

**Results of Proficiency Test
Crude Oil
November 2009**

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1998, the Institute for Interlaboratory Studies organized a proficiency test for Crude Oil every year. During the annual proficiency testing program 2009/2010, it was decided to continue the round robin for the analysis of Crude Oil. In this International Interlaboratory Study of the annual program, 128 laboratories from 47 different countries have participated. See appendix 2 for a list of participants in alphabetical country order. In this report, the results of the 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. In the regular Crude Oil round robin it was decided to send one sample of 1 litre (#0983), spiked with approx. 0.25% V/V water. 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 guide 43 and ILAC-G13-2007, (R007), since February 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This ensures 100% confidentiality of participant's data. In addition, customer's satisfaction is measured on a 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 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 was obtained from a local refinery. The approx. 200 litre sample was homogenised in a metal drum. After homogenisation, 163 subsamples were transferred to 1 L wide-neck transparent colourless glass bottles and labelled #0983. The homogeneity of the subsamples was checked by determination of Density in accordance

ASTM D5002:05 and Water in accordance with ASTM D 4928:05 of 6 stratified random selected samples.

	Density @ 15 °C in kg/L	Water in %M/M
Sample #0983-1	0.85842	0.023
Sample #0983-2	0.85838	0.024
Sample #0983-3	0.85841	0.024
Sample #0983-4	0.85836	0.023
Sample #0983-5	0.85838	0.022
Sample #0983-6	0.85843	0.022

Table 1: Homogeneity tests of subsample #0983

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
r sample #0983	0.00008	0.003
reference method	ASTM D5002:05	ASTM D4377:06
0.3*R(reference method)	0.00106	0.008

Table 2: Repeatabilities of subsamples #0983

The calculated repeatabilities were less than 0.3 times the respective reproducibilities of the reference methods. Therefore, homogeneity of the subsamples #0983 was assumed.

Due to the low water content (0.023 %M/M) each one litre subsample was enriched with 2.6 mL water (= 0.30 %M/M).

To each of the participating laboratories one bottle of 1 L (labelled #0983) was sent on October 14, 2009. Because of the fact that it was not possible to get brown coloured wide-neck glass bottles, 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 (Upper and Lower), 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 and the

standard methods were printed, was sent together with each sample. In addition, 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 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.

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; nr.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:

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

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 Cotê D'Ivoire, Ecuador, Gabon, Jordan, Malaysia, Mexico, Nigeria, Russia, U.S.A., Ukraine 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 103 laboratories submitted 695 numerical results. Observed were 46 outlying results, which is 6.6 % of all 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 Density @ 15°C, API Gravity, Light Ends (C6), Upper and Lower Pour Point, Sediment ASTM D 473 (%V/V) and Water 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.

Acid Number (Total): This determination is not problematic. Two statistical outliers and were observed. However, the calculated reproducibility, after rejection of the statistical outliers, is in good agreement with the requirements of ASTM D664:09. One result was excluded as the test method ASTM D974 is not equivalent to ASTM D664.

BSW: This determination is problematic. One statistical outlier and four false negatives were observed. However, the calculated reproducibility, after rejection of the statistical outlier, is not at all in agreement with the requirements of ASTM D4007:06.

Density: This determination is not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is, in good agreement with the requirements of ASTM D5002:05. Some participants used ASTM D4052 / IP365, although in the scope of these methods is mentioned that ASTM D5002 is to be used for crude oil (see eg. §1.2 of ASTM D4052:02e1).

API Gravity: This determination is not problematic. Three statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is in good agreement with the requirements of ASTM D287:06.

Light Ends: This determination may be problematic. In total thirteen statistical outliers were observed. All calculated reproducibilities, except for Light Ends C6 and Total C1-C6, are, after rejection of the statistical outliers, in agreement with the requirements of IP344:04. Light Ends C6 seems to be divided bimodally. Therefore no significant conclusions were drawn. However, the large spread for Light Ends C6 and Total C1-C6, might be explained by the variety of test methods used. The test methods may have different definitions of Light Ends C6.

Pour Point, Upper (Maximum): This determination is very problematic for this group of participants. It is noticed that the reported values are to be divided into two groups. One group of 10 participants reported a numerical result with a consensus value of -25.8 °C. The second group of 21 participants reported "less than -36°C". Furthermore, seven results had to be excluded as the reported test methods, ASTM D97 and ASTM D5950, are not suitable for Crude Oil (see scope of the test method). Two other results were excluded as the reported value was out of the application

range of ASTM D5853. Crucial for this determination are the pre-treatment steps: eg pre-heating and 24 hrs stabilization time at room temperature. Each participant has to verify the procedure used. Strict adherence to the test method is necessary.

Pour Point, Lower (Minimum): This determination is not problematic. Only four participants reported a numerical result with a consensus value of -35.8°C, while 18 participants reported "less than -36°C". Three results were excluded, as the reported test methods, ASTM D97 and ASTM D5950, are not suitable for Crude Oil (see the scope of the test method). One other result was excluded as the reported value was out of the application range of ASTM D5853. Each participant has to verify the procedure used. Strict adherence to the test method is necessary.

Salt as NaCl: This determination is problematic for only one laboratory. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the statistical outlier, is in agreement with the requirements of ASTM D3230:08, but not with the requirements of ASTM D6470:04. In the new coming version of ASTM D3230, ASTM D6470 will be mentioned as referee method in case of dispute.

Sediment:
ASTM D4807 The determination of sediment in accordance with ASTM D 4807:05e1 is problematic. No statistical outliers but two false negative results were observed. The calculated reproducibility does not meet the requirements of ASTM D 4807:05e1. The results seem to be divided trimodally. The large spread may be explained by differences in executing of the method: eg. using of an unheated funnel, a wrong filter or not well rinsing of the filter.

Sediment:
ASTM D473: The determination of sediment in accordance with ASTM D 473:07 is problematic for one laboratory. Four statistical outliers were observed. However, the calculated reproducibility, after rejection of the statistical outliers, is in good agreement with the requirements of ASTM D 473:07.

Sulphur: This determination is very problematic. Eight statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers, is not in agreement with the requirements of ASTM D4294:08a. When the ASTM D4294 and ASTM D2622 results were evaluated separately, both calculated reproducibilities were not in agreement with the requirements of the respective test method.

Mercury: This determination may be problematic. Regretfully in UOP938, no precision data is mentioned, therefore the precision data calculated using the Horwitz equation is used. No statistical outliers but two false negative results were observed. The calculated reproducibility is not at all in agreement with the strict estimated reproducibility, calculated using the Horwitz equation.

Kin.Visc.@40°C: This determination is very problematic. Four statistical outliers were observed and the calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the requirements of ASTM D 445:06. The large spread may be explained by loss of light ends prior to or during measurements. Especially with automated equipment.

Water: Serious analytical problems have been observed. The samples were spiked with water, therefore the minimal water concentration to be found was known (added amount = 0.30%M/M = 0.25%V/V). The laboratories should be able to find at least 0.19%V/V [$0.25\%V/V_{(\text{added amount})} - 0.06\%V/V_{(R\ D4377)}$]. However, 11 of 77 laboratories reported lower amounts than 0.19%V/V and were rejected prior to data analysis. The reason for the low water concentrations found is possibly insufficient homogenisation of the sample by the respective laboratory prior to sub sampling for analysis. After excluding, one statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirements of ASTM D 4377:06. When ASTM D4377, D4928 and D4006 are evaluated separately, all three calculated reproducibilities are not in agreement with the requirements of the respective standards.

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	32	0.0746	0.0812	0.1513
BSW	%V/V	27	0.280	0.354	0.280
Density @ 15°C	kg/L	92	0.85905	0.00160	0.00354
API Gravity		58	33.131	0.342	0.500
C1 Light Ends	%M/M	3	<0.01	unknown	unknown
C2 Light Ends	%M/M	7	0.003	0.002	unknown
C3 Light Ends	%M/M	14	0.153	0.032	0.032
C4 Light Ends	%M/M	13	0.860	0.074	0.114
C5 Light Ends	%M/M	13	2.232	0.241	0.230
C6 Light Ends	%M/M	13	unknown	unknown	unknown
C1-C6 Light Ends	%M/M	13	6.102	0.840	0.519
Pour Point, Upper	°C	10	unknown	unknown	unknown
Pour Point, Lower	°C	4	-35.3	4.2	22.0
Salt as NaCl	mg/kg	50	6.19	7.92	10.91
Sediment (D4807)	%M/M	30	0.0156	0.0253	0.0147
Sediment (D473)	%V/V	42	0.0056	0.0072	0.0344
Total Sulphur	%M/M	68	1.892	0.189	0.110
Total Mercury	mg/kg	11	53.2	30.7	13.1
Kinematic Viscosity @ 40°C	mm ² /s	48	5.9498	0.7415	0.4403
Water	%V/V	65	0.339	0.171	0.066

Table 3: Reproducibilities of the tests methods for sample #0983

Without further statistical calculations it can be concluded that for almost all the 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 2009 WITH PREVIOUS PTS

	<i>November 2009</i>	<i>November 2008</i>	<i>December 2007</i>	<i>November 2006</i>
Number of reporting labs	103	80	81	77
Number of results reported	695	551	578	446
Statistical outliers	48	31	38	28
Percentage outliers	6.9%	5.6%	6.6%	6.3%

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 2009</i>	<i>November 2008</i>	<i>December 2007</i>	<i>November 2006</i>
Total Acid Number	++	n.e.	n.e.	n.e.
BSW	--	n.e.	n.e.	n.e.
Density @ 15°C	++	++	++	++
API Gravity	++	++	++	++
Light Ends (C1-C6)	++	--	--	--
Pour Point, Upper	n.a.	--	++	n.e.
Pour Point, Lower	n.a.	--		
Salt as NaCl	++	+/-	++	+/-
Sediment (D4807)	--	-	--	--
Sediment (D473)	++	++	++	++
Sulphur	--	+	++	--
Mercury	--	(-)	(--)	n.e.
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

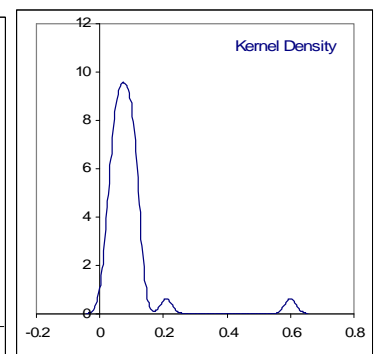
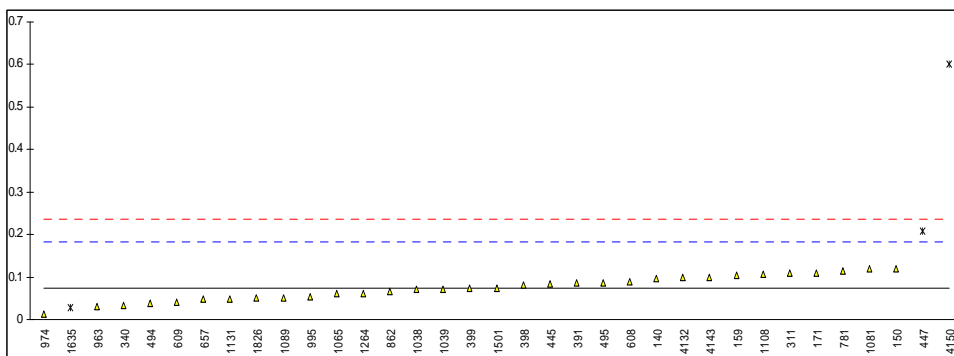
APPENDIX 1

