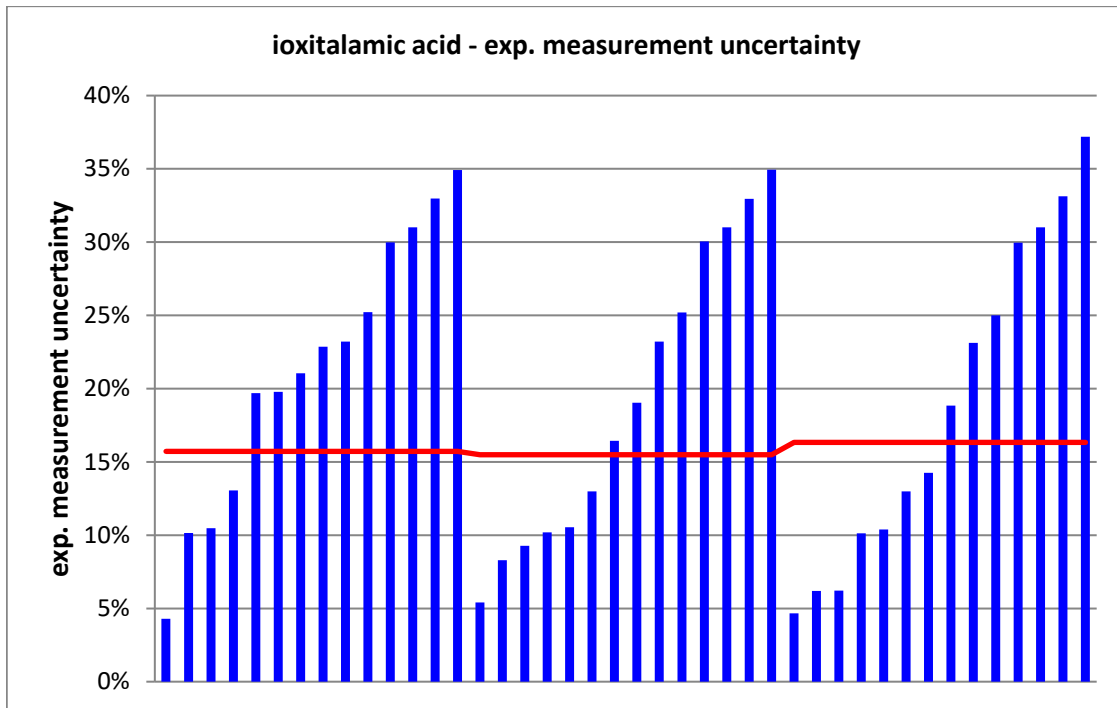
HPLC-MS/MS - direct injection									
level	robust mean [µg/l]	exp. unc. of the mean [µg/l]	exp. unc. of the mean [%]	robust standard deviation [µg/l]	robust standard deviation [%]	number of results	out below	out above	out [%]
1	0,099	0,004	3,782	0,012	12,47	17	0	1	5,882
2	0,253	0,011	4,196	0,035	13,84	17	0	1	5,882
3	0,411	0,017	4,206	0,057	13,87	17	0	0	0







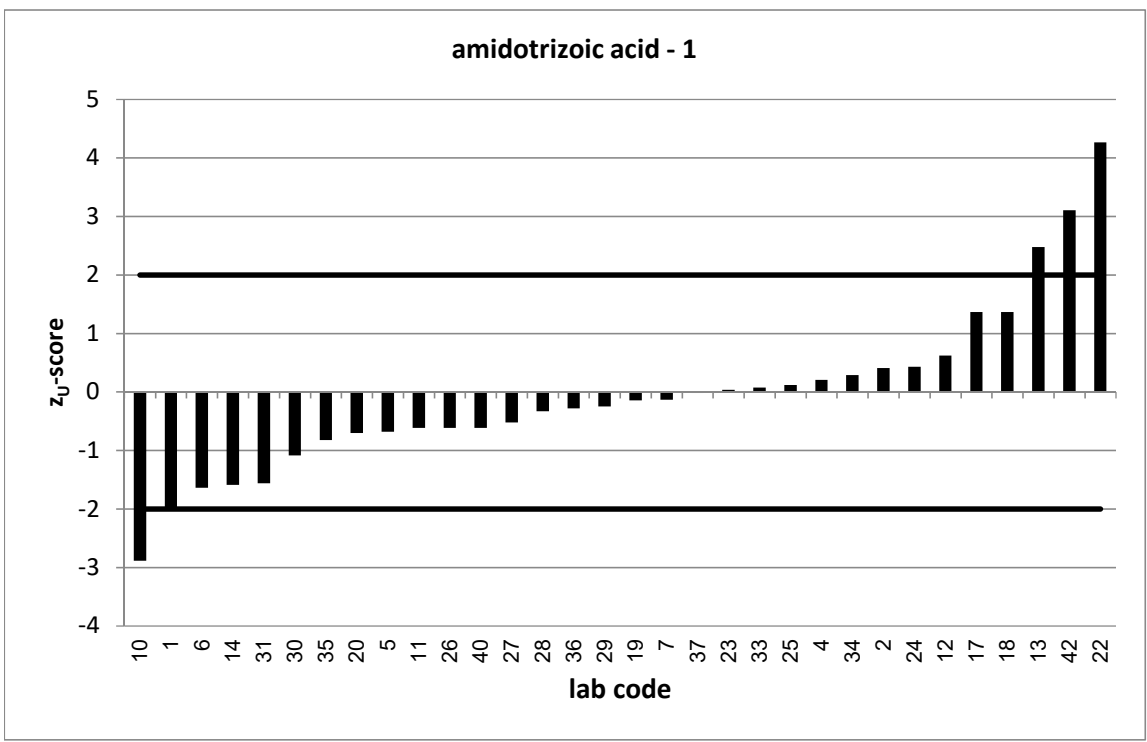
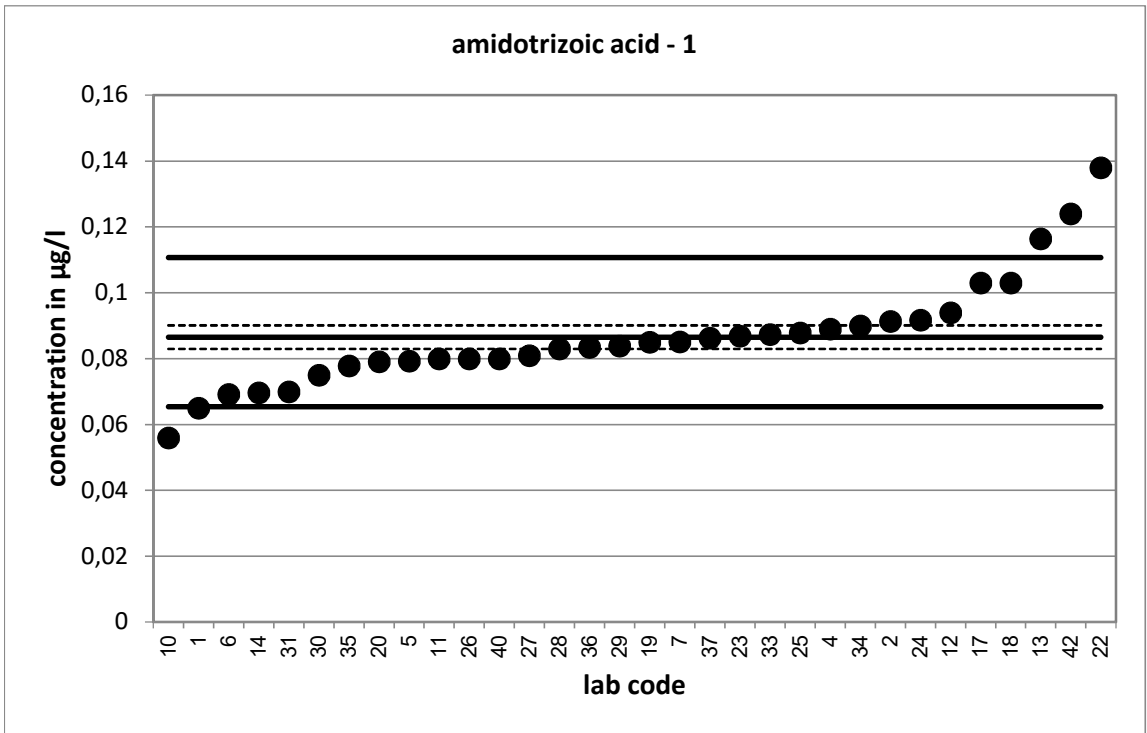


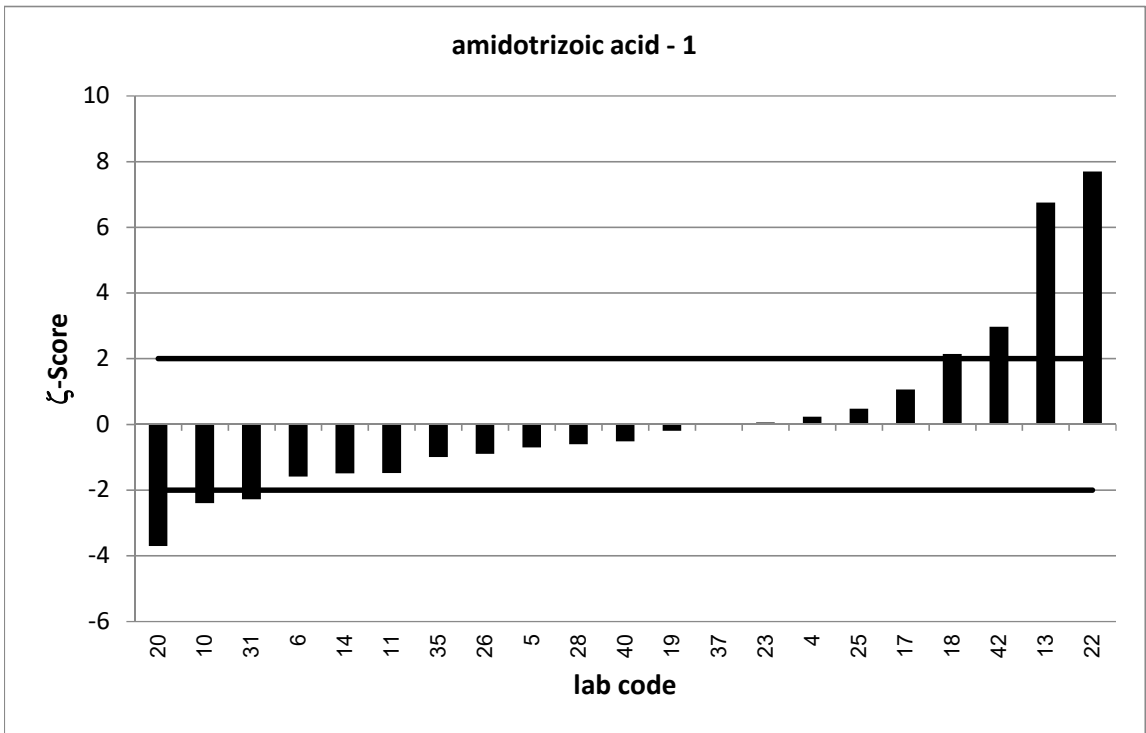
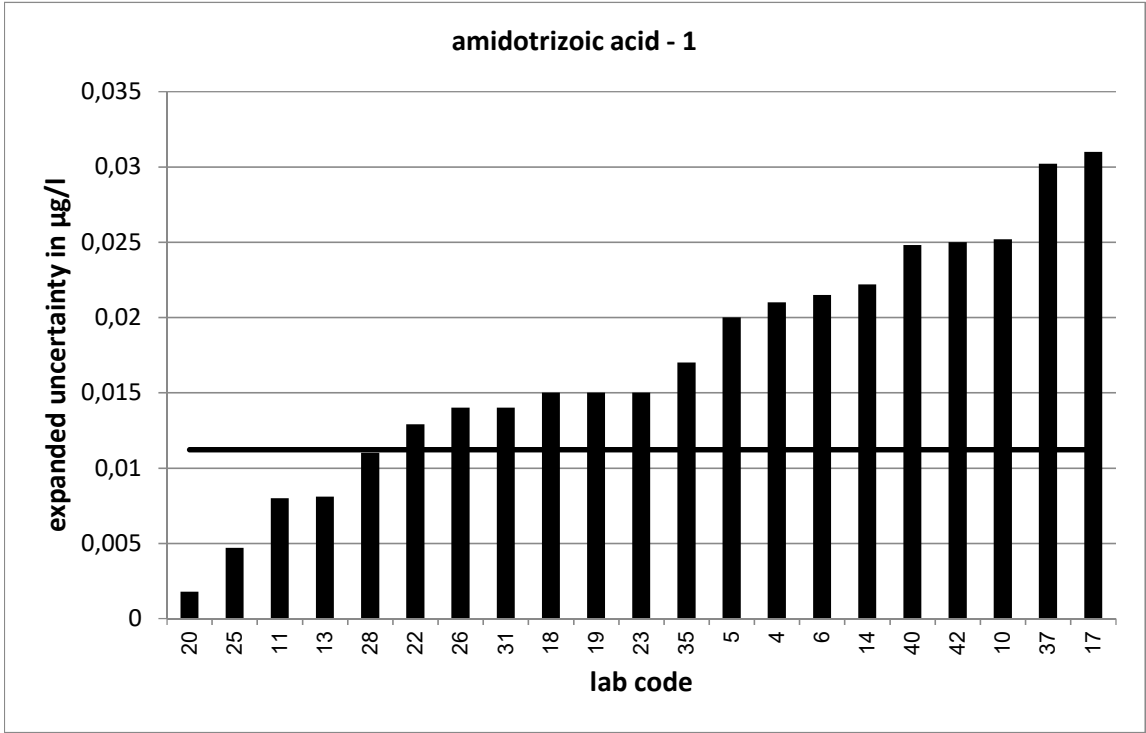


PT 4/21 - TW S6		amidotrizoic acid - 1			
assigned value [$\mu\text{g/l}$]*		0,08651 \pm 0,00358			
upper tolerance limit [$\mu\text{g/l}$]		0,1107			
lower tolerance limit [$\mu\text{g/l}$]		0,06538			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,065			-2,0	s
2	0,0914			0,4	s
4	0,089	0,021	0,2	0,2	s
5	0,0793	0,02	-0,7	-0,7	s
6	0,0692	0,022	-1,6	-1,6	s
7	0,0851			-0,1	s
10	0,056	0,025	-2,4	-2,9	q
11	0,08	0,008	-1,5	-0,6	s
12	0,094			0,6	s
13	0,1164	0,008	6,8	2,5	q
14	0,0697	0,022	-1,5	-1,6	s
17	0,103	0,031	1,1	1,4	s
18	0,103	0,015	2,1	1,4	s
19	0,085	0,015	-0,2	-0,1	s
20	0,0791	0,002	-3,7	-0,7	s
22	0,138	0,013	7,7	4,3	u
23	0,0869	0,015	0,1	0,0	s
24	0,0917			0,4	s
25	0,0879	0,005	0,5	0,1	s
26	0,08	0,014	-0,9	-0,6	s
27	0,081			-0,5	s
28	0,083	0,011	-0,6	-0,3	s
29	0,0839			-0,2	s
30	0,075			-1,1	s
31	0,07	0,014	-2,3	-1,6	s
33	0,0874			0,1	s
34	0,09			0,3	s
35	0,0778	0,017	-1,0	-0,8	s
36	0,0835			-0,3	s
37	0,0863	0,03	0,0	0,0	s
40	0,08	0,025	-0,5	-0,6	s
42	0,124	0,025	3,0	3,1	u

* 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

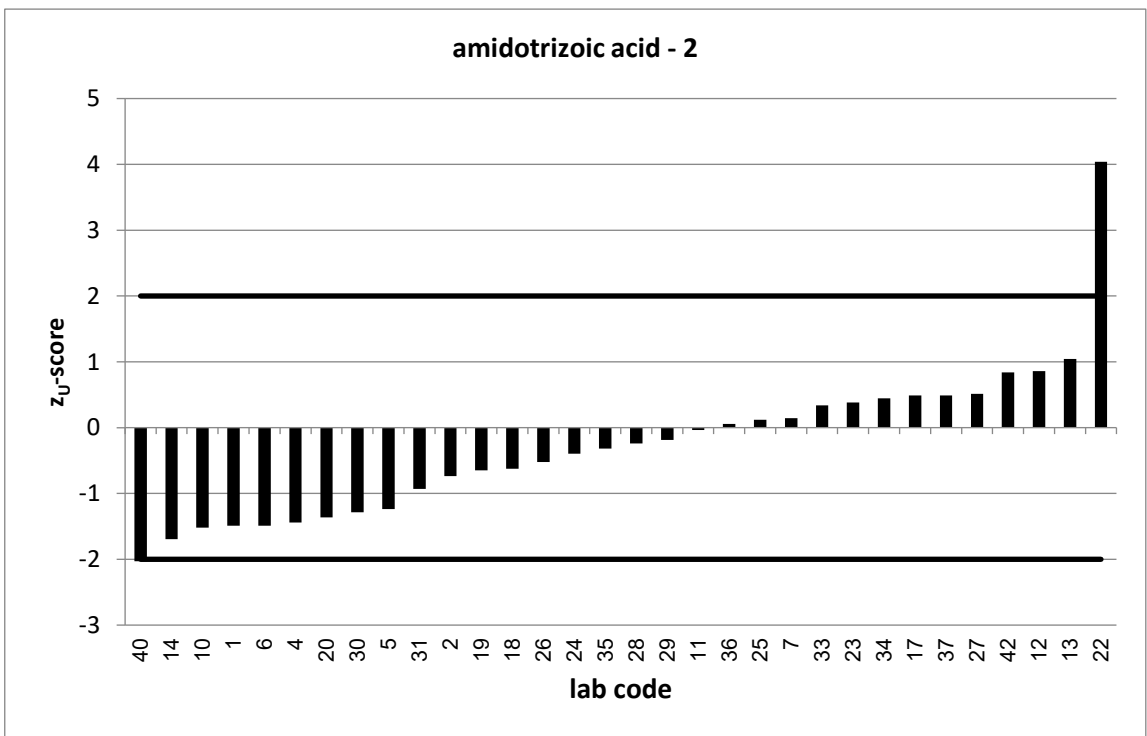
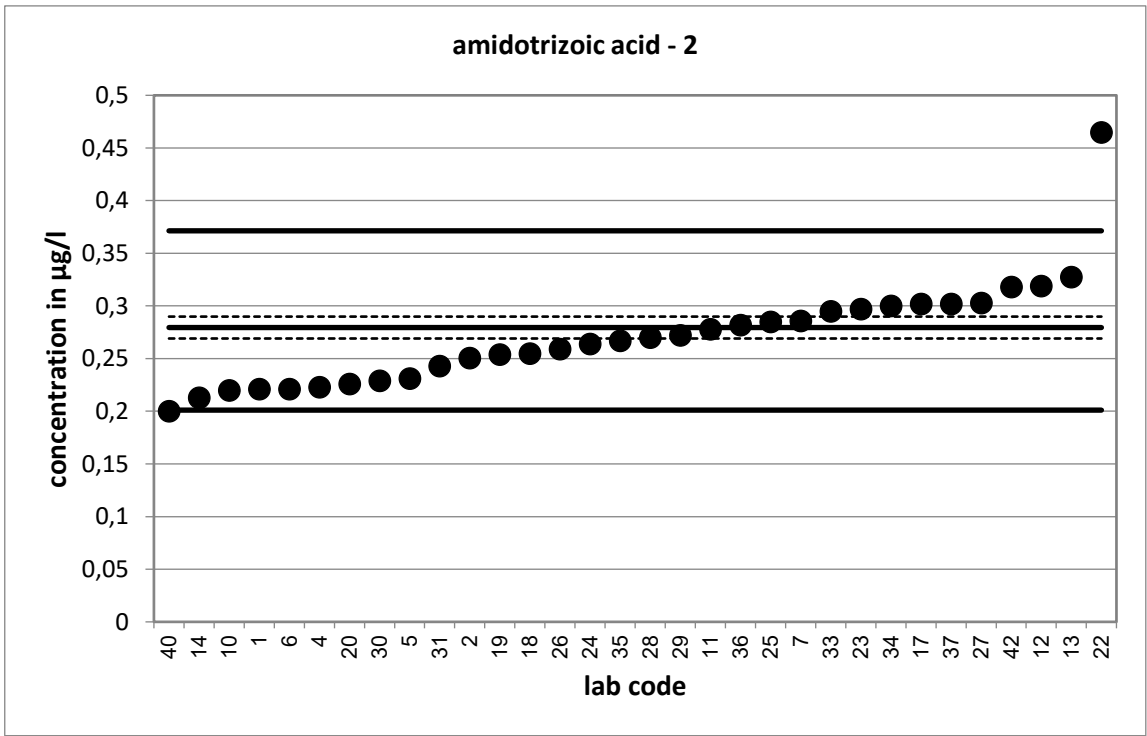


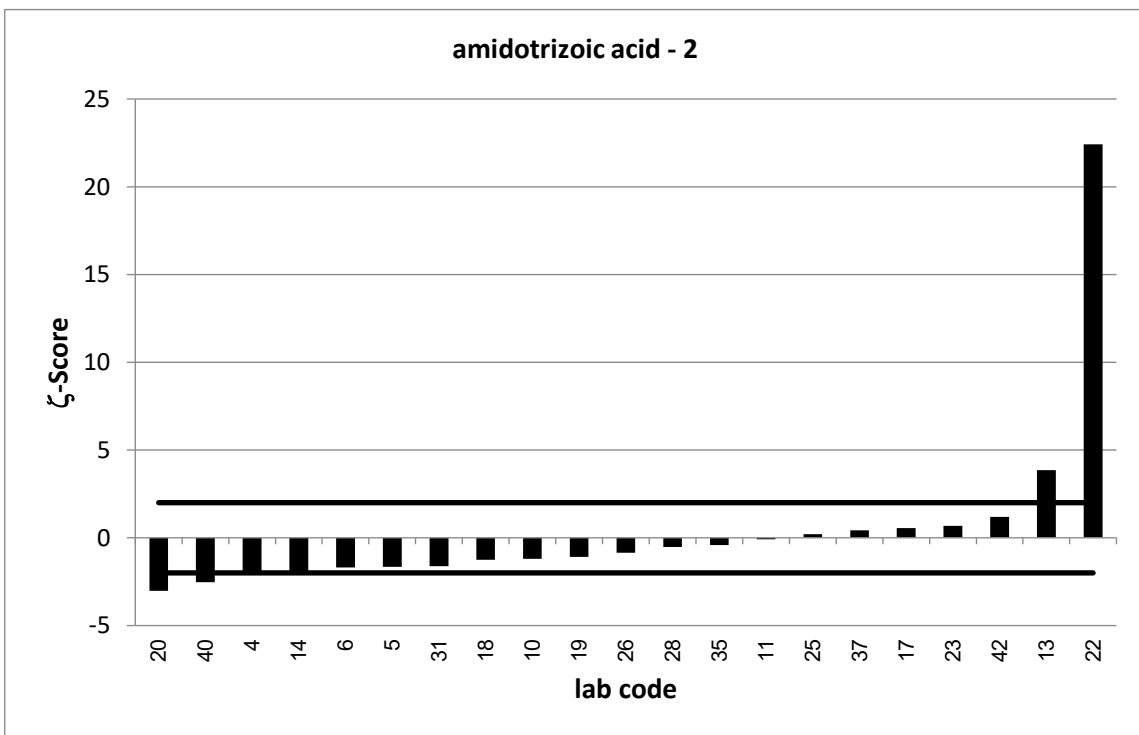
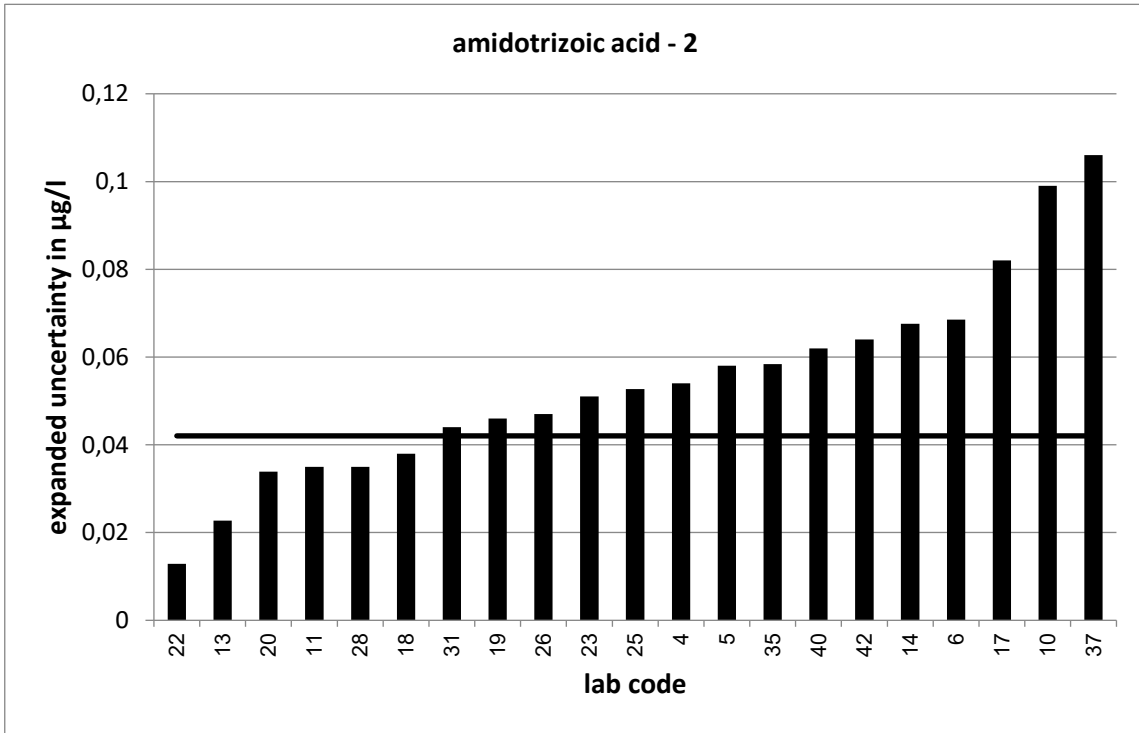


PT 4/21 - TW S6		amidotrizoic acid - 2			
assigned value [$\mu\text{g/l}$]*		0,2795		$\pm 0,0104$	
upper tolerance limit [$\mu\text{g/l}$]		0,3713			
lower tolerance limit [$\mu\text{g/l}$]		0,2011			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,221			-1,5	s
2	0,2507			-0,7	s
4	0,223	0,054	-2,1	-1,4	s
5	0,231	0,058	-1,6	-1,2	s
6	0,221	0,069	-1,7	-1,5	s
7	0,286			0,1	s
10	0,22	0,099	-1,2	-1,5	s
11	0,278	0,035	-0,1	0,0	s
12	0,319			0,9	s
13	0,3275	0,023	3,8	1,0	s
14	0,213	0,068	-1,9	-1,7	s
17	0,302	0,082	0,5	0,5	s
18	0,255	0,038	-1,2	-0,6	s
19	0,254	0,046	-1,1	-0,7	s
20	0,226	0,034	-3,0	-1,4	s
22	0,465	0,013	22,4	4,0	u
23	0,297	0,051	0,7	0,4	s
24	0,264			-0,4	s
25	0,285	0,053	0,2	0,1	s
26	0,259	0,047	-0,9	-0,5	s
27	0,303			0,5	s
28	0,27	0,035	-0,5	-0,2	s
29	0,2721			-0,2	s
30	0,229			-1,3	s
31	0,243	0,044	-1,6	-0,9	s
33	0,295			0,3	s
34	0,3			0,4	s
35	0,267	0,058	-0,4	-0,3	s
36	0,282			0,1	s
37	0,302	0,106	0,4	0,5	s
40	0,2	0,062	-2,5	-2,0	s
42	0,318	0,064	1,2	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

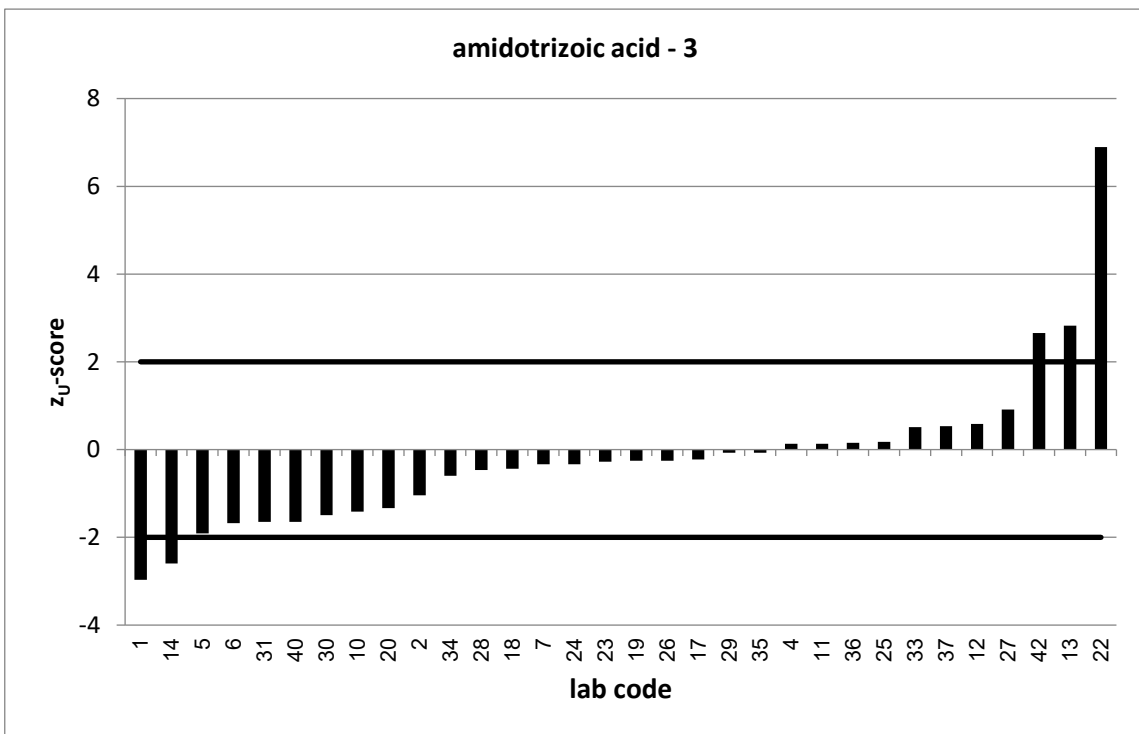
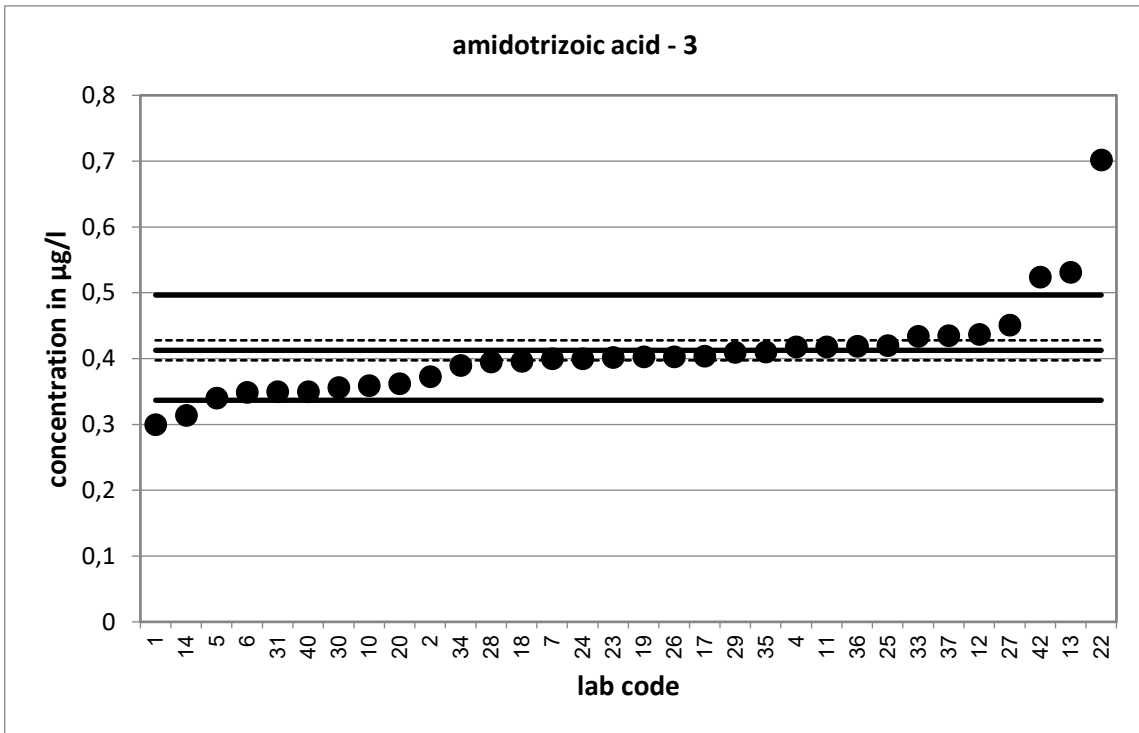


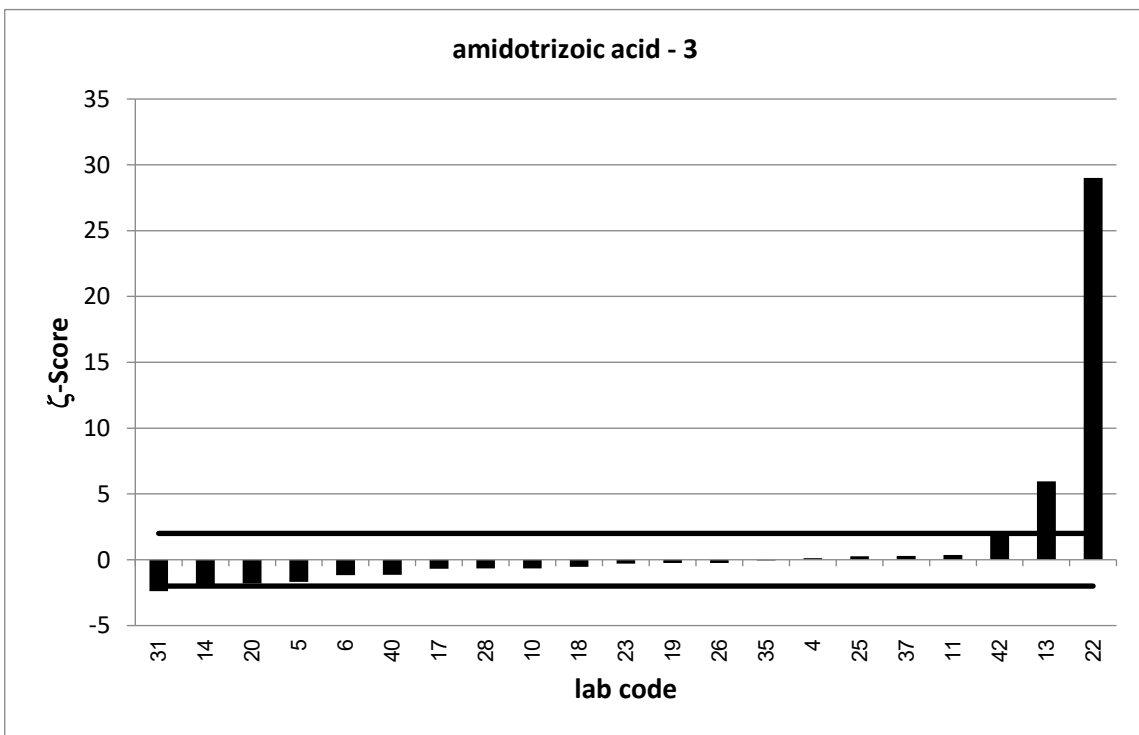
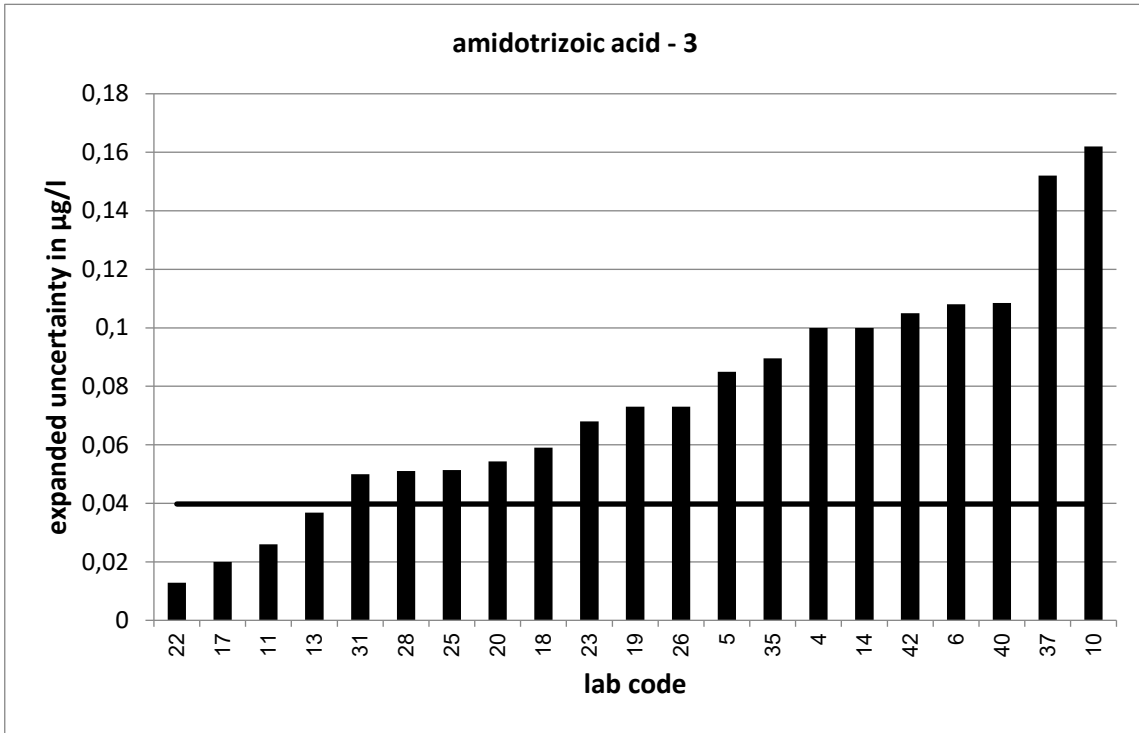


PT 4/21 - TW S6		amidotrizoic acid - 3			
assigned value [$\mu\text{g/l}$]*		0,4126 \pm 0,0152			
upper tolerance limit [$\mu\text{g/l}$]		0,4965			
lower tolerance limit [$\mu\text{g/l}$]		0,3367			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,3			-3,0	u
2	0,373			-1,0	s
4	0,418	0,1	0,1	0,1	s
5	0,34	0,085	-1,7	-1,9	s
6	0,349	0,108	-1,2	-1,7	s
7	0,4			-0,3	s
10	0,359	0,162	-0,7	-1,4	s
11	0,418	0,026	0,4	0,1	s
12	0,437			0,6	s
13	0,5312	0,037	6,0	2,8	q
14	0,314	0,1	-1,9	-2,6	q
17	0,404	0,02	-0,7	-0,2	s
18	0,396	0,059	-0,5	-0,4	s
19	0,403	0,073	-0,3	-0,3	s
20	0,362	0,054	-1,8	-1,3	s
22	0,702	0,013	29,0	6,9	u
23	0,402	0,068	-0,3	-0,3	s
24	0,4			-0,3	s
25	0,42	0,051	0,3	0,2	s
26	0,403	0,073	-0,3	-0,3	s
27	0,451			0,9	s
28	0,395	0,051	-0,7	-0,5	s
29	0,4098			-0,1	s
30	0,356			-1,5	s
31	0,35	0,05	-2,4	-1,6	s
33	0,434			0,5	s
34	0,39			-0,6	s
35	0,41	0,09	-0,1	-0,1	s
36	0,419			0,2	s
37	0,435	0,152	0,3	0,5	s
40	0,35	0,109	-1,1	-1,6	s
42	0,524	0,105	2,1	2,7	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

