

Results of Proficiency Test
Acetone
September 2009

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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CONTENTS

1	INTRODUCTION	3
2	SET UP	3
2.1	QUALITY SYSTEM	3
2.2	PROTOCOL.....	3
2.3	CONFIDENTIALITY STATEMENT	3
2.4	SAMPLES	3
2.5	STABILITY OF THE SAMPLES.....	4
2.6	ANALYSES	4
3	RESULTS.....	5
3.1	STATISTICS	5
3.2	GRAPHICS	5
3.3	Z-SCORES	6
4	EVALUATION.....	6
4.1	EVALUATION PER TEST	6
4.2	PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES.....	9
4.3	COMPARISON OF THE PROFICIENCY TEST OF SEPTEMBER 2009 WITH PREVIOUS PT'S ...	10

Appendices:

1.	Data and statistical results	11
2.	Number of participants per country	31
3.	Abbreviations and literature	30

1 INTRODUCTION

Since 1999, the Institute for Interlaboratory Studies organizes a proficiency test for the analysis of Benzene and Toluene. As part of the annual proficiency test program of 2009/2010, the Institute decided to continue this proficiency test on Benzene and Toluene. In this international interlaboratory study, 21 laboratories from 15 different countries have participated. See appendix 2 for a list of participants in alphabetical country order. In this report, the results of the Acetone PT are presented and discussed.

2 SET UP

The Institute for Interlaboratory Studies (i.i.s.) in Spijkenisse, The Netherlands, was the organiser of this proficiency test and decided to send one sample Acetone (1*1000 mL, labelled #0954) to the participants. The participants were requested to report rounded and unrounded results. The unrounded results were preferably used for statistical evaluation.

2.1 QUALITY SYSTEM

The Institute for Interlaboratory Studies in Spijkenisse, The Netherlands, has implemented a quality system based on ISO guide 43 and ILAC-G13:2007. This ensures 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 organisation of this proficiency test was the one as described for proficiency testing in the report 'I.I.S. Interlaboratory Studies: Protocol for the Organization, Statistics and Evaluation' (i.i.s.-protocol, version 3.1) of November 2008.

2.3 CONFIDENTIALITY STATEMENT

All data present 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

The necessary bulk material of Acetone was purchased from a local Chemical supplier. The approx. 30 litre bulk sample was homogenised in a pre-cleaned drum. After homogenisation, the bulk sample was divided over 33 brown glass bottles of one litre (labelled #0954). The homogeneity of the subsamples #0954 was checked by determination of Water content in accordance with ASTM D1364:07, Density in

accordance with ASTM D4052:02e1 and Mesityloxyde in accordance with an inhouse method on 4 stratified random selected samples.

	Density in kg/L	Water in mg/kg	Mesityloxyde in mg/kg
sample #0954-1	0.79040	1820	30
sample #0954-2	0.79040	1810	30
sample #0954-3	0.79041	1845	30
sample #0954-4	0.79041	1820	30

Table 1: homogeneity test of subsamples #0954

From the above results of the homogeneity test, the relative between sample standard deviations RSD_r were calculated and compared with 0.3 times the relative proficiency target standard deviations RSD_R in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density in kg/L	Water in mg/kg	Mesityloxyde in mg/kg
RSD_r (observed)	0.00002	42	0.0
reference method	D 4052:02e1	D 1364:07	Horwitz
$0.3 \times RSD_R$ (ref. method)	0.00015	45	2.4

Table 2: relative repeatability standard deviations of subsamples #0954

The calculated variation coefficients RSD_r are all in good agreement with the targets from the standards and the estimated target, calculated using the Horwitz equation. Therefore, homogeneity of all subsamples was assumed.

One sample of acetone (1000 mL of sample #0954) was sent to each of the participating laboratories on August 26, 2009.

2.5 STABILITY OF THE SAMPLES

In order to be sure that the material, which is used in this proficiency test, is stable for the valid period the stability of the material, packed in the brown glass bottles, was checked prior to use.

2.6 ANALYSES

The participants were asked to determine: Acidity, Aldehydes, Appearance, Chloride as Cl, Colour as Pt/Co, Density @ 20 °C, Distillation (IBP, MBP and DP), Water Miscibility, Nonvolatile Matter, Purity as is, Purity on dry basis, Diacetonolcohol, Mesityloxyde, methanol, Permanganate Time Test @ 25 °C, Refractive Index @ 20 °C and Water on sample #0954 in accordance with specification ASTM D329:02.

To get comparable results, a detailed report form on which the units and the standard methods were printed, was sent together with each set of samples. Also, a letter of instructions and a SDS were added to the package.

3 RESULTS

During four weeks after sample despatch, the results of the individual laboratories were gathered. The original data are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder fax was sent to laboratories that had not reported results at that moment. Shortly after the deadline, the available results were screened for suspect data. A 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 results. Additional or corrected results are used for data analysis and original results are placed under 'Remarks' in the result tables in appendix 1.

3.1 STATISTICS

Statistical calculations were performed as described in the report 'i.i.s. Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of November 2008 (iis-protocol, version 3.1).

For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded results. 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. After removal of outliers this check was repeated. In case a data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

In accordance to ISO 5725 (1986 and 1994) the original results per determination were submitted subsequently to Dixon and Grubbs outlier tests. Outliers are marked by D(0.01) for the Dixon test and by G(0.01) or DG(0.01) for the Grubbs test. Stragglers are marked by D(0.05) for the Dixon test and by G(0.05) or DG(0.05) for the Grubbs test. Both outliers and stragglers were not included in the calculations of the averages and the standard deviations.

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

3.2 GRAPHICS

In order to visualise 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 analysis results are plotted. The corresponding laboratory numbers are under 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 standard. 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 (see appendix 4; nr.14 and 15).

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, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the spread of this interlaboratory study.

The target standard deviation was calculated from the target reproducibility (preferably taken from a standardized test method) by division with 2.8.

The z-scores were calculated in accordance with:

$ z < 1$	good
$1 < z < 2$	satisfactory
$2 < z < 3$	questionable
$ z > 3$	unsatisfactory

4 EVALUATION

In this proficiency test, problems were encountered with the dispatch of the samples to the Brazil and India, due to custom problems. From the total of 21 participants, two participants did report results after the deadline for reporting and 2 participants did not report any result. In total 216 numerical results were reported. Observed were 7 outlying results, which is 3.2 %. In proficiency studies, outlier percentages of 3 % - 7.5 % are quite normal.

4.1 EVALUATION PER TEST

Not all original data sets proved to have a normal distribution. For Density, IBP, MBP (automated mode) and MBP, DP (manual mode) non-Gaussian distributions were found and therefore the statistical evaluation for these determinations should be used with care. In this section, the results are discussed per test.

Acidity: No analytical problems were observed. The calculated reproducibility is, after rejection of the statistical outlier, in good agreement with the requirements of ASTM D1613:06.

Aldehydes: No conclusions could be drawn. Only four participants reported a result. Three of the four laboratories reported a result in accordance to ASTM

D329:02 and one laboratory reported a numerical result. The analytical method described in ASTM D329:07 is a pass/fail test.

Appearance: No analytical problems were observed. All labs, except one, agreed about the appearance of sample #0954, which is bright, clear and free of suspended matter. The uniformity of reporting can be improved. A new standardized method is available for Appearance since 2009, being ASTM E2680. According this method the appearance should be reported as 'pass' (or 'fail').

Chloride: It is hard to draw conclusions, because only one participant reported a numerical result.

Colour: This determination is problematic for one laboratory (false negative). The calculated reproducibility is in good agreement with the requirements of ASTM D1209:05.

Density @ 20°C: This determination is not problematic. The calculated reproducibility is in good agreement with the requirements of ASTM D4052:02e1.

Distillation: This determination was not problematic for both the manual and automated mode. All calculated reproducibilities for both operating modes (for IBP, MBP and DP as well) were in agreement with the requirements of ASTM D1078:05. From the reported results of the Mid Boiling Point (automated), it was concluded that one laboratory possibly may not have corrected the results properly for barometric pressure and thermometer accuracy as described in ASTM D1078. The same correction is applicable to IBP and DP. After manual correction the spreads are a bit smaller for MBP and DP, but larger for IBP. After correction, the calculated reproducibilities were still all in agreement with the requirements of ASTM D1078:05.

Water Miscibility: This determination was not problematic. All laboratories reported this test pass(es). The analytical method described in ASTM D1722:09 is a pass/fail test.

NVM: This determination was not problematic. The calculated reproducibility is in good agreement with the requirements of ASTM D1353:09.

Purity as is: For this determination no statistical outliers were noticed. The calculated reproducibility is small.

Purity on DB: Two statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is small in comparison with the calculated reproducibility of the 2007 PT iis07C09 (0.0080 vs 0.0211).

