

Results of Proficiency Test  
Crude Oil  
November 2010

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 2010/2011, it was decided to continue the round robin for the analysis of Crude Oil. In this interlaboratory study 149 laboratories from 49 different countries have participated. See appendix 2 for the number of participants per country.

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. 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. And to increase the water content with approx. 0.35 %V/V water. Analyses for fit-for-use and homogeneity testing were subcontracted to an ISO17025 accredited laboratory. 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 January 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 of Crude Oil was homogenised in a metal drum. After homogenisation, 180 subsamples were transferred to 1 L wide-neck transparent colourless glass bottles and labelled #1080.

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 8 stratified randomly selected samples.

	Density @ 15 °C in kg/L	Water in mg/kg
Sample #1080-1	0.86266	400
Sample #1080-2	0.86266	430
Sample #1080-3	0.86272	440
Sample #1080-4	0.86269	430
Sample #1080-5	0.86290	410
Sample #1080-6	0.86287	400
Sample #1080-7	0.86286	380
Sample #1080-8	0.86293	400

Table 1: Homogeneity test results of subsamples #1080

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 mg/kg
observed repeatability	0.00032	57
reference method	ASTM D5002:05	ASTM D4377:06
0.3*R(reference method)	0.00107	98

Table 2: Repeatabilities on subsamples #1080

The calculated repeatabilities were less than 0.3 times the respective reproducibilities of the reference methods. Therefore, homogeneity of the subsamples #1080 was assumed.

The water content of the original Crude Oil was low (410 mg/kg) and therefore for BSW only 'less than' results would be reported by the participating laboratories. Therefore each one litre subsample was enriched with 3.1 mL water per bottle (= 0.40 %M/M).

To each of the participating laboratories one bottle of 1 L (labelled #1080) was sent on October 12, 2010. 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 Azerbaijan, Ecuador, Gabon, Jordan, Malaysia, Mexico, Nigeria, Russia and Ukraine arrived near or after the deadline or did never reach the laboratories at all due to customs clearance and/or transportation problems.

In total 121 laboratories submitted 879 numerical results. Observed were 43 statistically outlying results, which is 4.9% 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 TAN, BSW, Density, API Gravity, Light Ends (C1 and C2), Salt and Sediment ASTM D 473 (%V/V) 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 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 D664:09.

BSW: This determination was problematic. Only one statistical outlier was 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 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 D5002:05. Several 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 e.g. §1.2 of ASTM D4052:02e1).

API Gravity: This determination was 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 was problematic. In total eleven statistical outliers were observed. None of the calculated reproducibilities is, after rejection of the statistical outliers, in agreement with the requirements of IP344:04.

Pour Point, Upper (Max.): This determination was not problematic. Three test results were excluded from the calculations as the reported test method ASTM D97 is not suitable for Crude Oil (see the scope of this test method). No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D5853A:06.

Pour Point, Lower (Min): This determination was not problematic. One test result was excluded from the calculations as the reported test method ASTM D97 is not suitable for Crude Oil (see the scope of this test method). Four other results were excluded as the reported value was below the application range of ASTM D5853. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D5853B:06.

Pour Point (Auto.): Although automated test methods like D5950 are not (yet) applicable for Crude Oils, a number laboratories is using this method. Therefore these

test results were evaluated separately. No statistical outliers were observed, but the observed reproducibility is not at all in agreement with the requirements of ASTM D5950.

Salt as NaCl: This determination was not problematic. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the statistical outlier, is in full agreement with the requirements of ASTM D3230:10, but not with the more strict 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 was problematic. Three statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, does not meet the requirements of ASTM D4807:05e1. 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 after filtration.

Sediment:  
ASTM D473: The determination of sediment in accordance with ASTM D473:07 was problematic for one laboratory. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the statistical outlier, is in good agreement with the requirements of ASTM D473:07.

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

Mercury: This determination may be problematic. Regrettably in UOP938, no precision data is mentioned. Therefore the precision data calculated using the Horwitz equation is used. No statistical outliers 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 was very problematic. Eight (!) 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 D445:09. The large spread may be explained by loss of light ends prior to or during measurements. Especially with automated equipment this may occur.

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 = 0.40%M/M = 0.35%V/V). The laboratories should be able to find at least 0.28%V/V [ $0.35\%V/V_{(\text{added amount})} - 0.07\%V/V_{(R\ D4377)}$ ]. However, 13 of all 84 laboratories reported lower amounts than 0.28%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.

Two 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 D 4377:06.

#### 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 <sub>R</sub>	R (lit)
Total Acid Number	mg KOH/g	40	0.072	0.100	0.151
BSW	%V/V	48	0.29	0.40	0.28
Density @ 15°C	kg/L	110	0.8633	0.0025	0.0036
API Gravity		76	32.31	0.43	0.50
C1 Light Ends	%M/M	10	<0.001	unknown	unknown
C2 Light Ends	%M/M	15	0.009	0.005	0.004
C3 Light Ends	%M/M	21	0.19	0.12	0.04
C4 Light Ends	%M/M	20	0.89	0.28	0.12
C5 Light Ends	%M/M	19	1.85	0.24	0.19
C6 Light Ends	%M/M	17	2.58	1.11	0.45
C1-C6 Light Ends	%M/M	16	5.51	1.08	0.50
Pour Point, Upper	°C	37	-24.1	15.8	18.0
Pour Point, Lower	°C	7	-29.4	21.9	22.0
Salt as NaCl	mg/kg	61	7.0	11.0	12.0
Sediment (D4807)	%M/M	31	0.015	0.028	0.015
Sediment (D473)	%V/V	55	0.008	0.017	0.035
Total Sulphur	%M/M	80	1.72	0.18	0.10
Total Mercury	µg/kg	10	3.0	7.2	3.2
Kinematic Viscosity @ 40°C	mm <sup>2</sup> /s	58	6.515	0.650	0.482
Water	%V/V	69	0.41	0.17	0.07

Table 3: Reproducibilities of the tests methods for sample #1080

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

### 4.3 COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2010 WITH PREVIOUS PTS

	<i>November 2010</i>	<i>November 2009</i>	<i>November 2008</i>	<i>December 2007</i>
Number of reporting labs	121	103	80	81
Number of results reported	879	695	551	578
Statistical outliers	43	48	31	38
Percentage outliers	4.9%	6.9%	5.6%	6.6%

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 2010</i>	<i>November 2009</i>	<i>November 2008</i>	<i>December 2007</i>
Total Acid Number	++	++	n.e.	n.e.
BSW	--	--	n.e.	n.e.
Density @15°C	++	++	++	++
API Gravity	++	++	++	++
Light Ends (C1-C6)	--	++	--	--
Pour Point, Upper	++	n.a.	--	++
Pour Point, Lower	+/-	n.a.	--	
Salt as NaCl	++	++	+/-	++
Sediment (D4807)	--	--	-	--
Sediment (D473)	++	++	++	++
Sulphur	--	--	+	++
Mercury	(--)	(--)	(-)	(--)
Kinematic Viscosity @40°C	--	--	++	--
Water	--	--	--	++

Table 5: Comparison determinations against the standard  
Between brackets is a comparison against Horwitz

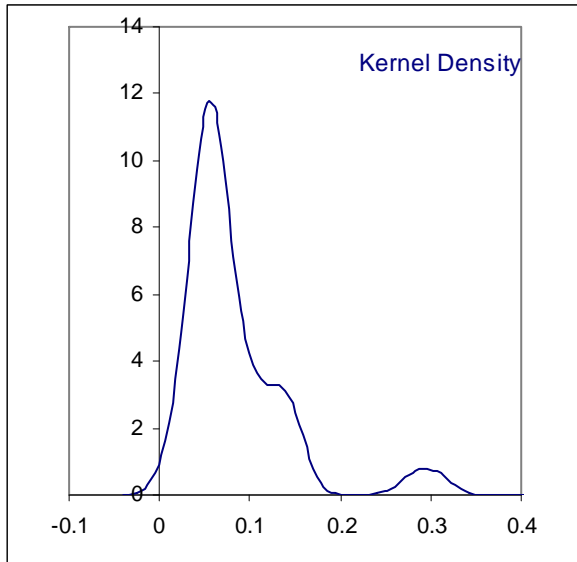
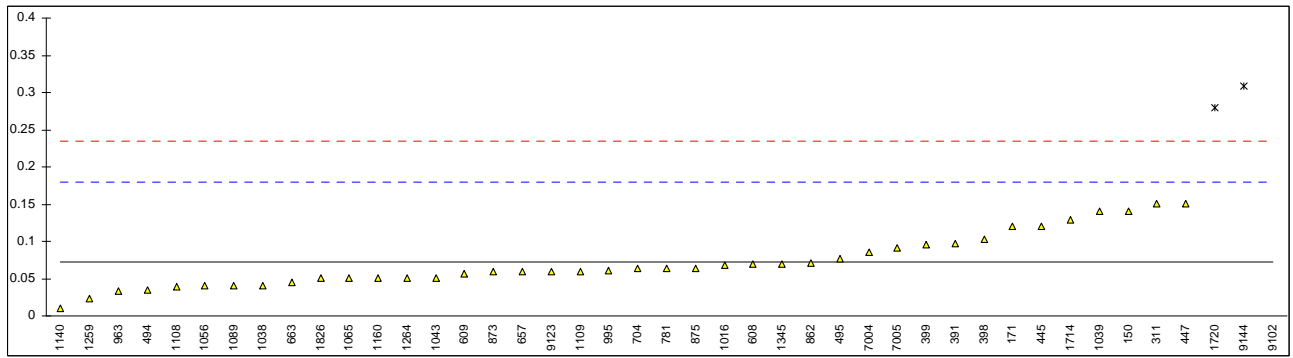
The performance of the determinations against the requirements of the respective standards is listed in the above table. The following performance categories were used-

- ++: 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 Total Acid Number on sample #1080; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	D664	0.14		1.26	
154		----		----	
158		----		----	
159		----		----	
171	D664	0.12		0.89	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D664	0.15		1.44	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391	D664	0.097		0.46	
398	D664	0.103		0.57	
399	D664	0.095		0.42	
402		----		----	
441		----		----	
442		----		----	
445	D664	0.121		0.91	
446		----		----	
447	D664	0.151		1.46	
494	D664	0.035		-0.69	
495	D664	0.077		0.09	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	D664	0.0695		-0.05	
609	D664	0.056		-0.30	
613		----		----	
657	D664	0.06		-0.22	
663	D664	0.045		-0.50	
704	D664	0.064		-0.15	
705		----		----	
732		----		----	
733		----		----	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781	D664	0.064		-0.15	
784		----		----	
862	D664	0.0704		-0.03	
873	D664	0.06		-0.22	
874		----		----	
875	D664	0.064		-0.15	
904		----		----	
963	D664	0.0328		-0.73	
974		----		----	
994		----		----	
995	D664	0.06125		-0.20	
996		----		----	
1016	D664	0.068		-0.08	
1023		----		----	
1038	D664	0.041		-0.58	
1039	D664	0.14		1.26	
1043	D664	0.051		-0.39	
1056	D664	0.04		-0.60	
1065	D664	0.05		-0.41	
1081	D664	<0.05		----	
1089	D664	0.04		-0.60	
1106		----		----	
1108	D664	0.039		-0.61	

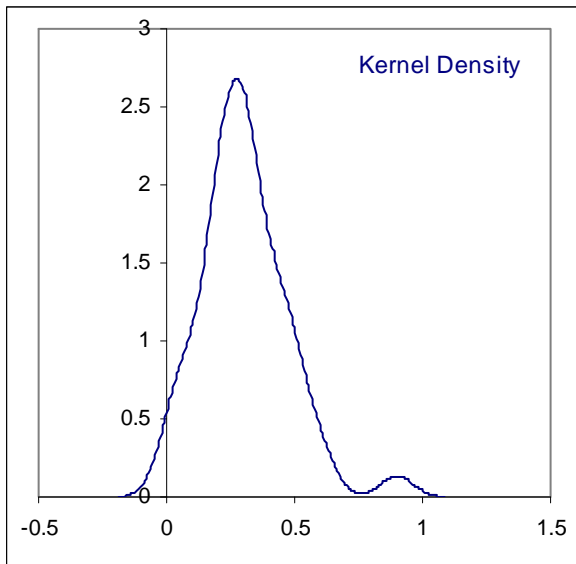
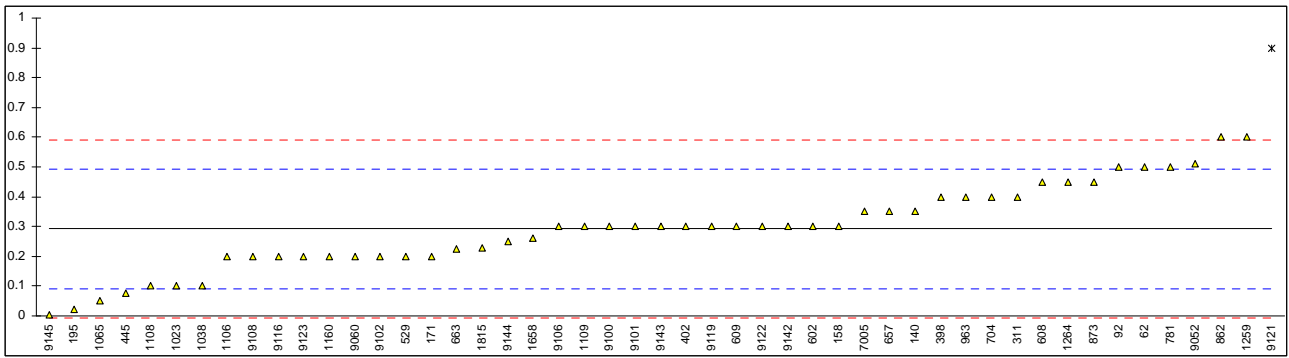
1109	D664	0.06		-0.22
1140	D664	0.01		-1.15
1160	IP177	0.05		-0.41
1236		----		----
1248		----		----
1259	D664	0.0239		-0.89
1264	D664	0.0507		-0.40
1287		----		----
1337		----		----
1345	D664	0.07		-0.04
1360		----		----
1379		----		----
1403		----		----
1412		----		----
1419		----		----
1603		----		----
1616		----		----
1635		----		----
1658	D664	n.d.		----
1714	D664	0.1285		1.04
1720	D664	0.28	G(0.01)	3.85
1728		----		----
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826	D664	0.05		-0.41
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
7004	D664	0.086		0.26
7005	D664	0.091		0.35
9050		----		----
9051		----		----
9052		----		----
9053		----		----
9057		----		----
9060		----		----
9100		----		----
9101		----		----
9102	D664mod	1.9	G(0.01)	33.86
9103		----		----
9104		----		----
9105		----		----
9106		----		----
9107		----		----
9108		----		----
9116	D664	<0.10		----
9117		----		----
9118		----		----
9119		----		----
9120		----		----
9121		----		----
9122		----		----
9123	D664	0.06		-0.22
9125		----		----
9126		----		----
9132		----		----
9133		----		----
9134		----		----
9135		----		----
9136		----		----
9137		----		----
9138		----		----
9139		----		----
9142		----		----
9143		----		----
9144	D664	0.308	G(0.01)	4.37
9145		----		----
	normality	not OK		
	n	40		
	outliers	3		
	mean (n)	0.07213		
	st.dev. (n)	0.035652		
	R(calc.)	0.09983		
	R(D664:09)	0.15117		