Determination of Total Acid Number on sample #0983; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140	D664	0.097		0.41	
150	D664	0.12		0.84	
154		----		----	
158		----		----	
159	D664	0.105		0.56	
171	D664	0.11		0.66	
175		----		----	
180		----		----	
193		----		----	
195	D664	NIL		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D664	0.11		0.66	
314		----		----	
333		----		----	
334		----		----	
340	D664	0.032		-0.79	
360		----		----	
375		----		----	
391	D664	0.085		0.19	
398	D664	0.081		0.12	
399	D664	0.073		-0.03	
441		----		----	
442		----		----	
445	D664	0.084		0.17	
446		----		----	
447	D664	0.209	G(0.01)	2.48	
463		----		----	
494	D664	0.039		-0.66	
495	D664	0.085		0.19	
529		----		----	
593		----		----	
602		----		----	
608	D664	0.088		0.25	
609	D664	0.040		-0.64	
613		----		----	
657	D664	0.049		-0.47	
663		----		----	
704		----		----	
732		----		----	
733		----		----	
751		----		----	
752		----		----	
759		----		----	
781	D664	0.115		0.75	
784		----		----	
862	D664	0.0668		-0.14	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963	D664	0.0316		-0.79	
974	D664	0.012		-1.16	
994		----		----	
995	D664	0.0525		-0.41	
996		----		----	
1023		----		----	
1038	D664	0.07		-0.08	
1039	D664	0.07		-0.08	
1056		----		----	
1065	D664	0.0599		-0.27	
1081	D664	0.12	C	0.84	First reported 124
1089	D664	0.05		-0.45	
1106		----		----	
1108	D664	0.106		0.58	
1109		----		----	
1131	D664	0.049		-0.47	

1140		----		----
1148		----		----
1236		----		----
1248		----		----
1264	D664	0.0609		-0.25
1301		----		----
1501	D664	0.074		-0.01
1603		----		----
1613		----		----
1635	D974	0.0267	ex	-0.88
1658		----		----
1720		----		----
1728		----		----
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826	D664	0.05		-0.45
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
4131		----		----
4132	D664	0.1		0.47
4134		----		----
4136		----		----
4138		----		----
4139		----		----
4141		----		----
4143	D664	0.1		0.47
4145		----		----
4147		----		----
4150	D664	0.6	G(0.01)	9.71
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114		----		----
9119		----		----

normality OK
n 32
outliers 2
mean (n) 0.0746
st.dev. (n) 0.02899
R(calc.) 0.0812
R(D664:09) 0.1515

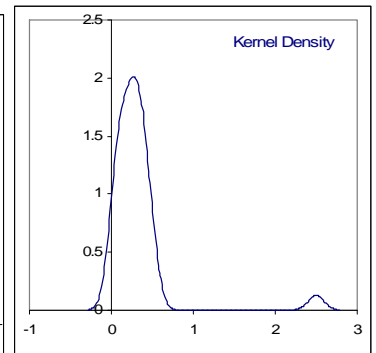
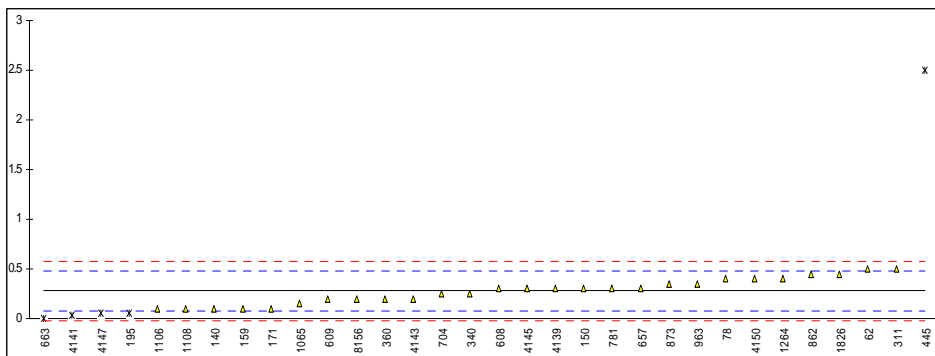


Determination of BSW on sample #0983; results in%V/V

lab	method	value	mark	z(targ)	remarks
62	D4007	0.50		2.20	
78	D4007	0.40		1.20	
90		----		----	
92		----		----	
140	D4007	0.10		-1.80	
150	D4007	0.30		0.20	
154		----		----	
158		----		----	
159	D4007	0.10		-1.80	
171	D4007	0.10		-1.80	
175		----		----	
180		----		----	
193		----		----	
195	D4007	0.05	ex	-2.30	False negative?
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D4007	0.50		2.20	
314		----		----	
333		----		----	
334		----		----	
340	D4007	0.253		-0.27	
360	D4007	0.20		-0.80	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
441		----		----	
442		----		----	
445	D4007	2.50	G(0.01)	22.20	
446		----		----	
447		----		----	
463		----		----	
494		----		----	
495		----		----	
529		----		----	
593		----		----	
602		----		----	
608	D4007	0.30		0.20	
609	D4007	0.20		-0.80	
613		----		----	
657	D4007	0.30		0.20	
663	D4007	0.00	ex	-2.80	Zero is not a real value, False negative?
704	D4007	0.25		-0.30	
732		----		----	
733		----		----	
751		----		----	
752		----		----	
759		----		----	
781	D4007	0.30		0.20	
784		----		----	
862	D4007	0.45		1.70	
873	D4007	0.35		0.70	
874		----		----	
875		----		----	
904		----		----	
963	D4007	0.35		0.70	
974		----		----	
994		----		----	
995		----		----	
996		----		----	
1023	D4007	<0.025		----	False negative?
1038		----		----	
1039		----		----	
1056		----		----	
1065	D4007	0.15		-1.30	
1081		----		----	
1089		----		----	
1106	D4007	0.10		-1.80	
1108	D4007	0.1		-1.80	
1109		----		----	
1131		----		----	

1140		----		----	
1148		----		----	
1236		----		----	
1248		----		----	
1264	D4007	0.4		1.20	
1301		----		----	
1501		----		----	
1603		----		----	
1613		----		----	
1635		----		----	
1658		----		----	
1720		----		----	
1728		----		----	
1800		----		----	
1810		----		----	
1811		----		----	
1815		----		----	
1826	D4007	0.45		1.70	
1833		----		----	
1842		----		----	
1928		----		----	
1929		----		----	
1930		----		----	
4131		----		----	
4132		----		----	
4134		----		----	
4136		----		----	
4138		----		----	
4139	D4007	0.3		0.20	
4141	D4007	0.03	ex	-2.50	False negative?
4143	D4007	0.2		-0.80	
4145	D4007	0.3		0.20	
4147	D4007	0.05	ex	-2.30	False negative?
4150	D4007	0.4		1.20	
4158		----		----	
4159		----		----	
4166		----		----	
4167		----		----	
8156	D4007	0.2		-0.80	
8160		----		----	
9114		----		----	
9119		----		----	

normality OK
n 27
outliers 1
mean (n) 0.280
st.dev. (n) 0.1265
R(calc.) 0.354
R(D4007:06) 0.280

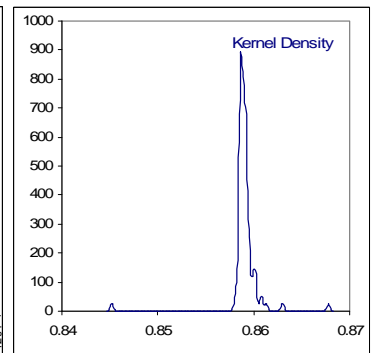
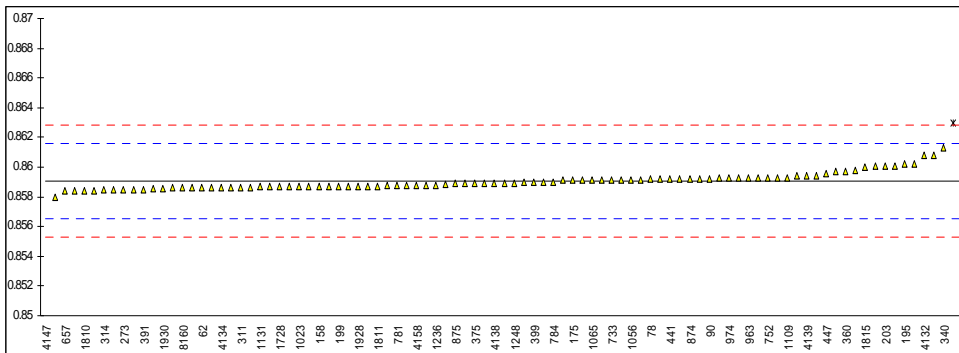


Determination of Density @ 15°C on sample #0983; results in kg/L

lab	method	value	mark	z(targ)	remarks
62	D4052	0.8586	C	-0.36	First reported 858.6
78	D4052	0.85919		0.11	
90	D5002	0.8592		0.12	
92	D5002	0.8592		0.12	
140		-----		-----	
150		-----		-----	
154		-----		-----	
158	D5002	0.8587	C	-0.28	First reported 858.7
159	D4052	0.8630	CG(0.01)	3.12	First reported 863.0
171		-----		-----	
175	D4052	0.8591		0.04	
180		-----		-----	
193		-----		-----	
195	D4052	0.8602	C	0.91	First reported 0.8621
199	D5002	0.8587		-0.28	
203	D1298	0.8601		0.83	
225		-----		-----	
238		-----		-----	
273	D5002	0.8585		-0.44	
311	D5002	0.8586		-0.36	
314	D5002	0.85847		-0.46	
333	D5002	0.8590		-0.04	
334	D4052	0.8585		-0.44	
340	D5002	0.86132	C	1.79	First reported 861.32
360	D5002	0.8597		0.51	
375	D1298	0.8589		-0.12	
391	D5002	0.8585		-0.44	
398	D4052	0.8589	C	-0.12	First reported 858.9
399	D1298	0.8590		-0.04	
441	D4052	0.8592		0.12	
442	D5002	0.8586		-0.36	
445	D5002	0.8587		-0.28	
446	D5002	0.8591		0.04	
447	D5002	0.8596		0.43	
463		-----		-----	
494	D5002	0.85855		-0.40	
495	D4052	0.8587		-0.28	
529		-----		-----	
593	D4052	0.8593		0.19	
602		-----		-----	
608	D5002	0.8601		0.83	
609	D5002	0.8591		0.04	
613	D1298	0.85859	C	-0.37	First reported 0.8607
657	D5002	0.8584		-0.52	
663	D5002	0.8584		-0.52	
704	D5002	0.8584		-0.52	
732	D5002	0.8589		-0.12	
733	D1250	0.8591		0.04	
751	D1298	0.8592		0.12	
752	D5002	0.8593		0.19	
759	D5002	0.8588		-0.20	
781	D5002	0.8588		-0.20	
784	D5002	0.8590		-0.04	
862	D5002	0.85944		0.31	
873	D5002	0.8591		0.04	
874	D1298	0.8592		0.12	
875	D5002	0.8589		-0.12	
904	D5002	0.8587		-0.28	
963	D4052	0.8593		0.19	
974	D5002	0.8593		0.19	
994	D5002	0.8589		-0.12	
995	D5002	0.8593		0.19	
996	D1298	0.8587		-0.28	
1023	D5002	0.8587		-0.28	
1038	D5002	0.8585		-0.44	
1039	D5002	0.85865		-0.32	
1056	D5002	0.8591		0.04	
1065	D5002	0.8591		0.04	
1081	ISO12185	0.8594		0.27	
1089	D5002	0.8593		0.19	
1106	D1298	0.8602		0.91	
1108	D5002	0.85874		-0.25	
1109	D5002	0.8593		0.19	
1131	D5002	0.85866		-0.31	