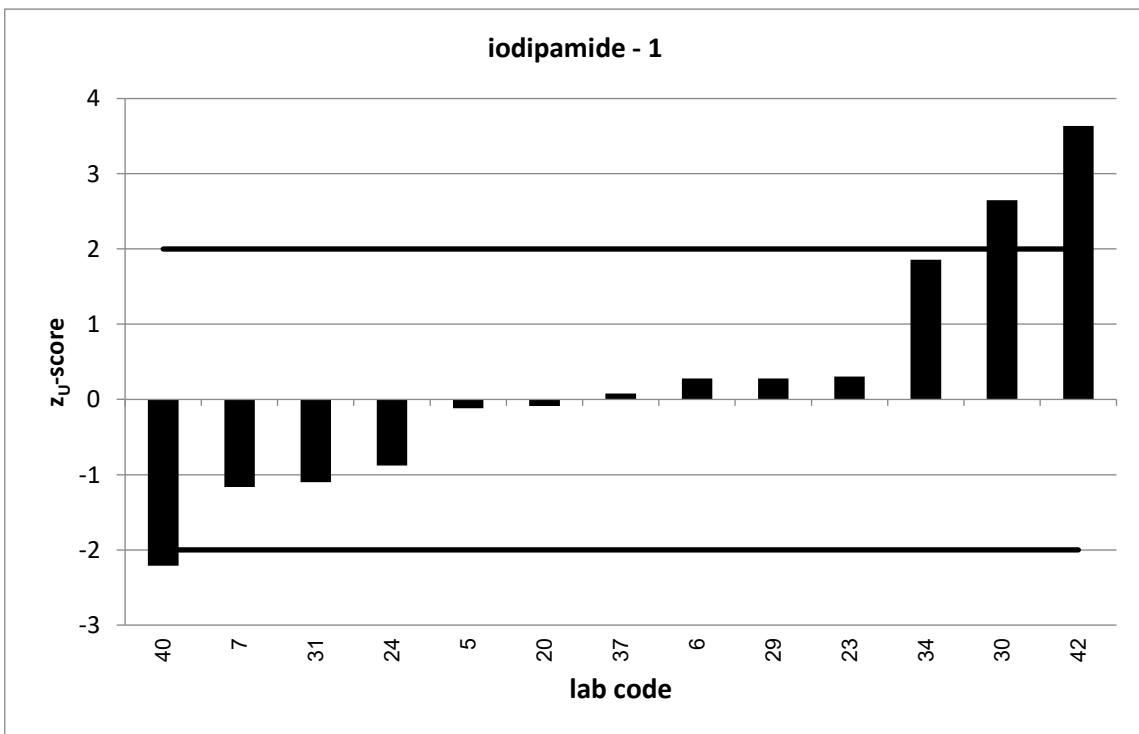
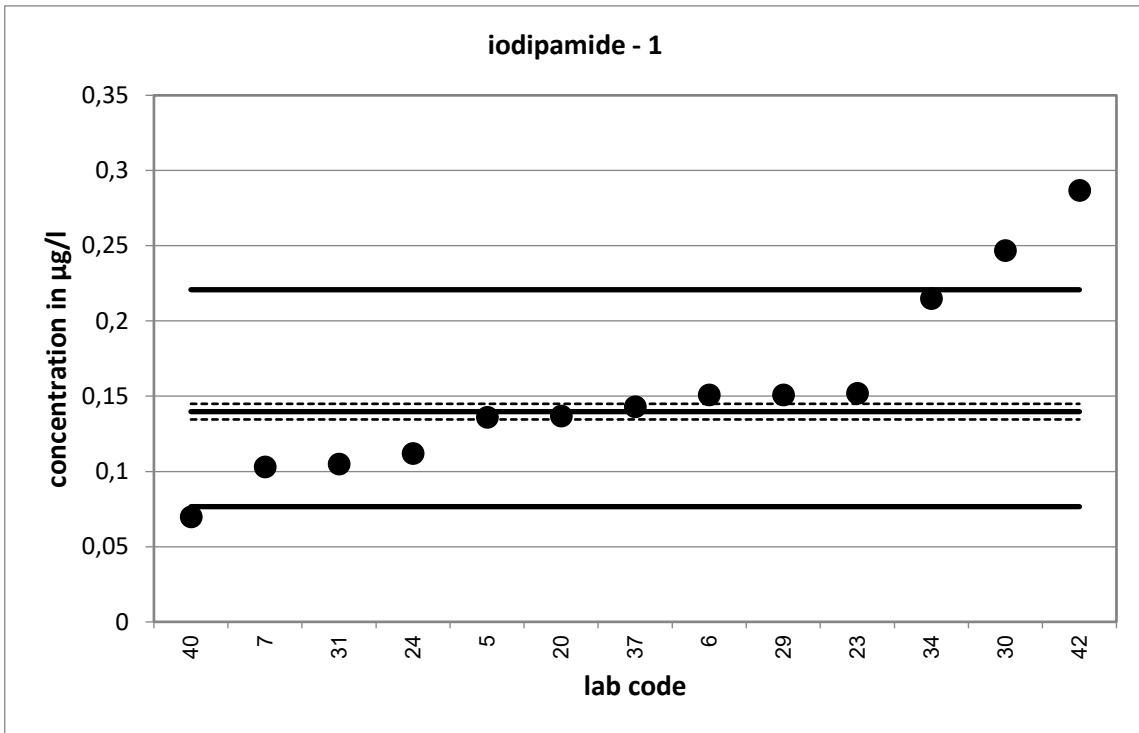


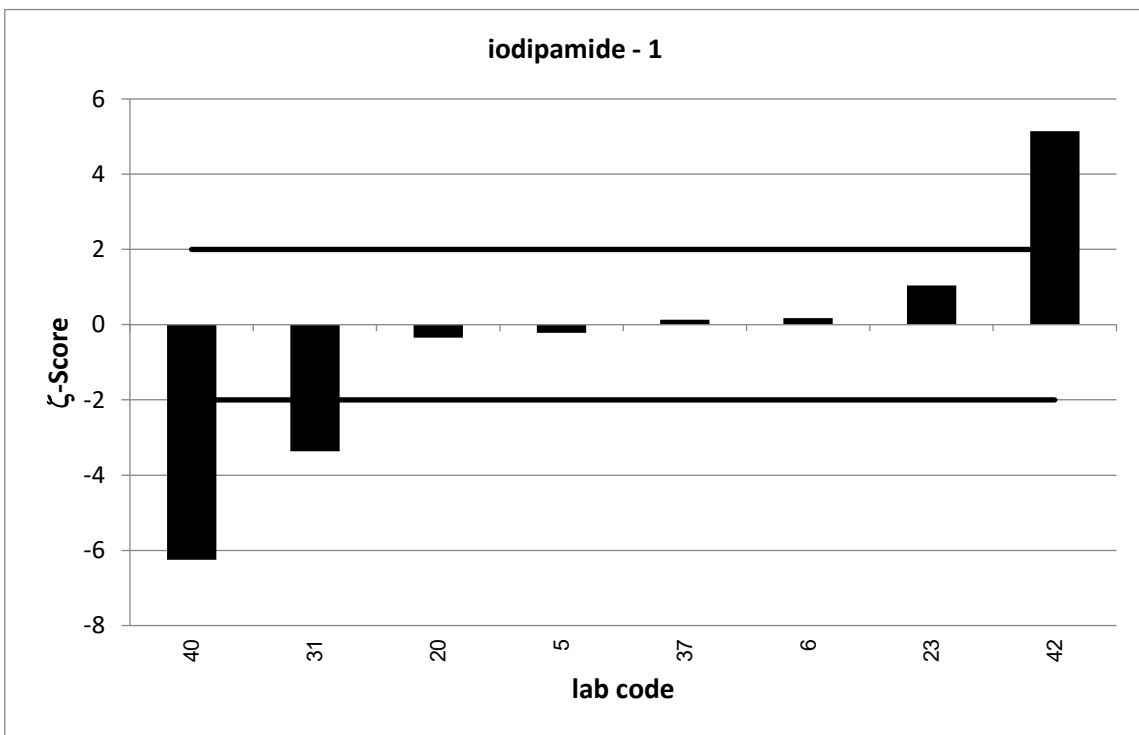
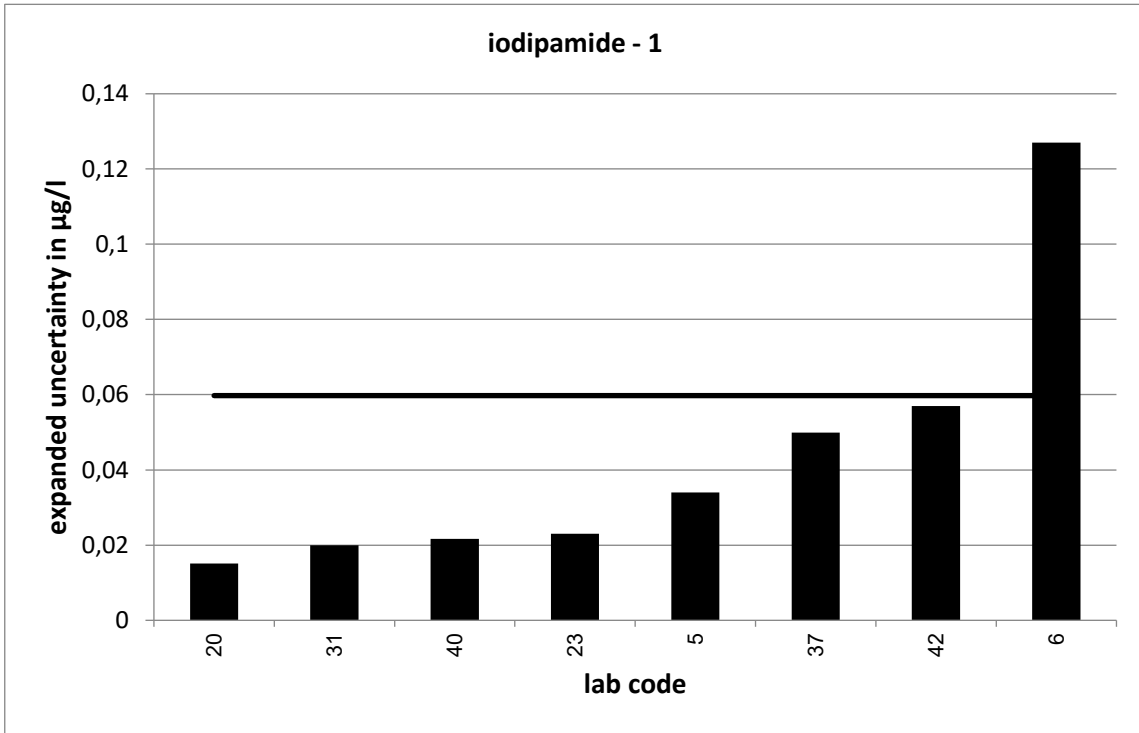


PT 4/21 - TW S6		iodipamide - 1			
assigned value [$\mu\text{g/l}$]*		0,1397	$\pm 0,0052$		
upper tolerance limit [$\mu\text{g/l}$]		0,2208			
lower tolerance limit [$\mu\text{g/l}$]		0,0766			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,136	0,034	-0,2	-0,1	s
6	0,151	0,127	0,2	0,3	s
7	0,103			-1,2	s
20	0,137	0,015	-0,3	-0,1	s
23	0,152	0,023	1,0	0,3	s
24	0,112			-0,9	s
29	0,151			0,3	s
30	0,247			2,6	q
31	0,105	0,02	-3,4	-1,1	s
34	0,215			1,9	s
37	0,143	0,05	0,1	0,1	s
40	0,07	0,022	-6,2	-2,2	q
42	0,287	0,057	5,1	3,6	u

* 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

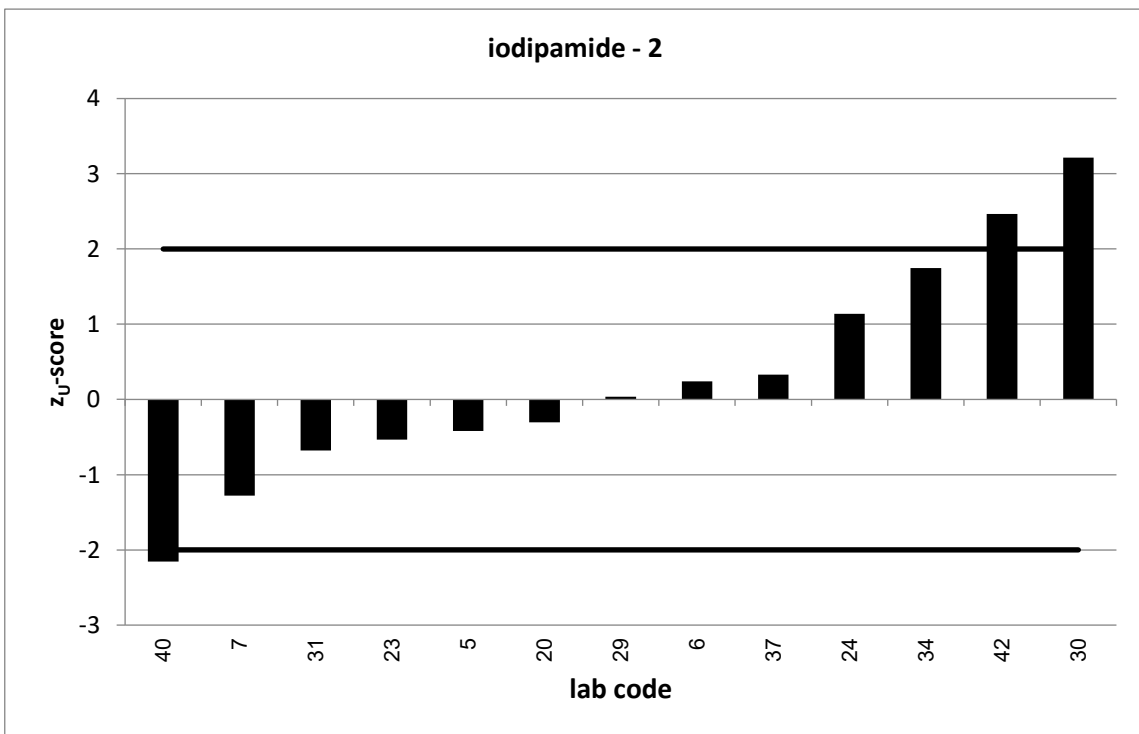
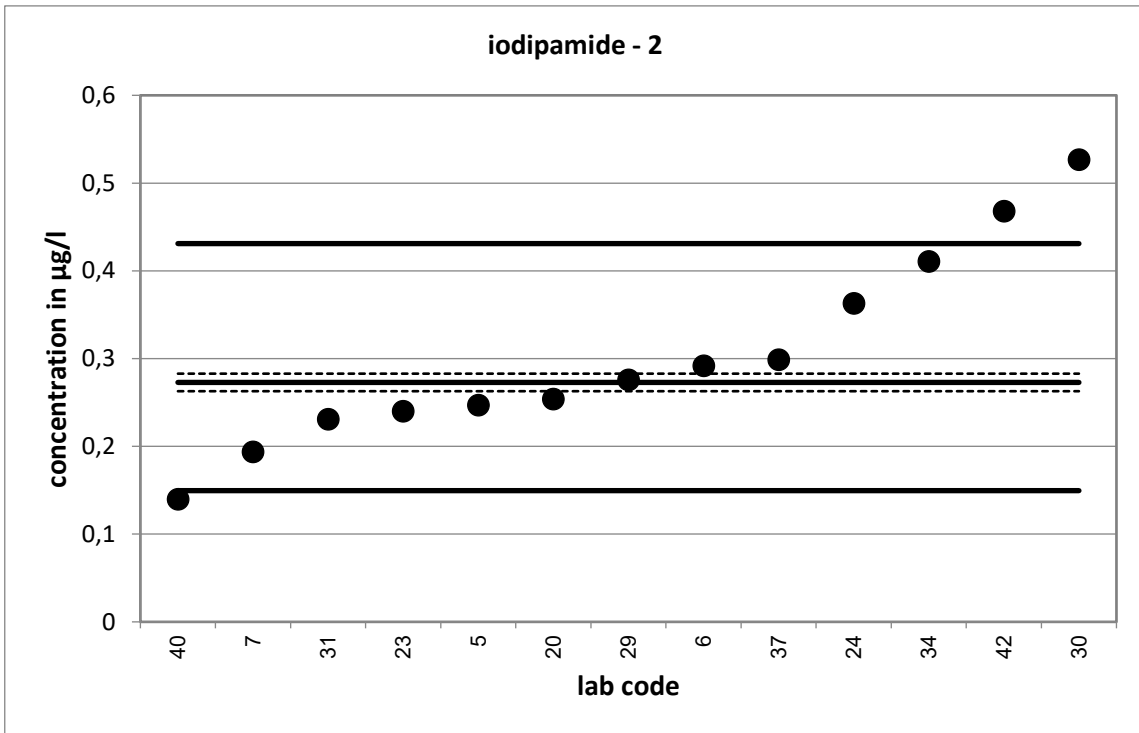


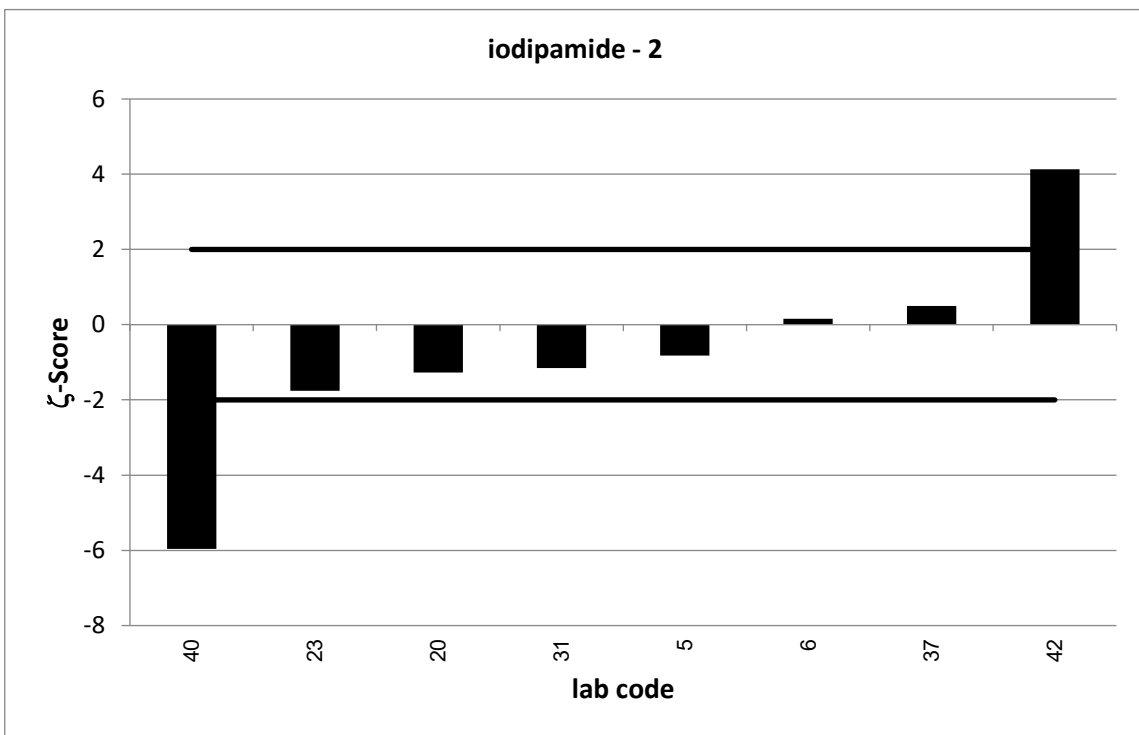
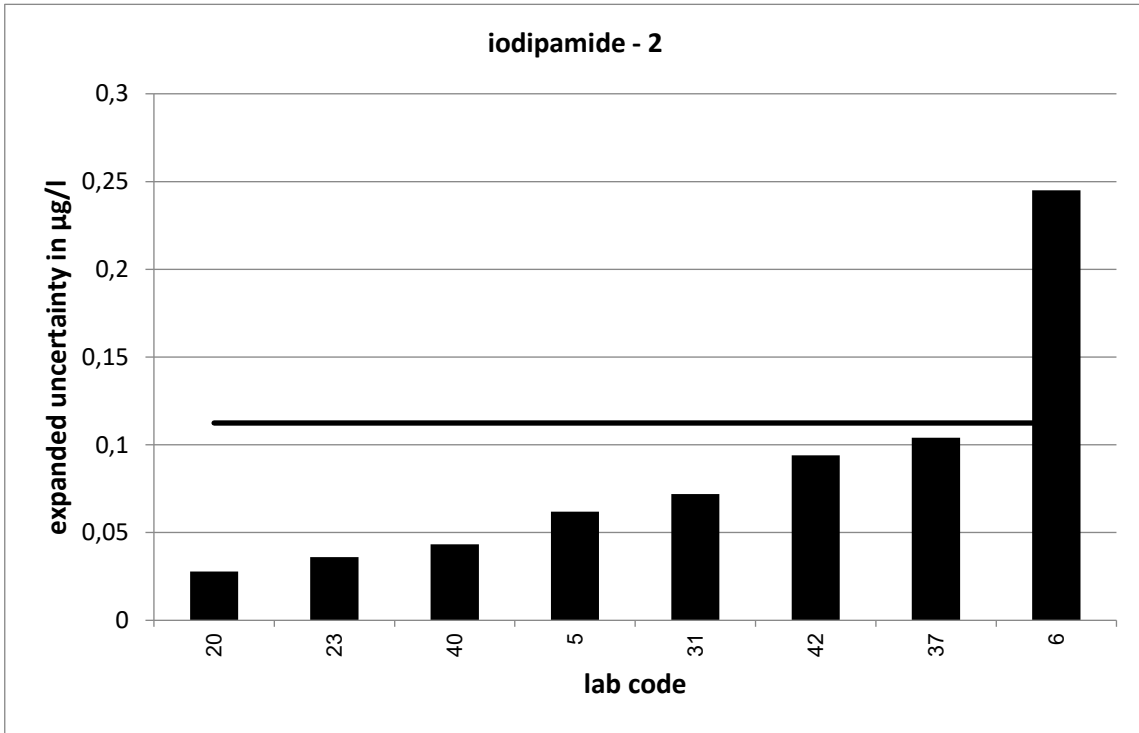


PT 4/21 - TW S6		iodipamide - 2			
assigned value [$\mu\text{g/l}$]*		0,2728 \pm 0,01			
upper tolerance limit [$\mu\text{g/l}$]		0,431			
lower tolerance limit [$\mu\text{g/l}$]		0,1496			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,247	0,062	-0,8	-0,4	s
6	0,292	0,245	0,2	0,2	s
7	0,194			-1,3	s
20	0,254	0,028	-1,3	-0,3	s
23	0,24	0,036	-1,8	-0,5	s
24	0,363			1,1	s
29	0,2758			0,0	s
30	0,527			3,2	u
31	0,231	0,072	-1,2	-0,7	s
34	0,411			1,7	s
37	0,299	0,104	0,5	0,3	s
40	0,14	0,043	-6,0	-2,2	q
42	0,468	0,094	4,1	2,5	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

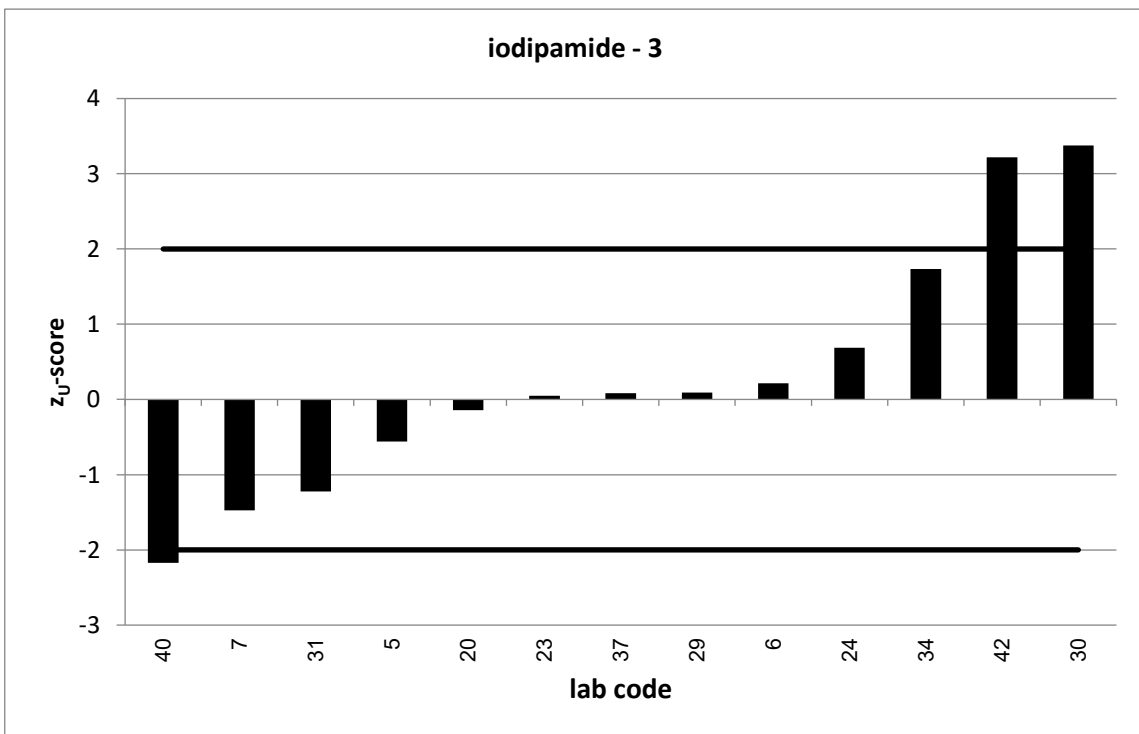
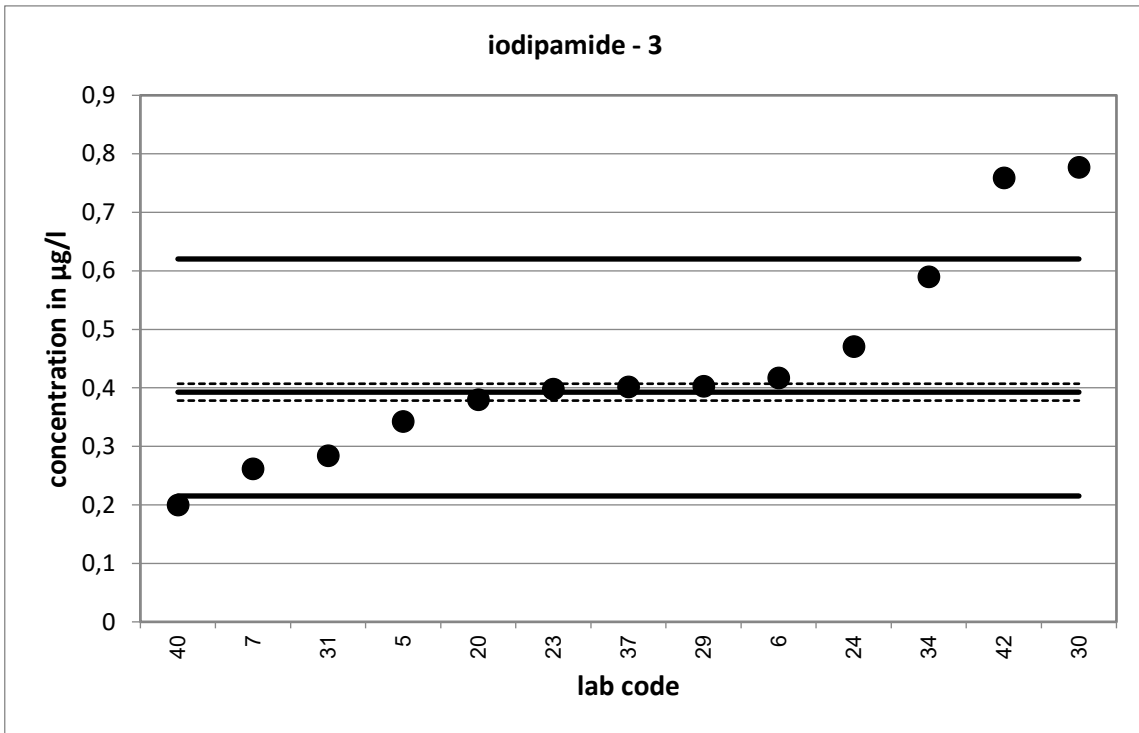


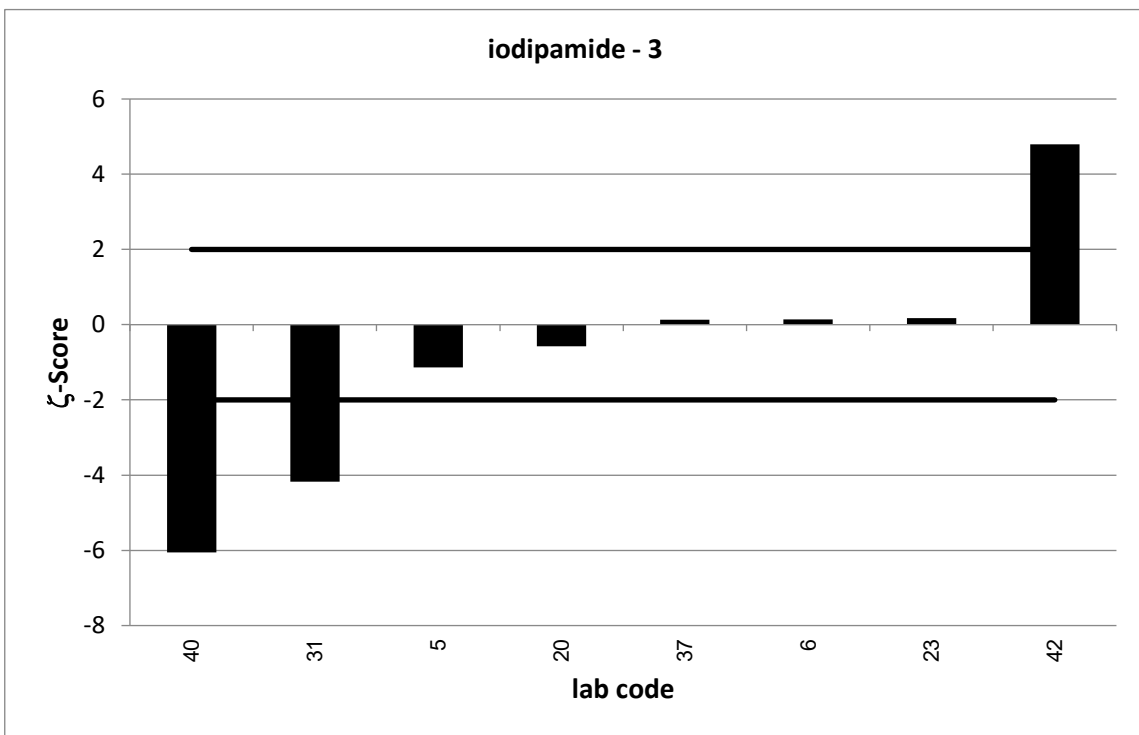
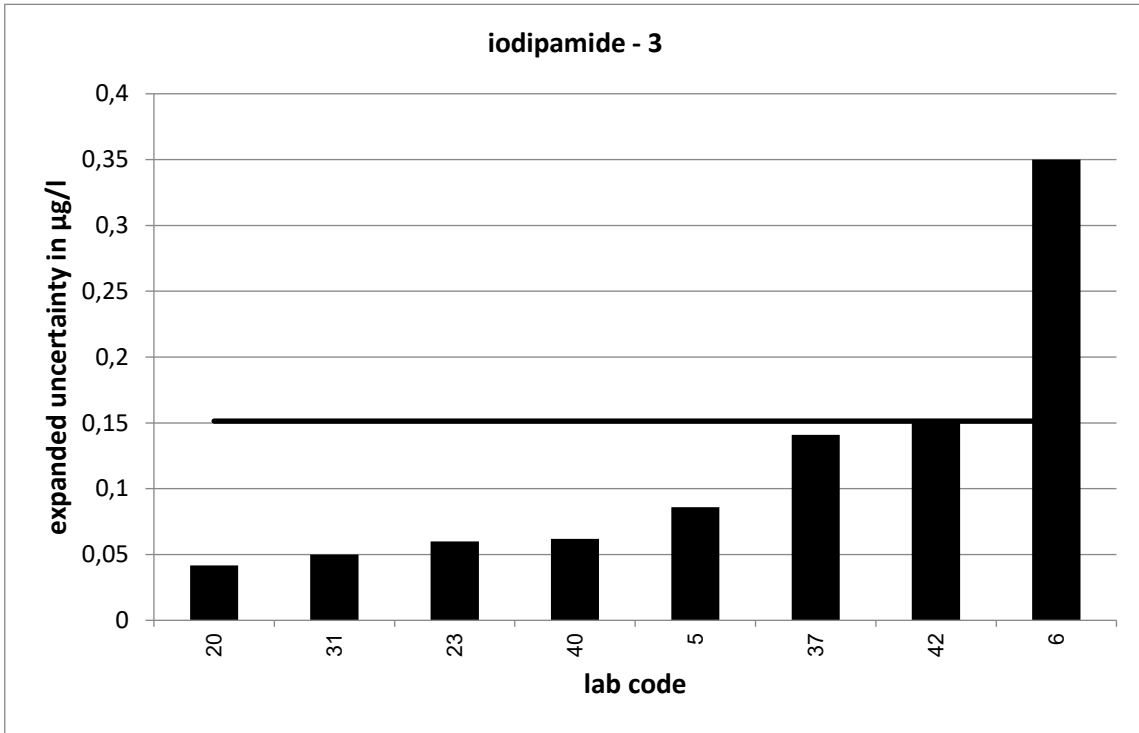


PT 4/21 - TW S6		iodipamide - 3			
assigned value [$\mu\text{g/l}$]*		0,3926 \pm 0,0144			
upper tolerance limit [$\mu\text{g/l}$]		0,6203			
lower tolerance limit [$\mu\text{g/l}$]		0,2152			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,343	0,086	-1,1	-0,6	s
6	0,417	0,35	0,1	0,2	s
7	0,262			-1,5	s
20	0,38	0,042	-0,6	-0,1	s
23	0,398	0,06	0,2	0,0	s
24	0,471			0,7	s
29	0,4028			0,1	s
30	0,777			3,4	u
31	0,284	0,05	-4,2	-1,2	s
34	0,59			1,7	s
37	0,402	0,141	0,1	0,1	s
40	0,2	0,062	-6,1	-2,2	q
42	0,759	0,152	4,8	3,2	u

* 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

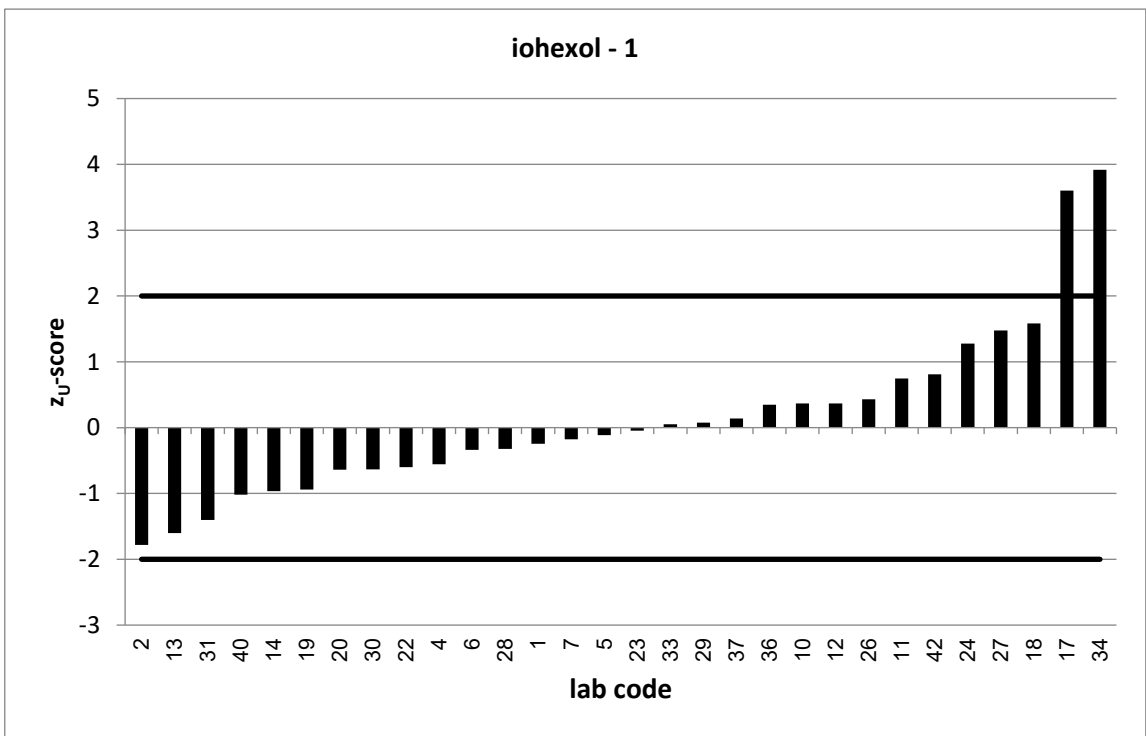
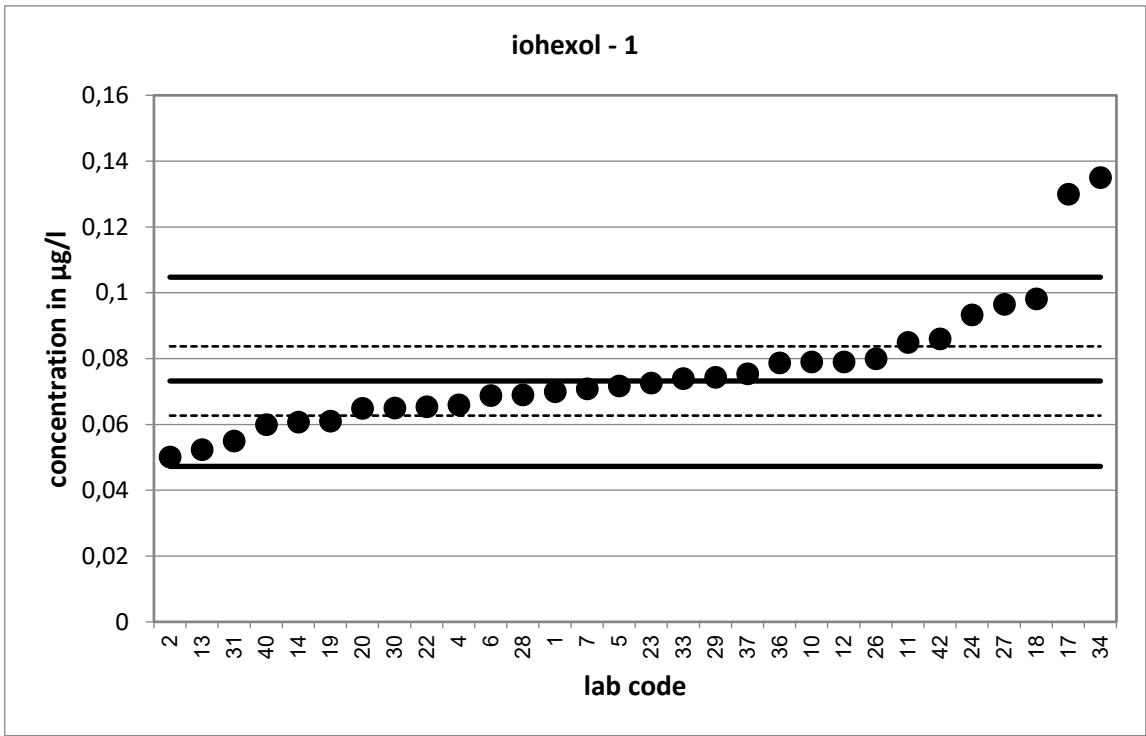