## Determination of BSW on sample #1080; results in %V/V

lab	method	value	mark	z(targ)	remarks
62	D4007	0.50		2.08	
78		----		----	
90		----		----	
92	D4007	0.5		2.08	
140	D4007	0.350		0.58	
150		----		----	
154		----		----	
158	D4007	0.30		0.08	
159		----		----	
171	D4007	0.20		-0.92	
175		----		----	
180		----		----	
193		----		----	
195	D4007	0.02		-2.72	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D4007	0.40		1.08	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391		----		----	
398	D4007	0.40		1.08	
399		----		----	
402	D4007	0.3		0.08	
441		----		----	
442		----		----	
445	D4007	0.075		-2.17	
446		----		----	
447		----		----	
494		----		----	
495		----		----	
529	D4007	0.20		-0.92	
541		----		----	
593		----		----	
602	D4007	0.3		0.08	
608	D4007	0.45		1.58	
609	D4007	0.3		0.08	
613		----		----	
657	D4007	0.35		0.58	
663	D4007	0.225		-0.67	
704	D4007	0.40		1.08	
705		----		----	
732		----		----	
733		----		----	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781	D4007	0.50		2.08	
784		----		----	
862	D4007	0.60		3.08	
873	D4007	0.45		1.58	
874		----		----	
875		----		----	
904		----		----	
963	D4007	0.40		1.08	
974		----		----	
994		----		----	
995		----		----	
996		----		----	
1016		----		----	
1023	D4007	0.1		-1.92	
1038	D4007	0.10		-1.92	
1039		----		----	
1043		----		----	
1056		----		----	
1065	D4007	0.05		-2.42	
1081		----		----	
1089		----		----	
1106	D4007	0.20		-0.92	
1108	D4007	0.10		-1.92	

1109	D1796	0.30	0.08
1140		----	----
1160	D4007	0.2	-0.92
1236		----	----
1248		----	----
1259	D4007	0.60	3.08
1264	D4007	0.45	1.58
1287		----	----
1337		----	----
1345		----	----
1360		----	----
1379		----	----
1403		----	----
1412		----	----
1419		----	----
1603		----	----
1616		----	----
1635		----	----
1658	D4007	0.26	-0.32
1714		----	----
1720		----	----
1728		----	----
1800		----	----
1810		----	----
1811		----	----
1815	in house	0.23	-0.62
1826		----	----
1833		----	----
1842		----	----
1928		----	----
1929		----	----
1930		----	----
7004		----	----
7005	D4007	0.35	0.58
9050		----	----
9051		----	----
9052	D4007	0.51	2.18
9053		----	----
9057		----	----
9060	D4007	0.2	-0.92
9100	D4007	0.30	0.08
9101	D4007	0.30	0.08
9102	D4007	0.20	-0.92
9103		----	----
9104		----	----
9105		----	----
9106	D4007	0.30	0.08
9107		----	----
9108	D4007	0.2	-0.92
9116	D4007	0.200	-0.92
9117		----	----
9118		----	----
9119	D4007	0.30	0.08
9120		----	----
9121	D4007	0.9	6.08
9122	D4007	0.30	0.08
9123	D4007	0.20	-0.92
9125		----	----
9126		----	----
9132		----	----
9133		----	----
9134		----	----
9135		----	----
9136		----	----
9137		----	----
9138		----	----
9139		----	----
9142	D4007	0.30	0.08
9143	D4007	0.30	0.08
9144	D4007	0.250	-0.42
9145	D4007	0.002	-2.90
	normality	not OK	
	n	48	
	outliers	1	
	mean (n)	0.292	
	st.dev. (n)	0.1430	
	R(calc.)	0.400	
	R(D4007:06)	0.280	



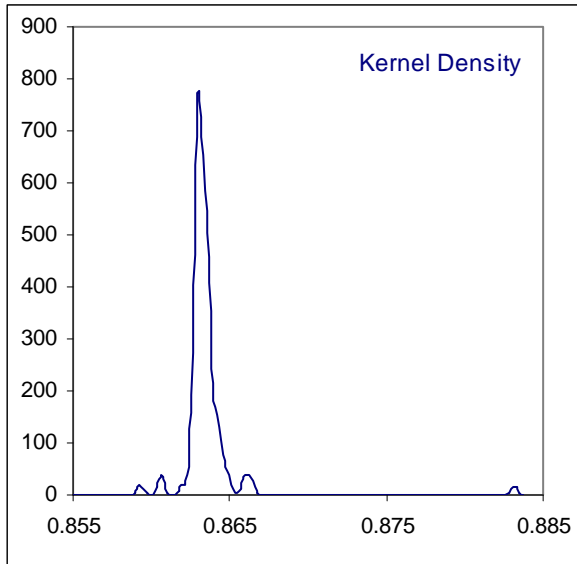
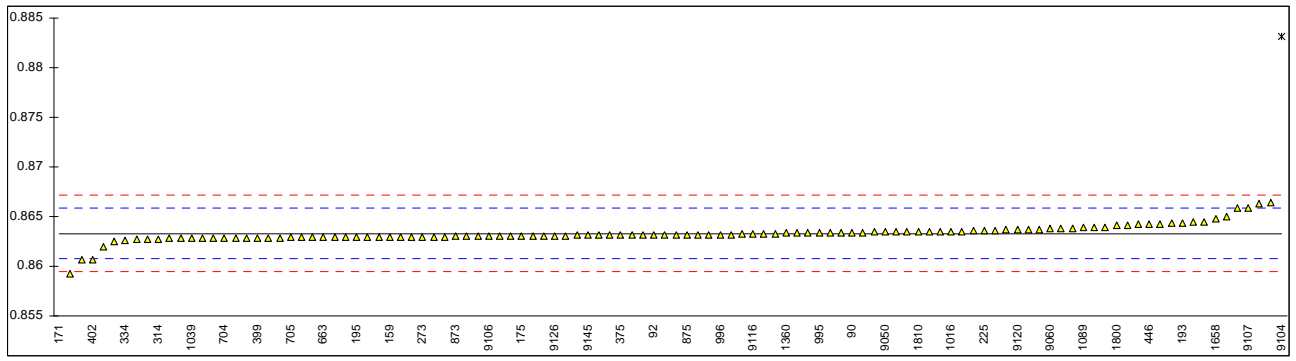


## Determination of Density @ 15°C on sample #1080; results in kg/L

lab	method	value	mark	z(target)	remarks
62	D5002	0.8632		-0.09	
78		-----		-----	
90	D5002	0.8634		0.07	
92	D5002	0.8632		-0.09	
140		-----		-----	
150		-----		-----	
154		-----		-----	
158		-----		-----	
159	D4052	0.8629		-0.33	
171	D5002	0.8264	C,G(0.01)	-29.06	first reported 0.9434
175	D4052	0.86300		-0.25	
180		-----		-----	
193	D4052	0.8644		0.86	
195	D4052	0.8629		-0.33	
199		-----		-----	
203	D1298	0.8643		0.78	
225	D5002	0.8636		0.23	
238		-----		-----	
273	D5002	0.8629		-0.33	
311	D5002	0.8628		-0.40	
314	D4052	0.86274		-0.45	
333	D5002	0.8629		-0.33	
334	D4052	0.86263		-0.54	
340		-----		-----	
375	D1298	0.8632		-0.09	
391	D5002	0.8629		-0.33	
398	D4052	0.8627		-0.48	
399	D5002	0.8628		-0.40	
402	D5002	0.8606		-2.14	
441	D4052	0.8633		-0.01	
442	D4052	0.8628		-0.40	
445	D5002	0.8632		-0.09	
446	D5002	0.8642		0.70	
447	D5002	0.86341		0.08	
494	D5002	0.8629		-0.33	
495	D5002	0.86308		-0.18	
529		-----		-----	
541	D5002	0.8628		-0.40	
593		-----		-----	
602	D1298	0.8637		0.30	
608	D5002	0.8642		0.70	
609	D5002	0.8638		0.38	
613	D4052	0.86372		0.32	
657	D5002	0.8630		-0.25	
663	D5002	0.8629		-0.33	
704	D5002	0.8628		-0.40	
705	D1298	0.8629		-0.33	
732	D5002	0.8637		0.30	
733	D1298	0.8635		0.15	
739		-----		-----	
742	D5002	0.8633		-0.01	
750	D5002	0.8634		0.07	
751	D1298	0.8632		-0.09	
752	D5002	0.8628		-0.40	
781	D5002	0.8630		-0.25	
784	D5002	0.8632		-0.09	
862	D5002	0.86310		-0.17	
873	D1298	0.8630		-0.25	
874	D5002	0.8632		-0.09	
875	D5002	0.8632		-0.09	
904	D5002	0.8632		-0.09	
963	D5002	0.8639		0.46	
974		-----		-----	
994	D5002	0.8634		0.07	
995	D5002	0.8634		0.07	
996	D1298	0.8632		-0.09	
1016	D4052	0.8635		0.15	
1023	D5002	0.8629		-0.33	
1038	D5002	0.8628		-0.40	
1039	D5002	0.8628		-0.40	
1043	ISO12185	0.8629		-0.33	
1056	D5002	0.8642	C	0.70	first reported 0.8671
1065	D5002	0.8630		-0.25	
1081	D5002	0.8635		0.15	
1089	D5002	0.8639		0.46	
1106	D5002	0.85929		-3.17	
1108	D5002	0.8628		-0.40	

1109	D5002	0.8638		0.38	
1140	D5002	0.8630		-0.25	
1160	IP365	0.8641		0.62	
1236	D5002	0.86296		-0.28	
1248	D5002Mod.	0.86328		-0.03	
1259	ISO3675	0.8629	C	-0.33	first reported 862.9
1264	D4052	0.8627		-0.48	
1287		----		----	
1337		----		----	
1345	D5002	0.8629		-0.33	
1360	ISO12185	0.8634		0.07	
1379		----		----	
1403		----		----	
1412	D5002	0.8635		0.15	
1419	ISO12185	0.86343		0.09	
1603	in house	0.8636		0.23	
1616		----		----	
1635	D4052	0.8645	C	0.93	first reported 864.5
1658	D5002	0.8648		1.17	
1714	D5002	0.86320		-0.09	
1720	D5002	0.8663	C	2.35	first reported 866.3
1728	D5002	0.86295		-0.29	
1800	in house	0.8641		0.62	
1810	D4052	0.8635		0.15	
1811	D5002	0.8634		0.07	
1815	ISO91-1	0.8664		2.43	
1826	D4052	0.8630		-0.25	
1833		----		----	
1842		----		----	
1928	ISO12185	0.8635		0.15	
1929	ISO12185	0.8636		0.23	
1930	ISO12185	0.86283		-0.38	
7004	D5002	0.8635		0.15	
7005	D5002	0.8634		0.07	
9050	D4052	0.8635		0.15	
9051		----		----	
9052		----		----	
9053	D4052	0.863		-0.25	
9057	D1298	0.8625		-0.64	
9060	D4052	0.8638		0.38	
9100	D5002	0.862		-1.03	
9101	D1298	0.8632		-0.09	
9102	D5002	0.8628		-0.40	
9103		----		----	
9104	D5002conv.	0.8832	G(0.01)	15.66	
9105		----		----	
9106	D1298	0.8630		-0.25	
9107	D1298	0.8659		2.04	
9108	D1298	0.8659		2.04	
9116	D5002	0.8633		-0.01	
9117		----		----	
9118		----		----	
9119	GOST3900	0.8606		-2.14	
9120	GOST3900	0.8637		0.30	
9121	D5002	0.8639		0.46	
9122	D5002	0.86448		0.92	
9123	D5002	0.8650		1.33	
9125		----		----	
9126	D4052	0.86301		-0.24	
9132		----		----	
9133		----		----	
9134		----		----	
9135		----		----	
9136		----		----	
9137		----		----	
9138		----		----	
9139		----		----	
9142	D1298	0.8629		-0.33	
9143		----		----	
9144	D5002	0.8632		-0.09	
9145	D5002	0.8631		-0.17	

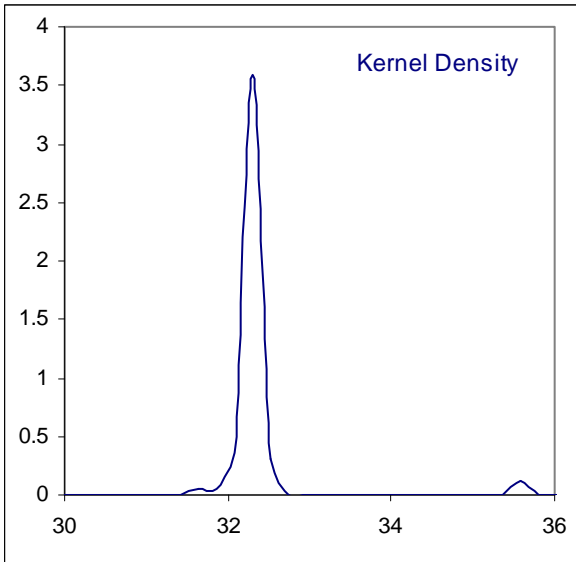
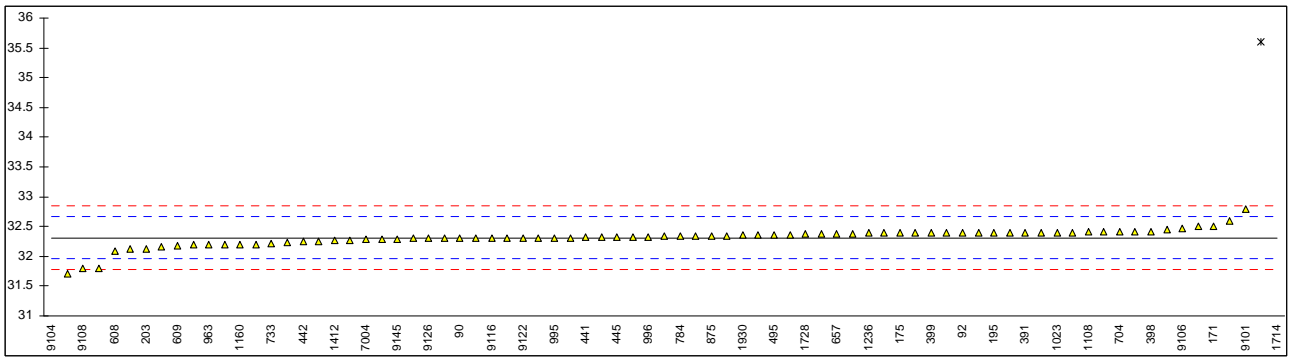
normality not OK  
n 110  
outliers 2  
mean (n) 0.86331  
st.dev. (n) 0.000908  
R(calc.) 0.00254  
R(D5002:05) 0.00356



## Determination of API Gravity on sample #1080;

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90	D287	32.30		-0.07	
92	D1298	32.4		0.49	
140	D287	32.3		-0.07	
150	D287	32.5		1.05	
154		----		----	
158	D287	32.3		-0.07	
159	D4052	32.40		0.49	
171	D287	32.5		1.05	
175	D4052	32.39		0.43	
180		----		----	
193	D4052	32.24		-0.41	
195	D287	32.4		0.49	
199		----		----	
203	calc.	32.12		-1.08	
225	calc.	32.27		-0.24	
238		----		----	
273	IP250	32.4		0.49	
311	D4052	32.41		0.54	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391	D287	32.40		0.49	
398	TABLE	32.422		0.61	
399	D287	32.40		0.49	
402		----		----	
441	D1298	32.32		0.04	
442	D4052	32.245		-0.38	
445	TABLE 51	32.33		0.09	
446		----		----	
447		----		----	
494	calc.	32.39		0.43	
495	calc.	32.36		0.26	
529	D287	35.6	G(0.01)	18.41	
541		----		----	
593		----		----	
602		----		----	
608	calc.	32.08		-1.31	
609	D5002	32.17		-0.80	
613		----		----	
657	D4052	32.38		0.37	
663		----		----	
704	D1250	32.418		0.59	
705	D1250	32.399		0.48	
732	D287	32.19		-0.69	
733	D1250	32.21		-0.58	
739		----		----	
742	D1250	32.32		0.04	
750	D1250	32.30		-0.07	
751	calc.	32.34		0.15	
752	D1250	32.42		0.60	
781	D1250	32.38		0.37	
784	D287	32.34		0.15	
862	D287	32.36		0.26	
873	converted	32.38		0.37	
874	converted	32.34		0.15	
875	D1250	32.34		0.15	
904	D5002	32.28		-0.19	
963	calc.	32.2		-0.63	
974		----		----	
994	D1250	32.25		-0.35	
995	calc.	32.304		-0.05	
996	calc.	32.33		0.09	
1016		----		----	
1023	D1250	32.4		0.49	
1038		----		----	
1039		----		----	
1043	D287	32.33		0.09	
1056	calc.	32.2	C	-0.63	first reported 31.6
1065		----		----	
1081		----		----	
1089		----		----	
1106		----		----	
1108	calc.	32.41		0.54	

