Results of Proficiency Test
Ethanol (Food / Neutral grade)
December 2021

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 2007 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Ethanol (Food / Neutral grade) every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Ethanol (Food / Neutral grade).

In this interlaboratory study 28 laboratories in 19 different countries registered for participation. See appendix 3 for the number of participants per country. In this report the results of the Ethanol (Food / Neutral grade) proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
It was decided to send two different samples of Ethanol (Food / Neutral grade): one bottle of 0.5L labelled #21265 for regular analyzes and one bottle of 250mL labelled #21266 for GC determination only.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

All data presented in this report must be regarded as confidential and for use by the participating companies only. Disclosure of the information in this report is only allowed by means of the entire report. Use of the contents of this report for third parties is only allowed by written permission of the Institute for Interlaboratory Studies. Disclosure of the identity of one or more of the participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

For the preparation of the sample for the regular analyzes a batch of approximately 30 liters of Ethanol (Food / Neutral grade) was obtained from a local supplier. After homogenization 48 amber glass bottles of 0.5L were filled and labelled #21265.
The homogeneity of the subsamples was checked by determination of Density at 20°C in accordance with ASTM D4052 on 8 stratified randomly selected subsamples.

	Density at 20°C in kg/L
sample #21265-1	0.80574
sample #21265-2	0.80574
sample #21265-3	0.80574
sample #21265-4	0.80574
sample #21265-5	0.80574
sample #21265-6	0.80574
sample #21265-7	0.80574
sample #21265-8	0.80574

Table 1: homogeneity test results of subsamples #21265

From the above test results the repeatability was calculated and compared with 0.3 times the reproducibility of the reference test method in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Density at 20°C in kg/L
r (observed)	0.00000
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 2: evaluation of the repeatability of subsamples #21265

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

For the preparation of the GC sample a batch of approximately 22 liters Ethanol (Food / Neutral grade) was made available from the retain materials from earlier PTs. After homogenization 48 amber glass bottles of 250mL were filled and labelled #21266.
The homogeneity of the subsamples was checked by determination of Isopropanol and Methanol in accordance with an in-house method on 8 stratified randomly selected subsamples.

	Isopropanol in mg/kg	Methanol in mg/kg
sample #21266-1	6.0	10.2
sample #21266-2	6.1	10.1
sample #21266-3	6.1	10.2
sample #21266-4	6.1	10.3
sample #21266-5	6.2	10.0
sample #21266-6	5.7	10.2
sample #21266-7	5.9	10.3
sample #21266-8	5.9	10.0

Table 3: homogeneity test results of subsamples #21266

From the above test results the repeatabilities were calculated and compared with 0.3 times the estimated reproducibilities calculated with the Horwitz equation in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Isopropanol in mg/kg	Methanol in mg/kg
r (observed)	0.4	0.3
reference method	Horwitz	Horwitz
0.3 x R (reference method)	0.6	1.0

Table 4: evaluation of the repeatabilities of subsamples #21266

The calculated repeatabilities are in agreement with 0.3 times the estimated reproducibilities calculated with the Horwitz equation. Therefore, homogeneity of the subsamples was assumed.

To each of the participating laboratories one sample Ethanol (Food / Neutral grade) labelled #21265 and one sample Ethanol (Food / Neutral grade) for GC only labelled #21266 was sent on November 10, 2021. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Ethanol packed in amber glass bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on sample #21265: Appearance, Density at 20°C, Nonvolatile matter, Permanganate Time Test at 20°C, pHe (with LiCl and KCl electrode), Strength (in %M/M and %V/V), Water and UV absorbance at 300, 270, 260, 250, 240, 230 and 220 nm with an evaluation of the UV-scan.
On sample #21266 it was requested to determine: Purity of Ethanol on dry basis, Methanol, Acetal (1,1-diethoxyethane), Acetaldehyde, Acetone, Benzene, Isopropanol, Mono Ethylene glycol (MEG), Other impurities and Total impurities.

It was explicitly requested to treat the samples as if they were routine samples and to report the test results using the indicated units on the report form and not to round the test results, but report as much significant figures as possible. It was also requested not to report ‘less than’ test results, which are above the detection limit, because such test results cannot be used for meaningful statistical evaluations

To get comparable test results a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods (when applicable) that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendix 1 and 2 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyzes). Additional or corrected test results are used for data analysis and the original test results are placed under 'Remarks' in the result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as ‘<…’ or ‘>…’ were not used in the statistical evaluation.

First, the normality of the distribution of the various data sets per determination was checked by means of the Lilliefors-test, a variant of the Kolmogorov-Smirnov test and by the calculation of skewness and kurtosis. Evaluation of the three normality indicators in combination with the visual evaluation of the graphic Kernel density plot, lead to judgement of the normality being either ‘unknown’, ‘OK’, ‘suspect’ or ‘not OK’. After removal of outliers, this check was repeated. If a data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

The assigned value is determined by consensus based on the test results of the group of participants after rejection of the statistical outliers and/or suspect data.

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1. was met for all evaluated tests, therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.

Finally, the reproducibilities were calculated from the standard deviations by multiplying them with a factor of 2.8.

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements (derived from e.g. ISO or ASTM test methods), the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

When a laboratory did use a test method with a reproducibility that is significantly different from the reproducibility of the reference test method used in this report, it is strongly advised to recalculate the z-score, while using the reproducibility of the actual test method used, this in order to evaluate whether the reported test result is fit-for-use.

The z-scores were calculated according to:

$z_{(target)}$ = (test result - average of PT) / target standard deviation

The $z_{(target)}$ scores are listed in the test result tables in appendix 1.

Absolute values for z<2 are very common and absolute values for z>3 are very rare. Therefore, the usual interpretation of z-scores is as follows:

	|z|	< 1	good
1 <	|z|	< 2	satisfactory
2 <	|z|	< 3	questionable
3 <	|z|		unsatisfactory

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Therefore, the reporting time on the data entry portal was extended with another two weeks. When considering the test results of the two samples together two participants reported test results after the final reporting date and one participant did not report any test result. Not all participants were able to perform all analyzes requested.
In total 27 participants reported 311 numerical test results. Observed were 8 outlying test results, which is 2.6%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

Not all data sets proved to have a normal Gaussian distribution. These are referred to as “not OK” or “suspect”. The statistical evaluation of these data sets should be used with due care, see also paragraph 3.1.

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section the reported test results are discussed per sample and per test. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 4.

Unfortunately, a suitable reference test method, providing the precision data, is not available for all determinations. For these tests the calculated reproducibility was compared against the estimated reproducibility calculated with the Horwitz equation.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D1363) and an added designation for the year that the test method was adopted or revised (e.g. D1363:06). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D1363:06(2019)). In the test results tables of appendix 1 only the method number (sub) and year of adoption or revision (e.g. D1363:06) will be used.

Appearance: This determination was not problematic. All reporting participants agreed on a test result as Pass (Clear and Bright).

Density at 20°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO12185:96.

Nonvolatile matter: This determination was not problematic. Almost all reporting participants agreed on a test result of <1 mg/100mL. Therefore, no z-scores were calculated.

Permanganate Time Test at 20°C: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D1363:06(2019).

pHe: It is known that the pHe determined with a LiCl electrode will be lower than the pHe determined with a KCl electrode. Test method EN15490 describes the use of a LiCl electrode and test method ASTM D6423 describes the use of a KCl electrode.

pHe with LiCl electrode: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of EN15490:07.

pHe with KCl electrode: This determination may be problematic (only three test results were reported). No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D6423:20a.

Strength (%M/M): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the reproducibility derived from the OIML table.

Strength (%V/V): This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the reproducibility derived from the OIML table.

Water: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility calculated with the Horwitz equation but is not in agreement with the strict requirements of ASTM E203:16.

Regretfully, no reference test method for this determination exists. Some participants reported test results obtained with a 50 mm cuvette, others with a 10 mm cuvette. In order to determine a Pass or Fail based on the sample UV-graph, it is important that even the smallest deviation is detected. Therefore, the use of a 50 mm cuvette is preferable. In this PT nine laboratories used a 50 mm cuvette and eight laboratories used a 10 mm cuvette. Both groups were evaluated separately.

UV - 50 mm cuvette: In total over seven parameters (UV absorbance in nm) one statistical outlier was observed. Seven participants evaluated the sample as ‘Pass’ and one other evaluated as ‘Not Smooth’.

UV - 10 mm cuvette: In total over seven parameters (UV absorbance in nm) two statistical outliers were observed. Five participants evaluated the sample as ‘Pass’ while two other evaluated as ‘Fail’.

Purity of Ethanol on dry basis: This determination may not be problematic. One statistical outlier was observed. Regretfully, no reference test method is available that provides precision data for the determination of purity in Ethanol (Food / Neutral grade). Therefore, no z-scores could be calculated.

Methanol: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Acetone: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Benzene: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the estimated reproducibility calculated with the Horwitz equation.

Isopropanol: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Other impurities: This determination may be problematic. No statistical outliers were observed. Due to a large variation in the test results it was decided not to calculate z-scores.

Total impurities: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation for 7 components.

For impurities not listed above, but mentioned in paragraph 2.6, the participants agree on a concentration near or below the limit of detection. Therefore, these impurities were not further evaluated. The reported test results are given in appendix 2.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from literature reference test methods (in casu ASTM, EN and ISO test methods) or the target reproducibility derived from the official test method or estimated using the Horwitz equation are presented in the next tables.

Parameter	unit	n	average	2.8 * sd	R(lit)
Appearance		19	Pass (C&B)	n.a.	n.a.
Density at 20°C	kg/L	23	0.8058	0.0002	0.0005
Nonvolatile matter	mg/100mL	14	<1	n.e.	n.e.
Permanganate Time Test 20°C	minutes	10	32.7	11.1	8.2
pHe with LiCl electrode		5	7.7	0.7	0.7
pHe with KCl electrode		3	8.1	1.3	1.0
Strength	%M/M	13	94.42	0.05	0.06
Strength	%V/V	19	96.40	0.03	0.06
Water	%M/M	17	5.55	0.20	0.48
UV – 50 mm cuvette:					
UV-absorbance 300 nm		8	0.012	0.008	n.a.
UV-absorbance 270 nm		9	0.038	0.007	n.a.
UV-absorbance 260 nm		9	0.062	0.015	n.a.
UV-absorbance 250 nm		9	0.118	0.014	n.a.
UV-absorbance 240 nm		9	0.246	0.027	n.a.
UV-absorbance 230 nm		8	0.559	0.068	n.a.
UV-absorbance 220 nm		8	1.181	0.207	n.a.
Conclusion UV-scan		7	Pass	n.a.	n.a.
UV – 10 mm cuvette:					
UV-absorbance 300 nm		7	0.002	0.005	n.a.
UV-absorbance 270 nm		8	0.010	0.013	n.a.
UV-absorbance 260 nm		8	0.015	0.014	n.a.
UV-absorbance 250 nm		8	0.027	0.016	n.a.
UV-absorbance 240 nm		8	0.055	0.020	n.a.
UV-absorbance 230 nm		8	0.120	0.041	n.a.

