

Results of Proficiency Test
Crude Oil
October 2013

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1998, the Institute for Interlaboratory Studies organizes a proficiency test for Crude Oil every year. During the annual proficiency testing program 2013/2014, it was decided to continue the round robin for the analysis of Crude Oil. In this interlaboratory study 147 laboratories from 55 different countries have participated. See appendix 2 for the number of participants per country.

In this report, the results of the 2013 Crude Oil proficiency test are presented and discussed.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, The Netherlands, was the organiser of this proficiency test. It was decided to send one sample of approx. 1 litre of Crude Oil in a one liter wide-necked bottle to enable use of a large size Ultra Turrax for homogenisation. Analyses for fit-for-use and homogeneity testing were subcontracted. Participants were requested to report rounded and unrounded results. The unrounded results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in accordance with ISO/IEC 17043:2010, since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). 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 organisation 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 January 2010 (iis-protocol, version 3.2).

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

The necessary bulk material was obtained from a local refinery. The approx. 200 litre of Crude Oil was homogenised in a metal drum. After homogenisation, the material was transferred to 180 subsamples of 1 L wide-neck transparent colourless glass bottles and labelled #13198.

The homogeneity of the subsamples, before the addition of water, was checked by determination of Density in accordance ASTM D5002:10 and Water in accordance with ASTM D4377:11 on 8 stratified randomly selected samples.

	Density @ 15 °C in kg/L	Water in %M/M
Sample #13198-1	0.87561	0.020
Sample #13198-2	0.87565	0.019
Sample #13198-3	0.87569	0.020
Sample #13198-4	0.87570	0.019
Sample #13198-5	0.87565	0.020
Sample #13198-6	0.87574	0.020
Sample #13198-7	0.87578	0.019
Sample #13198-8	0.87581	0.020

Table 1: Homogeneity test results of subsamples #13198

From the above test results, the repeatabilities were calculated and compared with 0.3 times the corresponding target reproducibilities in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density @ 15 °C in kg/L	Water in %M/M
observed repeatability	0.00019	0.001
reference method	ASTM D5002:10	ASTM D4377:11
0.3*R (reference method)	0.00108	0.008

Table 2: Repeatabilities on subsamples #13198

The calculated repeatabilities were less than 0.3 times the respective reproducibilities of the reference methods. Therefore, homogeneity of the subsamples #13198 was assumed.

The water content of the original Crude Oil was low (0.02 %M/M) and therefore for BSW probably only 'less than' results would be reported by the participating laboratories. Therefore each one litre subsample was enriched with 2.5 mL water per bottle (= 0.28 %V/V) by means of a calibrated FINN pipette.

To each of the participating laboratories one bottle of 1 L (labelled #13198) was sent on October 16, 2013. Because brown coloured wide-neck glass bottles were not available, the (clear glass) bottles were packed in red plastics bags. In the letter of instructions, all participants were asked to shield the samples from light before analysis.

2.5 STABILITY OF THE SAMPLES

The stability of Crude Oil packed in the clear glass bottles with red plastic bag was checked. The material has been found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine Total Acid Number, BSW, Density @ 15°C, API Gravity, Light ends (C1-C6), Pour Point (Maximum), Salt as NaCl, Sediment (ASTM D4807 and D473), Total Sulphur, Total Mercury, Kinematic Viscosity @ 40°C and Water.

To get comparable results a detailed report form, on which the units were prescribed as well as some of the required standards and a letter of instructions were prepared and made available for download on the iis website.

A SDS and a form to confirm receipt of the samples were added to the sample package.

3 RESULTS

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

Directly after deadline, a reminder fax was sent to those laboratories that did not report 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 raw data of these tests (no reanalysis). 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 January 2010 (iis-protocol, version 3.2).

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 with 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, by G(0.01) or DG(0.01) for the Grubbs test. Stragglers are marked by

D(0.05) for the Dixon test, by G(0.05) or DG(0.05) for the Grubbs 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. When the uncertainty passed the evaluation, no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

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 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 "x". 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 3; nos.13 and 14)

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, e.g. ASTM reproducibilities, 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 literature reproducibility by division with 2.8.

The z-scores were calculated in accordance with:

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

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 the fit-for-useness of the reported test result.

The $z_{(\text{target})}$ scores are listed in the 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 serious sample dispatch problems were encountered during the execution. The samples to the participants in Algeria, Brazil, Brunei, Malaysia, Peru, Russia, Saudi Arabia, Sultanate of Oman and United Kingdom arrived near or after the deadline or did never reach the laboratories at all due to customs clearance and/or transportation problems.

In total 125 laboratories submitted 827 numerical results. Observed were 36 statistically outlying results, which is 4.4% of the reported results. In proficiency tests, 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 BSW, Density, API Gravity, Sediment ASTM D473 and Total Sulphur a non-Gaussian distribution was found and therefore the statistical evaluation for these determinations should be used with care. In this section, the results are discussed per test.

Acid Number (Total): This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D664:11a.

BSW: This determination was problematic. Only one statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D4007:11.

Density: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5002:13. Several participants used ASTM D4052 / IP365. It must be noted that in the scope of these methods is mentioned that ASTM D5002 is to be used for crude oils (see e.g. §1.3 of ASTM D4052:11).

API Gravity: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D287:12b.

Light Ends: This determination was very problematic. In total nine statistical outliers were observed. None of the calculated reproducibilities, after rejection of the statistical outliers, was in agreement with the requirements of IP344:10.

Pour Point, (Max.): This determination was very problematic. Five test results were excluded from the calculations as the reported test method is in principle not suitable for Crude Oils (see the scope of the test method, ASTM D97). After exclusion of the test results, no statistical outliers were observed. The calculated reproducibility after rejection of the excluded test results is not at all in agreement with the requirements of ASTM D5853A:11.

Salt as NaCl: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D3230:13.

Sediment:
ASTM D4807 The determination of sediment in accordance with ASTM D4807:10 was problematic. One statistical outlier was observed and three test results were excluded from statistical evaluation as the reported test method is not equivalent to ASTM D4807. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D4807:10. The large spread may be explained by differences in execution of the method: e.g. use of an unheated funnel, a wrong filter or not well rinsing of the filter after filtration. Also homogenisation of the sample prior to sub sampling, is a critical step in this determination.

Sediment:
ASTM D473: No significant conclusions were drawn as the consensus value found was below or near application range of the test method.

Sulphur: This determination was very problematic. Five statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the requirements of ASTM D4294:10.

Mercury: This determination may be problematic at the low mercury concentration (< 5 µg/kg). Four statistical outliers were observed, but the results vary over a wide range (0.42 – 792.7 µg/kg). The precision requirements of UOP938 (table B3) are extremely strict and as they are 4-5 times more strict than the Horwitz estimate, these requirements will not be met easily. Also, the reproducibility of UOP938 is only available for concentrations in µg/L and conversion to µg/kg will lead to extra uncertainty. Therefore, it was decided to use the Horwitz estimates for evaluation of the test results in this report. The calculated reproducibility is not at all in agreement with the strict estimated reproducibility, calculated using the Horwitz equation. Because another 7 laboratories reported 'less than' test results, it was decided to evaluate also the full data using x/2 for each <x test result. The evaluation of all 20 test results does not differ significantly from the evaluation of the 13 numerical test results.

Kin.Visc.@40°C: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D445:12.

Water: Serious analytical problems have been observed. Water was added to the samples. Therefore the minimum water concentration to be found was known (added amount = 0.32%M/M = 0.28%V/V). The laboratories should be able to find at least 0.22%V/V [$0.28\%V/V_{(\text{added amount})} - 0.06\%V/V_{(R_{D4377})}$]. However, 14 of the 92 laboratories reported lower concentration than 0.22%V/V and therefore these test results were rejected prior to data analysis. The reason for the reported low water concentrations may possibly be insufficient homogenisation of the sample by the respective laboratory prior to sub sampling for analysis. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is still not at all in agreement with the requirements of ASTM D4377:11.

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 table.

Parameter	unit	n	average	2.8 *sd _R	R (lit)
Total Acid Number	mg KOH/g	52	0.16	0.13	0.16
BSW	%V/V	42	0.19	0.35	0.27
Density @ 15°C	kg/m ³	111	876.2	2.0	3.6
API Gravity		63	29.9	0.4	0.5
C1 Light Ends	%M/M	6	<0.01	n.a.	n.a.
C2 Light Ends	%M/M	16	0.017	0.020	0.006
C3 Light Ends	%M/M	15	0.277	0.117	0.058
C4 Light Ends	%M/M	15	1.00	0.23	0.13
C5 Light Ends	%M/M	16	1.94	0.47	0.20
C6 Light Ends	%M/M	13	2.80	0.52	0.45
Total C1-C6 Light Ends	%M/M	14	5.92	0.84	0.51
Pour Point, Max.	°C	19	-37	38	18
Salt as NaCl	mg/kg	63	6.32	7.29	11.08
Sediment (D4807)	%M/M	39	0.014	0.019	0.014
Sediment (D473)	%V/V51	52	0.009	0.024	(0.035)
Total Sulphur	%M/M	85	2.68	0.30	0.14
Total Mercury	µg/kg	9	2.5	6.3	2.8
Kinematic Viscosity @ 40°C	mm ² /s	64	10.96	1.24	0.81
Water	%V/V	75	0.32	0.13	0.06

Table 3: Reproducibilities of the tests methods for sample #13198

Result between brackets in near the detection limit of the test method

Without further statistical calculations it can be concluded that for several 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 NOVEMBER 2013 WITH PREVIOUS PTS

	<i>November 2013</i>	<i>November 2012</i>	<i>November 2011</i>	<i>November 2010</i>
Number of reporting labs	125	121	132	121
Number of results reported	827	860	845	879
Statistical outliers	36	42	43	43
Percentage outliers	4.4%	4.9%	5.1%	4.9%

Table 4: 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 against the requirements of the respective standards. The conclusions are given the following table:

<i>Determination</i>	<i>November 2013</i>	<i>November 2012</i>	<i>November 2011</i>	<i>November 2010</i>
Total Acid Number	+	++	++	++
BSW	-	++	-	--
Density @15°C	++	++	++	++
API Gravity	+	++	++	++
Light Ends (C1-C6)	--	--	+/-	--
Pour Point, max	--	+/-	--	++
Salt as NaCl	+	+	--	++
Sediment (D4807)	-	--	-	--
Sediment (D473)	n.e.	++	++	++
Sulphur	--	+/-	-	--
Mercury	(--)	(--)	(--)	(--)
Kinematic Viscosity @40°C	--	--	++	--
Water	--	--	--	--

Table 5: Comparison determinations against the standard
(between brackets is a comparison against Horwitz)

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

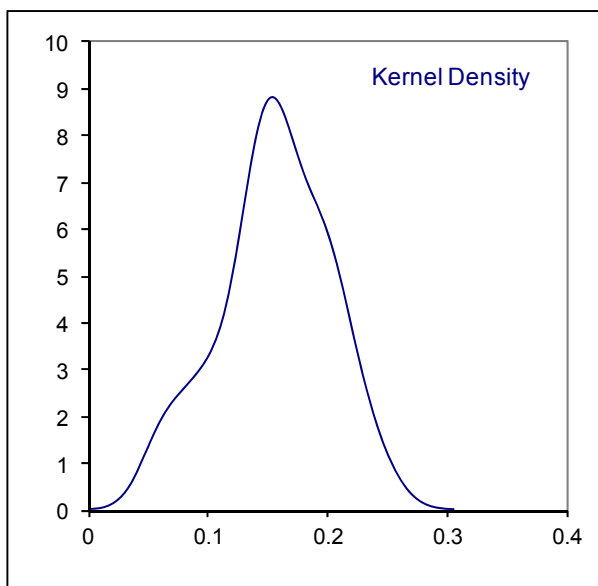
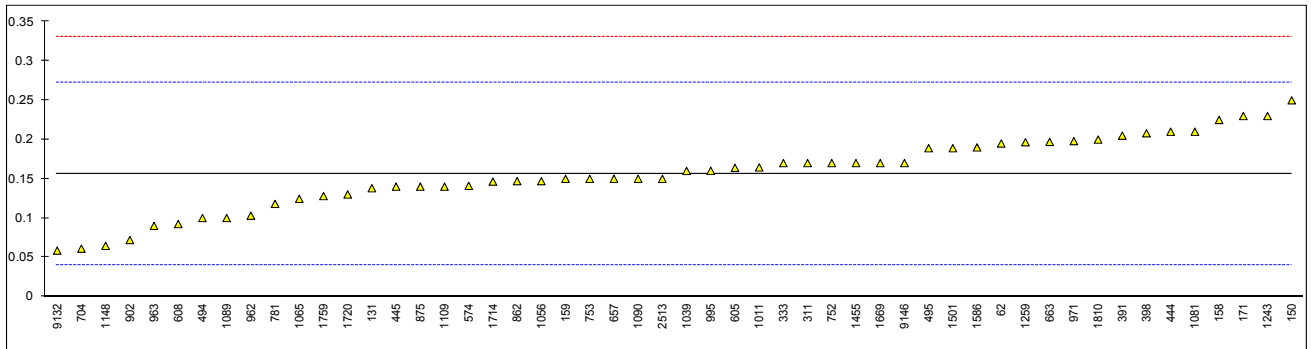
- ++: group performed much better than the standard
- + : group performed better than the standard
- +/-: group performance equals the standard
- : group performed worse than the standard
- : group performed much worse than the standard
- n.e.: not evaluated