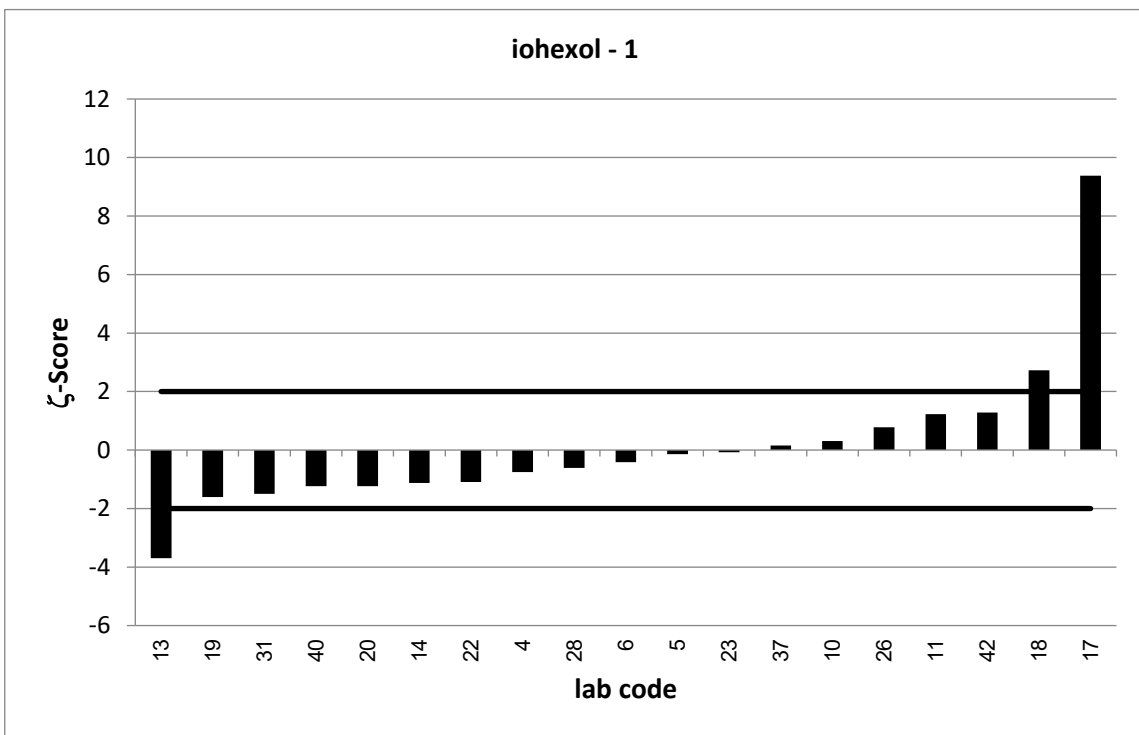
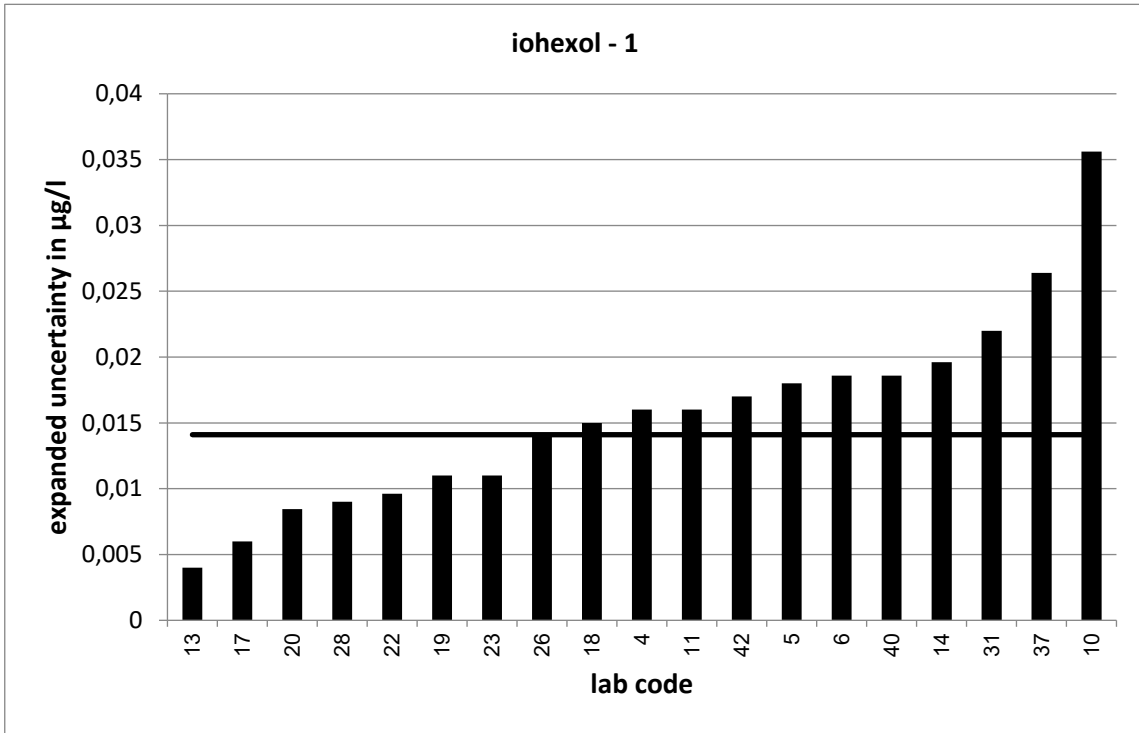


PT 4/21 - TW S6		iohexol - 1			
assigned value [$\mu\text{g/l}$]*		0,0732		$\pm 0,01052$	
upper tolerance limit [$\mu\text{g/l}$]		0,1047			
lower tolerance limit [$\mu\text{g/l}$]		0,04724			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,07			-0,2	s
2	0,0501			-1,8	s
4	0,066	0,016	-0,8	-0,6	s
5	0,0717	0,018	-0,1	-0,1	s
6	0,0688	0,019	-0,4	-0,3	s
7	0,0709			-0,2	s
10	0,079	0,036	0,3	0,4	s
11	0,085	0,016	1,2	0,7	s
12	0,079			0,4	s
13	0,0524	0,004	-3,7	-1,6	s
14	0,0607	0,02	-1,1	-1,0	s
17	0,13	0,006	9,4	3,6	u
18	0,0982	0,015	2,7	1,6	s
19	0,061	0,011	-1,6	-0,9	s
20	0,0649	0,008	-1,2	-0,6	s
22	0,0654	0,01	-1,1	-0,6	s
23	0,0726	0,011	-0,1	0,0	s
24	0,0933			1,3	s
26	0,08	0,014	0,8	0,4	s
27	0,0965			1,5	s
28	0,069	0,009	-0,6	-0,3	s
29	0,0744			0,1	s
30	0,065			-0,6	s
31	0,055	0,022	-1,5	-1,4	s
33	0,074			0,1	s
34	0,135			3,9	u
36	0,0787			0,3	s
37	0,0754	0,026	0,2	0,1	s
40	0,06	0,019	-1,2	-1,0	s
42	0,086	0,017	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

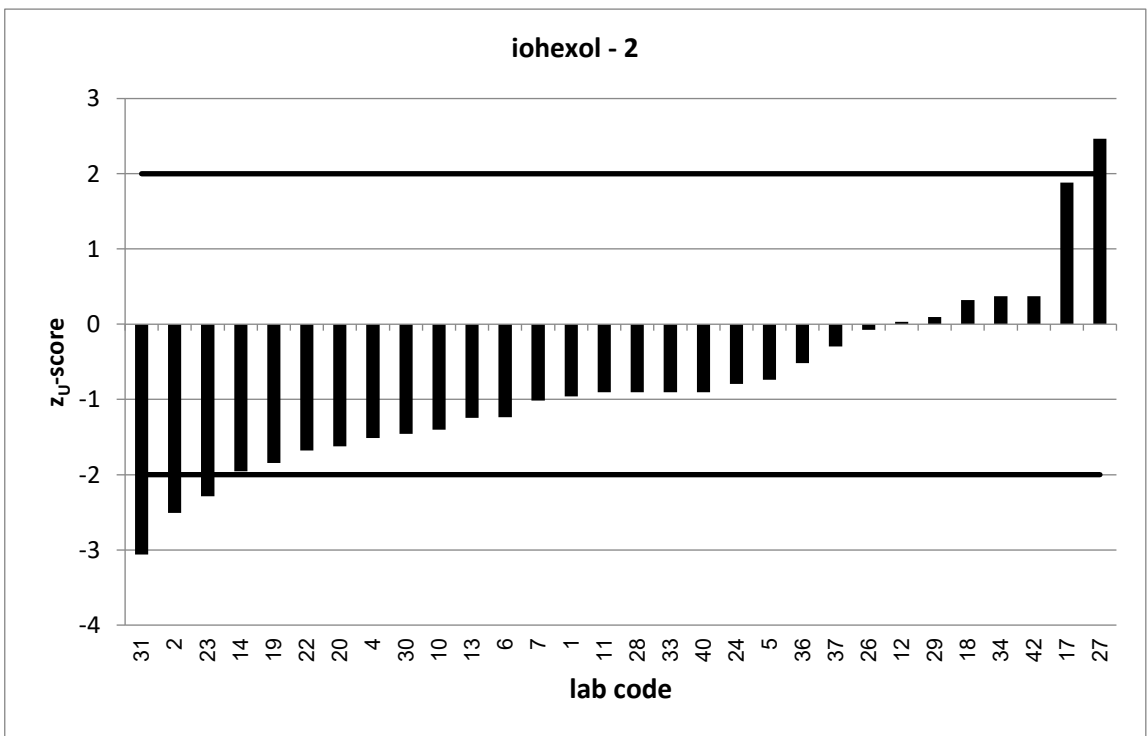
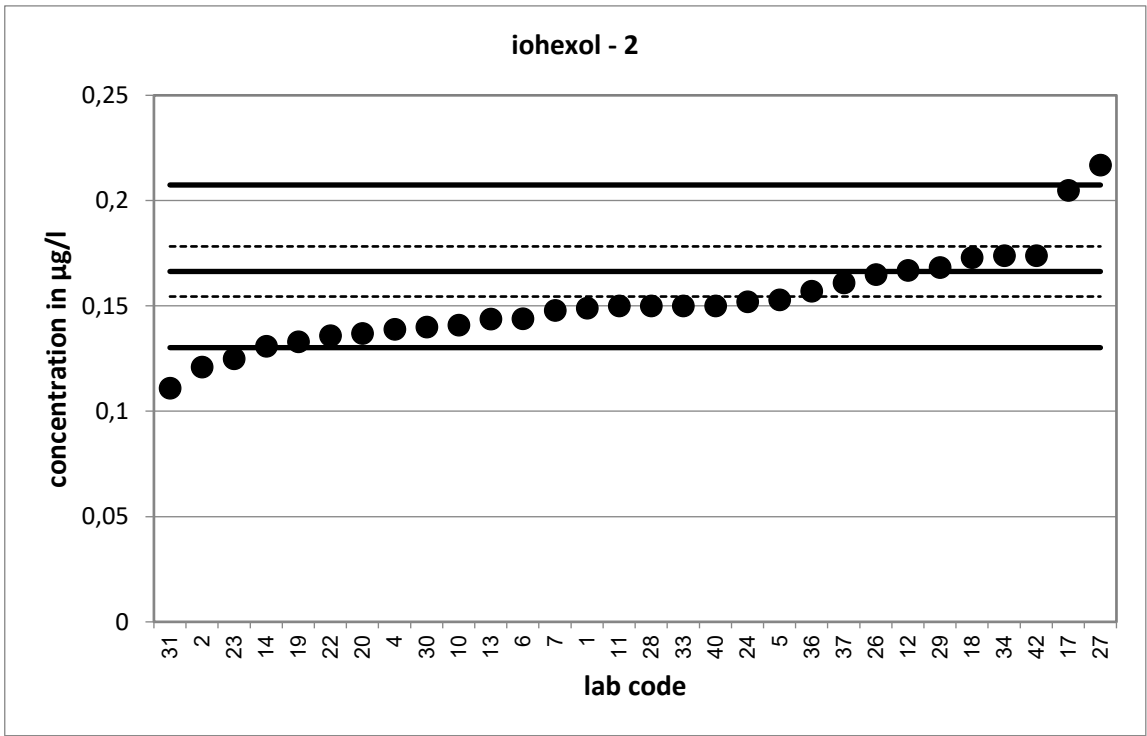


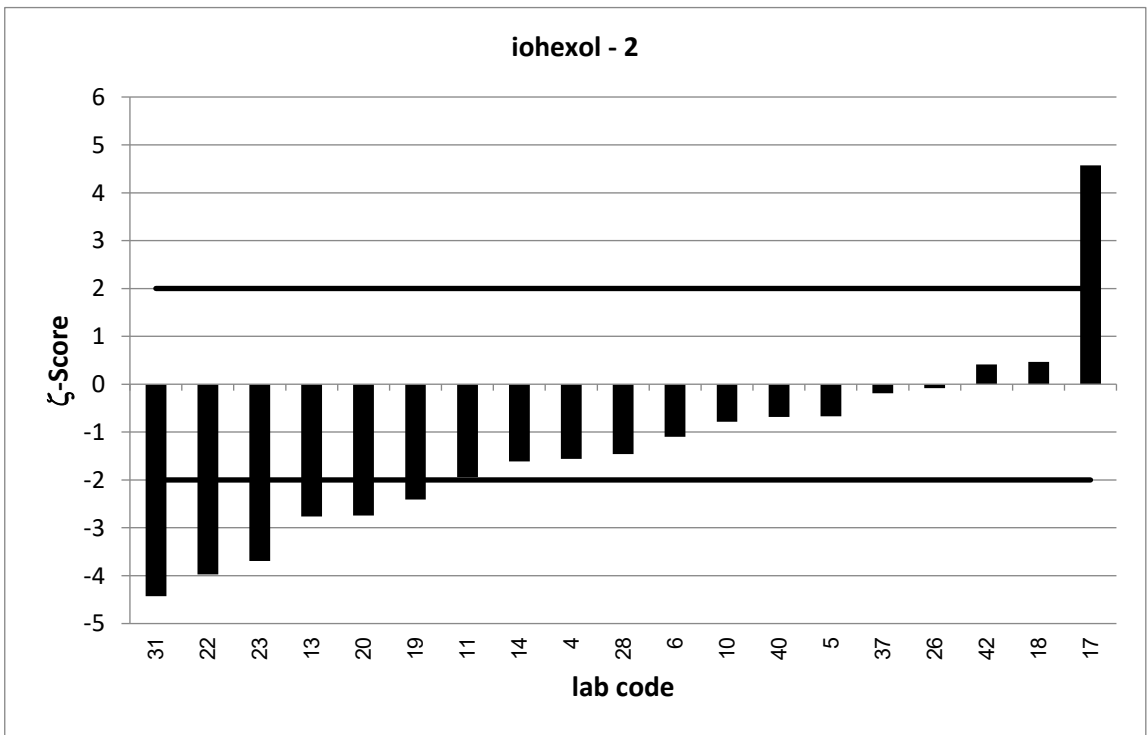
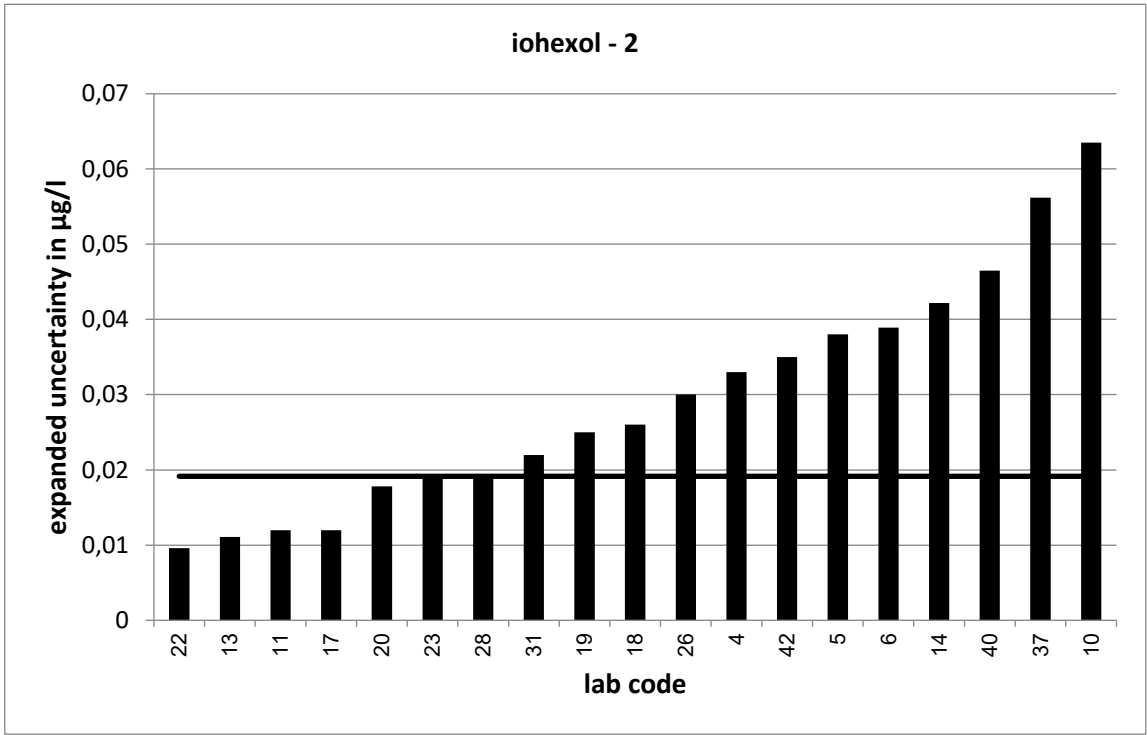


PT 4/21 - TW S6		iohexol - 2			
assigned value [$\mu\text{g/l}$]*		0,1664 \pm 0,0119			
upper tolerance limit [$\mu\text{g/l}$]		0,2074			
lower tolerance limit [$\mu\text{g/l}$]		0,1302			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,149			-1,0	s
2	0,121			-2,5	q
4	0,139	0,033	-1,6	-1,5	s
5	0,153	0,038	-0,7	-0,7	s
6	0,144	0,039	-1,1	-1,2	s
7	0,148			-1,0	s
10	0,141	0,064	-0,8	-1,4	s
11	0,15	0,012	-1,9	-0,9	s
12	0,167			0,0	s
13	0,1439	0,011	-2,8	-1,2	s
14	0,131	0,042	-1,6	-2,0	s
17	0,205	0,012	4,6	1,9	s
18	0,173	0,026	0,5	0,3	s
19	0,133	0,025	-2,4	-1,8	s
20	0,137	0,018	-2,7	-1,6	s
22	0,136	0,01	-4,0	-1,7	s
23	0,125	0,019	-3,7	-2,3	q
24	0,152			-0,8	s
26	0,165	0,03	-0,1	-0,1	s
27	0,217			2,5	q
28	0,15	0,019	-1,5	-0,9	s
29	0,1683			0,1	s
30	0,14			-1,5	s
31	0,111	0,022	-4,4	-3,1	u
33	0,15			-0,9	s
34	0,174			0,4	s
36	0,157			-0,5	s
37	0,161	0,056	-0,2	-0,3	s
40	0,15	0,047	-0,7	-0,9	s
42	0,174	0,035	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

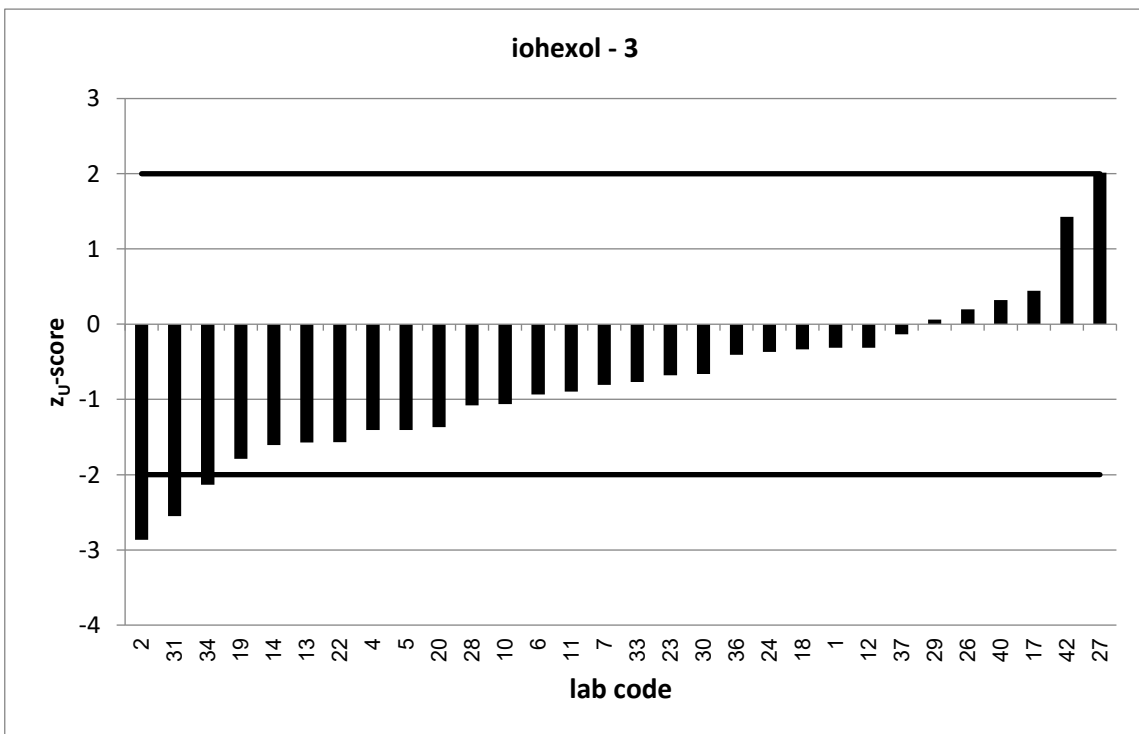
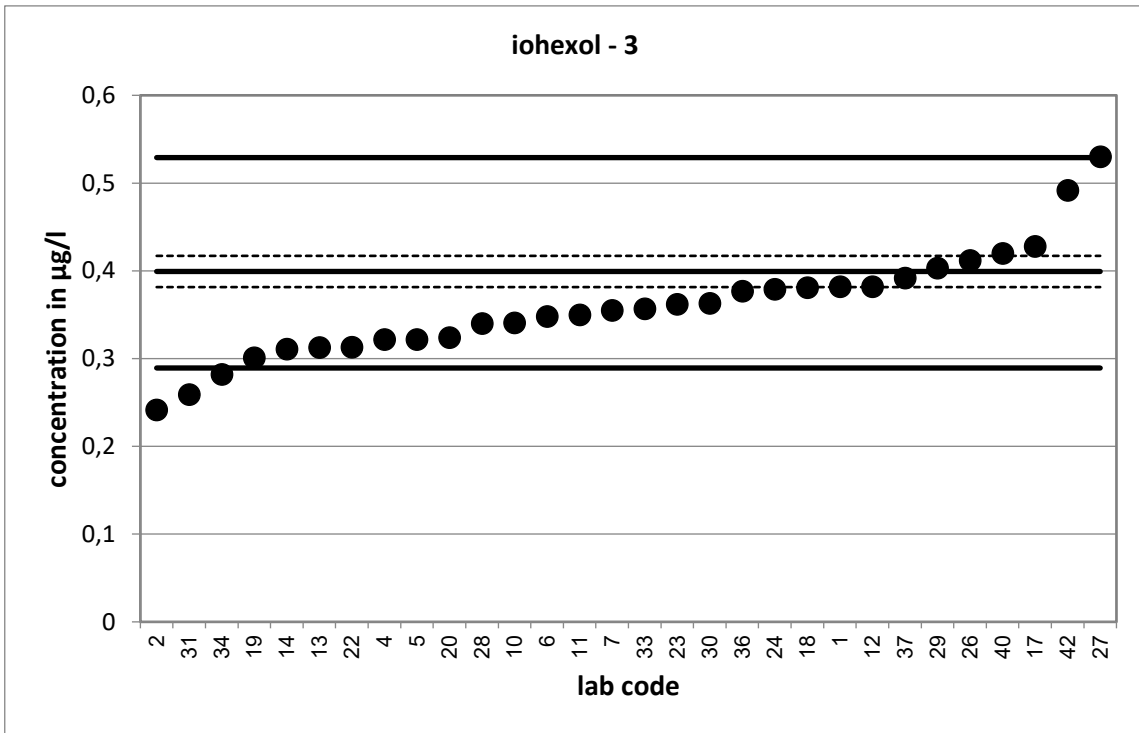


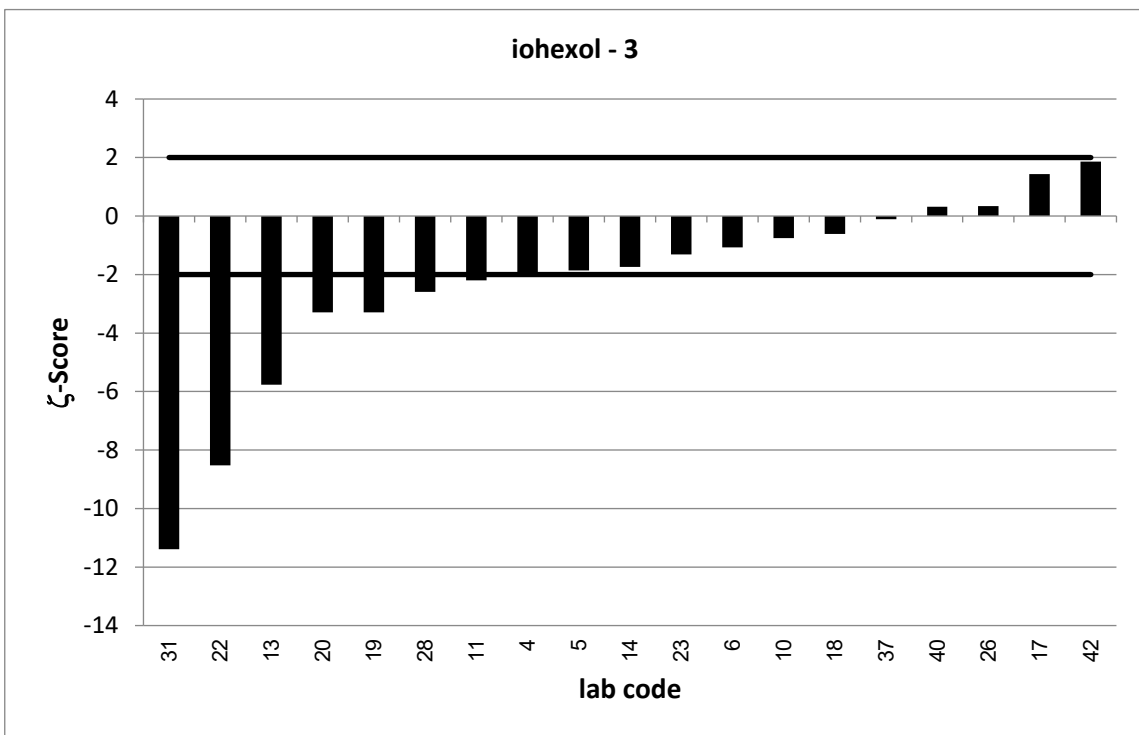
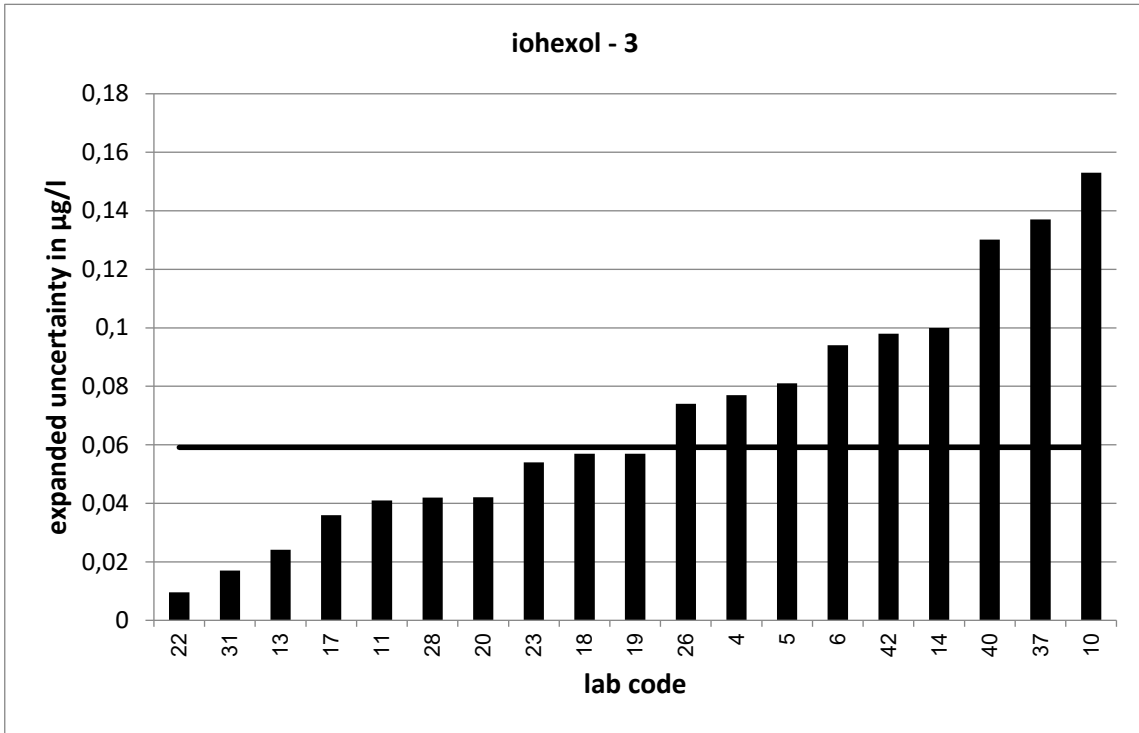


PT 4/21 - TW S6		iohexol - 3			
assigned value [$\mu\text{g/l}$]*		0,3993		$\pm 0,0178$	
upper tolerance limit [$\mu\text{g/l}$]		0,529			
lower tolerance limit [$\mu\text{g/l}$]		0,2893			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,382			-0,3	s
2	0,2417			-2,9	q
4	0,322	0,077	-2,0	-1,4	s
5	0,322	0,081	-1,9	-1,4	s
6	0,348	0,094	-1,1	-0,9	s
7	0,355			-0,8	s
10	0,341	0,153	-0,8	-1,1	s
11	0,35	0,041	-2,2	-0,9	s
12	0,382			-0,3	s
13	0,3128	0,024	-5,8	-1,6	s
14	0,311	0,1	-1,7	-1,6	s
17	0,428	0,036	1,4	0,4	s
18	0,381	0,057	-0,6	-0,3	s
19	0,301	0,057	-3,3	-1,8	s
20	0,324	0,042	-3,3	-1,4	s
22	0,313	0,01	-8,5	-1,6	s
23	0,362	0,054	-1,3	-0,7	s
24	0,379			-0,4	s
26	0,412	0,074	0,3	0,2	s
27	0,53			2,0	s
28	0,34	0,042	-2,6	-1,1	s
29	0,4032			0,1	s
30	0,363			-0,7	s
31	0,259	0,017	-11,4	-2,6	q
33	0,357			-0,8	s
34	0,282			-2,1	q
36	0,377			-0,4	s
37	0,392	0,137	-0,1	-0,1	s
40	0,42	0,13	0,3	0,3	s
42	0,492	0,098	1,9	1,4	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

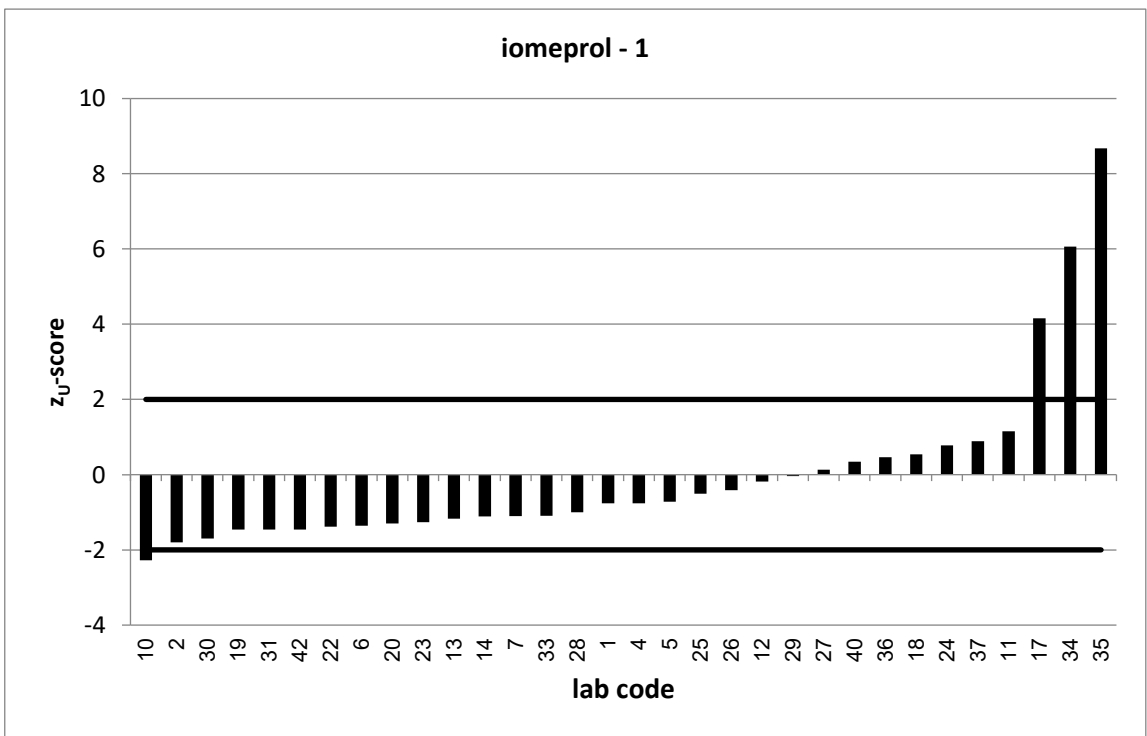
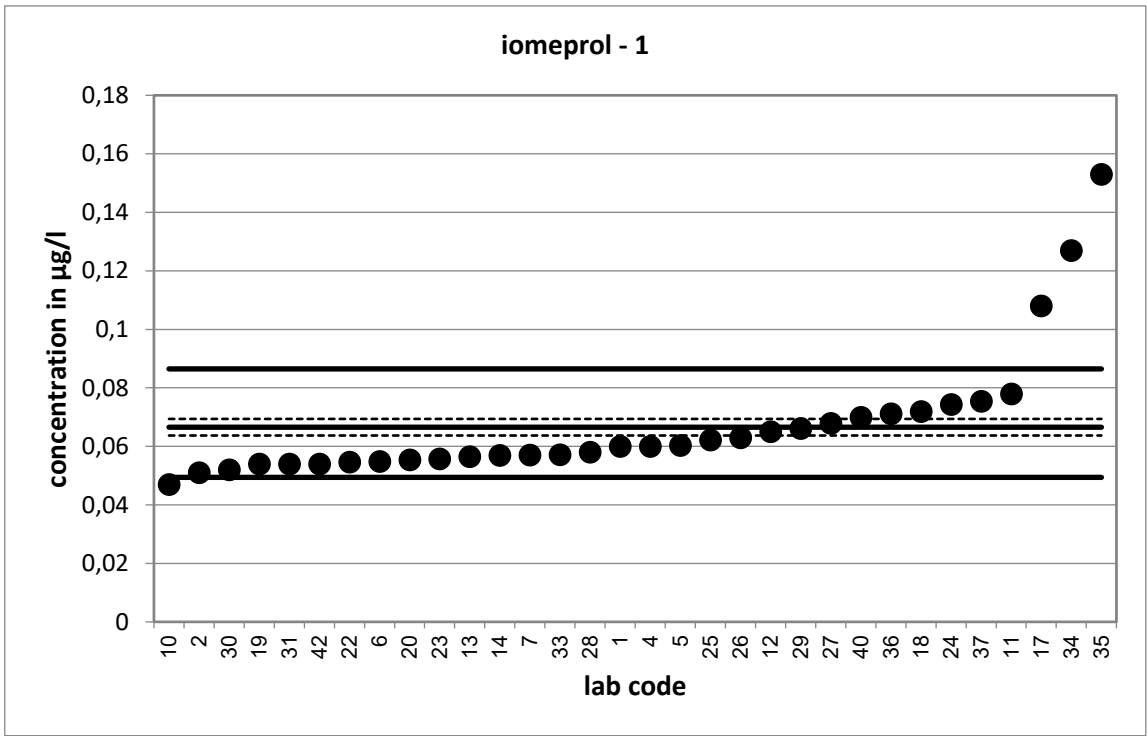