Parameter	unit	n	average	2.8 * sd	R(lit)
UV-absorbance 220 nm		7	0.238	0.037	n.a.
Conclusion UV-scan		5	Pass	n.a.	n.a.

Table 5: reproducibilities of tests on sample #21265

Parameter	unit	n	average	2.8 *sd	R(target)
Purity of Ethanol on dry basis	%M/M	17	99.99	0.006	n.e.
Methanol	mg/kg	17	11.4	8.2	3.5
Acetone	mg/kg	16	16.8	9.1	4.9
Benzene	mg/kg	7	3.1	1.3	1.2
Isopropanol	mg/kg	14	6.2	2.6	2.1
Other impurities	mg/kg	10	30.2	69.9	(14.0)
Total impurities	mg/kg	12	67.7	78.4	42.5

Table 6: reproducibilities of tests on sample #21266

Results between brackets no z-scores are calculated

Without further statistical calculations it can be concluded that for many tests there is not a good compliance of the group of participants with the reference test methods. The problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF DECEMBER 2021 WITH PREVIOUS PTS

	December 2021	December 2020	December 2019	December 2018	December 2017
Number of reporting laboratories	27	24	25	25	29
Number of test results	311	315	337	303	301
Number of statistical outliers	8	19	19	20	22
Percentage of statistical outliers	2.6%	6.0%	5.6%	6.6%	7.3%

Table 7: comparison with previous proficiency tests

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.

The performance of the determinations of the proficiency tests was compared to the requirements of the reference test methods. The conclusions are given in the following table.

Parameter	December 2021	December 2020	December 2019	December 2018	December 2017
Density at 20°C	++	++	++	++	++
Nonvolatile matter	n.e.	n.e.	-	++	++
Permanganate Time Test 20°C	-	-	+	-	-
pHe with LiCl electrode	+/-	-	-	++	-
pHe with KCl electrode	-	-			
Strength %M/M	+	-	+	++	++
Strength %V/V	++	+	+/-	+	++
Water	++	+	+	-	-

Parameter	December 2021	December 2020	December 2019	December 2018	December 2017
Purity Ethanol on dry basis	n.e.	(+/-)	(++)	(+)	(+)
Methanol	--	-	-	--	-
Acetal (1,1-diethoxyethane)	n.e.	n.e.	+	n.e.	n.e.
Acetaldehyde	n.e.	n.e.	n.a.	n.a.	n.a.
Acetone	-	-	+	+/-	--
Benzene	+/-	-	-	--	n.e.
Isopropanol	-	-	-	+	+
Mono Ethylene glycol (MEG)	n.e.	(--)	n.e.	n.e.	n.e.
Other impurities	(--)	(--)	n.a.	n.a.	n.a.
Total impurities	--	+	-	-	-

Table 8: comparison determinations against the reference test methods

Results between brackets should be used with due care.

The following performance categories were used:

- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test method
- n.e. : not evaluated

APPENDIX 1

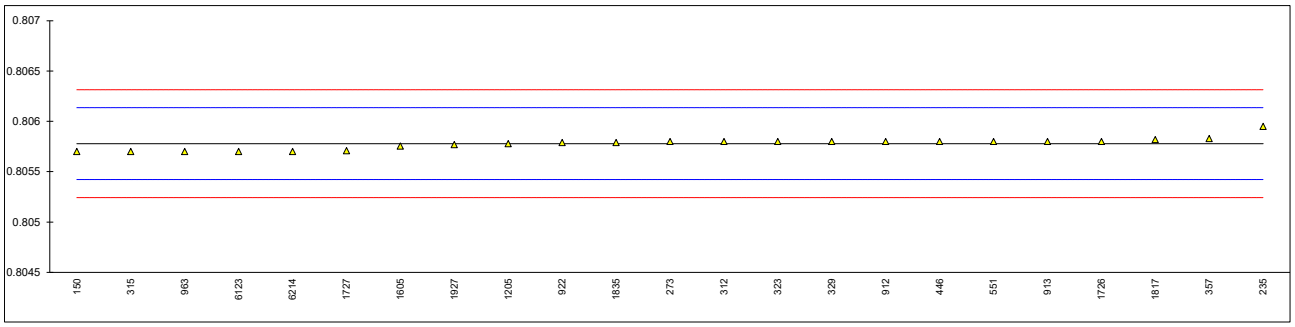
Determination of Appearance on sample #21265;

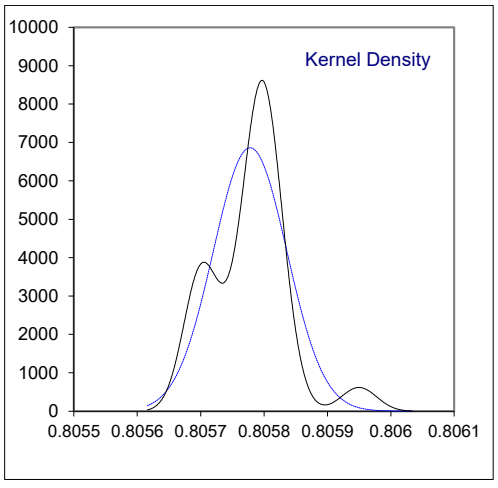
lab	method	value	mark	z(targ)	remarks
150	Visual	C&B		-----	
235	Visual	C&B		-----	
273	Visual	Pass		-----	
312	Visual	CLCOL		-----	
315	E2680	pass		-----	
323	E2679	C&B		-----	
329	Visual	clear liquid		-----	
357		CFSM = Clear and free of suspended matter		-----	
446	E2680	Pass		-----	
551	Visual	Pass		-----	
859		-----		-----	
912	Visual	Clear and bright		-----	
913	E2680	Clear and Bright		-----	
922	Visual	Clear & Bright		-----	
963	Visual	Pass		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	Visual	Clear&Colorless		-----	
1727	Visual	Clear&Colorless		-----	
1817	Visual	Pass		-----	
1835	Visual	C&C		-----	
1927		-----		-----	
6123		-----		-----	
6214	Visual	clear & colourless		-----	
6224		-----		-----	
6403		-----		-----	
	n	19			
	mean (n)	Clear and Bright / Pass			

Determination of Density at 20°C on sample #21265; results in kg/L

lab	method	value	mark	z(targ)	remarks
150	D4052	0.8057		-0.44	
235	D4052	0.80595		0.96	
273	D4052	0.8058		0.12	
312	ISO12185	0.8058		0.12	
315	D4052	0.8057		-0.44	
323	D4052	0.8058		0.12	
329	D4052	0.8058		0.12	
357	D4052	0.80583		0.29	
446	D4052	0.8058		0.12	
551	D4052	0.8058		0.12	
859		-----		-----	
912	ISO3675	0.8058		0.12	
913	D4052	0.8058		0.12	
922	D4052	0.80579		0.07	
963	ISO12185	0.8057		-0.44	
1205	In house	0.805779		0.00	
1438		-----		-----	
1574		-----		-----	
1605	D4052	0.805755		-0.13	
1726	D4052	0.80580		0.12	
1727	D4052	0.80571		-0.38	
1817	Table OIML	0.80582		0.23	
1835	ISO12185	0.80579		0.07	
1927	D4052	0.80577		-0.05	
6123	ISO3838	0.8057		-0.44	
6214	ISO12185	0.8057		-0.44	
6224		-----		-----	
6403		-----		-----	

normality	not OK
n	23
outliers	0
mean (n)	0.805778
st.dev. (n)	0.0000581
R(calc.)	0.000163
st.dev.(ISO12185:96)	0.0001786
R(ISO12185:96)	0.0005





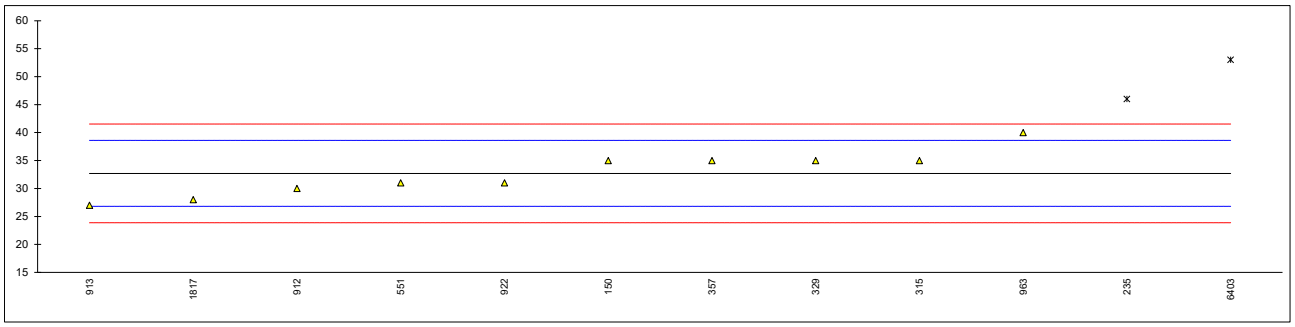
Determination of Nonvolatile matter on sample #21265; results in mg/100mL

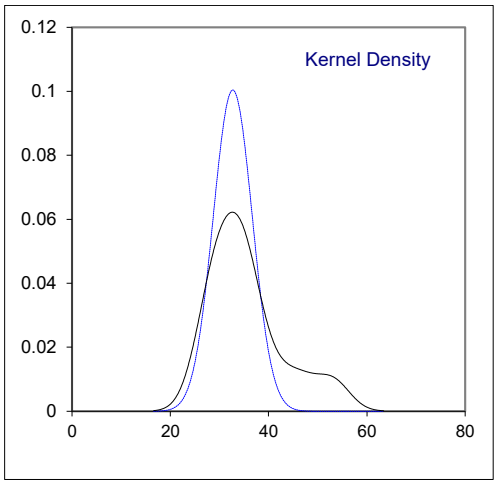
lab	method	value	mark	z(targ)	remarks
150	D1353	0.2		-----	
235	D1353	0.5		-----	
273		-----		-----	
312	D1353	<1		-----	
315	D1353	< 1		-----	
323	D1353	< 1		-----	
329	D1353	0.8	C	-----	first reported 8
357	D1353	< 1		-----	
446	D1353	0		-----	
551	D1353	<0.1		-----	
859		-----		-----	
912	D1353	0.6		-----	
913	D1353	<1		-----	
922	D1353	<1.0		-----	
963		-----		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	EN15691	<10		-----	
1727	EN15691	<1		-----	
1817	In house	0		-----	
1835	EN15691	<10		-----	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403		-----		-----	
	n	14			
	mean (n)	<1			

Determination of Permanganate Time Test at 20°C on sample #21265; results in minutes

lab	method	value	mark	z(targ)	remarks
150	D1363	35		0.78	
235	D1363	46	DG(0.05)	4.52	
273		-----		-----	
312		-----		-----	
315	D1363	35		0.78	
323		-----		-----	
329	D1363	35		0.78	
357	D1363	35		0.78	
446	D1363	>20		-----	
551	D1363	31		-0.58	
859		-----		-----	
912	D1363	30		-0.92	
913	D1363	27		-1.94	
922	D1363	31		-0.58	
963	D1363	40.0		2.48	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726		-----		-----	
1727		-----		-----	
1817	In house	28		-1.60	
1835		-----		-----	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403	In house	53	DG(0.05)	6.90	

normality	OK
n	10
outliers	2
mean (n)	32.70
st.dev. (n)	3.974
R(calc.)	11.13
st.dev.(D1363:06)	2.943
R(D1363:06)	8.24