APPENDIX 1

Determination of Acid Number (total) on sample #13198; results in mg KOH/g

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62	D664	0.195		0.67	995	D664	0.1602		0.07
90		----		----	996		----		----
92		----		----	997		----		----
120		----		----	1011	D664	0.1645		0.14
131	D664	0.138		-0.31	1038		----		----
150	D664	0.25		1.61	1039	D664	0.16		0.07
154		----		----	1040		----		----
158	D664	0.225		1.18	1056	D664	0.147		-0.16
159	D664	0.15		-0.11	1065	D664	0.1245		-0.54
171	D664	0.23		1.27	1081	D664	0.21		0.92
193		----		----	1089	D664	0.10		-0.97
203		----		----	1090	D664	0.15		-0.11
213		----		----	1106		----		----
225		----		----	1108		----		----
238		----		----	1109	D664	0.14		-0.28
242		----		----	1148	D664	0.0646		-1.57
273		----		----	1201		----		----
311	D664	0.17		0.24	1236		----		----
314		----		----	1243	D664	0.23		1.27
332		----		----	1248		----		----
333	D664	0.17		0.24	1259	D664	0.1966		0.69
334		----		----	1264		----		----
335		----		----	1287		----		----
340		----		----	1340		----		----
391	D664	0.205		0.84	1345		----		----
398	D664	0.208		0.89	1357		----		----
399		----		----	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442		----		----	1397		----		----
444	D664	0.21		0.92	1403		----		----
445	D664	0.140		-0.28	1412		----		----
446		----		----	1455	D664	0.17		0.24
447		----		----	1501	D664	0.189		0.56
485		----		----	1586	D664	0.19		0.58
494	D664	0.10		-0.97	1603		----		----
495	D664	0.189		0.56	1616		----		----
511		----		----	1635		----		----
527		----		----	1654		----		----
529		----		----	1669	D664	0.170		0.24
541		----		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	in house	0.1464		-0.17
574	D664	0.141		-0.26	1720	D664	0.13		-0.45
593		----		----	1728		----		----
602		----		----	1749		----		----
605	D664	0.164		0.13	1759	in house	0.128		-0.48
606		----		----	1761		----		----
608	D664	0.0923		-1.10	1800		----		----
609		----		----	1810	D664	0.20		0.75
613		----		----	1811		----		----
657	D664	0.15		-0.11	1815		----		----
663	D664	0.197		0.70	1842		----		----
704	D664	0.061		-1.64	1928		----		----
732		----		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951		----		----
750		----		----	2513	D664	0.15		-0.11
751		----		----	9050		----		----
752	D664	0.17		0.24	9051		----		----
753	D664	0.150		-0.11	9052		----		----
781	D664	0.118		-0.66	9053		----		----
862	D664	0.147		-0.16	9057		----		----
872		----		----	9060		----		----
874		----		----	9062		----		----
875	D664	0.14		-0.28	9063		----		----
902	D664	0.072		-1.45	9064		----		----
962	D664	0.103		-0.91	9132	D664	0.0585		-1.68
963	D664	0.09		-1.14	9146	D664Mod.	0.17		0.24
970		----		----	9151		----		----
971	D664	0.198		0.72	9152		----		----
974		----		----					
993		----		----					
994		----		----					

normality OK
 n 52
 outliers 0
 mean (n) 0.1562
 st.dev. (n) 0.04555
 R(calc.) 0.1275
 R(D664:11a) 0.1635

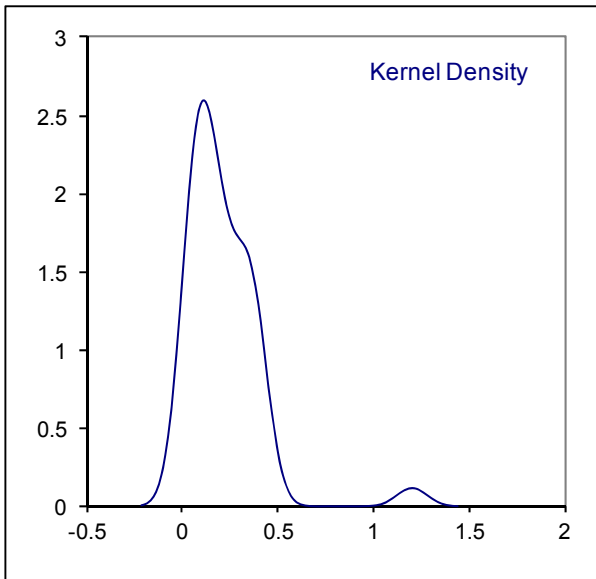
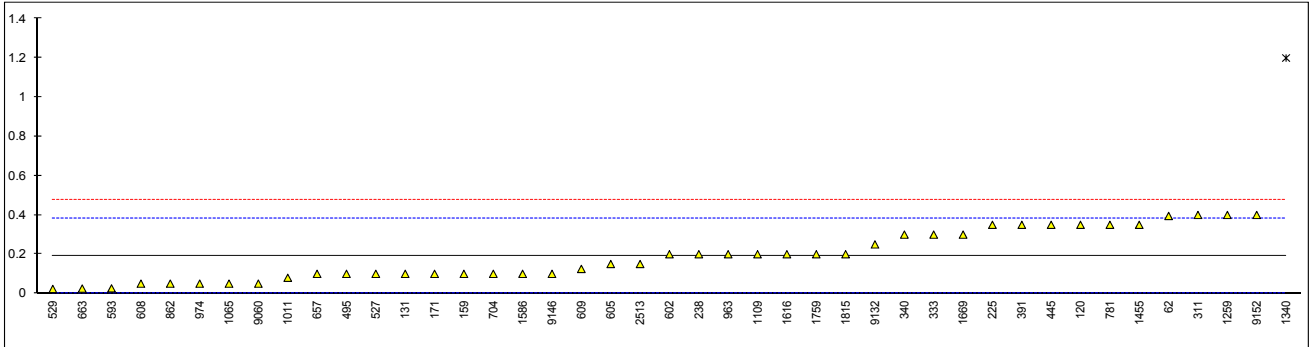


Determination of BSW on sample #13198; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62	D4007	0.395		2.16	995		----		----
90		----		----	996		----		----
92		----		----	997		----		----
120	D4007	0.35		1.68	1011	D4007	0.08		-1.15
131	D4007	0.100		-0.94	1038		----		----
150		----		----	1039		----		----
154		----		----	1040		----		----
158		----		----	1056		----		----
159	D4007	0.10		-0.94	1065	D4007	0.05		-1.47
171	D4007	0.10		-0.94	1081		----		----
193		----		----	1089		----		----
203		----		----	1090		----		----
213		----		----	1106		----		----
225	D4007	0.35		1.68	1108		----		----
238	D4007	0.20		0.11	1109	D4007	0.20		0.11
242		----		----	1148		----		----
273		----		----	1201		----		----
311	D4007	0.40	C	2.21	1236		----		----
314		----		----	1243		----		----
332		----		----	1248		----		----
333	D4007	0.30		1.16	1259	ISO9030	0.40		2.21
334		----		----	1264		----		----
335		----		----	1287		----		----
340	D4007	0.300		1.16	1340	ISO9030	1.20	G(0.01)	10.61
391	D4007	0.35		1.68	1345		----		----
398		----		----	1357		----		----
399		----		----	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442		----		----	1397		----		----
444		----		----	1403		----		----
445	D4007	0.35		1.68	1412		----		----
446		----		----	1455	D4007	0.350		1.68
447		----		----	1501		----		----
485		----		----	1586	D4007	0.10		-0.94
494		----		----	1603		----		----
495	D4007	0.10		-0.94	1616	D4007	0.2		0.11
511		----		----	1635	D4007	<0.05		----
527	D4007	0.10		-0.94	1654		----		----
529	D4007	0.023		-1.75	1669	D4007	0.30		1.16
541		----		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714		----		----
574	D4007	no visible		----	1720		----		----
593	D4006/D473	0.026		-1.72	1728		----		----
602	D4007	0.20		0.11	1749		----		----
605	D4007	0.150		-0.42	1759	ISO9030	0.20		0.11
606		----		----	1761		----		----
608	D4007	0.05		-1.47	1800		----		----
609	D4007	0.125		-0.68	1810		----		----
613		----		----	1811		----		----
657	D4007	0.10		-0.94	1815	D4007	0.20		0.11
663	D4007	0.025		-1.73	1842		----		----
704	D4007	0.10		-0.94	1928		----		----
732		----		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951		----		----
750		----		----	2513	D4007	0.15		-0.42
751		----		----	9050		----		----
752		----		----	9051		----		----
753		----		----	9052		----		----
781	D4007	0.35		1.68	9053		----		----
862	D4007	0.050		-1.47	9057		----		----
872		----		----	9060	D4007	0.05		-1.47
874		----		----	9062		----		----
875		----		----	9063		----		----
902		----		----	9064		----		----
962		----		----	9132	D4007	0.25		0.63
963	D4007	0.20		0.11	9146	D4007Mod.	0.10		-0.94
970		----		----	9151		----		----
971		----		----	9152	D4007	0.4		2.21
974	D4007	0.05		-1.47					
993		----		----					
994		----		----					

normality	not OK
n	42
outliers	1
mean (n)	0.190
st.dev. (n)	0.1250
R(calc.)	0.350
R(D4007:11)	0.266

Lab 311: first reported 0.70

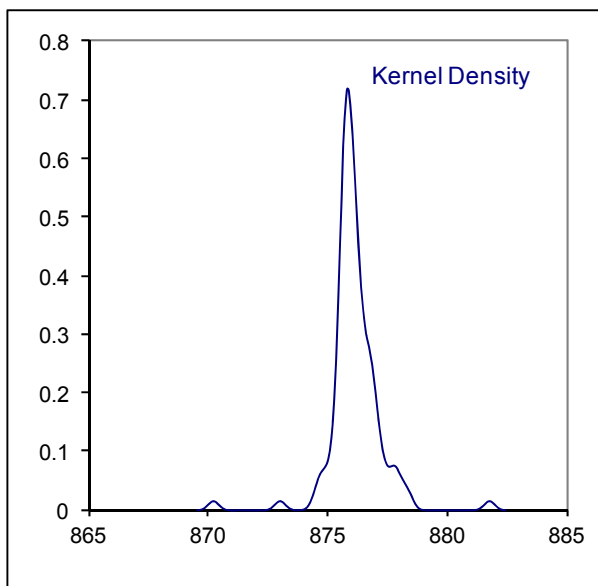
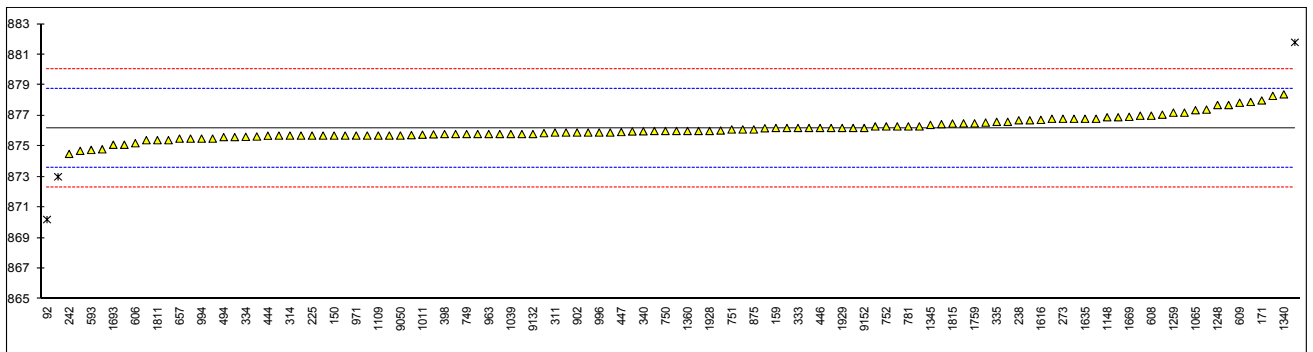


Determination of Density @ 15°C on sample #13198; results in kg/m³

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62	D5002	876.45		0.22	995	D5002	875.78		-0.30
90	D5002	877.0		0.65	996	D1298	875.9		-0.21
92	D5002	870.2	G(0.01)	-4.63	997	D5002	875.7		-0.36
120	D5002	877.9		1.35	1011	D5002	875.76		-0.31
131	D5002	876.3		0.10	1038		----		----
150	D4052	875.7		-0.36	1039	D5002	875.8		-0.28
154		----		----	1040		----		----
158	D1298	873.0	G(0.01)	-2.46	1056	D5002	876.2	C	0.03
159	D5002	876.2	C	0.03	1065	D5002	877.36		0.93
171	D5002	878.0		1.42	1081	D5002	876.3		0.10
193		----		----	1089	D5002	876.8	C	0.49
203	D1298	875.4	C	-0.59	1090	D5002	874.80		-1.06
213		----		----	1106		----		----
225	D5002	875.7		-0.36	1108		----		----
238	D1298	876.7		0.41	1109	D5002	875.7		-0.36
242	D5002	874.5		-1.29	1148	D5002	876.9		0.57
273	D5002	876.8		0.49	1201		----		----
311	D5002	875.9		-0.21	1236	D5002	878.3		1.66
314	D5002	875.7	C	-0.36	1243	D5002	876.6		0.34
332	D5002	875.8		-0.28	1248	D5002Mod.	877.7		1.19
333	D5002	876.2		0.03	1259	ISO3675	877.2		0.80
334	D5002	875.62		-0.42	1264		----		----
335	D5002	876.6		0.34	1287		----		----
340	D5002	875.98		-0.14	1340	ISO3675	878.4		1.73
391	D5002	876.2		0.03	1345	D5002	876.4		0.18
398	D1298	875.8		-0.28	1357		----		----
399	D1298	876.5		0.26	1360	D5002	876.0		-0.13
402		----		----	1365		----		----
441	D4052	876.1		-0.05	1379	D5002	876.0		-0.13
442	IP365	876.55		0.30	1397		----		----
444	D4052	875.69		-0.37	1403		----		----
445	D5002	875.8		-0.28	1412	D5002	875.5		-0.52
446	D5002	876.2		0.03	1455	D5002	875.8		-0.28
447	D4052	875.93		-0.18	1501	D5002	875.9		-0.21
485	D5002	875.9		-0.21	1586	D5002	877.7		1.19
494	D5002	875.6		-0.44	1603	in house	876.18		0.01
495	D5002	876.8		0.49	1616	D4052	876.73		0.44
511		----		----	1635	D1298	876.8		0.49
527		----		----	1654	D4052	875.7		-0.36
529	D5002	876.0		-0.13	1669	D5002	876.93		0.59
541	D5002	875.7		-0.36	1693	ISO3675	875.1		-0.83
551		----		----	1695	ISO3675	875.1		-0.83
557		----		----	1714	D5002	875.73		-0.34
574	D7042	881.8	G(0.01)	4.37	1720	D5002	876.8		0.49
593	D1298	874.76		-1.09	1728		----		----
602	D5002	875.7		-0.36	1749	ISO12185	877.2		0.80
605	D5002	875.64		-0.41	1759	ISO3675	876.5		0.26
606	D1298	875.2		-0.75	1761		----		----
608	D5002	877.0		0.65	1800	D5002	876.9		0.57
609	D5002	877.85		1.31	1810	D5002	877.4		0.96
613	D4052	875.97	C	-0.15	1811	D5002	875.4		-0.59
657	D5002	875.5		-0.52	1815	ISO12185	876.49		0.25
663	D5002	875.86	C	-0.24	1842	D4052	875.6	C	-0.44
704	D5002	877.07		0.70	1928	D5002	876.0		-0.13
732	D5002	876.3		0.10	1929	D5002	876.2		0.03
739		----		----	1930		----		----
742		----		----	1950		----		----
749	INH-51069	875.8		-0.28	1951	D5002	874.7	C	-1.14
750	D5002	876.0		-0.13	2513	D5002	875.4		-0.59
751	D1298	876.1		-0.05	9050	INH-21	875.7		-0.36
752	D5002	876.3		0.10	9051		----		----
753	D5002	876.0		-0.13	9052		----		----
781	D5002	876.3		0.10	9053		----		----
862	D5002	875.70		-0.36	9057	D5002	876.03		-0.10
872	D5002	876.2		0.03	9060	D5002	876.2		0.03
874	D5002	875.7		-0.36	9062		----		----
875	D5002	876.1		-0.05	9063		----		----
902	D5002	875.9		-0.21	9064		----		----
962	D5002	875.5	C	-0.52	9132	D5002	875.8		-0.28
963	D5002	875.8		-0.28	9146	D5002Mod.	876.7		0.41
970		----		----	9151		----		----
971	D5002	875.7		-0.36	9152	D5002	876.2		0.03
974	D5002	875.9		-0.21					
993	D5002	875.8		-0.28					
994	D5002	875.5		-0.52					

normality	not OK
n	111
outliers	3
mean (n)	876.17
st.dev. (n)	0.729
R(calc.)	2.04
R(D5002:13)	3.61