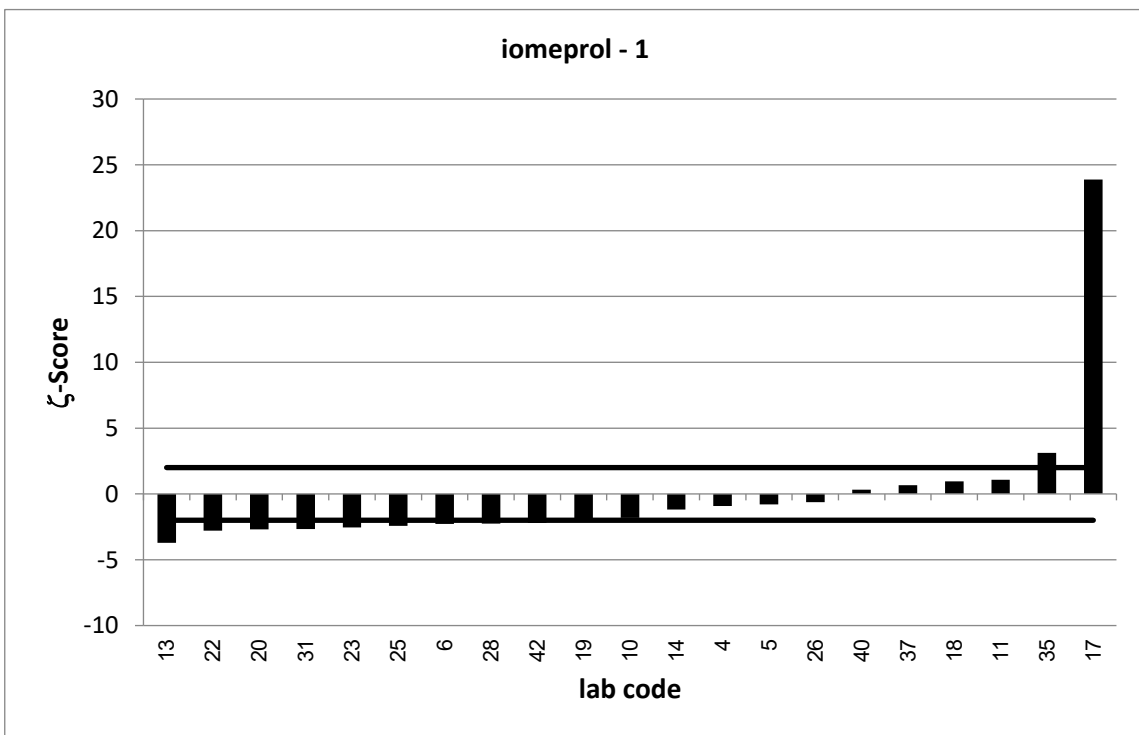
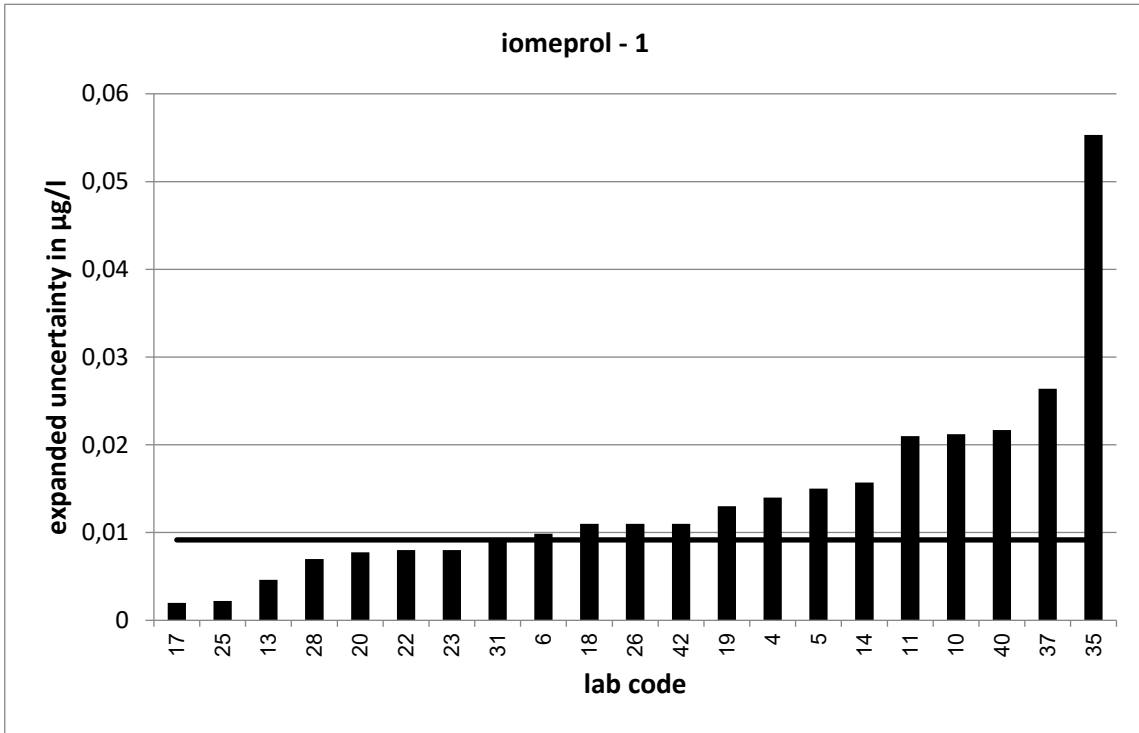


PT 4/21 - TW S6		iomeprol - 1			
assigned value [$\mu\text{g/l}$]*		0,06655		$\pm 0,00284$	
upper tolerance limit [$\mu\text{g/l}$]		0,08648			
lower tolerance limit [$\mu\text{g/l}$]		0,0494			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,06			-0,8	s
2	0,0511			-1,8	s
4	0,06	0,014	-0,9	-0,8	s
5	0,0604	0,015	-0,8	-0,7	s
6	0,0549	0,01	-2,3	-1,4	s
7	0,0571			-1,1	s
10	0,047	0,021	-1,8	-2,3	q
11	0,078	0,021	1,1	1,1	s
12	0,065			-0,2	s
13	0,0565	0,005	-3,7	-1,2	s
14	0,057	0,016	-1,2	-1,1	s
17	0,108	0,002	23,9	4,2	u
18	0,0719	0,011	0,9	0,5	s
19	0,054	0,013	-1,9	-1,5	s
20	0,0554	0,008	-2,7	-1,3	s
22	0,0547	0,008	-2,8	-1,4	s
23	0,0557	0,008	-2,6	-1,3	s
24	0,0743			0,8	s
25	0,0622	0,002	-2,4	-0,5	s
26	0,063	0,011	-0,6	-0,4	s
27	0,0679			0,1	s
28	0,058	0,007	-2,3	-1,0	s
29	0,0662			0,0	s
30	0,052			-1,7	s
31	0,054	0,009	-2,7	-1,5	s
33	0,0572			-1,1	s
34	0,127			6,1	u
35	0,153	0,055	3,1	8,7	u
36	0,0712			0,5	s
37	0,0754	0,026	0,7	0,9	s
40	0,07	0,022	0,3	0,3	s
42	0,054	0,011	-2,2	-1,5	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

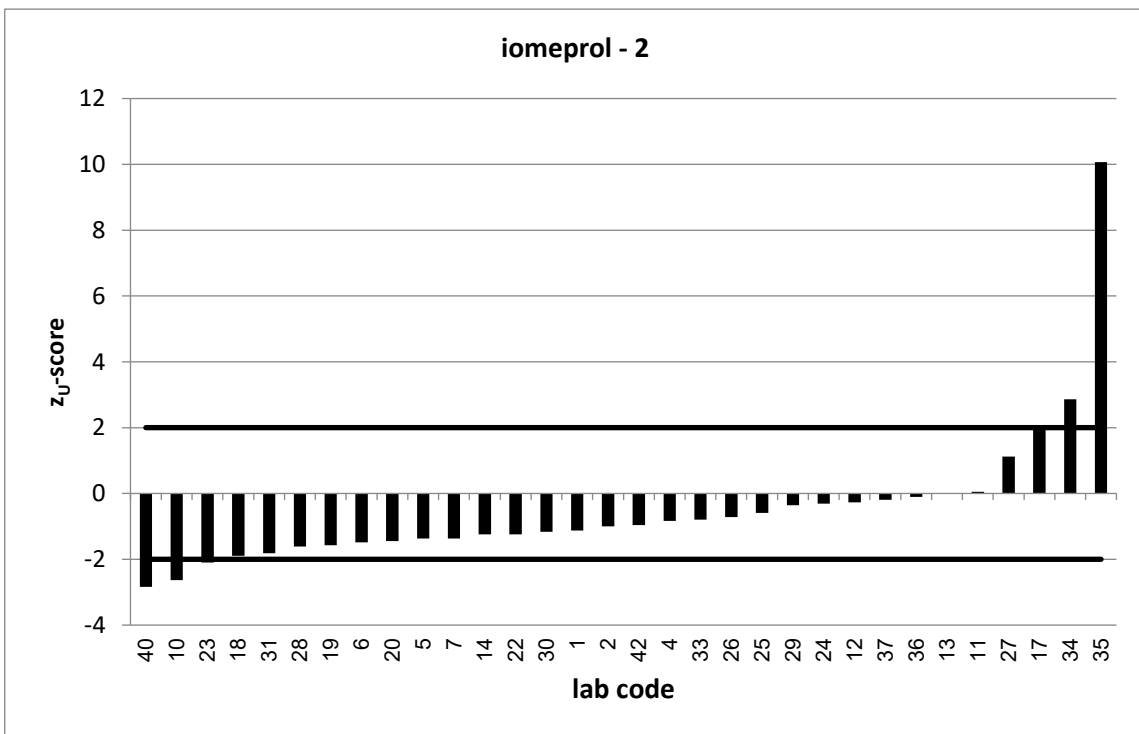
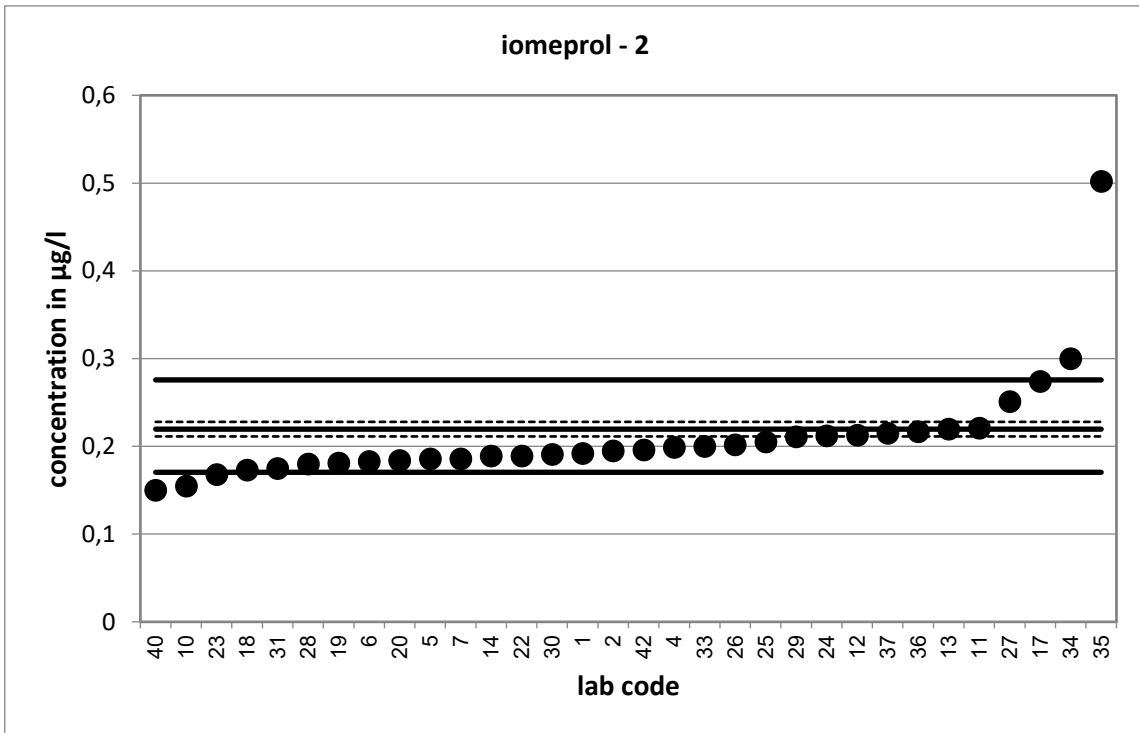


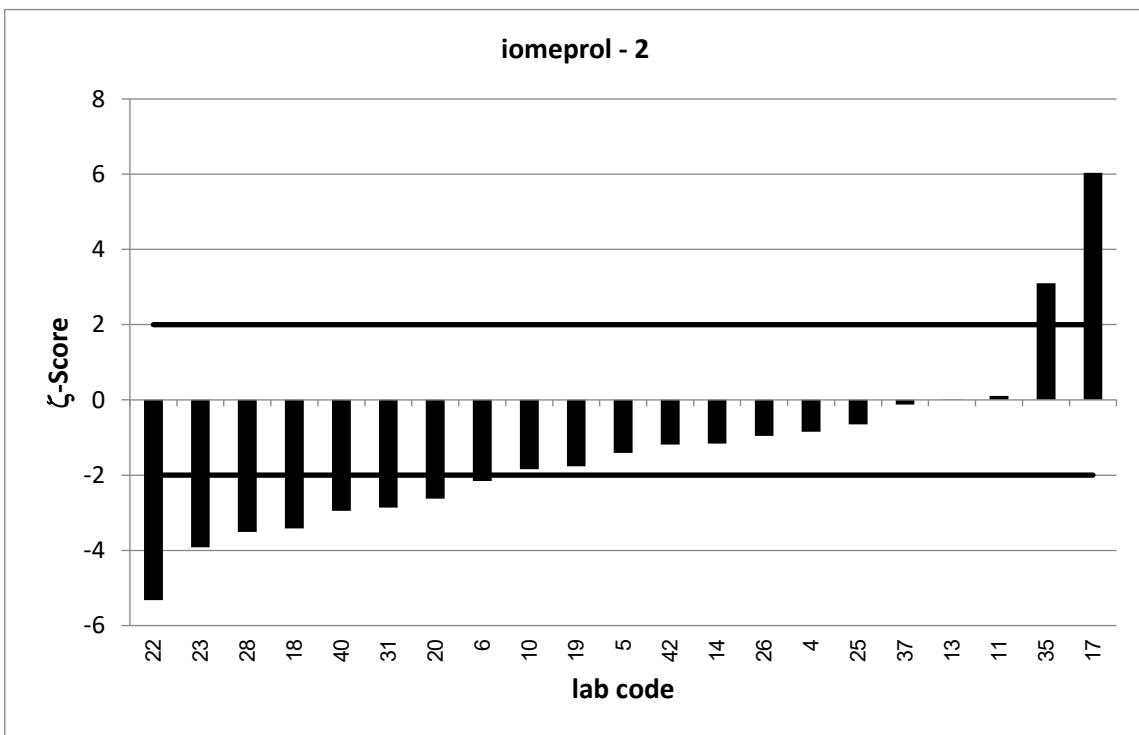
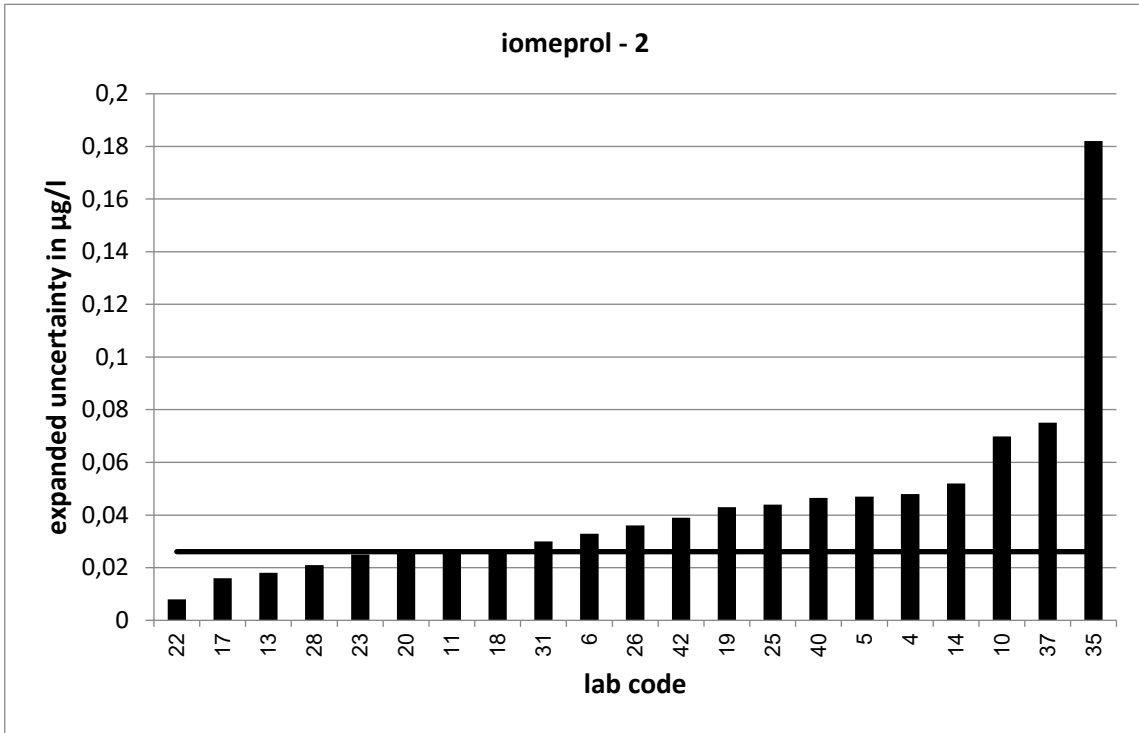


PT 4/21 - TW S6		iomeprol - 2			
assigned value [$\mu\text{g/l}$]*		0,2196 \pm 0,0083			
upper tolerance limit [$\mu\text{g/l}$]		0,2757			
lower tolerance limit [$\mu\text{g/l}$]		0,1705			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,192			-1,1	s
2	0,1951			-1,0	s
4	0,199	0,048	-0,8	-0,8	s
5	0,186	0,047	-1,4	-1,4	s
6	0,183	0,033	-2,2	-1,5	s
7	0,186			-1,4	s
10	0,155	0,07	-1,8	-2,6	q
11	0,221	0,026	0,1	0,0	s
12	0,213			-0,3	s
13	0,2197	0,018	0,0	0,0	s
14	0,189	0,052	-1,2	-1,2	s
17	0,274	0,016	6,0	1,9	s
18	0,173	0,026	-3,4	-1,9	s
19	0,181	0,043	-1,8	-1,6	s
20	0,184	0,026	-2,6	-1,4	s
22	0,189	0,008	-5,3	-1,2	s
23	0,168	0,025	-3,9	-2,1	q
24	0,212			-0,3	s
25	0,205	0,044	-0,7	-0,6	s
26	0,202	0,036	-1,0	-0,7	s
27	0,251			1,1	s
28	0,18	0,021	-3,5	-1,6	s
29	0,2109			-0,4	s
30	0,191			-1,2	s
31	0,175	0,03	-2,9	-1,8	s
33	0,2			-0,8	s
34	0,3			2,9	q
35	0,502	0,182	3,1	10,1	u
36	0,217			-0,1	s
37	0,215	0,075	-0,1	-0,2	s
40	0,15	0,047	-2,9	-2,8	q
42	0,196	0,039	-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

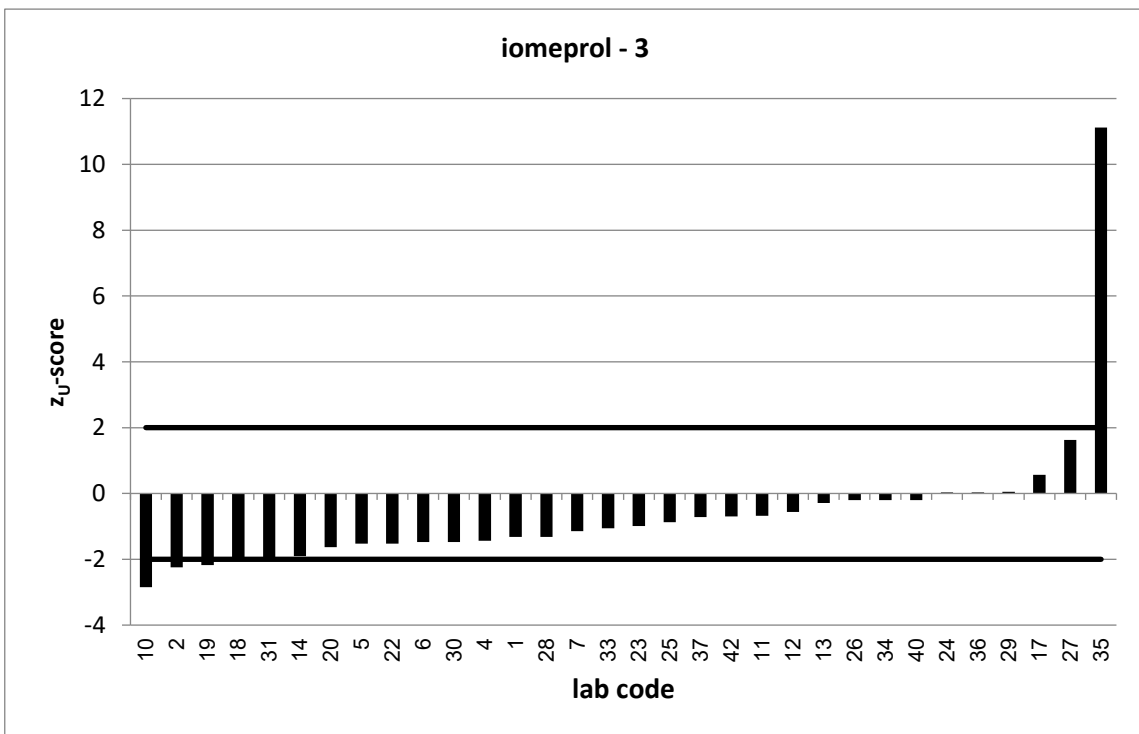
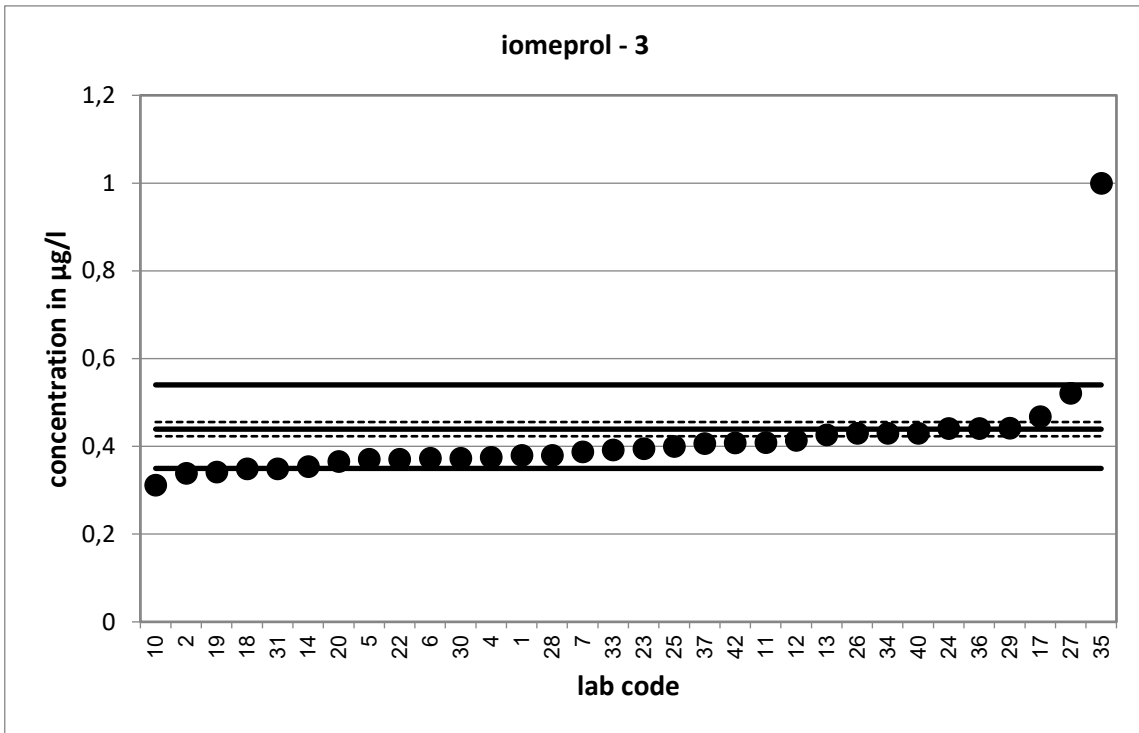


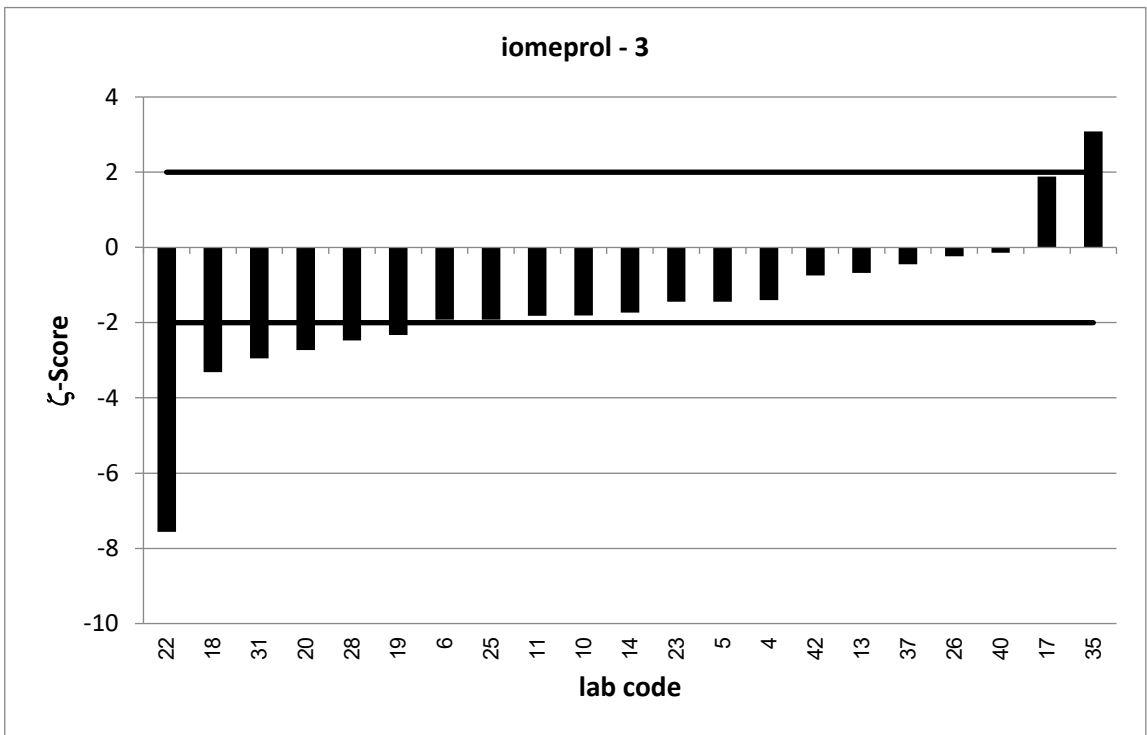
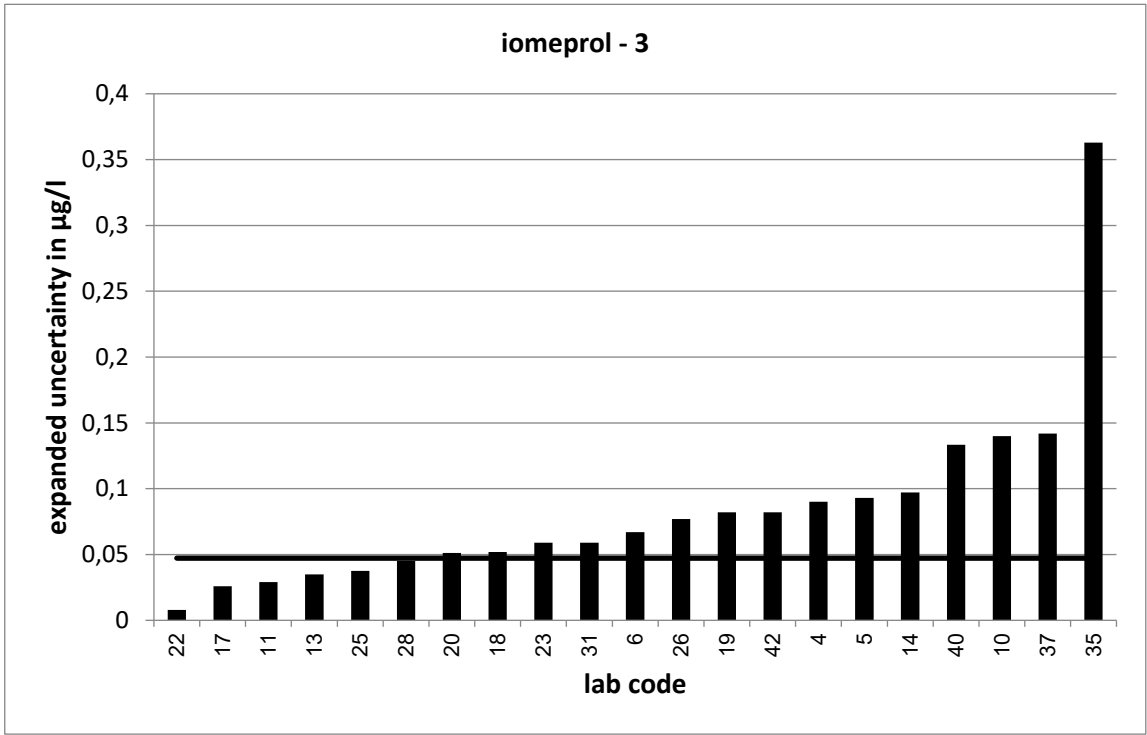


PT 4/21 - TW S6		iomeprol - 3			
assigned value [$\mu\text{g/l}$]*		0,4392		$\pm 0,0162$	
upper tolerance limit [$\mu\text{g/l}$]		0,54			
lower tolerance limit [$\mu\text{g/l}$]		0,3497			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,38			-1,3	s
2	0,3388			-2,2	q
4	0,375	0,09	-1,4	-1,4	s
5	0,371	0,093	-1,4	-1,5	s
6	0,373	0,067	-1,9	-1,5	s
7	0,388			-1,1	s
10	0,312	0,14	-1,8	-2,8	q
11	0,409	0,029	-1,8	-0,7	s
12	0,414			-0,6	s
13	0,4261	0,035	-0,7	-0,3	s
14	0,354	0,097	-1,7	-1,9	s
17	0,468	0,026	1,9	0,6	s
18	0,349	0,052	-3,3	-2,0	s
19	0,342	0,082	-2,3	-2,2	q
20	0,366	0,051	-2,7	-1,6	s
22	0,371	0,008	-7,6	-1,5	s
23	0,395	0,059	-1,4	-1,0	s
24	0,441			0,0	s
25	0,4	0,038	-1,9	-0,9	s
26	0,43	0,077	-0,2	-0,2	s
27	0,521			1,6	s
28	0,38	0,045	-2,5	-1,3	s
29	0,4418			0,1	s
30	0,373			-1,5	s
31	0,349	0,059	-2,9	-2,0	s
33	0,392			-1,1	s
34	0,43			-0,2	s
35	1	0,363	3,1	11,1	u
36	0,441			0,0	s
37	0,407	0,142	-0,5	-0,7	s
40	0,43	0,133	-0,1	-0,2	s
42	0,408	0,082	-0,7	-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

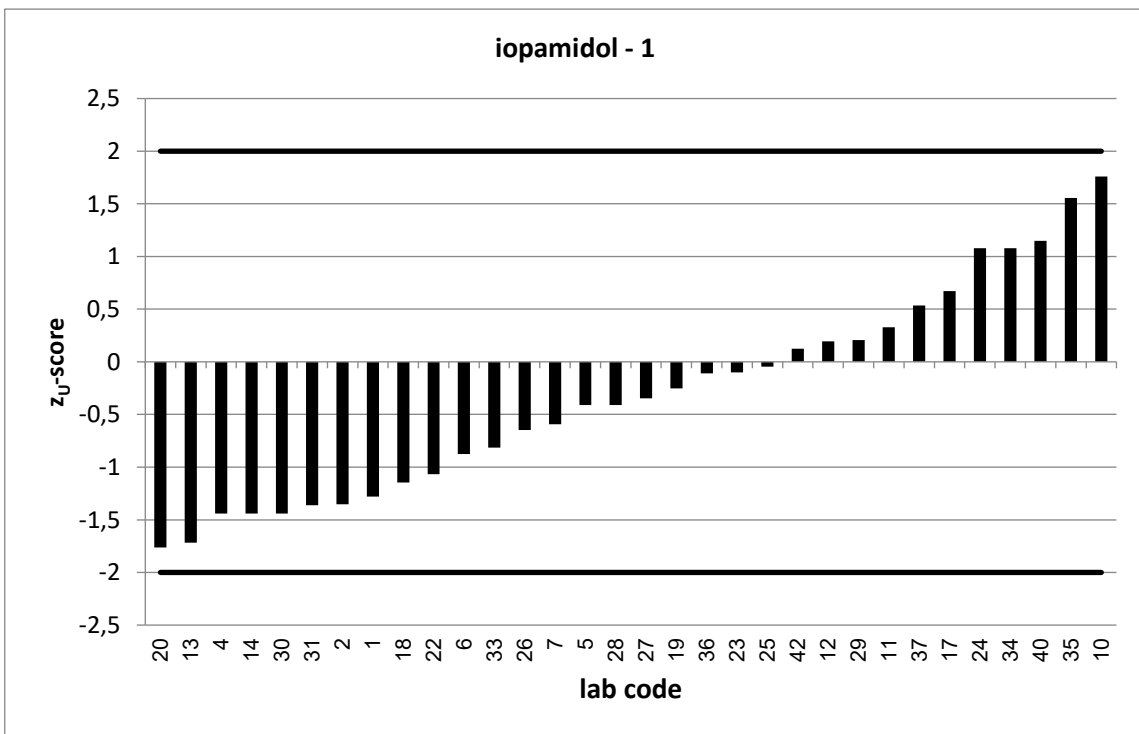
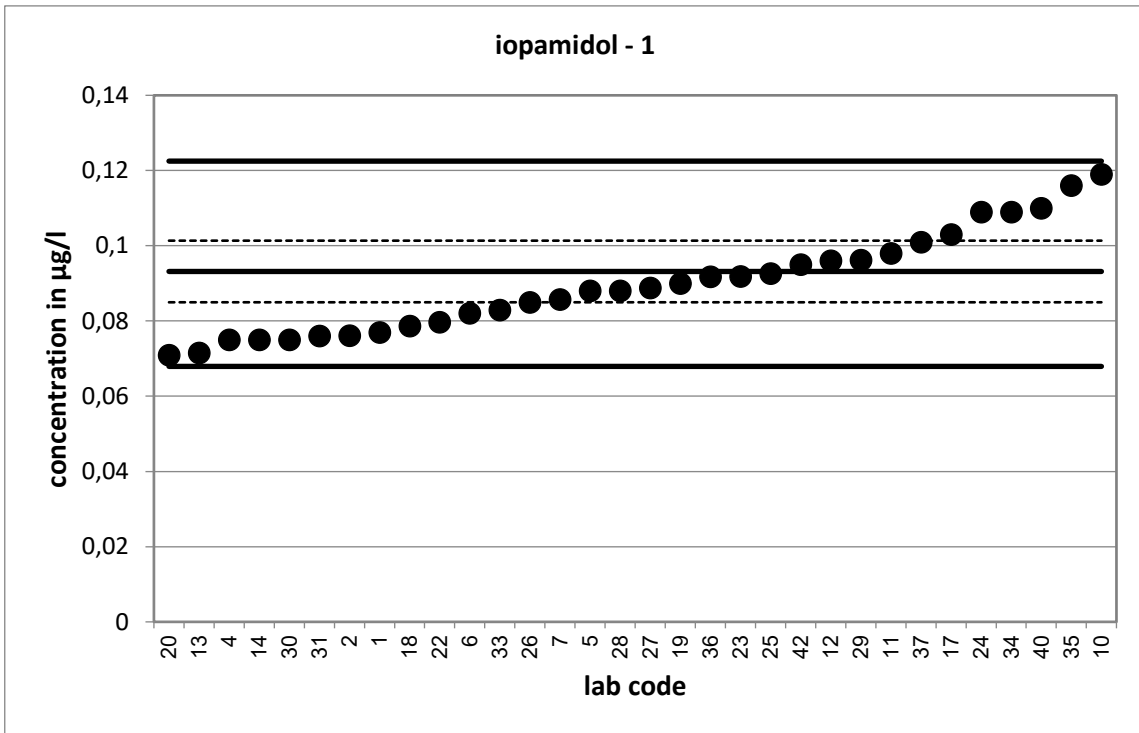


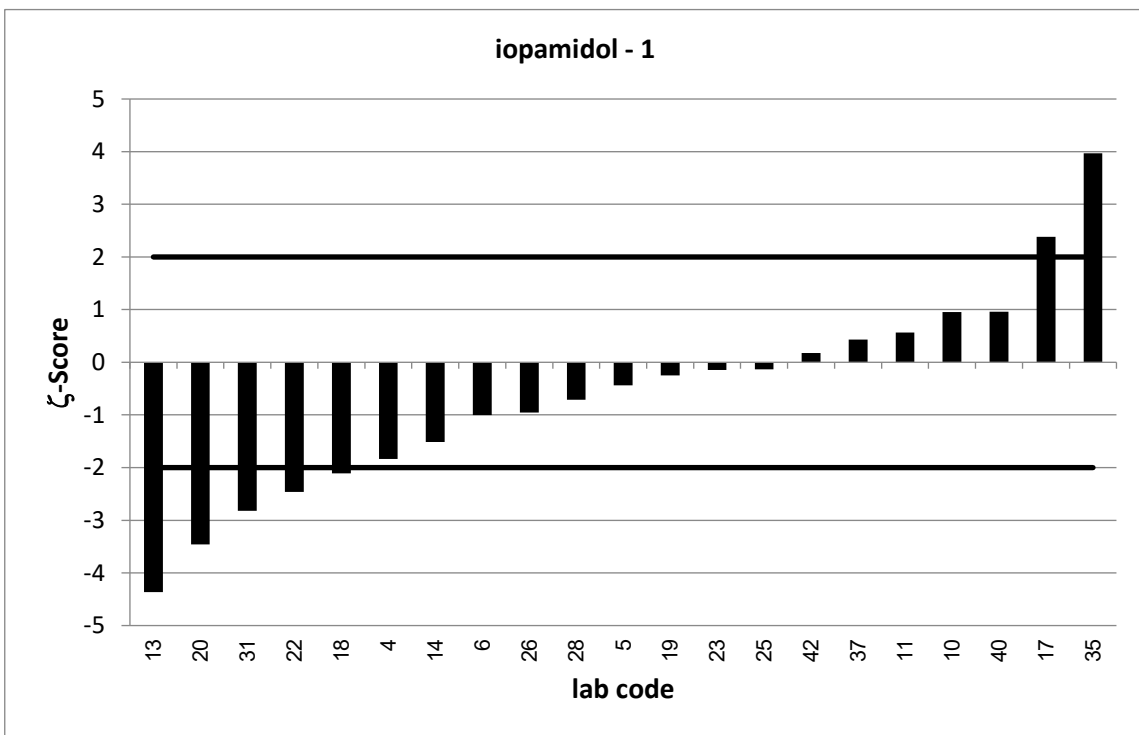
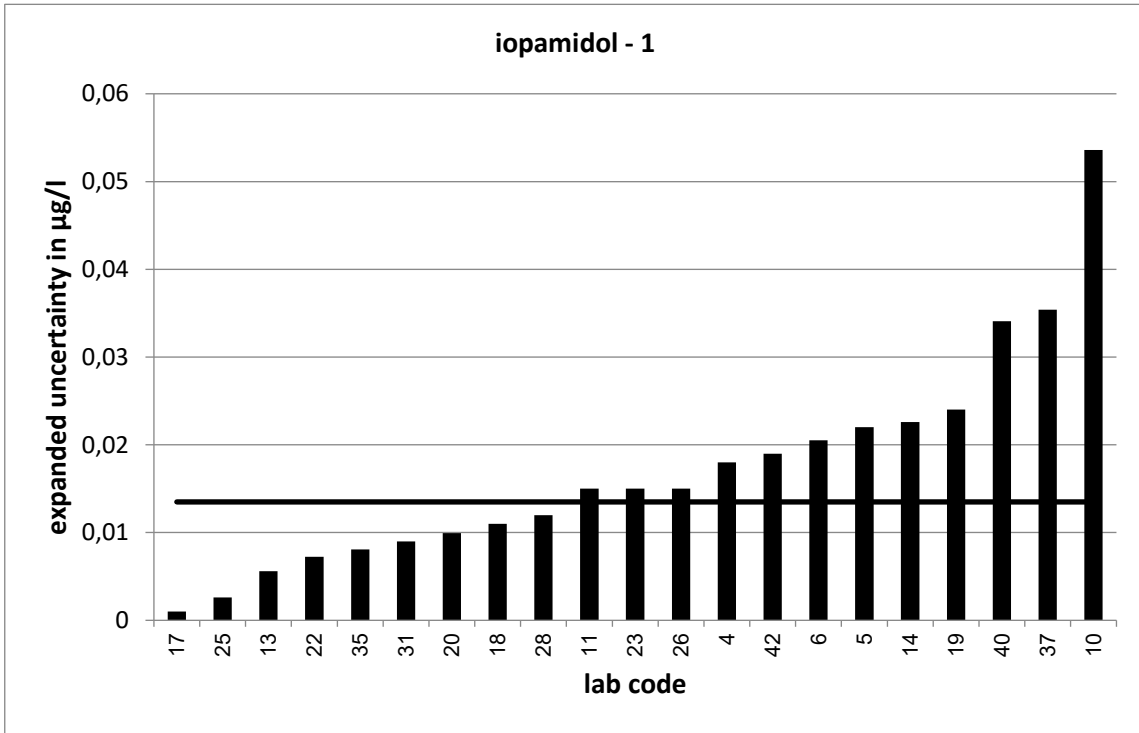