1140		-----		-----
1148	D5002	0.85868		-0.30
1236	D5002	0.85880		-0.20
1248	D5002	0.85893		-0.10
1264	D4052	0.8678	G(0.01)	6.92
1301		-----		-----
1501	D5002	0.85885		-0.16
1603	INHOUSE	0.8598		0.59
1613	D5002	0.8591		0.04
1635	D4052	0.8593		0.19
1658		-----		-----
1720	D1298	0.8586		-0.36
1728	D5002	0.85870		-0.28
1800	inhouse	0.8580		-0.83
1810	D5002	0.8584		-0.52
1811	D5002	0.8587		-0.28
1815	ISO91	0.86000		0.75
1826	D4052	0.8587		-0.28
1833		-----		-----
1842		-----		-----
1928	ISO12185	0.8587		-0.28
1929	ISO12185	0.8590		-0.04
1930	ISO12185	0.85858		-0.37
4131		-----		-----
4132	D1298	0.8608		1.38
4134	D5002	0.8586		-0.36
4136	D5002	0.8586		-0.36
4138	D5002	0.8589		-0.12
4139	D5002	0.8594		0.27
4141	D5002	0.8591		0.04
4143	D5002	0.8601		0.83
4145	D1298	0.8592		0.12
4147	D5002	0.8452	G(0.01)	-10.96
4150		-----		-----
4158	D1298	0.8588		-0.20
4159		-----		-----
4166		-----		-----
4167		-----		-----
8156	D5002	0.8597		0.51
8160	D5002	0.8586		-0.36
9114	DMA	0.8608		1.38
9119	D1298	0.8588		-0.20

normality not OK
n 92
outliers 3
mean (n) 0.85905
st.dev. (n) 0.000572
R(calc.) 0.00160
R(D5002:05) 0.00354

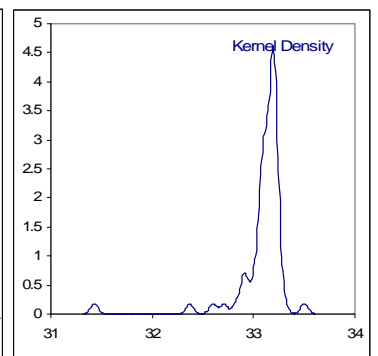
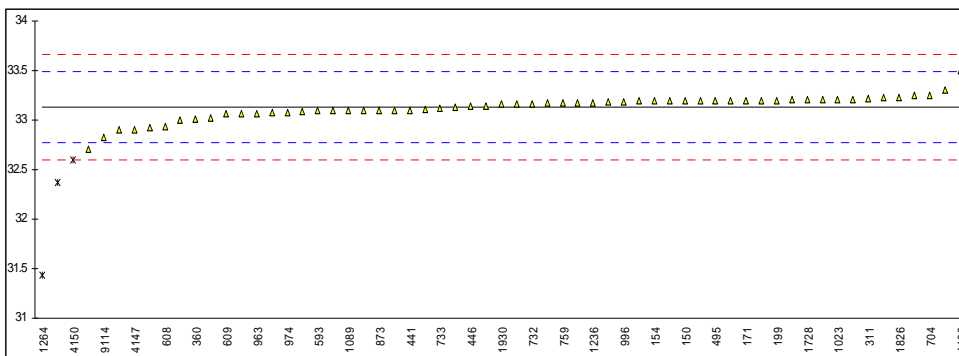


Determination of API Gravity on sample #0983;

lab	method	value	mark	z(targ)	remarks
62		----		----	
78	D4052	33.190		0.33	
90	D5002	33.11		-0.12	
92	D1298	33.2		0.39	
140	D287	33.0		-0.73	
150	D287	33.2		0.39	
154	D287	33.2		0.39	
158	D287	33.2		0.39	
159	D4052	32.37	G(0.01)	-4.26	
171	D287	33.2		0.39	
175	D4052	33.2		0.39	
180	D287	33.3		0.95	
193		----		----	
195	D287	32.9		-1.29	
199	D287	33.2		0.39	
203	Calculated	32.92		-1.18	
225		----		----	
238		----		----	
273		----		----	
311	D287	33.22		0.50	
314		----		----	
333		----		----	
334		----		----	
340	D287	32.71	C	-2.36	First reported 32.601
360	D5002	33.01		-0.68	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
441	D287	33.10		-0.17	
442	D287	33.2456		0.64	
445	Table 51	33.21		0.44	
446	D1250	33.14		0.05	
447		----		----	
463		----		----	
494	Inh-1393	33.23		0.56	
495	Calculated	33.20		0.39	
529	D287	33.2		0.39	
593	D287	33.1		-0.17	
602		----		----	
608	Calculated	32.93		-1.12	
609	D5002	33.06		-0.40	
613		----		----	
657		----		----	
663		----		----	
704	D1250	33.254		0.69	
732	In house	33.16		0.16	
733	D1250	33.12		-0.06	
751	Calculated	33.10		-0.17	
752	D1250	33.09		-0.23	
759	D1250	33.178		0.26	
781	D1250	33.178		0.26	
784		----		----	
862	D287	33.06		-0.40	
873	Converted	33.1		-0.17	
874	D1298	33.10		-0.17	
875		----		----	
904	D287	33.13		0.00	
963	Calculated	33.07		-0.34	
974	D1250	33.08		-0.28	
994	D1250	33.17		0.22	
995	Calculated	33.08		-0.28	
996	Calculated	33.19		0.33	
1023	Table 51	33.21		0.44	
1038		----		----	
1039		----		----	
1056		----		----	
1065		----		----	
1081		----		----	
1089	D287	33.1		-0.17	
1106		----		----	
1108	Calculated	33.21		0.44	
1109	D287	33.02		-0.62	
1131		----		----	

1140		----		----
1148		----		----
1236	D287	33.179		0.27
1248	In house	33.14		0.05
1264	D4052	31.43	G(0.01)	-9.52
1301		----		----
1501	D287	33.16		0.16
1603		----		----
1613	D287	33.207	C	0.43
1635		----		----
1658		----		----
1720	D287	33.2		0.39
1728	D1250	33.2073		0.43
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826	D287	33.23		0.56
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930	D287	33.16		0.16
4131		----		----
4132		----		----
4134		----		----
4136		----		----
4138		----		----
4139	D287	33.5		2.07
4141		----		----
4143	D287	33.1		-0.17
4145		----		----
4147	D287	32.9		-1.29
4150	D287	32.6	G(0.01)	-2.97
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114	D287	32.83		-1.68
9119		----		----

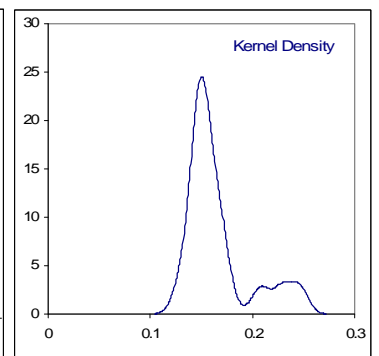
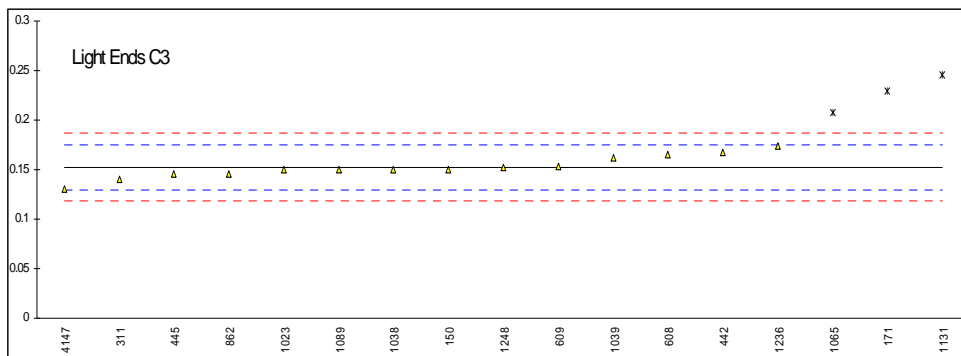
normality not OK
n 58
outliers 3
mean (n) 33.131
st.dev. (n) 0.1220
R(calc.) 0.342
R(D287:06) 0.500



Determination of Light ends [C1-C3] on sample #0983; results in%M/M

lab	method	C1	mark	Z(targ)	C2	mark	Z(targ)	C3	mark	Z(targ)
62		----		----	----		----	----		----
78		----		----	----		----	----		----
90		----		----	----		----	----		----
92		----		----	----		----	----		----
140		----		----	----		----	----		----
150	IP344	<0.01		----	<0.01		----	0.15		-0.22
154		----		----	----		----	----		----
158		----		----	----		----	----		----
159		----		----	----		----	----		----
171	IP344	<0.01		----	<0.01		----	0.229	DG(0.01)	6.71
175		----		----	----		----	----		----
180		----		----	----		----	----		----
193		----		----	----		----	----		----
195		----		----	----		----	----		----
199		----		----	----		----	----		----
203		----		----	----		----	----		----
225		----		----	----		----	----		----
238		----		----	----		----	----		----
273		----		----	----		----	----		----
311	Inh-267	<0.01		----	<0.01		----	0.14		-1.10
314		----		----	----		----	----		----
333		----		----	----		----	----		----
334		----		----	----		----	----		----
340		----		----	----		----	----		----
360		----		----	----		----	----		----
375		----		----	----		----	----		----
391		----		----	----		----	----		----
398		----		----	----		----	----		----
399		----		----	----		----	----		----
441		----		----	----		----	----		----
442	IP344	0.0002		----	0.0029		----	0.1673		1.29
445	IP344	<0.01		----	0.002	fr 0.022	----	0.146		-0.58
446		----		----	----		----	----		----
447		----		----	----		----	----		----
463		----		----	----		----	----		----
494		----		----	----		----	----		----
495		----		----	----		----	----		----
529		----		----	----		----	----		----
593		----		----	----		----	----		----
602		----		----	----		----	----		----
608	IP344	0.00087		----	0.0031		----	0.1651		1.10
609	IP344	0.0001		----	0.0026		----	0.1534		0.07
613		----		----	----		----	----		----
657		----		----	----		----	----		----
663		----		----	----		----	----		----
704		----		----	----		----	----		----
732		----		----	----		----	----		----
733		----		----	----		----	----		----
751		----		----	----		----	----		----
752		----		----	----		----	----		----
759		----		----	----		----	----		----
781		----		----	----		----	----		----
784		----		----	----		----	----		----
862	D6730	<0.01		----	<0.01		----	0.146		-0.58
873		----		----	----		----	----		----
874		----		----	----		----	----		----
875		----		----	----		----	----		----
904		----		----	----		----	----		----
963		----		----	----		----	----		----
974		----		----	----		----	----		----
994		----		----	----		----	----		----
995		----		----	----		----	----		----
996		----		----	----		----	----		----
1023	D5134	0	ex	----	0	ex	----	0.15		-0.22
1038	IP344	0	ex	----	0	ex	----	0.15		-0.22
1039	IP-PMDL	0	ex	----	0	ex	----	0.162		0.83
1056		----		----	----		----	----		----
1065	IP344	0	ex	----	0.004		----	0.208	G(0.01)	4.87
1081		----		----	----		----	----		----
1089	D5134	<0.01		----	<0.01		----	0.15		-0.22
1106		----		----	----		----	----		----
1108		----		----	----		----	----		----
1109		----		----	----		----	----		----
1131	Inh-13379	0	ex	----	0	ex	----	0.246	DG(0.01)	8.21