- Diacetonalcohol: This determination may be somewhat problematic. The calculated reproducibility is not in agreement with the estimated requirements, calculated using the strict Horwitz equation. The calculated relative reproducibility is also large in comparison with the calculated relative reproducibility of the 2007 PT iis07C09 (27% vs 19%)
- Mesityloxiide: This determination is problematic for two laboratories only. The calculated reproducibility, after rejection of the two statistical outliers, is in good agreement with the estimated requirements, calculated using the strict Horwitz equation.
- Methanol: This determination is not problematic. Two statistical outliers were observed. However, the calculated reproducibility, after rejection of the two outliers, is in good agreement with the estimated requirements, calculated using the strict Horwitz equation.
- PTT: This determination is not problematic. All participants agreed on a result far above 30 minutes. When a statistical evaluation is performed on the actually reported results, the calculated reproducibility is not in agreement with the requirements of ASTM D1363:06. However, as it is unknown whether a Permanganate Time Test result of >100 minutes is in the applicability range, it is therefore difficult to draw any conclusions. No z-scores were calculated.
- Refractive index: This test is somewhat problematic. The calculated reproducibility is almost in agreement with the requirements of ASTM D1218:07.
- Water: This determination is not problematic. The calculated reproducibility is in good agreement with the requirements of ASTM D1364:07.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant standard and the reproducibility as found for the group of participating laboratories. The average results per sample, calculated reproducibilities and reproducibilities derived from literature standards (in casu ASTM standards) are compared in the next tables.

Parameter	unit	n	average	2.8 * sd	R (lit)
Acidity as acetic acid	%M/M	17	0.00137	0.00075	0.00140
Aldehydes	---	1	n.a.	n.a.	n.a.
Appearance	---	15	pass	n.a.	n.a.
Chloride as Cl	mg/kg	1	n.a.	n.a.	n.a.
Colour Pt/Co	---	13	3.7	4.0	7.0
Density @ 20 °C	kg/L	19	0.79042	0.00019	0.00050
Initial Boiling Point (automated)	°C	8	55.93	0.20	0.87
Mid Boiling Point (automated)	°C	8	56.09	0.10	0.38
Dry Point (automated)	°C	8	56.35	0.30	0.60
Initial Boiling Point (manual)	°C	8	55.96	0.26	0.60
Mid Boiling Point (manual)	°C	8	56.11	0.18	0.36
Dry Point (manual)	°C	8	56.51	0.28	0.74
Miscibility with water	---	15	pass	n.a.	n.a.
Nonvolatile Matter	mg/100 mL	12	1.04	1.36	2.40
Purity as is	%M/M	10	99.7860	0.0248	unknown
Purity on dry basis	%M/M	13	99.9680	0.0080	unknown
Diacetonolcohol	mg/kg	13	125.0	33.4	26.8
Mesityloxyde	mg/kg	11	31.8	7.5	8.5
Methanol	mg/kg	12	147.2	16.5	31.1
Permanganate Time Test	min	12	106	99	27
Refractive Index	---	11	1.35878	0.00055	0.00050
Water	mg/kg	17	1816.4	151.3	256.2

Table 4: Reproducibilities for sample #0954

Without further statistical calculations, it can be concluded that for many tests there is a good compliance of the group of participating laboratories with the relevant standards. The problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF SEPTEMBER 2009 WITH PREVIOUS PT'S

	September 2007	September 2007	October 2006	October 2005
Number of reporting labs	19	18	21	16
Number of results reported	216	157	178	156
Statistical outliers	7	8	12	7
Percentage outliers	3.2 %	5.1 %	6.7 %	4.5 %

Table 5: comparison of summary data 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 against the requirements of the respective standards. The conclusions are given the following table:

Determination	September 2009	September 2007	October 2006	October 2005
Acidity as acetic acid	++	++	++	++
Chloride as Cl	unknown	unknown	unknown	++
Colour Pt/Co	++	++	++	++
Density @ 20 °C	++	++	++	++
Distillation (automated)	++	++	++	++
Distillation (manual)	++	++	++	++
Nonvolatile Matter	++	++	++	++
Diacetonolcohol	--	--	--	--
Mesityloxide	+	n.a.	n.a.	n.a.
Methanol	++	n.a.	n.a.	n.a.
Permanganate Time Test	n.a.	n.a.	--	--
Refractive Index	-	--	-	--
Water	++	++	++	+/-

Table 6: comparison determinations against the standard

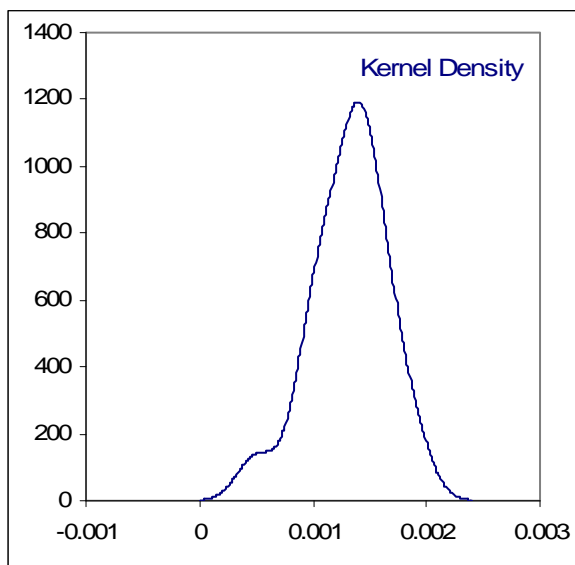
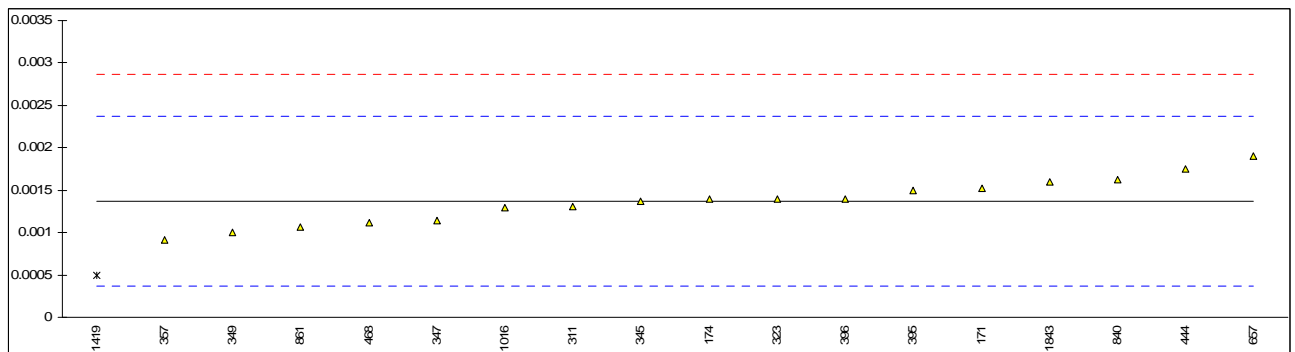
The performance of the determinations against the requirements of the respective standards is listed in the above table. The following performance categories were used:

- ++: group performed much better than the standard
- + : group performed better than the standard
- +/-: group performance equals the standard
- : group performed worse than the standard
- : group performed much worse than the standard
- n.a.: not applicable
- n.d.: not determined
- n.e.: not evaluated

APPENDIX 1

Determination of Acidity on sample #0954; results in %M/M

lab	method	value	mark	z(targ)	remarks
171	D1613	0.00152		0.30	
174	D1613	0.0014		0.06	
311	D1613	0.0013		-0.14	
323	D1613	0.0014		0.06	
345	D1613	0.001367		0.00	
347	D1613	0.00114		-0.46	
349	D1613	0.0010		-0.74	
357	D1613	0.00091		-0.92	
395	D1613	0.0015		0.26	
396	D1613	0.0014		0.06	
444	D1613	0.00175		0.76	
468	D1613	0.00111		-0.52	
551		----		----	
657	D1613	0.0019		1.06	
840	D1613	0.00162		0.50	
861	D1613	0.00106		-0.62	
913		----		----	
1016	D1613	0.00129		-0.16	
1419	D1613	0.0005	G(0.05)	-1.74	
1826		----		----	
1843	D1613	0.0016		0.46	
normality		OK			
n		17			
outliers		1			
mean (n)		0.00137			
st.dev. (n)		0.000269			
R(calc.)		0.00075			
R(D1613:06)		0.00140			



Determination of Aldehydes on sample #0954;

lab	method	value	mark	z(targ)	remarks
171		----		----	
174		----		----	
311		----		----	
323	D329	passes		----	
345		----		----	
347		----		----	
349		----		----	
357	D329	passes		----	
395		----		----	
396		----		----	
444		----		----	
468		----		----	
551		----		----	
657	INH-0049	0.0016		----	
840	D329	passes		----	
861		----		----	
913		----		----	
1016		----		----	
1419		----		----	
1826		----		----	
1843		----		----	
	normality	n.a.			
	n	1			
	outliers	0			
	mean (n)	n.a.			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D329:07e1)	n.a.			

