Results of Proficiency Test
Crude Oil
November 2017

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Authors: ing. A.S. Noordman-de Neef & ing. A. Lewinska
Correctors: dr. R.G. Visser & ing. R.J. Starink

Report: iis17R01

February 2018

-- empty page --

CONTENTS

1 INTRODUCTION

Since 1998, the Institute for Interlaboratory Studies (iis) organizes a proficiency test (PT) for Crude Oil every year. During the annual proficiency testing program 2017/2018, it was decided to continue the round robin for the analysis of Crude Oil. In this interlaboratory study 145 laboratories from 51 different countries registered for participation. See appendix 3 for the number of participants per country.
In this report, the results of the 2017 Crude Oil proficiency test are presented and discussed. This report is also available as PDF from the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies in Spijkenisse, The Netherlands, was the organiser of this proficiency test. Sample analyses for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. It was decided to send two different samples of Crude Oil: approx. 1 litre of Crude Oil, labelled #17215, in a one liter wide-necked bottle to enable use of a large size diameter high speed shear mixer for homogenisation and one 40ml vial, labelled #17216, for Mercury (Hg) only. The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC 17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the 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 March 2017(iis-protocol, version 3.4). This protocol can be downloaded from the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

The necessary bulk material was obtained from a local refinery. The approx. 200 litre of Crude Oil was homogenised in a metal drum. After homogenisation, the material was transferred to 200 wide-neck transparent colourless glass bottles of 1 L and labelled #17215.
The water content of the original Crude Oil was low (<0.05 %M/M). Therefore, each one litre subsample was enriched with 1 mL water per bottle by means of a calibrated FINN pipette.

The homogeneity of the subsamples was checked by the determination of Density at 15 °C in accordance of ASTM D5002 and the determination of Water in accordance of ASTM D4928 on 7 stratified randomly selected samples.

	Density at 15 °C in kg/m^3	Water in M/M%
Sample #17215-1	873.05	0.15
Sample #17215-2	873.09	0.16
Sample #17215-3	873.13	0.16
Sample #17215-4	872.87	0.15
Sample #17215-5	873.04	0.15
Sample #17215-6	873.17	0.15
Sample #17215-7	872.99	0.16

Table 1: homogeneity test results of subsamples #17215

The repeatabilities (r) were calculated from the test results of table 1 and compared with 0.3 times the corresponding reproducibilities (R) of the reference test methods in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density at 15 °C in kg/m^3	Water in M/M%
r (observed)	0.28	0.015
reference test method	ASTM D5002:16	ASTM D4377:00(2011)
0.3*R (ref.test method)	1.08	0.018

Table 2: evaluation of the repeatabilities on subsamples #17215

The calculated repeatabilities is less than 0.3 times the corresponding reproducibilities of the reference test methods. Therefore, homogeneity of the subsamples #17215 was assumed.

Because the Crude Oil used for samples #17215 did not contain a detectable concentration mercury, 8 liters of Crude oil was taken from the original batch and spiked with 1.0 grams Conostan Hg std (100mg/kg) and with 0.27 ml of a 5.2 mg/ml $HgCl_2$ in Methanol solution especially for Mercury determination. After homogenisation, 201 amber glass vials of 40 ml were filled with the spiked Crude Oil and labelled #17216. The homogeneity of subsamples #17216 was checked by determination of Mercury in accordance with UOP938 on 8 stratified randomly selected samples, see next table.

	Mercury in µg/kg
sample #17216-1	28.32
sample #17216-2	28.01
sample #17216-3	27.71
sample #17216-4	28.03
sample #17216-5	28.32
sample #17216-6	29.24
sample #17216-7	29.31
sample #17216-8	30.15

Table 3: homogeneity test results of subsamples #17216

The repeatability (r) was calculated from the test results of table 3 and compared with 0.3 times the target reproducibility (R) of the target method in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Mercury in µg/kg
r (observed)	2.4
reference method	Horwitz
0.3*R (ref. method)	6.6

Table 4: evaluation of the repeatability on subsamples #17216

The calculated repeatability is less than 0.3 times the target reproducibility Therefore, homogeneity of the subsamples #17216 was assumed.