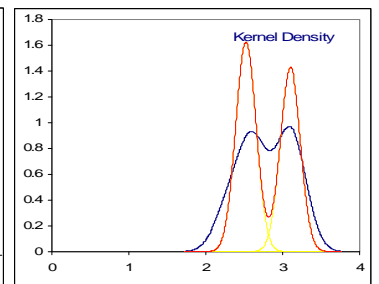
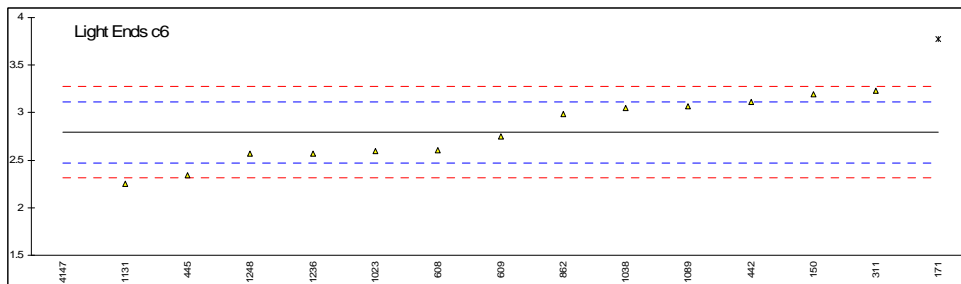
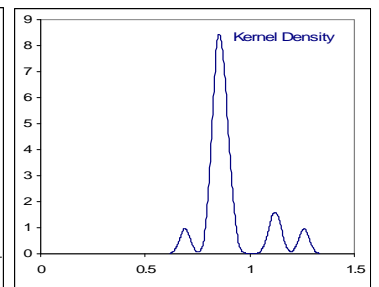
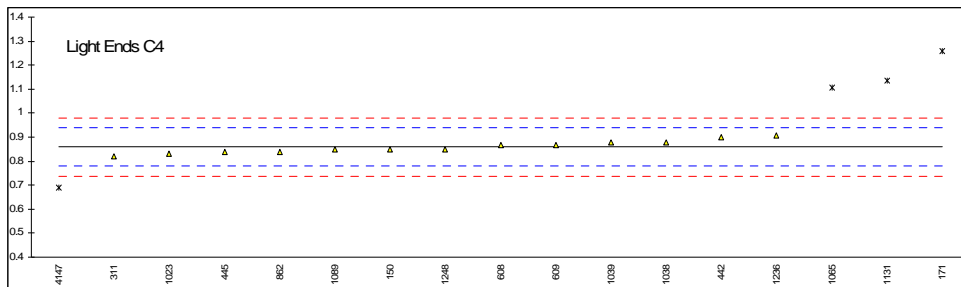
1140		----		----	----		----	----
1148		----		----	----		----	----
1236	D5134	0	ex	0.003		0.174	1.88	
1248	In house	0	ex	0.003		0.152	-0.05	
1264		----		----		----	----	
1301		----		----		----	----	
1501		----		----		----	----	
1603		----		----		----	----	
1613		----		----		----	----	
1635		----		----		----	----	
1658		----		----		----	----	
1720		----		----		----	----	
1728		----		----		----	----	
1800		----		----		----	----	
1810		----		----		----	----	
1811		----		----		----	----	
1815		----		----		----	----	
1826		----		----		----	----	
1833		----		----		----	----	
1842		----		----		----	----	
1928		----		----		----	----	
1929		----		----		----	----	
1930		----		----		----	----	
4131		----		----		----	----	
4132		----		----		----	----	
4134		----		----		----	----	
4136		----		----		----	----	
4138		----		----		----	----	
4139		----		----		----	----	
4141		----		----		----	----	
4143		----		----		----	----	
4145		----		----		----	----	
4147	IP344	0	ex	0.76	G(0.01)	0.13	-1.98	
4150		----		----		----	----	
4158		----		----		----	----	
4159		----		----		----	----	
4166		----		----		----	----	
4167		----		----		----	----	
8156		----		----		----	----	
8160		----		----		----	----	
9114		----		----		----	----	
9119		----		----		----	----	
normality		n.a.		OK		OK		
n		3		7		14		
outliers		0		1		3		
mean (n)		<0.01		0.0029		0.153		
st.dev. (n)		n.a.		0.00060		0.0114		
R(calc.)		n.a.		0.0017		0.032		
R(IP344:04)		n.a.		n.a.		0.032		



Determination of Light ends [C4-C6] on sample #0983; results in%M/M

lab	method	C4	mark	Z(targ)	C5	mark	Z(targ)	C6	mark	Z(targ)
62		----		----	----		----	----		----
78		----		----	----		----	----		----
90		----		----	----		----	----		----
92		----		----	----		----	----		----
140		----		----	----		----	----		----
150	IP344	0.85		-0.24	2.29		0.70	3.19		2.46
154		----		----	----		----	----		----
158		----		----	----		----	----		----
159		----		----	----		----	----		----
171	IP344	1.260	DG(0.05)	9.87	2.811	DG(0.05)	7.05	3.773	CG(0.05)	6.09
175		----		----	----		----	----		----
180		----		----	----		----	----		----
193		----		----	----		----	----		----
195		----		----	----		----	----		----
199		----		----	----		----	----		----
203		----		----	----		----	----		----
225		----		----	----		----	----		----
238		----		----	----		----	----		----
273		----		----	----		----	----		----
311	Inh-267	0.82		-0.98	2.20		-0.39	3.23		2.71
314		----		----	----		----	----		----
333		----		----	----		----	----		----
334		----		----	----		----	----		----
340		----		----	----		----	----		----
360		----		----	----		----	----		----
375		----		----	----		----	----		----
391		----		----	----		----	----		----
398		----		----	----		----	----		----
399		----		----	----		----	----		----
441		----		----	----		----	----		----
442	IP344	0.8984		0.95	2.2805		0.59	3.1149		1.99
445	IP344	0.838		-0.54	2.449		2.64	2.345		-2.80
446		----		----	----		----	----		----
447		----		----	----		----	----		----
463		----		----	----		----	----		----
494		----		----	----		----	----		----
495		----		----	----		----	----		----
529		----		----	----		----	----		----
593		----		----	----		----	----		----
602		----		----	----		----	----		----
608	IP344	0.8665		0.16	2.1153		-1.42	2.6046		-1.18
609	IP344	0.8685		0.21	2.2172		-0.18	2.7455		-0.30
613		----		----	----		----	----		----
657		----		----	----		----	----		----
663		----		----	----		----	----		----
704		----		----	----		----	----		----
732		----		----	----		----	----		----
733		----		----	----		----	----		----
751		----		----	----		----	----		----
752		----		----	----		----	----		----
759		----		----	----		----	----		----
781		----		----	----		----	----		----
784		----		----	----		----	----		----
862	D6730	0.840		-0.49	2.226		-0.07	2.983		1.17
873		----		----	----		----	----		----
874		----		----	----		----	----		----
875		----		----	----		----	----		----
904		----		----	----		----	----		----
963		----		----	----		----	----		----
974		----		----	----		----	----		----
994		----		----	----		----	----		----
995		----		----	----		----	----		----
996		----		----	----		----	----		----
1023	D5134	0.83		-0.74	2.14		-1.12	2.60		-1.21
1038	IP344	0.88		0.50	2.29		0.70	3.05		1.59
1039	IP-PMDL	0.88		0.50	2.1849		-0.58	----		----
1056		----		----	----		----	----		----
1065	IP344	1.106	G(0.01)	6.07	2.664	DG(0.05)	5.26	----		----
1081		----		----	----		----	----		----
1089	D5134	0.85		-0.24	2.26		0.34	3.07		1.71
1106		----		----	----		----	----		----
1108		----		----	----		----	----		----
1109		----		----	----		----	----		----
1131	Inh-13379	1.136	DG(0.05)	6.81	2.583	G(0.05)	4.27	2.252		-3.38

1140		----		----		----		----		----
1148		----		----		----		----		----
1236	D5134	0.907		1.16	2.210		-0.27	2.572		-1.38
1248	In house	0.850		-0.24	2.155		-0.94	2.571		-1.39
1264		----		----		----		----		----
1301		----		----		----		----		----
1501		----		----		----		----		----
1603		----		----		----		----		----
1613		----		----		----		----		----
1635		----		----		----		----		----
1658		----		----		----		----		----
1720		----		----		----		----		----
1728		----		----		----		----		----
1800		----		----		----		----		----
1810		----		----		----		----		----
1811		----		----		----		----		----
1815		----		----		----		----		----
1826		----		----		----		----		----
1833		----		----		----		----		----
1842		----		----		----		----		----
1928		----		----		----		----		----
1929		----		----		----		----		----
1930		----		----		----		----		----
4131		----		----		----		----		----
4132		----		----		----		----		----
4134		----		----		----		----		----
4136		----		----		----		----		----
4138		----		----		----		----		----
4139		----		----		----		----		----
4141		----		----		----		----		----
4143		----		----		----		----		----
4145		----		----		----		----		----
4147	IP344	0.69	G(0.01)	-4.19	1.34	G(0.01)	-10.87	0.15	G(0.01)	-16.45
4150		----		----		----		----		----
4158		----		----		----		----		----
4159		----		----		----		----		----
4166		----		----		----		----		----
4167		----		----		----		----		----
8156		----		----		----		----		----
8160		----		----		----		----		----
9114		----		----		----		----		----
9119		----		----		----		----		----
	Normality	OK		OK			<u>All data:</u>	<u>Group 1</u>	<u>Group 2</u>	
	N	13		13			OK	not OK	OK	
	Outliers	4		4			13	7	6	
	mean (n)	0.860		2.232			2	0	0	
	st.dev. (n)	0.0263		0.0861			2.794	2.527	3.106	
	R(calc.)	0.074		0.241			0.3288	0.1692	0.0917	
	R(IP344:04)	0.114		0.230			0.921	0.474	0.257	
							0.450	0.450	0.450	

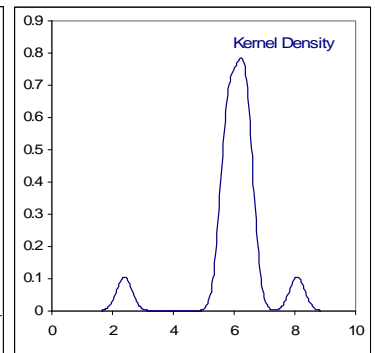
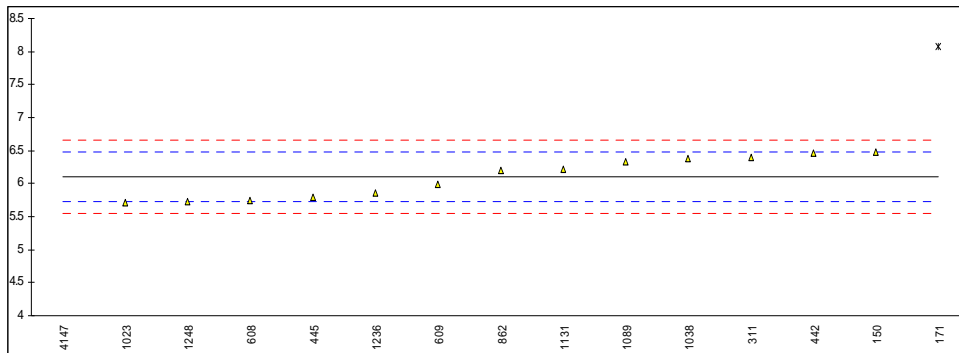


Determination of Light ends [Total C1-C6] on sample #0983; results in%M/M

lab	method	value	mark	z(targ)	Remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	IP344	6.48		2.04	
154		----		----	
158		----		----	
159		----		----	
171	IP344	8.076	CG(0.01)	10.65	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	Inh-267	6.40		1.61	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
360		----		----	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
441		----		----	
442	IP344	6.4642		1.96	
445	IP344	5.800		-1.63	
446		----		----	
447		----		----	
463		----		----	
494		----		----	
495		----		----	
529		----		----	
593		----		----	
602		----		----	
608	IP344	5.7512		-1.89	
609	IP344	5.9873		-0.62	
613		----		----	
657		----		----	
663		----		----	
704		----		----	
732		----		----	
733		----		----	
751		----		----	
752		----		----	
759		----		----	
781		----		----	
784		----		----	
862	D6730	6.195		0.50	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963		----		----	
974		----		----	
994		----		----	
995		----		----	
996		----		----	
1023	D5134	5.72		-2.06	
1038	IP344	6.38		1.50	
1039		----		----	
1056		----		----	
1065		----		----	
1081		----		----	
1089	D5134	6.33		1.23	
1106		----		----	
1108		----		----	
1109		----		----	
1131	Inh-13379	6.217		0.62	