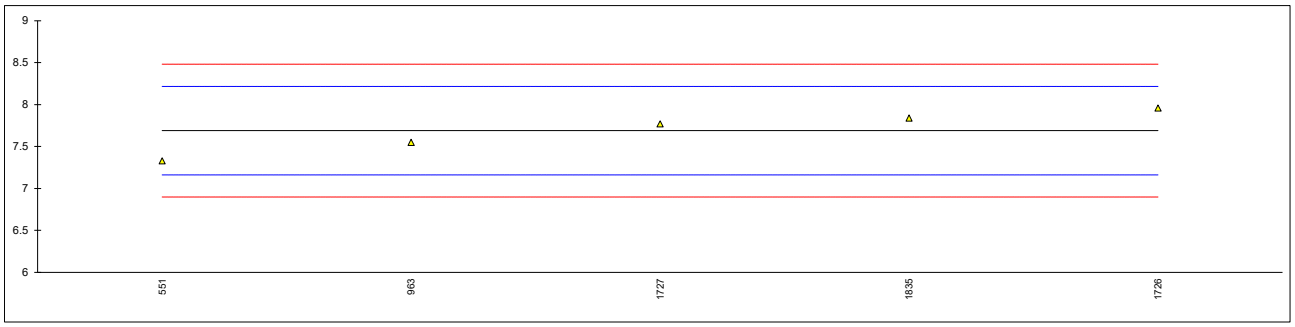




Determination of pHe with LiCl electrode on sample #21265;

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
235		-----		-----	
273		-----		-----	
312		-----		-----	
315		-----		-----	
323		-----		-----	
329		-----		-----	
357		-----		-----	
446		-----		-----	
551	NBR10891	7.33		-1.37	
859		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
963	EN15490	7.55		-0.53	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	EN15490	7.96		1.02	
1727	EN15490	7.77		0.30	
1817		-----		-----	
1835	EN15490	7.84		0.57	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403		-----		-----	

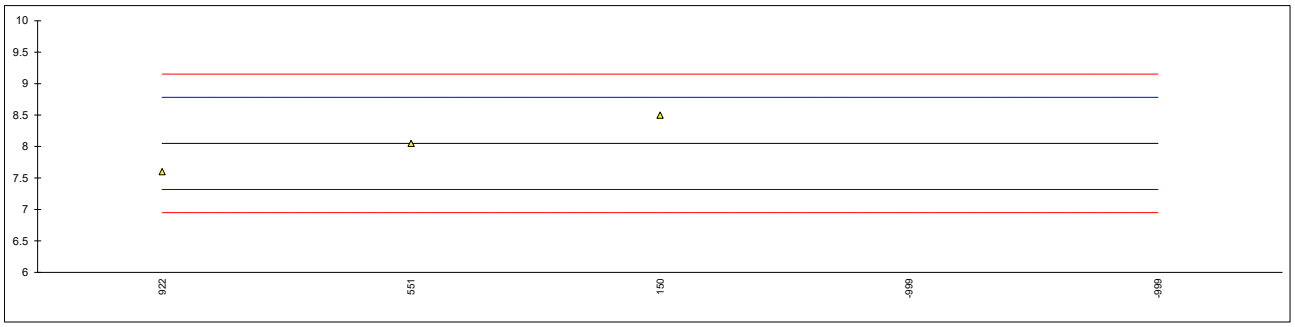
normality	unknown
n	5
outliers	0
mean (n)	7.690
st.dev. (n)	0.2505
R(calc.)	0.701
st.dev.(EN15490:07)	0.2637
R(EN15490:07)	0.738



Determination of pHe with KCl electrode on sample #21265;

lab	method	value	mark	z(targ)	remarks
150	D6423	8.5		1.23	
235		-----		-----	
273		-----		-----	
312		-----		-----	
315		-----		-----	
323		-----		-----	
329		-----		-----	
357		-----		-----	
446		-----		-----	
551	D6423	8.05		0.00	
859		-----		-----	
912		-----		-----	
913		-----		-----	
922	D6423	7.6		-1.23	
963		-----		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726		-----		-----	
1727		-----		-----	
1817		-----		-----	
1835		-----		-----	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403		-----		-----	

normality	unknown
n	3
outliers	0
mean (n)	8.050
st.dev. (n)	0.4500
R(calc.)	1.260
st.dev.(D6423:20a)	0.3668
R(D6423:20a)	1.027

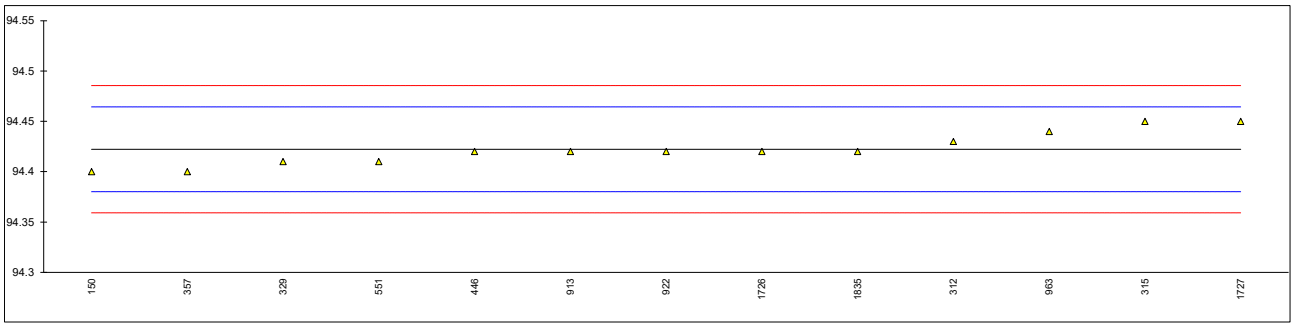


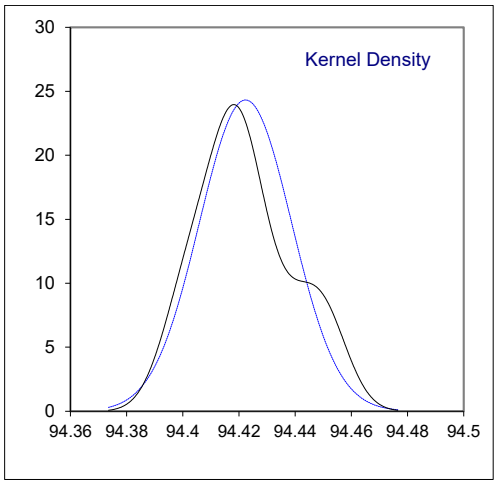
Determination of Strength on sample #21265; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	Table OIML	94.4		-1.06	
235		-----		-----	
273		-----		-----	
312	Table OIML	94.43		0.37	
315	Table OIML	94.45		1.31	
323		-----		-----	
329	Table OIML	94.41		-0.58	
357	Table OIML	94.40		-1.06	
446	Table OIML	94.42		-0.11	
551	Table OIML	94.41		-0.58	
859		-----		-----	
912		-----		-----	
913	Table OIML	94.42		-0.11	
922	Table OIML	94.42		-0.11	
963	Table OIML	94.44		0.84	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	Table OIML	94.42		-0.11	
1727	Table OIML	94.45		1.31	
1817		-----		-----	
1835	Table OIML	94.42		-0.11	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403		-----		-----	

normality	OK
n	13
outliers	0
mean (n)	94.422
st.dev. (n)	0.0164
R(calc.)	0.046
st.dev.(OIML table)	0.0211
R(OIML table)	0.059

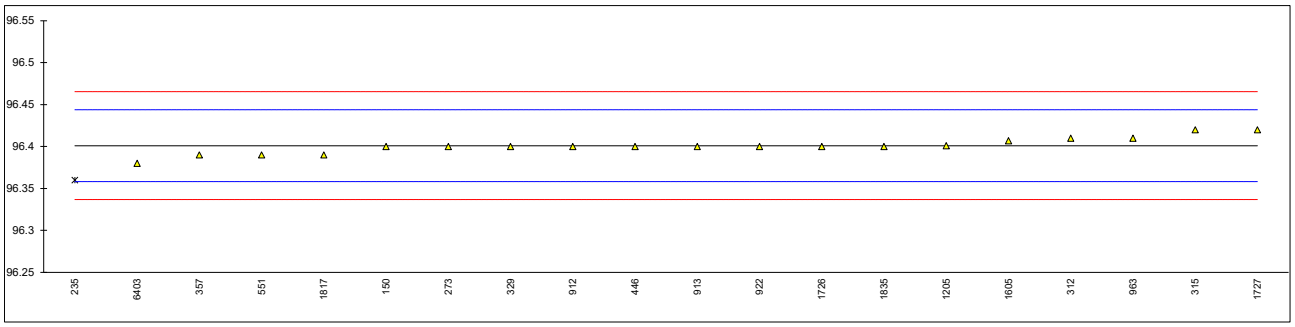
OIML R022-e75

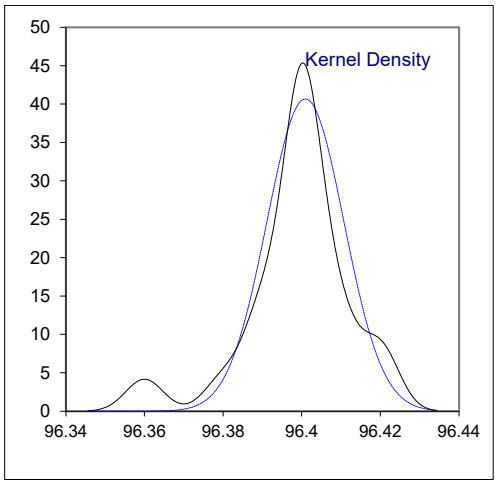




Determination of Strength on sample #21265; results in %V/V

lab	method	value	mark	z(targ)	remarks
150	Table OIML	96.4		-0.04	
235	Table OIML	96.36	D(0.01)	-1.91	
273	Table OIML	96.40		-0.04	
312	Table OIML	96.41		0.42	
315	Table OIML	96.42		0.89	
323		-----		-----	
329	Table OIML	96.40		-0.04	
357	Table OIML	96.39		-0.51	
446	Table OIML	96.40		-0.04	
551	Table OIML	96.39		-0.51	
859		-----		-----	
912	Table OIML	96.40		-0.04	
913	Table OIML	96.40		-0.04	
922	Table OIML	96.40		-0.04	
963	Table OIML	96.41		0.42	
1205	Table OIML	96.401		0.00	
1438		-----		-----	
1574		-----		-----	
1605	Table OIML	96.407		0.28	
1726	Table OIML	96.40		-0.04	
1727	Table OIML	96.42		0.89	
1817	Table OIML	96.39		-0.51	
1835	Table OIML	96.40		-0.04	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403	Table OIML	96.38		-0.98	
	normality	OK			
	n	19			
	outliers	1			
	mean (n)	96.401			
	st.dev. (n)	0.0098			
	R(calc.)	0.027			
	st.dev.(OIML table)	0.0214			
	R(OIML table)	0.060			OIML R022-e75