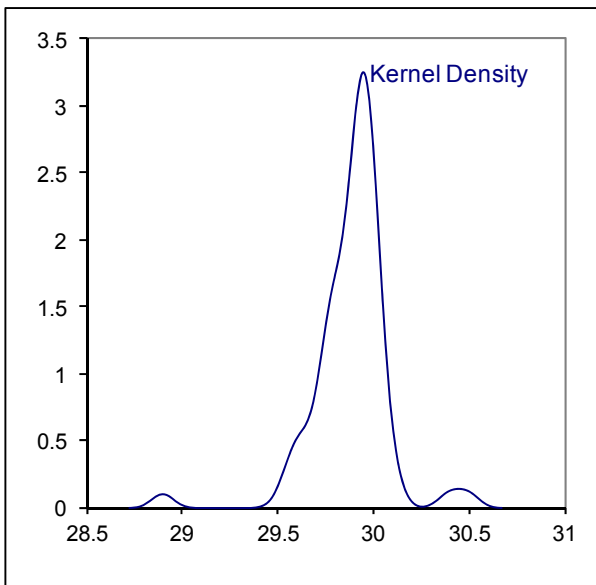
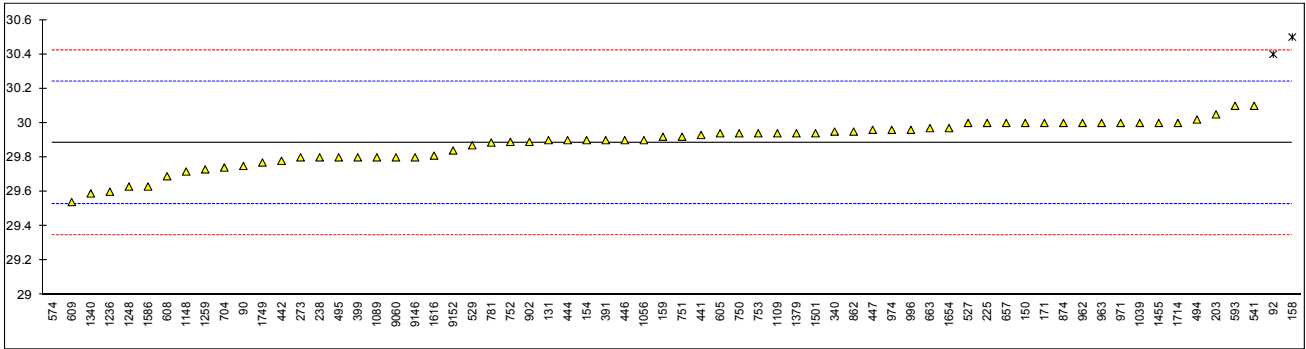
Lab 159: first reported 29.92
 Lab 203: first reported 0.8754
 Lab 314: first reported 0.8757
 Lab 613: first reported 0.87597
 Lab 663: first reported 0.87586
 Lab 962: first reported 0.8755
 Lab 1056: first reported 0.8762
 Lab 1089: first reported 0.8768
 Lab 1842: first reported 0.8756
 Lab 1951: first reported 0.8747



Determination of API Gravity on sample #13198;

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995		----		----
90	D287	29.75		-0.76	996	Calc.	29.96		0.42
92	D1298	30.4	G(0.01)	2.88	997		----		----
120		----		----	1011		----		----
131	D5002	29.9		0.08	1038		----		----
150	D4052	30.0		0.64	1039	D287	30.0		0.64
154	D287	29.9		0.08	1040		----		----
158	D287	30.5	G(0.01)	3.44	1056	D287	29.9		0.08
159	D5002	29.92		0.20	1065		----		----
171	D287	30.0		0.64	1081		----		----
193		----		----	1089	D287	29.8		-0.48
203	Calc.	30.05		0.92	1090		----		----
213		----		----	1106		----		----
225	Calc.	30.0		0.64	1108		----		----
238	D1298	29.80		-0.48	1109	D287	29.94		0.31
242		----		----	1148	D287	29.7175		-0.94
273	D287	29.8		-0.48	1201		----		----
311		----		----	1236	D287	29.6		-1.60
314		----		----	1243		----		----
332		----		----	1248	in house	29.63		-1.43
333		----		----	1259	Calc.	29.73		-0.87
334		----		----	1264		----		----
335		----		----	1287		----		----
340	D287	29.95		0.36	1340	D1298	29.59		-1.65
391	D287	29.90		0.08	1345		----		----
398		----		----	1357		----		----
399	D287	29.8		-0.48	1360		----		----
402		----		----	1365		----		----
441	D1298	29.93		0.25	1379	D1250	29.94		0.31
442	D287	29.78		-0.59	1397		----		----
444	D4052	29.9		0.08	1403		----		----
445		----		----	1412		----		----
446	ASTM Table3	29.9		0.08	1455	D287	30.0		0.64
447	D1250	29.96		0.42	1501	D4052	29.94		0.31
485		----		----	1586	D287	29.63		-1.43
494	D5002	30.02		0.76	1603		----		----
495	D287	29.80		-0.48	1616	Calc.	29.81		-0.42
511		----		----	1635		----		----
527	D287	30.0		0.64	1654	D4052	29.97		0.48
529	D287	29.87		-0.08	1669		----		----
541	D5002	30.1		1.20	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	D5002	30.00		0.64
574	D7042	28.9	G(0.01)	-5.52	1720		----		----
593	D1298	30.1		1.20	1728		----		----
602		----		----	1749	ISO12185	29.77		-0.64
605	D4052	29.94		0.31	1759		----		----
606		----		----	1761		----		----
608	D5002	29.69		-1.09	1800		----		----
609	D5002	29.54		-1.93	1810		----		----
613		----		----	1811		----		----
657	D5002	30.0		0.64	1815		----		----
663	D5002	29.97		0.48	1842		----		----
704	D1250	29.741		-0.81	1928		----		----
732		----		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951		----		----
750	D1250	29.94		0.31	2513		----		----
751	Calc.	29.92		0.20	9050		----		----
752	D1250	29.89		0.03	9051		----		----
753	D1250	29.94		0.31	9052		----		----
781	D1250	29.886		0.01	9053		----		----
862	D287	29.95		0.36	9057		----		----
872		----		----	9060	Calc.	29.8		-0.48
874	D1250	30.00		0.64	9062		----		----
875		----		----	9063		----		----
902	D5002	29.89		0.03	9064		----		----
962	D287	30.0		0.64	9132		----		----
963	D5002Calc.	30.0		0.64	9146	in house	29.8		-0.48
970		----		----	9151		----		----
971	Conv.	30.00		0.64	9152	D287	29.84		-0.25
974	D1250	29.96		0.42					
993		----		----					
994		----		----					

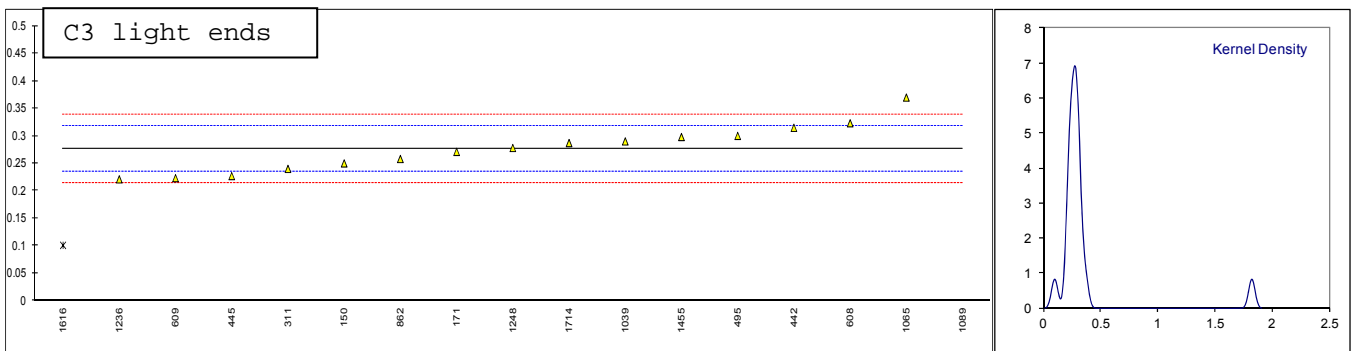
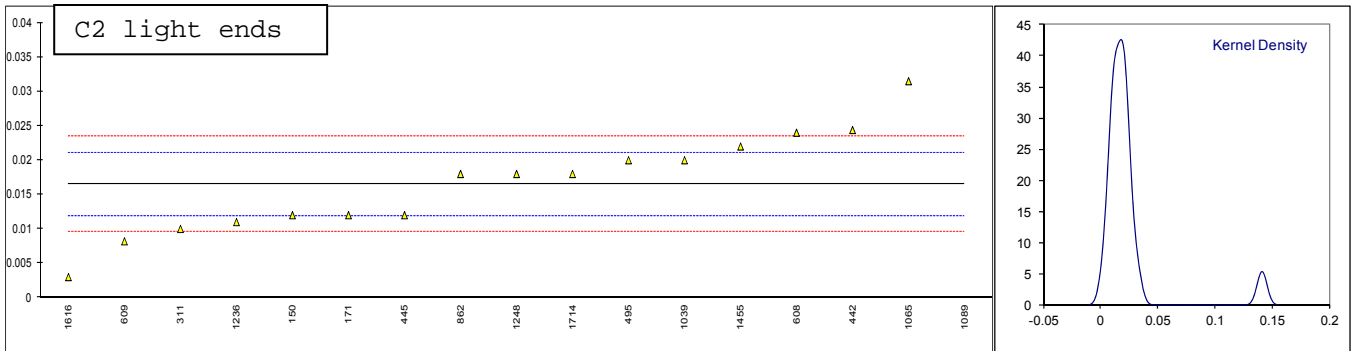
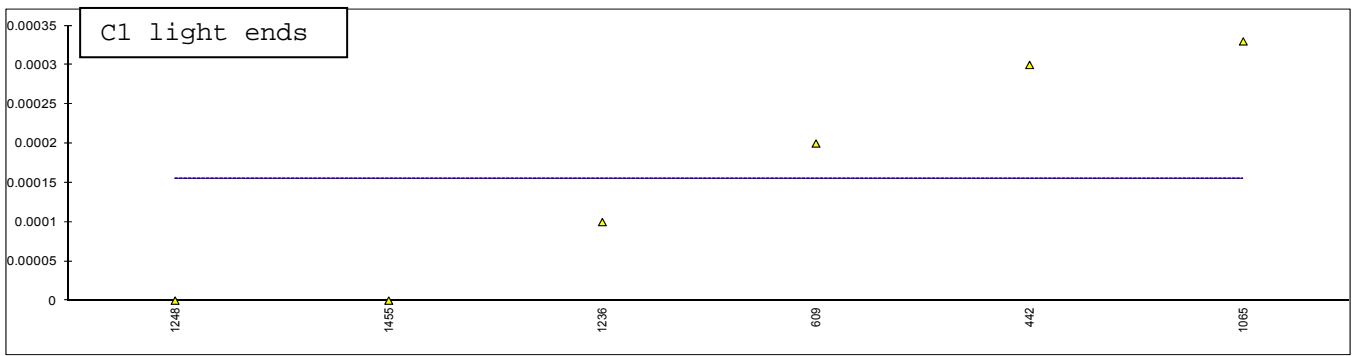
normality	not OK
n	63
outliers	3
mean (n)	29.885
st.dev. (n)	0.1263
R(calc.)	0.354
R(D287:12b)	0.500



Determination of individual Light ends [C1-C3] on sample #13198; results in%M/M

lab	method	C1	mark	z(targ)	C2	mark	z(targ)	C3	mark	z(targ)
62		----		----	----		----	----		----
90		----		----	----		----	----		----
92		----		----	----		----	----		----
120		----		----	----		----	----		----
131		----		----	----		----	----		----
150	IP344	<0.01		----	0.012		-1.96	0.250		-1.29
154		----		----	----		----	----		----
158		----		----	----		----	----		----
159		----		----	----		----	----		----
171	IP344	----		----	0.012		-1.96	0.271		-0.28
193		----		----	----		----	----		----
203		----		----	----		----	----		----
213		----		----	----		----	----		----
225		----		----	----		----	----		----
238		----		----	----		----	----		----
242		----		----	----		----	----		----
273		----		----	----		----	----		----
311	INH-267	<0.01		----	0.01		-2.83	0.24		-1.78
314		----		----	----		----	----		----
332		----		----	----		----	----		----
333		----		----	----		----	----		----
334		----		----	----		----	----		----
335		----		----	----		----	----		----
340		----		----	----		----	----		----
391		----		----	----		----	----		----
398		----		----	----		----	----		----
399		----		----	----		----	----		----
402		----		----	----		----	----		----
441		----		----	----		----	----		----
442	IP344	0.0003		----	0.0244		3.43	0.3147		1.84
444		----		----	----		----	----		----
445	IP344Mod.	<0.001		----	0.012		-1.96	0.227		-2.41
446		----		----	----		----	----		----
447		----		----	----		----	----		----
485		----		----	----		----	----		----
494		----		----	----		----	----		----
495	IP344	<0.01		----	0.02		1.52	0.30		1.13
511		----		----	----		----	----		----
527		----		----	----		----	----		----
529		----		----	----		----	----		----
541		----		----	----		----	----		----
551		----		----	----		----	----		----
557		----		----	----		----	----		----
574		----		----	----		----	----		----
593		----		----	----		----	----		----
602		----		----	----		----	----		----
605		----		----	----		----	----		----
606		----		----	----		----	----		----
608	IP344	<0.01		----	0.024		3.26	0.323		2.24
609	IP344	0.0002		----	0.0082		-3.61	0.2232		-2.59
613		----		----	----		----	----		----
657		----		----	----		----	----		----
663		----		----	----		----	----		----
704		----		----	----		----	----		----
732		----		----	----		----	----		----
739		----		----	----		----	----		----
742		----		----	----		----	----		----
749		----		----	----		----	----		----
750		----		----	----		----	----		----
751		----		----	----		----	----		----
752		----		----	----		----	----		----
753		----		----	----		----	----		----
781		----		----	----		----	----		----
862	IP344	<0.01		----	0.018		0.65	0.258		-0.91
872		----		----	----		----	----		----
874		----		----	----		----	----		----
875		----		----	----		----	----		----
902		----		----	----		----	----		----
962		----		----	----		----	----		----
963		----		----	----		----	----		----
970		----		----	----		----	----		----
971		----		----	----		----	----		----
974		----		----	----		----	----		----
993		----		----	----		----	----		----
994		----		----	----		----	----		----
995		----		----	----		----	----		----