1140		----		----
1148		----		----
1236	D5134	5.866		-1.27
1248	In house	5.731		-2.00
1264		----		----
1301		----		----
1501		----		----
1603		----		----
1613		----		----
1635		----		----
1658		----		----
1720		----		----
1728		----		----
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826		----		----
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
4131		----		----
4132		----		----
4134		----		----
4136		----		----
4138		----		----
4139		----		----
4141		----		----
4143		----		----
4145		----		----
4147	IP344	2.39	G(0.01)	-20.03
4150		----		----
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114		----		----
9119		----		----

normality OK
n 13
outliers 2
mean (n) 6.102
st.dev. (n) 0.3001
R(calc.) 0.840
R(IP344:04) 0.519



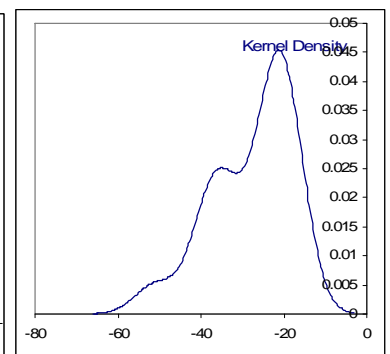
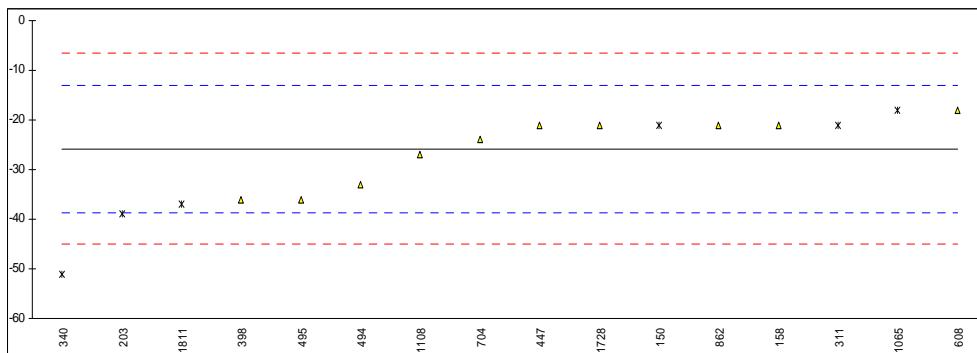
Determination of Upper (Maximum) Pour Point on sample #0983; results in °C

lab	method	value	mark	z(targ)	remarks
62	D5853A	<-36		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	D97	-21	ex	----	Result excluded, method not intended for Crude Oils
154		----		----	
158	D5853A	-21		----	
159		----		----	
171	D5853A	<-12		----	False positive?
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203	D97	-39	ex	----	Result excluded, method not intended for Crude Oils
225		----		----	
238		----		----	
273		----		----	
311	D5950	-21	ex	----	Result excluded, method not intended for Crude Oils
314		----		----	
333		----		----	
334		----		----	
340	D5950	-51	ex	----	Result excluded, method not intended for Crude Oils
360	D5853A	<-36		----	
375		----		----	
391	D5853A	<-36		----	
398	D5853A	-36		----	
399	D5853A	<-36		----	
441		----		----	
442		----		----	
445	D5853A	<-36		----	
446		----		----	
447	D5853A	-21		----	
463		----		----	
494	D5853A	-33		----	
495	D5853A	-36		----	
529		----		----	
593		----		----	
602		----		----	
608	D5853A	-18		----	
609		----		----	
613		----		----	
657	D5853A	<-36		----	
663	D97	<-24	ex	----	Result excluded, method not intended for Crude Oils
704	D5853A	-24		----	
732	D5853A	<-36		----	
733	D5853A	<-36		----	
751	D5853A	<-36		----	
752		----		----	
759	D5853A	<-36		----	
781	D5853A	<-36		----	
784		----		----	
862	D5853A	-21		----	
873		----		----	
874	D5853A	<-36		----	
875		----		----	
904		----		----	
963	D5853A	<-36		----	
974		----		----	
994	D5853A	<-36		----	
995	D5853A	<-36		----	
996	D5853A	<-36		----	
1023	D97	<-39	ex	----	Result excluded, method not intended for Crude Oils
1038	D5853A	<-21		----	
1039		----		----	
1056		----		----	
1065	D5950	-18	ex	----	Result excluded, method not intended for Crude Oils
1081		----		----	
1089	D5853A	<-45	ex	----	Result excluded, out of application range of method
1106		----		----	
1108	D5853A	-27		----	
1109		----		----	
1131		----		----	

1140		----		----
1148		----		----
1236		----		----
1248	D5853A	<-36		----
1264	D5853A	<-30		----
1301		----		----
1501	D5853A	<-36		----
1603		----		----
1613		----		----
1635		----		----
1658		----		----
1720	D5853A	<-36		----
1728	D5853A	-21		----
1800		----		----
1810		----		----
1811	D5853A	-37	ex	---- Result excluded, out of application range of method
1815		----		----
1826		----		----
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
4131		----		----
4132	D5853A	<-36		----
4134		----		----
4136		----		----
4138		----		----
4139		----		----
4141		----		----
4143		----		----
4145		----		----
4147	D5853A	<-28		----
4150	D5853A	<-36		----
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156	D5853A	<-30		----
8160		----		----
9114		----		----
9119		----		----

normality	not OK	unknown
n	10	21
outliers	0	0
mean (n)	-25.8	<-36
st.dev. (n)	6.81	n.a.
R(calc.)	19.1	n.a.
R(D5853:06)	18.0	n.a.

Application range of ASTM D5853 = down to -36 °C

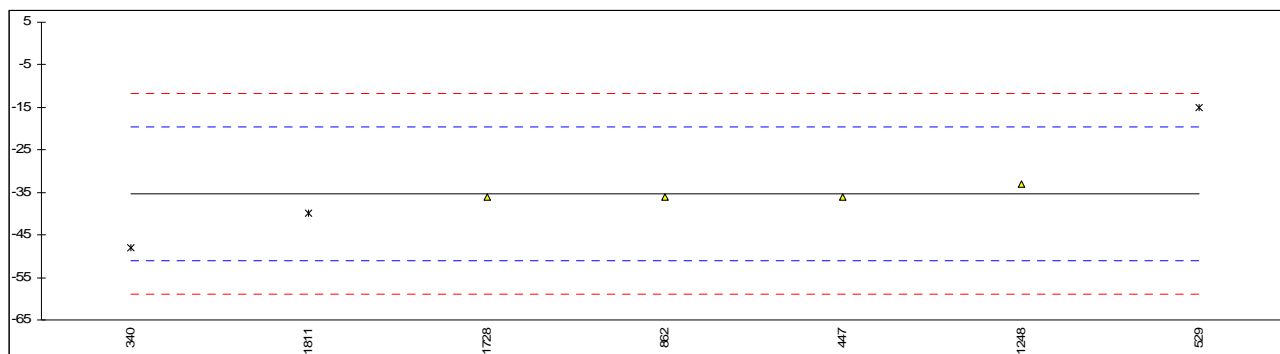


Determination of Lower (Minimum) Pour Point on sample #0983; results in °C

lab	method	value	mark	z(targ)	remarks
62	D5853B	<-36		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150		----		----	
154		----		----	
158		----		----	
159		----		----	
171		----		----	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311		----		----	
314		----		----	
333		----		----	
334		----		----	
340	D5950	-48	ex	----	Result excluded, method not intended for Crude Oils
360	D5853B	<-36		----	
375		----		----	
391	D5853B	<-36		----	
398	D5853B	<-36		----	
399	D5853B	<-36		----	
441		----		----	
442		----		----	
445	D5853B	<-36		----	
446		----		----	
447	D5853B	-36		----	
463		----		----	
494		----		----	
495		----		----	
529	D97	-15	ex	----	Result excluded, method not intended for Crude Oils
593		----		----	
602		----		----	
608	D5853B	<-36		----	
609		----		----	
613		----		----	
657	D5853B	<-36		----	
663		----		----	
704		----		----	
732	D5853B	<-36		----	
733	D5853B	<-36		----	
751		----		----	
752		----		----	
759		----		----	
781	D5853B	<-36		----	
784		----		----	
862	D5853B	-36		----	
873		----		----	
874	D5853B	<-36		----	
875		----		----	
904		----		----	
963	D5853B	<-36		----	
974		----		----	
994	D5853B	<-36		----	
995	D5853B	<-36		----	
996	D5853B	<-36		----	
1023	D97	<-39	ex	----	Result excluded, method not intended for Crude Oils
1038		----		----	
1039		----		----	
1056		----		----	
1065		----		----	
1081		----		----	
1089		----		----	
1106		----		----	
1108		----		----	
1109		----		----	
1131		----		----	

1140		----		----
1148		----		----
1236		----		----
1248	D5853B	-33		----
1264		----		----
1301		----		----
1501	D5853B	<-36		----
1603		----		----
1613		----		----
1635		----		----
1658		----		----
1720		----		----
1728	D5853B	-36		----
1800		----		----
1810		----		----
1811	D5853B	-40	ex	---- Result excluded, out of application range of method
1815		----		----
1826	D5853B	<-36		----
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
4131		----		----
4132		----		----
4134		----		----
4136		----		----
4138		----		----
4139		----		----
4141		----		----
4143		----		----
4145		----		----
4147		----		----
4150		----		----
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114		----		----
9119		----		----

normality	unknown	unknown
n	4	18
outliers	0	0
mean (n)	-35.3	<-36
st.dev. (n)	1.50	n.a.
R(calc.)	4.2	n.a.
R(D5853:06)	22.0	n.a.



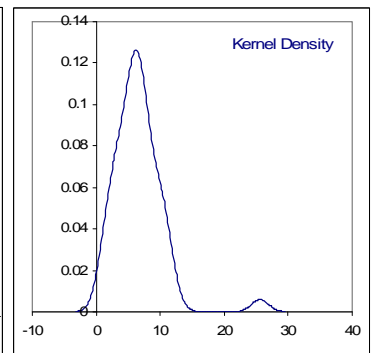
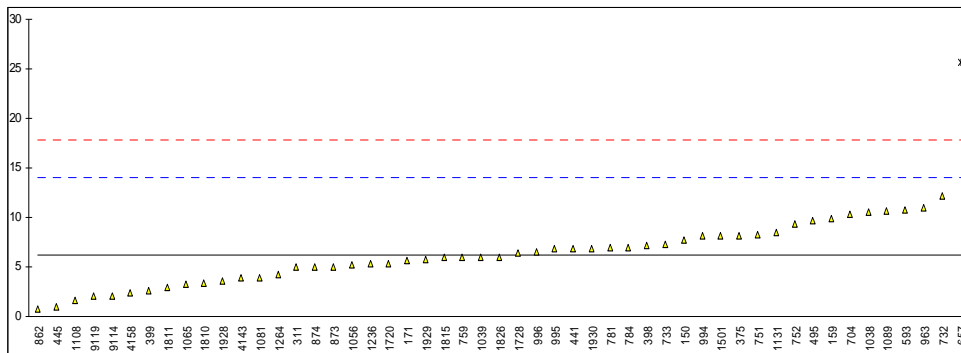
Determination of Salt as NaCl on sample #0983; results in mg/kg

lab	method	value	mark	z(targ)	Remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	D3230	7.7		0.39	
154		----		----	
158		----		----	
159	D3230	9.92		0.96	
171	D3230	5.648		-0.14	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D3230	5		-0.30	
314		----		----	
333		----		----	
334		----		----	
340	D3230	<5		<-0.30	
360		----		----	
375	D3230	8.19		0.51	
391		----		----	
398	D3230	7.2		0.26	
399	D3230	2.59		-0.92	
441	D3230	6.9		0.18	
442		----		----	
445	IP265	1		-1.33	
446		----		----	
447		----		----	
463		----		----	
494		----		----	
495	D3230	9.7		0.90	
529		----		----	
593	D3230	10.78		1.18	
602		----		----	
608		----		----	
609		----		----	
613		----		----	
657	IP265	25.6	CG(0.01)	4.98	First reported 22.1
663		----		----	
704	D3230	10.3		1.06	
732	Inh-21534	12.12		1.52	
733	Inh-21534	7.28		0.28	
751	D3230	8.3		0.54	
752	D3230	9.30		0.80	
759	D3230	5.98		-0.05	
781	D3230	6.98		0.20	
784	D3230	6.985		0.21	
862	D3230	0.8		-1.38	
873	D3230	5		-0.30	
874	D3230	5		-0.30	
875		----		----	
904		----		----	
963	D3230	10.968		1.23	
974		----		----	
994	D3230	8.1		0.49	
995	D3230	6.85		0.17	
996	D3230	6.5		0.08	
1023		----		----	
1038	D3230	10.5		1.11	
1039	D3230	6		-0.05	
1056	D3230	5.2		-0.25	
1065	D3230	3.3		-0.74	
1081	D3230	3.9		-0.59	
1089	D3230	10.7		1.16	
1106		----		----	
1108	D3230	1.6		-1.18	
1109		----		----	
1131	D3230	8.5		0.59	