Determination of Appearance on sample #0954;

lab	method	value	mark	z(targ)	remarks
171	E2680	C&F		----	reporting not in agreement with method used
174	E2680	CFFSM		----	reporting not in agreement with method used
311	Inh-402	B&C		----	
323	E2680	pass		----	
345	visual	CFFSM		----	
347	E2680	CFFSM		----	reporting not in agreement with method used
349	E2680	B&C		----	
357	visual	CWFP		----	
395	E2680	pass		----	
396	visual	B&C&T		----	
444	INHOUSE	PASS		----	
468	E2680	CFFSIM		----	reporting not in agreement with method used
551		----		----	
657	E2680	pass		----	
840	E2680	pass		----	
861	E2680	pass		----	
913		----		----	
1016		----		----	
1419		----		----	
1826		----		----	
1843	E2680	B&C		----	

Abbreviations:

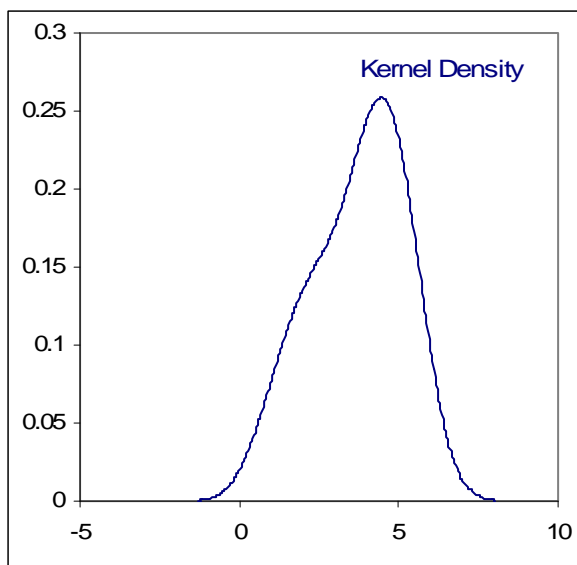
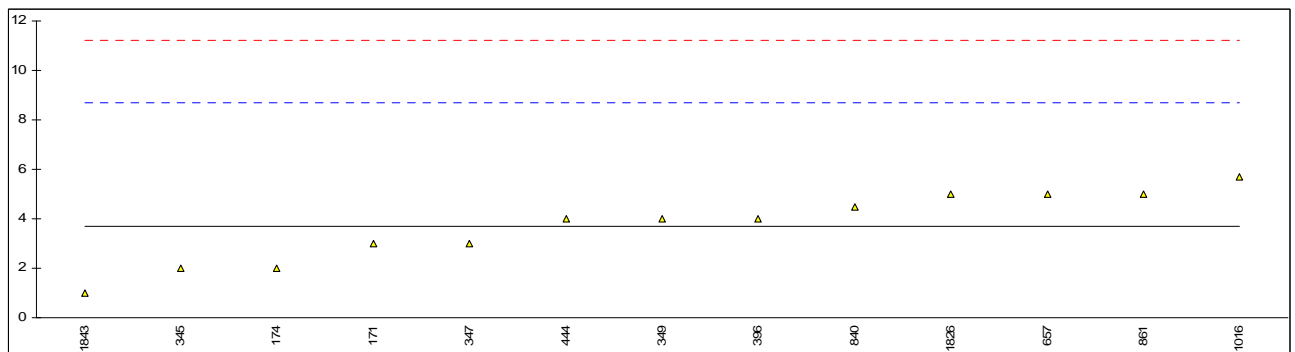
B&C:	bright and clear
B&C&T:	bright and clear and transparent
CFFSIM:	clear and free from matter in suspension
CFFSM:	clear and free from suspended matter
C&F:	clear and free
CWFP:	clear with free particles

Determination of Chloride as Cl on sample #0954; results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	Titrimetric	<0.1		----	
174	Titrimetric	<0.10		----	
311	Inh-158	<0.2		----	
323	IMPCA002	<0.25		----	
345		----		----	
347		----		----	
349		----		----	
357	Titrimetric	<0.5		----	
395		----		----	
396		----		----	
444		----		----	
468		----		----	
551		----		----	
657		----		----	
840	IMPCA002	0.04		----	
861	Inh-001	<0.5		----	
913		----		----	
1016		----		----	
1419		----		----	
1826		----		----	
1843		----		----	
	normality	n.a.			
	n	1			
	outliers	0			
	mean (n)	n.a.			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(lit.)	n.a.			

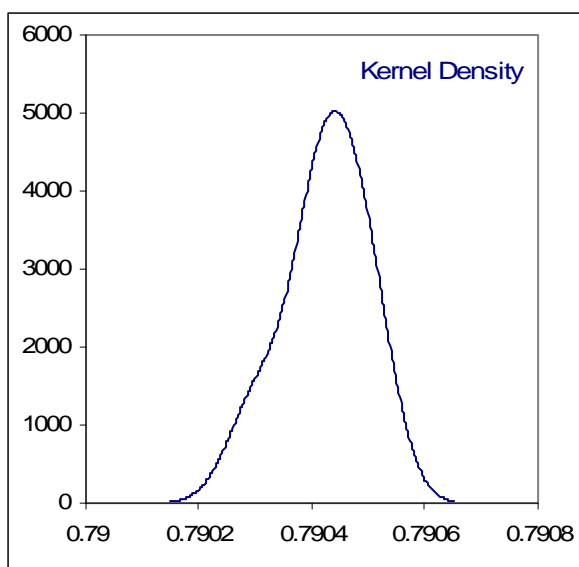
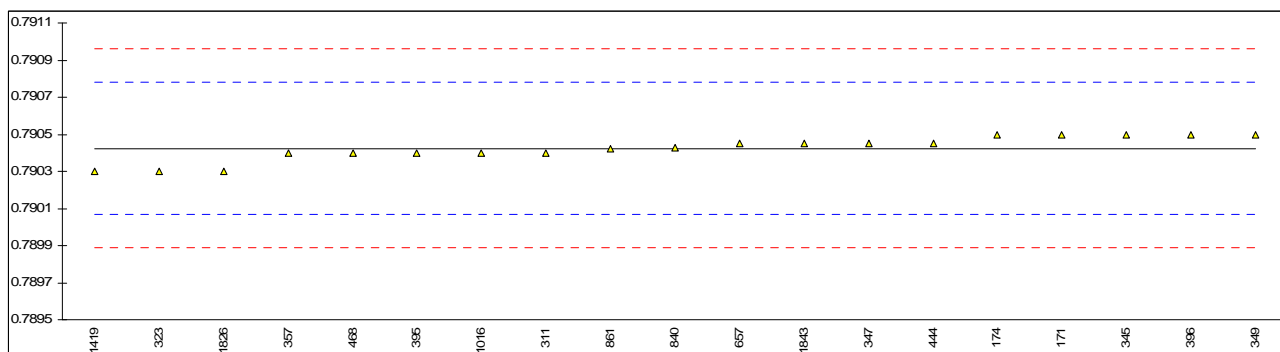
Determination of Colour as Pt/Co on sample #0954;

lab	method	value	mark	z(targ)	remarks
171	D1209	3		-0.28	
174	D1209	2		-0.68	
311	D1209	<5		<0.52	
323	D1209	<5		<0.52	
345	D1209	2		-0.68	
347	D1209	3		-0.28	
349	D1209	4		0.12	
357	D1209	<5		<0.52	
395	D1209	<5		<0.52	
396	D1209	4		0.12	
444	D1209	4		0.12	
468	D1209	<1		<-1.08	False negative?
551		----		----	
657	D1209	5		0.52	
840	D1209	4.5		0.32	
861	D1209	5		0.52	
913		----		----	
1016	D1209	5.71		0.80	
1419		----		----	
1826	D1209	5		0.52	
1843	D1209	1		-1.08	
normality		OK			
n		13			
outliers		0			
mean (n)		3.7			
st.dev. (n)		1.42			
R(calc.)		4.0			
R(D1209:05e1)		7.0			