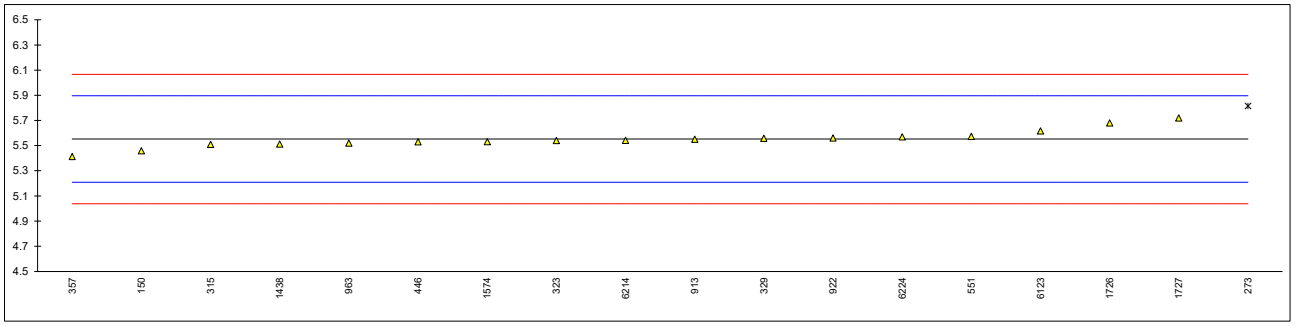


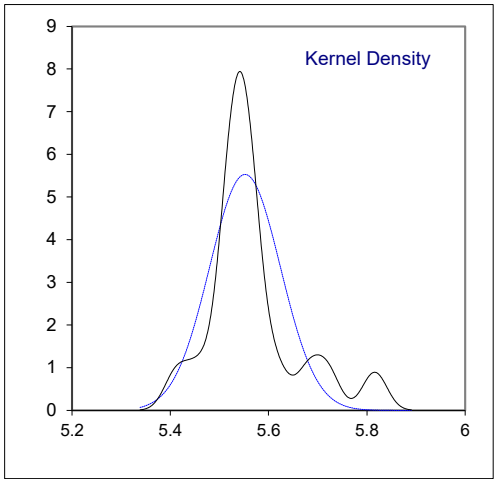


Determination of Water on sample #21265; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	E203	5.459		-0.54	
235		-----		-----	
273	E203	5.816	G(0.05)	1.54	
312		-----		-----	
315	E203	5.51		-0.25	
323	E203	5.540		-0.07	
329	E203	5.558		0.03	
357	E203	5.413		-0.81	
446	D1364	5.53		-0.13	
551	E203	5.573		0.12	
859		-----		-----	
912		-----		-----	
913	E203	5.551		-0.01	
922	E203	5.56		0.05	
963	E203	5.52		-0.19	
1205		-----		-----	
1438	E203	5.512		-0.23	
1574		5.5308		-0.12	
1605		-----		-----	
1726	EN15692	5.6803		0.75	
1727	D1364	5.72		0.98	
1817		-----		-----	
1835		-----		-----	
1927		-----		-----	
6123	ISO12937	5.617		0.38	
6214		5.54164		-0.06	
6224	In house	5.57		0.10	
6403		-----		-----	

normality	suspect
n	17
outliers	1
mean (n)	5.5521
st.dev. (n)	0.07216
R(calc.)	0.2021
st.dev.(Horwitz)	0.17158
R(Horwitz)	0.4804
compare	
R(E203:16)	0.078

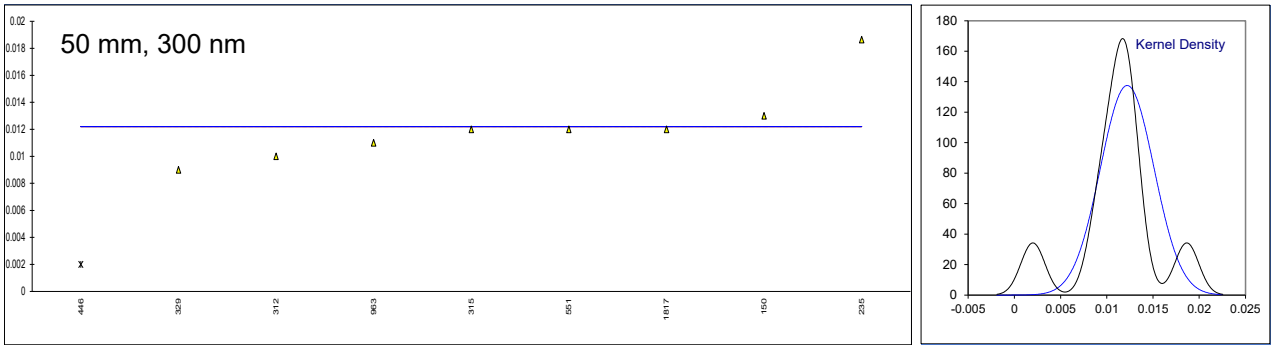


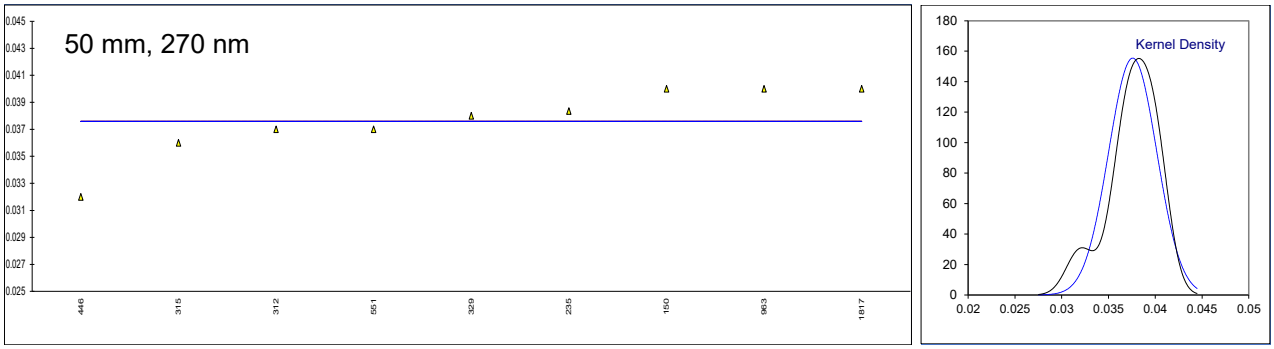


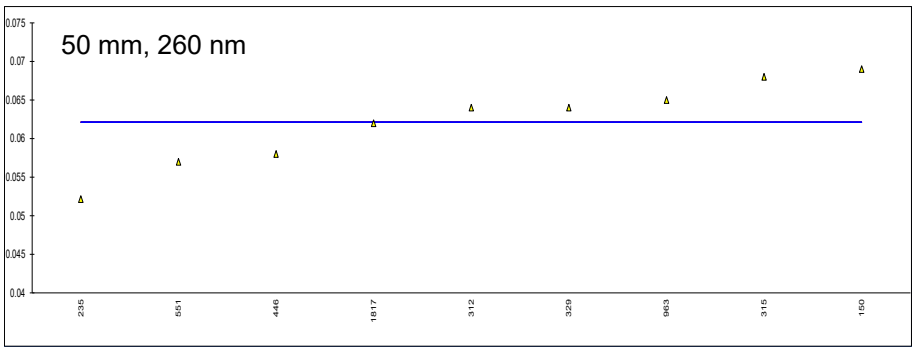
Determination of UV absorbance (50 mm cuvette) on sample #21265;

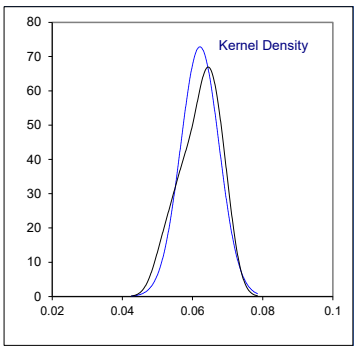
lab	method	300 nm	270 nm	260 nm	250 nm	240 nm	230 nm	220 nm	Pass/Fail
150	IMPCA004	0.013	0.040	0.069	0.122	0.250	0.560	1.178	Pass
235	INH-13-001	0.01865 C	0.03835 C	0.05215 C	0.10885 C	0.22495 C	0.5247 C	1.06005 C	Pass
273		-----	-----	-----	-----	-----	-----	-----	-----
312		0.010	0.037	0.064	0.123	0.256	0.575	1.220	-----
315	INH-013	0.012	0.036	0.068	0.124	0.254	0.560	1.204	Pass
323		-----	-----	-----	-----	-----	-----	-----	Pass
329	INH-CM	0.009	0.038	0.064	0.120	0.245	0.553	1.180	Pass
357		-----	-----	-----	-----	-----	-----	-----	-----
446	INH-13	0.002 D5	0.032	0.058	0.116	0.254	0.606	1.318	Pass
551	INH-3063	0.012	0.037	0.057	0.114	0.240	0.537	1.135	Not smooth
859		-----	-----	-----	-----	-----	-----	-----	-----
912		-----	-----	-----	-----	-----	-----	-----	-----
913		-----	-----	-----	-----	-----	-----	-----	-----
922		-----	-----	-----	-----	-----	-----	-----	-----
963	IMPCA004	0.011	0.040	0.065	0.122	0.247	0.560	1.155	Pass
1205		-----	-----	-----	-----	-----	-----	-----	-----
1438		-----	-----	-----	-----	-----	-----	-----	-----
1574		-----	-----	-----	-----	-----	-----	-----	-----
1605		-----	-----	-----	-----	-----	-----	-----	-----
1726		-----	-----	-----	-----	-----	-----	-----	-----
1727		-----	-----	-----	-----	-----	-----	-----	-----
1817	In house	0.012	0.040	0.062	0.116	0.244	-----	-----	-----
1835		-----	-----	-----	-----	-----	-----	-----	-----
1927		-----	-----	-----	-----	-----	-----	-----	-----
6123		-----	-----	-----	-----	-----	-----	-----	-----
6214		-----	-----	-----	-----	-----	-----	-----	-----
6224		-----	-----	-----	-----	-----	-----	-----	-----
6403		-----	-----	-----	-----	-----	-----	-----	-----
	normality	not OK	not OK	OK	OK	not OK	unknown	unknown	
	n	8	9	9	9	9	8	8	7
	outliers	1	0	0	0	0	0	0	
	mean (n)	0.0122	0.0376	0.0621	0.1184	0.2461	0.5595	1.1813	Pass
	st.dev. (n)	0.00290	0.00257	0.00548	0.00504	0.00955	0.02439	0.07392	
	R(calc.)	0.0081	0.0072	0.0153	0.0141	0.0267	0.0683	0.2070	