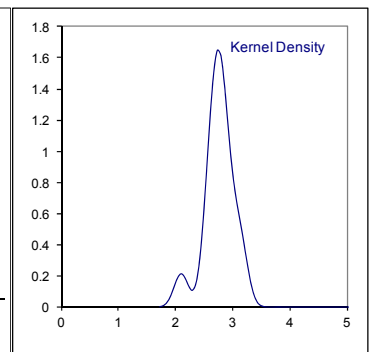
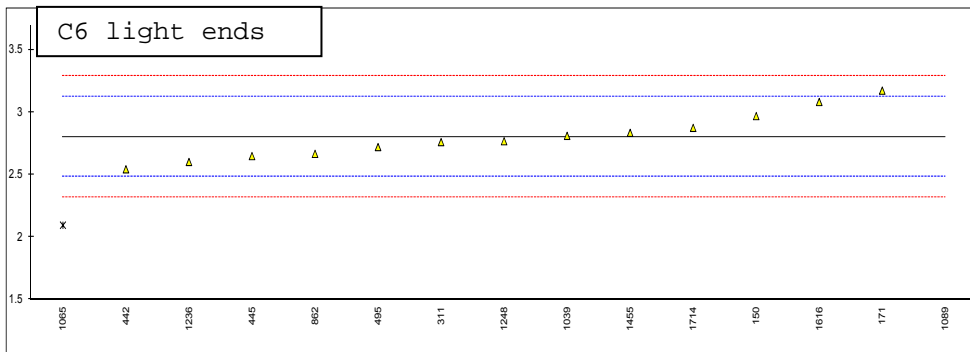
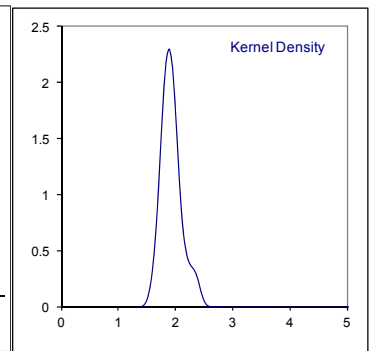
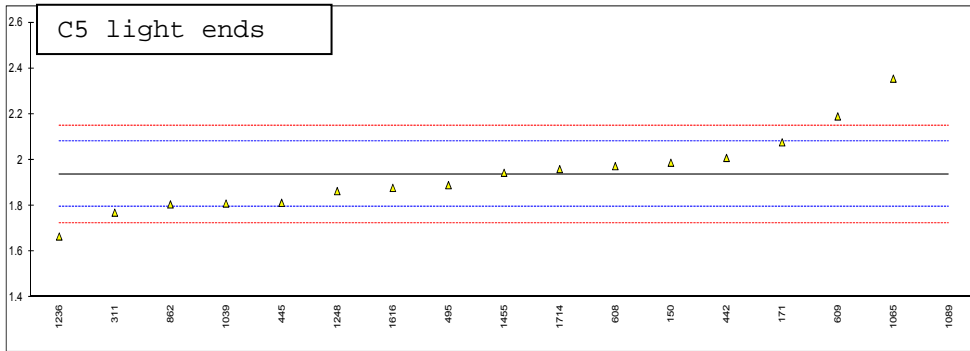
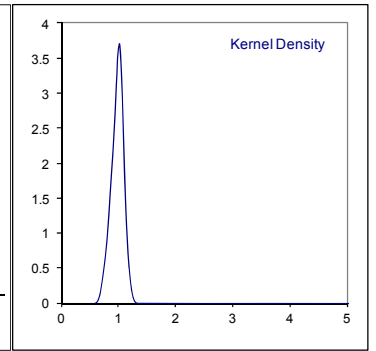
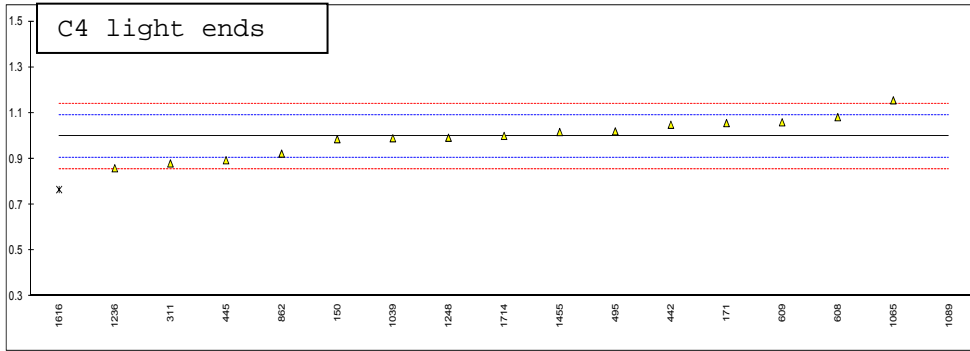
996		----	----	----	----	----	----
997		----	----	----	----	----	----
1011		----	----	----	----	----	----
1038		----	----	----	----	----	----
1039	IP344	<0.01	----	0.02	1.52	0.29	0.64
1040		----	----	----	----	----	----
1056		----	----	----	----	----	----
1065	IP344	0.00033	----	0.0315	6.52	0.3697	4.50
1081		----	----	----	----	----	----
1089		----	----	0.1411	G(0.01) 54.19	1.8254	G(0.01) 74.98
1090		----	----	----	----	----	----
1106		----	----	----	----	----	----
1108		----	----	----	----	----	----
1109		----	----	----	----	----	----
1148		----	----	----	----	----	----
1201		----	----	----	----	----	----
1236	D5134	0.0001	----	0.011	-2.39	0.221	-2.70
1243		----	----	----	----	----	----
1248	in house	0.000	----	0.018	0.65	0.278	0.06
1259		----	----	----	----	----	----
1264		----	----	----	----	----	----
1287		----	----	----	----	----	----
1340		----	----	----	----	----	----
1345		----	----	----	----	----	----
1357		----	----	----	----	----	----
1360		----	----	----	----	----	----
1365		----	----	----	----	----	----
1379		----	----	----	----	----	----
1397		----	----	----	----	----	----
1403		----	----	----	----	----	----
1412		----	----	----	----	----	----
1455	IP344	0.000	----	0.022	2.39	0.298	1.03
1501		----	----	----	----	----	----
1586		----	----	----	----	----	----
1603		----	----	----	----	----	----
1616	D5134	<0.05	----	0.003	-5.87	0.101	G(0.05) -8.51
1635		----	----	----	----	----	----
1654		----	----	----	----	----	----
1669		----	----	----	----	----	----
1693		----	----	----	----	----	----
1695		----	----	----	----	----	----
1714		----	----	0.018	0.65	0.287	0.50
1720		----	----	----	----	----	----
1728		----	----	----	----	----	----
1749		----	----	----	----	----	----
1759		----	----	----	----	----	----
1761		----	----	----	----	----	----
1800		----	----	----	----	----	----
1810		----	----	----	----	----	----
1811		----	----	----	----	----	----
1815		----	----	----	----	----	----
1842		----	----	----	----	----	----
1928		----	----	----	----	----	----
1929		----	----	----	----	----	----
1930		----	----	----	----	----	----
1950		----	----	----	----	----	----
1951		----	----	----	----	----	----
2513		----	----	----	----	----	----
9050		----	----	----	----	----	----
9051		----	----	----	----	----	----
9052		----	----	----	----	----	----
9053		----	----	----	----	----	----
9057		----	----	----	----	----	----
9060		----	----	----	----	----	----
9062		----	----	----	----	----	----
9063		----	----	----	----	----	----
9064		----	----	----	----	----	----
9132		----	----	----	----	----	----
9146		----	----	----	----	----	----
9151		----	----	----	----	----	----
9152		----	----	----	----	----	----
	normality	OK		OK		OK	
	n	6		16		15	
	outliers	0		1		2	
	mean (n)	<0.01		0.0165		0.2767	
	st.dev. (n)	n.a.		0.00726		0.04174	
	R(calc.)	n.a.		0.0203		0.1169	
	R(IP344:10)	n.a.		0.0064		0.0578	



Determination of individual Light ends [C4-C6] on sample #13198; results in%M/M

lab	method	C4	mark	z(targ)	C5	mark	z(targ)	C6	mark	z(targ)
62		----		----	----		----	----		----
90		----		----	----		----	----		----
92		----		----	----		----	----		----
120		----		----	----		----	----		----
131		----		----	----		----	----		----
150	IP344	0.986		-0.25	1.988		0.71	2.968		1.02
154		----		----	----		----	----		----
158		----		----	----		----	----		----
159		----		----	----		----	----		----
171	IP344	1.056		1.24	2.077		1.96	3.172		2.29
193		----		----	----		----	----		----
203		----		----	----		----	----		----
213		----		----	----		----	----		----
225		----		----	----		----	----		----
238		----		----	----		----	----		----
242		----		----	----		----	----		----
273		----		----	----		----	----		----
311	INH-267	0.88		-2.50	1.77		-2.34	2.76		-0.27
314		----		----	----		----	----		----
332		----		----	----		----	----		----
333		----		----	----		----	----		----
334		----		----	----		----	----		----
335		----		----	----		----	----		----
340		----		----	----		----	----		----
391		----		----	----		----	----		----
398		----		----	----		----	----		----
399		----		----	----		----	----		----
402		----		----	----		----	----		----
441		----		----	----		----	----		----
442	IP344	1.0488		1.09	2.0089		1.01	2.5424		-1.62
444		----		----	----		----	----		----
445	IP344Mod.	0.894		-2.20	1.813		-1.74	2.648		-0.97
446		----		----	----		----	----		----
447		----		----	----		----	----		----
485		----		----	----		----	----		----
494		----		----	----		----	----		----
495	IP344	1.02		0.48	1.89		-0.66	2.72		-0.52
511		----		----	----		----	----		----
527		----		----	----		----	----		----
529		----		----	----		----	----		----
541		----		----	----		----	----		----
551		----		----	----		----	----		----
557		----		----	----		----	----		----
574		----		----	----		----	----		----
593		----		----	----		----	----		----
602		----		----	----		----	----		----
605		----		----	----		----	----		----
606		----		----	----		----	----		----
608	IP344	1.082		1.80	1.973		0.50	----		----
609	IP344	1.0597		1.32	2.1901		3.55	----		----
613		----		----	----		----	----		----
657		----		----	----		----	----		----
663		----		----	----		----	----		----
704		----		----	----		----	----		----
732		----		----	----		----	----		----
739		----		----	----		----	----		----
742		----		----	----		----	----		----
749		----		----	----		----	----		----
750		----		----	----		----	----		----
751		----		----	----		----	----		----
752		----		----	----		----	----		----
753		----		----	----		----	----		----
781		----		----	----		----	----		----
862	IP344	0.923		-1.58	1.806		-1.84	2.666		-0.85
872		----		----	----		----	----		----
874		----		----	----		----	----		----
875		----		----	----		----	----		----
902		----		----	----		----	----		----
962		----		----	----		----	----		----
963		----		----	----		----	----		----
970		----		----	----		----	----		----
971		----		----	----		----	----		----
974		----		----	----		----	----		----
993		----		----	----		----	----		----
994		----		----	----		----	----		----
995		----		----	----		----	----		----

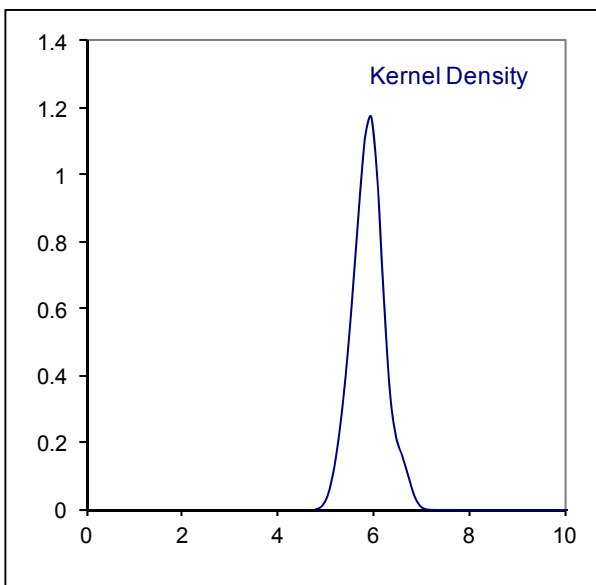
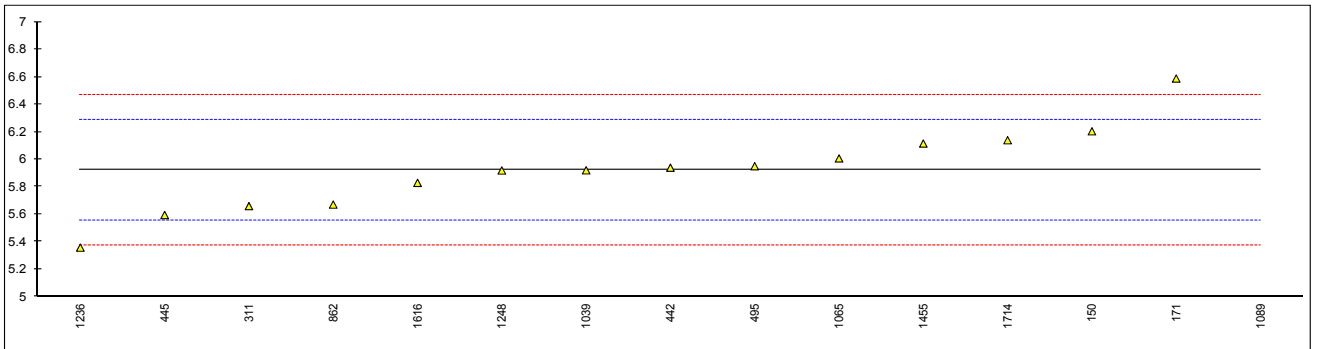
996		----		----		----		----		----
997		----		----		----		----		----
1011		----		----		----		----		----
1038		----		----		----		----		----
1039	IP344	0.99		-0.16	1.81			-1.78	2.81	0.04
1040		----		----		----		----		----
1056		----		----		----		----		----
1065	IP344	1.1555		3.36	2.3549			5.86	2.0948	G(0.05) -4.41
1081		----		----		----		----		----
1089	D5134	6.1515	G(0.01)	109.60	11.7363	G(0.01)	137.52	17.4009	G(0.01)	90.83
1090		----		----		----		----		----
1106		----		----		----		----		----
1108		----		----		----		----		----
1109		----		----		----		----		----
1148		----		----		----		----		----
1201		----		----		----		----		----
1236	D5134	0.859		-2.95	1.666			-3.80	2.601	-1.26
1243		----		----		----		----		----
1248	in house	0.992		-0.12	1.864			-1.03	2.767	-0.23
1259		----		----		----		----		----
1264		----		----		----		----		----
1287		----		----		----		----		----
1340		----		----		----		----		----
1345		----		----		----		----		----
1357		----		----		----		----		----
1360		----		----		----		----		----
1365		----		----		----		----		----
1379		----		----		----		----		----
1397		----		----		----		----		----
1403		----		----		----		----		----
1412		----		----		----		----		----
1455	IP344	1.017		0.41	1.944			0.10	2.834	0.19
1501		----		----		----		----		----
1586		----		----		----		----		----
1603		----		----		----		----		----
1616	D5134	0.766	G(0.05)	-4.92	1.878			-0.83	3.081	1.73
1635		----		----		----		----		----
1654		----		----		----		----		----
1669		----		----		----		----		----
1693		----		----		----		----		----
1695		----		----		----		----		----
1714	in house	1.000		0.05	1.960			0.32	2.874	0.44
1720		----		----		----		----		----
1728		----		----		----		----		----
1749		----		----		----		----		----
1759		----		----		----		----		----
1761		----		----		----		----		----
1800		----		----		----		----		----
1810		----		----		----		----		----
1811		----		----		----		----		----
1815		----		----		----		----		----
1842		----		----		----		----		----
1928		----		----		----		----		----
1929		----		----		----		----		----
1930		----		----		----		----		----
1950		----		----		----		----		----
1951		----		----		----		----		----
2513		----		----		----		----		----
9050		----		----		----		----		----
9051		----		----		----		----		----
9052		----		----		----		----		----
9053		----		----		----		----		----
9057		----		----		----		----		----
9060		----		----		----		----		----
9062		----		----		----		----		----
9063		----		----		----		----		----
9064		----		----		----		----		----
9132		----		----		----		----		----
9146		----		----		----		----		----
9151		----		----		----		----		----
9152		----		----		----		----		----
	normality	OK		OK		OK		OK		
	n	15		16		13		13		
	outliers	2		1		2		2		
	mean (n)	0.9975		1.9371		2.8033		2.8033		
	st.dev. (n)	0.08124		0.16911		0.18445		0.18445		
	R(calc.)	0.2275		0.4735		0.5165		0.5165		
	R(IP344:10)	0.1317		0.1995		0.4500		0.4500		