Because brown coloured wide-neck glass bottles of 1 L were not available, the (clear glass) bottles of 1 L were packed in red plastics bags. In the letter of instructions, all participants were asked to shield the samples from light before analysis.
To each of the participating laboratories one bottle of 1 L (labelled #17215) and one 40 ml vial (labelled #17216) were sent on October 18, 2017. An SDS was added to the sample package.

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 on sample #17215: Acid Number, API Gravity, BS&W, Density at 15°C, Kinematic Viscosity at 40°C, Light ends (C1-C6 and total C1-C6), Molecular Mass Average, Pour Point (Maximum), Salt as Chloride, Sediment by Extraction (ASTM D473) and Sediment by Membrane filtration (ASTM D4807), Sulphur total, Water content and simulated Distillation by high temp GC and on sample #17216: total Mercury.

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

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

3 RESULTS

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

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

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of March 2017 (iis-protocol, version 3.4).
For the statistical evaluation, the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as ‘<…’ or ‘>…’ were not used in the statistical evaluation.

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

According to ISO 5725 the original test results per determination were submitted to Dixon’s, Grubbs’ and/or Rosner’s outlier tests. Outliers are marked by D(0.01) for the Dixon’s test, by G(0.01) or DG(0.01) for the Grubbs’ test and by R(0.01) for the Rosner’s test. Stragglers are marked by D(0.05) for the Dixon’s test, by G(0.05) or DG(0.05) for the Grubbs’ test and by R(0.05) for the Rosner’s test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. When the uncertainty passed the evaluation, no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

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

3.2 GRAPHICS

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

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also a normal Gauss curve was projected over the Kernel Density Graph for reference.

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, EN or ISO reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation of this interlaboratory study. The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used. In some cases, a reproducibility based on former iis proficiency tests could be used.

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

The z-scores were calculated according to:

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

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

Absolute values for $z<2$ are very common and absolute values for $z>3$ are very rare.

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 sample dispatch problems were encountered during the execution. The samples to participants in Brazil, Colombia, Mexico, Peru, Russian Federation, Thailand and United States arrived late or did never reach the laboratories due to customs clearance and/or transportation problems. Nine laboratories reported after the deadline. In total 140 laboratories submitted 1234 numerical results. Observed were 60 statistically outlying test 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 SAMPLE AND PER TEST

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

In the iis PT reports, ASTM methods are referred to with a number (e.g. D4007) and an added designation for the year that the method was adopted or revised (e.g. D4007:11e1). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D4007:11e1(2016)). In the results tables of appendix 1 only the method number and year of adoption or revision e.g. D4007:11e1 are used.

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

Sample #17215

Acid Number: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D664-A:17.

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

BS&W: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D4007:11e1(2016).

Density: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5002:16. Several participants used ASTM D4052. It must be noted that in the scope of test method ASTM D4052 it is mentioned that ASTM D5002 is intended for crude oils (see e.g. §1.3 of ASTM D4052:16).

Kin.Visc.at 40°C: 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 D445:17a.

Light Ends: This determination was very problematic. In total fifteen statistical outliers were observed and twenty other test results were excluded over ten components. Only one (n-Pentane) of the ten calculated reproducibilities after rejection of the suspect data was in agreement with the requirements of IP344:88(2010).

Molecular Mass: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D2503:92(2016).

Pour Point: This determination was not problematic. Five numerical test results were excluded from the statistical evaluation as the reported test methods are in principle not suitable for Crude Oils (see for example the scope of the test method of ASTM D97). After exclusion of these test results, no statistical outliers were observed. The calculated reproducibility after rejection of the suspect test data is in agreement with the requirements of ASTM D5853A:17.

Salt as Chloride: This determination was not problematic. No statistical outliers were observed, but two test results are excluded from the statistical evaluation. However, the calculated reproducibility after the rejection of the suspect data is in full agreement with the requirements of ASTM D3230:13.

Sediment by Extraction (ASTM D473): This determination was not problematic. Two statistical outliers were observed and two other test results were excluded from the statistical evaluation. However, the calculated reproducibility after rejection of the suspect data is in good agreement with the requirements of ASTM D473:07e1(2017).

Sediment by Membrane filtration (ASTM D4807): The determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D4807:05(2015).

Sulphur: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D4294:16e1.