PT 4/21 - TW S6		iopamidol - 1			
assigned value [$\mu\text{g/l}$]*		0,09317		$\pm 0,00819$	
upper tolerance limit [$\mu\text{g/l}$]		0,1225			
lower tolerance limit [$\mu\text{g/l}$]		0,06793			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,077			-1,3	s
2	0,0761			-1,4	s
4	0,075	0,018	-1,8	-1,4	s
5	0,088	0,022	-0,4	-0,4	s
6	0,0821	0,021	-1,0	-0,9	s
7	0,0857			-0,6	s
10	0,119	0,054	1,0	1,8	s
11	0,098	0,015	0,6	0,3	s
12	0,096			0,2	s
13	0,0715	0,006	-4,4	-1,7	s
14	0,075	0,023	-1,5	-1,4	s
17	0,103	0,001	2,4	0,7	s
18	0,0787	0,011	-2,1	-1,1	s
19	0,09	0,024	-0,2	-0,3	s
20	0,0709	0,01	-3,5	-1,8	s
22	0,0797	0,007	-2,5	-1,1	s
23	0,0919	0,015	-0,1	-0,1	s
24	0,109			1,1	s
25	0,0926	0,003	-0,1	0,0	s
26	0,085	0,015	-1,0	-0,6	s
27	0,0888			-0,3	s
28	0,088	0,012	-0,7	-0,4	s
29	0,0962			0,2	s
30	0,075			-1,4	s
31	0,076	0,009	-2,8	-1,4	s
33	0,0829			-0,8	s
34	0,109			1,1	s
35	0,116	0,008	4,0	1,6	s
36	0,0918			-0,1	s
37	0,101	0,035	0,4	0,5	s
40	0,11	0,034	1,0	1,1	s
42	0,095	0,019	0,2	0,1	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

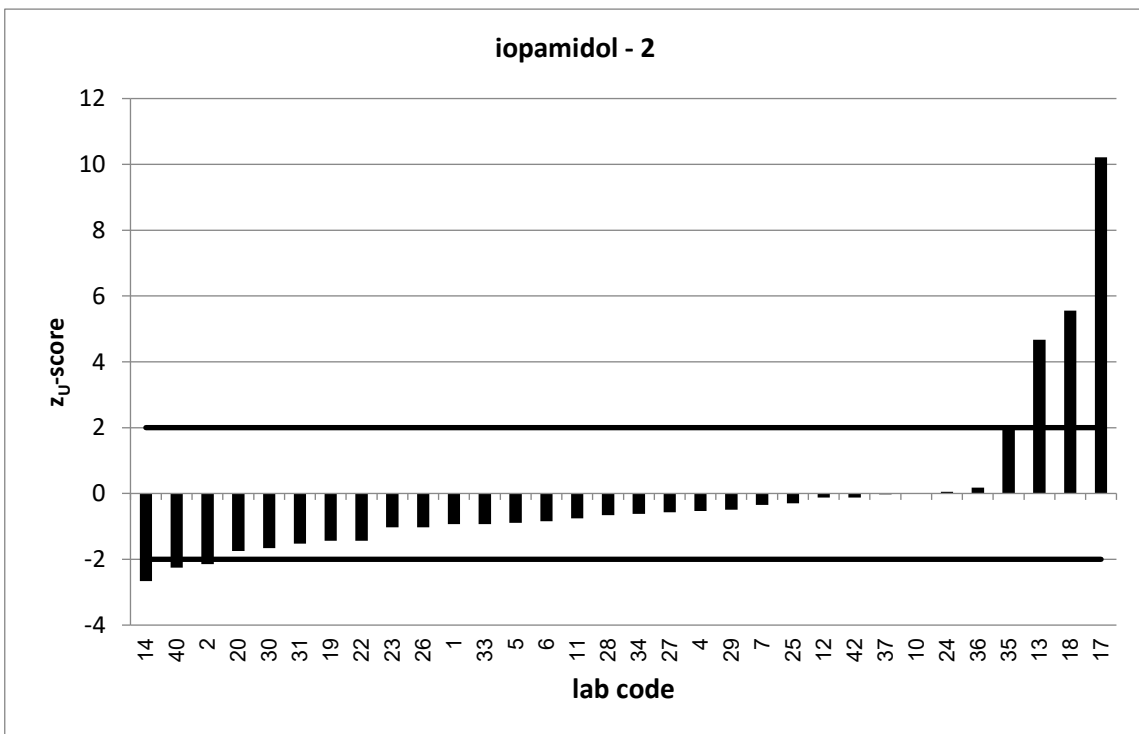
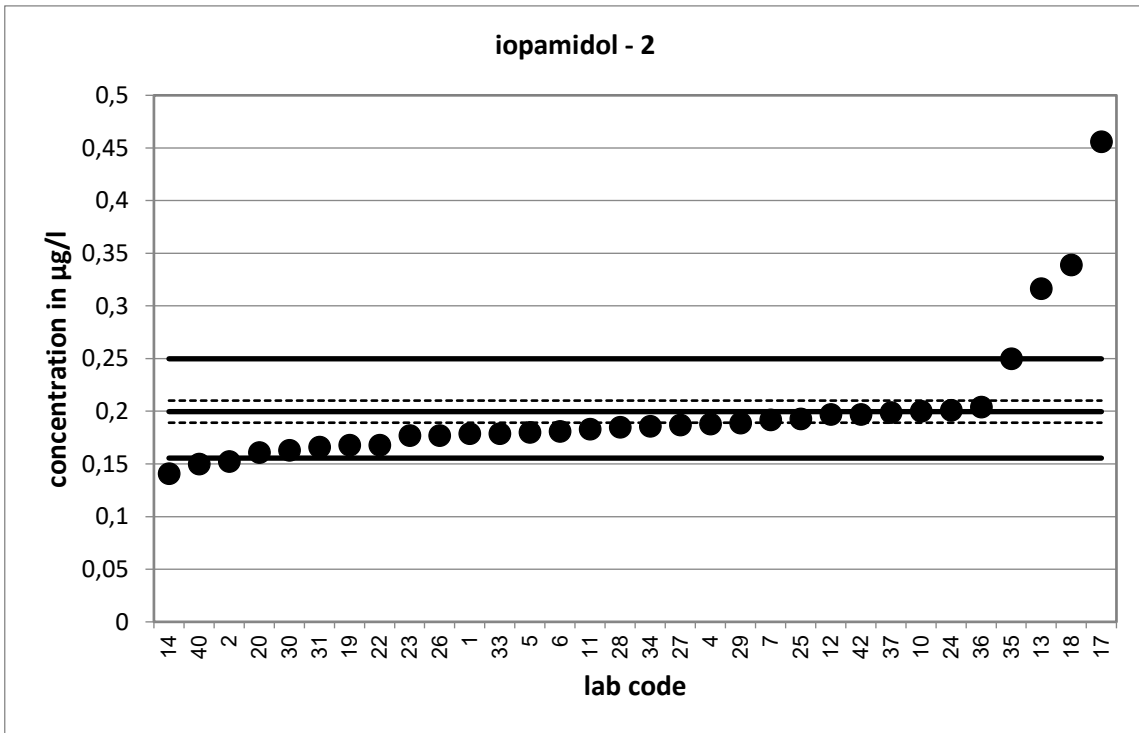


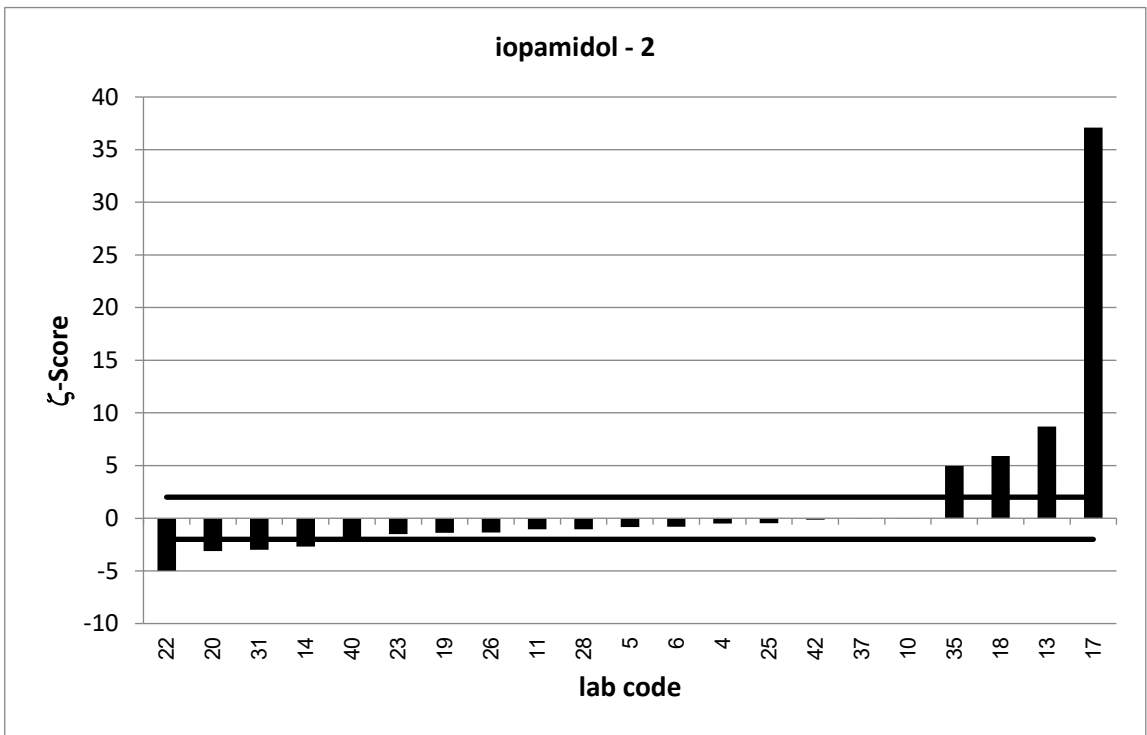
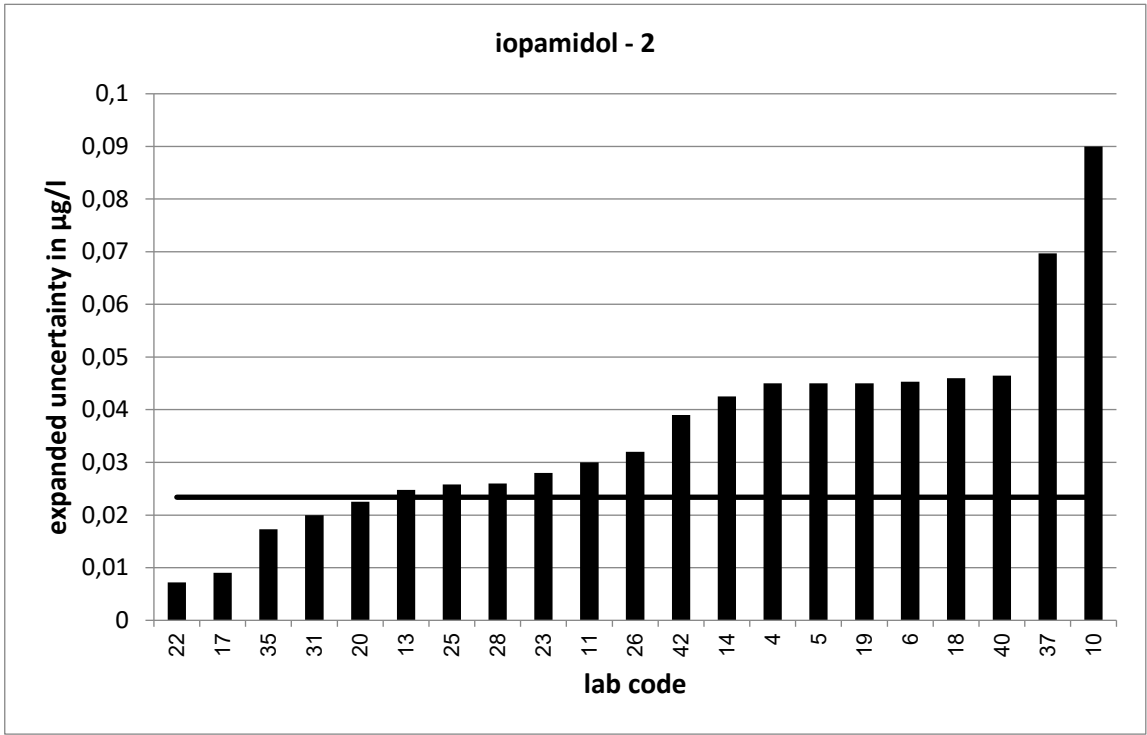


PT 4/21 - TW S6		iopamidol - 2			
assigned value [$\mu\text{g/l}$]*		0,1996 \pm 0,0105			
upper tolerance limit [$\mu\text{g/l}$]		0,2498			
lower tolerance limit [$\mu\text{g/l}$]		0,1555			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,179			-0,9	s
2	0,1523			-2,1	q
4	0,188	0,045	-0,5	-0,5	s
5	0,18	0,045	-0,9	-0,9	s
6	0,181	0,045	-0,8	-0,8	s
7	0,192			-0,3	s
10	0,2	0,09	0,0	0,0	s
11	0,183	0,03	-1,0	-0,8	s
12	0,197			-0,1	s
13	0,3167	0,025	8,7	4,7	u
14	0,141	0,043	-2,7	-2,7	q
17	0,456	0,009	37,1	10,2	u
18	0,339	0,046	5,9	5,6	u
19	0,168	0,045	-1,4	-1,4	s
20	0,161	0,023	-3,1	-1,8	s
22	0,168	0,007	-5,0	-1,4	s
23	0,177	0,028	-1,5	-1,0	s
24	0,201			0,1	s
25	0,193	0,026	-0,5	-0,3	s
26	0,177	0,032	-1,3	-1,0	s
27	0,187			-0,6	s
28	0,185	0,026	-1,0	-0,7	s
29	0,1888			-0,5	s
30	0,163			-1,7	s
31	0,166	0,02	-3,0	-1,5	s
33	0,179			-0,9	s
34	0,186			-0,6	s
35	0,25	0,017	5,0	2,0	s
36	0,204			0,2	s
37	0,199	0,07	0,0	0,0	s
40	0,15	0,047	-2,1	-2,2	q
42	0,197	0,039	-0,1	-0,1	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

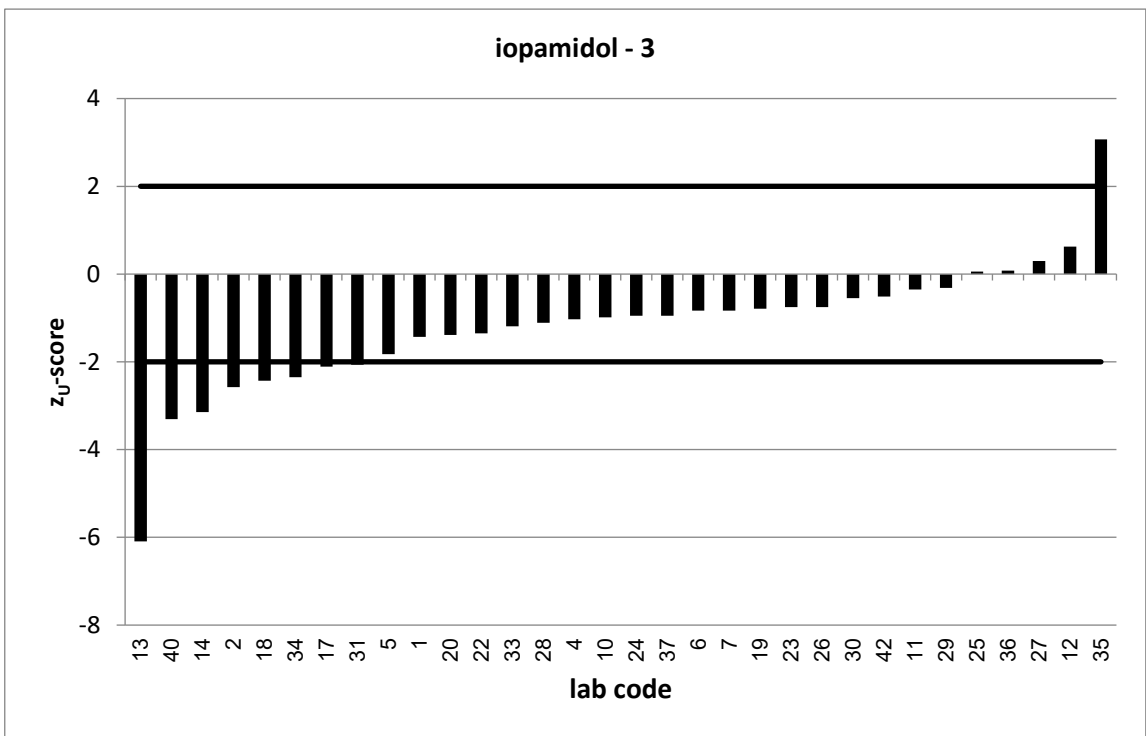
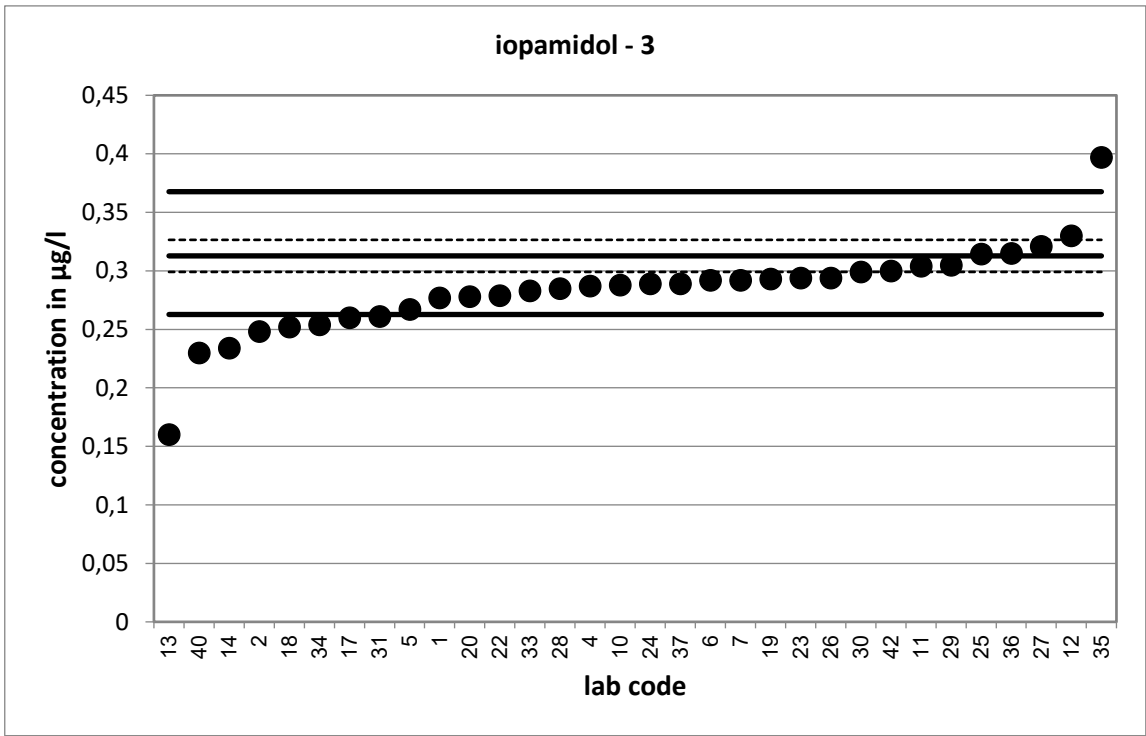


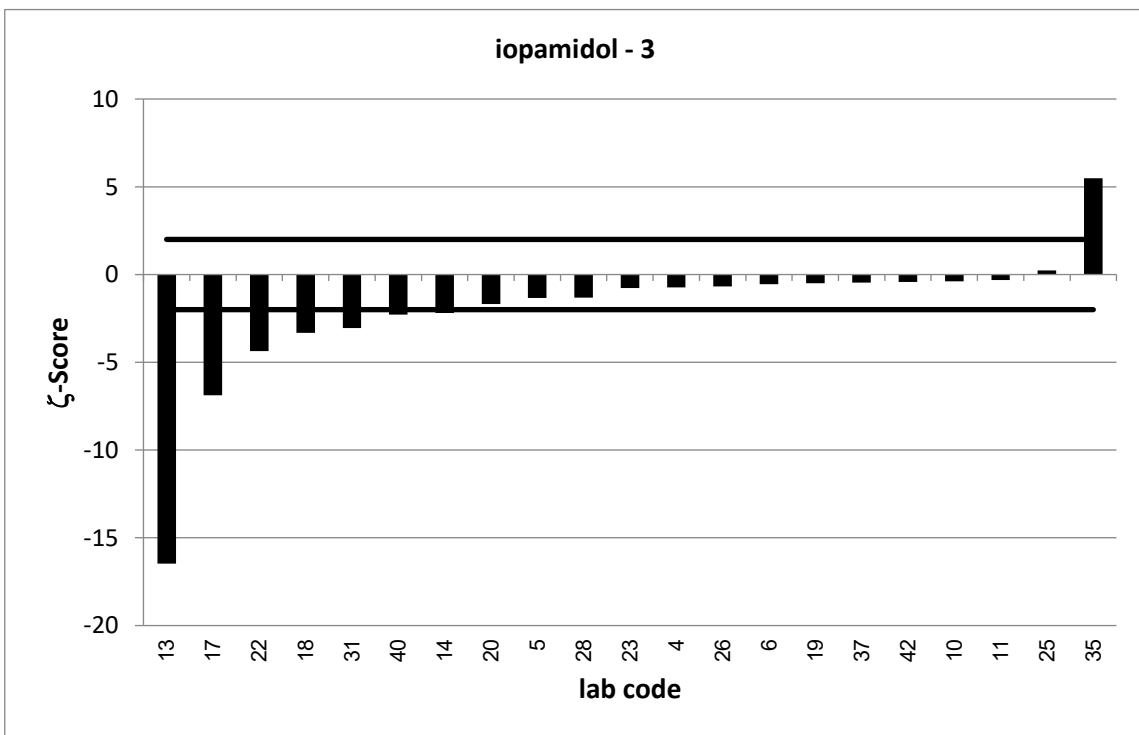
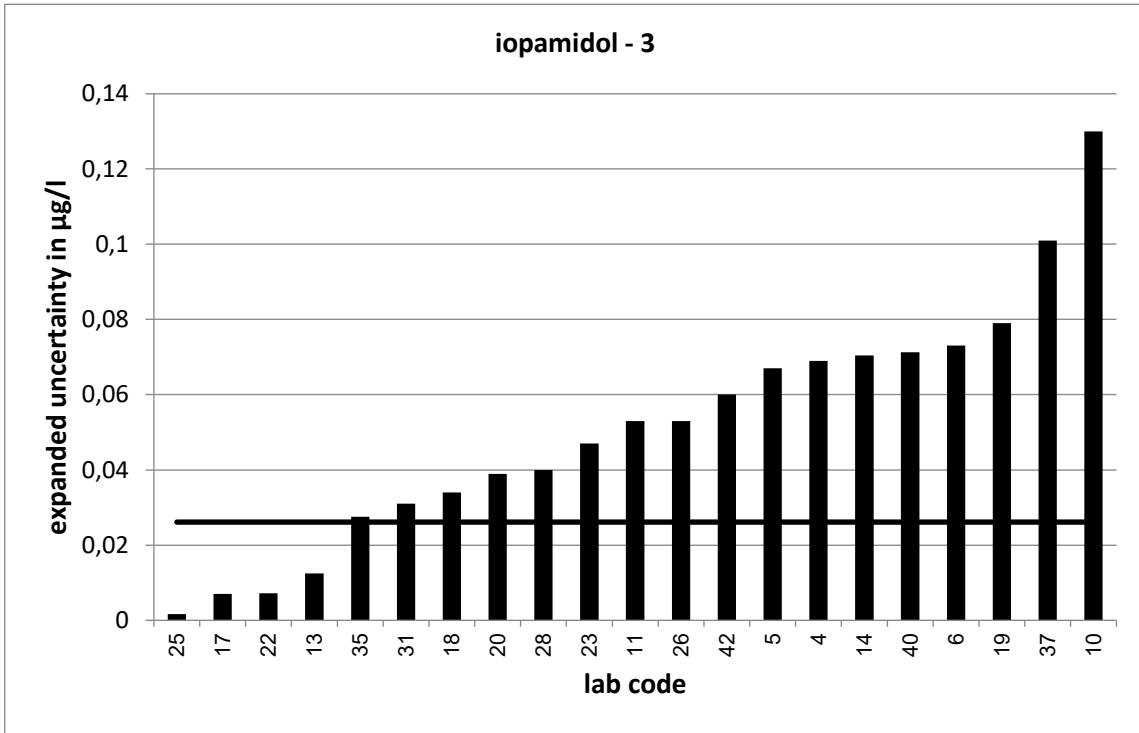


PT 4/21 - TW S6		iopamidol - 3			
assigned value [$\mu\text{g/l}$]*		0,3128 \pm 0,0137			
upper tolerance limit [$\mu\text{g/l}$]		0,3676			
lower tolerance limit [$\mu\text{g/l}$]		0,2627			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,277			-1,4	s
2	0,2482			-2,6	q
4	0,287	0,069	-0,7	-1,0	s
5	0,267	0,067	-1,3	-1,8	s
6	0,292	0,073	-0,6	-0,8	s
7	0,292			-0,8	s
10	0,288	0,13	-0,4	-1,0	s
11	0,304	0,053	-0,3	-0,4	s
12	0,33			0,6	s
13	0,1603	0,013	-16,5	-6,1	u
14	0,234	0,07	-2,2	-3,1	u
17	0,26	0,007	-6,9	-2,1	q
18	0,252	0,034	-3,3	-2,4	q
19	0,293	0,079	-0,5	-0,8	s
20	0,278	0,039	-1,7	-1,4	s
22	0,279	0,007	-4,4	-1,3	s
23	0,294	0,047	-0,8	-0,7	s
24	0,289			-0,9	s
25	0,3144	0,002	0,2	0,1	s
26	0,294	0,053	-0,7	-0,7	s
27	0,321			0,3	s
28	0,285	0,04	-1,3	-1,1	s
29	0,3049			-0,3	s
30	0,299			-0,6	s
31	0,261	0,031	-3,1	-2,1	q
33	0,283			-1,2	s
34	0,254			-2,3	q
35	0,397	0,028	5,5	3,1	u
36	0,315			0,1	s
37	0,289	0,101	-0,5	-0,9	s
40	0,23	0,071	-2,3	-3,3	u
42	0,3	0,06	-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

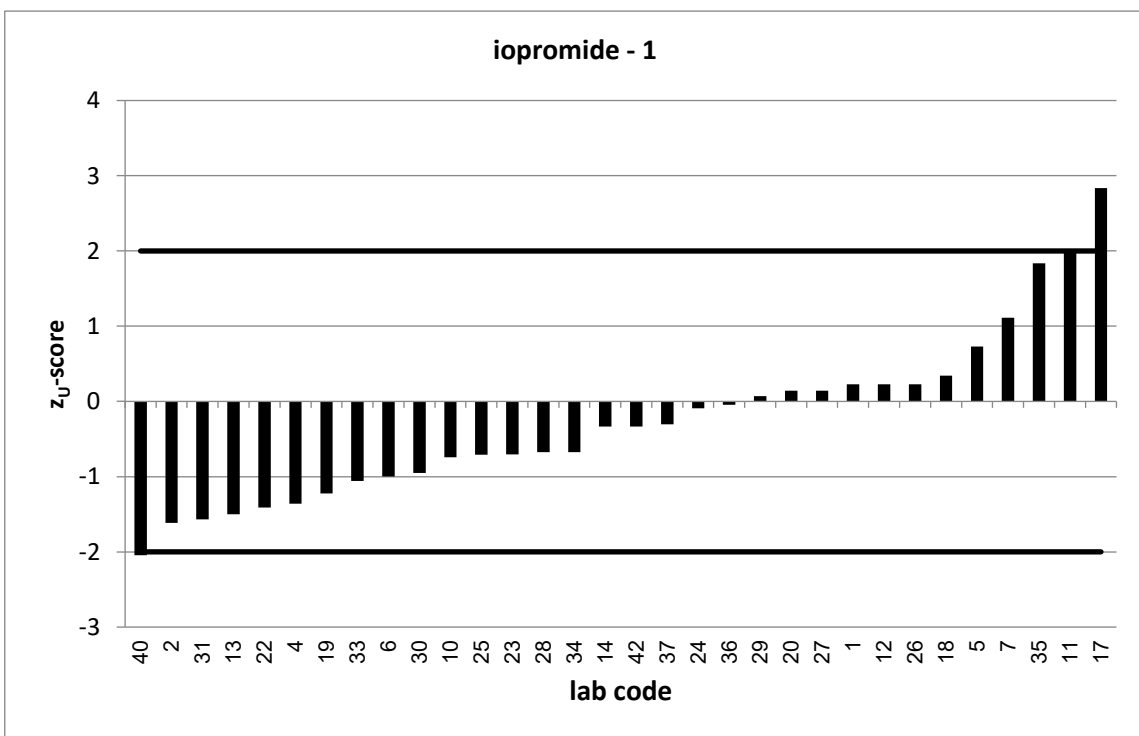
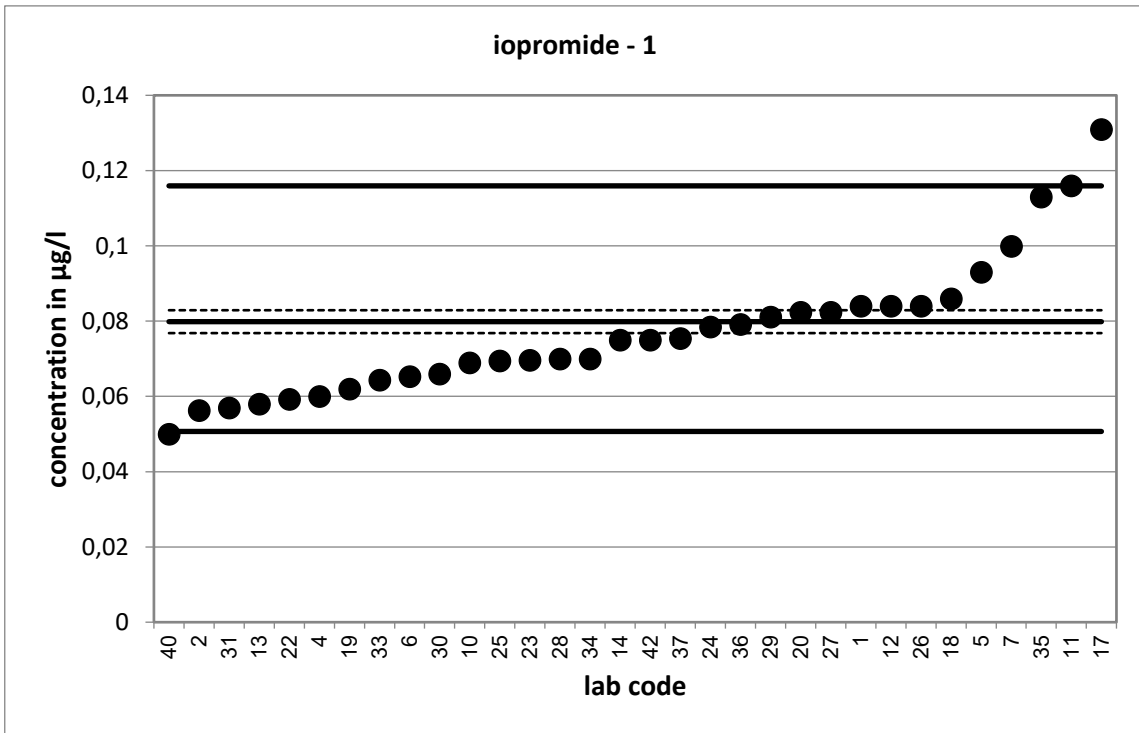


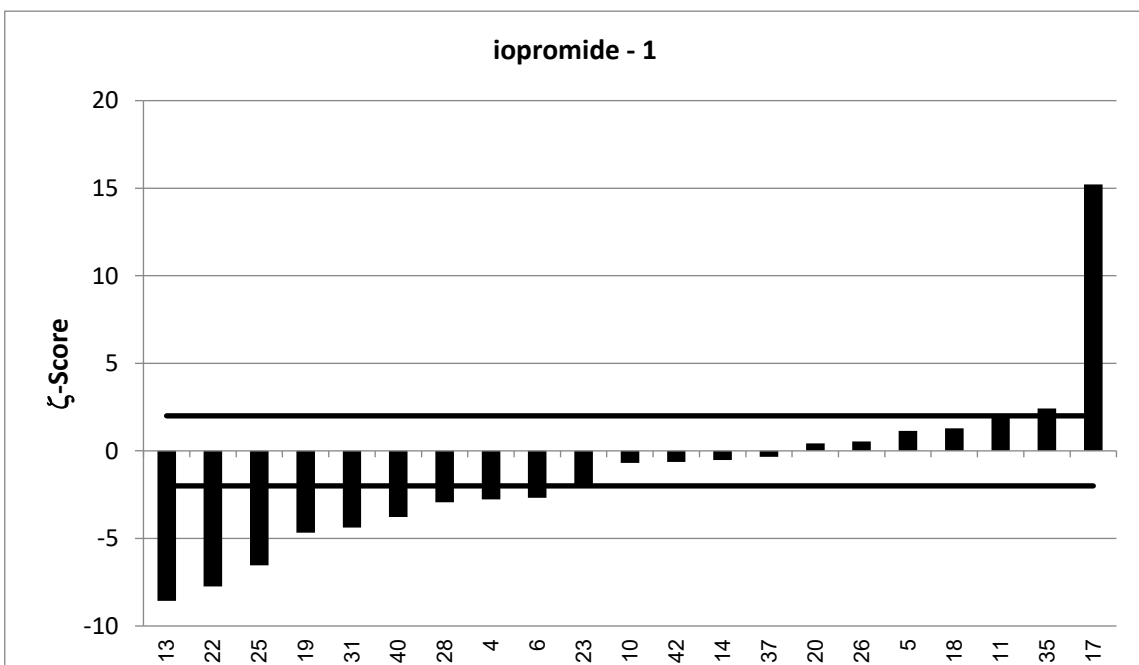
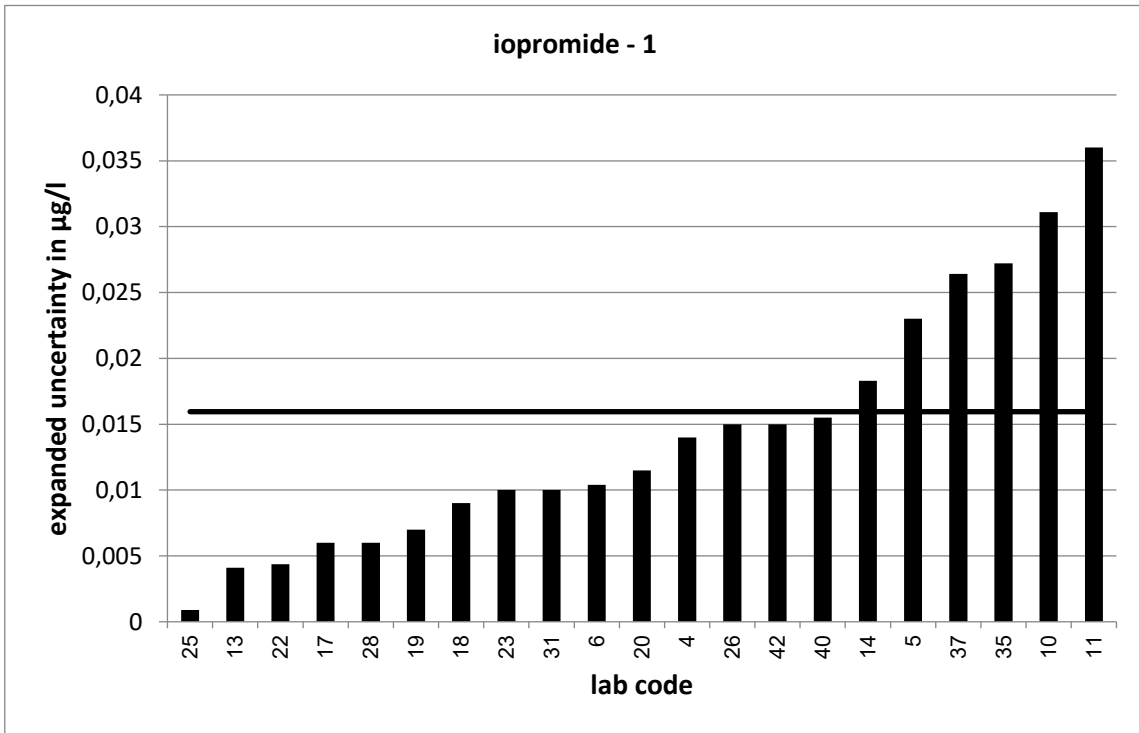


PT 4/21 - TW S6		iopromide - 1			
assigned value [$\mu\text{g/l}$]*		0,07986 \pm 0,00304			
upper tolerance limit [$\mu\text{g/l}$]		0,1159			
lower tolerance limit [$\mu\text{g/l}$]		0,05068			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,084			0,2	s
2	0,0563			-1,6	s
4	0,06	0,014	-2,8	-1,4	s
5	0,093	0,023	1,1	0,7	s
6	0,0653	0,01	-2,7	-1,0	s
7	0,0999			1,1	s
10	0,069	0,031	-0,7	-0,7	s
11	0,116	0,036	2,0	2,0	s
12	0,084			0,2	s
13	0,058	0,004	-8,6	-1,5	s
14	0,075	0,018	-0,5	-0,3	s
17	0,131	0,006	15,2	2,8	q
18	0,086	0,009	1,3	0,3	s
19	0,062	0,007	-4,7	-1,2	s
20	0,0824	0,012	0,4	0,1	s
22	0,0593	0,004	-7,7	-1,4	s
23	0,0696	0,01	-2,0	-0,7	s
24	0,0785			-0,1	s
25	0,0695	9E-04	-6,5	-0,7	s
26	0,084	0,015	0,5	0,2	s
27	0,0824			0,1	s
28	0,07	0,006	-2,9	-0,7	s
29	0,0811			0,1	s
30	0,066			-0,9	s
31	0,057	0,01	-4,4	-1,6	s
33	0,0644			-1,1	s
34	0,07			-0,7	s
35	0,113	0,027	2,4	1,8	s
36	0,0792			0,0	s
37	0,0754	0,026	-0,3	-0,3	s
40	0,05	0,016	-3,8	-2,0	s
42	0,075	0,015	-0,6	-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