Determination of Total Light ends [C1-C6] on sample #13198; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995		----		----
90		----		----	996		----		----
92		----		----	997		----		----
120		----		----	1011		----		----
131		----		----	1038		----		----
150	IP344	6.204		1.54	1039	IP344	5.92		-0.01
154		----		----	1040		----		----
158		----		----	1056		----		----
159		----		----	1065	IP344	6.0067		0.47
171	IP344	6.588		3.64	1081		----		----
193		----		----	1089	D5134	37.2552	G(0.01)	171.07
203		----		----	1090		----		----
213		----		----	1106		----		----
225		----		----	1108		----		----
238		----		----	1109		----		----
242		----		----	1148		----		----
273		----		----	1201		----		----
311	INH-267	5.66		-1.43	1236	IP344	5.358		-3.07
314		----		----	1243		----		----
332		----		----	1248	in house	5.919		-0.01
333		----		----	1259		----		----
334		----		----	1264		----		----
335		----		----	1287		----		----
340		----		----	1340		----		----
391		----		----	1345		----		----
398		----		----	1357		----		----
399		----		----	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442	IP344	5.9395		0.10	1397		----		----
444		----		----	1403		----		----
445	IP344Mod.	5.595		-1.78	1412		----		----
446		----		----	1455	IP344	6.115		1.06
447		----		----	1501		----		----
485		----		----	1586		----		----
494		----		----	1603		----		----
495	IP344	5.95		0.16	1616	D5134	5.829		-0.50
511		----		----	1635		----		----
527		----		----	1654		----		----
529		----		----	1669		----		----
541		----		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	in house	6.139		1.19
574		----		----	1720		----		----
593		----		----	1728		----		----
602		----		----	1749		----		----
605		----		----	1759		----		----
606		----		----	1761		----		----
608		----		----	1800		----		----
609		----		----	1810		----		----
613		----		----	1811		----		----
657		----		----	1815		----		----
663		----		----	1842		----		----
704		----		----	1928		----		----
732		----		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951		----		----
750		----		----	2513		----		----
751		----		----	9050		----		----
752		----		----	9051		----		----
753		----		----	9052		----		----
781		----		----	9053		----		----
862	IP344	5.671		-1.36	9057		----		----
872		----		----	9060		----		----
874		----		----	9062		----		----
875		----		----	9063		----		----
902		----		----	9064		----		----
962		----		----	9132		----		----
963		----		----	9146		----		----
970		----		----	9151		----		----
971		----		----	9152		----		----
974		----		----					
993		----		----					
994		----		----					

normality OK
 n 14
 outliers 1
 mean (n) 5.921
 st.dev. (n) 0.3014
 R(calc.) 0.844
 R(IP344:10) 0.513

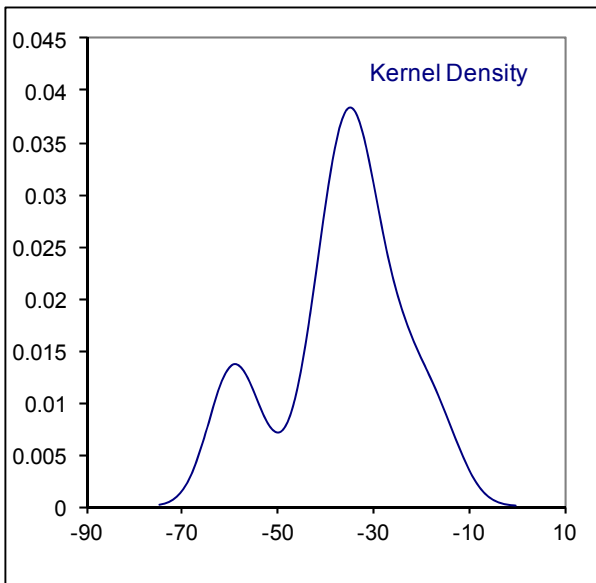
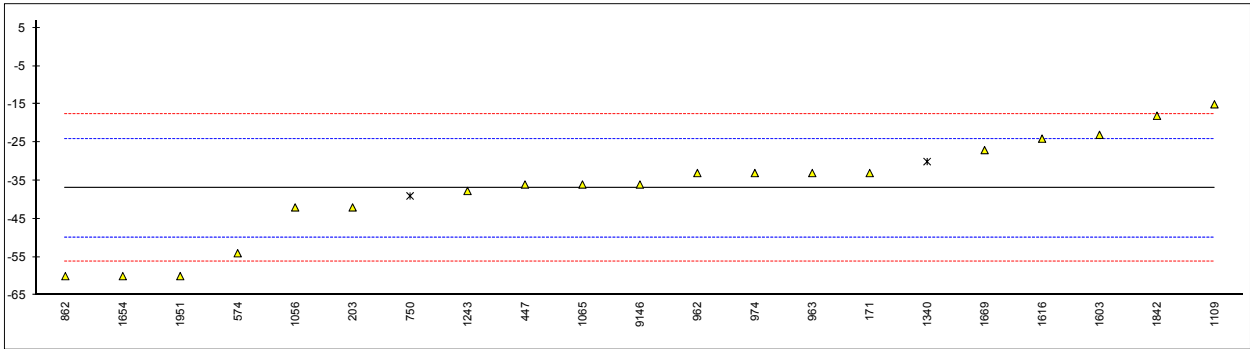


Determination of Pour Point (Maximum) on sample #13198; results in °C

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995	D5853A	≤-36		----
90		----		----	996	D5853A	≤-36		----
92		----		----	997	D5853A	<-36		----
120		----		----	1011	D97	<-24	ex	----
131		----		----	1038		----		----
150	D97	<-33	ex	----	1039		----		----
154		----		----	1040		----		----
158		----		----	1056	D5853A	-42		-0.78
159		----		----	1065	D5853A	-36		0.15
171	D5853A	-33.0		0.62	1081		----		----
193		----		----	1089	D5853A	<-42		----
203	D5853	-42		-0.78	1090		----		----
213		----		----	1106		----		----
225		----		----	1108		----		----
238	D5853A	<-24		----	1109	D5853A	-15		3.42
242		----		----	1148	ISO3016	<-35	ex	----
273		----		----	1201		----		----
311		----		----	1236		----		----
314		----		----	1243	D5853A	-37.7		-0.11
332		----		----	1248	IP441Mod.	<-36		----
333		----		----	1259	D5853A	≤-36		----
334		----		----	1264		----		----
335		----		----	1287		----		----
340		----		----	1340	ISO3016	-30	ex	1.09
391	D5853A	<-36		----	1345	D5853A	<-36		----
398		----		----	1357		----		----
399	D5853A	<-21		----	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442		----		----	1397		----		----
444		----		----	1403		----		----
445	D5853	<-36		----	1412	D5853A	<-36		----
446		----		----	1455		----		----
447	D5853A	-36		0.15	1501	D5853A	<-36		----
485		----		----	1586		----		----
494	D5853A	<-51		----	1603	in house	-23.0		2.18
495	D5853A	<-39		----	1616	D5853A	-24		2.02
511		----		----	1635		----		----
527		----		----	1654	D5853A	-60.0	C	-3.58
529		----		----	1669	D5853A	-27.0		1.55
541		----		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	D5853A	≤-36		----
574	D5853A	-54		-2.65	1720		----		----
593		----		----	1728		----		----
602		----		----	1749		----		----
605	D5853A	≤-36		----	1759	D5853A	<-36		----
606		----		----	1761		----		----
608	D5853A	<-36		----	1800		----		----
609		----		----	1810		----		----
613		----		----	1811		----		----
657	D5853A	<-36		----	1815	D5853A	<-36.0		----
663	D5853A	<-39		----	1842	D5853	-18		2.95
704	D5853A	≤-36		----	1928		----		----
732	D5853A	<-36		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951	D5853A	-60.0		-3.58
750	D97	-39	ex	-0.31	2513		----		----
751	D5853A	≤-36		----	9050		----		----
752		----		----	9051		----		----
753	D5853A	≤-36		----	9052		----		----
781	D5853A	<-36		----	9053		----		----
862	D5853A	-60		-3.58	9057	D5853A	<-33		----
872		----		----	9060		----		----
874	D5853A	<-36		----	9062		----		----
875	D5853	<-36		----	9063		----		----
902		----		----	9064		----		----
962	D5853A	-33		0.62	9132		----		----
963	D5853A	-33		0.62	9146	D5853A	-36		0.15
970		----		----	9151		----		----
971	D5853A	<-36		----	9152		----		----
974	D5853A	-33		0.62					
993		----		----					
994	D5853A	≤-36		----					

normality	OK	
n	19	
outliers	0	+ 5 excluded
mean (n)	-36.98	
st.dev. (n)	13.547	
R(calc.)	37.93	
R(D5853A:11)	18.00	

Lab 1654: first reported -63
 Ex = results excluded, method is not intended for Crude Oil

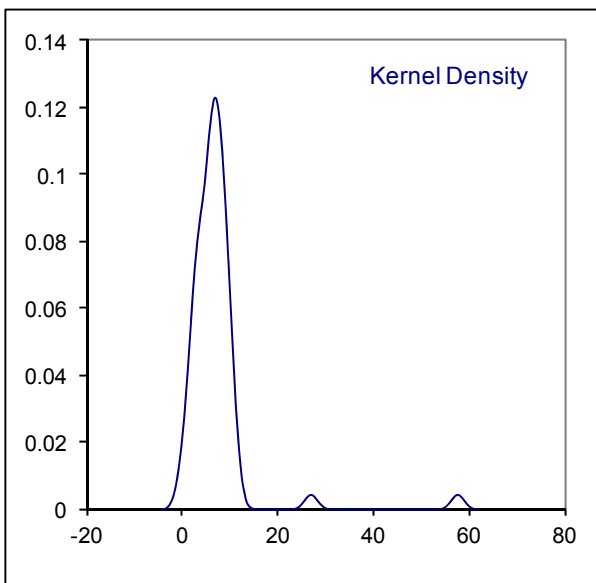
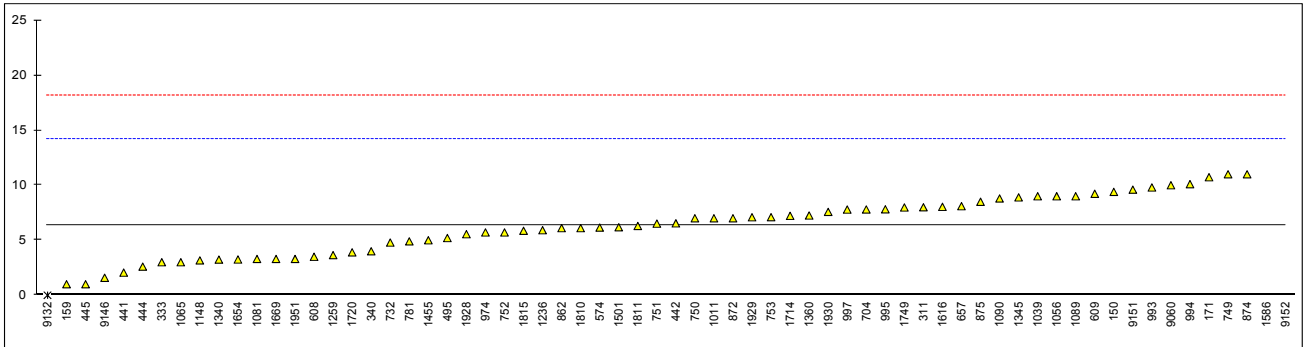