Determination of Density @ 20 °C on sample #0954; results in kg/L

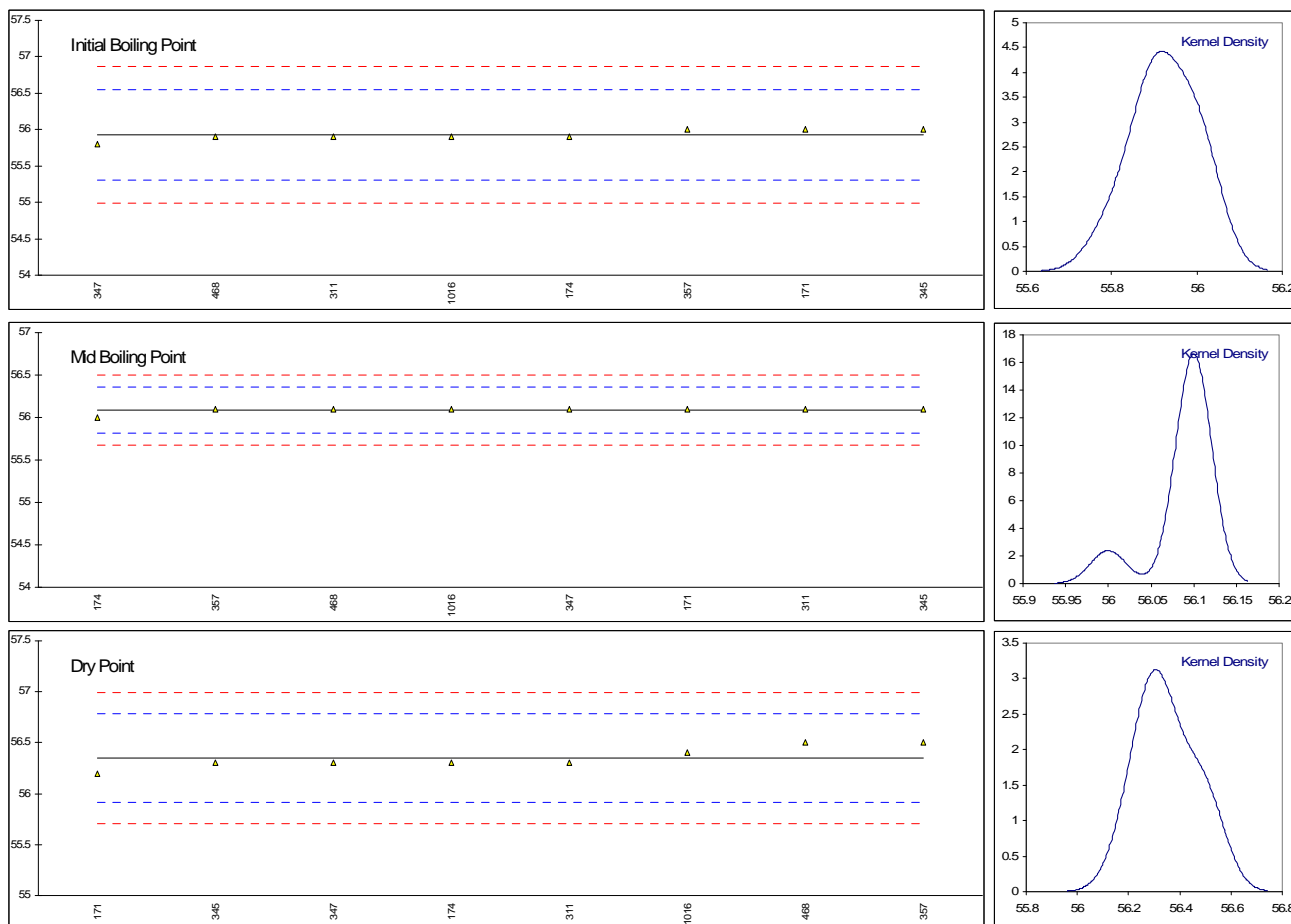
lab	method	value	mark	z(targ)	remarks
171	D4052	0.7905		0.43	
174	D4052	0.7905		0.43	
311	D4052	0.7904		-0.13	
323	D4052	0.7903		-0.69	
345	D4052	0.7905		0.43	
347	D4052	0.79045		0.15	
349	D4052	0.7905		0.43	
357	D1298	0.7904		-0.13	
395	D4052	0.7904		-0.13	
396	D4052	0.7905		0.43	
444	D4052	0.79045		0.15	
468	D4052	0.7904		-0.13	
551		----		----	
657	D4052	0.79045		0.15	
840	D4052	0.79043		0.04	
861	D4052	0.79042		-0.02	
913		----		----	
1016	D4052	0.7904		-0.13	
1419	ISO12185	0.7903		-0.69	
1826	D4052	0.7903		-0.69	
1843	D4052	0.79045		0.15	
normality		not OK			
n		19			
outliers		0			
mean (n)		0.79042			
st.dev. (n)		0.000067			
R(calc.)		0.00019			
R(D4052:02e1)		0.00050			



Determination of IBP, MBP and DP (automated) @ 760 mmHg on sample #0954; results in °C

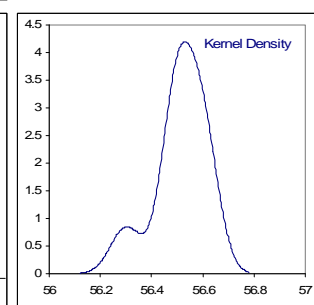
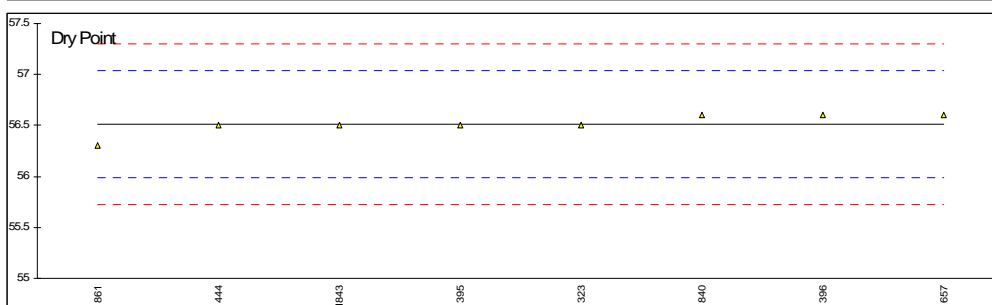
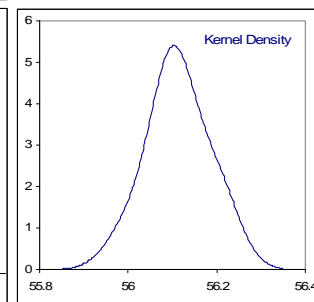
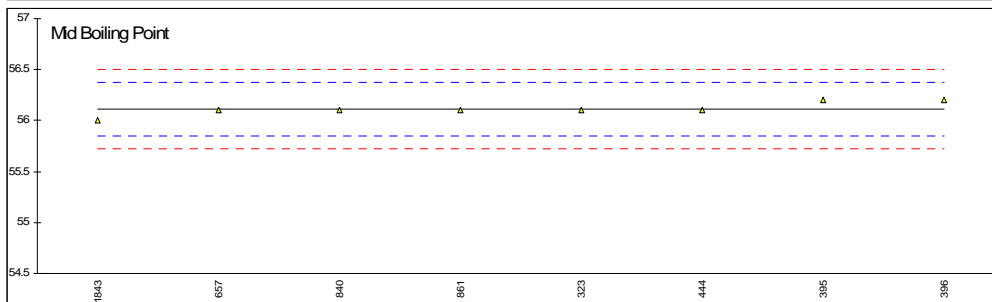
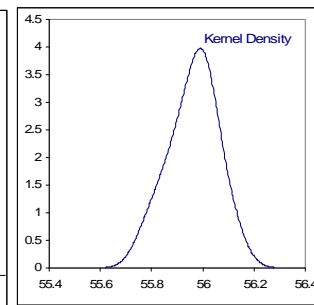
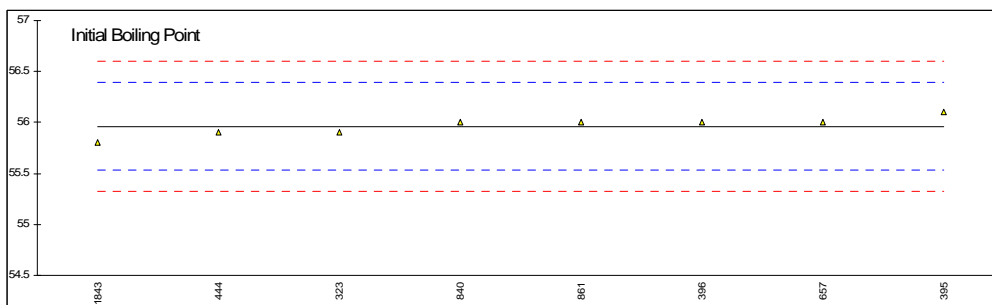
lab	method	IBP	mark	z(targ)	MBP	mark	z(targ)	DP	mark	z(targ)	remarks
171	D1078	56.0		0.24	56.1		0.09	56.2		-0.70	
174	D1078	55.9		-0.08	56.0		-0.64	56.3		-0.23	
311	D1078	55.9		-0.08	56.1		0.09	56.3		-0.23	
323		----		----	----		----	----		----	
345	D1078	56.0		0.24	56.1		0.09	56.3		-0.23	
347	D1078	55.8		-0.40	56.1		0.09	56.3		-0.23	*)
349		----		----	----		----	----		----	
357	D1078	56.0		0.24	56.1		0.09	56.5		0.70	
395		----		----	----		----	----		----	
396		----		----	----		----	----		----	
444		----		----	----		----	----		----	
468	D1078	55.9		-0.08	56.1		0.09	56.5		0.70	
551		----		----	----		----	----		----	
657		----		----	----		----	----		----	
840		----		----	----		----	----		----	
861		----		----	----		----	----		----	
913		----		----	----		----	----		----	
1016	D1078	55.9		-0.08	56.1		0.09	56.4		0.23	
1419		----		----	----		----	----		----	
1826		----		----	----		----	----		----	
1843		----		----	----		----	----		----	
	normality	After OK		Before not OK	After not OK		Before not OK	After not OK		Before OK	
	n	8		8	8		8	8		8	
	outliers	0		0	0		0	0		0	
	mean (n)	55.93		55.95	56.09		56.11	56.35		56.38	
	st.dev. (n)	0.071		0.053	0.035		0.083	0.107		0.116	
	R(calc.)	0.20		0.15	0.10		0.23	0.30		0.33	
	R(D1078:05-A)	0.87		0.87	0.38		0.38	0.60		0.60	