1109	D287	32.16		-0.86
1140		----		----
1160	D287	32.2		-0.63
1236	D287	32.387		0.41
1248	calc.	32.31		-0.02
1259	calc.	32.40		0.49
1264	D4052	32.35		0.21
1287		----		----
1337		----		----
1345		----		----
1360		----		----
1379		----		----
1403		----		----
1412	D1250	32.27		-0.24
1419		----		----
1603		----		----
1616		----		----
1635		----		----
1658	D287	32.12		-1.08
1714	D287	84.2	G(0.01)	290.57
1720		----		----
1728	D1250	32.3775		0.36
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826	D287	32.4		0.49
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930	D287	32.35		0.21
7004	D5002	32.28		-0.19
7005	D5002	32.30		-0.07
9050		----		----
9051		----		----
9052		----		----
9053		----		----
9057		----		----
9060		----		----
9100	D287	32.6		1.61
9101	calc.	32.7865		2.65
9102	D287	32.34		0.15
9103		----		----
9104	D1298	28.7	G(0.01)	-20.23
9105		----		----
9106	D1298	32.46		0.82
9107	D1298	31.8		-2.87
9108	D1298	31.8		-2.87
9116	D287	32.3		-0.07
9117		----		----
9118		----		----
9119		----		----
9120		----		----
9121	D287	31.7		-3.43
9122	D287	32.3		-0.07
9123	D287	32.3		-0.07
9125		----		----
9126	D4052	32.30		-0.07
9132		----		----
9133		----		----
9134		----		----
9135		----		----
9136		----		----
9137		----		----
9138		----		----
9139		----		----
9142	D1298	32.45		0.77
9143	D287	32.4		0.49
9144	D287	32.2		-0.63
9145	D287	32.29		-0.13
	normality	not OK		
	n	76		
	outliers	3		
	mean (n)	32.313		
	st.dev. (n)	0.1538		
	R(calc.)	0.431		
	R(D287:06)	0.500		

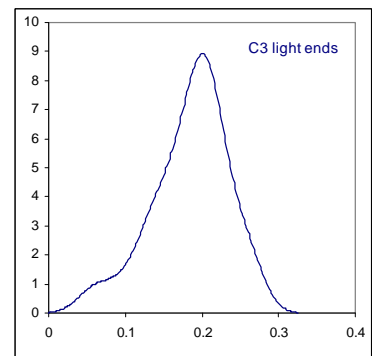
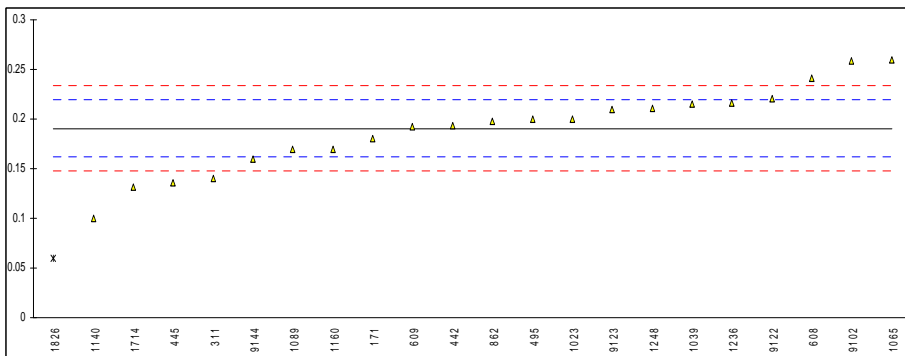
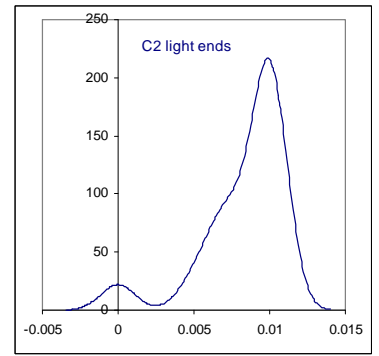
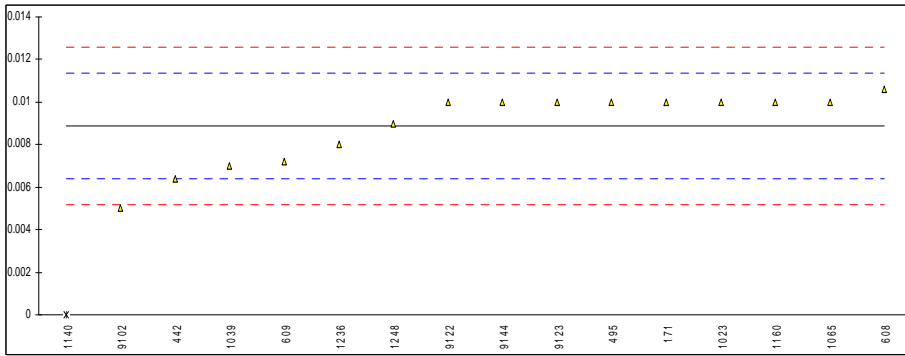
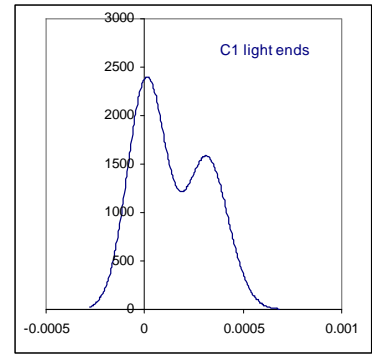
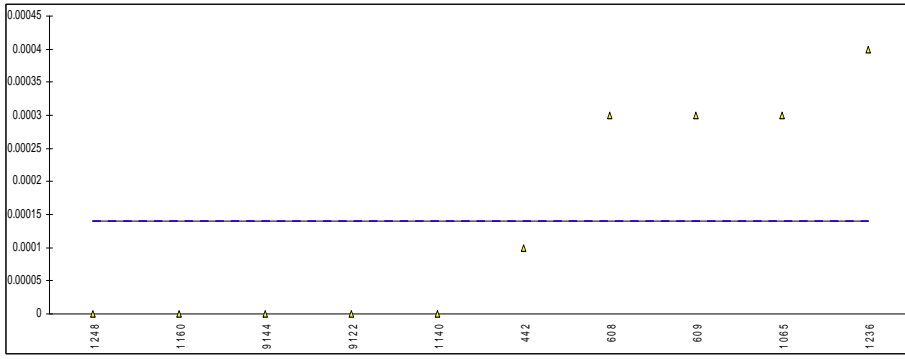


Determination of Light ends [C1-C3] on sample #1080; results in%M/M

lab	method	C1	mark	Z(targ)	C2	mark	Z(targ)	C3	mark	Z(targ)
62		----		----	----		----	----		----
78		----		----	----		----	----		----
90		----		----	----		----	----		----
92		----		----	----		----	----		----
140		----		----	----		----	----		----
150		----		----	----		----	----		----
154		----		----	----		----	----		----
158		----		----	----		----	----		----
159		----		----	----		----	----		----
171	IP344	<0.01		----	0.01		0.91	0.18		-0.75
175		----		----	----		----	----		----
180		----		----	----		----	----		----
193		----		----	----		----	----		----
195		----		----	----		----	----		----
199		----		----	----		----	----		----
203		----		----	----		----	----		----
225		----		----	----		----	----		----
238		----		----	----		----	----		----
273		----		----	----		----	----		----
311	INH-267	<0.01		----	<0.01		----	0.14		-3.56
314		----		----	----		----	----		----
333		----		----	----		----	----		----
334		----		----	----		----	----		----
340		----		----	----		----	----		----
375		----		----	----		----	----		----
391		----		----	----		----	----		----
398		----		----	----		----	----		----
399		----		----	----		----	----		----
402		----		----	----		----	----		----
441		----		----	----		----	----		----
442	IP344	0.0001		----	0.0064		-2.01	0.1932		0.17
445	IP344	<0.01		----	<0.01		----	0.136		-3.84
446		----		----	----		----	----		----
447		----		----	----		----	----		----
494		----		----	----		----	----		----
495	IP344	<0.01		----	0.01		0.91	0.20		0.65
529		----		----	----		----	----		----
541		----		----	----		----	----		----
593		----		----	----		----	----		----
602		----		----	----		----	----		----
608	IP344	0.0003		----	0.0106		1.39	0.2416		3.57
609	IP344	0.0003		----	0.0072		-1.36	0.1924		0.12
613		----		----	----		----	----		----
657		----		----	----		----	----		----
663		----		----	----		----	----		----
704		----		----	----		----	----		----
705		----		----	----		----	----		----
732		----		----	----		----	----		----
733		----		----	----		----	----		----
739		----		----	----		----	----		----
742		----		----	----		----	----		----
750		----		----	----		----	----		----
751		----		----	----		----	----		----
752		----		----	----		----	----		----
781		----		----	----		----	----		----
784		----		----	----		----	----		----
862	D6730	<0.01		----	<0.01		----	0.198		0.51
873		----		----	----		----	----		----
874		----		----	----		----	----		----
875		----		----	----		----	----		----
904		----		----	----		----	----		----
963		----		----	----		----	----		----
974		----		----	----		----	----		----
994		----		----	----		----	----		----
995		----		----	----		----	----		----
996		----		----	----		----	----		----
1016		----		----	----		----	----		----
1023	D5134	<0.001		----	0.01		0.91	0.20		0.65
1038		----		----	----		----	----		----
1039	INH-07	----		----	0.007		-1.52	0.215		1.71
1043		----		----	----		----	----		----
1056		----		----	----		----	----		----
1065	IP344	0.0003		----	0.010		0.91	0.260		4.87
1081		----		----	----		----	----		----
1089	IP344	<0.01		----	<0.01		----	0.17		-1.46
1106		----		----	----		----	----		----
1108		----		----	----		----	----		----

1109		----	----	----		----	----	----
1140	D5134	0.0	----	0.0	ex	-7.18	0.10	-6.37
1160	IP344	0.00	----	0.01		0.91	0.17	-1.46
1236	D5134	0.0004	----	0.008		-0.71	0.216	1.78
1248	in house	0.000	----	0.009		0.10	0.211	1.42
1259		----	----	----		----	----	----
1264		----	----	----		----	----	----
1287		----	----	----		----	----	----
1337		----	----	----		----	----	----
1345		----	----	----		----	----	----
1360		----	----	----		----	----	----
1379		----	----	----		----	----	----
1403		----	----	----		----	----	----
1412		----	----	----		----	----	----
1419		----	----	----		----	----	----
1603		----	----	----		----	----	----
1616		----	----	----		----	----	----
1635		----	----	----		----	----	----
1658		----	----	----		----	----	----
1714	D7169	----	----	----		----	0.132	-4.12
1720		----	----	----		----	----	----
1728		----	----	----		----	----	----
1800		----	----	----		----	----	----
1810		----	----	----		----	----	----
1811		----	----	----		----	----	----
1815		----	----	----		----	----	----
1826	in house	<0.01	----	<0.01		----	0.06	D(0.05) -9.18
1833		----	----	----		----	----	----
1842		----	----	----		----	----	----
1928		----	----	----		----	----	----
1929		----	----	----		----	----	----
1930		----	----	----		----	----	----
7004		----	----	----		----	----	----
7005		----	----	----		----	----	----
9050		----	----	----		----	----	----
9051		----	----	----		----	----	----
9052		----	----	----		----	----	----
9053		----	----	----		----	----	----
9057		----	----	----		----	----	----
9060		----	----	----		----	----	----
9100		----	----	----		----	----	----
9101		----	----	----		----	----	----
9102	D5134	n.d.	----	0.005		-3.14	0.259	4.80
9103		----	----	----		----	----	----
9104		----	----	----		----	----	----
9105		----	----	----		----	----	----
9106		----	----	----		----	----	----
9107		----	----	----		----	----	----
9108		----	----	----		----	----	----
9116		----	----	----		----	----	----
9117		----	----	----		----	----	----
9118		----	----	----		----	----	----
9119		----	----	----		----	----	----
9120		----	----	----		----	----	----
9121		----	----	----		----	----	----
9122	INH-2103	0.000	----	0.010		0.91	0.221	2.13
9123	in house	<0.01	----	0.01		0.91	0.21	1.35
9125		----	----	----		----	----	----
9126		----	----	----		----	----	----
9132		----	----	----		----	----	----
9133		----	----	----		----	----	----
9134		----	----	----		----	----	----
9135		----	----	----		----	----	----
9136		----	----	----		----	----	----
9137		----	----	----		----	----	----
9138		----	----	----		----	----	----
9139		----	----	----		----	----	----
9142		----	----	----		----	----	----
9143		----	----	----		----	----	----
9144	INH-625	0.00	----	0.01		0.91	0.16	-2.16
9145		----	----	----		----	----	----
	normality	not OK		not OK			OK	
	n	10		15			21	
	outliers	0		1			1	
	mean (n)	0.00014		0.0089			0.1907	
	st.dev. (n)	0.000165		0.00172			0.04146	
	R(calc.)	0.00046		0.0048			0.1161	
	R(IP344:04)	n.a.		0.0035			0.0399	

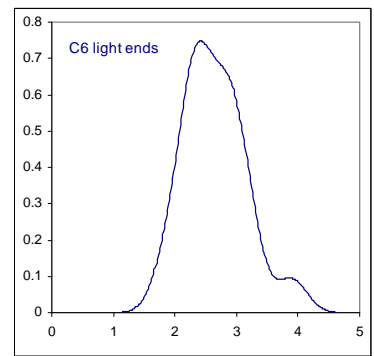
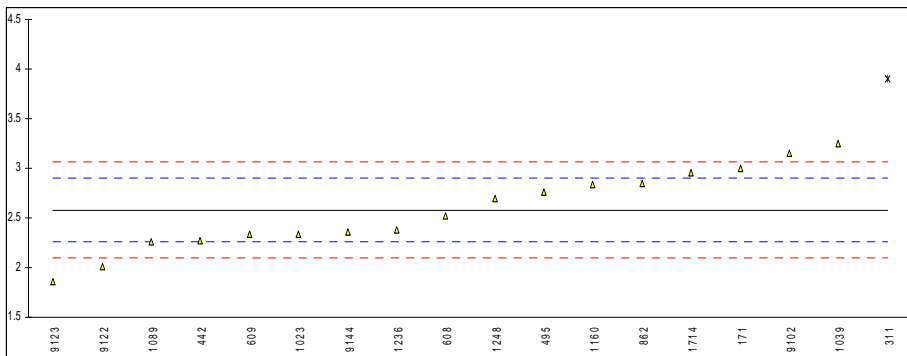
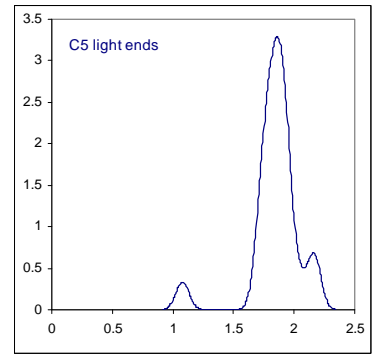
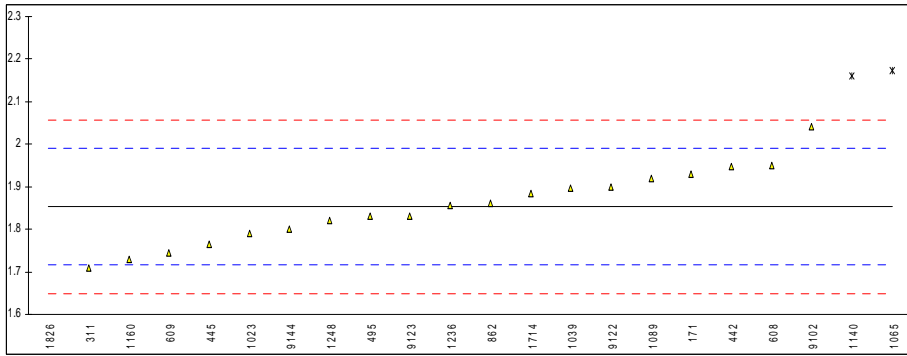
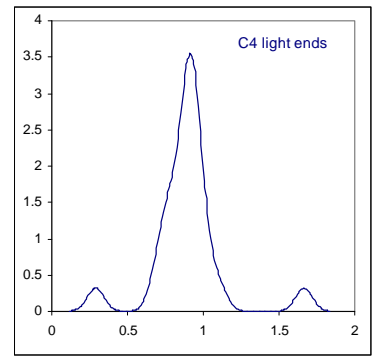
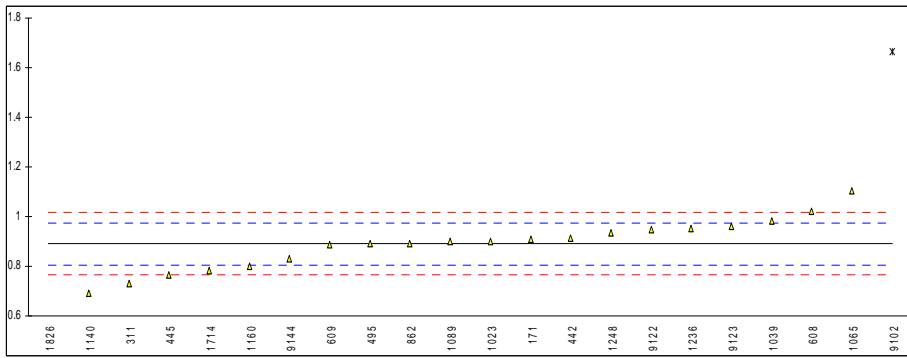