Determination of Salt as NaCl on sample #13198; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995	D3230	7.8137		0.38
90		----		----	996				
92		----		----	997	D3230	7.79		0.37
120		----		----	1011	D3230	7	C	0.17
131		----		----	1038				
150	D3230	9.4		0.78	1039	D3230	9		0.68
154		----		----	1040				
158		----		----	1056	D3230	9		0.68
159	D3230	1		-1.34	1065	D3230	3		-0.84
171	D3230	10.73		1.11	1081	in house	3.3		-0.76
193		----		----	1089	D3230	9		0.68
203		----		----	1090	D3230	8.80		0.63
213		----		----	1106				
225		----		----	1108				
238		----		----	1109				
242		----		----	1148	D3230	3.17		-0.80
273		----		----	1201				
311	D3230	8		0.42	1236	D3230	5.91		-0.10
314		----		----	1243				
332		----		----	1248				
333	D3230	3		-0.84	1259	D3230	3.6480		-0.68
334		----		----	1264				
335		----		----	1287				
340	D3230	4		-0.59	1340	UOP22	3.24		-0.78
391		----		----	1345	D3230	8.9		0.65
398		----		----	1357				
399		----		----	1360	STN656030	7.25		0.23
402		----		----	1365				
441	IP265	2.055		-1.08	1379				
442	IP265	6.537		0.05	1397				
444	IP265	2.6		-0.94	1403				
445	IP265	1		-1.34	1412				
446		----		----	1455	D3230	5		-0.33
447		----		----	1501	D3230	6.18		-0.04
485		----		----	1586	D3230	27.1	G(0.01)	5.25
494		----		----	1603				
495	D3230	5.2		-0.28	1616	D3230	8.04		0.43
511		----		----	1635				
527		----		----	1654	D3230	3.25		-0.78
529		----		----	1669	D3230	3.3		-0.76
541		----		----	1693				
551		----		----	1695				
557		----		----	1714	D6470	7.22		0.23
574	D3230	6.15		-0.04	1720	D3230	3.9		-0.61
593		----		----	1728				
602		----		----	1749	D3230	7.98		0.42
605		----		----	1759				
606		----		----	1761				
608	D3230	3.5		-0.71	1800				
609	D3230	9.2271		0.73	1810	D3230	6.1		-0.06
613		----		----	1811	D3230	6.3		-0.01
657	IP265	8.1		0.45	1815	D3230	5.86		-0.12
663		----		----	1842				
704	D3230	7.8		0.37	1928	STN656030	5.55		-0.19
732	INH-21534	4.79		-0.39	1929	STN656030	7.09		0.19
739		----		----	1930	DIN51576	7.58		0.32
742		----		----	1950				
749	INH-21534	11		1.18	1951	D3230	3.3		-0.76
750	INH-21534	7.0		0.17	2513				
751	D3230	6.513		0.05	9050				
752	D3230	5.71		-0.15	9051				
753	D3230	7.1		0.20	9052				
781	D3230	4.9		-0.36	9053				
862	D3230	6.1		-0.06	9057				
872	D3230	7		0.17	9060	D3230	10		0.93
874	D3230	11		1.18	9062				
875	D3230	8.5		0.55	9063				
902		----		----	9064				
962		----		----	9132	D3230	0	ex	-1.60
963		----		----	9146	in house	1.587		-1.20
970		----		----	9151	D3230	9.6		0.83
971		----		----	9152	D3230	57.7	G(0.01)	12.98
974	D3230	5.71		-0.15					
993	D3230	9.80		0.88					
994	D3230	10.1		0.95					

normality	OK	
n	63	
outliers	2	+ 1 excluded
mean (n)	6.320	
st.dev. (n)	2.6029	
R(calc.)	7.288	
R(D3230:13)	11.083	

Lab 1011: reported 0.0007 (probably reported in a deviating unit)
 Lab 9132: result excluded, zero is not a real result

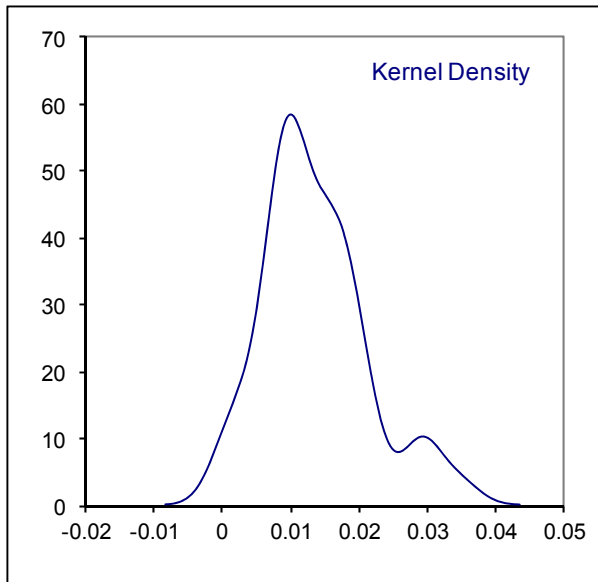
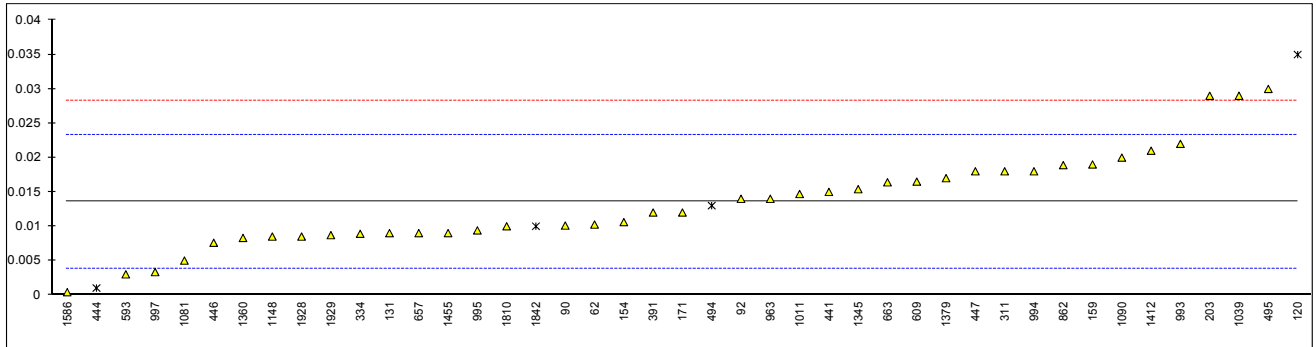


Determination of Sediment ASTM D4807 on sample #13198; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62	D4807	0.01025		-0.68	995	D4807	0.009396	C	-0.85
90	D4807	0.0101		-0.71	996				
92	D4807	0.014		0.09	997	D4807	0.003324		-2.09
120	D4807	0.035	G(0.05)	4.38	1011	D4807	0.0147		0.23
131	D4807	0.009		-0.94	1038				
150					1039	D4807	0.029		3.15
154	D4807	0.0106		-0.61	1040				
158					1056				
159	D4807	0.019		1.11	1065				
171	D4807	0.012		-0.32	1081	in house	0.005		-1.75
193					1089				
203	D4807	0.029		3.15	1090	D4807	0.02		1.31
213					1106				
225					1108				
238					1109				
242					1148	D4807	0.0085		-1.04
273					1201				
311	D4807	0.018		0.90	1236				
314					1243				
332					1248				
333					1259				
334	D4807	0.0089		-0.96	1264				
335					1287				
340					1340				
391	D4807	0.012	C	-0.32	1345	D4807	0.0154		0.37
398					1357				
399	D4807	<0.01			1360	STN656080	0.0083		-1.08
402					1365				
441	D4807	0.015		0.29	1379	D4807	0.017	C	0.70
442					1397				
444	D473	0.0010	ex	-2.57	1403				
445					1412	D4807	0.021		1.52
446	D4807	0.0076		-1.22	1455	D4807	0.009		-0.94
447	D4807	0.018		0.90	1501				
485					1586	D4807	0.0004		-2.69
494	D473	0.013	ex	-0.12	1603				
495	D4807	0.03		3.36	1616				
511					1635				
527					1654				
529					1669				
541					1693				
551					1695				
557					1714				
574					1720				
593	D4807	0.003		-2.16	1728				
602					1749				
605					1759				
606					1761				
608					1800				
609	D4807	0.0165		0.60	1810	D4807	0.01		-0.73
613					1811				
657	D4807	0.009		-0.94	1815				
663	D4807	0.0164		0.58	1842	D473	0.01	ex	-0.73
704					1928	STN656080	0.0085		-1.04
732					1929	STN656080	0.0087		-1.00
739					1930				
742					1950				
749					1951				
750					2513				
751					9050				
752					9051				
753					9052				
781					9053				
862	D4807	0.0189		1.09	9057				
872					9060				
874					9062				
875					9063				
902					9064				
962					9132				
963	D4807	0.0140		0.09	9146				
970					9151				
971					9152				
974									
993	D4807	0.022		1.72					
994	D4807	0.018		0.90					

normality	OK	
n	39	
outliers	1	+ 3 excl
mean (n)	0.0136	
st.dev. (n)	0.00692	
R(calc.)	0.0194	
R(D4807:10)	0.0137	

Lab 391: first reported 0.12
 Lab 995: first reported 0.03396
 Lab 1379: first reported 0.035
 Ex = result excluded, as test method is not equivalent to ASTM D4807



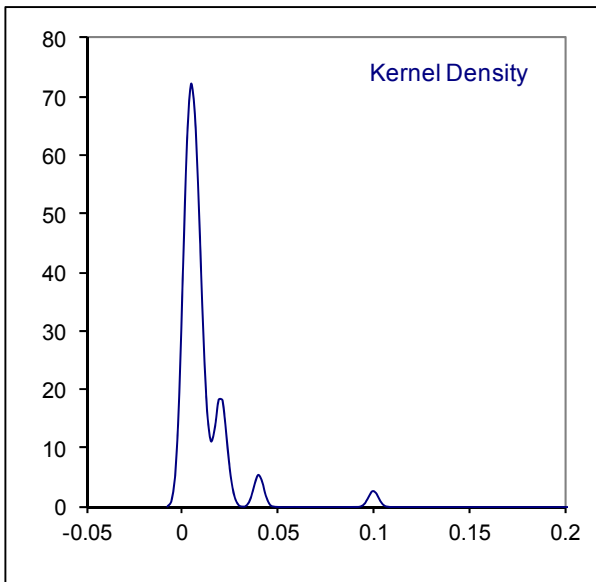
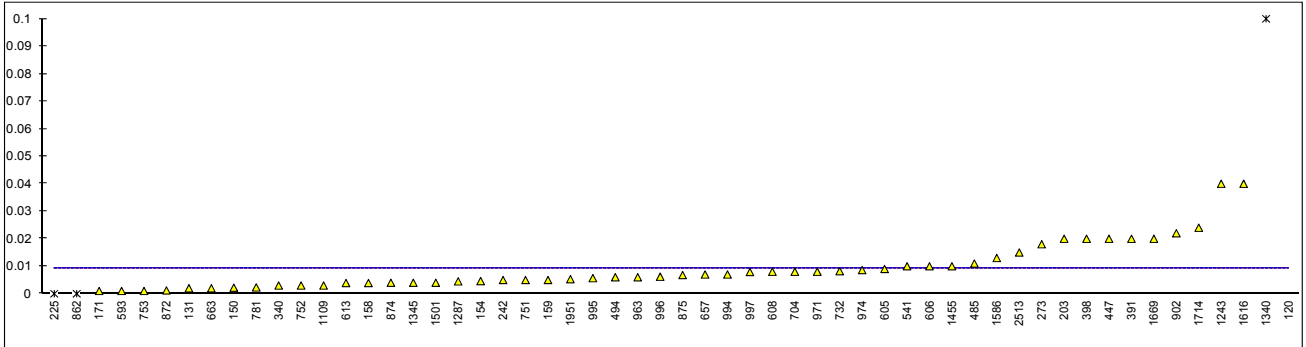
Determination of Sediment ASTM D473 on sample #13198; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995	D473	0.00567		----
90		----		----	996	D473	0.0062		----
92		----		----	997	D473	0.0079		----
120	D473	0.51	G(0.01), false +?	----	1011		----		----
131	D473	0.002		----	1038		----		----
150	D473	0.0022		----	1039		----		----
154	D473	0.0046		----	1040		----		----
158	D473	0.0039		----	1056		----		----
159	D473	0.005		----	1065		----		----
171	D473	0.001		----	1081		----		----
193		----		----	1089		----		----
203	D473	0.02		----	1090		----		----
213		----		----	1106		----		----
225	D473	0	ex	----	1108		----		----
238		----		----	1109	D473	0.003		----
242	D473	0.004995		----	1148		----		----
273	D473	0.018		----	1201		----		----
311	D473	<0.01		----	1236		----		----
314		----		----	1243	D473	0.04		----
332	D473	<0.01		----	1248		----		----
333	D473	<0.01		----	1259		----		----
334		----		----	1264		----		----
335	D473	<0.01		----	1287	D473	0.0045		----
340	D473	0.003		----	1340	ISO9030	0.10	G(0.01)	----
391	D473	0.02		----	1345	D473	0.004		----
398	D473	0.020		----	1357		----		----
399		----		----	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442		----		----	1397		----		----
444		----		----	1403		----		----
445	D473	<0.01		----	1412	D473	<0.01		----
446	D473	<0.001		----	1455	D473	0.01		----
447	D473	0.02		----	1501	D473	0.004		----
485	D473	0.011		----	1586	D473	0.013		----
494	D473	0.006		----	1603		----		----
495	D473	<0.01		----	1616	D473	0.04		----
511		----		----	1635		----		----
527		----		----	1654		----		----
529		----		----	1669	D473	0.02		----
541	D473	0.01		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	D473	0.024		----
574		----		----	1720		----		----
593	D473	0.001		----	1728		----		----
602		----		----	1749		----		----
605	D473	0.009		----	1759		----		----
606	D473	0.010		----	1761		----		----
608	D473	0.008		----	1800		----		----
609		----		----	1810		----		----
613	D473	0.0039		----	1811		----		----
657	D473	0.007		----	1815		----		----
663	D473	0.002		----	1842		----		----
704	D473	0.008		----	1928		----		----
732	D473	0.0082		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951	D473	0.0053		----
750		----		----	2513	D473	0.015		----
751	D473	0.005		----	9050		----		----
752	D473	0.003		----	9051		----		----
753	D473	0.001		----	9052		----		----
781	D473	0.0023		----	9053		----		----
862	D473	0	ex	----	9057		----		----
872	D473	0.0012		----	9060		----		----
874	D473	0.0040		----	9062		----		----
875	D473	0.0068		----	9063		----		----
902	D473	0.022		----	9064		----		----
962		----		----	9132		----		----
963	D473	0.006		----	9146		----		----
970		----		----	9151		----		----
971	D473	0.008		----	9152		----		----
974	D473	0.0086		----					
993		----		----					
994	D473	0.007		----					

normality	not OK	
n	52	
outliers	2	+ 2 excluded
mean (n)	0.0094	
st.dev. (n)	0.00873	
R(calc.)	0.0244	
R(IP344:10)	(0.0354)	