1140		----	----
1148		----	----
1236	D3230	5.315	-0.22
1248		----	----
1264	D3230	4.23	-0.50
1301		----	----
1501	D3230	8.17	0.51
1603		----	----
1613		----	----
1635	D3230	<3.5	<-0.69
1658		----	----
1720	D3230	5.34	-0.22
1728	In house	6.4	0.05
1800		----	----
1810	D3230	3.4	-0.72
1811	D3230	2.95	-0.83
1815	D3230	5.97	-0.06
1826	D3230	6	-0.05
1833		----	----
1842		----	----
1928	In house	3.57	-0.67
1929	In house	5.78	-0.10
1930	DIN51576	6.9	0.18
4131		----	----
4132		----	----
4134		----	----
4136		----	----
4138		----	----
4139		----	----
4141		----	----
4143	D3230	3.9	-0.59
4145		----	----
4147		----	----
4150		----	----
4158	D3230	2.4	-0.97
4159		----	----
4166		----	----
4167		----	----
8156		----	----
8160		----	----
9114	Inh-21534	2.10	-1.05
9119	Inh-21534	2.10	-1.05

normality OK
n 50
outliers 1
mean (n) 6.19
st.dev. (n) 2.830
R(calc.) 7.92
R(D3230:08) 10.91

Compare R(D6470:04) = 5.19

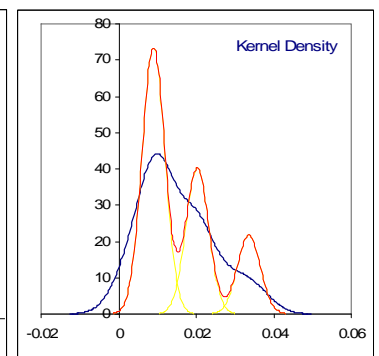
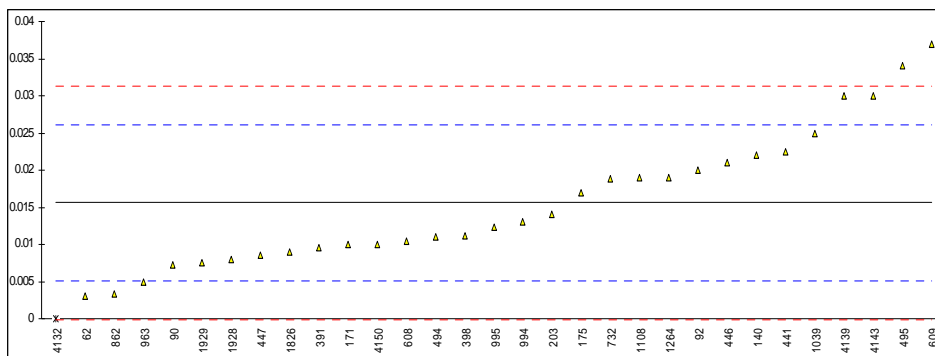


Determination of Sediment ASTM D4807 on sample #0983; results in %M/M

lab	method	value	mark	z(targ)	remarks
62	D4807	0.003		-2.40	
78		----		----	
90	D4807	0.0073		-1.58	
92	D4807	0.020		0.84	
140	D4807	0.022		1.22	
150		----		----	
154		----		----	
158		----		----	
159		----		----	
171	D4807	0.01		-1.07	
175	D4807	0.0170		0.26	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203	D4807	0.014		-0.31	
225		----		----	
238		----		----	
273		----		----	
311	D4807	<0.001		<-2.97	False negative?
314		----		----	
333		----		----	
334	D4807	<0.001		<-2.97	False negative?
340		----		----	
360		----		----	
375		----		----	
391	D4807	0.0096		-1.15	
398	D4807	0.0111		-0.86	
399		----		----	
441	D4807	0.0224		1.29	
442		----		----	
445		----		----	
446	D4807	0.021		1.03	
447	D4807	0.0086		-1.34	
463		----		----	
494	D4807	0.011		-0.88	
495	D4807	0.034		3.50	
529		----		----	
593		----		----	
602		----		----	
608	D4807	0.0105		-0.97	
609	D4807	0.0370		4.07	
613		----		----	
657		----		----	
663		----		----	
704		----		----	
732	D4807	0.0189		0.63	
733		----		----	
751		----		----	
752		----		----	
759		----		----	
781		----		----	
784		----		----	
862	D4807	0.0033		-2.35	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963	D4807	0.005		-2.02	
974		----		----	
994	D4807	0.0131		-0.48	
995	D4807	0.0123		-0.63	
996		----		----	
1023		----		----	
1038		----		----	
1039	D4807	0.0249		1.77	
1056		----		----	
1065		----		----	
1081		----		----	
1089		----		----	
1106		----		----	
1108	D4807	0.019		0.64	
1109		----		----	
1131		----		----	

1140		----		----
1148		----		----
1236		----		----
1248		----		----
1264	D4807	0.019		0.64
1301		----		----
1501		----		----
1603		----		----
1613		----		----
1635		----		----
1658		----		----
1720		----		----
1728		----		----
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826	D4807	0.009		-1.26
1833		----		----
1842		----		----
1928	In house	0.0080		-1.45
1929	In house	0.0075		-1.55
1930		----		----
4131		----		----
4132	D4807	0	ex	-2.98 Zero is not a real result
4134		----		----
4136		----		----
4138		----		----
4139	D4807	0.03		2.74
4141		----		----
4143	D4807	0.03		2.74
4145		----		----
4147		----		----
4150	D4807	0.01		-1.07
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114		----		----
9119		----		----

		<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>
normality	OK	OK	OK	n.a.
n	30	17	9	4
outliers	0	0	0	0
mean (n)	0.0156	0.0090	0.0205	0.0328
st.dev. (n)	0.00903	0.00313	0.00237	0.00340
R(calc.)	0.0253	0.0088	0.0066	0.0095
R(D4807:05e1)	0.0147	0.0112	0.0168	0.0213

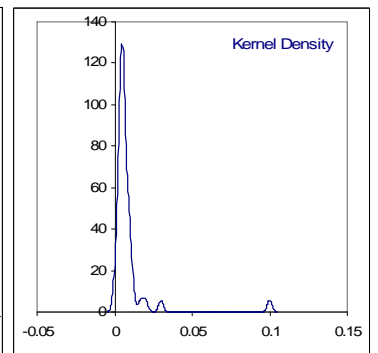
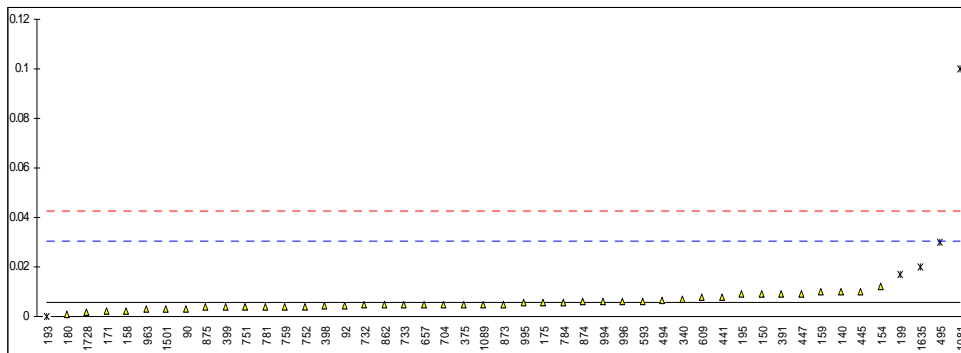


Determination of Sediment ASTM D473 on sample #0983; results in%V/V

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90	D473	0.0031		-0.21	
92	D473	0.0044		-0.10	
140	D473	0.01		0.35	
150	D473	0.009		0.27	
154	D473	0.0121		0.52	
158	D473	0.002	C	-0.30	First reported 0.02
159	D473	0.01		0.35	
171	D473	0.002		-0.30	
175	D473	0.0058		0.01	
180	D473	0.0008		-0.39	
193	D473	0	ex	-0.46	Zero not a real result
195	D473	0.009		0.27	
199	D473	0.017	G(0.01)	0.92	
203	D473	<0.01		----	
225		----		----	
238		----		----	
273	D473	<0.01		----	
311	D473	<0.01		----	
314		----		----	
333	D473	<0.01		----	
334		----		----	
340	D473	0.007		0.11	
360		----		----	
375	D473	0.005		-0.05	
391	D473	0.009		0.27	
398	D473	0.0042		-0.12	
399	D473	0.004		-0.13	
441	D473	0.008		0.19	
442		----		----	
445	D473	0.01		0.35	
446		----		----	
447	D473	0.009		0.27	
463		----		----	
494	D473	0.0065		0.07	
495	D473	0.03	G(0.01)	1.98	
529		----		----	
593	D473	0.0063		0.05	
602		----		----	
608	D473	<0.01		----	
609	D473	0.008		0.19	
613		----		----	
657	D473	0.005		-0.05	
663	D473	<0.01		----	
704	D473	0.005	C	-0.05	First reported 0.021
732	D473	0.0048		-0.07	
733	D473	0.005		-0.05	
751	D473	0.004		-0.13	
752	D473	0.0041		-0.13	
759	D473	0.004		-0.13	
781	D473	0.004		-0.13	
784	D473	0.0058		0.01	
862	D473	0.0049		-0.06	
873	D473	0.005		-0.05	
874	D473	0.006		0.03	
875	D473	0.0037		-0.16	
904		----		----	
963	D473	0.003		-0.22	
974		----		----	
994	D473	0.0061		0.04	
995	D473	0.0056		0.00	
996	D473	0.0062		0.05	
1023		----		----	
1038		----		----	
1039		----		----	
1056		----		----	
1065		----		----	
1081	In house	0.10	G(0.01)	7.67	
1089	D473	0.005		-0.05	
1106		----		----	
1108		----		----	
1109		----		----	
1131		----		----	

1140		----		----
1148		----		----
1236		----		----
1248		----		----
1264		----		----
1301		----		----
1501	D473	0.003		-0.22
1603		----		----
1613		----		----
1635	D473	0.02	G(0.01)	1.17
1658		----		----
1720		----		----
1728	D473	0.00173		-0.32
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826		----		----
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
4131		----		----
4132		----		----
4134		----		----
4136		----		----
4138		----		----
4139		----		----
4141		----		----
4143		----		----
4145		----		----
4147		----		----
4150		----		----
4158		----		----
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114		----		----
9119		----		----

normality not OK
n 42
outliers 4
mean (n) 0.0056
st.dev. (n) 0.00256
R(calc.) 0.0072
R(D473:07) 0.0344