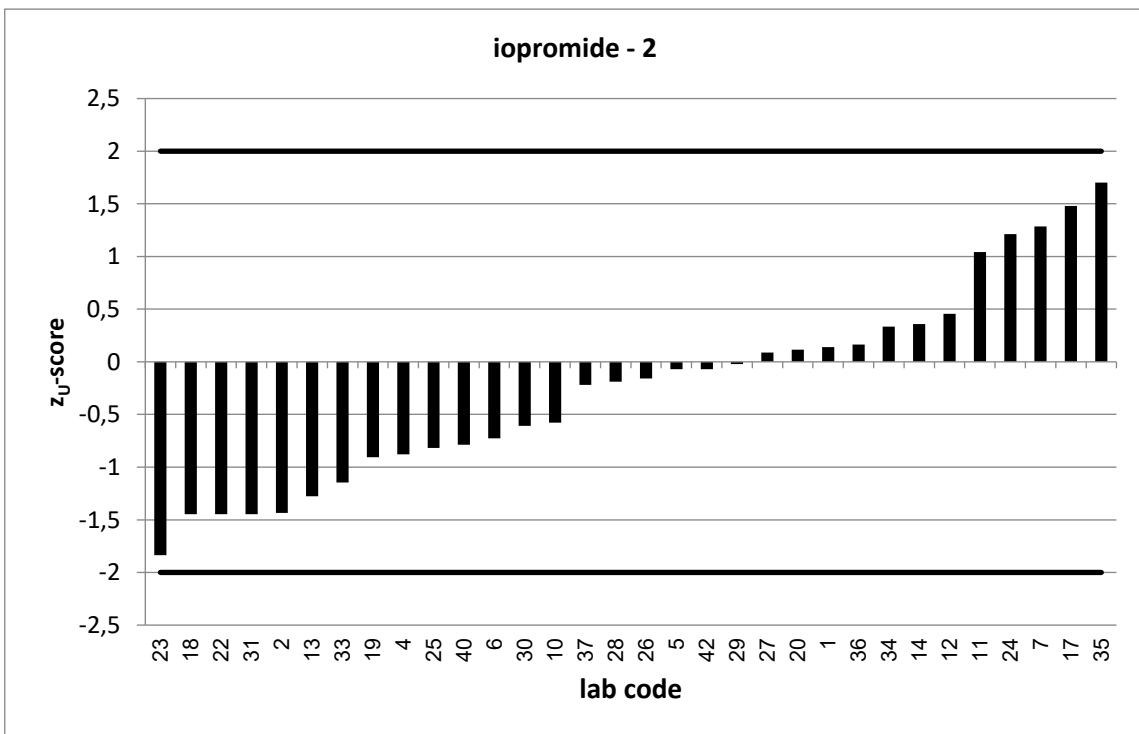
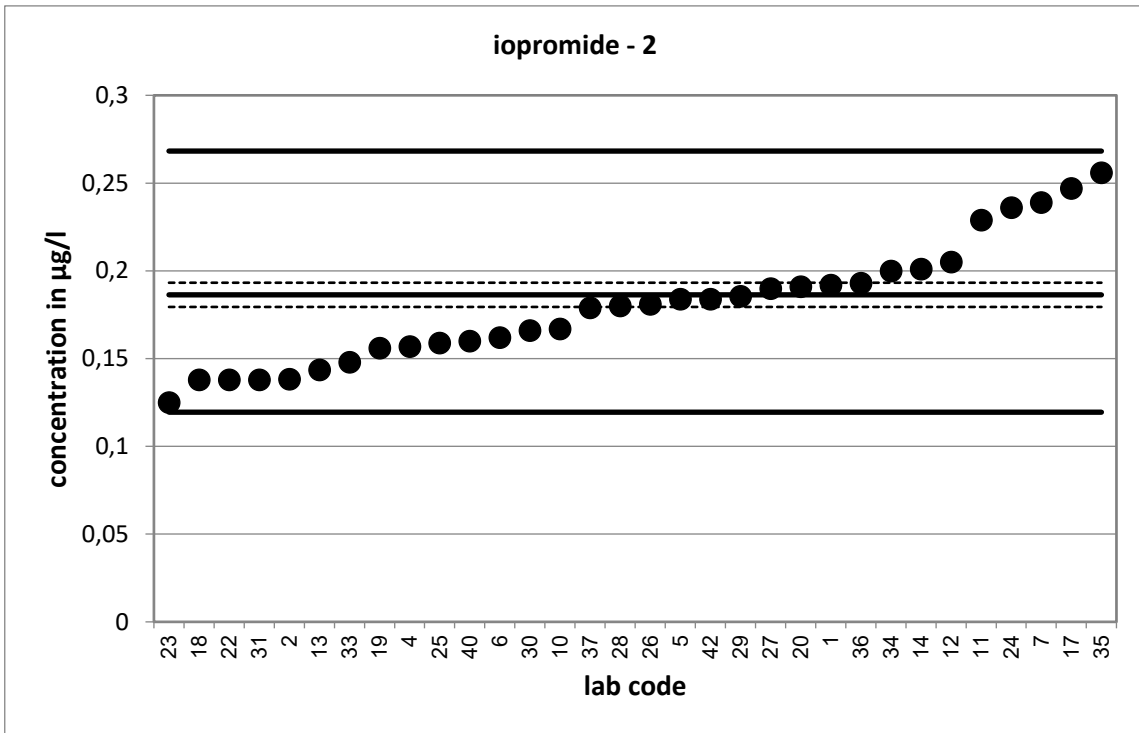


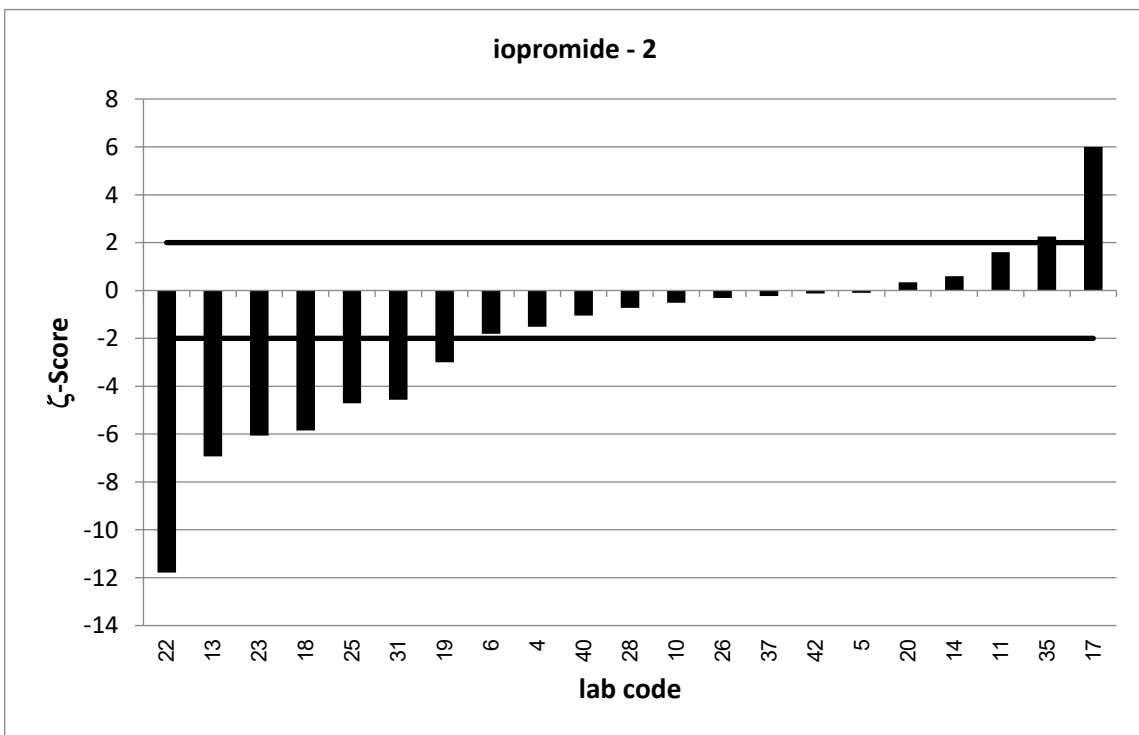
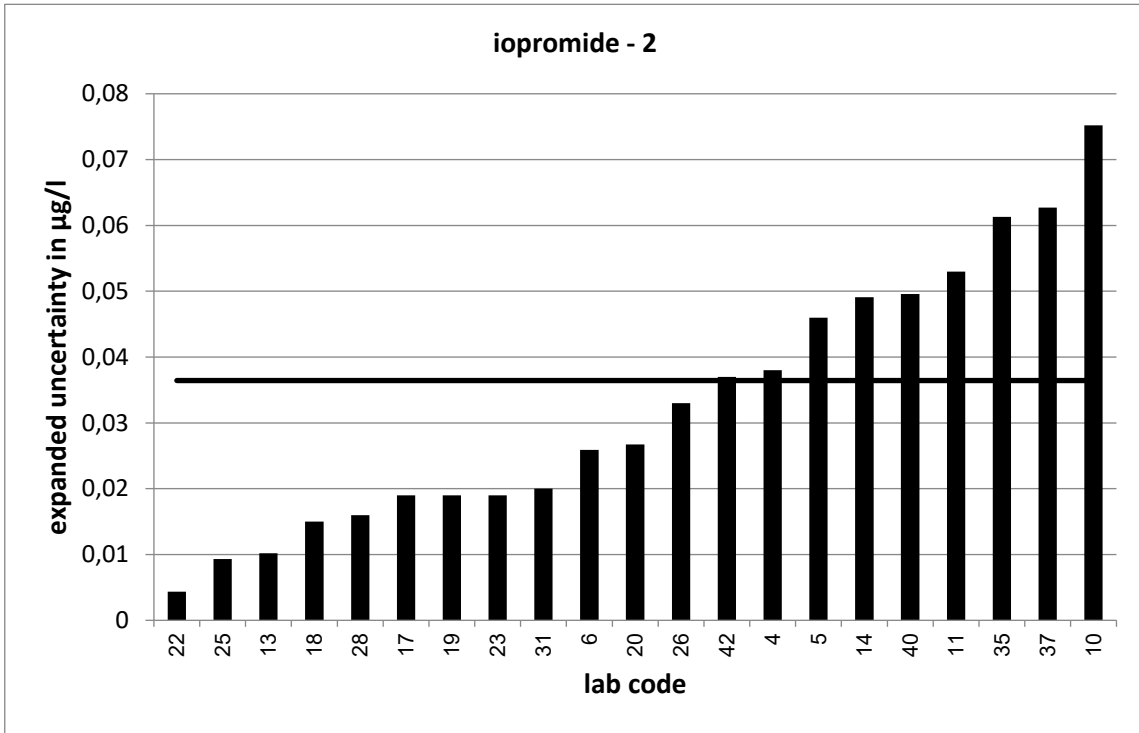
lab code

PT 4/21 - TW S6		iopromide - 2			
assigned value [$\mu\text{g/l}$]*		0,1863		$\pm 0,0069$	
upper tolerance limit [$\mu\text{g/l}$]		0,2682			
lower tolerance limit [$\mu\text{g/l}$]		0,1195			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,192			0,1	s
2	0,1384			-1,4	s
4	0,157	0,038	-1,5	-0,9	s
5	0,184	0,046	-0,1	-0,1	s
6	0,162	0,026	-1,8	-0,7	s
7	0,239			1,3	s
10	0,167	0,075	-0,5	-0,6	s
11	0,229	0,053	1,6	1,0	s
12	0,205			0,5	s
13	0,1436	0,01	-6,9	-1,3	s
14	0,201	0,049	0,6	0,4	s
17	0,247	0,019	6,0	1,5	s
18	0,138	0,015	-5,8	-1,4	s
19	0,156	0,019	-3,0	-0,9	s
20	0,191	0,027	0,3	0,1	s
22	0,138	0,004	-11,8	-1,4	s
23	0,125	0,019	-6,1	-1,8	s
24	0,236			1,2	s
25	0,159	0,009	-4,7	-0,8	s
26	0,181	0,033	-0,3	-0,2	s
27	0,19			0,1	s
28	0,18	0,016	-0,7	-0,2	s
29	0,1856			0,0	s
30	0,166			-0,6	s
31	0,138	0,02	-4,6	-1,4	s
33	0,148			-1,1	s
34	0,2			0,3	s
35	0,256	0,061	2,3	1,7	s
36	0,193			0,2	s
37	0,179	0,063	-0,2	-0,2	s
40	0,16	0,05	-1,1	-0,8	s
42	0,184	0,037	-0,1	-0,1	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

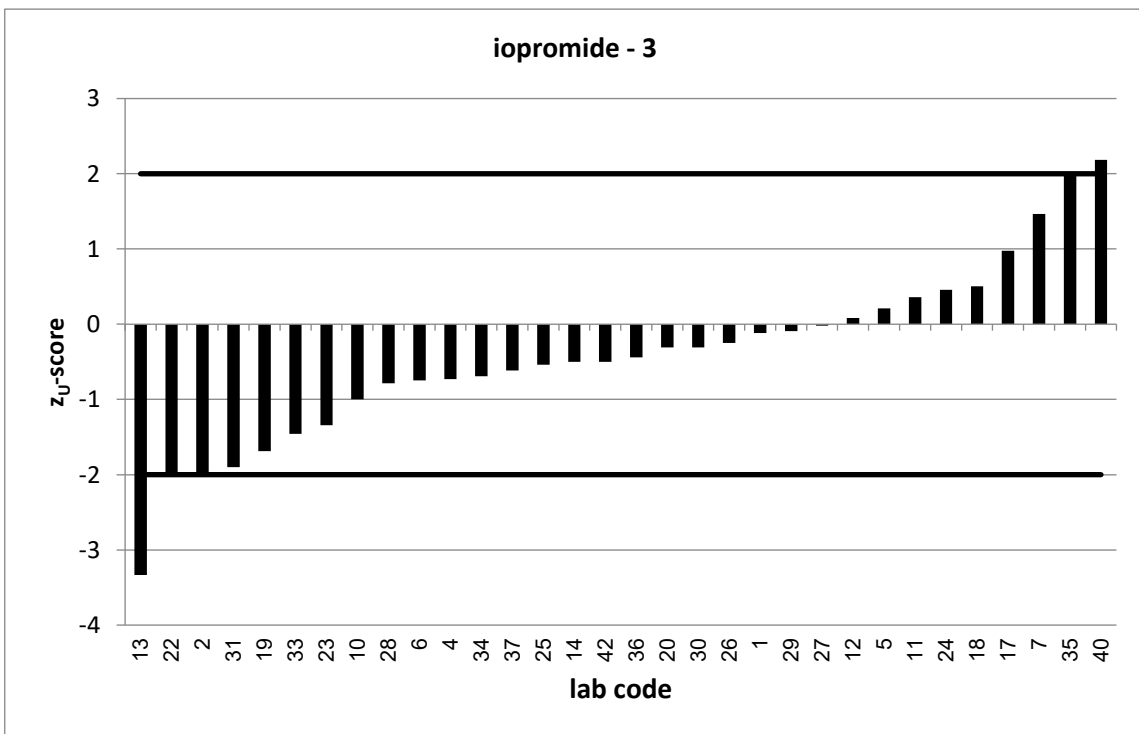
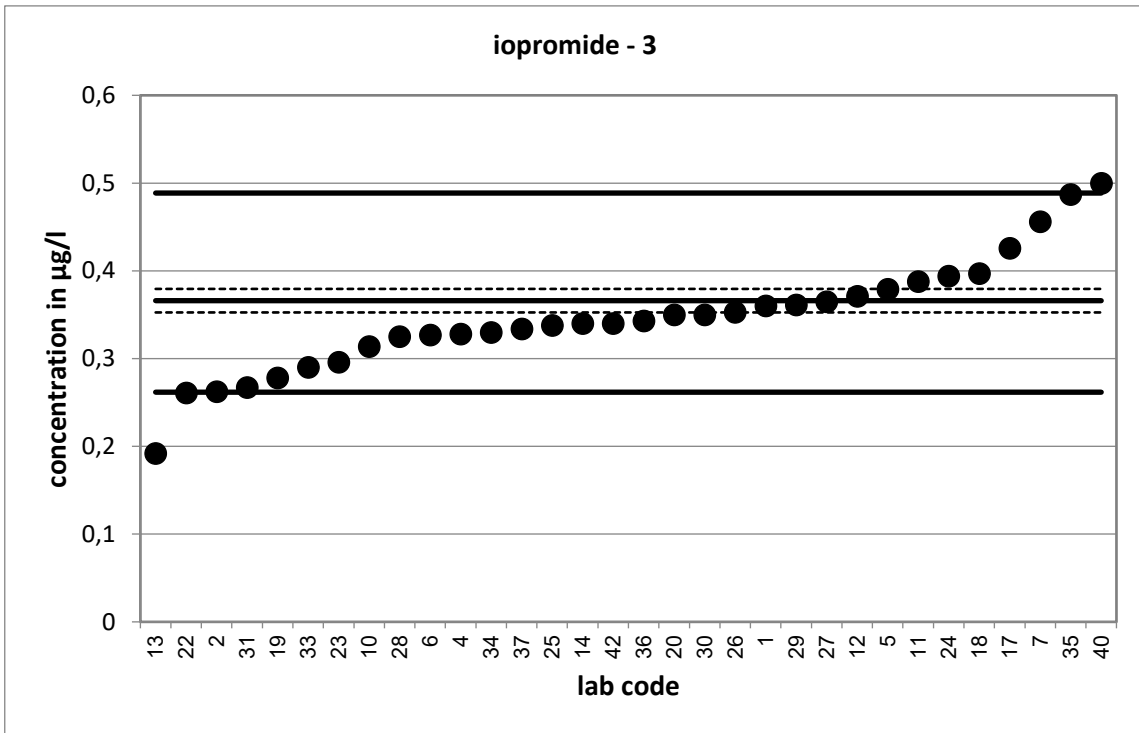


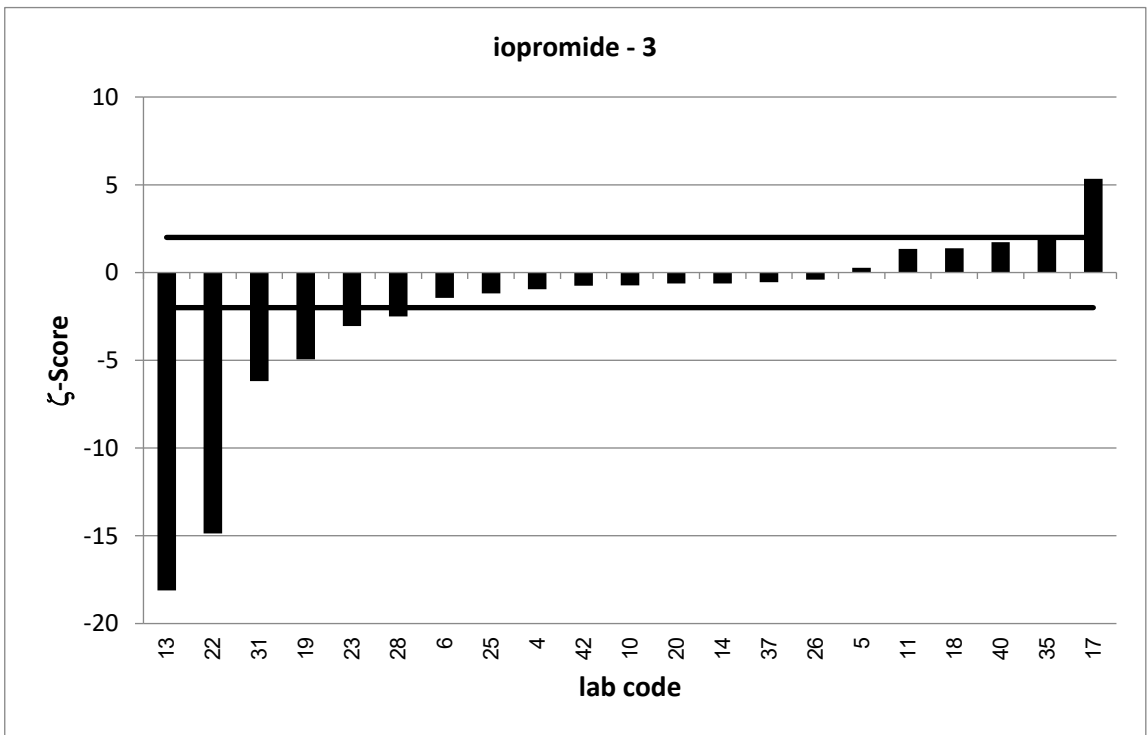
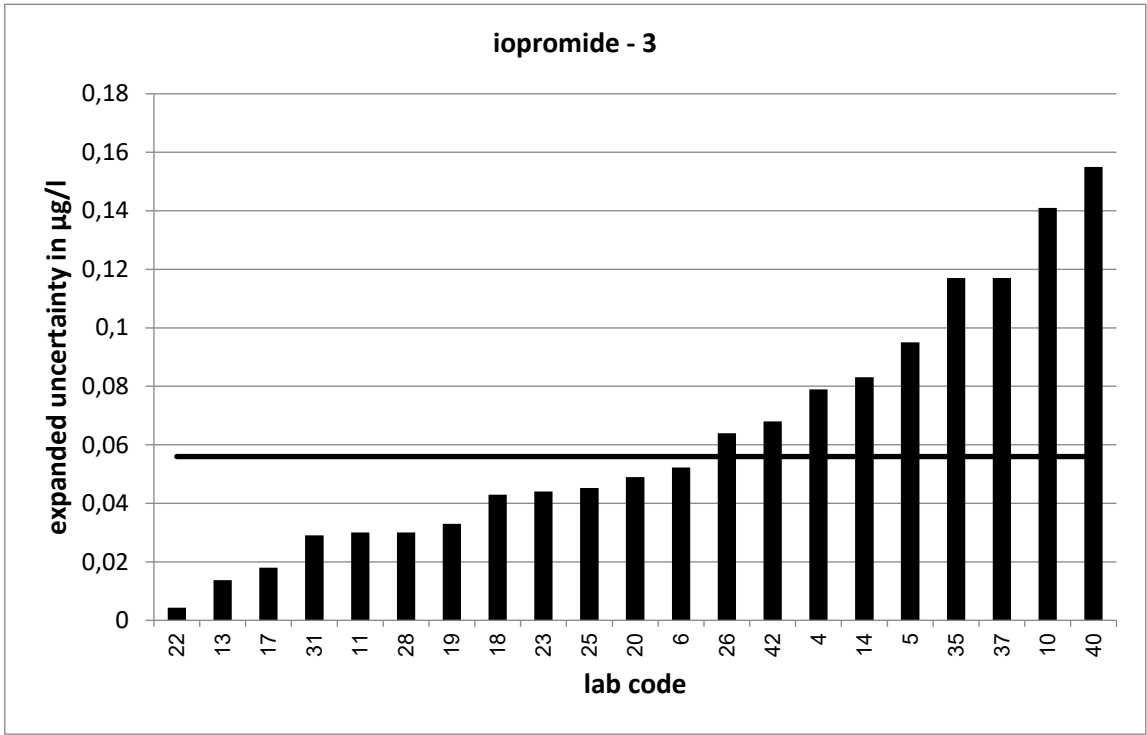


PT 4/21 - TW S6		iopromide - 3			
assigned value [$\mu\text{g/l}$]*		0,366 \pm 0,0134			
upper tolerance limit [$\mu\text{g/l}$]		0,4887			
lower tolerance limit [$\mu\text{g/l}$]		0,2617			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
1	0,36			-0,1	s
2	0,2623			-2,0	s
4	0,328	0,079	-0,9	-0,7	s
5	0,379	0,095	0,3	0,2	s
6	0,327	0,052	-1,4	-0,7	s
7	0,456			1,5	s
10	0,314	0,141	-0,7	-1,0	s
11	0,388	0,03	1,3	0,4	s
12	0,371			0,1	s
13	0,1922	0,014	-18,1	-3,3	u
14	0,34	0,083	-0,6	-0,5	s
17	0,426	0,018	5,3	1,0	s
18	0,397	0,043	1,4	0,5	s
19	0,278	0,033	-4,9	-1,7	s
20	0,35	0,049	-0,6	-0,3	s
22	0,261	0,004	-14,9	-2,0	s
23	0,296	0,044	-3,0	-1,3	s
24	0,394			0,5	s
25	0,338	0,045	-1,2	-0,5	s
26	0,353	0,064	-0,4	-0,2	s
27	0,365			0,0	s
28	0,325	0,03	-2,5	-0,8	s
29	0,3612			-0,1	s
30	0,35			-0,3	s
31	0,267	0,029	-6,2	-1,9	s
33	0,29			-1,5	s
34	0,33			-0,7	s
35	0,487	0,117	2,1	2,0	s
36	0,343			-0,4	s
37	0,334	0,117	-0,5	-0,6	s
40	0,5	0,155	1,7	2,2	q
42	0,34	0,068	-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

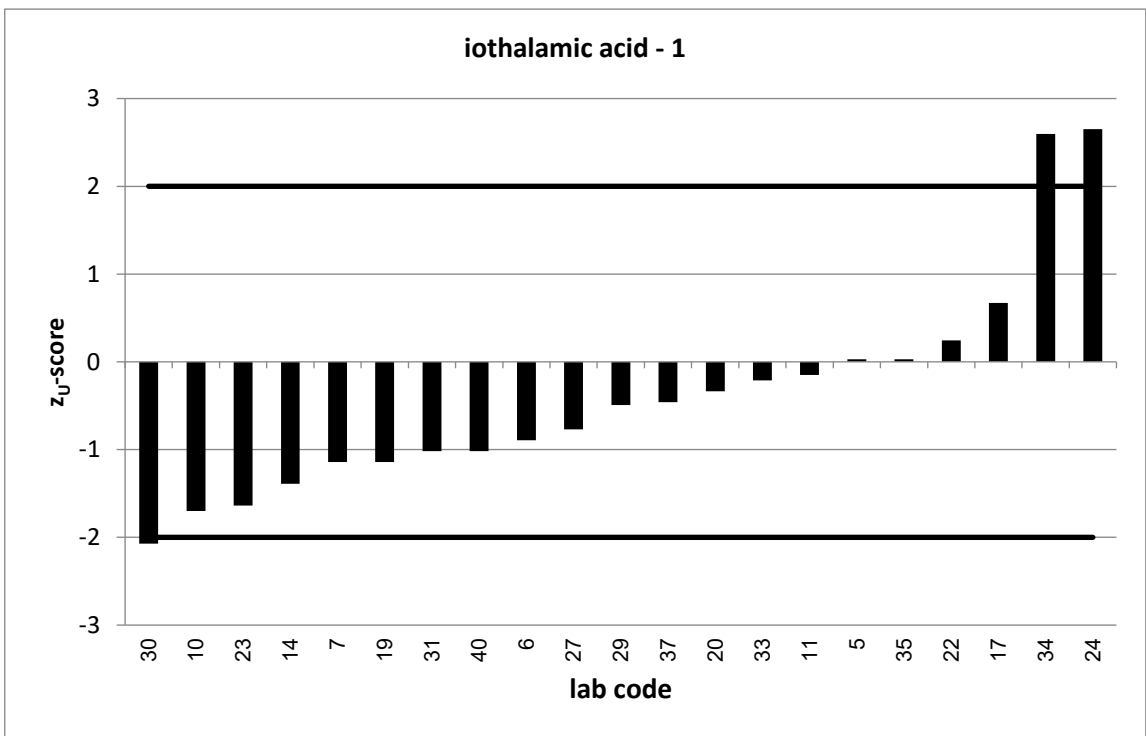
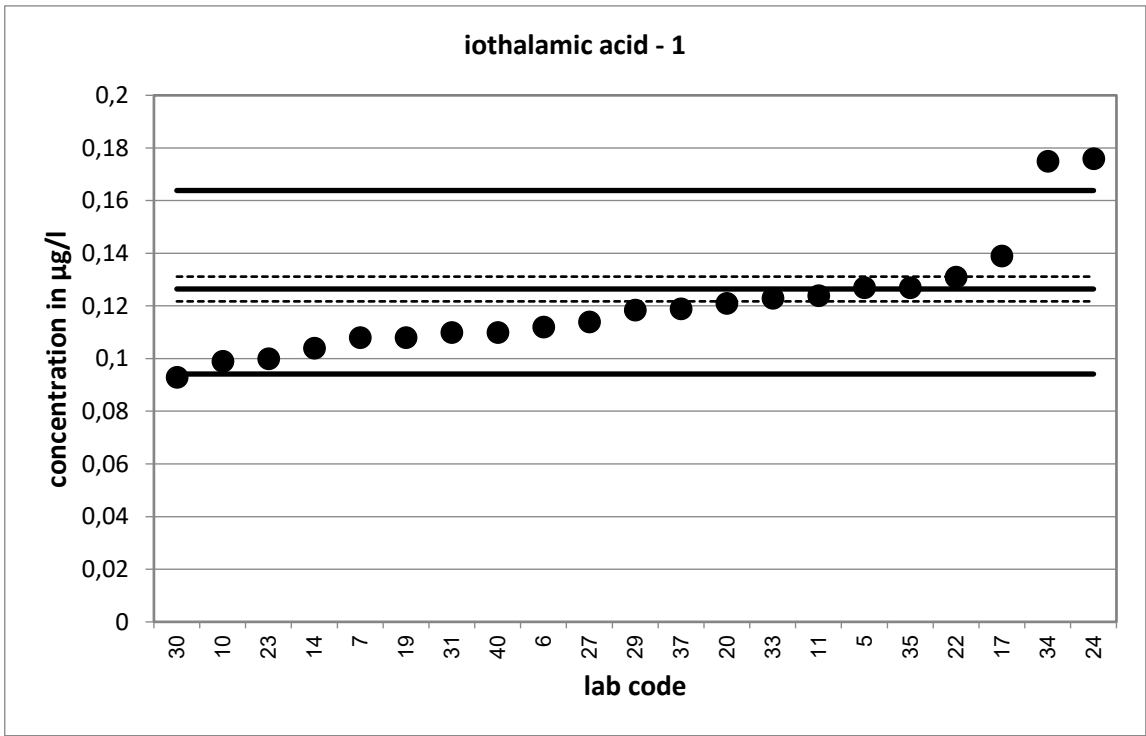


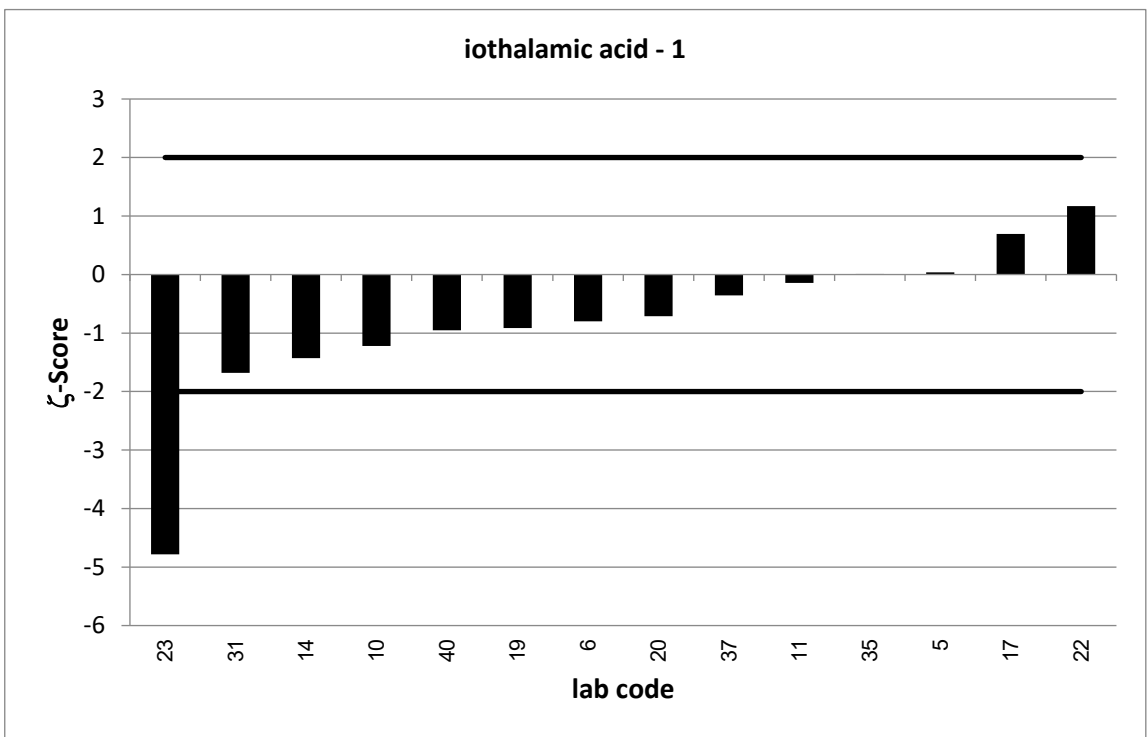
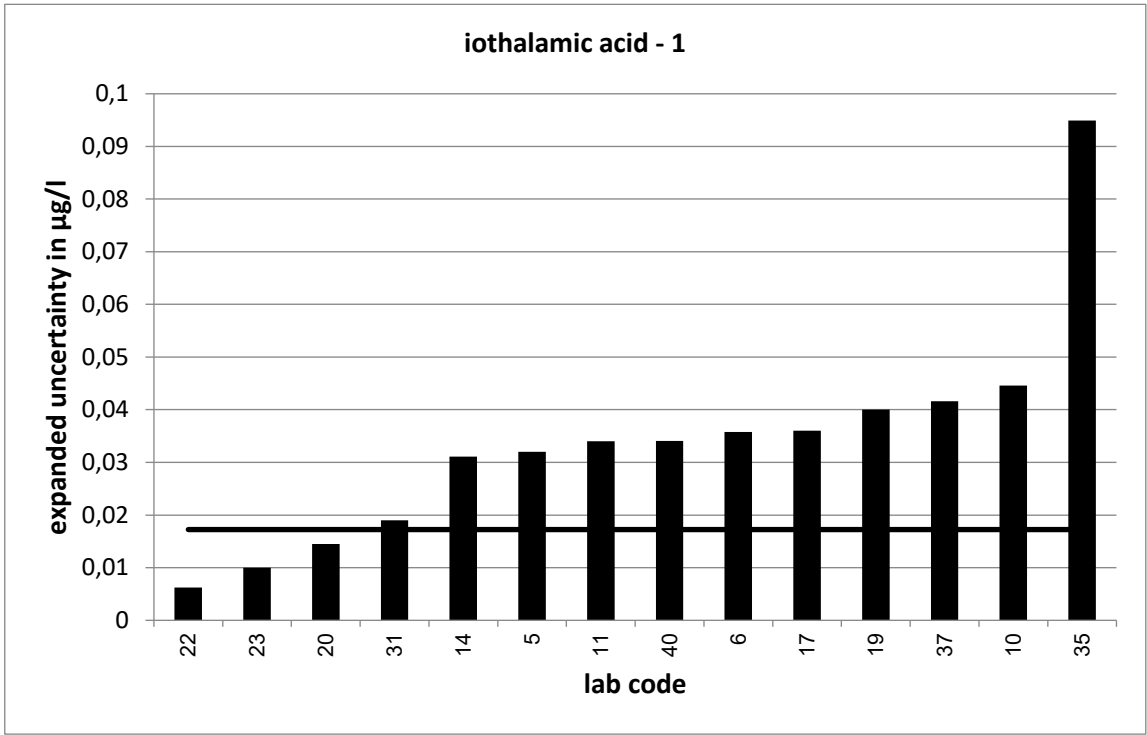


PT 4/21 - TW S6		iothalmic acid - 1			
assigned value [$\mu\text{g/l}$]*		0,1264 \pm 0,0047			
upper tolerance limit [$\mu\text{g/l}$]		0,1638			
lower tolerance limit [$\mu\text{g/l}$]		0,09414			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,127	0,032	0,0	0,0	s
6	0,112	0,036	-0,8	-0,9	s
7	0,108			-1,1	s
10	0,099	0,045	-1,2	-1,7	s
11	0,124	0,034	-0,1	-0,2	s
14	0,104	0,031	-1,4	-1,4	s
17	0,139	0,036	0,7	0,7	s
19	0,108	0,04	-0,9	-1,1	s
20	0,121	0,015	-0,7	-0,3	s
22	0,131	0,006	1,2	0,2	s
23	0,1	0,01	-4,8	-1,6	s
24	0,176			2,7	q
27	0,114			-0,8	s
29	0,1185			-0,5	s
30	0,093			-2,1	q
31	0,11	0,019	-1,7	-1,0	s
33	0,123			-0,2	s
34	0,175			2,6	q
35	0,127	0,095	0,0	0,0	s
37	0,119	0,042	-0,4	-0,5	s
40	0,11	0,034	-1,0	-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

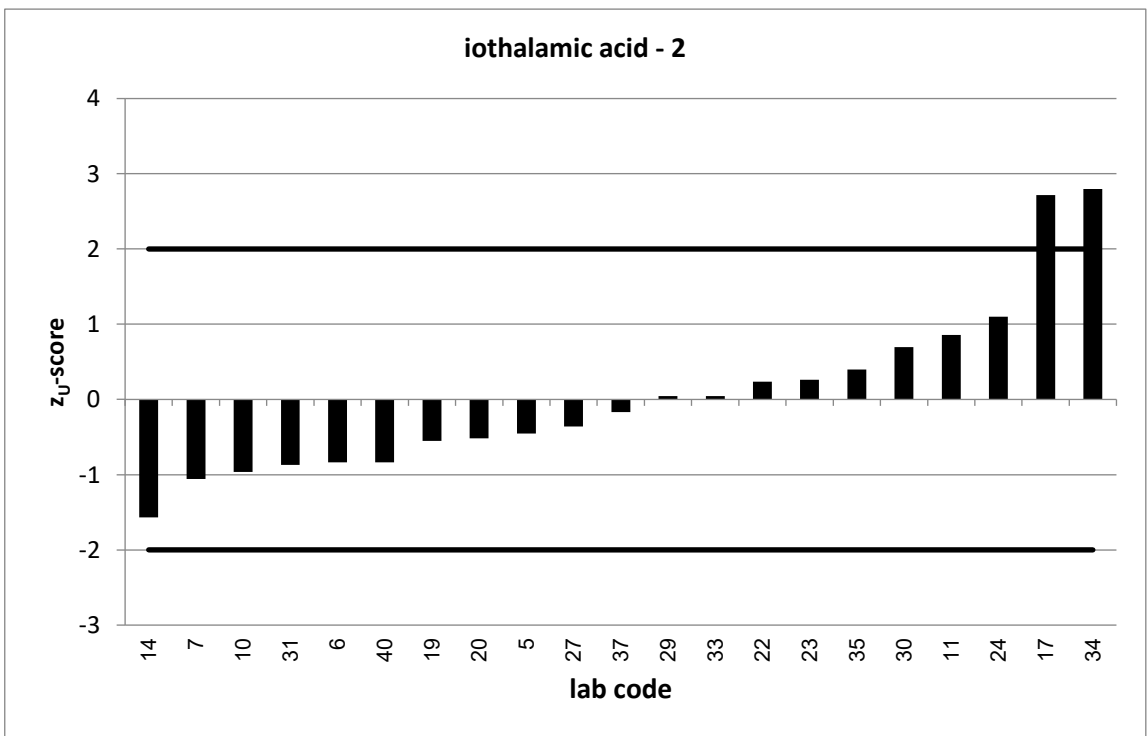
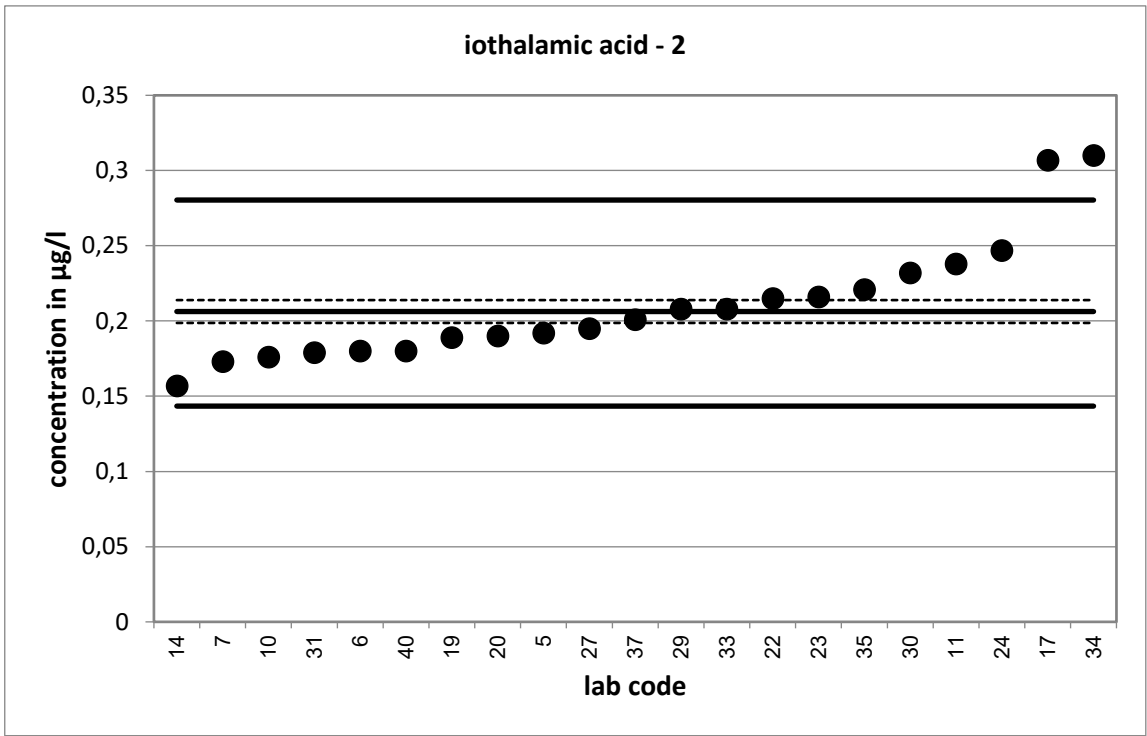