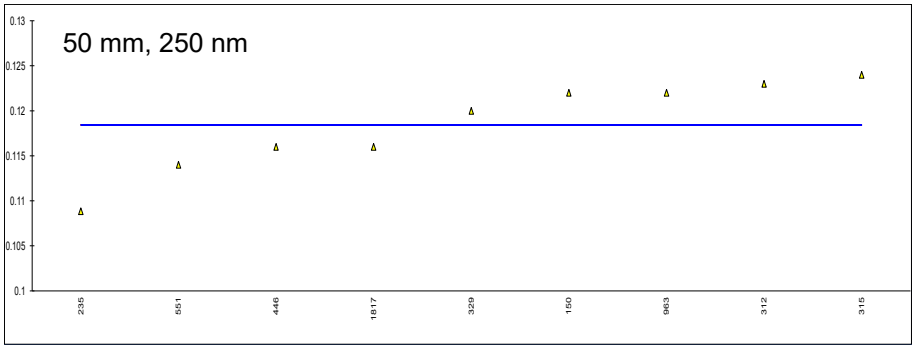
Lab 235 first reported 0.0000, 0.0014, 0.03015, 0.0763, 0.19575, 0.5033, 1.1028 respectively

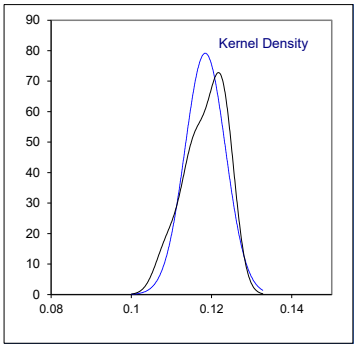


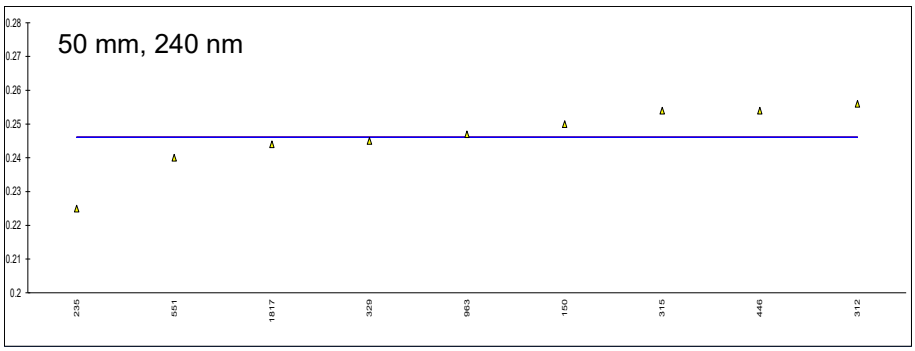


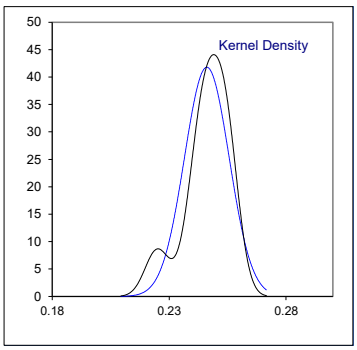

50 mm, 260 nm
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
235
551
446
1817
312
329
963
315
150

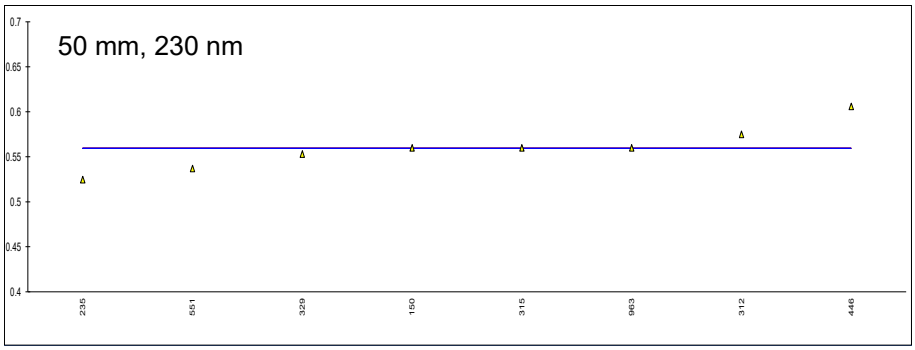

Kernel Density
80
70
60
50
40
30
20
10
0
0.02
0.04
0.06
0.08
0.1

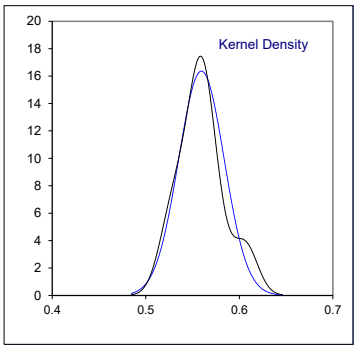

50 mm, 250 nm
0.13
0.125
0.12
0.115
0.11
0.105
0.1
235
551
446
1817
329
150
963
312
315

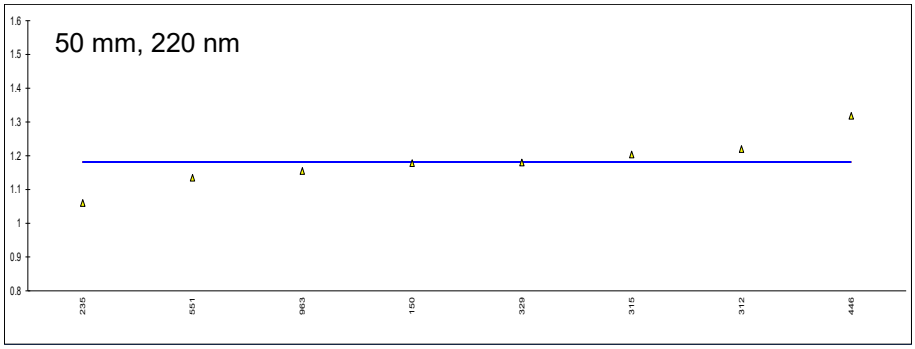

Kernel Density
90
80
70
60
50
40
30
20
10
0
0.08
0.1
0.12
0.14

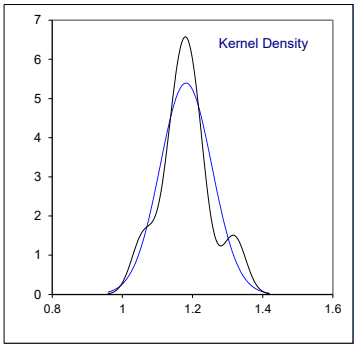

50 mm, 240 nm
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.2
235
551
1817
329
963
150
315
446
312


Kernel Density
50
45
40
35
30
25
20
15
10
5
0
0.18
0.23
0.28


50 mm, 230 nm
0.7
0.65
0.6
0.55
0.5
0.45
0.4
235
551
329
150
315
963
312
446

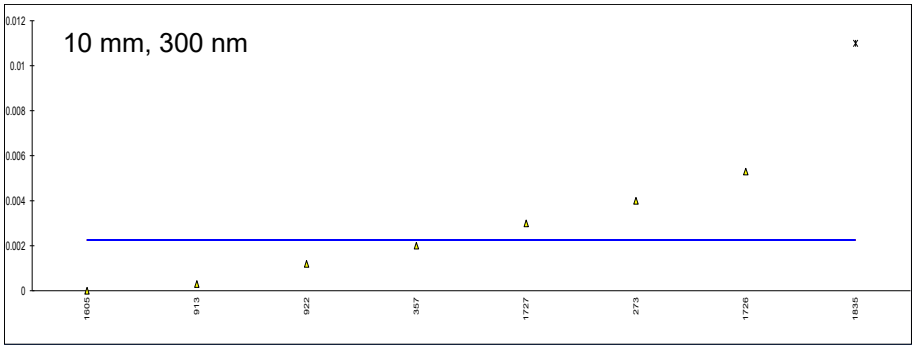

Kernel Density
20
18
16
14
12
10
8
6
4
2
0
0.4
0.5
0.6
0.7

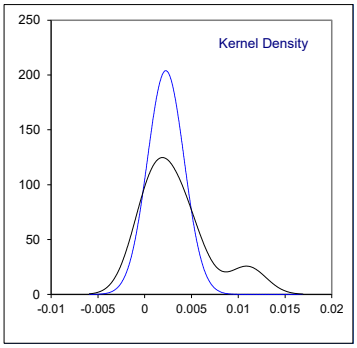

50 mm, 220 nm
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
235
551
963
150
329
315
312
446

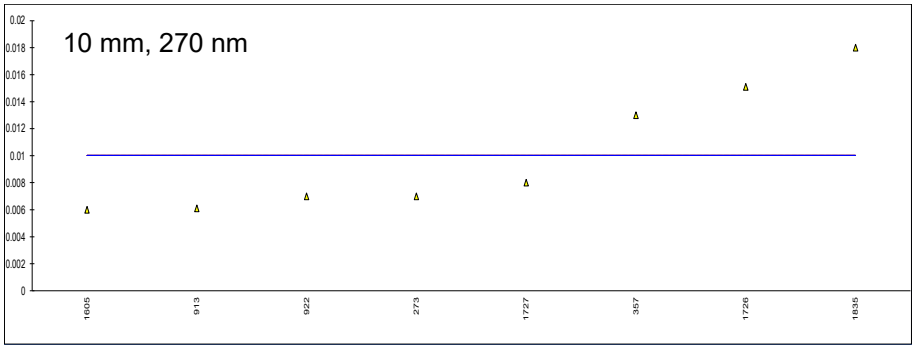

Kernel Density
7
6
5
4
3
2
1
0
0.8
1
1.2
1.4
1.6

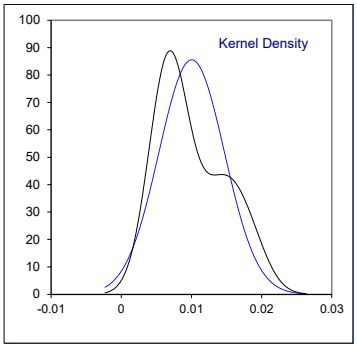
Determination of UV absorbance (10 mm cuvette) on sample #21265;