Water: This determination was very problematic. A known concentration of water was added to the subsamples (see §2.4) and therefore the minimum water concentration able to be determined was known (0.4%V/V=0.1%V/V-0.06%V/V$_{(R\ D4377)}$). However, 19! of the 113 laboratories reported a concentration lower than or equal to 0.4%V/V and these test results were rejected prior to statistical analysis. The reason for the reported low water concentrations may be insufficient homogenisation of the sample prior to sub sampling for analysis.
After the exclusion of the suspect data four statistical outliers were observed. Two other test results were reported in a different unit and therefore excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D4377:00(2011).

Simulated Distillation: This determination was very problematic. Only 19 labs reported test results for this determination. In total over eight parameters eleven statistical outliers were observed and seventeen other test values were excluded. However, none of the calculated reproducibilities after rejection of the suspect data was at all in agreement with the requirements of ASTM D7169:16.

Sample #17216

Mercury: This determination may not be problematic at the mercury concentration of 25 µg/kg. Two statistical outliers were observed. Regretfully no target reproducibility is available. ASTM D7623 and UOP938 gives only a repeatability. Furthermore, UOP938, used by most of the laboratories, is not intended to be used on crude oil. Also, the repeatability of UOP938 is only available for concentrations in µg/**L** and conversion to µg/**kg** will lead to extra uncertainty. Therefore, it was decided to use the Horwitz equation for evaluation of the test results in this report. The calculated reproducibility is in agreement with the estimated requirements using the Horwitz equation.

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 target reproducibilities derived from literature standards and the calculated reproducibilities are compared in the next table.

Parameter		unit	n	average	2.8 *sd_R	R (lit)
Acid Number (total)		mg KOH/g	69	0.15	0.10	0.16
API Gravity			91	30.4	0.3	0.5
BS&W		%V/V	55	0.08	0.14	0.18
Density at 15°C		kg/m^3	126	873.4	1.3	3.6
Kinematic Viscosity at 40°C		mm^2/s	75	9.99	0.91	0.74
Methane		%M/M	18	<0.01	n.a.	n.a.
Ethane		%M/M	16	0.018	0.014	0.007
Propane		%M/M	16	0.26	0.12	0.05
i-Butane		%M/M	16	0.18	0.05	0.03
n-Butane		%M/M	16	0.84	0.17	0.11
i-Pentane		%M/M	16	0.71	0.10	0.06
n-Pentane		%M/M	15	1.22	0.13	0.13
Cyclopentane		%M/M	12	0.06	0.04	0.01
total Hexanes		%M/M	10	2.93	0.84	0.45
Total C1-C6 Light Ends		%M/M	9	6.30	0.99	0.49
Molecular Mass, average		g/mol	5	234	15	14
Pour Point, Max.		°C	50	-27	16	18
Salt as Chloride		mg/kg	80	9.6	14.2	15.3
Sediment Extraction (D473)		%V/V	67	0.008	0.012	0.035
Sediment Membrane filt. (D4807)		%M/M	36	0.015	0.014	0.015
Total Sulphur		%M/M	103	2.60	0.20	0.13
Water		%V/V	88	0.13	0.10	0.06
Simulated Distillation	IBP	°C	10	5.2	74.7	2.5
	5%recovered	°C	15	72.7	30.7	19.6
	10%recovered	°C	15	114	25	20
	30%recovered	°C	15	246	34	13
	50%recovered	°C	15	360	52	16
	70%recovered	°C	14	494	50	21
	90%recovered	°C	13	662	101	n.a.
	FBP	°C	9	679	358	n.a.
Mercury (total)		µg/kg	19	24.8	9.8	19.4

Table 5: reproducibilities of tests on sample #17215 and #17216 (Hg only)

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2017 WITH PREVIOUS PTS

	November 2017	*November 2016*	*November 2015*	*November 2014*	*October 2013*
Number of reporting labs	140	136	129	133	125
Number of results reported	1234	1126	1077	985	827
Statistical outliers	60	60	26	44	36
Percentage outliers	4.9%	5.3%	2.4%	4.5%	4.4%

Table 6: 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 reference test methods. The conclusions are given the following table:

Determination	*November 2017*	*November 2016*	*November 2015*	*November 2014*	*October 2013*
Acid Number (total)	+	+	+	++	+
API Gravity	+	+	+/-	+	+
BS&W	+	+	-	++	-
Density at 15°C	++	++	++	++	++
Kinematic Viscosity at 40°C	-	-	-	+/-	--
Light Ends (C1-C6)	--	--	+/-	--	--
Molecular Mass, average	+/-	-	+	n.e.	n.e.
Pour Point, Max	+	+	-	+	--
Salt as Chloride	+/-	+	+ *)	+ *)	+ *)
Sediment Extraction (D473)	++	++	++	n.e.	n.e.
Sediment Membrane filt. (D4807)	+/-	--	--	-	-
Total Sulphur	-	-	--	+/-	--
Water	--	+/-	--	+/-	--
Simulated Distillation	--	--	--	n.e.	n.e.
Mercury (total)	(++)	(+)	(--)	(-)	(--)

Table 7: comparison determinations against the reference test method

NB: values between brackets is a comparison against Horwitz

*) Salt as NaCL

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

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

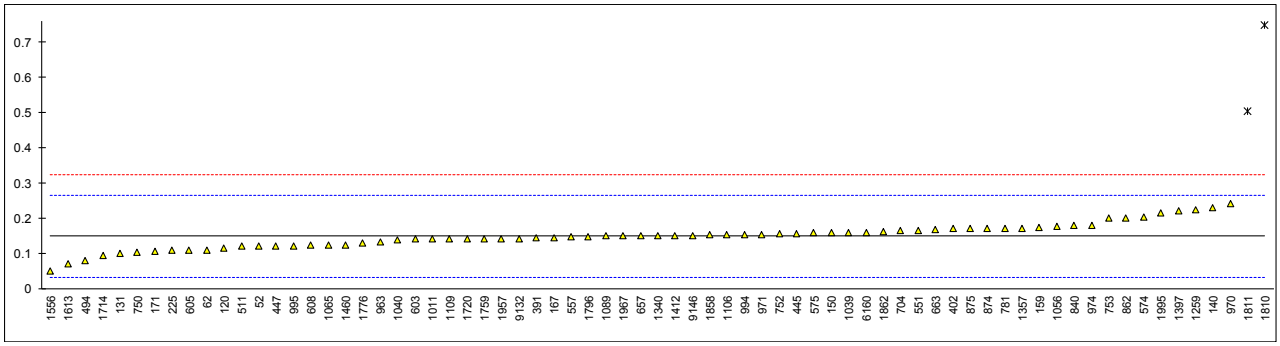
APPENDIX 1

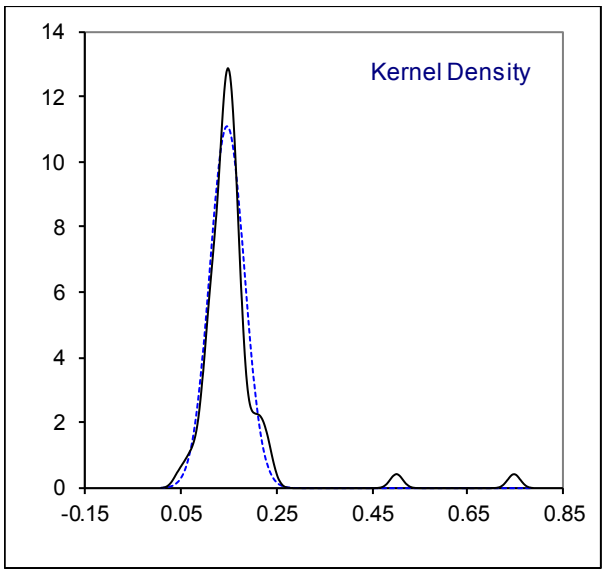
Determination of Acid Number (total) on sample #17215; results in mg KOH/g