*) results before correction IBP = 50.0°C, MBP = 56.3°C, DP = 56.5°C



Determination of IBP, MBP and DP (manual) @ 760 mmHg on sample #0954; results in °C

lab	method	IBP	mark	z(targ)	MBP	mark	z(targ)	DP	mark	z(targ)	remarks
171		----		----	----		----	----		----	
174		----		----	----		----	----		----	
311		----		----	----		----	----		----	
323	D1078	55.9		-0.29	56.1		-0.10	56.5		-0.05	
345		----		----	----		----	----		----	
347		----		----	----		----	----		----	
349		----		----	----		----	----		----	
357		----		----	----		----	----		----	
395	D1078	56.1		0.64	56.2		0.67	56.5		-0.05	
396	D1078	56.0		0.18	56.2		0.67	56.6		0.33	
444	D1078	55.9		-0.29	56.1		-0.10	56.5		-0.05	
468		----		----	----		----	----		----	
551		----		----	----		----	----		----	
657	D1078	56.0		0.18	56.1		-0.10	56.6		0.33	
840	D1078	56.0		0.18	56.1		-0.10	56.6		0.33	
861	D1078	56.0		0.18	56.1		-0.10	56.3		-0.81	
913		----		----	----		----	----		----	
1016		----		----	----		----	----		----	
1419		----		----	----		----	----		----	
1826		----		----	----		----	----		----	
1843	D1078	55.8		-0.76	56.0		-0.87	56.5		-0.05	
	normality	OK			not OK			not OK			
	n	8			8			8			
	outliers	0			0			0			
	mean (n)	55.96			56.11			56.51			
	st.dev. (n)	0.092			0.064			0.099			
	R(calc.)	0.26			0.18			0.28			
	R(D1078:05-M)	0.60			0.36			0.74			

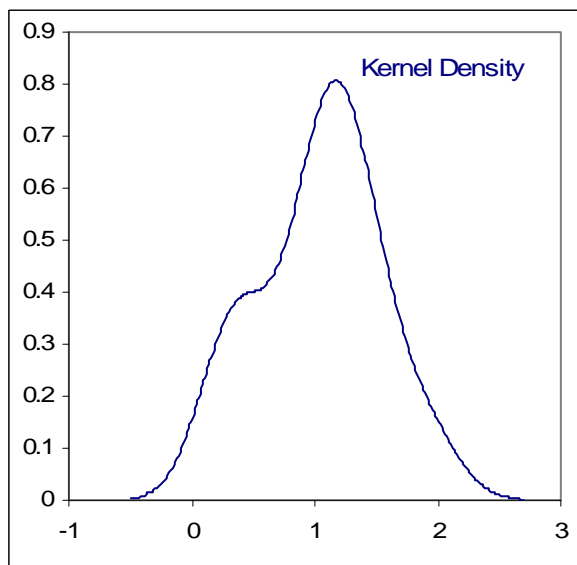
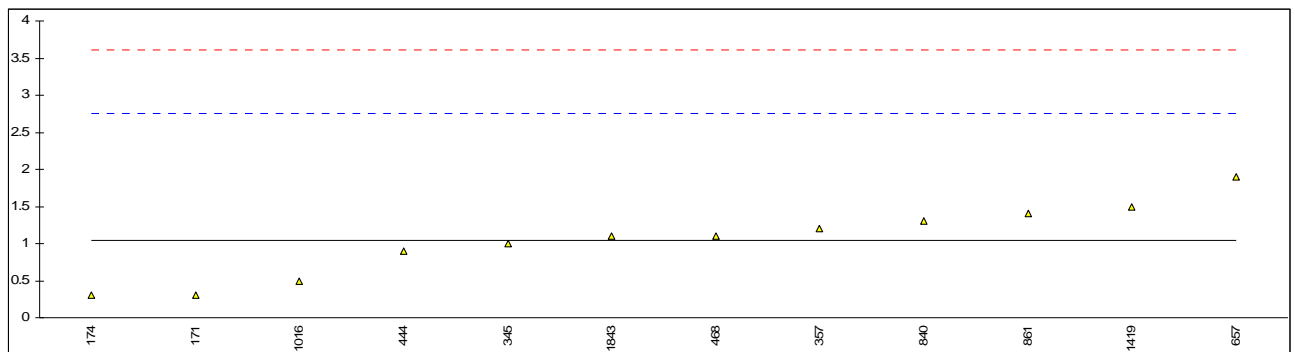


Determination of Miscibility with Water on sample #0954;

lab	method	value	mark	z(targ)	remarks
171	D1722	pass		----	
174	D1722	pass		----	
311	D1722	pass		----	
323	D1722	passes		----	
345		----		----	
347	D1722	pass		----	
349		----		----	
357	D1722	passes		----	
395	D1722	pass		----	
396	D1722	pass		----	
444	D1722	pass		----	
468	D1722	passes		----	
551		----		----	
657	D1722	pass		----	
840	D1722	passes		----	
861	D1722	passes		----	
913		----		----	
1016	D1722	pass		----	
1419		----		----	
1826		----		----	
1843	D1722	passes		----	
	normality	not OK			
	n	15			
	outliers	0			
	mean (n)	Pass			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D1722:09)	n.a.			

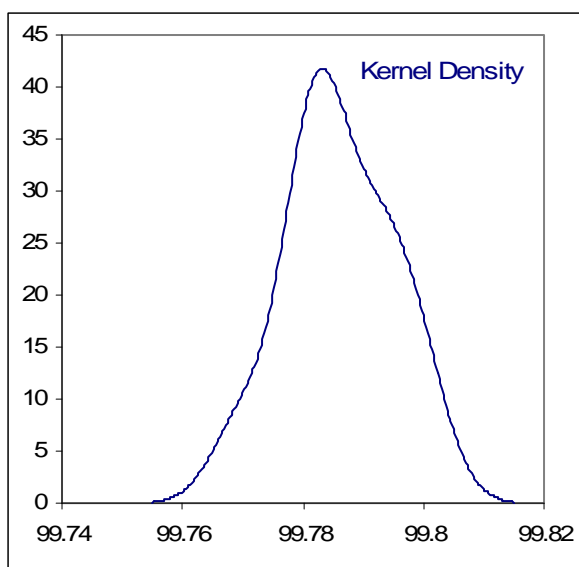
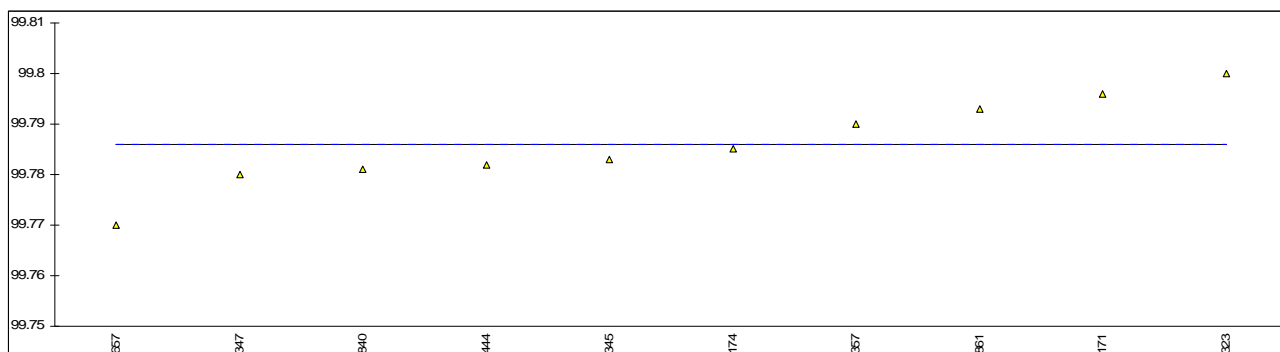
Determination of Nonvolatile Matter on sample #0954; results in mg/100 mL

lab	method	value	mark	z(targ)	remarks
171	D1353	0.3		-0.87	
174	D1353	0.3		-0.87	
311	D1353	<1		<-0.05	
323	D1353	<1		<-0.05	
345	D1353	1.0		-0.05	
347		----		----	
349		----		----	
357	D1353	1.2		0.18	
395		----		----	
396		----		----	
444	D1353	0.9		-0.17	
468	D1353	1.1		0.07	
551		----		----	
657	D1353	1.9		1.00	
840	D1353	1.30		0.30	
861	D1353	1.4		0.42	
913		----		----	
1016	D1353	0.5		-0.63	
1419	D1353	1.5		0.53	
1826		----		----	
1843	D1353	1.1		0.07	
normality		OK			
n		12			
outliers		0			
mean (n)		1.04			
st.dev. (n)		0.485			
R(calc.)		1.36			
R(D1353:09)		2.40			