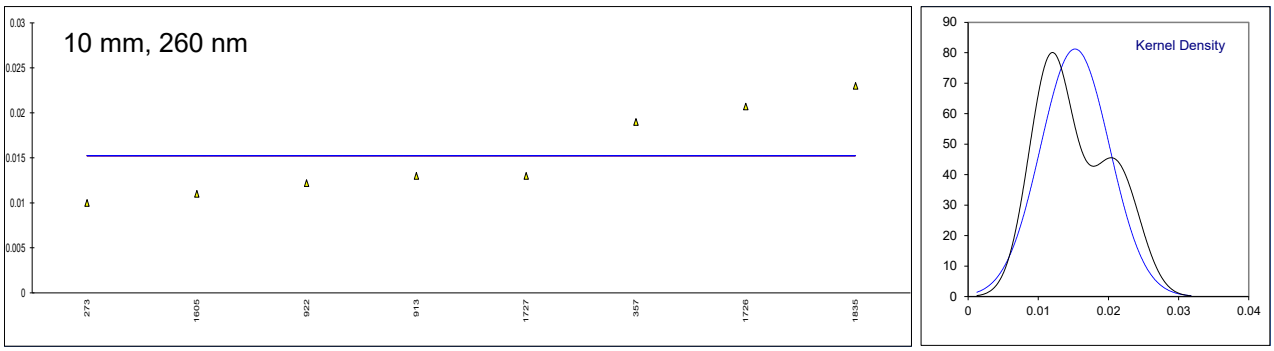
lab	method	300 nm	270 nm	260 nm	250 nm	240 nm	230 nm	220 nm	Pass/Fail
150		-----	-----	-----	-----	-----	-----	-----	-----
235		-----	-----	-----	-----	-----	-----	-----	-----
273	IMPCA004	0.004	0.007	0.010	0.018	0.045	0.108	0.225	-----
312		-----	-----	-----	-----	-----	-----	-----	-----
315		-----	-----	-----	-----	-----	-----	-----	-----
323		-----	-----	-----	-----	-----	-----	-----	-----
329		-----	-----	-----	-----	-----	-----	-----	-----
357	INH-13-001	0.002	0.013	0.019	0.027	0.058	0.150	0.324 D5	Pass
446		-----	-----	-----	-----	-----	-----	-----	-----
551		-----	-----	-----	-----	-----	-----	-----	-----
859		-----	-----	-----	-----	-----	-----	-----	-----
912		-----	-----	-----	-----	-----	-----	-----	-----
913	IMPCA004	0.0003	0.0061	0.0130	0.0319	0.0626	0.1182	0.2337	Fail
922	INH-13	0.0012	0.0070	0.0122	0.0230	0.0491	0.1113	0.2379	Fail
963		-----	-----	-----	-----	-----	-----	-----	-----
1205		-----	-----	-----	-----	-----	-----	-----	-----
1438		-----	-----	-----	-----	-----	-----	-----	-----
1574		-----	-----	-----	-----	-----	-----	-----	-----
1605		0.000	0.006	0.011	0.022	0.048	0.107	0.228	Pass
1726	IMPCA004	0.0053	0.0151	0.0207	0.0332	0.0620	0.1303	0.2633	Pass
1727	IMPCA004	0.003	0.008	0.013	0.024	0.050	0.110	0.232	Pass
1817		-----	-----	-----	-----	-----	-----	-----	-----
1835		0.011 G5	0.018	0.023	0.034	0.062	0.125	0.247	Pass
1927		-----	-----	-----	-----	-----	-----	-----	-----
6123		-----	-----	-----	-----	-----	-----	-----	-----
6214		-----	-----	-----	-----	-----	-----	-----	-----
6224		-----	-----	-----	-----	-----	-----	-----	-----
6403		-----	-----	-----	-----	-----	-----	-----	-----
	normality	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
	n	7	8	8	8	8	8	7	5
	outliers	1	0	0	0	0	0	1	
	mean (n)	0.0023	0.0100	0.0152	0.0266	0.0546	0.1200	0.2381	Pass
	st.dev. (n)	0.00196	0.00466	0.00491	0.00587	0.00729	0.01475	0.01319	
	R(calc.)	0.0055	0.0131	0.0138	0.0164	0.0204	0.0413	0.0369	

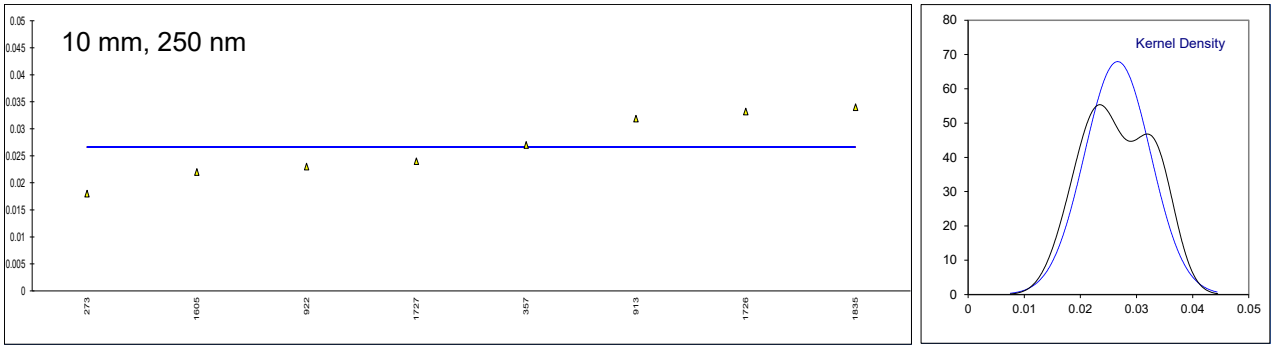


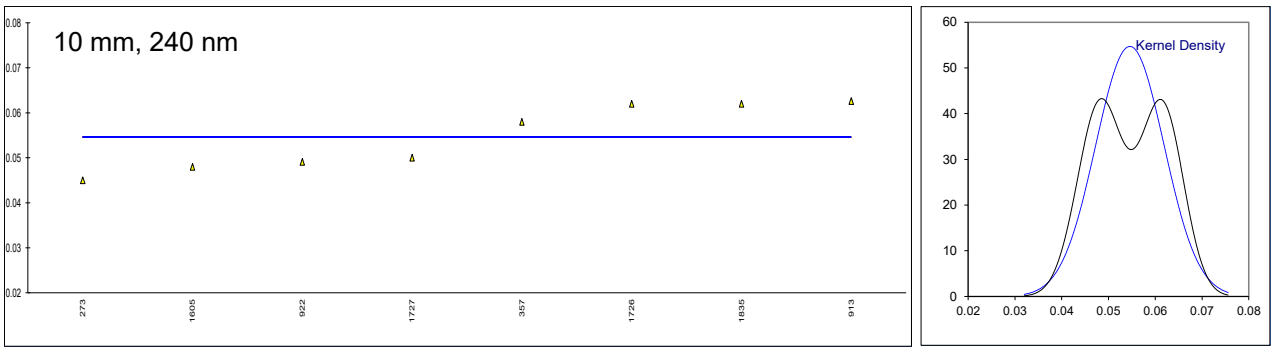


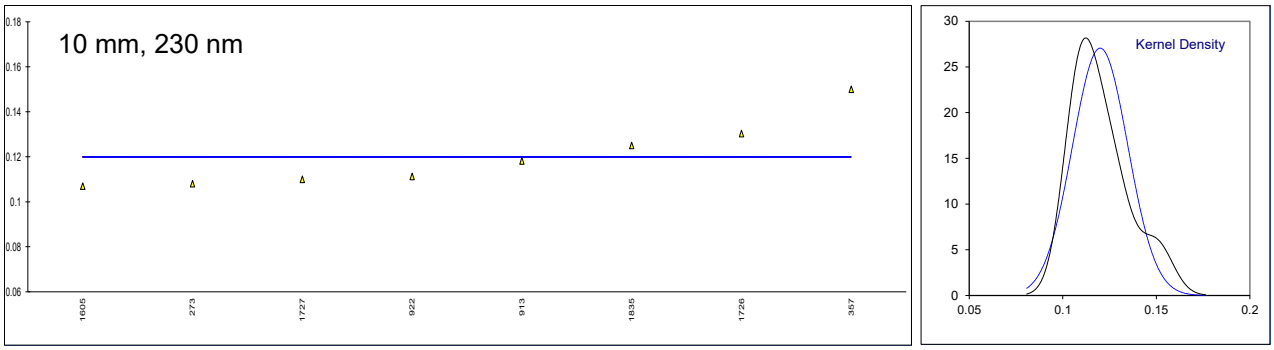


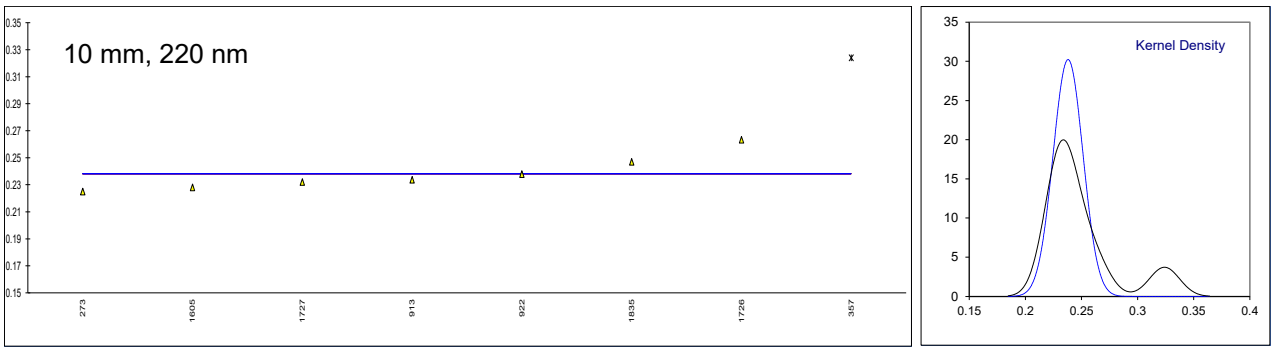



10 mm, 260 nm
Kernel Density


10 mm, 250 nm
Kernel Density


10 mm, 240 nm
Kernel Density

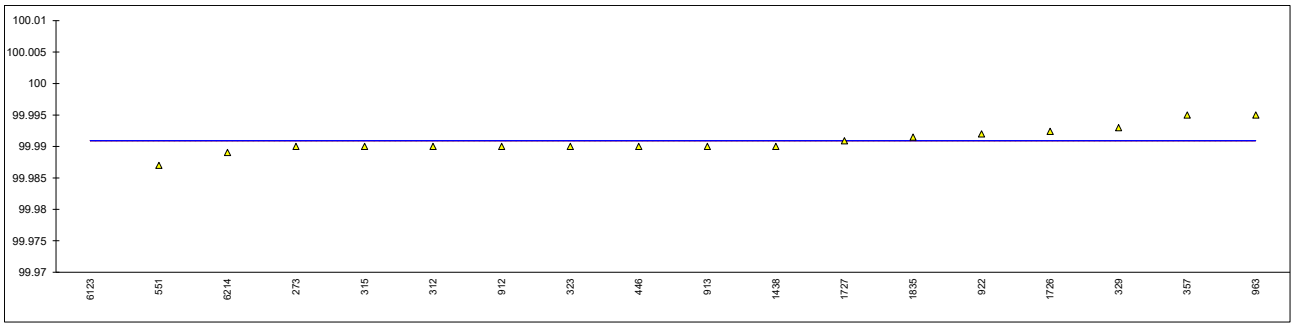

10 mm, 230 nm
Kernel Density

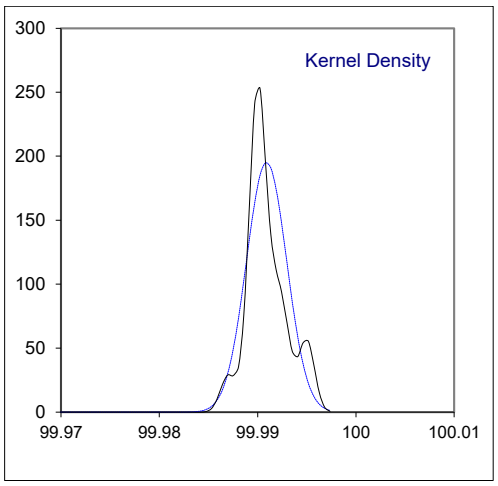

10 mm, 220 nm
Kernel Density

Determination of Purity of Ethanol on dry basis on sample #21266; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
235		-----		-----	
273	IMPCA004	99.99	C	-----	first reported 99.96
312	INH-0001	99.99		-----	
315	INH-933	99.99		-----	
323	INH-001	99.99		-----	
329	INH-0001	99.993		-----	
357	INH-02	99.995	C	-----	first reported 99.987
446	INH-043	99.99		-----	
551	INH-1313	99.987		-----	
859		-----		-----	
912	INH-02	99.99		-----	
913	INH-0002	99.99		-----	
922	INH-02	99.992		-----	
963	D5501	99.995		-----	
1205		-----		-----	
1438		99.99		-----	
1574		-----		-----	
1605		-----		-----	
1726	In house	99.9924		-----	
1727		99.9909		-----	
1817		-----		-----	
1835	In house	99.9915		-----	
1927		-----		-----	
6123	In house	99.86	C,D(0.01)	-----	first reported 94.1
6214		99.98905	C	-----	first reported 95.0477
6224		-----		-----	
6403		-----		-----	

normality	OK
n	17
outliers	1
mean (n)	99.9909
st.dev. (n)	0.00205
R(calc.)	0.0057