Determination of Light ends [C4-C6] on sample #1080; results in%M/M

lab	method	C4	mark	Z(targ)	C5	mark	Z(targ)	C6	mark	Z(targ)
62		----		----	----		----	----		----
78		----		----	----		----	----		----
90		----		----	----		----	----		----
92		----		----	----		----	----		----
140		----		----	----		----	----		----
150		----		----	----		----	----		----
154		----		----	----		----	----		----
158		----		----	----		----	----		----
159		----		----	----		----	----		----
171	IP344	0.91		0.49	1.93		1.13	3.00		2.62
175		----		----	----		----	----		----
180		----		----	----		----	----		----
193		----		----	----		----	----		----
195		----		----	----		----	----		----
199		----		----	----		----	----		----
203		----		----	----		----	----		----
225		----		----	----		----	----		----
238		----		----	----		----	----		----
273		----		----	----		----	----		----
311	INH-267	0.73		-3.80	1.71		-2.10	3.90	G(0.05)	8.22
314		----		----	----		----	----		----
333		----		----	----		----	----		----
334		----		----	----		----	----		----
340		----		----	----		----	----		----
375		----		----	----		----	----		----
391		----		----	----		----	----		----
398		----		----	----		----	----		----
399		----		----	----		----	----		----
402		----		----	----		----	----		----
441		----		----	----		----	----		----
442	IP344	0.9112		0.52	1.9475		1.39	2.2683		-1.93
445	IP344	0.766		-2.95	1.764		-1.31	----		----
446		----		----	----		----	----		----
447		----		----	----		----	----		----
494		----		----	----		----	----		----
495	IP344	0.89		0.01	1.83		-0.34	2.76		1.13
529		----		----	----		----	----		----
541		----		----	----		----	----		----
593		----		----	----		----	----		----
602		----		----	----		----	----		----
608	IP344	1.0224		3.17	1.9495		1.42	2.5193		-0.37
609	IP344	0.8851		-0.11	1.7448		-1.59	2.332		-1.53
613		----		----	----		----	----		----
657		----		----	----		----	----		----
663		----		----	----		----	----		----
704		----		----	----		----	----		----
705		----		----	----		----	----		----
732		----		----	----		----	----		----
733		----		----	----		----	----		----
739		----		----	----		----	----		----
742		----		----	----		----	----		----
750		----		----	----		----	----		----
751		----		----	----		----	----		----
752		----		----	----		----	----		----
781		----		----	----		----	----		----
784		----		----	----		----	----		----
862	D6730	0.892		0.06	1.862		0.13	2.851		1.70
873		----		----	----		----	----		----
874		----		----	----		----	----		----
875		----		----	----		----	----		----
904		----		----	----		----	----		----
963		----		----	----		----	----		----
974		----		----	----		----	----		----
994		----		----	----		----	----		----
995		----		----	----		----	----		----
996		----		----	----		----	----		----
1016		----		----	----		----	----		----
1023	D5134	0.90		0.25	1.79		-0.92	2.34		-1.48
1038		----		----	----		----	----		----
1039	INH-07	0.983		2.23	1.896		0.63	3.248		4.17
1043		----		----	----		----	----		----
1056		----		----	----		----	----		----
1065	IP344	1.104		5.11	2.173	DG(0.05)	4.69	----		----
1081		----		----	----		----	----		----
1089	IP344	0.90		0.25	1.92		0.98	2.26		-1.98
1106		----		----	----		----	----		----
1108		----		----	----		----	----		----

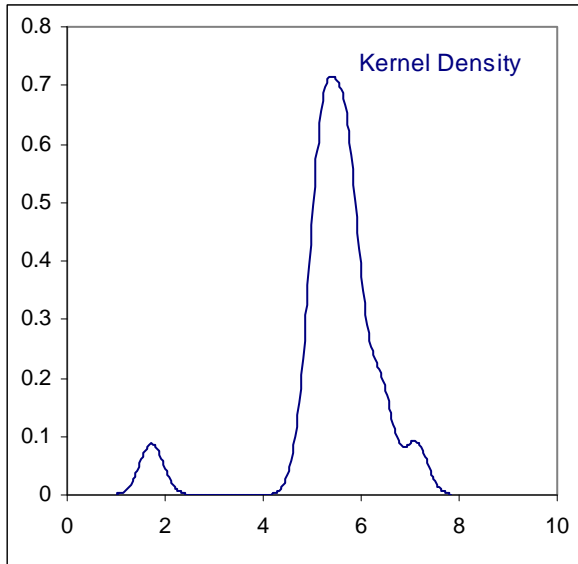
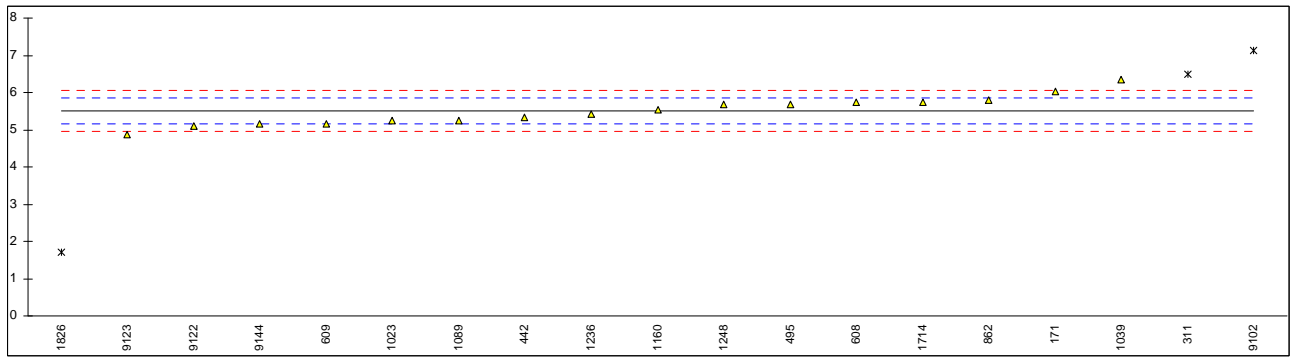
1109		----		----		----		----
1140	D5134	0.69		-4.76	2.16	DG(0.05)	4.50	----
1160	IP344	0.80		-2.14	1.73		-1.80	2.84
1236	D5134	0.951		1.47	1.857		0.06	2.378
1248	in house	0.934		1.06	1.821		-0.47	2.693
1259		----		----			----	----
1264		----		----			----	----
1287		----		----			----	----
1337		----		----			----	----
1345		----		----			----	----
1360		----		----			----	----
1379		----		----			----	----
1403		----		----			----	----
1412		----		----			----	----
1419		----		----			----	----
1603		----		----			----	----
1616		----		----			----	----
1635		----		----			----	----
1658		----		----			----	----
1714	D7169	0.782		-2.56	1.883		0.44	2.953
1720		----		----			----	----
1728		----		----			----	----
1800		----		----			----	----
1810		----		----			----	----
1811		----		----			----	----
1815		----		----			----	----
1826	in house	0.29	G(0.01)	-14.30	1.08	G(0.01)	-11.34	----
1833		----		----			----	----
1842		----		----			----	----
1928		----		----			----	----
1929		----		----			----	----
1930		----		----			----	----
7004		----		----			----	----
7005		----		----			----	----
9050		----		----			----	----
9051		----		----			----	----
9052		----		----			----	----
9053		----		----			----	----
9057		----		----			----	----
9060		----		----			----	----
9100		----		----			----	----
9101		----		----			----	----
9102	D5134	1.665	G(0.01)	18.49	2.042		2.77	3.151
9103		----		----			----	----
9104		----		----			----	----
9105		----		----			----	----
9106		----		----			----	----
9107		----		----			----	----
9108		----		----			----	----
9116		----		----			----	----
9117		----		----			----	----
9118		----		----			----	----
9119		----		----			----	----
9120		----		----			----	----
9121		----		----			----	----
9122	INH-2103	0.950		1.44	1.900		0.69	2.016
9123	in house	0.96		1.68	1.83		-0.34	1.86
9125		----		----			----	----
9126		----		----			----	----
9132		----		----			----	----
9133		----		----			----	----
9134		----		----			----	----
9135		----		----			----	----
9136		----		----			----	----
9137		----		----			----	----
9138		----		----			----	----
9139		----		----			----	----
9142		----		----			----	----
9143		----		----			----	----
9144	INH-625	0.83		-1.42	1.80		-0.78	2.36
9145		----		----			----	----
	normality	OK		OK			OK	
	n	20		19			17	
	outliers	2		3			1	
	mean (n)	0.890		1.853			2.578	
	st.dev. (n)	0.1004		0.0861			0.3970	
	R(calc.)	0.281		0.241			1.112	
	R(IP344:04)	0.117		0.191			0.450	



Determination of Light ends [Total C1-C6] on sample #1080; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150		----		----	
154		----		----	
158		----		----	
159		----		----	
171	IP344	6.03		2.90	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	INH-267	6.48	DG(0.05)	5.40	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
402		----		----	
441		----		----	
442	IP344	5.3266		-1.00	
445		----		----	
446		----		----	
447		----		----	
494		----		----	
495	IP344	5.69		1.02	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	IP344	5.7437		1.32	
609	IP344	5.1618		-1.92	
613		----		----	
657		----		----	
663		----		----	
704		----		----	
705		----		----	
732		----		----	
733		----		----	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781		----		----	
784		----		----	
862	D6730	5.803		1.64	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963		----		----	
974		----		----	
994		----		----	
995		----		----	
996		----		----	
1016		----		----	
1023	D5134	5.24		-1.48	
1038		----		----	
1039	INH-07	6.349		4.68	
1043		----		----	
1056		----		----	
1065		----		----	
1081		----		----	
1089	IP344	5.26		-1.37	
1106		----		----	
1108		----		----	

1109		----		----
1140		----		----
1160	IP344	5.55		0.24
1236	D5134	5.410		-0.54
1248	in house	5.668		0.89
1259		----		----
1264		----		----
1287		----		----
1337		----		----
1345		----		----
1360		----		----
1379		----		----
1403		----		----
1412		----		----
1419		----		----
1603		----		----
1616		----		----
1635		----		----
1658		----		----
1714	D7169	5.750		1.35
1720		----		----
1728		----		----
1800		----		----
1810		----		----
1811		----		----
1815		----		----
1826	in house	1.723	G(0.01)	-21.01
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930		----		----
7004		----		----
7005		----		----
9050		----		----
9051		----		----
9052		----		----
9053		----		----
9057		----		----
9060		----		----
9100		----		----
9101		----		----
9102	D5134	7.121	DG(0.05)	8.96
9103		----		----
9104		----		----
9105		----		----
9106		----		----
9107		----		----
9108		----		----
9116		----		----
9117		----		----
9118		----		----
9119		----		----
9120		----		----
9121		----		----
9122	INH-2103	5.097		-2.28
9123	in house	4.87		-3.54
9125		----		----
9126		----		----
9132		----		----
9133		----		----
9134		----		----
9135		----		----
9136		----		----
9137		----		----
9138		----		----
9139		----		----
9142		----		----
9143		----		----
9144	INH-625	5.16		-1.93
9145		----		----
	normality	OK		
	n	16		
	outliers	3		
	mean (n)	5.5068		
	st.dev. (n)	0.38593		
	R(calc.)	1.0806		
	R(IP344:04)	0.5043		



## Determination of Upper (Maximum) Pour Point on sample #1080; results in °C

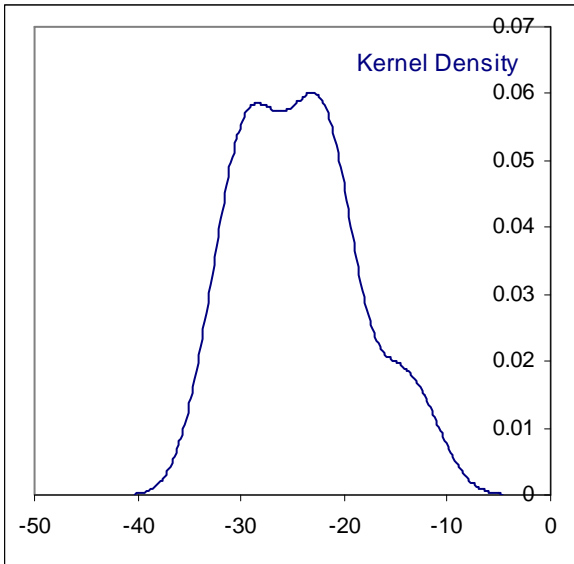
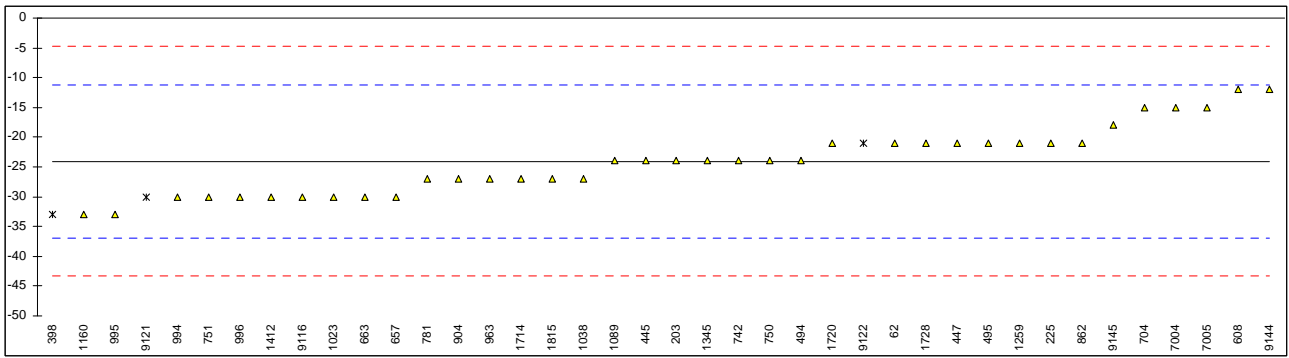
lab	method	value	mark	z(targ)	remarks
62	D5853A	-21		0.48	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150		----		----	
154		----		----	
158		----		----	
159		----		----	
171		----		----	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203	D5853A	-24		0.01	
225	D5853A	-21		0.48	
238		----		----	
273		----		----	
311		----		----	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391	D5853A	<-36		<-1.85	
398	D97	-33	ex	-1.39	result excluded, method not intended for Crude Oils
399		----		----	
402		----		----	
441		----		----	
442		----		----	
445	D5853A	-24		0.01	
446		----		----	
447	D5853A	-21		0.48	
494	D5853A	-24		0.01	
495	D5853A	-21		0.48	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	D5853A	-12		1.88	
609		----		----	
613		----		----	
657	D5853A	-30		-0.92	
663	D5853A	-30		-0.92	
704	D5853A	-15		1.41	
705		----		----	
732		----		----	
733		----		----	
739		----		----	
742	D5853A	-24		0.01	
750	D5853A	-24		0.01	
751	D5853A	-30		-0.92	
752		----		----	
781	D5853A	-27		-0.45	
784		----		----	
862	D5853A	-21		0.48	
873		----		----	
874		----		----	
875		----		----	
904	D5853A	-27		-0.45	
963	D5853A	-27		-0.45	
974		----		----	
994	D5853A	-30		-0.92	
995	D5853A	-33		-1.39	
996	D5853A	-30.0		-0.92	
1016		----		----	
1023	D5853A	-30		-0.92	
1038	D5853A	-27		-0.45	
1039		----		----	
1043		----		----	
1056		----		----	
1065		----		----	
1081		----		----	
1089	D5853A	-24		0.01	
1106		----		----	
1108		----		----	