Determination of Purity as is on sample #0954, results in %M/M

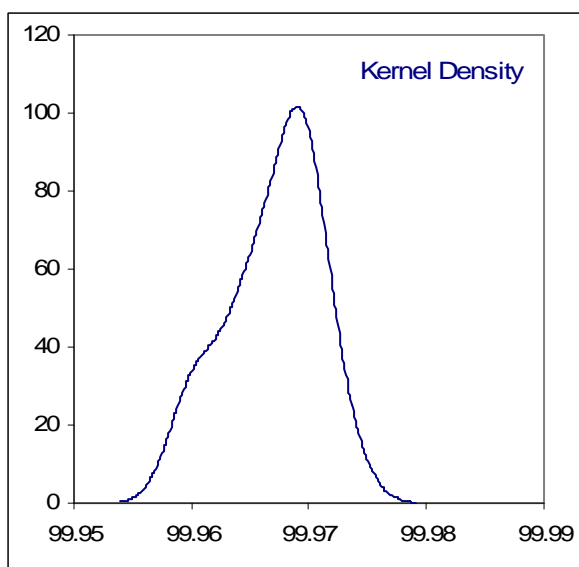
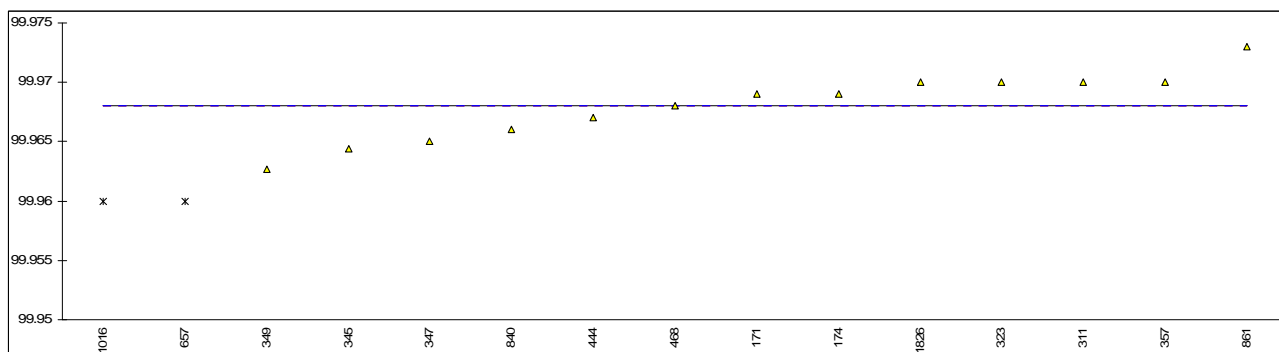
lab	method	value	mark	z(targ)	remarks
171	D6438	99.796		----	
174	Inhouse	99.785		----	
311		----		----	
323	Inh-022	99.80		----	
345	GC	99.7829		----	
347	Inh-PE	99.780		----	
349		----		----	
357	GC	99.79		----	
395		----		----	
396		----		----	
444	Inhouse	99.782		----	
468		----		----	
551		----		----	
657	Inh-0049	99.77		----	
840	Inh-0005	99.781		----	
861	Inh-011	99.793		----	
913		----		----	
1016		----		----	
1419		----		----	
1826		----		----	
1843		----		----	
normality		OK			
n		10			
outliers		0			
mean (n)		99.7860			
st.dev. (n)		0.00885			
R(calc.)		0.0248			
R(lit)		unknown			



Determination of Purity on Dry Basis on sample #0954, results in %M/M

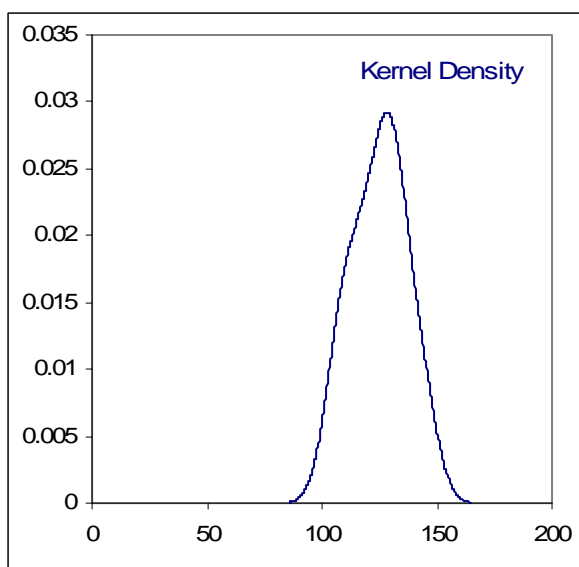
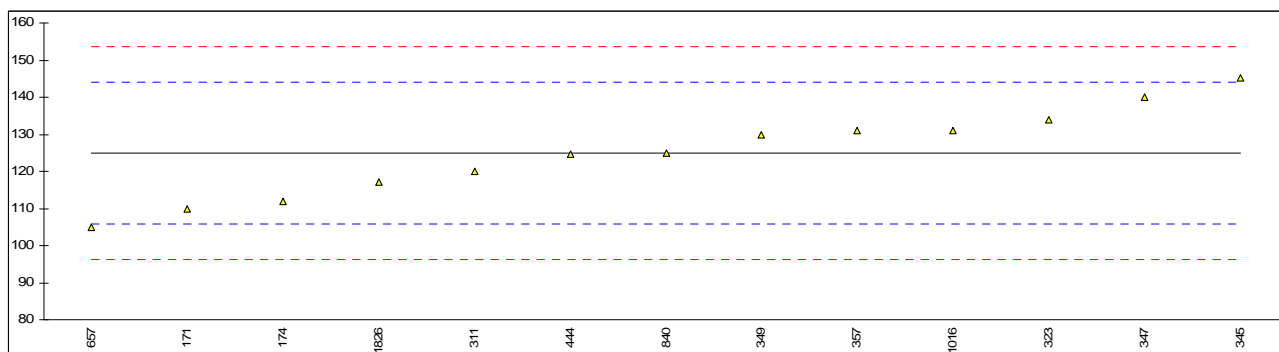
lab	method	value	mark	z(targ)	remarks
171	D6438	99.969		----	
174	Inhouse	99.969		----	
311	Inh-168	99.97		----	
323	Inh-022	99.97		----	
345	GC	99.9644		----	
347	Inh-PE	99.965		----	
349	GC	99.9627		----	
357	GC	99.97		----	
395		----		----	
396		----		----	
444	Inhouse	99.967		----	
468	GC	99.968		----	
551		----		----	
657	Inh-0049	99.96	DG(0.05)	----	
840	Inh-0005	99.966		----	
861	Inh-011	99.973		----	
913		----		----	
1016	DIN55687	99.96	DG(0.05)	----	
1419		----		----	
1826		99.97		----	
1843		----		----	
normality		OK			
n		13			
outliers		2			
mean (n)		99.9680			
st.dev. (n)		0.00286			
R(calc.)		0.0080			
R(lit)		unknown			