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D664-A	0.12		-0.50	970	D664-A	0.24		1.58
62	D664-A	0.11		-0.67	971	D664-A	0.154		0.09
90		-----		-----	974	D664-A	0.18		0.54
92		-----		-----	991		-----		-----
120	D664-A	0.116		-0.57	992		-----		-----
131	D664-A	0.10		-0.84	994	D664-A	0.153		0.07
140	D664-A	0.23		1.40	995	D664-A	0.12		-0.50
150	D664-A	0.16		0.19	997		-----		-----
154		-----		-----	998		-----		-----
158		-----		-----	1011	D664-A	0.14		-0.15
159	D664-A	0.174		0.43	1039	D664-A	0.16		0.19
167	D664-A	0.145		-0.07	1040	D664-A	0.138		-0.19
168		-----		-----	1056	D664-A	0.178		0.50
171	D664-A	0.107		-0.72	1065	D664-A	0.124		-0.43
175		-----		-----	1089	D664-A	0.149		0.00
186		-----		-----	1106	D664-A	0.1528		0.07
203		-----		-----	1109	D664-A	0.14		-0.15
225	D664-A	0.11		-0.67	1236		-----		-----
238		-----		-----	1248		-----		-----
273		-----		-----	1259	D664-A	0.224		1.30
311		-----		-----	1320		-----		-----
314		-----		-----	1340	D664-A	0.15		0.02
332		-----		-----	1357	D664-A	0.17		0.37
333		-----		-----	1360		-----		-----
334		-----		-----	1397	D664-A	0.22		1.23
335		-----		-----	1412	D664-A	0.15		0.02
336		-----		-----	1460	D664-A	0.124		-0.43
391	D664-A	0.144		-0.08	1556	D664-A	0.050		-1.71
398		-----		-----	1613	D664-A	0.07		-1.36
399		-----		-----	1654		-----		-----
402	D664-A	0.17		0.37	1656	D664-A	<0.1		-----
442		-----		-----	1714		0.093		-0.97
444		-----		-----	1720	D664-A	0.14		-0.15
445	D664-A	0.155		0.11	1728		-----		-----
446		-----		-----	1759	In house	0.14	C	-0.15
447	D664-A	0.12		-0.50	1776	D664-A	0.13		-0.33
485		-----		-----	1796	D664-A	0.1461		-0.05
494	D664-A	0.078		-1.22	1810		0.7486	R(0.01)	10.37
511	D664-A	0.12		-0.50	1811	D664-A	0.5030	R(0.01)	6.12
525		-----		-----	1815		-----		-----
529		-----		-----	1842		-----		-----
541		-----		-----	1849		-----		-----
551	D664-A	0.166		0.30	1858	D664-A	0.1516		0.05
557	D664-A	0.14578628948		-0.05	1862	D664-A	0.1608		0.21
574	D664-A	0.204		0.95	1928		-----		-----
575	D664-A	0.160		0.19	1929		-----		-----
593		-----		-----	1930		-----		-----
602		-----		-----	1957	D664-A	0.14	C	-0.15
603	D664-A	0.14		-0.15	1960		-----		-----
605	D664-A	0.11		-0.67	1967	D664	0.149		0.00
608	D664-A	0.124		-0.43	1995	D664-A	0.215		1.14
609		-----		-----	6016		-----		-----
621		-----		-----	6091		-----		-----
657	D664-A	0.15		0.02	6159		-----		-----
663	D664-A	0.167		0.31	6160	D664-A	0.16	C	0.19
704	D664-A	0.164		0.26	6161		-----		-----
732		-----		-----	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750	D664-A	0.102		-0.81	9060		-----		-----
751		-----		-----	9063		-----		-----
752	D664-A	0.1550		0.11	9132	D664-A	0.14		-0.15
753	D664-A	0.20		0.88	9133		-----		-----
781	D664-A	0.17		0.37	9134		-----		-----
785		-----		-----	9135		-----		-----
840	D664-A	0.18		0.54	9136		-----		-----
862	D664-A	0.20		0.88	9139		-----		-----
874	D664-A	0.17		0.37	9145		-----		-----
875	D664-A	0.17		0.37	9146	D664Mod.	0.15		0.02
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963	D664-A	0.132		-0.29					

normality	OK
n	69
outliers	2
mean (n)	0.1489
st.dev. (n)	0.03601
R(calc.)	0.1008
st.dev.(D664-A:17)	0.05785
R(D664-A:17)	0.1620

Lab 1759 first reported: 0.52
Lab 1957 first reported: 0.342
Lab 6160 first reported: 0.481