1109		----	----
1140		----	----
1160	D5853A	-33	-1.39
1236		----	----
1248		----	----
1259	D5853A	-21	0.48
1264		----	----
1287		----	----
1337		----	----
1345	D5853A	-24	0.01
1360		----	----
1379		----	----
1403		----	----
1412	D5853A	-30	-0.92
1419		----	----
1603		----	----
1616		----	----
1635		----	----
1658	D5853A	<9	----
1714	D5853A	-27	-0.45
1720	D5853A	-21	0.48
1728	D5853A	-21	0.48
1800		----	----
1810		----	----
1811		----	----
1815	D5853A	-27.0	-0.45
1826		----	----
1833		----	----
1842		----	----
1928		----	----
1929		----	----
1930		----	----
7004	D5853A	-15	1.41
7005	D5853A	-15	1.41
9050		----	----
9051		----	----
9052		----	----
9053		----	----
9057		----	----
9060		----	----
9100		----	----
9101		----	----
9102		----	----
9103		----	----
9104		----	----
9105		----	----
9106		----	----
9107	D5853A	<-36	<-1.85
9108		----	----
9116	D5853A	-30.0	-0.92
9117		----	----
9118		----	----
9119		----	----
9120		----	----
9121	D97	-30	ex -0.92
9122	D97	-21	ex 0.48
9123	D5853A	<-33	<-1.39
9125		----	----
9126		----	----
9132		----	----
9133		----	----
9134		----	----
9135		----	----
9136		----	----
9137		----	----
9138		----	----
9139		----	----
9142		----	----
9143		----	----
9144	D5853A	-12	1.88
9145	D5853A	-18	0.95

result excluded, method not intended for Crude Oils  
 result excluded, method not intended for Crude Oils

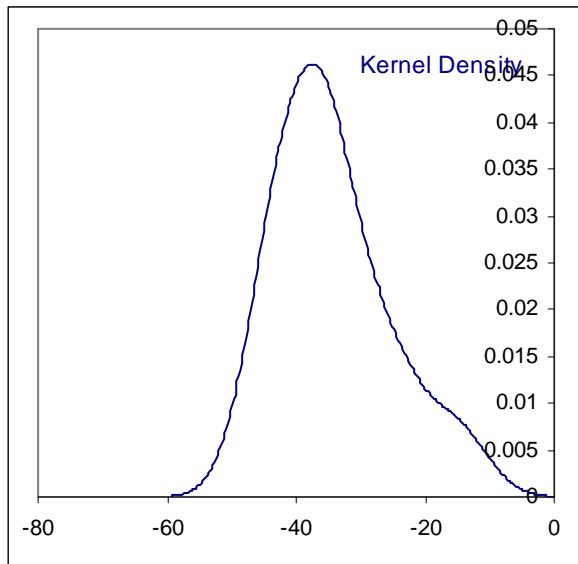
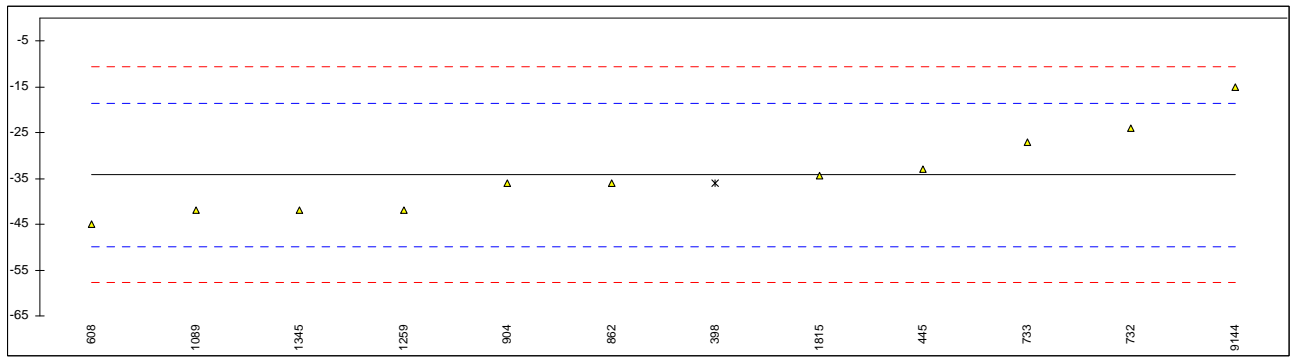
normality OK  
 n 37  
 outliers 0  
 mean (n) -24.081  
 st.dev. (n) 5.6341  
 R(calc.) 15.776  
 R(D5853:06) 18.000



Determination of Lower (Minimum) Pour Point on sample #1080; 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		----		----	
375		----		----	
391	D5853B	<-36		----	
398	D97	-36	ex	-0.85	result excluded, method not intended for Crude Oils
399		----		----	
402		----		----	
441		----		----	
442		----		----	
445	D5853B	-33		-0.46	
446		----		----	
447	D5853B	<-33		----	
494		----		----	
495		----		----	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	D5853B	-45	ex	-1.99	result excluded, out of application range of method
609		----		----	
613		----		----	
657	D5853B	<-36		----	
663		----		----	
704	D5853B	<-36		----	
705		----		----	
732	D5853B	-24		0.68	
733	D5853B	-27		0.30	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781	D5853B	<-36		----	
784		----		----	
862	D5853B	-36		-0.85	
873		----		----	
874		----		----	
875		----		----	
904	D5853B	-36		-0.85	
963	D5853B	<-36		----	
974		----		----	
994	D5853B	<-36		----	
995	D5853B	<-36		----	
996	D5853B	<-36.0		----	
1016		----		----	
1023	D5853B	<-36		----	
1038		----		----	
1039		----		----	
1043		----		----	
1056		----		----	
1065		----		----	
1081		----		----	
1089	D5853B	-42	ex	-1.61	result excluded, out of application range of method
1106		----		----	
1108		----		----	

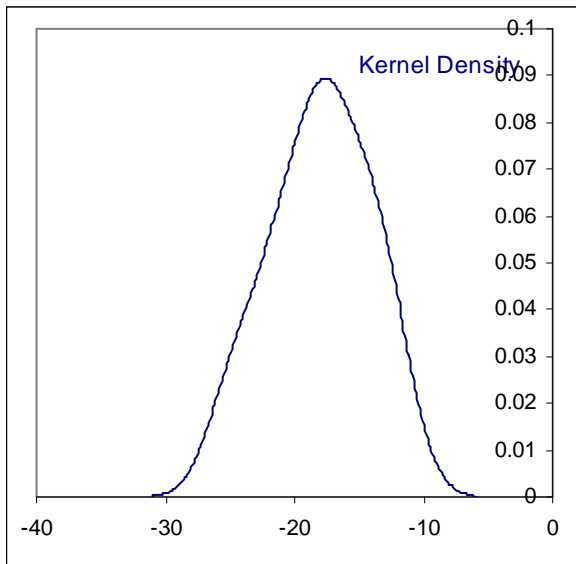
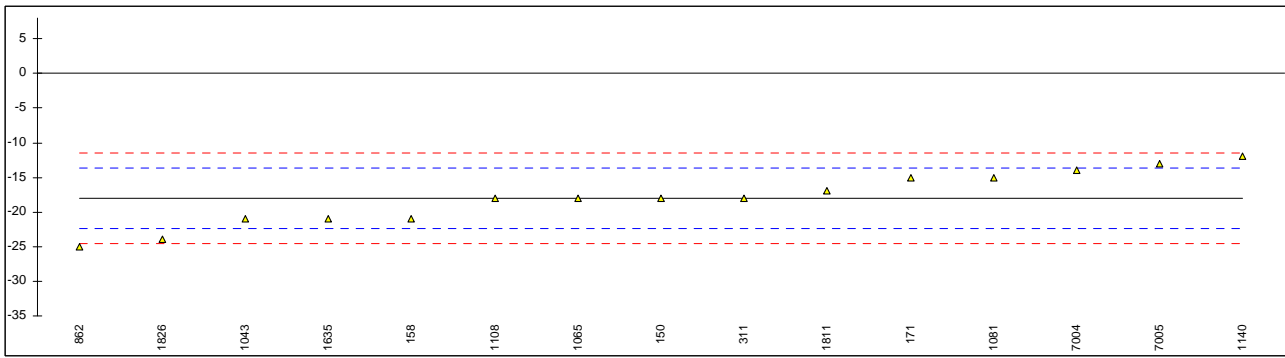
1109		----		----	
1140		----		----	
1160	D5853B	<-36		----	
1236		----		----	
1248		----		----	
1259	D5853B	-42	ex	-1.61	result excluded, out of application range of method
1264		----		----	
1287		----		----	
1337		----		----	
1345	D5853B	-42	ex	-1.61	result excluded, out of application range of method
1360		----		----	
1379		----		----	
1403		----		----	
1412	D5853B	<-36		----	
1419		----		----	
1603		----		----	
1616		----		----	
1635		----		----	
1658	D5853B	n.d.		----	
1714	D5853B	<-36		----	
1720		----		----	
1728	D5853B	<-36		----	
1800		----		----	
1810		----		----	
1811		----		----	
1815	D5853B	-34.5		-0.65	
1826		----		----	
1833		----		----	
1842		----		----	
1928		----		----	
1929		----		----	
1930		----		----	
7004	D5853B	<-36		----	
7005	D5853B	<-36		----	
9050		----		----	
9051		----		----	
9052		----		----	
9053		----		----	
9057		----		----	
9060		----		----	
9100		----		----	
9101		----		----	
9102		----		----	
9103		----		----	
9104		----		----	
9105		----		----	
9106		----		----	
9107		----		----	
9108		----		----	
9116		----		----	
9117		----		----	
9118		----		----	
9119		----		----	
9120		----		----	
9121		----		----	
9122		----		----	
9123		----		----	
9125		----		----	
9126		----		----	
9132		----		----	
9133		----		----	
9134		----		----	
9135		----		----	
9136		----		----	
9137		----		----	
9138		----		----	
9139		----		----	
9142		----		----	
9143		----		----	
9144	D5853B	-15		1.83	
9145		----		----	
	normality	OK			
	n	7			
	outliers	0			
	mean (n)	-29.357			
	st.dev. (n)	7.8354			
	R(calc.)	21.939			
	R(D5853:06)	22.000			



## Determination of Pour Point, Automatic on sample #1080; results in °C

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	D5950	-18		0.00	
154		----		----	
158	D97	-21		-1.38	
159		----		----	
171	D5950	-15		1.38	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D5950	-18		0.00	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
402		----		----	
441		----		----	
442		----		----	
445		----		----	
446		----		----	
447		----		----	
494		----		----	
495		----		----	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608		----		----	
609		----		----	
613		----		----	
657		----		----	
663		----		----	
704		----		----	
705		----		----	
732		----		----	
733		----		----	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781		----		----	
784		----		----	
862	D5950	-25		-3.21	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963		----		----	
974		----		----	
994		----		----	
995		----		----	
996		----		----	
1016		----		----	
1023		----		----	
1038		----		----	
1039		----		----	
1043	D5950	-21		-1.38	
1056		----		----	
1065	D5950	-18		0.00	
1081	D5950	-15.00		1.38	
1089		----		----	
1106		----		----	
1108	D5950	-18.0		0.00	

1109		----	----
1140	D5950	-12	2.75
1160		----	----
1236		----	----
1248		----	----
1259		----	----
1264		----	----
1287		----	----
1337		----	----
1345		----	----
1360		----	----
1379		----	----
1403		----	----
1412		----	----
1419		----	----
1603		----	----
1616		----	----
1635	D5950	-21	-1.38
1658	D5950	n.d.	----
1714		----	----
1720		----	----
1728		----	----
1800		----	----
1810		----	----
1811	D5950	-17	0.46
1815		----	----
1826	D5950	-24.0	-2.75
1833		----	----
1842		----	----
1928		----	----
1929		----	----
1930		----	----
7004	D6749	-14	1.84
7005	D6749	-13	2.30
9050		----	----
9051		----	----
9052		----	----
9053		----	----
9057		----	----
9060		----	----
9100		----	----
9101		----	----
9102		----	----
9103		----	----
9104		----	----
9105		----	----
9106		----	----
9107		----	----
9108		----	----
9116		----	----
9117		----	----
9118		----	----
9119		----	----
9120		----	----
9121		----	----
9122		----	----
9123		----	----
9125		----	----
9126		----	----
9132		----	----
9133		----	----
9134		----	----
9135		----	----
9136		----	----
9137		----	----
9138		----	----
9139		----	----
9142		----	----
9143		----	----
9144		----	----
9145		----	----
	normality	OK	
	n	15	
	outliers	0	
	mean (n)	-18.000	
	st.dev. (n)	3.8545	
	R(calc.)	10.793	
	R(D5950:07 (3°C))	6.100	

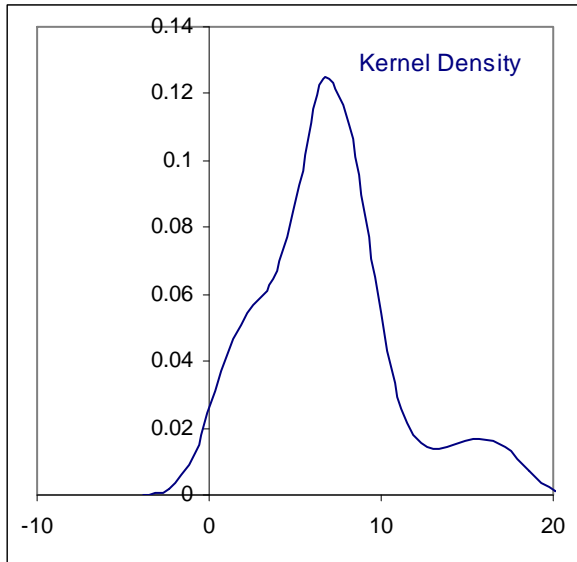
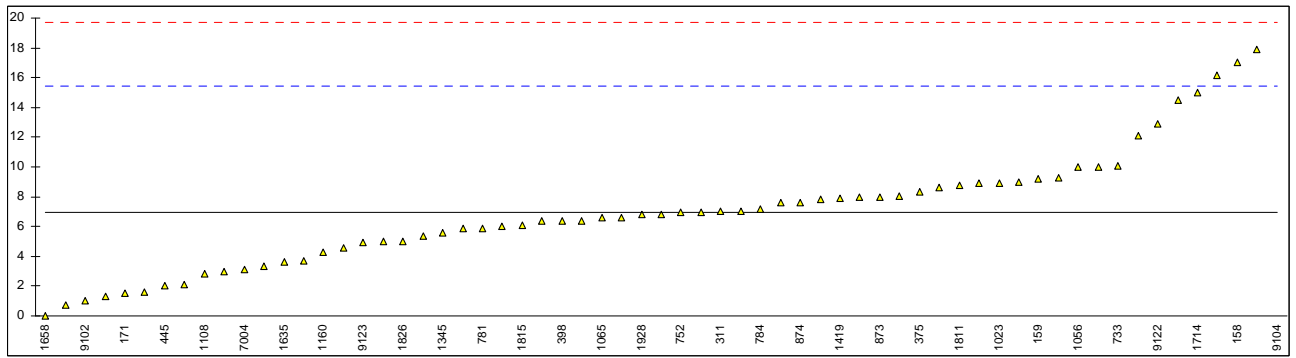