Compare with iis07C09 R(calc) = 0.0211



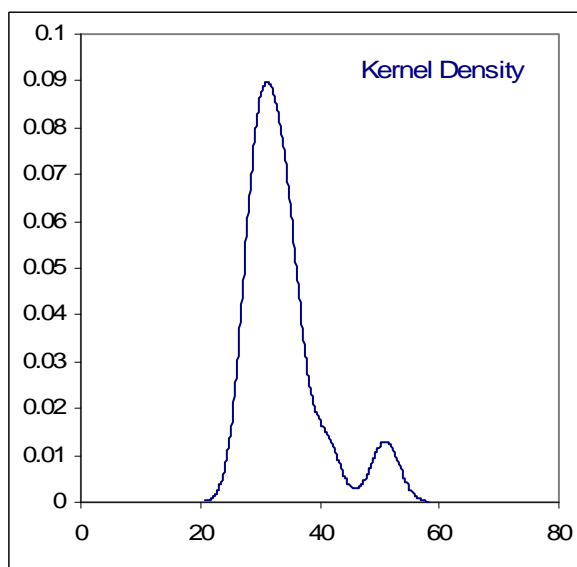
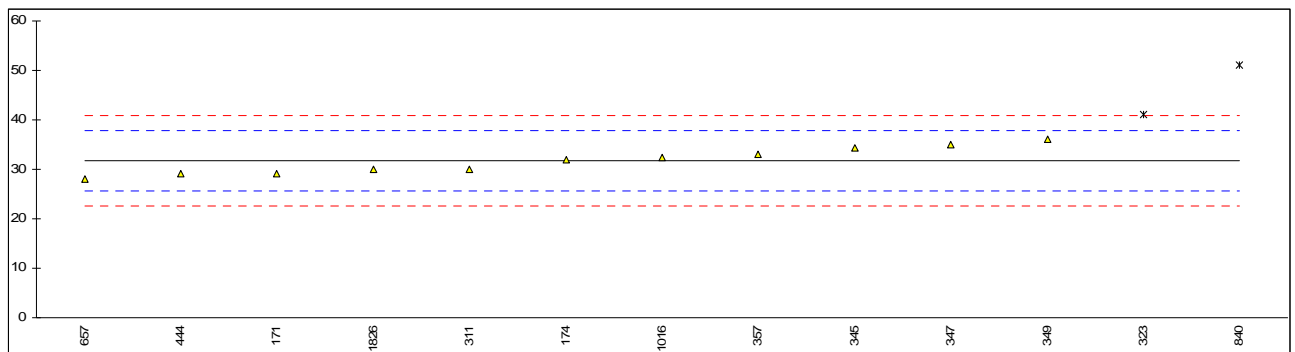
Determination of Diacetonolcohol on sample #0954, results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D6438	109.77		-1.57	
174	Inhouse	112		-1.34	
311	Inh-168	120		-0.51	
323	Inh-020	134		0.93	
345	GC	145.25		2.10	
347	Inh-PE	140	C	1.55	First reported 160
349	GC	130	C	0.52	First reported 160
357	GC	131		0.62	
395		----		----	
396		----		----	
444	Inhouse	124.6		-0.04	
468		----		----	
551		----		----	
657	Inh-0049	105		-2.07	
840	Inh-0005	125		0.00	
861		----		----	
913		----		----	
1016	DIN55687	131.1		0.63	
1419		----		----	
1826		117		-0.83	
1843		----		----	
normality		OK			
n		13			
outliers		0			
mean (n)		125.0			
st.dev. (n)		11.92			
R(calc.)		33.4			
R(Horwitz)		27.1			
				RSD = 27%	Compare iis07C09 RSD = 19%



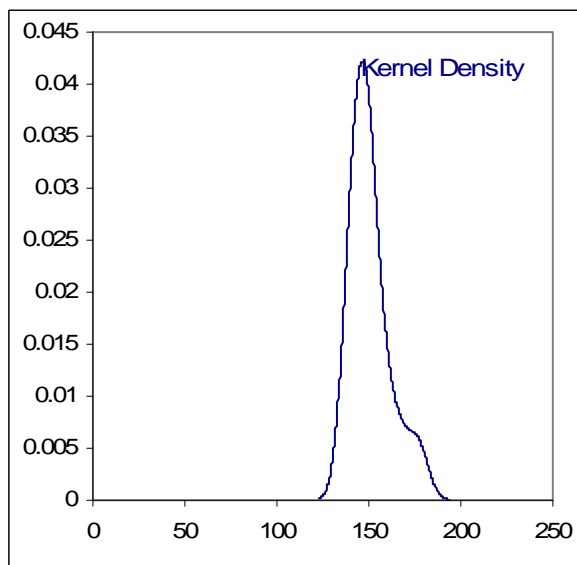
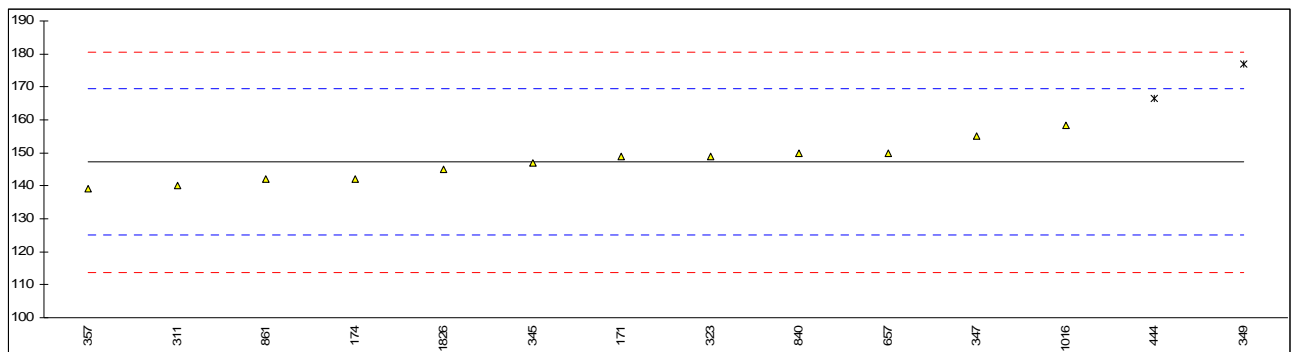
Determination of Mesitylooxide on sample #0954, results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D6438	29.22		-0.84	
174	Inhouse	32		0.08	
311	Inh-168	30		-0.58	
323	Inh-020	41	G(0.05)	3.06	
345	GC	34.41		0.88	
347	Inh-PE	35		1.07	
349	GC	36		1.41	
357	GC	33		0.41	
395		----		----	
396		----		----	
444	Inhouse	29.2	C	-0.85	First reported 10.4
468		----		----	
551		----		----	
657	Inh-0049	28		-1.24	
840	Inh-0005	51	G(0.01)	6.37	
861		----		----	
913		----		----	
1016	DIN55687	32.5		0.25	
1419		----		----	
1826		30		-0.58	
1843		----		----	
normality		OK			
N		11			
outliers		2			
mean (n)		31.8			
st.dev. (n)		2.66			
R(calc.)		7.5			
R(Horwitz)		8.5			



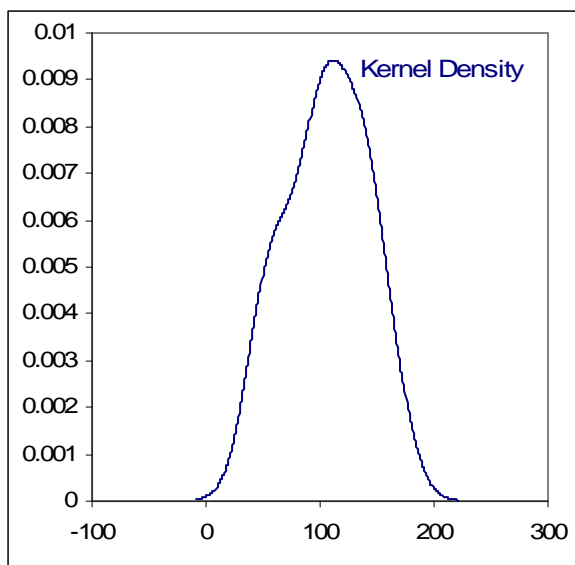
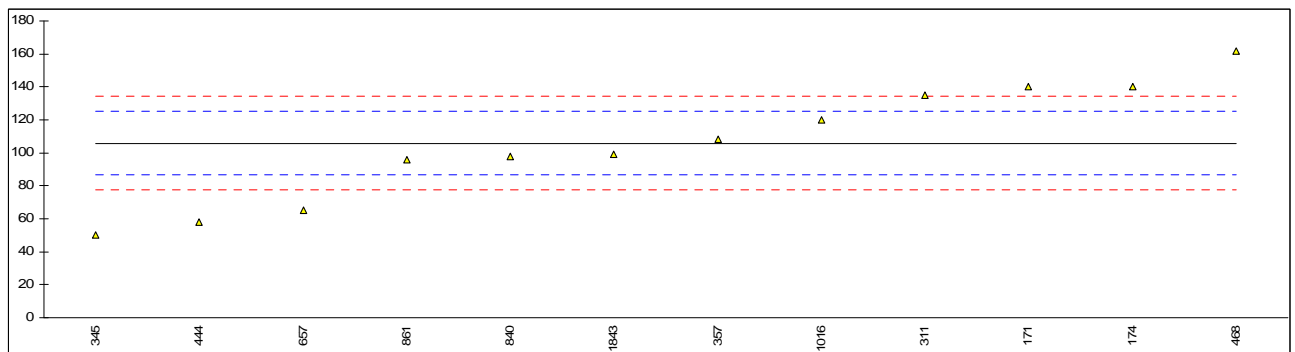
Determination of Methanol on sample #0954, results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D6438	148.91		0.16	
174	Inhouse	142		-0.47	
311	Inh-168	140		-0.65	
323	Inh-020	149		0.16	
345	GC	147.02		-0.01	
347	Inh-PE	155		0.70	
349	GC	177	DG(0.05)	2.68	
357	GC	139		-0.74	
395		----		----	
396		----		----	
444	Inhouse	166.4	DG(0.05)	1.73	
468		----		----	
551		----		----	
657	Inh-0049	150		0.25	
840	Inh-0005	150		0.25	
861	Inh-011	142		-0.47	
913		----		----	
1016	DIN55687	158.3		1.00	
1419		----		----	
1826		145		-0.20	
1843		----		----	
normality		OK			
n		12			
outliers		2			
mean (n)		147.2			
st.dev. (n)		5.91			
R(calc.)		16.5			
R(Horwitz)		31.1			