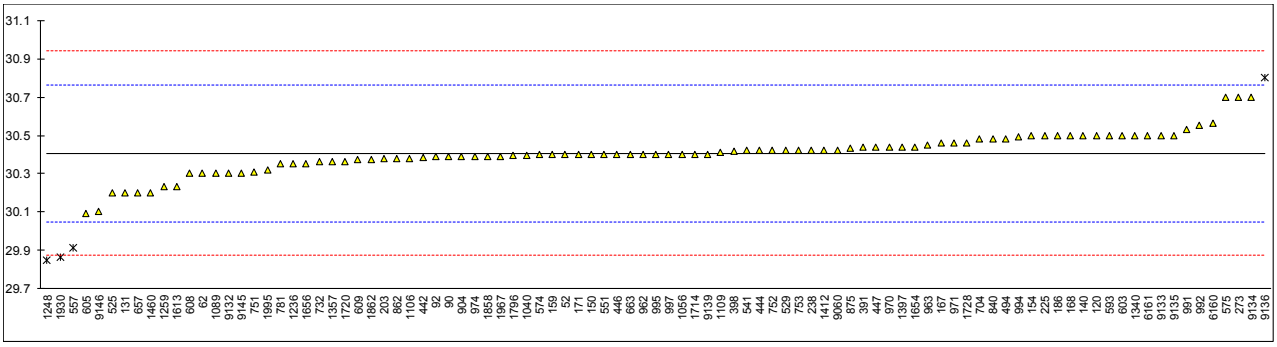


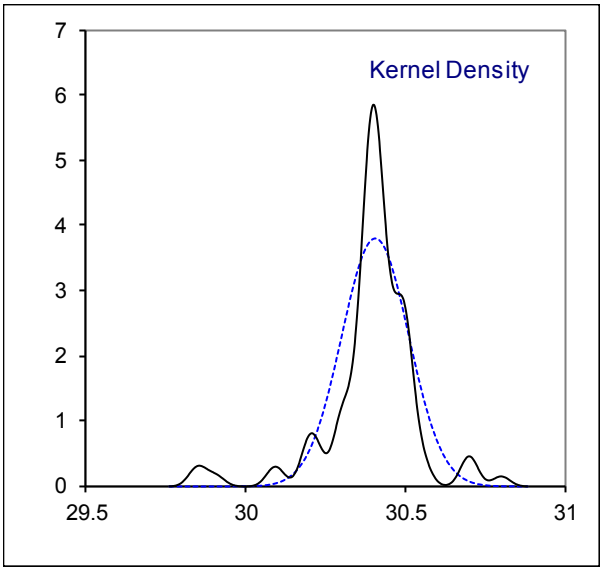
Determination of API Gravity on sample #17215;