## Determination of Salt as NaCl on sample #1080; results in mg/kg

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150		----		----	
154		----		----	
158	D3230	17		2.34	
159	D3230	9.2		0.52	
171	D3230	1.5		-1.29	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311	D3230	7		0.00	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375	D3230	8.33		0.31	
391		----		----	
398	D3230	6.4		-0.14	
399	D3230	2.96		-0.94	
402	D3230	8.017		0.24	
441	IP265	2.07		-1.15	
442	IP265	4.978		-0.47	
445	IP265	2		-1.17	
446		----		----	
447		----		----	
494		----		----	
495	D3230	8		0.24	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	D3230	7.593		0.14	
609		----		----	
613		----		----	
657	IP265	4.6		-0.56	
663		----		----	
704	D3230	8.6		0.38	
705		----		----	
732	INH-21534	17.88		2.55	
733	INH-21534	10.07		0.72	
739		----		----	
742		----		----	
750		----		----	
751	D3230	5.37		-0.38	
752	D3230	6.95		-0.01	
781	D3230	5.9		-0.26	
784	D3230	7.2		0.05	
862	D3230	7.8		0.19	
873	D3230	8		0.24	
874	D3230	7.6		0.14	
875		----		----	
904		----		----	
963	D3230	14.5		1.76	
974		----		----	
994		----		----	
995	D3230	6.783		-0.05	
996		----		----	
1016		----		----	
1023	D3230	8.9		0.45	
1038	D3230	5.9		-0.26	
1039	D3230	10		0.70	
1043	D3230	1.3		-1.33	
1056	IP265	10		0.70	
1065	D3230	6.6		-0.09	
1081	ICP	0.7		-1.47	
1089	IP265	7		0.00	
1106		----		----	
1108	D3230	2.8		-0.98	

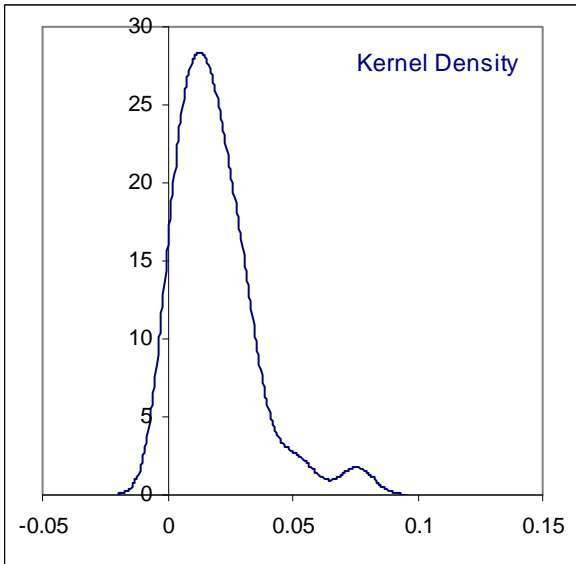
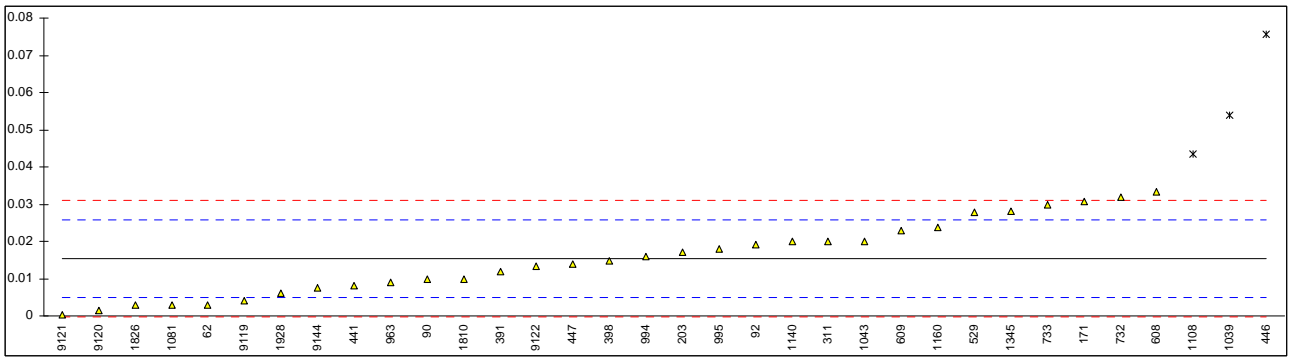
1109		----		----	
1140		----		----	
1160	IP265	4.3	ex	-0.63	reported 4.3 mg/L
1236	D3230	6.612		-0.09	
1248		----		----	
1259	D3230	9.3		0.54	
1264		----		----	
1287		----		----	
1337		----		----	
1345	D3230	5.6		-0.33	
1360	INH-6030	6.35		-0.15	
1379		----		----	
1403		----		----	
1412		----		----	
1419	in house	7.89		0.21	
1603		----		----	
1616		----		----	
1635	D3230	3.6		-0.79	
1658	D3230	0.00		-1.64	
1714	D3230	15		1.87	
1720	D3230	9.00		0.47	
1728	in house	6.41		-0.14	
1800		----		----	
1810	D3230	6.0		-0.23	
1811	INH-6030	8.8		0.42	
1815	D3230Mod.	6.09		-0.21	
1826	D3230	5		-0.47	
1833		----		----	
1842		----		----	
1928	INH-6030	6.78		-0.05	
1929	INH-6030	6.97		-0.01	
1930	DIN51576	8.9		0.45	
7004	D3230	3.1		-0.91	
7005	D3230	3.3		-0.86	
9050		----		----	
9051		----		----	
9052		----		----	
9053		----		----	
9057		----		----	
9060		----		----	
9100		----		----	
9101		----		----	
9102	D3230	1.0		-1.40	
9103		----		----	
9104	D4929	373.8	G(0.01)	85.90	
9105		----		----	
9106		----		----	
9107		----		----	
9108		----		----	
9116	D3230	1.6		-1.26	
9117		----		----	
9118		----		----	
9119	GOST21534	12.08		1.19	
9120	GOST21534	16.16		2.15	
9121		----		----	
9122	D3230	12.9		1.38	
9123	D3230	4.95		-0.48	
9125		----		----	
9126		----		----	
9132		----		----	
9133		----		----	
9134		----		----	
9135		----		----	
9136		----		----	
9137		----		----	
9138		----		----	
9139		----		----	
9142		----		----	
9143		----		----	
9144	D3230	3.72		-0.77	
9145		----		----	
	normality	not OK			
	n	61			
	outliers	1			
	mean (n)	6.994			
	st.dev. (n)	3.9248			
	R(calc.)	10.990			
	R(D3230:10)	11.957			Compare R(D6470:04) = 5.591



## Determination of Sediment ASTM D4807 on sample #1080; results in %M/M

lab	method	value	mark	z(targ)	remarks
62	D4807	0.003		-2.38	
78		----		----	
90	D4807	0.0098		-1.08	
92	D4807	0.019		0.69	
140		----		----	
150		----		----	
154		----		----	
158		----		----	
159		----		----	
171	D4807	0.03075		2.94	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203	D4807	0.017		0.31	
225		----		----	
238		----		----	
273		----		----	
311	D4807	0.020		0.88	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391	D4807	0.012		-0.65	
398	D4807	0.0148		-0.12	
399		----		----	
402		----		----	
441	D4807	0.008		-1.42	
442		----		----	
445		----		----	
446	D4807	0.07558	G(0.01)	11.54	
447	D4807	0.0138		-0.31	
494		----		----	
495		----		----	
529	D4807	0.0279		2.40	
541		----		----	
593		----		----	
602		----		----	
608	D4807	0.0334		3.45	
609	D4807	0.0230		1.46	
613		----		----	
657		----		----	
663		----		----	
704		----		----	
705		----		----	
732	D4807	0.032		3.18	
733	D4807	0.03		2.80	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781		----		----	
784		----		----	
862		----		----	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963	D4807	0.0089		-1.25	
974		----		----	
994	D4807	0.016		0.11	
995	D4807	0.018		0.50	
996		----		----	
1016		----		----	
1023		----		----	
1038		----		----	
1039	D4807	0.054	DG(0.05)	7.40	
1043	ISO3735	0.02		0.88	
1056		----		----	
1065		----		----	
1081	in house	0.003		-2.38	
1089		----		----	
1106		----		----	
1108	D4807	0.0436	DG(0.05)	5.41	

1109		----	----
1140	D4807	0.02	0.88
1160	D4807	0.0238	1.61
1236		----	----
1248		----	----
1259		----	----
1264		----	----
1287		----	----
1337		----	----
1345	D4807	0.028	2.42
1360	INH-6080	<0.005	<-2.00
1379		----	----
1403		----	----
1412		----	----
1419		----	----
1603		----	----
1616		----	----
1635		----	----
1658		----	----
1714		----	----
1720		----	----
1728		----	----
1800		----	----
1810	D4807	0.01	-1.04
1811		----	----
1815		----	----
1826	D4807	0.003	-2.38
1833		----	----
1842		----	----
1928	INH-6080	0.0060	-1.80
1929	INH-6080	<0.005	<-2.00
1930		----	----
7004		----	----
7005		----	----
9050		----	----
9051		----	----
9052		----	----
9053		----	----
9057		----	----
9060		----	----
9100		----	----
9101		----	----
9102		----	----
9103		----	----
9104		----	----
9105		----	----
9106		----	----
9107		----	----
9108		----	----
9116		----	----
9117		----	----
9118		----	----
9119	GOST6370	0.0040	-2.19
9120	GOST6370	0.0015	-2.67
9121	D4807	0.00019	-2.92
9122	D4807	0.0133	-0.40
9123		----	----
9125		----	----
9126		----	----
9132		----	----
9133		----	----
9134		----	----
9135		----	----
9136		----	----
9137		----	----
9138		----	----
9139		----	----
9142		----	----
9143		----	----
9144	D4807	0.00745	-1.53
9145		----	----
	normality	OK	
	n	31	
	outliers	3	
	mean (n)	0.01541	
	st.dev. (n)	0.009868	
	R(calc.)	0.02763	
	R(D4807:05e1)	0.01460	



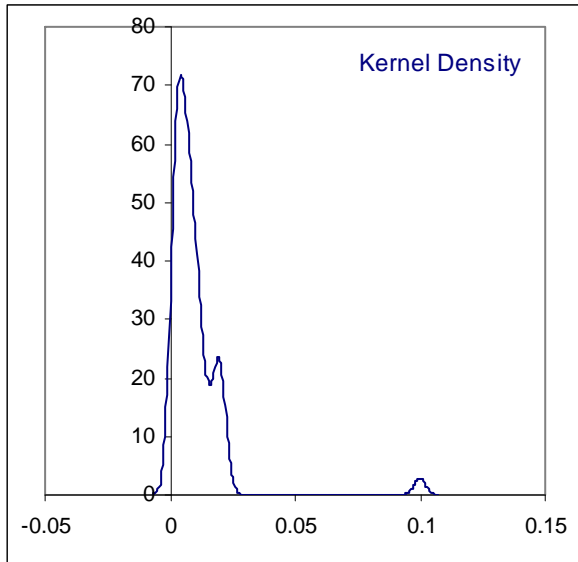
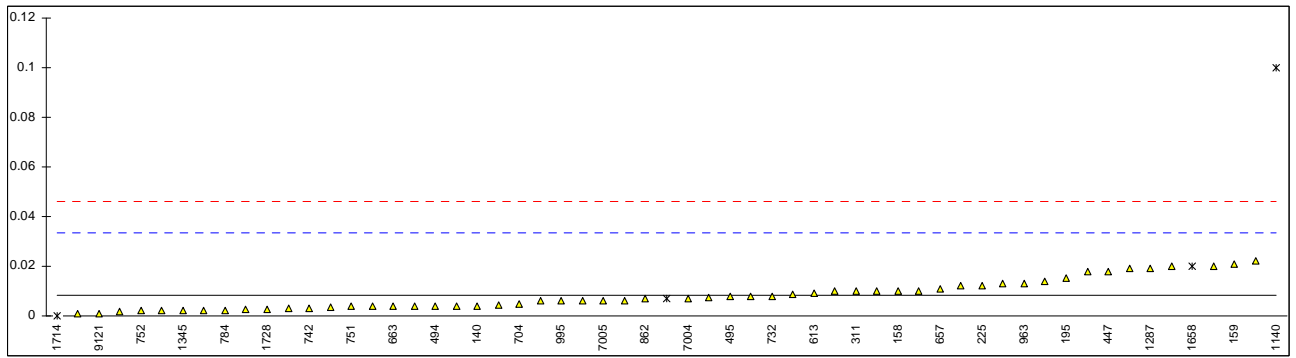
Determination of Sediment ASTM D473 on sample #1080; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90	D473	0.0043		-0.32	
92	D473	0.018		0.77	
140	D473	0.004		-0.34	
150		----		----	
154		----		----	
158	D473	0.01		0.13	
159	D473	0.021		1.01	
171	D473	0.00308		-0.42	
175	D473	0.008		-0.03	
180		----		----	
193		----		----	
195	D473	0.0153		0.56	
199		----		----	
203	D473	0.01		0.13	
225	D473	0.012		0.29	
238		----		----	
273		----		----	
311	D473	0.01		0.13	
314		----		----	
333	D473	<0.01		----	
334		----		----	
340		----		----	
375	D473	0.0036		-0.38	
391	D473	0.01		0.13	
398	D473	0.0062		-0.17	
399		----		----	
402	D473	0.012		0.29	
441	D473	0.02		0.93	
442		----		----	
445	D473	0.001		-0.58	
446		----		----	
447	D473	0.018		0.77	
494	D473	0.004		-0.34	
495	D473	0.008		-0.03	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	D473	0.0086		0.02	
609	D473	0.00172		-0.53	
613	D473	0.009		0.05	
657	D473	0.011		0.21	
663	D473	0.004		-0.34	
704	D473	0.005		-0.26	
705		----		----	
732	D473	0.008		-0.03	
733	D473	0.006		-0.18	
739		----		----	
742	D473	0.0031		-0.42	
750	D473	0.0026		-0.46	
751	D473	0.004		-0.34	
752	D473	0.002		-0.50	
781	D473	0.002		-0.50	
784	D473	0.00225		-0.48	
862	D473	0.007		-0.10	
873	D473	0.004		-0.34	
874	D473	0.0073		-0.08	
875	D473	0.00216		-0.49	
904		----		----	
963	D473	0.013		0.37	
974		----		----	
994	D473	0.0061		-0.18	
995	D473	0.006		-0.18	
996	D473	0.014		0.45	
1016		----		----	
1023		----		----	
1038		----		----	
1039		----		----	
1043	D473	0.02		0.93	
1056		----		----	
1065		----		----	
1081		----		----	
1089	D473	0.004		-0.34	
1106		----		----	
1108		----		----	