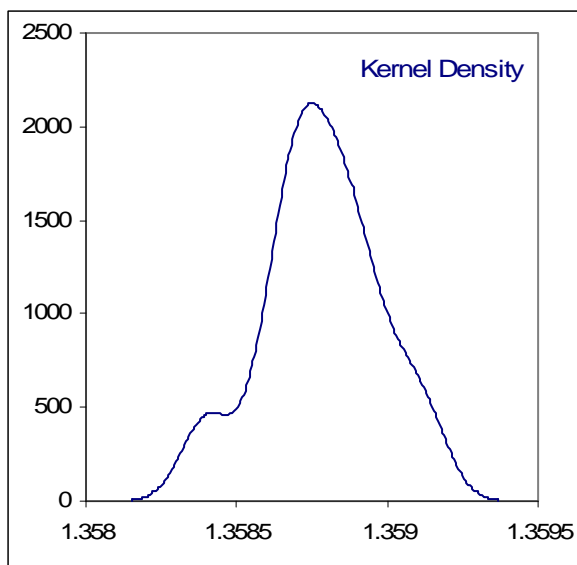
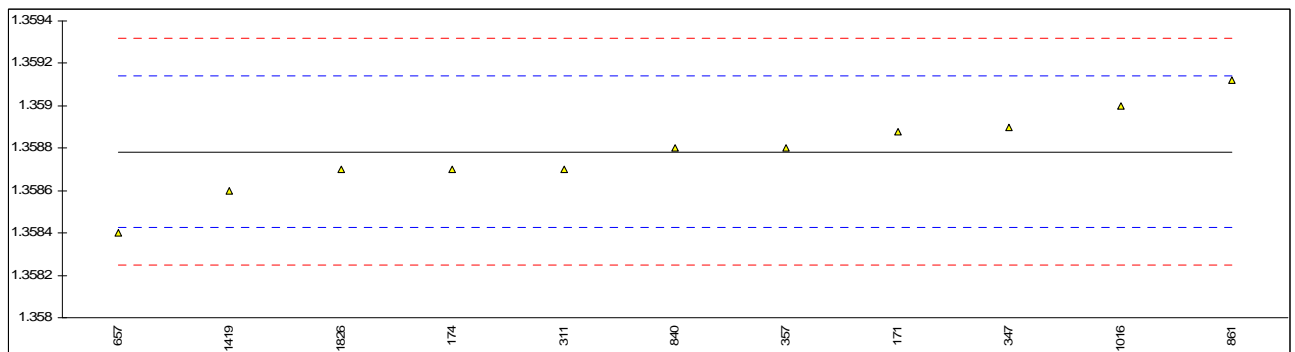
Determination of Permanganate Time Test @ 25°C on sample #0954; results in minutes

lab	method	value	mark	z(targ)	remarks
171	D1363	140		----	
174	D1363	140		----	
311	D1363	135		----	
323	D1363	>90		----	
345	D1363	50		----	
347		----		----	
349		----		----	
357	D1363	108		----	
395		----		----	
396		----		----	
444	D1363	58		----	
468	D1363	162		----	
551		----		----	
657	D1363	65		----	
840	D1363	98		----	
861	D1363	96		----	
913		----		----	
1016	D1363	120		----	
1419		----		----	
1826		----		----	
1843	D1363	99		----	
normality		OK			
n		12			
outliers		0			
mean (n)		106			
st.dev. (n)		35.4			
R(calc.)		99			
R(D1363:06)		(27)			



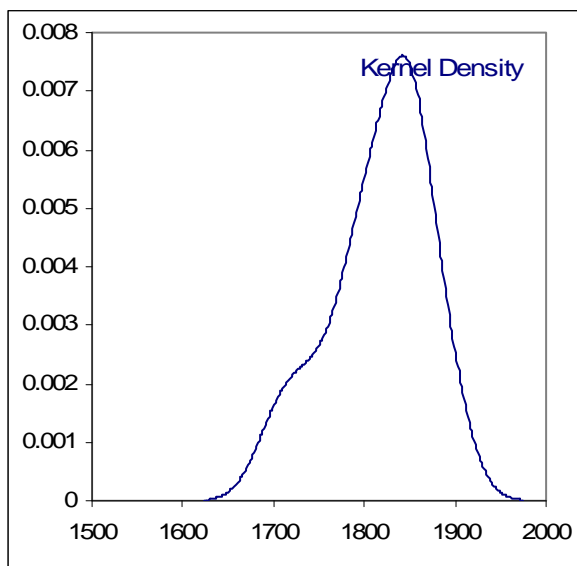
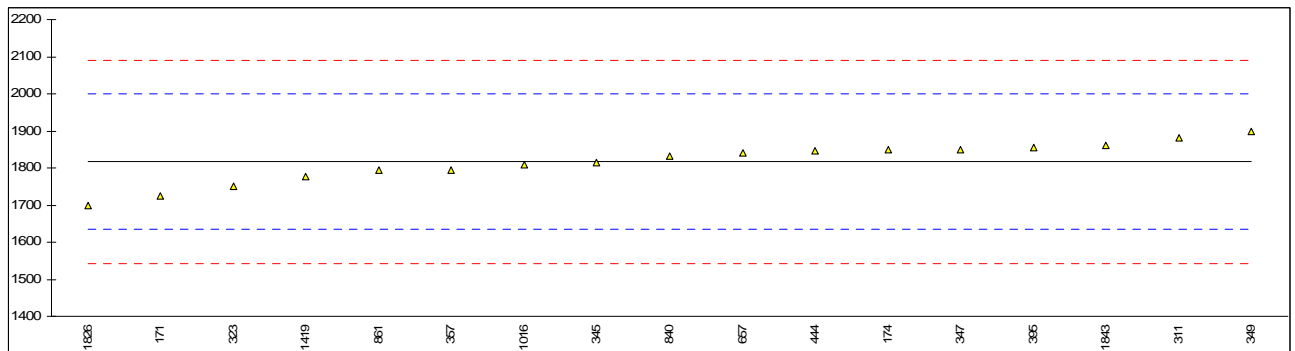
Determination of Refractive Index @ 20 °C on sample #0954;

lab	method	value	mark	z(targ)	remarks
171	D1218	1.35888		0.55	
174	D1218	1.3587		-0.46	
311	D1218	1.3587		-0.46	
323		----		----	
345		----		----	
347	D1218	1.3589		0.66	
349		----		----	
357	D1218	1.3588		0.10	
395		----		----	
396		----		----	
444		----		----	
468		----		----	
551		----		----	
657	D1218	1.35840		-2.14	
840	D1218	1.3588		0.10	
861	D1218	1.35912		1.89	
913		----		----	
1016	D1218	1.3590		1.22	
1419	D1218	1.3586		-1.02	
1826	D1218	1.3587		-0.46	
1843		----		----	
normality		OK			
n		11			
outliers		0			
mean (n)		1.35878			
st.dev. (n)		0.000196			
R(calc.)		0.00055			
R(D1218:07)		0.00050			



Determination of Water on sample #0954; results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D1364	1726		-0.99	
174	D1364	1848.3		0.35	
311	D1364	1880		0.69	
323	D1364	1750		-0.73	
345	D1364	1815		-0.02	
347	D1364	1850		0.37	
349	D1364	1898		0.89	
357	D1364	1795		-0.23	
395	D1364	1855.8		0.43	
396		----		----	
444	D1364	1845		0.31	
468		----		----	
551		----		----	
657	D1364	1840.85		0.27	
840	D1364	1831		0.16	
861	E1064	1794		-0.24	
913		----		----	
1016	D1364	1810		-0.07	
1419	E203	1778		-0.42	
1826	D1364	1700		-1.27	
1843	D1364	1862		0.50	
normality		OK			
n		17			
outliers		0			
mean (n)		1816.4			
st.dev. (n)		54.04			
R(calc.)		151.3			
R(D1364:07)		256.2			



APPENDIX 2

Number of participants per country

- 1 lab in AUSTRALIA
- 1 lab in BELGIUM
- 1 lab in BRAZIL
- 1 lab in FINLAND
- 1 lab in INDIA
- 2 labs in ITALY
- 1 lab in P.R. of CHINA
- 1 lab in SINGAPORE
- 1 lab in SLOVAK REPUBLIC
- 3 labs in SPAIN
- 1 lab in SWEDEN
- 3 labs in THE NETHERLANDS
- 2 labs in U.S.A.
- 1 lab in UNITED KINGDOM
- 1 lab in VIETNAM

APPENDIX 3

Abbreviations:

C	= final result after checking of first reported suspect 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
E	= error in calculations
U	= reported in wrong unit
ex	= excluded from calculations
n.a.	= not applicable
n.d.	= not detected

Literature:

- 1 i.i.s. Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, November 2008
- 2 ASTM E178-02
- 3 ASTM E1301-03
- 4 ISO 5725-86
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