Application range precision data: 0.01 – 0.4%M/M

Ex = result excluded, zero is not a real result

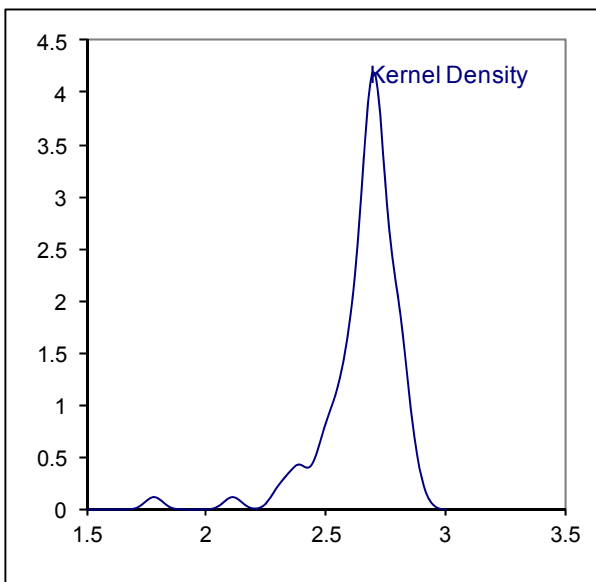
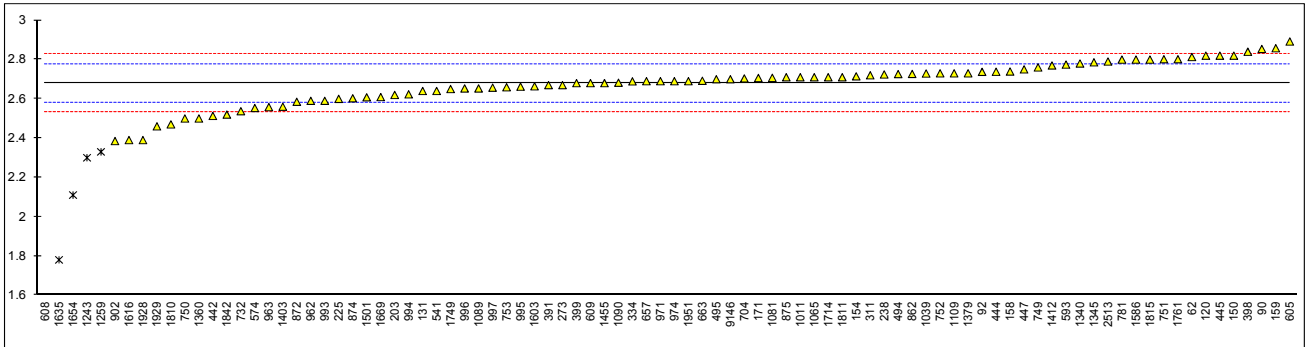


Determination of Total Sulphur on sample #13198; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62	D4294	2.813		2.72	995	D4294	2.662		-0.36
90	D4294	2.854		3.55	996	D4294	2.653		-0.55
92	D4294	2.7374		1.17	997	D4294	2.657		-0.47
120	D4294	2.82		2.86	1011	D4294	2.71		0.61
131	D4294	2.64		-0.81	1038		----		----
150	D4294	2.82		2.86	1039	D2622	2.729		1.00
154	D4294	2.7146		0.71	1040		----		----
158	D4294	2.7393		1.21	1056		----		----
159	D4294	2.8579		3.63	1065	IP336	2.71		0.61
171	D4294	2.7063		0.54	1081	D4294	2.707		0.55
193		----		----	1089	D4294	2.653		-0.55
203	D4294	2.62		-1.22	1090	D4294	2.682		0.04
213		----		----	1106		----		----
225	D4294	2.60		-1.63	1108		----		----
238	D4294	2.7241		0.90	1109	D4294	2.73		1.02
242		----		----	1148		----		----
273	D4294	2.67		-0.20	1201		----		----
311	D4294	2.72		0.82	1236		----		----
314		----		----	1243	D4294	2.3	DG(0.05)	-7.75
332		----		----	1248		----		----
333		----		----	1259	ISO8754	2.33	DG(0.05)	-7.14
334	D4294	2.689		0.19	1264		----		----
335		----		----	1287		----		----
340		----		----	1340	ISO8754	2.78		2.04
391	D4294	2.67		-0.20	1345	D4294	2.786		2.17
398	D4294	2.840		3.27	1357		----		----
399	D4294	2.680		0.00	1360	ISO8754	2.50		-3.67
402		----		----	1365		----		----
441		----		----	1379	D4294	2.73		1.02
442	IP336	2.513		-3.41	1397		----		----
444	IP336	2.738		1.19	1403	ISO10304	2.56		-2.45
445	IP336	2.82		2.86	1412	D4294	2.77		1.84
446		----		----	1455	D2622	2.68		0.00
447	IP336	2.75		1.43	1501	D4294	2.608		-1.47
485		----		----	1586	D4294	2.80		2.45
494	D4294	2.726		0.94	1603	in house	2.664		-0.32
495	D4294	2.70		0.41	1616	D4294	2.39		-5.92
511		----		----	1635	D4294	1.78	C,G(0.01)	-18.37
527		----		----	1654	D4294	2.11	C,G(0.01)	-11.63
529		----		----	1669	D4294	2.609		-1.45
541	D4294	2.64		-0.81	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	D4294	2.71		0.61
574	D4294	2.55332		-2.58	1720		----		----
593	D4294	2.7745		1.93	1728		----		----
602		----		----	1749	D4294	2.650		-0.61
605	D4294	2.892		4.33	1759		----		----
606		----		----	1761	ISO8754	2.802		2.49
608	D4294	0.1095	G(0.01)	-52.47	1800		----		----
609	D4294	2.68		0.00	1810	D4294	2.47		-4.28
613		----		----	1811	D4294	2.710		0.61
657	D4294	2.69		0.21	1815	D7039Mod.	2.8		2.45
663	D5453	2.692		0.25	1842	D2622	2.52		-3.26
704	D4294	2.704		0.49	1928	ISO8754	2.39		-5.92
732	D4294	2.537		-2.92	1929	ISO8754	2.46		-4.49
739		----		----	1930		----		----
742		----		----	1950		----		----
749	D4294	2.76		1.64	1951	D4294	2.69		0.21
750	D4294	2.50		-3.67	2513	D4294	2.79		2.25
751	D4294	2.802		2.49	9050		----		----
752	D4294	2.73		1.02	9051		----		----
753	D4294	2.659		-0.43	9052		----		----
781	D4294	2.80		2.45	9053		----		----
862	D2622	2.727		0.96	9057		----		----
872	D4294	2.585		-1.94	9060		----		----
874	D4294	2.603		-1.57	9062		----		----
875	D4294	2.71		0.61	9063		----		----
902	D4294	2.385		-6.02	9064		----		----
962	D4294	2.59		-1.83	9132		----		----
963	D4294	2.558		-2.49	9146	D4294Mod.	2.7		0.41
970		----		----	9151		----		----
971	D4294	2.69		0.21	9152		----		----
974	D4294	2.69		0.21					
993	D4294	2.59		-1.83					
994	D4294	2.623		-1.16					

normality	not OK
n	85
outliers	5
mean (n)	2.6799
st.dev. (n)	0.10770
R(calc.)	0.3016
R(D4294:10)	0.1372

Lab 1635: first reported 2.07
 Lab 1654: first reported 2.32



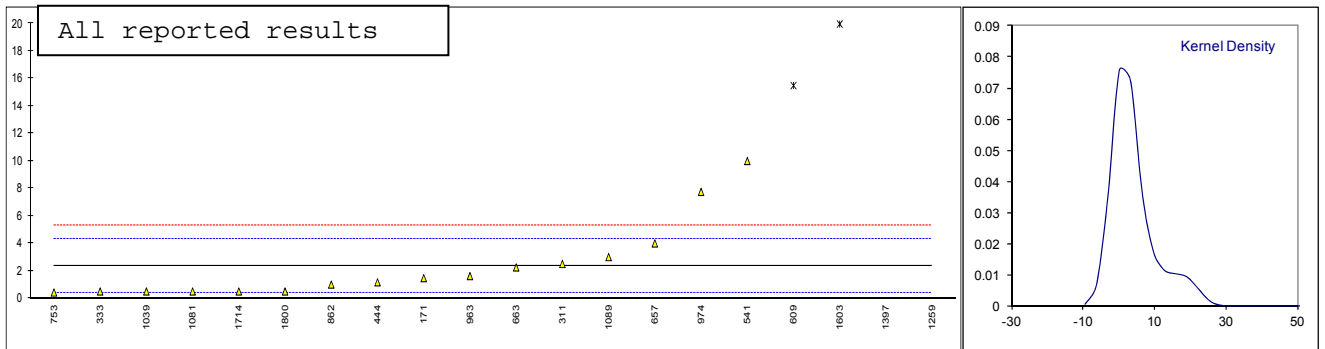
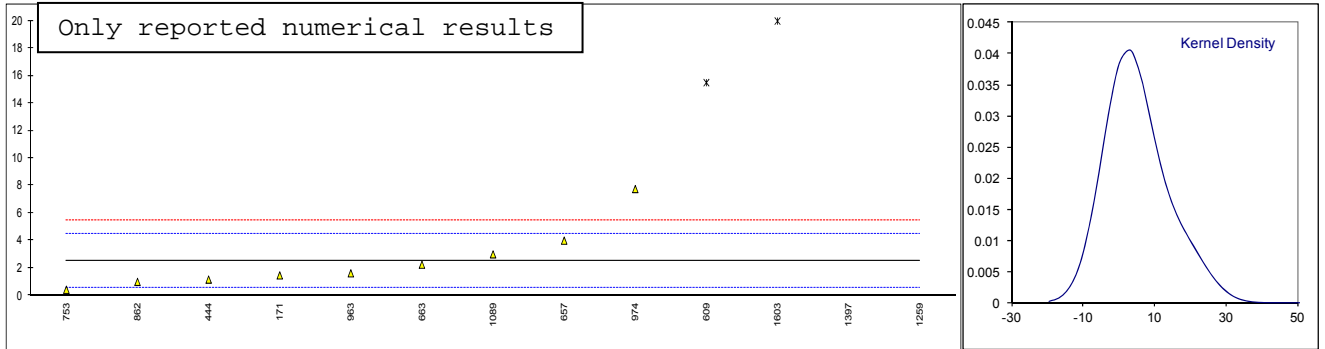
Determination of Total Mercury on sample #13198; results in µg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995		----		----
90		----		----	996		----		----
92		----		----	997		----		----
120		----		----	1011		----		----
131		----		----	1038		----		----
150		----		----	1039	UOP938	<1		----
154		----		----	1040		----		----
158		----		----	1056		----		----
159		----		----	1065		----		----
171	UOP938	1.4690		-1.06	1081	in house	<1		----
193		----		----	1089	in house	3		0.48
203		----		----	1090		----		----
213		----		----	1106		----		----
225		----		----	1108		----		----
238		----		----	1109		----		----
242		----		----	1148		----		----
273		----		----	1201		----		----
311	D7623	<5		----	1236		----		----
314		----		----	1243		----		----
332		----		----	1248		----		----
333	UOP938	<1		----	1259	in house	792.71	G(0.01)	796.36
334		----		----	1264		----		----
335		----		----	1287		----		----
340		----		----	1340		----		----
391		----		----	1345		----		----
398		----		----	1357		----		----
399		----		----	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442		----		----	1397	in house	196.56	G(0.01)	195.55
444	UOP938	1.165		-1.37	1403		----		----
445		----		----	1412		----		----
446		----		----	1455		----		----
447		----		----	1501		----		----
485		----		----	1586		----		----
494		----		----	1603	in house	19.97	DG(0.01)	17.59
495		----		----	1616		----		----
511		----		----	1635		----		----
527		----		----	1654		----		----
529		----		----	1669		----		----
541	EPA7473	<20		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	UOP938	<1		----
574		----		----	1720		----		----
593		----		----	1728		----		----
602		----		----	1749		----		----
605		----		----	1759		----		----
606		----		----	1761		----		----
608		----		----	1800	UOP938	<1		----
609	UOP938	15.4895	DG(0.01)	13.07	1810		----		----
613		----		----	1811		----		----
657	UOP938	4		1.49	1815		----		----
663	UOP938	2.25		-0.27	1842		----		----
704		----		----	1928		----		----
732		----		----	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951		----		----
750		----		----	2513		----		----
751		----		----	9050		----		----
752		----		----	9051		----		----
753	UOP938	0.4245		-2.11	9052		----		----
781		----		----	9053		----		----
862	UOP938	1.0		-1.53	9057		----		----
872		----		----	9060		----		----
874		----		----	9062		----		----
875		----		----	9063		----		----
902		----		----	9064		----		----
962		----		----	9132		----		----
963	UOP938	1.62		-0.91	9146		----		----
970		----		----	9151		----		----
971		----		----	9152		----		----
974	UOP938	7.75		5.27					
993		----		----					
994		----		----					

All results *)

normality	OK	not OK
n	9	16
outliers	4	4
mean (n)	2.52	2.35
st.dev. (n)	2.244	2.783
R(calc.)	6.28	7.79
R(Horwitz)	2.78	2.62
R(UOP938:10)	0.61	0.57

*) In the calculation of the mean, standard deviation, the reproducibility and in below graph, a reported value of <x is changed into x/2 (for example <1 into 0.5)

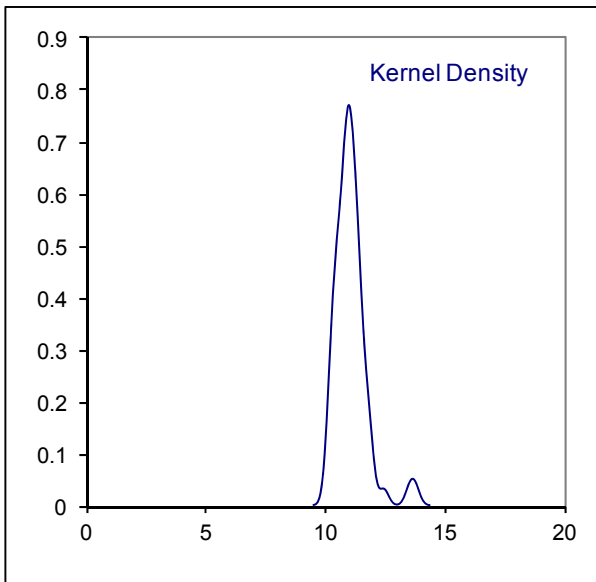
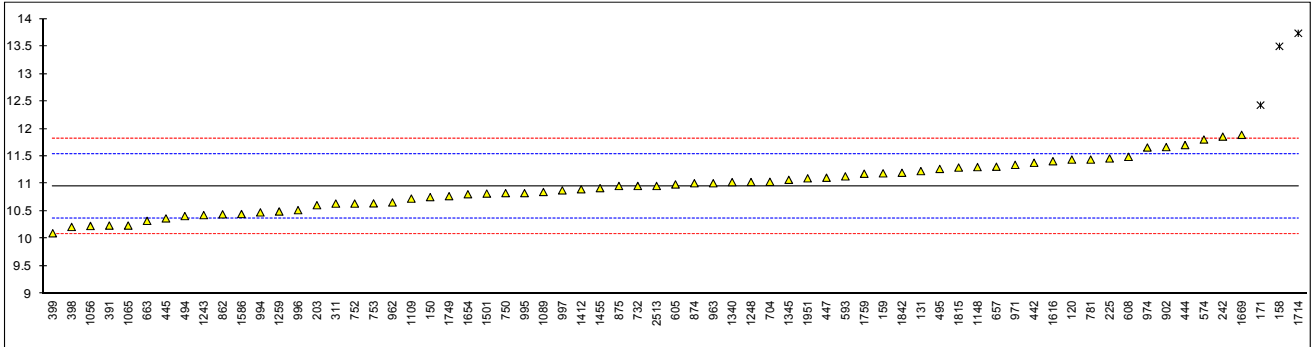