1109	D473	0.010		0.13	
1140	D473	0.10	G(0.01)	7.31	
1160		----		----	
1236		----		----	
1248		----		----	
1259		----		----	
1264	D473	0.022	C	1.09	first reported 0.051 %M/M
1287	D473	0.019		0.85	
1337		----		----	
1345	D473	0.002		-0.50	
1360		----		----	
1379		----		----	
1403		----		----	
1412		----		----	
1419		----		----	
1603		----		----	
1616		----		----	
1635	D473	<0.05		----	
1658	D473	0.02	ex	0.93	reported 0.02 %M/M
1714	D473	0	ex	-0.66	zero is not a real result
1720		----		----	
1728	D473	0.00268		-0.45	
1800		----		----	
1810		----		----	
1811		----		----	
1815		----		----	
1826	D473M	0.004		-0.34	
1833		----		----	
1842		----		----	
1928		----		----	
1929		----		----	
1930		----		----	
7004	D473	0.00712		-0.10	
7005	D473	0.00619		-0.17	
9050		----		----	
9051		----		----	
9052		----		----	
9053		----		----	
9057		----		----	
9060		----		----	
9100		----		----	
9101		----		----	
9102		----		----	
9103		----		----	
9104		----		----	
9105		----		----	
9106		----		----	
9107	D473	0.007	ex	-0.10	reported 0.007 %M/M
9108		----		----	
9116	D473	<0.01		----	reported in %M/M
9117		----		----	
9118		----		----	
9119		----		----	
9120		----		----	
9121	D473	0.00108		-0.58	
9122	D473	0.019		0.85	
9123	D473	0.013		0.37	
9125		----		----	
9126		----		----	
9132		----		----	
9133		----		----	
9134		----		----	
9135		----		----	
9136		----		----	
9137		----		----	
9138		----		----	
9139		----		----	
9142		----		----	
9143		----		----	
9144		----		----	
9145		----		----	

normality not OK  
n 55  
outliers 1  
mean (n) 0.00832  
st.dev. (n) 0.005905  
R(calc.) 0.01653  
R(D473:07) 0.03512

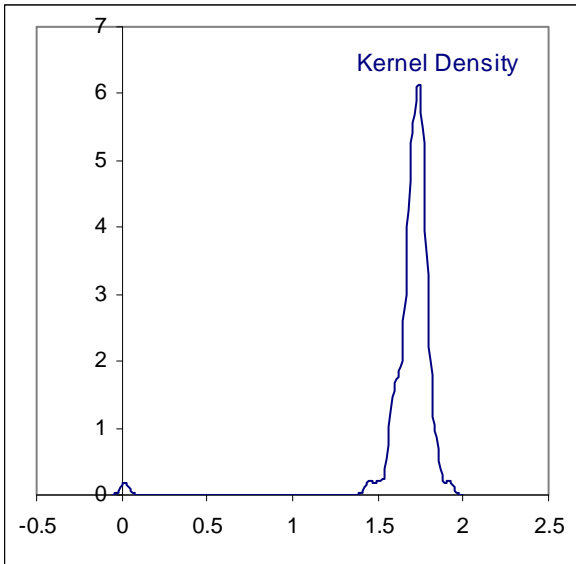
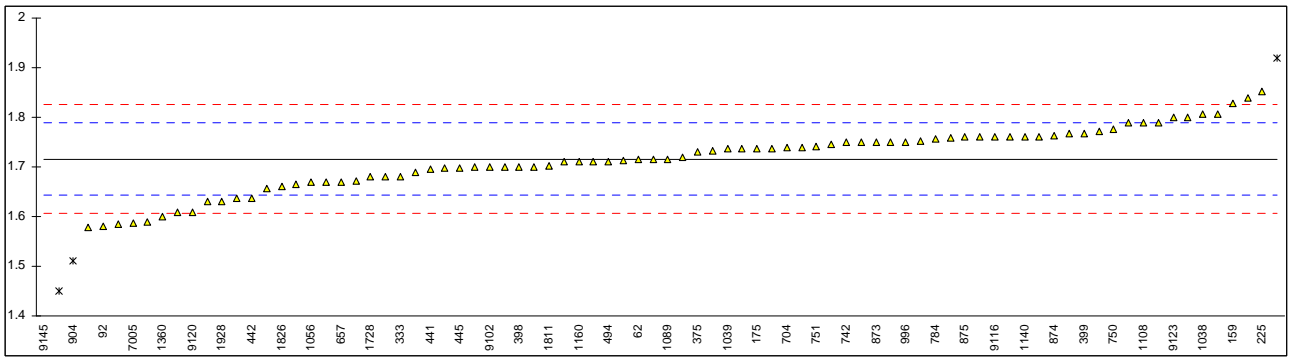




## Determination of Sulphur on sample #1080; results in %M/M

lab	method	value	mark	z(targ)	remarks
62	D4294	1.715		-0.02	
78		----		----	
90	D4294	1.807		2.48	
92	D4294	1.580		-3.70	
140	D4294	1.750		0.93	
150	D4294	1.760		1.20	
154		----		----	
158	D4294	1.70		-0.43	
159	D4294	1.82796		3.05	
171	D4294	1.738		0.60	
175	D4294	1.737		0.57	
180		----		----	
193	D4294	1.671		-1.22	
195	D4294	1.7667		1.38	
199		----		----	
203	D4294	1.75		0.93	
225	D4294	1.852		3.70	
238		----		----	
273		----		----	
311	D4294	1.63		-2.34	
314		----		----	
333	D2622	1.68		-0.98	
334	D4294	1.714		-0.05	
340		----		----	
375	D4294	1.73		0.38	
391	D4294	1.74		0.66	
398	D4294	1.700		-0.43	
399	D4294	1.767		1.39	
402		----		----	
441	IP336	1.695		-0.57	
442	IP336	1.637		-2.15	
445	D4294	1.697		-0.51	
446		----		----	
447	IP336	1.771		1.50	
494	D4294	1.71		-0.16	
495	D4294	1.657		-1.60	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	D4294	1.699		-0.46	
609	D4294	1.589		-3.45	
613		----		----	
657	D4294	1.67		-1.25	
663		----		----	
704	D4294	1.739		0.63	
705		----		----	
732	D4294	1.666		-1.36	
733		----		----	
739		----		----	
742	D4294	1.749		0.90	
750	D4294	1.776		1.64	
751	D4294	1.741		0.68	
752	D4294	1.753		1.01	
781	D4294	1.761		1.23	
784	D4294	1.756		1.09	
862	D2622	1.745		0.79	
873	D4294	1.75		0.93	
874	D4294	1.763		1.28	
875	D4294	1.76		1.20	
904	D4294	1.51	G(0.05)	-5.60	
963		----		----	
974		----		----	
994	D4294	1.736		0.55	
995	D4294	1.732		0.44	
996	D4294	1.751		0.96	
1016	D2622	1.715		-0.02	
1023	IP336	1.79		2.02	
1038	D4294	1.806		2.45	
1039	D2622	1.736		0.55	
1043	ISO8754	1.72		0.11	
1056	IP336	1.67	C	-1.25	first reported 1.92
1065	IP336	1.71		-0.16	
1081	D2622	1.70		-0.43	
1089	D4294	1.715	C	-0.02	first reported 1.415
1106		----		----	
1108	D4294	1.79		2.02	

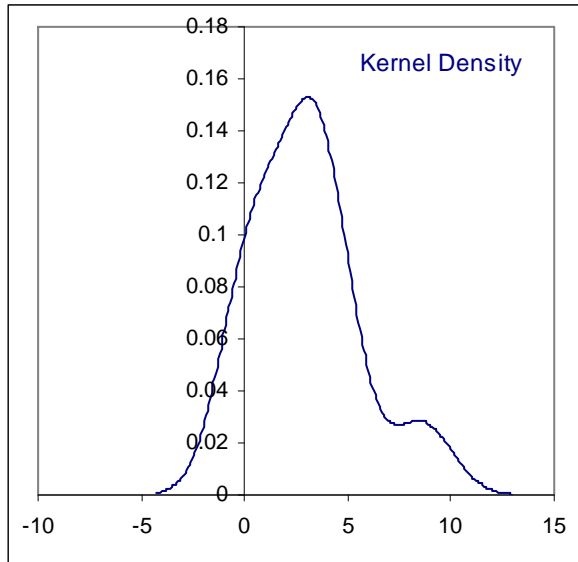
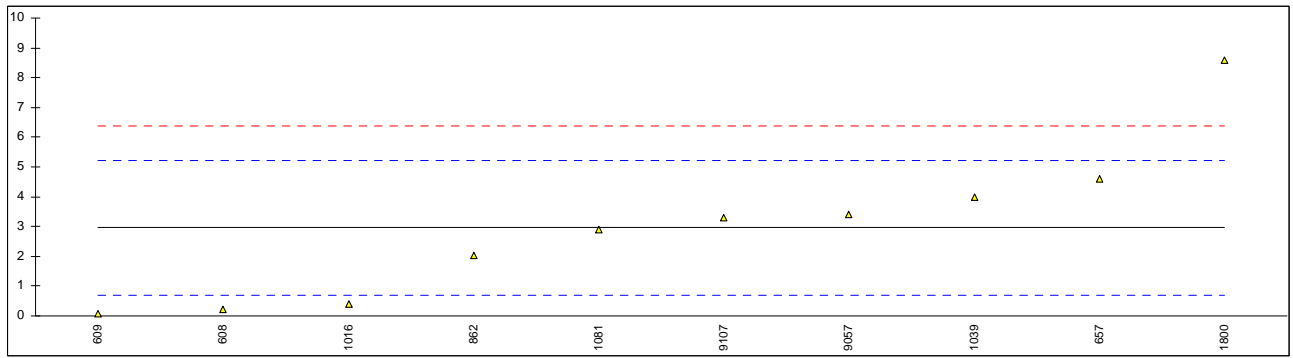
1109	D4294	1.579		-3.72	
1140	D4294	1.76		1.20	
1160	IP336	1.71		-0.16	
1236		----		----	
1248		----		----	
1259	ISO8754	1.45	G(0.05)	-7.23	
1264	D4294	1.80	C	2.29	first reported 2.262
1287		----		----	
1337	D4294	1.758		1.15	
1345	D4294	1.76	C	1.20	first reported 1.870
1360	ISO8754	1.60		-3.15	
1379		----		----	
1403		----		----	
1412	D4294	1.636		-2.17	
1419		----		----	
1603	in house	1.585		-3.56	
1616		----		----	
1635	D4294	1.84		3.38	
1658	D4294	n.d.		----	
1714	D2622	1.71		-0.16	
1720	D4294	1.69	C	-0.70	first reported 1.479
1728	D4294	1.68	C	-0.98	first reported 1.525
1800		----		----	
1810	D4294	1.68		-0.98	
1811	D4294	1.703		-0.35	
1815	D5453Mod.	>1.0		----	
1826	D4294	1.66		-1.52	
1833		----		----	
1842		----		----	
1928	ISO8754	1.63		-2.34	
1929	ISO8754	1.67		-1.25	
1930		----		----	
7004	D4294	1.6084		-2.92	
7005	D4294	1.5859		-3.54	
9050		----		----	
9051		----		----	
9052		----		----	
9053		----		----	
9057		----		----	
9060		----		----	
9100		----		----	
9101		----		----	
9102	D4294	1.7		-0.43	
9103		----		----	
9104		----		----	
9105		----		----	
9106		----		----	
9107		----		----	
9108		----		----	
9116	D4294	1.76		1.20	
9117		----		----	
9118		----		----	
9119		----		----	
9120	GOST51947	1.6087		-2.92	
9121	D4294	1.7902		2.02	
9122	D4294	1.9200	G(0.05)	5.55	
9123	D4294	1.80		2.29	
9125		----		----	
9126		----		----	
9132		----		----	
9133		----		----	
9134		----		----	
9135		----		----	
9136		----		----	
9137		----		----	
9138		----		----	
9139		----		----	
9142		----		----	
9143		----		----	
9144	D4294	1.697		-0.51	
9145	D4294	0.01748	G(0.01)	-46.21	
	normality	OK			
	n	80			
	outliers	4			
	mean (n)	1.7159			
	st.dev. (n)	0.06271			
	R(calc.)	0.1756			
	R(D4294:10)	0.1029			



Determination of Mercury on sample #1080; results in µg/kg

lab	method	value	mark	z(targ)	remarks
62		----		----	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150		----		----	
154		----		----	
158		----		----	
159		----		----	
171	ICP	<100		----	
175		----		----	
180		----		----	
193		----		----	
195		----		----	
199		----		----	
203		----		----	
225		----		----	
238		----		----	
273		----		----	
311		----		----	
314		----		----	
333		----		----	
334		----		----	
340		----		----	
375		----		----	
391		----		----	
398		----		----	
399		----		----	
402		----		----	
441		----		----	
442		----		----	
445		----		----	
446		----		----	
447		----		----	
494		----		----	
495		----		----	
529		----		----	
541		----		----	
593		----		----	
602		----		----	
608	INH-010	0.221		-2.41	
609	UOP938	0.06987		-2.54	
613		----		----	
657	UOP938	4.6	C	1.45	first reported 3.1
663		----		----	
704		----		----	
705		----		----	
732		----		----	
733		----		----	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752		----		----	
781		----		----	
784		----		----	
862	UOP938	2.04		-0.80	
873		----		----	
874		----		----	
875		----		----	
904		----		----	
963		----		----	
974		----		----	
994		----		----	
995		----		----	
996		----		----	
1016	UOP938	0.4		-2.25	
1023		----		----	
1038		----		----	
1039	UOP938	4		0.92	
1043		----		----	
1056		----		----	
1065		----		----	
1081	in house	2.9		-0.05	
1089		<1		----	
1106		----		----	
1108		----		----	

1109		----	----
1140		----	----
1160		----	----
1236		----	----
1248		----	----
1259		----	----
1264		----	----
1287		----	----
1337		----	----
1345		----	----
1360		----	----
1379		----	----
1403		----	----
1412		----	----
1419		----	----
1603		----	----
1616		----	----
1635		----	----
1658		n.d.	----
1714	in house	<0.01	----
1720		----	----
1728		----	----
1800	in house	8.6	4.97
1810		----	----
1811		----	----
1815		----	----
1826	AAS	<0.1	----
1833		----	----
1842		----	----
1928		----	----
1929		----	----
1930		----	----
7004		----	----
7005		----	----
9050		----	----
9051		----	----
9052		----	----
9053		----	----
9057	UOP938	3.4	0.39
9060		----	----
9100		----	----
9101		----	----
9102		----	----
9103		----	----
9104		----	----
9105		----	----
9106		----	----
9107	UOP938	3.307	0.31
9108		----	----
9116		----	----
9117		----	----
9118		----	----
9119		----	----
9120		----	----
9121		----	----
9122		----	----
9123		----	----
9125		----	----
9126		----	----
9132		----	----
9133		----	----
9134		----	----
9135		----	----
9136		----	----
9137		----	----
9138		----	----
9139		----	----
9142		----	----
9143		----	----
9144		----	----
9145		----	----
	normality	OK	
	n	10	
	outliers	0	
	mean (n)	2.954	
	st.dev. (n)	2.5637	
	R(calc.)	7.178	
	R(Horwitz)	3.180	