Determination of Sulphur on sample #0983; results in%M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
78	D4294	1.8200		-1.84	
90	D4294	1.791		-2.59	
92	D4294	1.9701		1.99	
140	D4294	1.9157		0.60	
150	D4294	1.93		0.97	
154	D4294	1.9581		1.68	
158	D4294	1.97		1.99	
159	D4294	1.902		0.25	
171	D4294	1.85		-1.08	
175	D4294	1.924		0.81	
180		----		----	
193	D4294	1.88		-0.31	
195	D4294	1.9234		0.80	
199	D4294	1.782		-2.81	
203	D4294	1.89		-0.06	
225		----		----	
238		----		----	
273		----		----	
311	D4294	1.91		0.46	
314		----		----	
333	D2622	1.783		-2.79	
334		----		----	
340	In house	2.0864		4.96	
360	D4294	1.926	C	0.86	First reported 1.726
375	D4294	1.902		0.25	
391	D4294	1.962		1.78	
398	D4294	1.806		-2.20	
399	D4294	1.891		-0.03	
441	D4294	1.933		1.04	
442		----		----	
445	D4294	1.871	C	-0.54	First reported 1.437
446		----		----	
447	IP336	1.880		-0.31	
463		----		----	
494	D4294	1.856		-0.92	
495	D4294	1.886		-0.16	
529		----		----	
593	D4294	1.9061		0.36	
602		----		----	
608	D4294	1.948		1.43	
609	D2622	1.903		0.28	
613		----		----	
657	D4294	1.811		-2.07	
663		----		----	
704	D4294	1.903		0.28	
732	D4294	1.852		-1.03	
733		----		----	
751	D4294	1.897		0.12	
752	D4294	1.831		-1.56	
759	D4294	1.999		2.73	
781	D4294	1.906		0.35	
784	D4294	1.898		0.15	
862	D2622	1.496	DG(0.01)	-10.12	
873	D4294	1.81		-2.10	
874	D4294	1.903		0.28	
875	D4294	1.83		-1.59	
904	D4294	1.90		0.20	
963	D4294	1.85	C	-1.08	First reported 1.65
974	D4294	1.812		-2.05	
994	D4294	1.910		0.46	
995	D4294	1.858		-0.87	
996	D4294	1.90		0.20	
1023	IP336	1.936		1.12	
1038	D4294	2.09		5.05	
1039	D2622	1.889		-0.08	
1056	D4294	1.73		-4.14	
1065	D4294	1.81		-2.10	
1081	D2622	1.90		0.20	
1089	D4294	1.841		-1.31	
1106		----		----	
1108	D4294	1.84		-1.33	
1109	D4294	2.236	G(0.05)	8.78	
1131	D4294	1.823		-1.77	

1140		----		----
1148		----		----
1236		----		----
1248		----		----
1264	D4294	1.909		0.43
1301		----		----
1501	D4294	1.892		0.00
1603	In house	1.867		-0.64
1613		----		----
1635	D4294	1.95		1.48
1658		----		----
1720		----		----
1728	D4294	1.4925	DG(0.01)	-10.21
1800		----		----
1810	D4294	1.54	G(0.05)	-9.00
1811	D4294	1.63	DG(0.01)	-6.70
1815		----		----
1826	D2622	1.852		-1.03
1833		----		----
1842		----		----
1928	ISO8754	1.81		-2.10
1929	ISO8754	1.57	G(0.05)	-8.23
1930		----		----
4131		----		----
4132		----		----
4134		----		----
4136	D2622	1.83		-1.59
4138		----		----
4139	D4294	1.93		0.97
4141		----		----
4143	D4294	1.95		1.48
4145		----		----
4147	D2622	2.34	G(0.05)	11.44
4150	D4294	1.65	DG(0.01)	-6.19
4158	D2622	2		2.75
4159		----		----
4166		----		----
4167		----		----
8156		----		----
8160		----		----
9114	D4294	1.997		2.68
9119	D4294	1.997		2.68

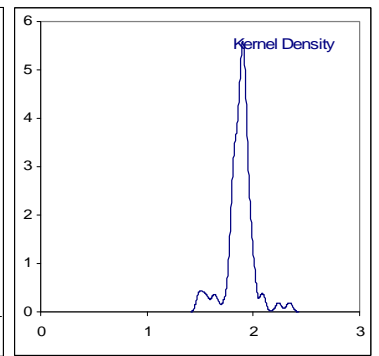
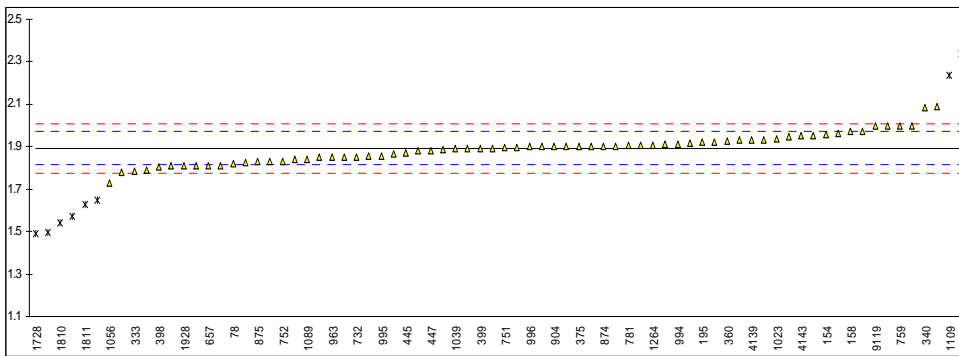
normality OK
n 68
outliers 8
mean (n) 1.892
st.dev. (n) 0.0674
R(calc.) 0.189
R(D4294:08a) 0.110

Only D4294 data:

OK
56
6
1.892
0.0643
0.180
0.110

Only D2622 data:

OK
7
2
1.880
0.0684
0.192
0.114

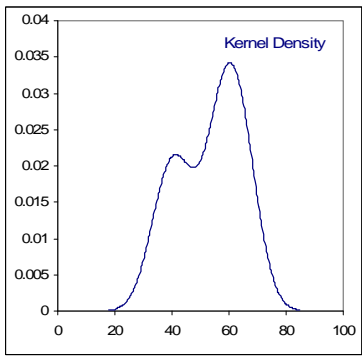
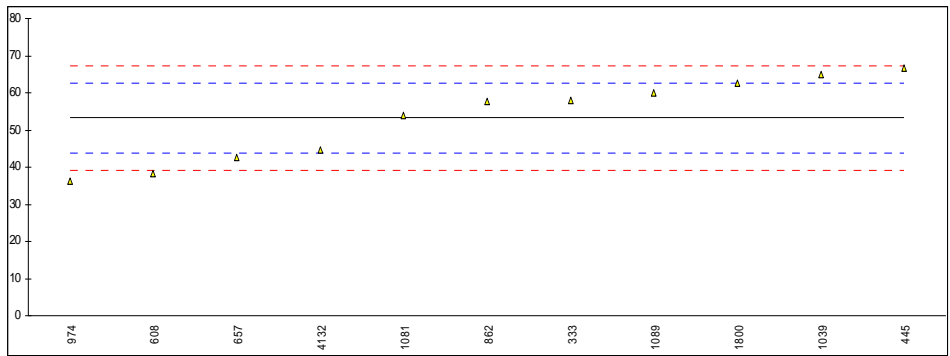


Determination of Mercury on sample #0983; results in µg/kg

lab	method	value	mark	z(targ)	Remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	EPA7471A	<40		<-2.83	False negative?
154		----		----	
158		----		----	
159		----		----	
171		----		----	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311		----		----	
314		----		----	
333		58	C	1.02	First reported <1
334		----		----	
340		----		----	
360		----		----	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
441		----		----	
442		----		----	
445	ISO16772	66.6		2.86	
446		----		----	
447		----		----	
463		----		----	
494		----		----	
495		----		----	
529		----		----	
593		----		----	
602		----		----	
608	In house	38.24		-3.20	
609		----		----	
613		----		----	
657	UOP938	42.5	C	-2.29	First reported 0.0425
663		----		----	
704		----		----	
732		----		----	
733		----		----	
751		----		----	
752		----		----	
759		----		----	
781		----		----	
784		----		----	
862	UOP938	57.8		0.98	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963		----		----	
974	UOP938	36.239		-3.63	
994		----		----	
995		----		----	
996		----		----	
1023		----		----	
1038		----		----	
1039	UOP938	65		2.51	
1056		----		----	
1065		----		----	
1081	In house	54		0.17	
1089	In house	60		1.45	
1106		----		----	
1108		----		----	
1109		----		----	
1131		----		----	

1140		----	----
1148		----	----
1236		----	----
1248		----	----
1264		----	----
1301		----	----
1501		----	----
1603		----	----
1613		----	----
1635		----	----
1658		----	----
1720		----	----
1728		----	----
1800	In house	62.6	2.00
1810		----	----
1811		----	----
1815		----	----
1826	In house	<50	<-0.69
1833		----	----
1842		----	----
1928		----	----
1929		----	----
1930		----	----
4131		----	----
4132		44.5	-1.86
4134		----	----
4136		----	----
4138		----	----
4139		----	----
4141		----	----
4143		----	----
4145		----	----
4147		----	----
4150		----	----
4158		----	----
4159		----	----
4166		----	----
4167		----	----
8156		<29	<-5.17 False negative?
8160		----	----
9114		----	----
9119		----	----

normality OK
n 11
outliers 0
mean (n) 53.23
st.dev. (n) 10.954
R(calc.) 30.67
R(Horwitz) 13.11

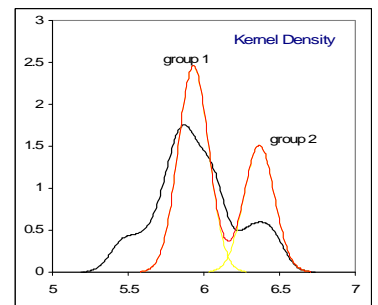
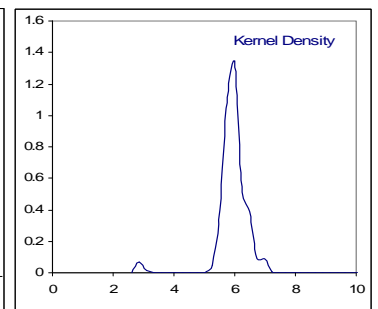
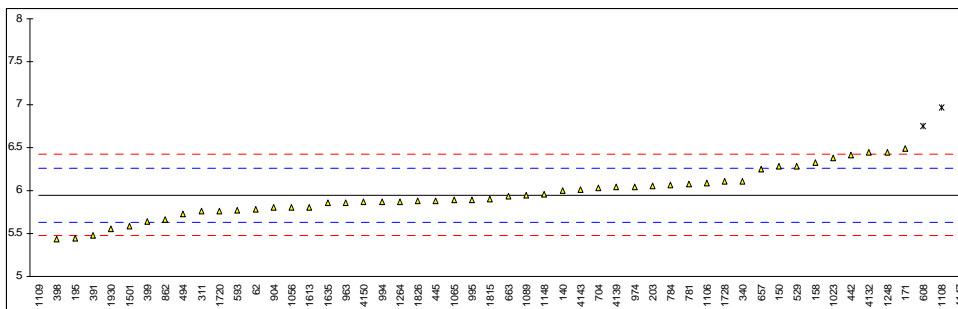