Determination of Kinematic Viscosity @ 40 °C on sample #13198; results in mm²/s

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62		----		----	995	D445	10.83		-0.44
90		----		----	996	D445	10.52		-1.51
92		----		----	997	D445	10.88		-0.26
120	D445	11.44		1.67	1011		----		----
131	D445	11.23		0.95	1038		----		----
150	D445	10.758		-0.68	1039		----		----
154		----		----	1040		----		----
158	D445	13.50	G(0.01)	8.79	1056	D445	10.232		-2.50
159	D445	11.19		0.81	1065	D445	10.24		-2.47
171	D445	12.43	G(0.01)	5.09	1081		----		----
193		----		----	1089	D445	10.85		-0.37
203	D445	10.61		-1.20	1090		----		----
213		----		----	1106		----		----
225	D445	11.46		1.74	1108		----		----
238		----		----	1109	D445	10.730		-0.78
242	D445	11.85719		3.11	1148	DIN53015	11.303		1.20
273		----		----	1201		----		----
311	D445	10.64		-1.09	1236		----		----
314		----		----	1243	D445	10.430		-1.82
332		----		----	1248	IP71Mod.	11.032		0.26
333		----		----	1259	ISO3104	10.4962		-1.59
334		----		----	1264		----		----
335		----		----	1287		----		----
340		----		----	1340	ISO3104	11.03		0.26
391	D445	10.24		-2.47	1345	D445	11.072		0.40
398	D445	10.215		-2.56	1357		----		----
399	D445	10.10		-2.96	1360		----		----
402		----		----	1365		----		----
441		----		----	1379		----		----
442	IP71	11.3825		1.47	1397		----		----
444	D445	11.704		2.58	1403		----		----
445	D445	10.37		-2.02	1412	D445	10.90		-0.19
446		----		----	1455	D445	10.92		-0.12
447	D445	11.11		0.53	1501	D7042	10.822		-0.46
485		----		----	1586	D445	10.45		-1.75
494	D445	10.412		-1.88	1603		----		----
495	D445	11.27		1.08	1616	D445	11.41		1.57
511		----		----	1635		----		----
527		----		----	1654	D445	10.810		-0.50
529		----		----	1669	D445	11.89		3.23
541		----		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	D445	13.7363	G(0.01)	9.60
574	D7042	11.805		2.93	1720		----		----
593	D445	11.135		0.62	1728		----		----
602		----		----	1749	ISO3104	10.7744		-0.63
605	D445	10.988		0.11	1759	in house	11.183		0.78
606		----		----	1761		----		----
608	D445	11.49		1.84	1800		----		----
609		----		----	1810		----		----
613		----		----	1811		----		----
657	D445	11.31	C	1.22	1815	ISO3104	11.295		1.17
663	D445	10.325		-2.18	1842	IP71	11.20		0.84
704	D445	11.036		0.28	1928		----		----
732	D445	10.96		0.01	1929		----		----
739		----		----	1930		----		----
742		----		----	1950		----		----
749		----		----	1951	D445	11.099		0.49
750	D445	10.83		-0.44	2513	D445	10.96		0.01
751		----		----	9050		----		----
752	D445	10.64		-1.09	9051		----		----
753	D445	10.644		-1.08	9052		----		----
781	D445	11.44		1.67	9053		----		----
862	D445	10.444		-1.77	9057		----		----
872		----		----	9060		----		----
874	D445	11.01		0.19	9062		----		----
875	D445	10.96		0.01	9063		----		----
902	D445	11.6675		2.46	9064		----		----
962	D445	10.66		-1.02	9132		----		----
963	D445	11.01		0.19	9146		----		----
970		----		----	9151		----		----
971	D445	11.344		1.34	9152		----		----
974	D445	11.66		2.43					
993		----		----					
994	D445	10.48		-1.64					

normality OK
 n 64
 outliers 3
 mean (n) 10.956
 st.dev. (n) 0.4426
 R(calc.) 1.239
 R(D445:12) 0.811

Lab 657: first reported 14.43

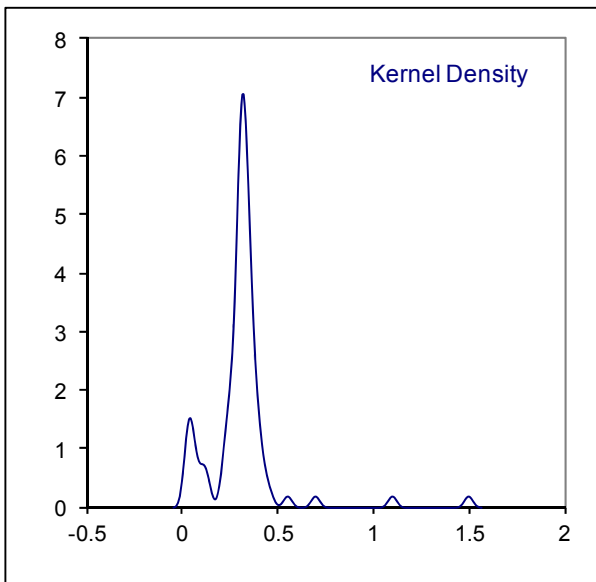
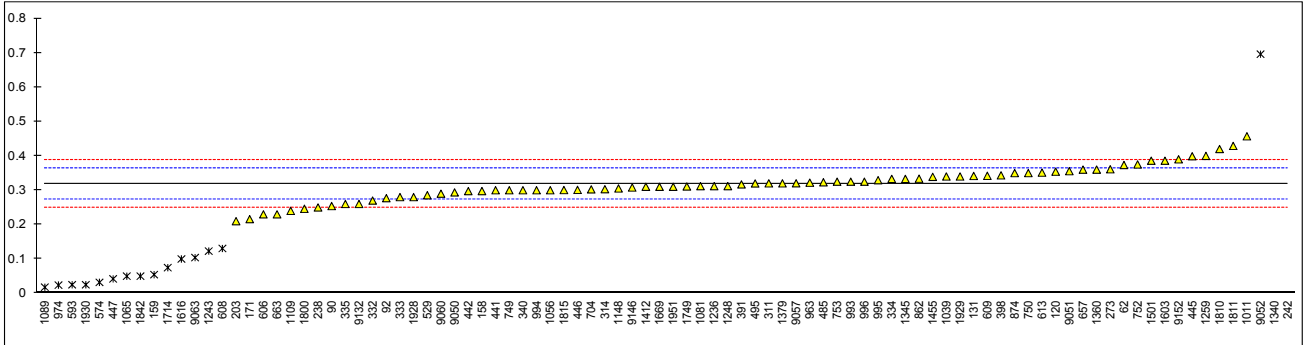


Determination of Water on sample #13198; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
62	D4377	0.3735		2.36	995	D6304	0.32923		0.45
90	D4928	0.254		-2.80	996	D4006	0.325		0.26
92	D4377	0.277		-1.81	997		----		----
120	D4377	0.354		1.52	1011	D4928	0.457		5.96
131	D4928	0.3416		0.98	1038		----		----
150		----		----	1039	D4928	0.34		0.91
154		----		----	1040		----		----
158	D4377	0.2976		-0.92	1056	D4377	0.30		-0.81
159	D4377	0.0544	ex	-11.41	1065	D4006	0.05	ex	-11.60
171	D4377	0.216		-4.44	1081	ISO12937	0.312		-0.30
193		----		----	1089	D4377	0.0178	ex	-12.99
203	D4928	0.21		-4.70	1090		----		----
213		----		----	1106		----		----
225		----		----	1108		----		----
238	D4006	0.250		-2.97	1109	D6304	0.24		-3.40
242	D4006	1.5	G(0.01)	50.96	1148	D4377	0.3053		-0.58
273	D4928	0.361		1.82	1201		----		----
311	D4928	0.32		0.05	1236	D4928	0.312		-0.30
314	D4928	0.303		-0.68	1243	D4377	0.123	ex	-8.45
332	D4377	0.27		-2.11	1248	D4377Mod.	0.312		-0.30
333	D4377	0.28		-1.68	1259	ISO9027	0.40		3.50
334	D4377	0.333		0.61	1264		----		----
335	D4377	0.26		-2.54	1287		----		----
340	D4377	0.30		-0.81	1340	ISO9030	1.10	G(0.01)	33.70
391	D4377	0.317		-0.08	1345	D4928	0.333		0.61
398	D4928	0.3433		1.05	1357		----		----
399		----		----	1360	D4377	0.36		1.77
402		----		----	1365		----		----
441	D4928	0.30		-0.81	1379	D4928	0.32		0.05
442	IP386	0.2975		-0.92	1397		----		----
444		----		----	1403	in house	<0.1		----
445	D4377	0.399		3.46	1412	D4928	0.31		-0.38
446	D4377	0.301		-0.77	1455	D4377	0.339		0.87
447	IP386	0.042	ex	-11.94	1501	D4928	0.386		2.90
485	D4377	0.3232		0.19	1586		----		----
494		----		----	1603	in house	0.386		2.90
495	D4377	0.3198		0.04	1616	D4006	0.1	ex	-9.44
511		----		----	1635		----		----
527		----		----	1654		----		----
529	D4377	0.2855		-1.44	1669	D4377	0.31		-0.38
541		----		----	1693		----		----
551		----		----	1695		----		----
557		----		----	1714	D4006	0.0746	ex	-10.54
574	D4377/E203	0.03201	ex	-12.37	1720		----		----
593	D4006	0.025	ex	-12.68	1728		----		----
602		----		----	1749	ISO12937	0.311		-0.34
605		----		----	1759		----		----
606	D4928	0.23		-3.83	1761		----		----
608	D4377	0.1305	ex	-8.13	1800	D4377	0.246		-3.14
609	D4377	0.342		1.00	1810	D4377	0.42		4.36
613	D4928	0.3514		1.40	1811	D4377	0.429		4.75
657	D4377	0.36		1.77	1815	ISO10337	0.3006		-0.79
663	D4928	0.230		-3.83	1842	D95	0.05	ex	-11.60
704	D4377	0.3026		-0.70	1928	D4377	0.28		-1.68
732		----		----	1929	D4377	0.34		0.91
739		----		----	1930	DIN51777	0.025	ex	-12.68
742		----		----	1950		----		----
749	INH-2477	0.30		-0.81	1951	D4377	0.31		-0.38
750	D95	0.35		1.34	2513		----		----
751		----		----	9050	INH-256	0.2938		-1.08
752	D4006	0.375		2.42	9051	INH-18	0.3556		1.59
753	D4006	0.325		0.26	9052	INH-18	0.6959	G(0.05)	16.27
781		----		----	9053		----		----
862	D4377	0.3336		0.64	9057	D4377	0.32028		0.06
872		----		----	9060	D4377	0.29		-1.24
874	D4006	0.350		1.34	9062		----		----
875		----		----	9063	INH-18	0.1040	ex	-9.27
902		----		----	9064		----		----
962		----		----	9132	D4928	0.26		-2.54
963	D4928	0.322		0.14	9146	D4377Mod.	0.308		-0.47
970		----		----	9151		----		----
971		----		----	9152	D4377	0.39		3.07
974	D4377	0.024	ex	-12.72					
993	D4006	0.325		0.26					
994	D4928	0.30		-0.81					

normality	OK		
n	75		
outliers	3	+ 14 excluded	<u>Spike</u>
mean (n)	0.3189		0.278 %V/V
st.dev. (n)	0.04782		
R(calc.)	0.1339		
R(D4377:11)	0.0649		

Ex = result excluded, see §4.1



APPENDIX 2**Number of participants per country**

1 lab in ALGERIA
1 lab in ARGENTINA
3 labs in AUSTRALIA
3 labs in AZERBAIJAN
1 lab in BOSNIA AND HERZEGOVINA
2 labs in BRAZIL
2 labs in BULGARIA
3 labs in CANADA
1 lab in COLOMBIA
1 lab in CONGO
1 lab in CÔTE D'IVOIRE
3 labs in CROATIA
2 labs in CZECH REPUBLIC
1 lab in ECUADOR
1 lab in EGYPT
5 labs in FRANCE
4 labs in GEORGIA
8 labs in GERMANY
1 lab in GREECE
1 lab in ISRAEL
4 labs in ITALY
1 lab in KAZAKHSTAN
1 lab in KOREA
1 lab in LATVIA
1 lab in LITHUANIA
5 labs in MALAYSIA
1 lab in MALTA
2 labs in MEXICO
1 lab in NEGARA BRUNEI DARUSSALAM
1 lab in NIGERIA
5 labs in NORWAY
3 labs in OMAN
1 lab in P.R. of CHINA
1 lab in PERU
2 labs in POLAND
1 lab in PORTUGAL
1 lab in QATAR
2 labs in ROMANIA
13 labs in RUSSIA
3 labs in SAUDI ARABIA
1 lab in SERBIA
1 lab in SINGAPORE
3 labs in SLOVAKIA
1 lab in SOUTH AFRICA
1 lab in SPAIN
1 lab in SUDAN
1 lab in SWEDEN
1 lab in THAILAND
9 labs in THE NETHERLANDS
2 labs in TURKEY
1 lab in TURKMENISTAN
2 labs in U.A.E.
10 labs in U.S.A.
1 lab in UKRAINE
17 labs in UNITED KINGDOM

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 different unit
W	= withdrawn on request participant
ex	= excluded from calculations
fr.	= first reported
n.a.	= not applicable
n.d.	= not determined
SDS	= Safety data Sheet

Literature

- 1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, January 2010
- 2 ASTM E178-02
- 3 ASTM E1301-03
- 4 ISO 13528-05
- 5 ISO 5725-86
- 6 ISO 5725, parts 1-6, 1994
- 7 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
- 8 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
- 9 IP 367/84
- 10 DIN 38402 T41/42
- 11 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
- 12 J.N. Miller, Analyst, 118, 455, (1993)
- 13 Analytical Methods Committee Technical brief, No4 February 2001.
- 14 The Royal Society of Chemistry 2002, Analyst 2002, 127 page 1359-1364, P.J. Lowthian and M. Thompson (see <http://www.rsc.org/suppdata/an/b2/b205600n/>).