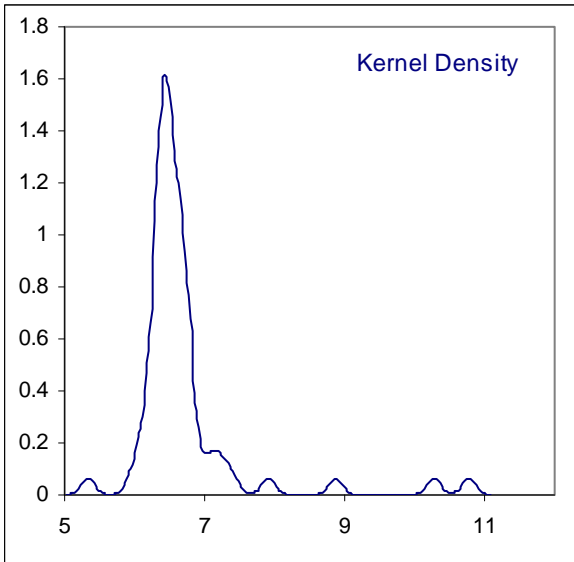
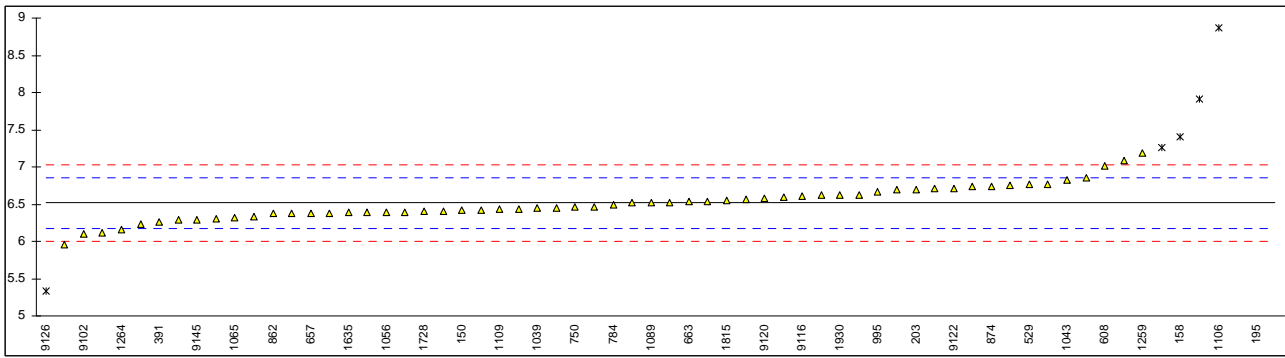


Determination of Kinematic Viscosity @ 40 °C on sample #1080; results in mm<sup>2</sup>/s

lab	method	value	mark	z(targ)	remarks
62	D445	6.516		0.01	
78		----		----	
90		----		----	
92		----		----	
140		----		----	
150	D445	6.415		-0.58	
154		----		----	
158	D445	7.4	DG(0.05)	5.14	
159		----		----	
171	D445	6.768		1.47	
175		----		----	
180		----		----	
193	D445	278.25	G(0.01)	1578.30	
195	D445	10.78	C,G(0.01)	24.77	first reported 7.580
199		----		----	
203	D445	6.700		1.08	
225	D445	6.595		0.47	
238		----		----	
273		----		----	
311	D445	6.405		-0.64	
314		----		----	
333	D445	6.616		0.59	
334		----		----	
340		----		----	
375		----		----	
391	D445	6.261		-1.47	
398	D445	6.3961		-0.69	
399	D445	6.116		-2.31	
402		----		----	
441		----		----	
442	D445	6.389		-0.73	
445	D445	6.7045		1.10	
446		----		----	
447		----		----	
494		----		----	
495		----		----	
529	D445	6.7646		1.45	
541		----		----	
593		----		----	
602		----		----	
608	D445	7.0107		2.88	
609	D7042	6.2324		-1.64	
613		----		----	
657	D445	6.382		-0.77	
663	D445	6.529		0.08	
704	D445	6.5271		0.07	
705		----		----	
732	D445	6.7540		1.39	
733		----		----	
739		----		----	
742	D445	6.4710		-0.25	
750	D445	6.4585		-0.33	
751		----		----	
752		----		----	
781	D445	6.732		1.26	
784	D445	6.494		-0.12	
862	D445	6.3764		-0.80	
873		----		----	
874	D445	6.7390		1.30	
875	D445	6.455		-0.35	
904	D445	5.96		-3.22	
963		----		----	
974		----		----	
994	D445	6.426		-0.51	
995	D445	6.661		0.85	
996		----		----	
1016		----		----	
1023	D445	6.43		-0.49	
1038		----		----	
1039	D445	6.454		-0.35	
1043	DIN51562	6.82		1.77	
1056	D445	6.39		-0.72	
1065	D445	6.319		-1.14	
1081		----		----	
1089	D445	6.520		0.03	
1106	D445	8.8705	G(0.01)	13.68	
1108	D445	6.302		-1.23	



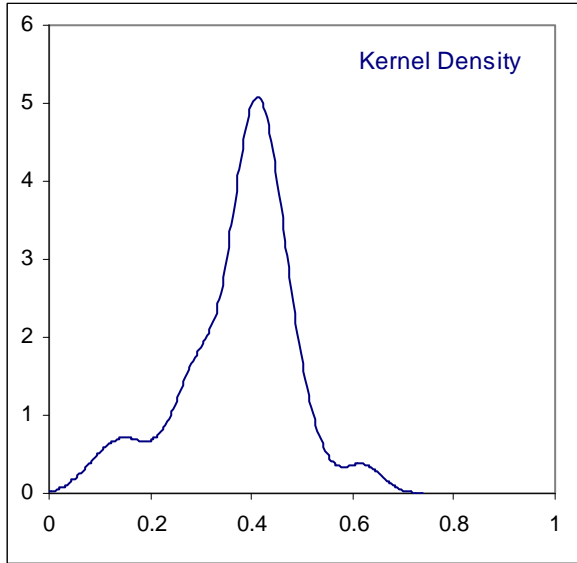
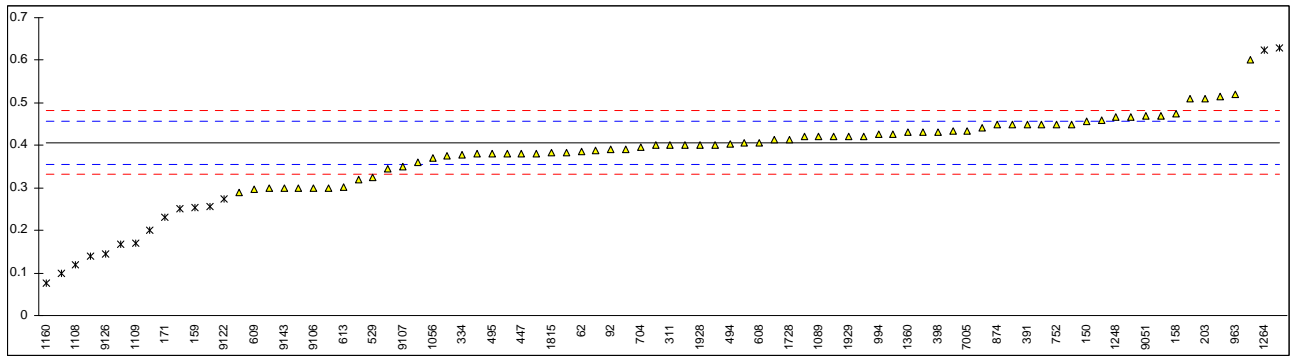
1109	D445	6.4281		-0.50
1140	D445	6.538		0.14
1160	IP71	6.564		0.29
1236		----		----
1248	IP71Mod.	6.8523		1.96
1259	ISO3104	7.18898		3.92
1264	D7042	6.163		-2.04
1287		----		----
1337		----		----
1345	D445	6.384		-0.76
1360		----		----
1379		----		----
1403		----		----
1412		----		----
1419		----		----
1603		----		----
1616		----		----
1635	D445	6.385		-0.75
1658	D445	6.690		1.02
1714	D445	7.2629	DG(0.05)	4.35
1720	D445	10.28	G(0.01)	21.87
1728	D445	6.4		-0.67
1800		----		----
1810		----		----
1811		----		----
1815	ISO3104	6.5495		0.20
1826	D445	6.283		-1.34
1833		----		----
1842		----		----
1928		----		----
1929		----		----
1930	DIN51562	6.62		0.61
7004		----		----
7005	D445	7.0909		3.35
9050		----		----
9051		----		----
9052		----		----
9053		----		----
9057		----		----
9060		----		----
9100		----		----
9101		----		----
9102	D445	6.1		-2.41
9103		----		----
9104		----		----
9105		----		----
9106		----		----
9107	D445	7.913	G(0.01)	8.12
9108		----		----
9116	D445	6.502		0.51
9117		----		----
9118		----		----
9119		----		----
9120	GOST33-200	6.5795		0.38
9121	D445	6.3354		-1.04
9122	D445	6.7080		1.12
9123	D445	6.626		0.65
9125		----		----
9126	D7042	5.3343	G(0.05)	-6.86
9132		----		----
9133		----		----
9134		----		----
9135		----		----
9136		----		----
9137		----		----
9138		----		----
9139		----		----
9142		----		----
9143		----		----
9144	D445	6.3800		-0.78
9145	D445	6.2853		-1.33
	normality	OK		
	n	58		
	outliers	8		
	mean (n)	6.51452		
	st.dev. (n)	0.232103		
	R(calc.)	0.64989		
	R(D445:09)	0.48208		



## Determination of Water on sample #1080; results in %V/V

lab	method	value	mark	z(targ)	remarks
62	D4928	0.385	C	-0.85	first reported 0.185
78		----		----	
90	D4928	0.389		-0.69	
92	D4377	0.39		-0.65	
140	D4928	0.3760		-1.21	
150	D4377	0.457		2.01	
154		----		----	
158	D4006	0.475		2.73	
159	D4377	0.2536	ex, C	-6.08	first reported 0.20134, manually excluded, see §4.1
171	D4377	0.2310	ex, C	-6.98	first reported 0.5767, manually excluded, see §4.1
175		----		----	
180		----		----	
193	D4006	0.30		-4.23	
195	D4377	0.3904	C	-0.64	first reported 0.1032
199		----		----	
203	D4928	0.51		4.12	
225	D4006	0.250	ex	-6.22	manually excluded, see §4.1
238		----		----	
273	D4928	0.421		0.58	
311	D4377	0.40		-0.26	
314	D4928	0.401		-0.22	
333		----		----	
334	D4377	0.377	C	-1.17	first reported 0.577
340		----		----	
375		----		----	
391	D4006	0.45		1.73	
398	D4377	0.431		0.98	
399		----		----	
402		----		----	
441	D4928	0.38		-1.05	
442	IP386	0.4328		1.05	
445		----		----	
446	IP386	0.431		0.98	
447	IP386	0.38		-1.05	
494	D4928	0.404		-0.10	
495	D4928	0.38		-1.05	
529	D4377	0.3249		-3.24	
541		----		----	
593		----		----	
602		----		----	
608	D4377	0.4069		0.02	
609	D4377	0.297		-4.35	
613	D4928	0.30207	C	-4.15	first reported 0.19087
657	D4377	0.60	C	7.70	first reported 0.28
663		----		----	
704	D4377	0.396		-0.41	
705		----		----	
732	inh-2477	0.30		-4.23	
733	D6304	0.40		-0.26	
739		----		----	
742		----		----	
750		----		----	
751		----		----	
752	D4006	0.450		1.73	
781		----		----	
784		----		----	
862	D4006	0.4702		2.54	
873	D4006	0.45		1.73	
874	D4006	0.450		1.73	
875		----		----	
904	D4928	0.45		1.73	
963	D4928	0.520		4.52	
974		----		----	
994	D4006	0.425		0.74	
995	D6304	0.4129		0.26	
996		----		----	
1016		----		----	
1023		----		----	
1038		----		----	
1039	D4928	0.42		0.54	
1043	DIN51777	0.63	DG(0.05)	8.90	first reported 0.14
1056	D4928Calc	0.37		-1.45	
1065		----		----	
1081	ISO12937	0.38		-1.05	
1089	D4377	0.42		0.54	
1106		----		----	
1108	D4377	0.12	ex	-11.40	manually excluded, see §4.1

1109	D6304	0.171	ex	-9.37	manually excluded, see §4.1
1140	D4377	0.10	ex	-12.19	manually excluded, see §4.1
1160	IP386	0.076	ex	-13.15	first reported 0.089, manually excluded, see §4.1
1236	D4928	0.458		2.05	
1248	D4928Mod.	0.467		2.41	
1259		----		----	
1264	D4377	0.6239	DG(0.05)	8.65	first reported 0.2874
1287		----		----	
1337		----		----	
1345	D4928	0.405		-0.06	
1360	D4377	0.43		0.94	
1379		----		----	
1403		----		----	
1412	D4928	0.4404		1.35	
1419	ISO9029	0.345		-2.44	
1603		----		----	
1616		----		----	
1635	D4007	<0.05		----	false negative?
1658	D4006	0.30		-4.23	
1714	D4006	0.256	ex	-5.98	manually excluded, see §4.1
1720	D4006	0.20	ex	-8.21	manually excluded, see §4.1
1728	D4377	0.4134		0.28	
1800	in house	0.380		-1.05	
1810	D4377	0.51		4.12	
1811	D4377	0.42		0.54	
1815	ISO10337	0.3829		-0.94	
1826	D6304	0.40		-0.26	
1833		----		----	
1842		----		----	
1928	D4377	0.40		-0.26	
1929	D4377	0.42		0.54	
1930	DIN51777	0.3835		-0.91	
7004	D4006	0.425		0.74	
7005	D4928	0.4345		1.12	
9050	D4006	0.515		4.32	
9051	D4006	0.47		2.53	
9052		----		----	
9053	D4006	0.29		-4.63	
9057		----		----	
9060	D4006	0.36		-1.85	
9100		----		----	
9101		----		----	
9102	D4928	0.14	ex	-10.60	manually excluded, see §4.1
9103		----		----	
9104		----		----	
9105		----		----	
9106	D4006	0.3		-4.23	
9107	D4928	0.35		-2.24	
9108		----		----	
9116		----		----	
9117		----		----	
9118		----		----	
9119	in house	0.45		1.73	
9120	in house	0.4674		2.43	
9121		----		----	
9122	D4928	0.274	ex	-5.27	manually excluded, see §4.1
9123	D4928	0.167	ex	-9.53	manually excluded, see §4.1
9125		----		----	
9126	D4377	0.145	ex	-10.40	manually excluded, see §4.1
9132		----		----	
9133		----		----	
9134		----		----	
9135		----		----	
9136		----		----	
9137		----		----	
9138		----		----	
9139		----		----	
9142	D4006	0.320		-3.44	
9143	D4006	0.300		-4.23	
9144		----		----	
9145		----		----	
	normality	OK			
	n	69			
	outliers	2	<u>Spike:</u>		
	mean (n)	0.406	0.350		
	st.dev. (n)	0.0609			
	R(calc.)	0.170			
	R(D4377:06)	0.070			



## APPENDIX 2

### Number of participants per country

1 lab in ARGENTINA  
3 labs in AUSTRALIA  
2 labs in AZERBAIJAN  
1 lab in BAHAMAS  
1 lab in BELARUS REPUBLIC  
7 labs in CANADA  
1 lab in CÔTE D'IVOIRE  
2 labs in CROATIA  
2 labs in CZECH REPUBLIC  
1 lab in ECUADOR  
1 lab in EGYPT  
3 labs in FRANCE  
1 lab in GABON  
3 labs in GEORGIA  
5 labs in GERMANY  
1 lab in GREECE  
2 labs in IRAN  
1 lab in ISRAEL  
4 labs in ITALY  
2 labs in KAZAKHSTAN  
5 labs in MALAYSIA  
1 lab in MEXICO  
1 lab in NEGARA BRUNEI DARUSSALAM  
10 labs in NIGERIA  
4 labs in NORWAY  
8 labs in OMAN  
1 lab in P.R. of CHINA  
1 lab in POLAND  
1 lab in QATAR  
2 labs in ROMANIA  
14 labs in RUSSIA  
1 lab in SAUDI ARABIA  
1 lab in SINGAPORE  
1 lab in SLOVAK REPUBLIC  
3 labs in SLOVAKIA  
1 lab in SOUTH AFRICA  
1 lab in SOUTH KOREA  
2 labs 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.  
2 labs in U.S. VIRGIN ISLANDS  
13 labs in U.S.A.  
2 labs in UKRAINE  
14 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
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/>).