Determination of Kinematic Viscosity @ 40 °C on sample #0983; results in mm²/s

lab	method	value	mark	z(targ)	Remarks
62	D445	5.786		-1.04	
78		----		----	
90		----		----	
92		----		----	
140	D445	6.000		0.32	
150	D445	6.278		2.09	
154		----		----	
158	D445	6.329		2.41	
159		----		----	
171	D445	6.493		3.45	
175		----		----	
180		----		----	
193		----		----	
195	D445	5.4501	C	-3.18	First reported 6.974
199		----		----	
203	D445	6.050		0.64	
225		----		----	
238		----		----	
273		----		----	
311	D445	5.758		-1.22	
314		----		----	
333		----		----	
334		----		----	
340	D445	6.1132		1.04	
360		----		----	
375		----		----	
391	D445	5.476		-3.01	
398	D445	5.4298		-3.31	
399	D445	5.638		-1.98	
441		----		----	
442	IP71	6.418		2.98	
445	D445	5.881		-0.44	
446		----		----	
447		----		----	
463		----		----	
494	D445	5.7326		-1.38	
495		----		----	
529	D445	6.2871		2.14	
593	D445	5.772		-1.13	
602		----		----	
608	D445	6.750	DG(0.05)	5.09	
609		----		----	
613		----		----	
657	D445	6.253		1.93	
663	D445	5.931		-0.12	
704	D445	6.0339		0.53	
732		----		----	
733		----		----	
751		----		----	
752		----		----	
759		----		----	
781	D445	6.071		0.77	
784	D445	6.069		0.76	
862	D445	5.6673		-1.80	
873		----		----	
874		----		----	
875		----		----	
904	D445	5.8		-0.95	
963	D445	5.861		-0.56	
974	D445	6.046		0.61	
994	D445	5.8690		-0.51	
995	D445	5.895		-0.35	
996		----		----	
1023	D445	6.38		2.74	
1038		----		----	
1039		----		----	
1056	D445	5.80		-0.95	
1065	D445	5.894		-0.36	
1081		----		----	
1089	D445	5.951		0.01	
1106	D445	6.0865		0.87	
1108	D445	6.962	DG(0.05)	6.44	
1109	D445	2.9024	G(0.01)	-19.38	
1131		----		----	

1140		-----	-----	
1148	D445	5.9561	0.04	
1236		-----	-----	
1248	IP71	6.4468	3.16	
1264	D445	5.8729	-0.49	
1301		-----	-----	
1501	D7042	5.5913	-2.28	
1603		-----	-----	
1613	D445	5.8044	-0.92	
1635	D445	5.854	-0.61	
1658		-----	-----	
1720	D445	5.765	-1.18	
1728	D445	6.1062	0.99	
1800		-----	-----	
1810		-----	-----	
1811		-----	-----	
1815	ISO3104	5.9053	-0.28	
1826	D445	5.876	-0.47	
1833		-----	-----	
1842		-----	-----	
1928		-----	-----	
1929		-----	-----	
1930	DIN51562	5.55	-2.54	
4131		-----	-----	
4132	D445	6.445	3.15	
4134		-----	-----	
4136		-----	-----	
4138		-----	-----	
4139	D445	6.039	0.57	
4141		-----	-----	
4143	D445	6.015	0.41	
4145		-----	-----	
4147	D445	64	G(0.01)	369.17
4150	D445	5.865	-0.54	
4158		-----	-----	
4159		-----	-----	
4166		-----	-----	
4167		-----	-----	
8156		-----	-----	
8160		-----	-----	
9114		-----	-----	
9119		-----	-----	

		<u>Group 1</u>	<u>Group 2</u>
normality	OK	OK	OK
n	48	39	9
outliers	4	1	3
mean (n)	5.9498	5.8529	6.3700
st.dev. (n)	0.26484	0.18362	0.08643
R(calc.)	0.7415	0.5141	0.2420
R(D445:06)	0.4403	0.4331	0.4714

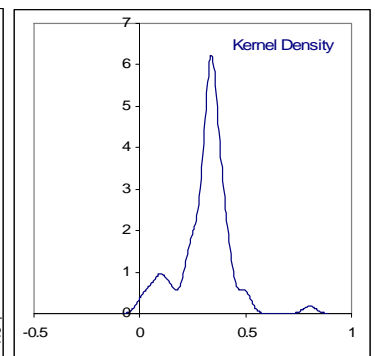
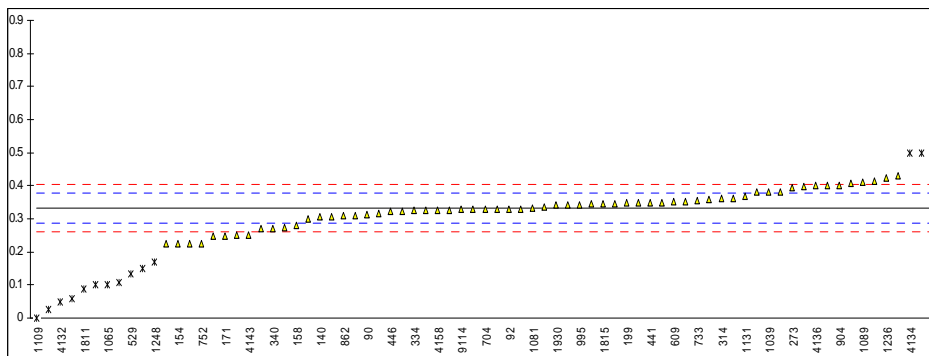


Determination of Water on sample #0983; results in%V/V

lab	method	value	mark	z(targ)	remarks
62	D4928	0.311		-0.91	
78		----		----	
90	D4928	0.314		-0.78	
92	D4377	0.330		-0.10	
140	D4298	0.3069		-1.09	
150	D4377	0.315		-0.74	
154	D4006	0.225		-4.57	
158	D4377	0.28		-2.23	
159	D4377	0.3072		-1.07	
171	D4377	0.248		-3.59	
175		----		----	
180	D4006	0.100	ex	-9.89	Manually excluded, see §4.1
193	D4377	0.25		-3.51	
195	D4377	0.1501	C,ex	-7.76	First reported 0.0738 , manually excluded see §4.1
199	D4377	0.348		0.66	
203	D4928	0.27		-2.66	
225		----		----	
238		----		----	
273	D4928	0.3960		2.70	
311	D4928	0.4	C	2.87	Reported first 0.49%M/M
314	D4928	0.3605		1.19	
333		----		----	
334	D4377	0.325		-0.32	
340	D4377	0.2720		-2.57	
360	D4928	0.330		-0.10	
375		----		----	
391	D4377	0.345		0.53	
398	D4377	0.3434		0.47	
399		----		----	
441	D4377	0.35		0.75	
442		----		----	
445	D4377	0.803	CG(0.01)	20.02	First reported 0.0803
446	IP386	0.323		-0.40	
447	IP386	0.361		1.21	
463		----		----	
494	D4377	0.3529		0.87	
495	D4377	0.346		0.58	
529	D4377	0.1339	ex	-8.45	Manually excluded, see §4.1
593		----		----	
602		----		----	
608	D4377	0.336		0.15	
609	D4377	0.351		0.79	
613		----		----	
657	D4377	0.330		-0.10	
663		----		----	
704	D4377	0.330		-0.10	
732	inh-2477	0.30		-1.38	
733	D6304	0.357		1.04	
751	D4006	0.225		-4.57	
752	D4006	0.225		-4.57	
759	D4005	0.275		-2.44	
781		----		----	
784		----		----	
862	D4006	0.309		-1.00	
873	D4006	0.35		0.75	
874	D4006	0.350		0.75	
875		----		----	
904	D4006	0.40		2.87	
963		----		----	
974	D4928	0.247		-3.64	
994		----		----	
995	D6304	0.3440		0.49	
996		----		----	
1023	D4928	0.407		3.17	
1038		----		----	
1039	D4928	0.38		2.02	
1056	D4377	0.381		2.07	
1065	D4006	0.1	ex	-9.89	Manually excluded, see §4.1
1081	ISO12937	0.331		-0.06	
1089	D4377	0.41		3.30	
1106		----		----	
1108	D4377	0.413		3.43	
1109	D6304	0.000037	ex	-14.14	Manually excluded, see §4.1
1131	GOST2477	0.37		1.60	

1140		-----		-----	
1148		-----		-----	
1236	D4928	0.425		3.94	
1248	D4928	0.168	ex	-7.00	Manually excluded, see §4.1
1264		-----		-----	
1301		-----		-----	
1501	D4928	0.3232		-0.39	
1603		-----		-----	
1613	D4377	0.108	ex	-9.55	Manually excluded, see §4.1
1635	ISO3733	0.5	DG(0.05)	7.13	
1658		-----		-----	
1720		-----		-----	
1728	D4377	0.3993		2.84	
1800		-----		-----	
1810	D4377	0.06	ex	-11.59	Manually excluded, see §4.1
1811	D4377	0.087	ex	-10.44	Manually excluded, see §4.1
1815	ISO10337	0.3458		0.57	
1826	D4928	0.43		4.15	
1833		-----		-----	
1842		-----		-----	
1928	D4377	0.36		1.17	
1929	D4377	0.38		2.02	
1930	DIN51777	0.3417		0.39	
4131		-----		-----	
4132	D4006	0.05	ex	-12.02	Manually excluded, see §4.1
4134	D4006	0.5	DG(0.05)	7.13	
4136	D4006	0.4		2.87	
4138	D4006	0.325		-0.32	
4139		-----		-----	
4141	D4006	0.025	ex	-13.08	Manually excluded, see §4.1
4143	D4006	0.25		-3.51	
4145		-----		-----	
4147		-----		-----	
4150		-----		-----	
4158	D4377	0.325		-0.32	
4159		-----		-----	
4166		-----		-----	
4167		-----		-----	
8156	D4006	0.225		-4.57	
8160	D4006	0.325		-0.32	
9114	D4006	0.329		-0.15	
9119	D4006	0.329		-0.15	

		<u>Only D4377 data:</u>	<u>Only D4928 data:</u>	<u>Only D4006 data:</u>
normality	not OK	OK	OK	OK
n	63	25	14	16
outliers	3	1	0	0
mean (n)	0.3324	0.3371	0.3500	0.3151
st.dev. (n)	0.05153	0.04330	0.05798	0.07745
R(calc.)	0.1443	0.1212	0.1623	0.2169
R(D4377:06)	0.0658	0.0661	0.0554	0.1100



APPENDIX 2

List of participants

Number of laboratories	Country
3 laboratories in	AUSTRALIA
1 laboratory in	AZERBAIJAN
1 laboratory in	BAHAMAS
1 laboratory in	BELARUS REPUBLIC
1 laboratory in	BULGARIA
4 laboratories in	CANADA
1 laboratory in	CÔTE D'IVOIRE
1 laboratory in	CROATIA
2 laboratories in	CZECH REPUBLIC
1 laboratory in	ECUADOR
1 laboratory in	EGYPT
3 laboratories in	FRANCE
1 laboratory in	GABON
1 laboratory in	GEORGIA
5 laboratories in	GERMANY
1 laboratory in	GREECE
1 laboratory in	ISRAEL
3 laboratories in	ITALY
1 laboratory in	JORDAN
2 laboratories in	KAZAKHSTAN
2 laboratories in	LITHUANIA
5 laboratories in	MALAYSIA
1 laboratory in	MEXICO
1 laboratory in	NEGARA BRUNEI DARUSSALAM
8 laboratories in	NIGERIA
5 laboratories in	NORWAY
8 laboratories in	OMAN
1 laboratory in	P.R. of CHINA
1 laboratory in	POLAND
1 laboratory in	ROMANIA
11 laboratories in	RUSSIA
1 laboratory in	SAUDI ARABIA
1 laboratory in	SINGAPORE
2 laboratories in	SLOVAKIA
1 laboratory in	SOUTH AFRICA
1 laboratory in	ST. EUSTATIUS
1 laboratory in	SUDAN
1 laboratory in	SWEDEN
1 laboratory in	THAILAND
6 laboratories in	THE NETHERLANDS
2 laboratories in	TURKEY
1 laboratory in	TURKMENISTAN
3 laboratories in	U.A.E.
1 laboratory in	U.S. VIRGIN ISLANDS
14 laboratories in	U.S.A.
1 laboratory in	UKRAINE
12 laboratories 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
n.a.	= not applicable
n.d.	= not determined
SDS	= Safety data Sheet

Literature

- 1 i.i.s. Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, November 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/>).