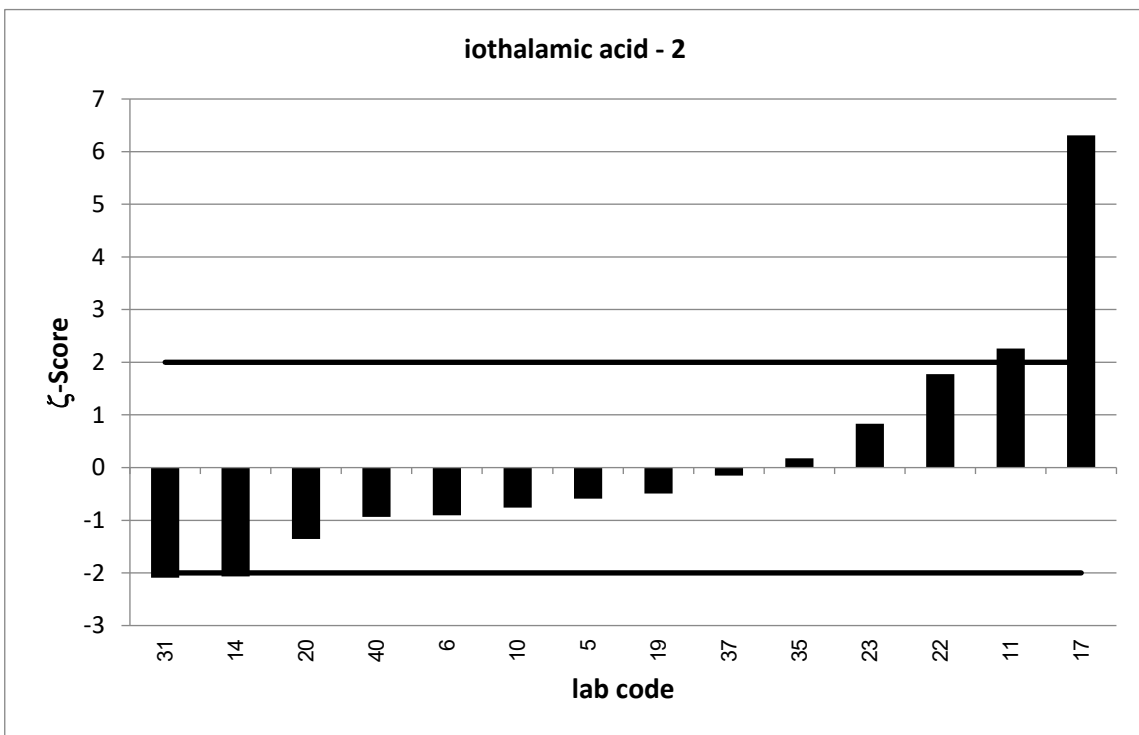
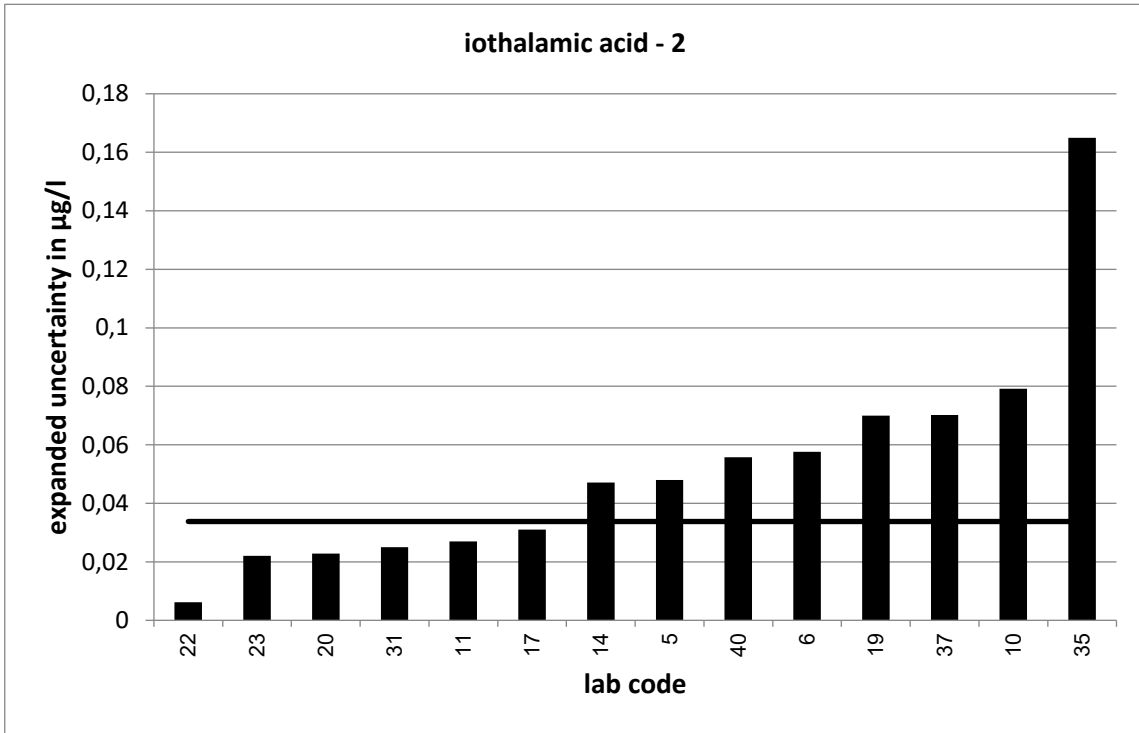


PT 4/21 - TW S6		iothalamic acid - 2			
assigned value [$\mu\text{g/l}$]*		0,2063		$\pm 0,0076$	
upper tolerance limit [$\mu\text{g/l}$]		0,2804			
lower tolerance limit [$\mu\text{g/l}$]		0,1434			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,192	0,048	-0,6	-0,5	s
6	0,18	0,058	-0,9	-0,8	s
7	0,173			-1,1	s
10	0,176	0,079	-0,8	-1,0	s
11	0,238	0,027	2,3	0,9	s
14	0,157	0,047	-2,1	-1,6	s
17	0,307	0,031	6,3	2,7	q
19	0,189	0,07	-0,5	-0,6	s
20	0,19	0,023	-1,4	-0,5	s
22	0,215	0,006	1,8	0,2	s
23	0,216	0,022	0,8	0,3	s
24	0,247			1,1	s
27	0,195			-0,4	s
29	0,2079			0,0	s
30	0,232			0,7	s
31	0,179	0,025	-2,1	-0,9	s
33	0,208			0,0	s
34	0,31			2,8	q
35	0,221	0,165	0,2	0,4	s
37	0,201	0,07	-0,1	-0,2	s
40	0,18	0,056	-0,9	-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

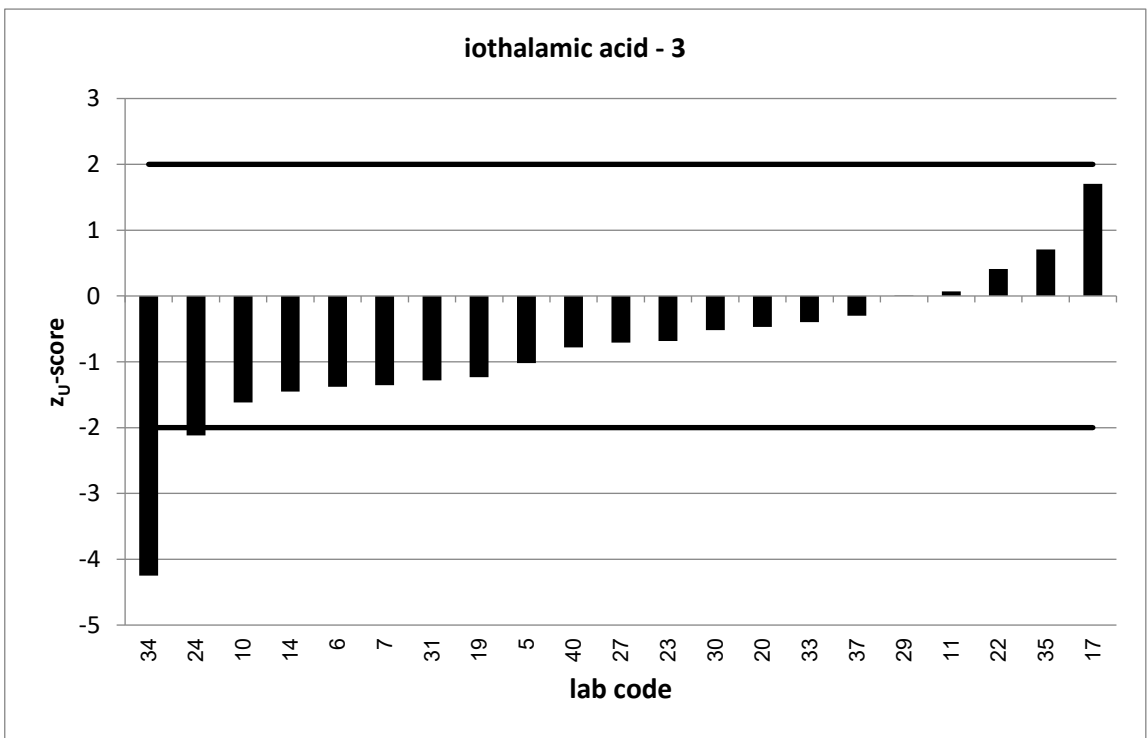
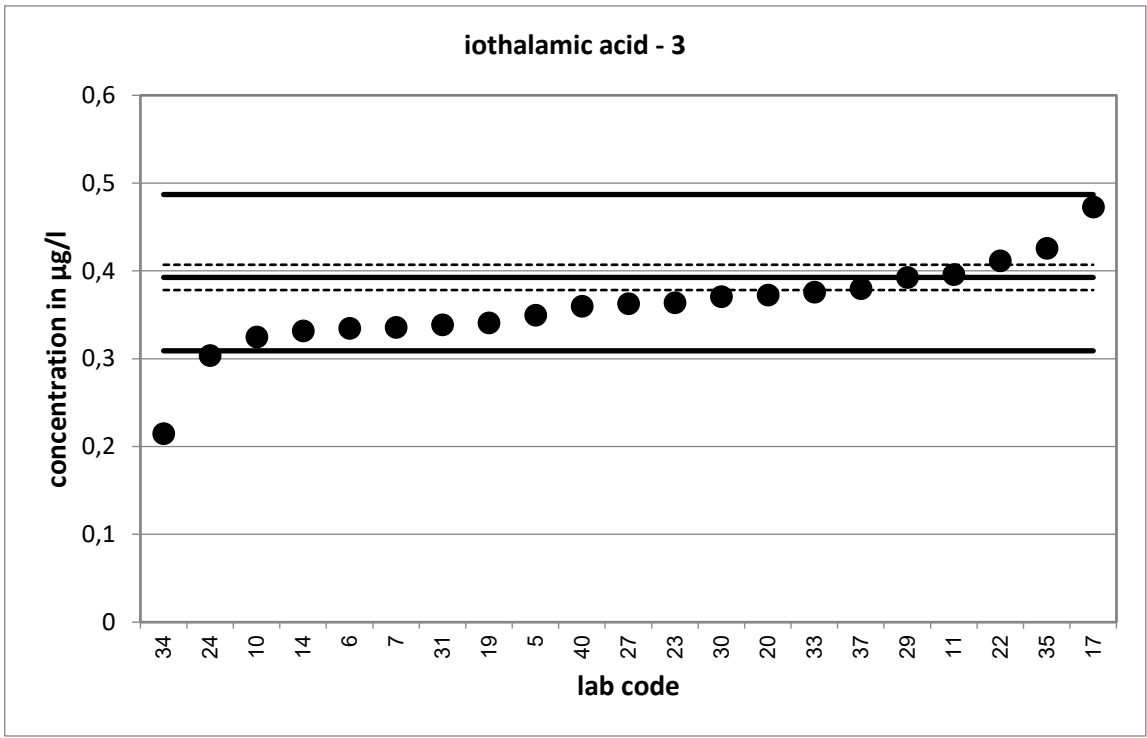


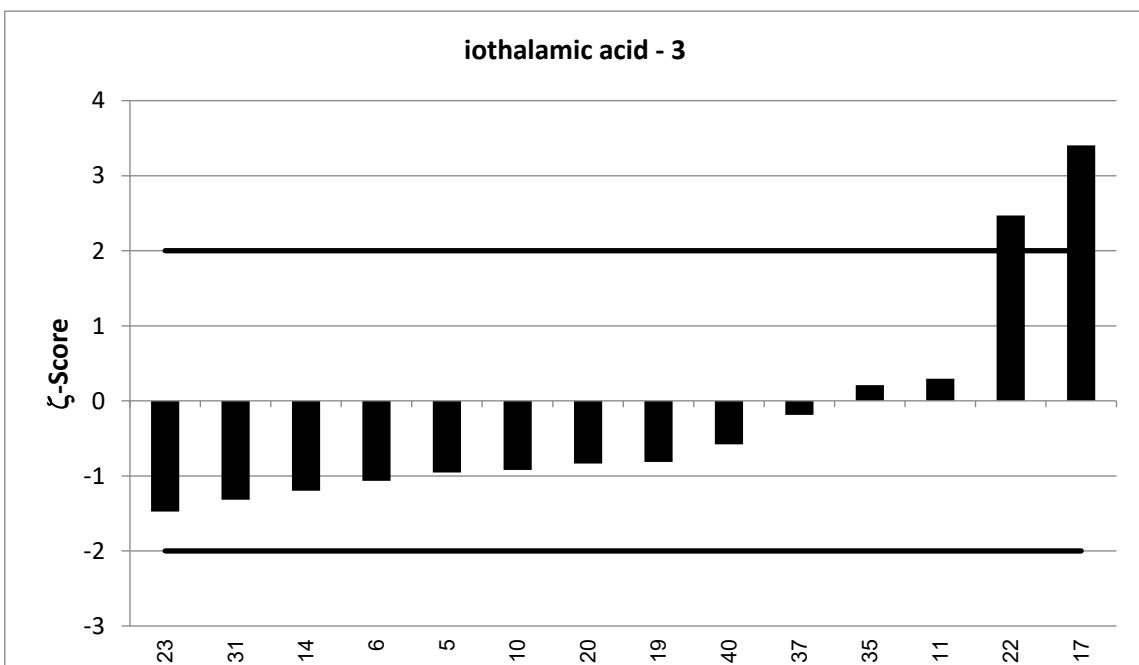
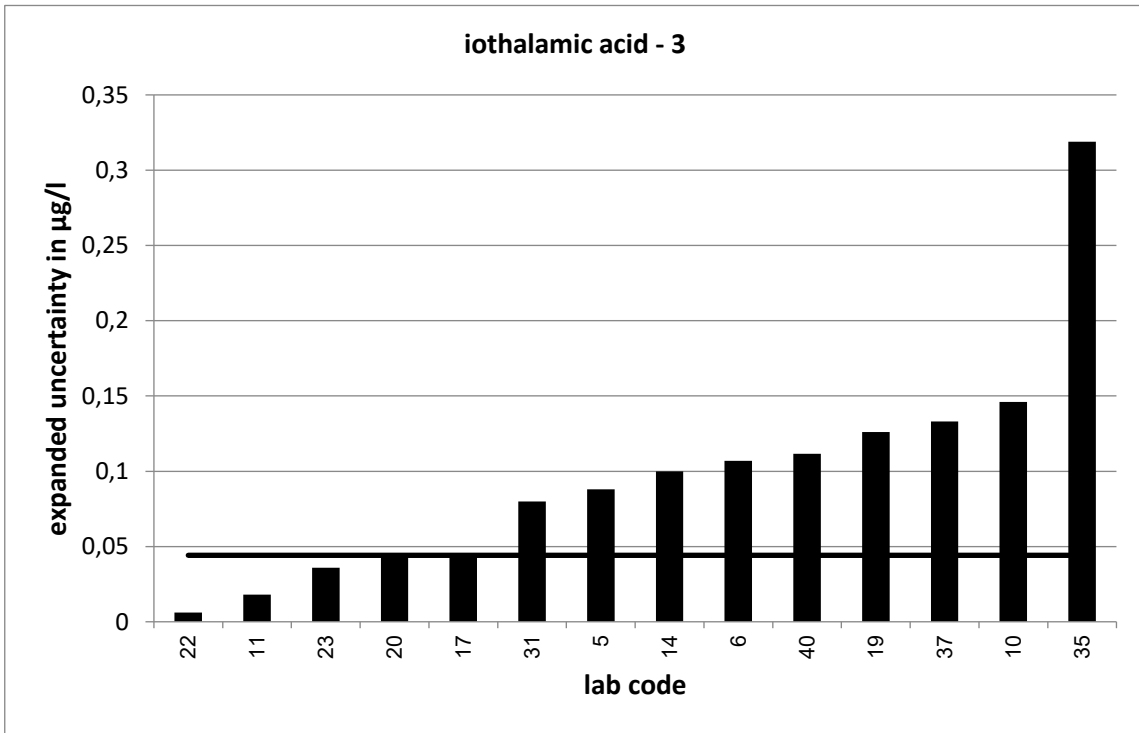


PT 4/21 - TW S6		iothalammic acid - 3			
assigned value [$\mu\text{g/l}$]*		0,3926 \pm 0,0144			
upper tolerance limit [$\mu\text{g/l}$]		0,487			
lower tolerance limit [$\mu\text{g/l}$]		0,309			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,35	0,088	-1,0	-1,0	s
6	0,335	0,107	-1,1	-1,4	s
7	0,336			-1,4	s
10	0,325	0,146	-0,9	-1,6	s
11	0,396	0,018	0,3	0,1	s
14	0,332	0,1	-1,2	-1,5	s
17	0,473	0,045	3,4	1,7	s
19	0,341	0,126	-0,8	-1,2	s
20	0,373	0,045	-0,8	-0,5	s
22	0,412	0,006	2,5	0,4	s
23	0,364	0,036	-1,5	-0,7	s
24	0,304			-2,1	q
27	0,363			-0,7	s
29	0,3927			0,0	s
30	0,371			-0,5	s
31	0,339	0,08	-1,3	-1,3	s
33	0,376			-0,4	s
34	0,215			-4,3	u
35	0,426	0,319	0,2	0,7	s
37	0,38	0,133	-0,2	-0,3	s
40	0,36	0,112	-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



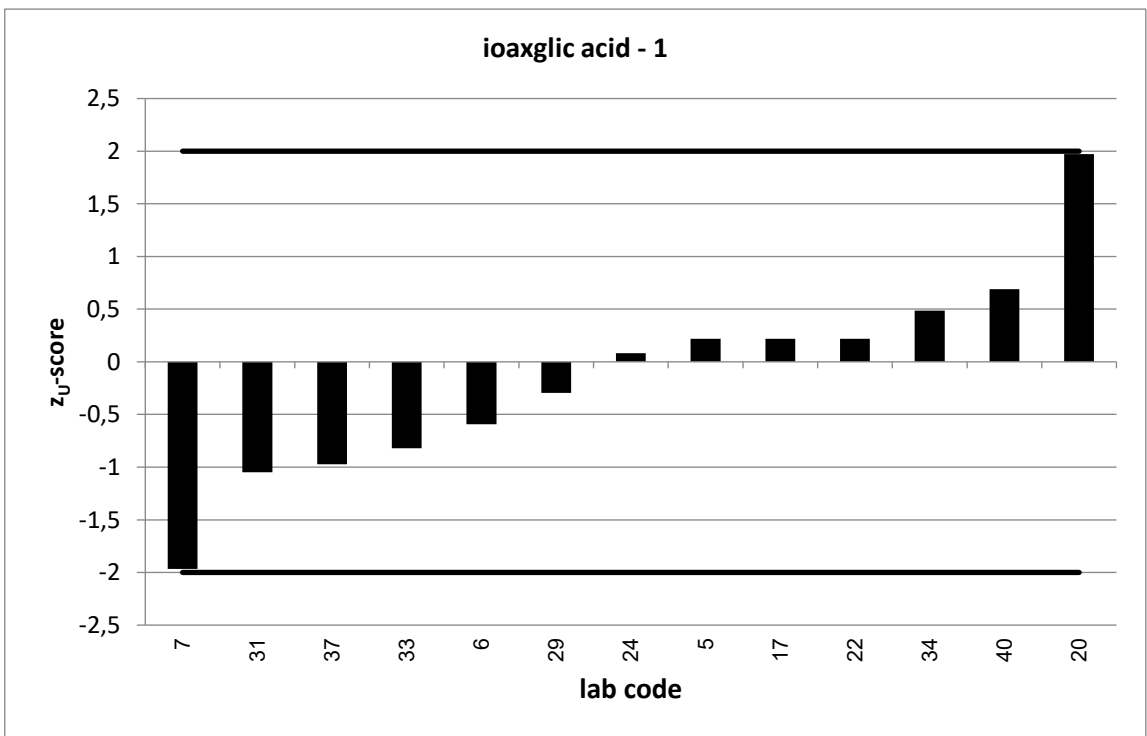
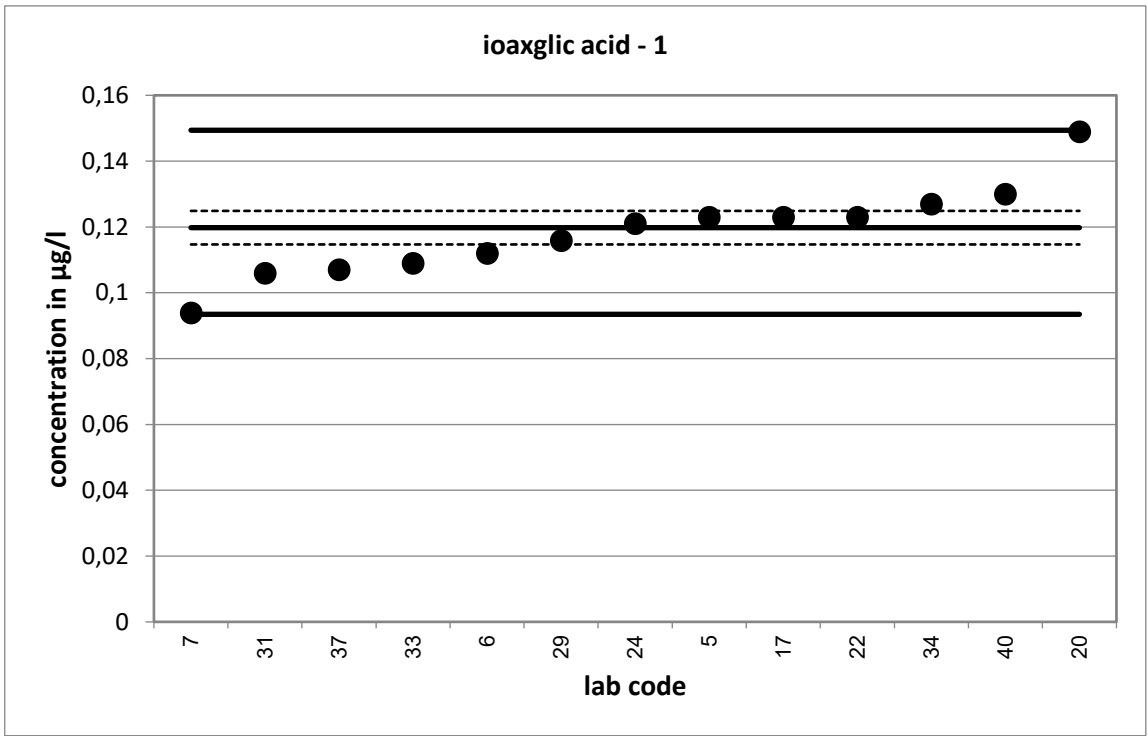


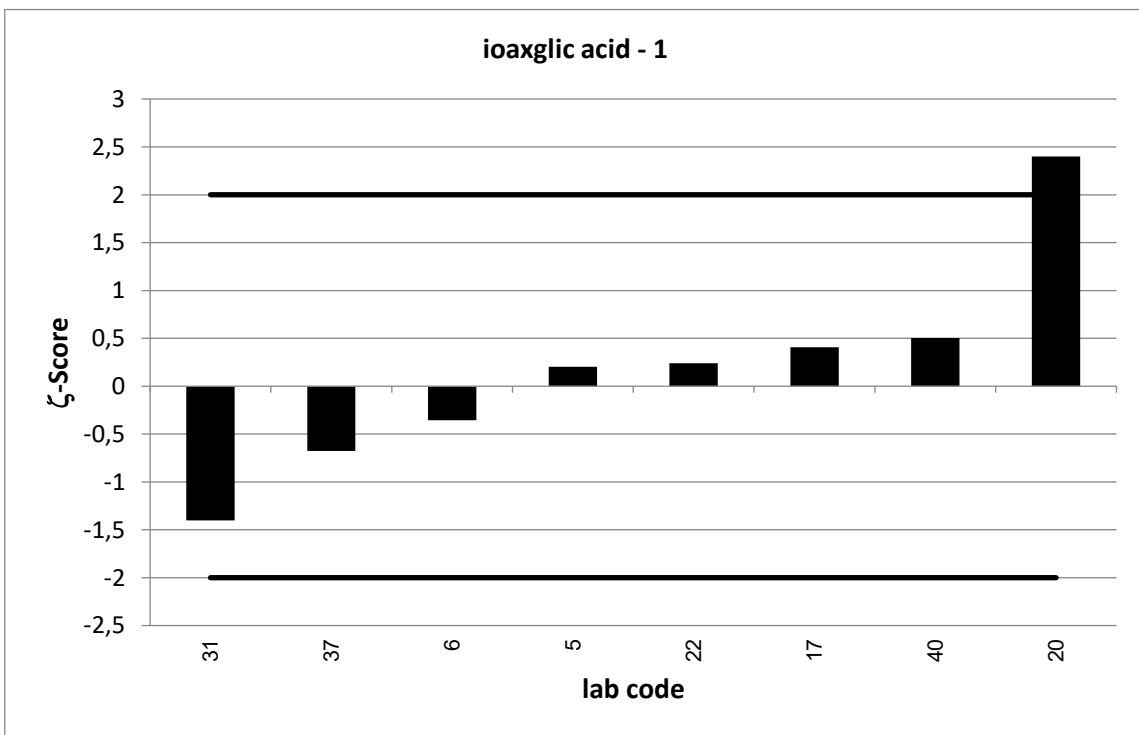
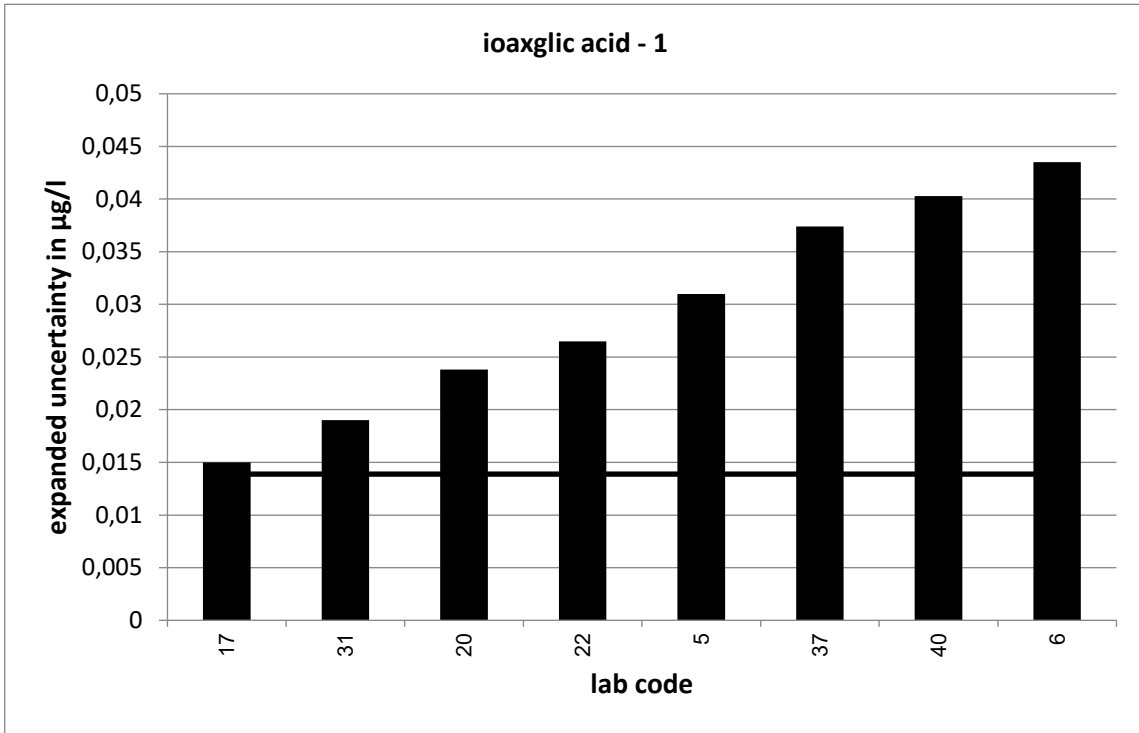
lab code

PT 4/21 - TW S6		ioaxglic acid - 1			
assigned value [$\mu\text{g/l}$]*		0,1198 \pm 0,0051			
upper tolerance limit [$\mu\text{g/l}$]		0,1494			
lower tolerance limit [$\mu\text{g/l}$]		0,09346			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,123	0,031	0,2	0,2	s
6	0,112	0,044	-0,4	-0,6	s
7	0,0939			-2,0	s
17	0,123	0,015	0,4	0,2	s
20	0,149	0,024	2,4	2,0	s
22	0,123	0,027	0,2	0,2	s
24	0,121			0,1	s
29	0,1159			-0,3	s
31	0,106	0,019	-1,4	-1,0	s
33	0,109			-0,8	s
34	0,127			0,5	s
37	0,107	0,037	-0,7	-1,0	s
40	0,13	0,04	0,5	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

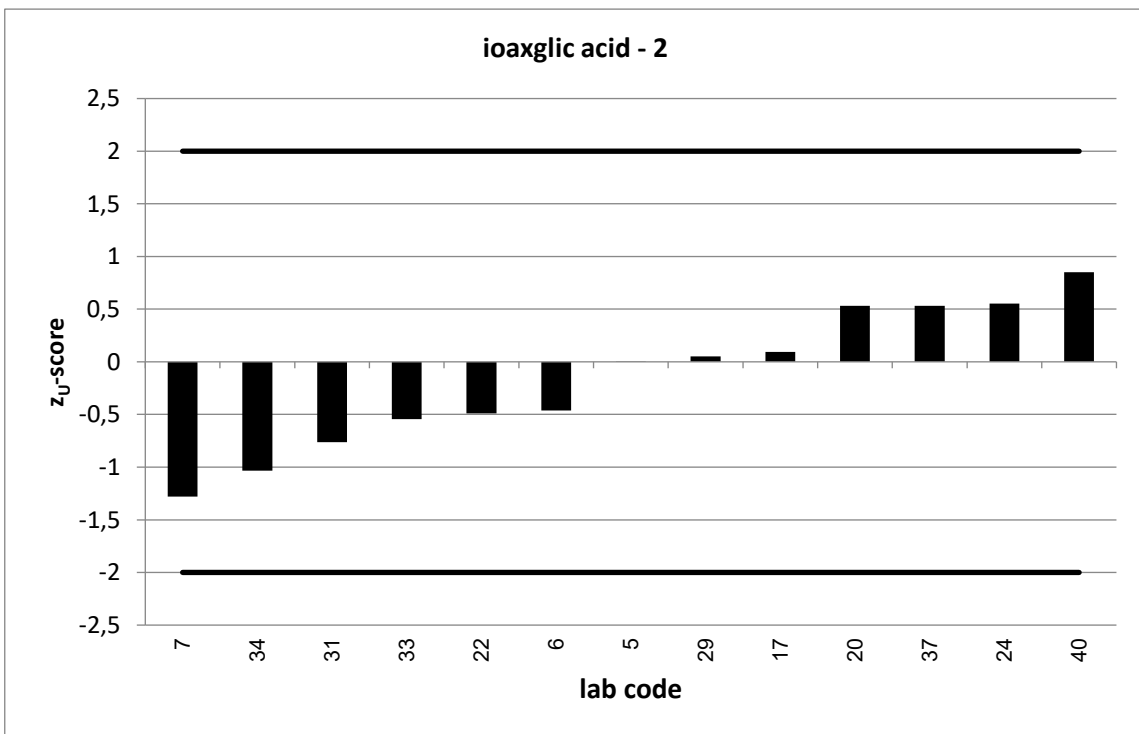
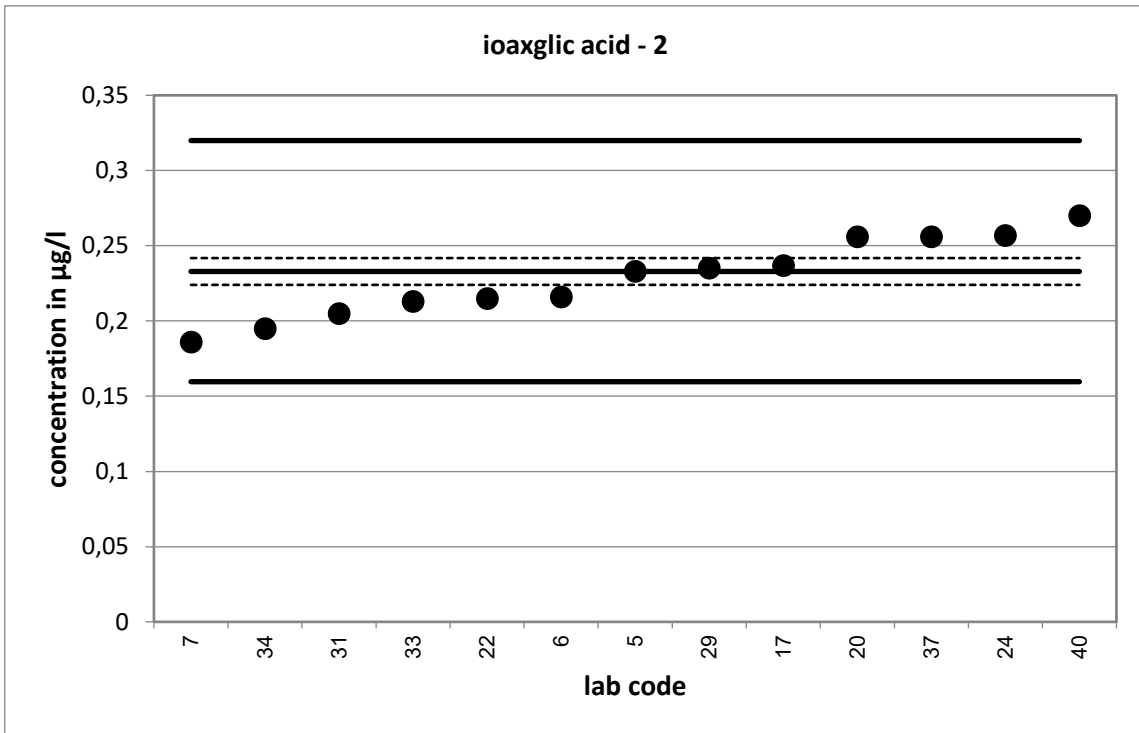


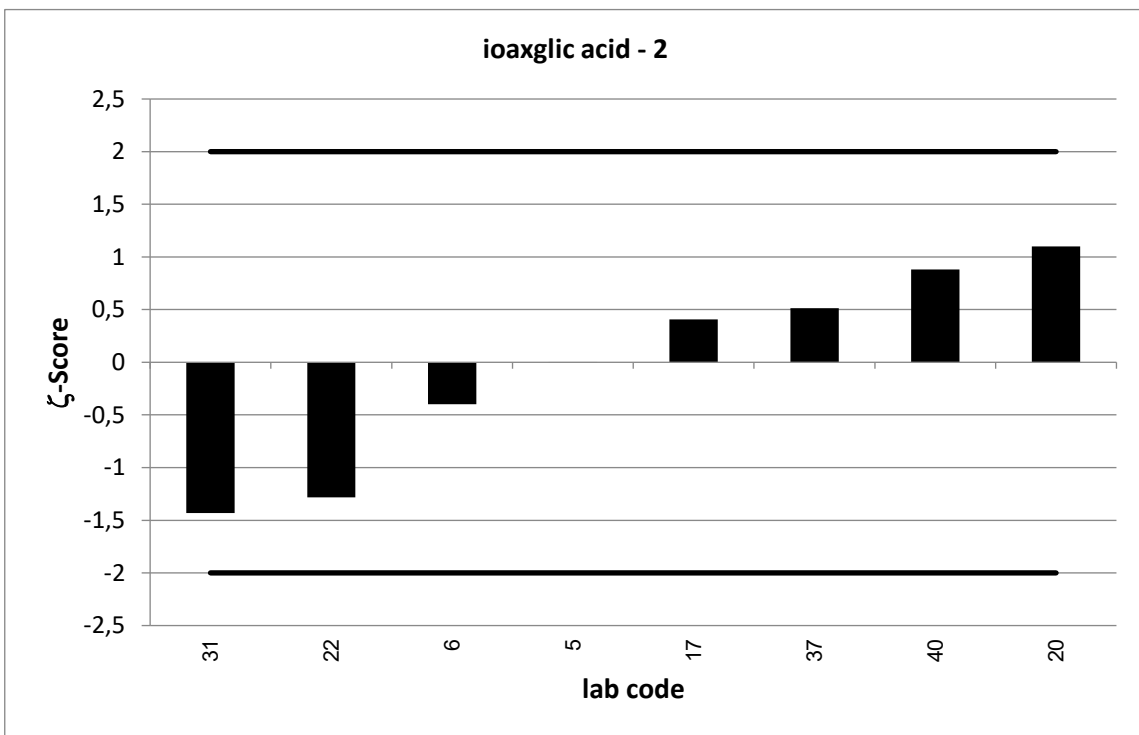
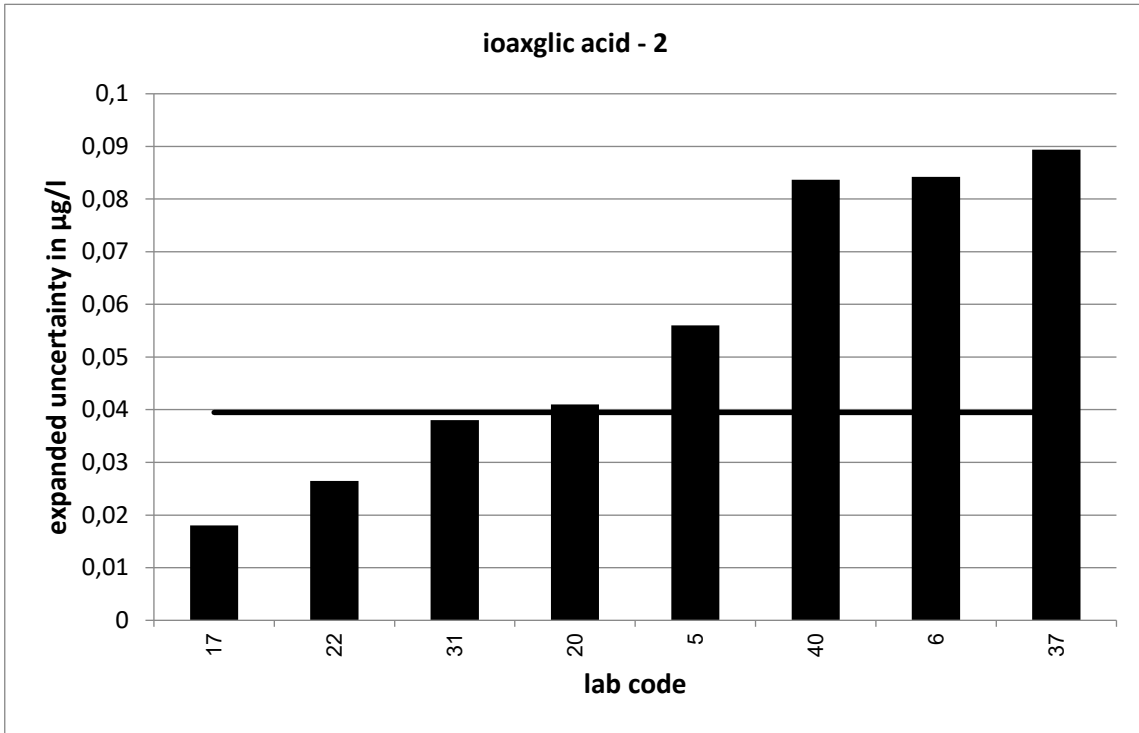