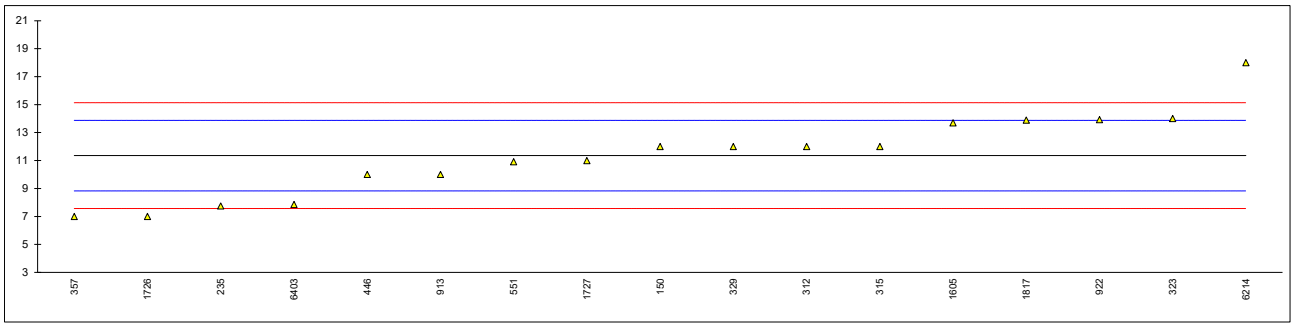


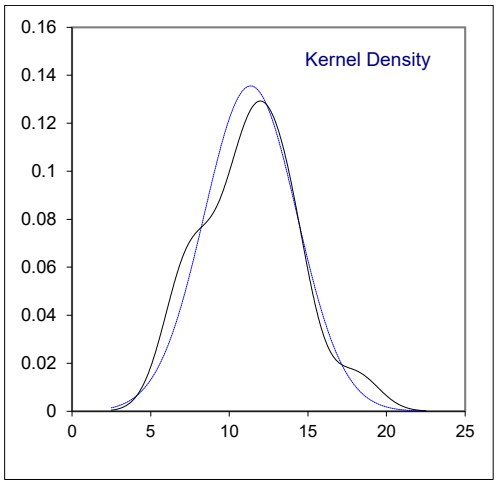


Determination of Methanol on sample #21266; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	INH-02	12		0.51	
235	INH-01	7.75		-2.86	
273		-----		-----	
312	INH-0001	12		0.51	
315	INH-933	12		0.51	
323	INH-001	14		2.10	
329	INH-0001	12		0.51	
357	INH-02	7		-3.46	
446	INH-043	10		-1.08	
551	INH-1313	10.91		-0.35	
859		-----		-----	
912		-----		-----	
913	INH-0002	10		-1.08	
922	INH-02	13.93		2.04	
963	D5501	<10		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		13.7		1.86	
1726	In house	7		-3.46	
1727		11		-0.28	
1817	In house	13.8860		2.01	
1835	In house	<25		-----	
1927		-----		-----	
6123		-----		-----	
6214		18		5.27	
6224		-----		-----	
6403	In house	7.86		-2.77	

normality	OK
n	17
outliers	0
mean (n)	11.355
st.dev. (n)	2.9421
R(calc.)	8.238
st.dev.(Horwitz)	1.2603
R(Horwitz)	3.529

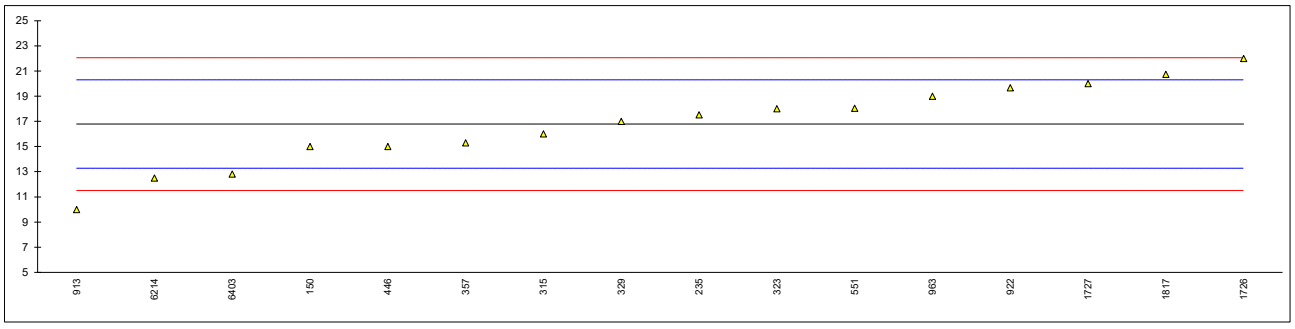


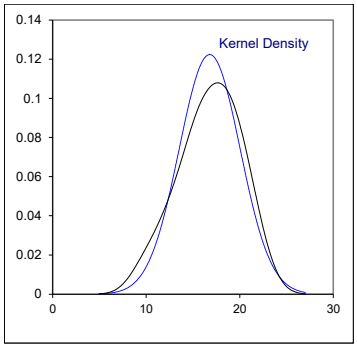


Determination of Acetone on sample #21266; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	INH-02	15		-1.02	
235	INH-01	17.52		0.42	
273		-----		-----	
312	INH-0001	<5		<-6.71	possibly a false negative test result?
315	INH-933	16		-0.45	
323	INH-001	18		0.69	
329	INH-0001	17		0.12	
357	INH-02	15.3	C	-0.85	first reported 97
446	INH-043	15		-1.02	
551	INH-1313	18.04		0.71	
859		-----		-----	
912		-----		-----	
913	INH-0002	10		-3.86	
922	INH-02	19.67		1.64	
963	D5501	19		1.26	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	In house	22		2.97	
1727		20		1.83	
1817	In house	20.7455		2.25	
1835	In house	<25		-----	
1927		-----		-----	
6123		-----		-----	
6214		12.5		-2.44	
6224		-----		-----	
6403	In house	12.82		-2.26	

normality	OK
n	16
outliers	0
mean (n)	16.787
st.dev. (n)	3.2598
R(calc.)	9.128
st.dev.(Horwitz)	1.7568
R(Horwitz)	4.919

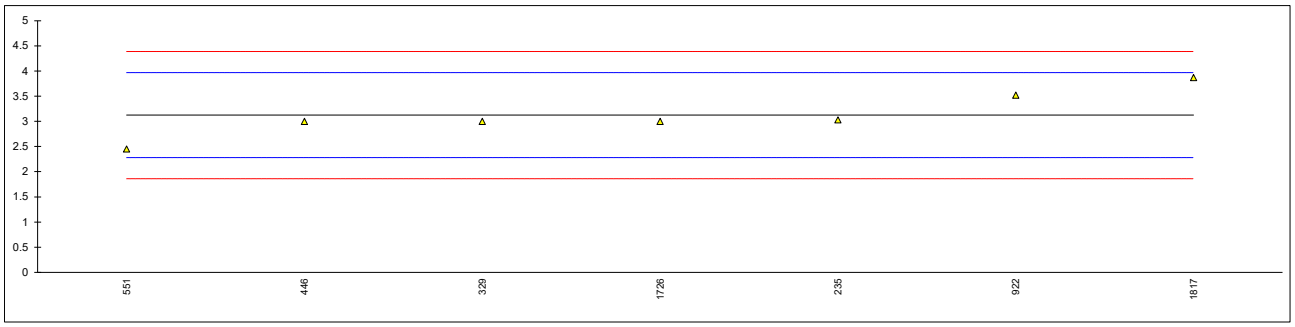


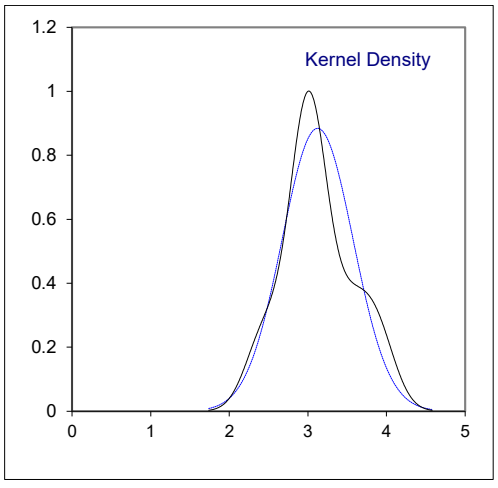


Determination of Benzene on sample #21266; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	INH-02	<5		-----	
235	INH-01	3.03		-0.22	
273		-----		-----	
312	INH-0001	<5		-----	
315	INH-933	<5		-----	
323	INH-001	< 5		-----	
329	INH-0001	3		-0.30	
357	INH-02	< 5		-----	
446	INH-043	3		-0.30	
551	INH-1299	2.45		-1.60	
859		-----		-----	
912		-----		-----	
913	INH-0002	<10		-----	
922	INH-02	3.52		0.94	
963	D5501	<10		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	In house	3		-0.30	
1727		nd		-----	
1817	In house	3.8697		1.77	
1835	In house	<10		-----	
1927		-----		-----	
6123		-----		-----	
6214		-----		-----	
6224		-----		-----	
6403		-----		-----	

normality	unknown
n	7
outliers	0
mean (n)	3.124
st.dev. (n)	0.4513
R(calc.)	1.264
st.dev.(Horwitz)	0.4211
R(Horwitz)	1.179