PT 4/21 - TW S6		ioaxglic acid - 2			
assigned value [$\mu\text{g/l}$]*		0,2329 \pm 0,0089			
upper tolerance limit [$\mu\text{g/l}$]		0,3199			
lower tolerance limit [$\mu\text{g/l}$]		0,1596			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,233	0,056	0,0	0,0	s
6	0,216	0,084	-0,4	-0,5	s
7	0,186			-1,3	s
17	0,237	0,018	0,4	0,1	s
20	0,256	0,041	1,1	0,5	s
22	0,215	0,027	-1,3	-0,5	s
24	0,257			0,6	s
29	0,2351			0,1	s
31	0,205	0,038	-1,4	-0,8	s
33	0,213			-0,5	s
34	0,195			-1,0	s
37	0,256	0,089	0,5	0,5	s
40	0,27	0,084	0,9	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

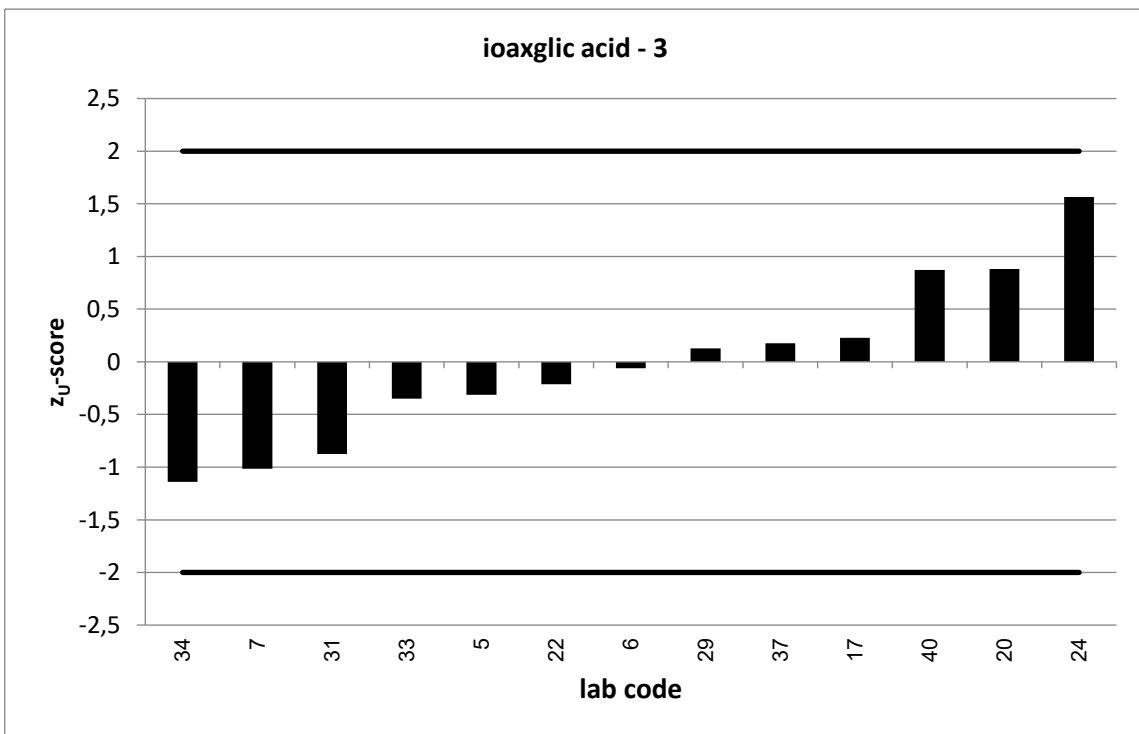
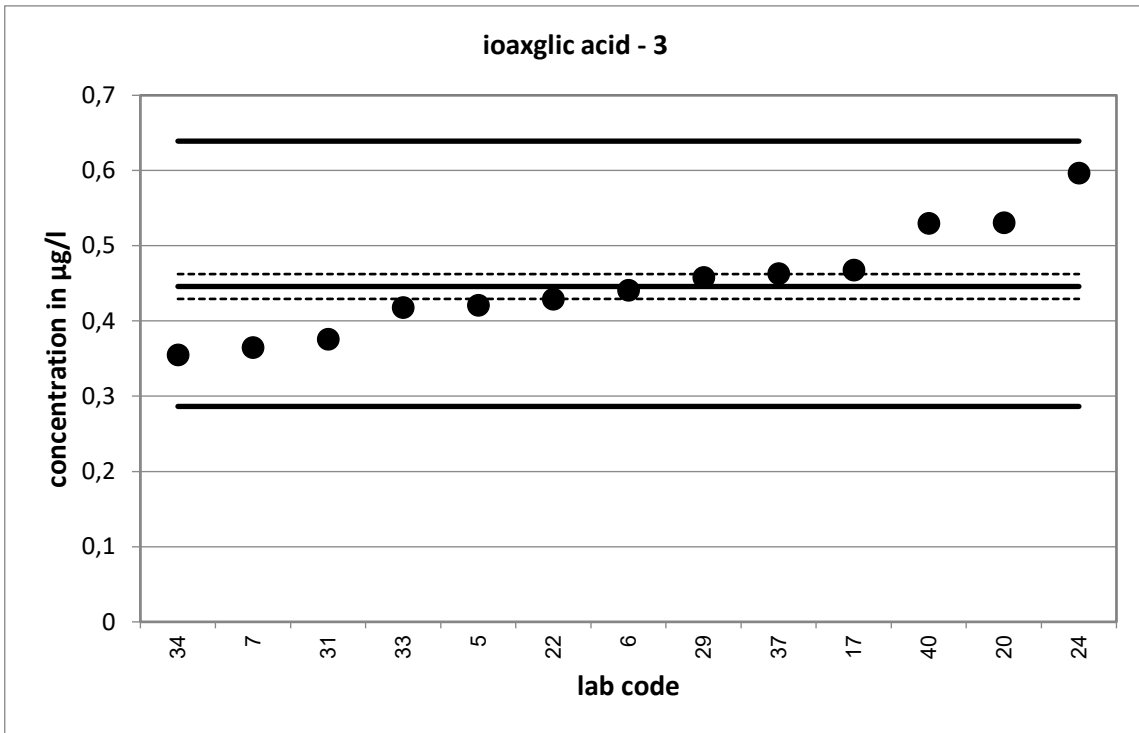


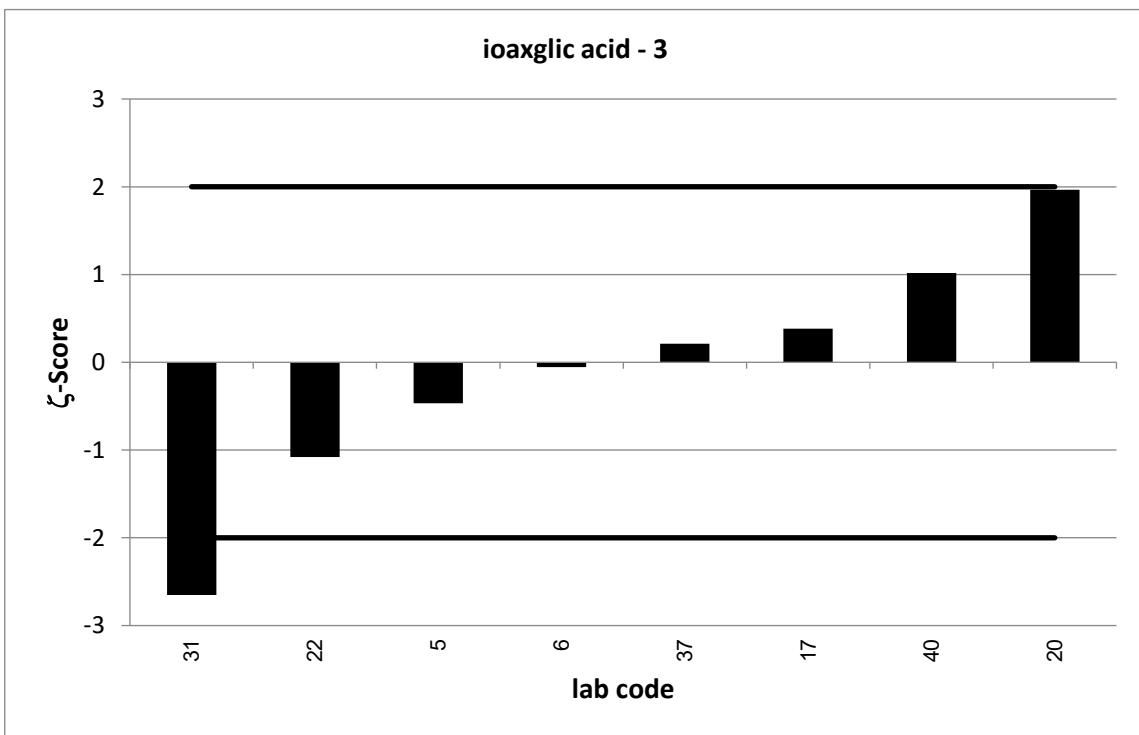
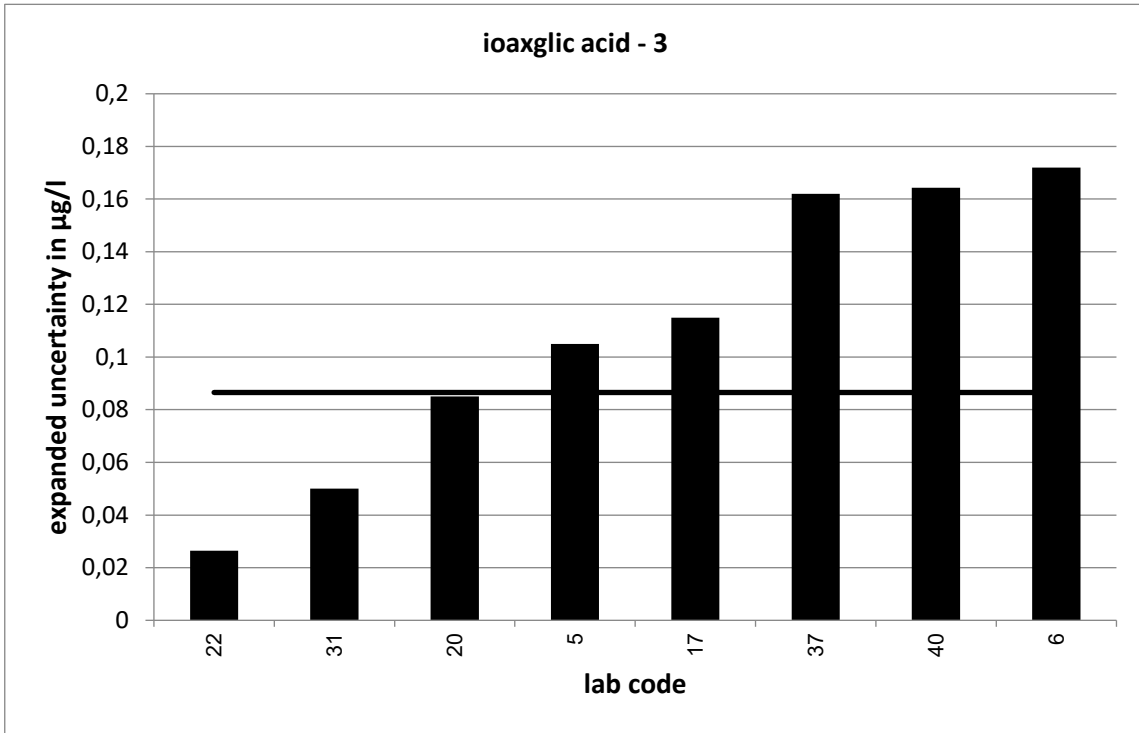


PT 4/21 - TW S6		ioaxglic acid - 3			
assigned value [$\mu\text{g/l}$]*		0,4459 \pm 0,0165			
upper tolerance limit [$\mu\text{g/l}$]		0,6391			
lower tolerance limit [$\mu\text{g/l}$]		0,2864			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,421	0,105	-0,5	-0,3	s
6	0,441	0,172	-0,1	-0,1	s
7	0,365			-1,0	s
17	0,468	0,115	0,4	0,2	s
20	0,531	0,085	2,0	0,9	s
22	0,429	0,027	-1,1	-0,2	s
24	0,597			1,6	s
29	0,4582			0,1	s
31	0,376	0,05	-2,7	-0,9	s
33	0,418			-0,3	s
34	0,355			-1,1	s
37	0,463	0,162	0,2	0,2	s
40	0,53	0,164	1,0	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

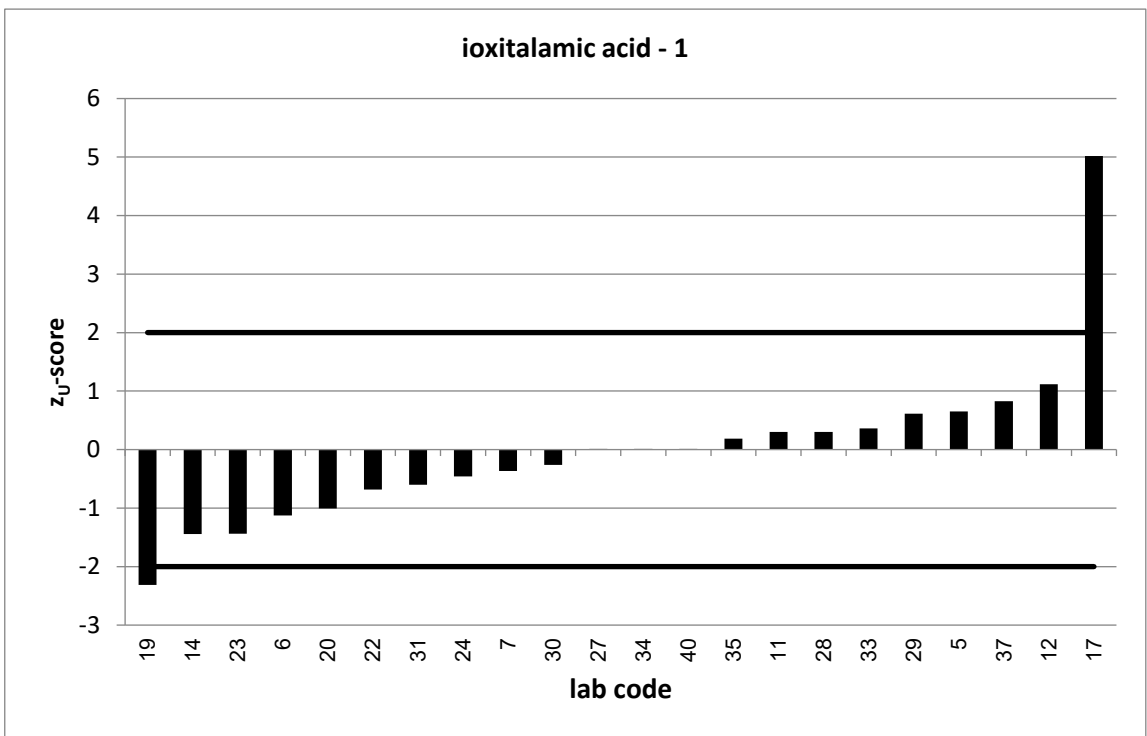
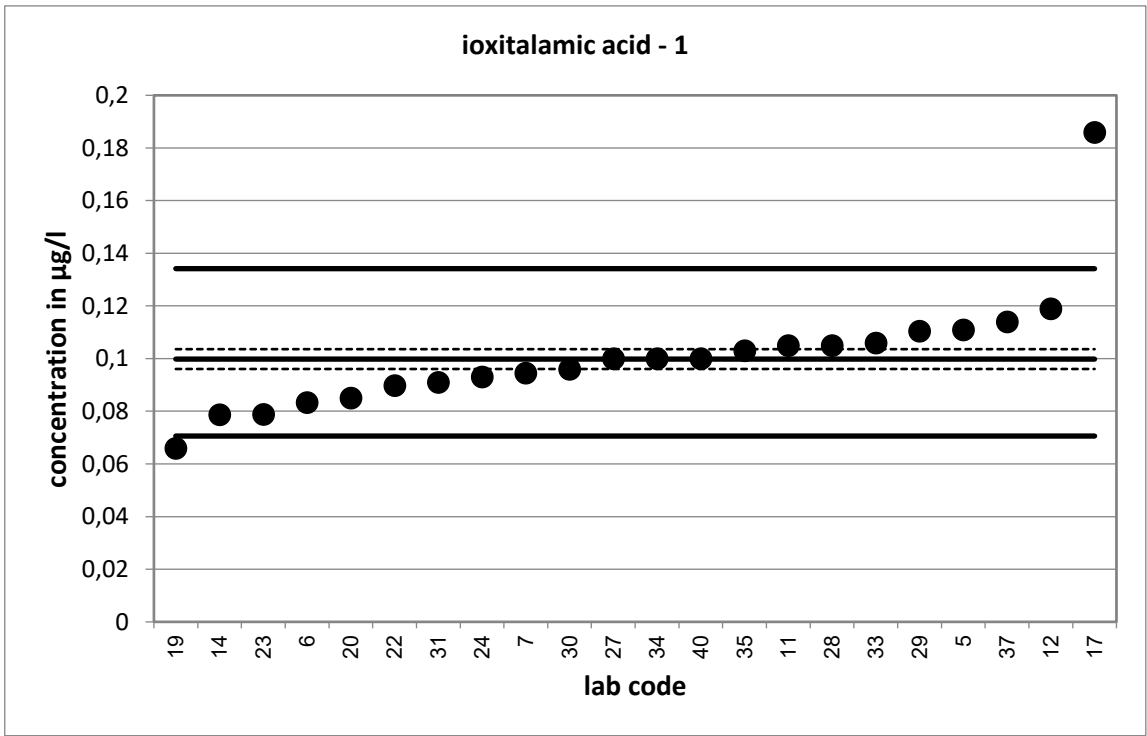


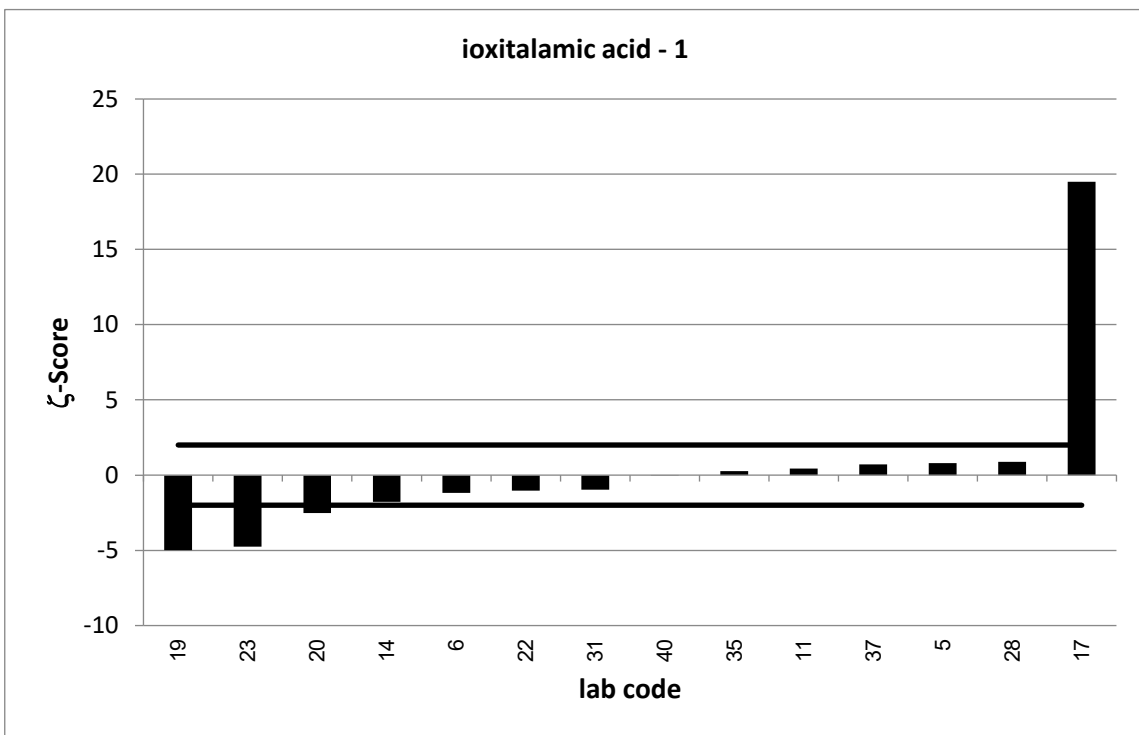
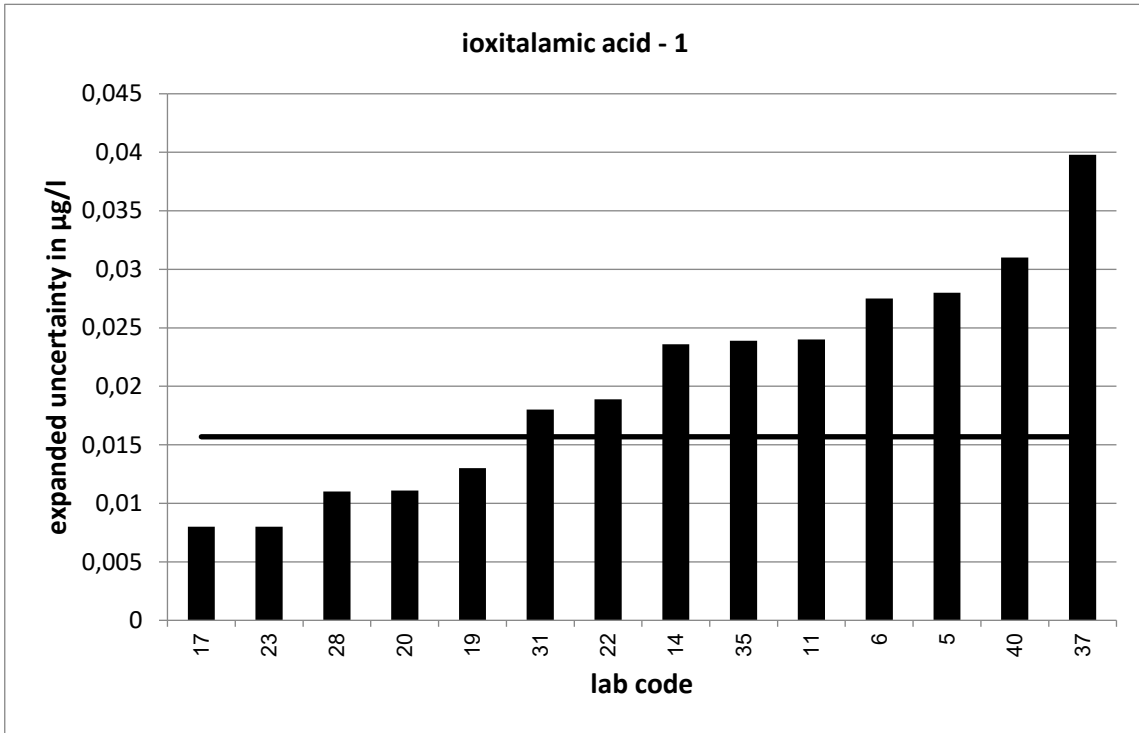


PT 4/21 - TW S6		ioxitalamic acid - 1			
assigned value [$\mu\text{g/l}$]*		0,09982 \pm 0,00376			
upper tolerance limit [$\mu\text{g/l}$]		0,1342			
lower tolerance limit [$\mu\text{g/l}$]		0,07059			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,111	0,028	0,8	0,7	s
6	0,0834	0,028	-1,2	-1,1	s
7	0,0945			-0,4	s
11	0,105	0,024	0,4	0,3	s
12	0,119			1,1	s
14	0,0787	0,024	-1,8	-1,4	s
17	0,186	0,008	19,5	5,0	u
19	0,066	0,013	-5,0	-2,3	q
20	0,0851	0,011	-2,5	-1,0	s
22	0,0898	0,019	-1,0	-0,7	s
23	0,0788	0,008	-4,8	-1,4	s
24	0,0931			-0,5	s
27	0,1			0,0	s
28	0,105	0,011	0,9	0,3	s
29	0,1104			0,6	s
30	0,096			-0,3	s
31	0,091	0,018	-1,0	-0,6	s
33	0,106			0,4	s
34	0,1			0,0	s
35	0,103	0,024	0,3	0,2	s
37	0,114	0,04	0,7	0,8	s
40	0,1	0,031	0,0	0,0	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

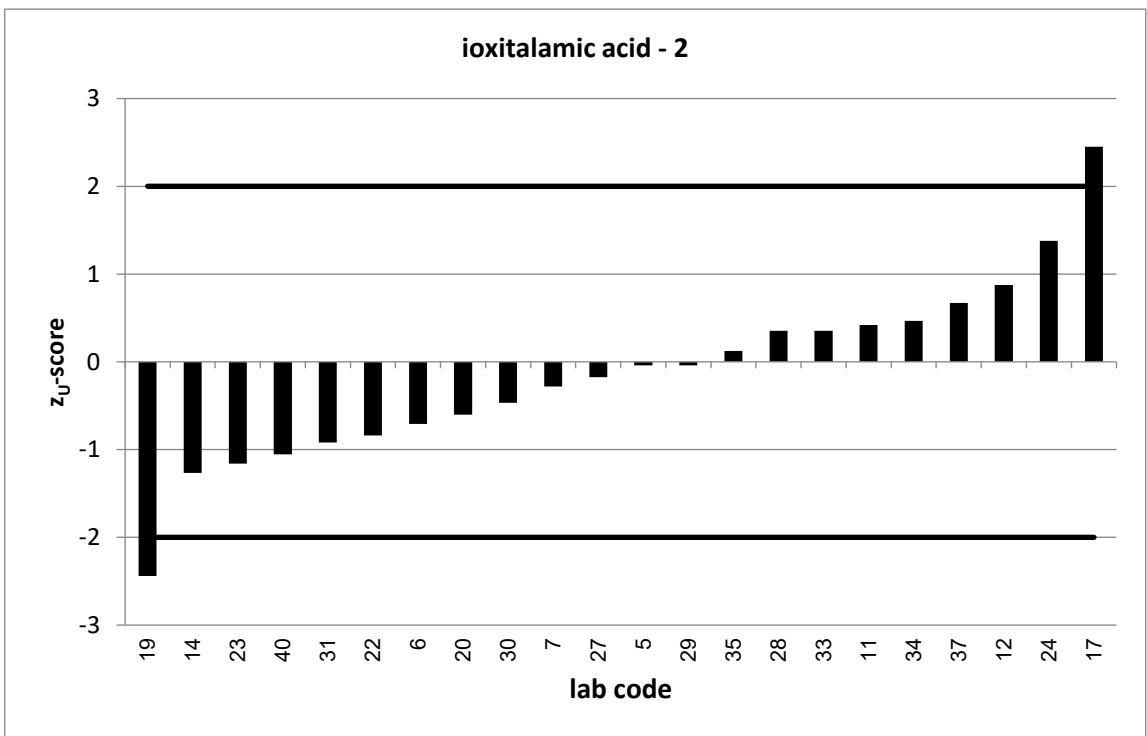
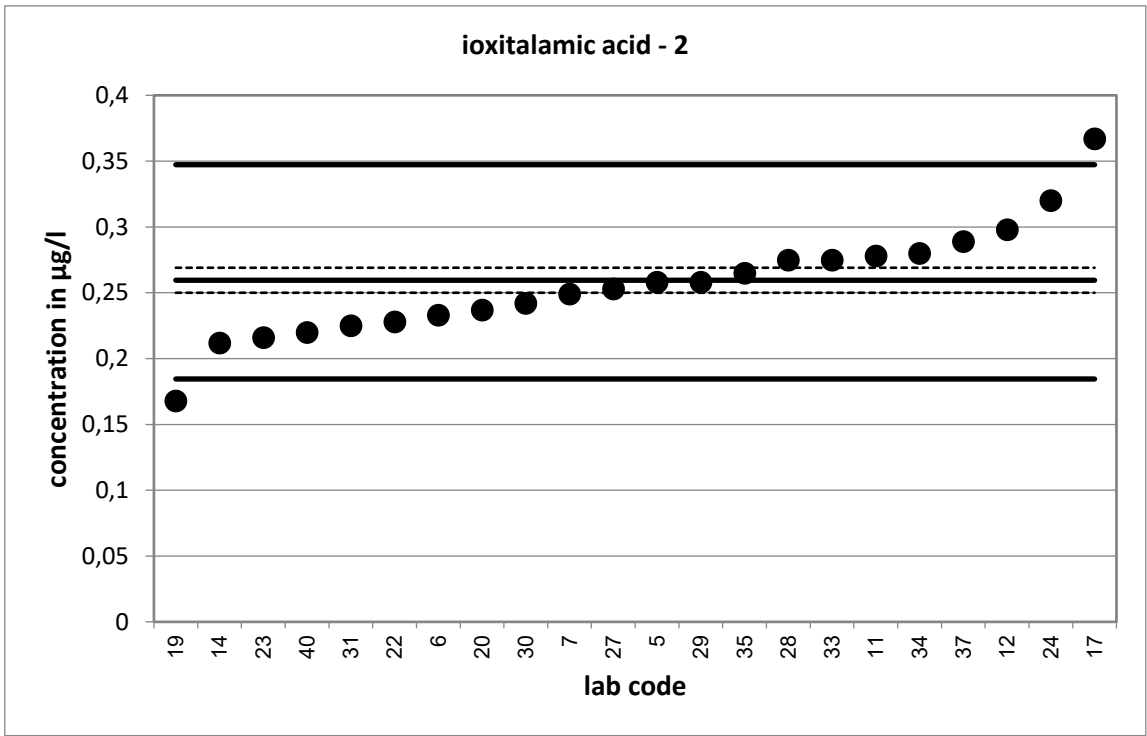


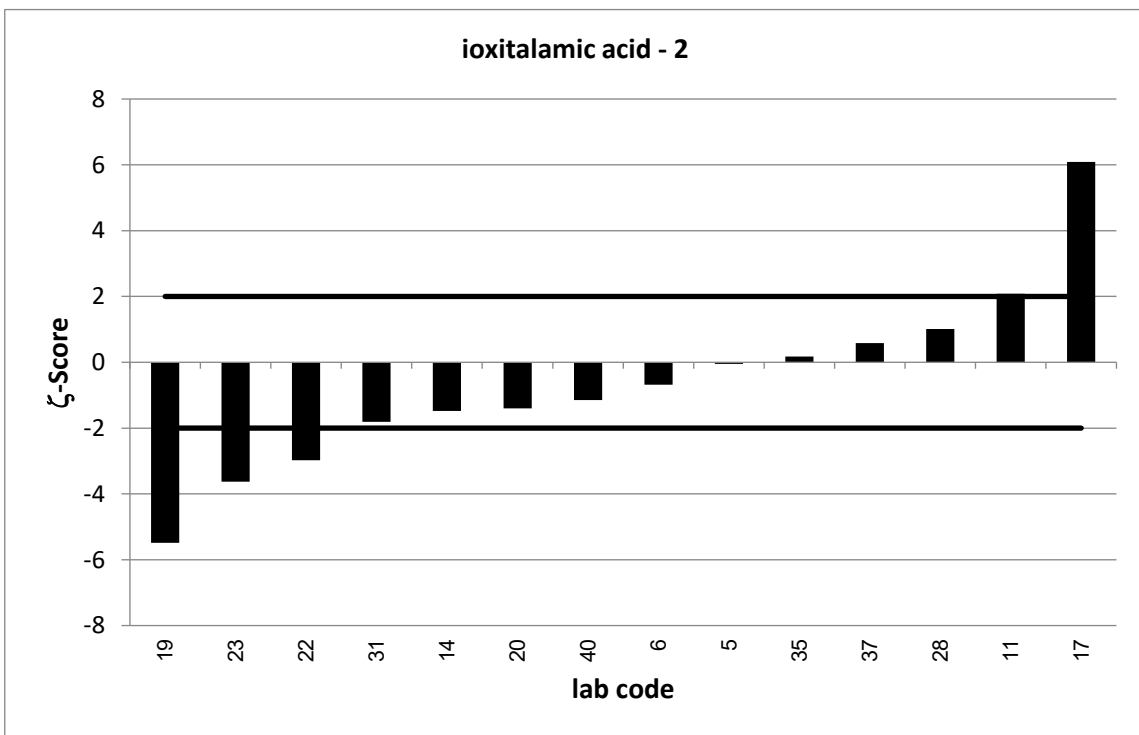
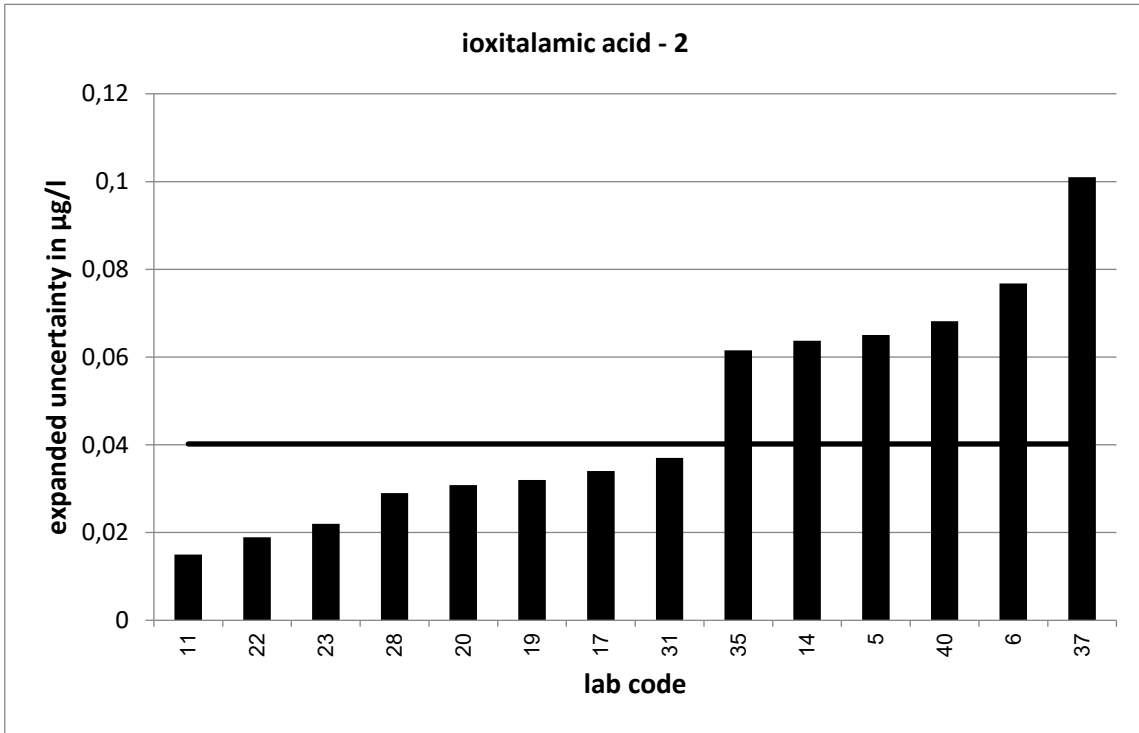


PT 4/21 - TW S6		ioxitalamic acid - 2			
assigned value [$\mu\text{g/l}$]*		0,2595		$\pm 0,0095$	
upper tolerance limit [$\mu\text{g/l}$]		0,3473			
lower tolerance limit [$\mu\text{g/l}$]		0,1845			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,258	0,065	0,0	0,0	s
6	0,233	0,077	-0,7	-0,7	s
7	0,249			-0,3	s
11	0,278	0,015	2,1	0,4	s
12	0,298			0,9	s
14	0,212	0,064	-1,5	-1,3	s
17	0,367	0,034	6,1	2,4	q
19	0,168	0,032	-5,5	-2,4	q
20	0,237	0,031	-1,4	-0,6	s
22	0,228	0,019	-3,0	-0,8	s
23	0,216	0,022	-3,6	-1,2	s
24	0,32			1,4	s
27	0,253			-0,2	s
28	0,275	0,029	1,0	0,4	s
29	0,258			0,0	s
30	0,242			-0,5	s
31	0,225	0,037	-1,8	-0,9	s
33	0,275			0,4	s
34	0,28			0,5	s
35	0,265	0,062	0,2	0,1	s
37	0,289	0,101	0,6	0,7	s
40	0,22	0,068	-1,1	-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





PT 4/21 - TW S6		ioxitalamic acid - 3			
assigned value [$\mu\text{g/l}$]*		0,4326 \pm 0,0159			
upper tolerance limit [$\mu\text{g/l}$]		0,5878			
lower tolerance limit [$\mu\text{g/l}$]		0,3012			
lab code	result [$\mu\text{g/l}$]	\pm	ζ -score	z_U -score	assessm.**
5	0,448	0,112	0,3	0,2	s
6	0,338	0,112	-1,7	-1,4	s
7	0,412			-0,3	s
11	0,436	0,027	0,2	0,0	s
12	0,516			1,1	s
14	0,347	0,104	-1,6	-1,3	s
17	0,596	0,037	8,1	2,1	q
19	0,313	0,059	-3,9	-1,8	s
20	0,401	0,052	-1,2	-0,5	s
22	0,406	0,019	-2,2	-0,4	s
23	0,346	0,035	-4,5	-1,3	s
24	0,545			1,4	s
27	0,47			0,5	s
28	0,385	0,04	-2,2	-0,7	s
29	0,428			-0,1	s
30	0,403			-0,5	s
31	0,386	0,055	-1,6	-0,7	s
33	0,438			0,1	s
34	0,41			-0,3	s
35	0,48	0,111	0,8	0,6	s
37	0,457	0,17	0,3	0,3	s
40	0,38	0,118	-0,9	-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