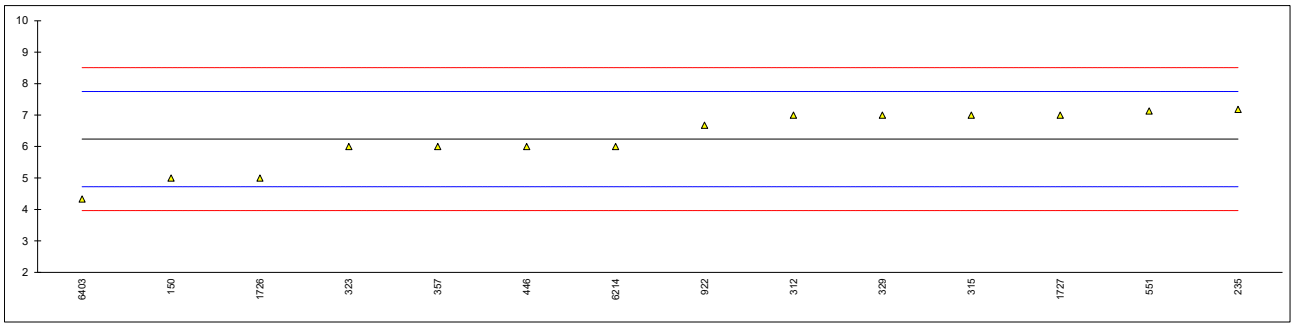


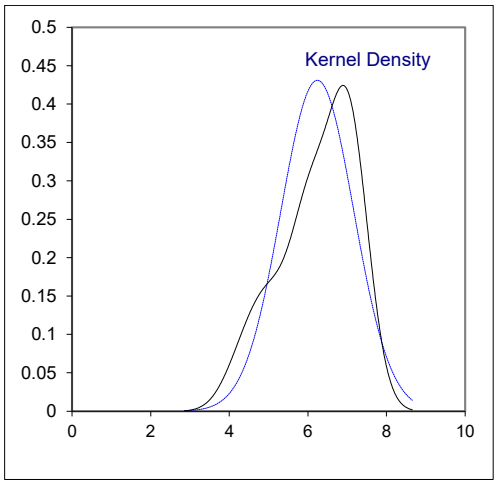


Determination of Isopropanol on sample #21266; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	INH-02	5		-1.63	
235	INH-01	7.18		1.24	
273		-----		-----	
312	INH-0001	7		1.01	
315	INH-933	7		1.01	
323	INH-001	6		-0.31	
329	INH-0001	7		1.01	
357	INH-02	6		-0.31	
446	INH-043	6		-0.31	
551	INH-1313	7.13		1.18	
859		-----		-----	
912		-----		-----	
913	INH-0002	<10		-----	
922	INH-02	6.68		0.58	
963	D5501	<10		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	In house	5		-1.63	
1727		7		1.01	
1817		-----		-----	
1835	In house	<25		-----	
1927		-----		-----	
6123		-----		-----	
6214		6		-0.31	
6224		-----		-----	
6403	In house	4.33		-2.52	

normality	OK
n	14
outliers	0
mean (n)	6.237
st.dev. (n)	0.9254
R(calc.)	2.591
st.dev.(Horwitz)	0.7576
R(Horwitz)	2.121

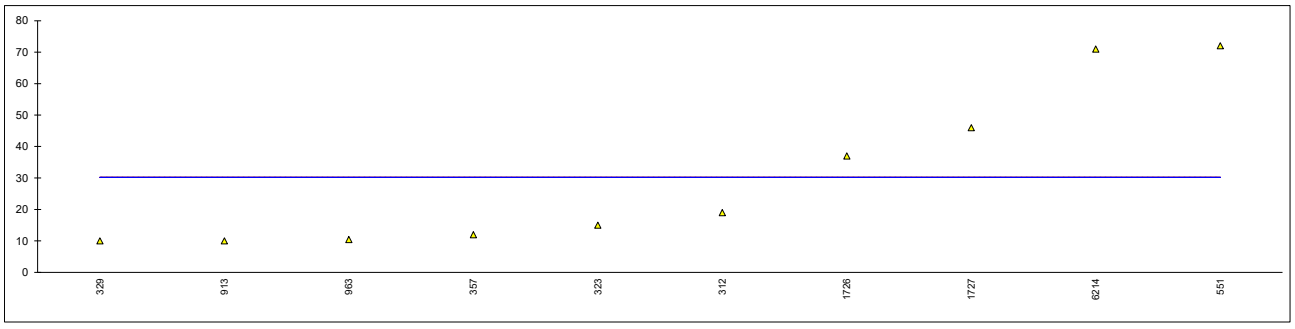


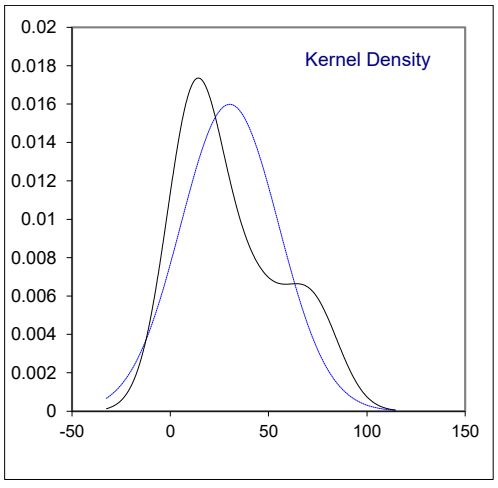


Determination of Other impurities on sample #21266; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
235		-----		-----	
273		-----		-----	
312	INH-0001	19		-----	
315	INH-933	<50		-----	
323	INH-001	15		-----	
329	INH-0001	10		-----	
357	INH-02	12		-----	
446	INH-043	<20		-----	
551	INH-1313	72.04		-----	
859		-----		-----	
912		-----		-----	
913	INH-0002	10		-----	
922		-----		-----	
963	D5501	10.42		-----	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	In house	37		-----	
1727		46		-----	
1817	In house	< 300		-----	
1835	In house	<50		-----	
1927		-----		-----	
6123		-----		-----	
6214		71		-----	
6224		-----		-----	
6403		-----		-----	

normality	OK
n	10
outliers	0
mean (n)	30.246
st.dev. (n)	24.9580
R(calc.)	69.883
st.dev.(Horwitz, comp:3)	(5.0175)
R(Horwitz, comp:3)	(14.049)

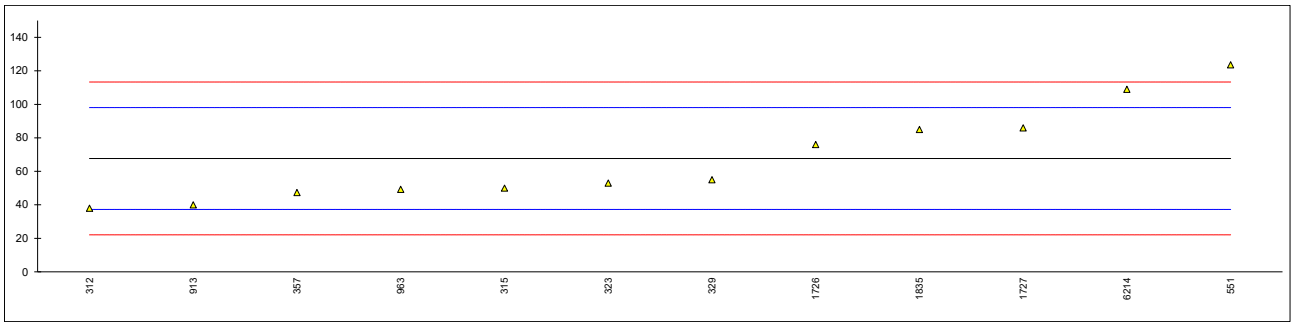


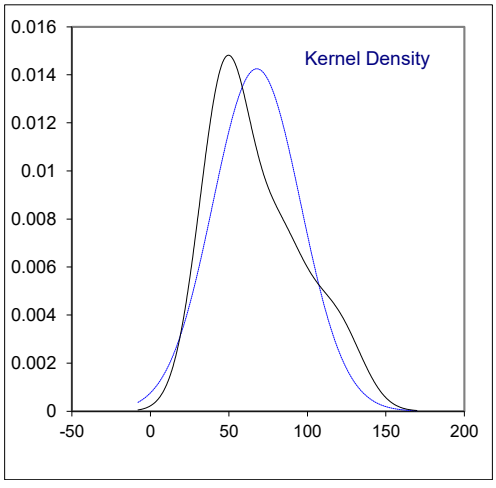


Determination of Total impurities on sample #21266; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
235		-----		-----	
273		-----		-----	
312	INH-0001	38		-1.95	
315	INH-933	50		-1.16	
323	INH-001	53		-0.97	
329	INH-0001	55		-0.83	
357	INH-02	47.3	C	-1.34	first reported 129
446	INH-043	<50		-----	
551	INH-1313	123.60		3.68	
859		-----		-----	
912		-----		-----	
913	INH-0002	40		-1.82	
922		-----		-----	
963	D5501	49.31		-1.21	
1205		-----		-----	
1438		-----		-----	
1574		-----		-----	
1605		-----		-----	
1726	In house	76		0.55	
1727		86		1.21	
1817		-----		-----	
1835	In house	85		1.14	
1927		-----		-----	
6123		-----		-----	
6214		109		2.72	
6224		-----		-----	
6403		-----		-----	

normality	OK
n	12
outliers	0
mean (n)	67.684
st.dev. (n)	28.0064
R(calc.)	78.418
st.dev.(Horwitz, comp:7)	15.1929
R(Horwitz, comp:7)	42.540





APPENDIX 2

Other reported impurities in sample #21266; results in mg/kg

lab	Acetal (1,1-diethoxyethane)	Acetaldehyde	Mono Ethylene glycol (MEG)
150	<5	<5	-----
235	-----	0.183	-----
273	-----	-----	-----
312	<5	<5	<5
315	<5	<5	<5
323	< 5	< 5	-----
329	<5	<5	4
357	< 5	< 5	< 30
446	<5	<5	<5
551	1.80	3.22	8.01
859	-----	-----	-----
912	-----	-----	-----
913	<10	<10	<10
922	2.27	<2.0	7.2
963	-----	<10	-----
1205	-----	-----	-----
1438	-----	-----	-----
1574	-----	-----	-----
1605	-----	-----	-----
1726	2	-----	-----
1727	2	<1	-----
1817	< 5	< 5	-----
1835	<25	<10	-----
1927	-----	-----	-----
6123	-----	-----	-----
6214	2	0	-----
6224	-----	-----	-----
6403	-----	-----	-----

APPENDIX 3

Number of participants per country

3 labs in	BELGIUM
1 lab in	BRAZIL
1 lab in	CHINA, People's Republic
1 lab in	FINLAND
1 lab in	HONG KONG
1 lab in	HUNGARY
2 labs in	INDIA
1 lab in	ISRAEL
1 lab in	MAURITIUS
4 labs in	NETHERLANDS
1 lab in	PAKISTAN
1 lab in	ROMANIA
1 lab in	SAUDI ARABIA
1 lab in	SERBIA
1 lab in	SOUTH AFRICA
3 labs in	SPAIN
2 labs in	THAILAND
1 lab in	UNITED KINGDOM
1 lab in	UNITED STATES OF AMERICA

APPENDIX 4

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
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9 Analytical Methods Committee, Technical Brief, No 4, January 2001
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