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D5002	30.4		-0.04	970	D4052	30.44		0.19
62	D5002	30.3		-0.60	971	D5002	30.46		0.30
90	D5002	30.39		-0.09	974	Calc.	30.39		-0.09
92	D5002	30.39		-0.09	991	Calc.	30.53		0.69
120	D4052	30.5		0.52	992	Calc.	30.55		0.80
131	D5002	30.2	C	-1.16	994	Calc.	30.49		0.47
140	D5002	30.5		0.52	995	D5002	30.4		-0.04
150	D5002	30.4		-0.04	997	D5002	30.4		-0.04
154	D287	30.5		0.52	998		-----		-----
158		-----		-----	1011		-----		-----
159	D5002	30.4		-0.04	1039		-----		-----
167	D5002	30.46		0.30	1040	Calc.	30.395		-0.07
168	D287	30.5		0.52	1056	Calc.	30.4		-0.04
171	D287	30.4		-0.04	1065		-----		-----
175		-----		-----	1089	D287	30.3		-0.60
186	D5002	30.5		0.52	1106	D5002	30.38		-0.15
203	Calc.	30.38		-0.15	1109	Calc.	30.41		0.02
225	Calc.	30.5		0.52	1236	D287	30.35		-0.32
238	D5002	30.42		0.07	1248	Calc.	29.846	C,R(0.01)	-3.14
273	D5002	30.7		1.64	1259	Calc.	30.23		-0.99
311		-----		-----	1320		-----		-----
314		-----		-----	1340	D1298	30.5		0.52
332		-----		-----	1357	D287	30.36		-0.26
333		-----		-----	1360		-----		-----
334		-----		-----	1397	DMA4500Mod.	30.44		0.19
335		-----		-----	1412	D5002	30.42		0.07
336		-----		-----	1460	D4052	30.20		-1.16
391	Calc.	30.44		0.19	1556		-----		-----
398	D287	30.417		0.06	1613	D5002	30.23		-0.99
399		-----		-----	1654	D4052	30.44		0.19
402		-----		-----	1656	D5002	30.35		-0.32
442	Calc.	30.3807		-0.15	1714	D4052	30.4		-0.04
444	D5002	30.42		0.07	1720	D5002	30.36		-0.26
445		-----		-----	1728	D5002	30.461		0.30
446	Calc.	30.4		-0.04	1759		-----		-----
447	D5002	30.44		0.19	1776		-----		-----
485		-----		-----	1796	Calc.	30.392		-0.08
494	D4052	30.48		0.41	1810		-----		-----
511		-----		-----	1811		-----		-----
525	D7042	30.2		-1.16	1815		-----		-----
529	D287	30.42		0.07	1842		-----		-----
541	D4052	30.42		0.07	1849		-----		-----
551	D5002	30.4		-0.04	1858	Calc.	30.39		-0.09
557	D1250	29.91	R(0.01)	-2.78	1862	D5002	30.37		-0.21
574	D4052	30.4		-0.04	1928		-----		-----
575	D1298	30.7		1.64	1929		-----		-----
593	D1298	30.5		0.52	1930	Calc.	29.86	R(0.01)	-3.06
602		-----		-----	1957		-----		-----
603	Calc.	30.5		0.52	1960		-----		-----
605	D5002	30.09		-1.77	1967	D1298	30.39		-0.09
608	D5002	30.3		-0.60	1995	Calc.	30.32		-0.49
609	D5002	30.37		-0.21	6016		-----		-----
621		-----		-----	6091		-----		-----
657	D5002	30.2	C	-1.16	6159		-----		-----
663	D5002	30.4		-0.04	6160	D1298	30.56		0.86
704	D1298	30.48		0.41	6161	D1298	30.5		0.52
732	D5002	30.36		-0.26	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750		-----		-----	9060	D287	30.42		0.07
751	Calc.	30.31		-0.54	9063		-----		-----
752	D287	30.42		0.07	9132	D1250	30.3		-0.60
753	D5002	30.42		0.07	9133	D1250	30.5		0.52
781	D5002	30.35		-0.32	9134	D1250	30.7		1.64
785		-----		-----	9135	D1250	30.5		0.52
840	D5002	30.48		0.41	9136	D1250	30.8	R(0.05)	2.20
862	D287	30.38		-0.15	9139	D1250	30.4		-0.04
874		-----		-----	9145	D4052	30.30		-0.60
875	D5002	30.43		0.13	9146	In house	30.1		-1.72
904	D5002	30.39		-0.09	9151		-----		-----
962	D5002	30.40		-0.04	9152		-----		-----
963	D287	30.45		0.24					

normality	not OK
n	91
outliers	4
mean (n)	30.407
st.dev. (n)	0.1048
R(calc.)	0.293
st.dev.(D287:12b)	0.1786
R(D287:12b)	0.500

Lab 131 first reported: 20.76
Lab 657 first reported: 29.4
Lab 1248 first reported: 29.781



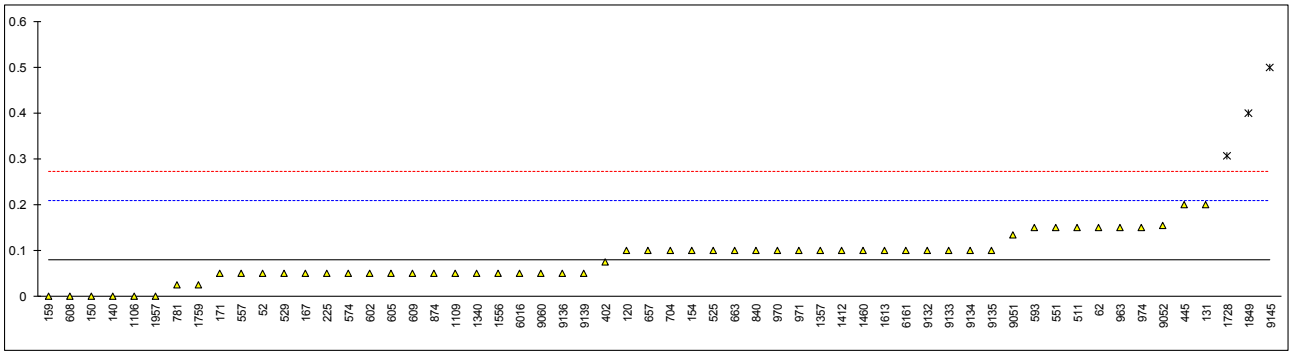


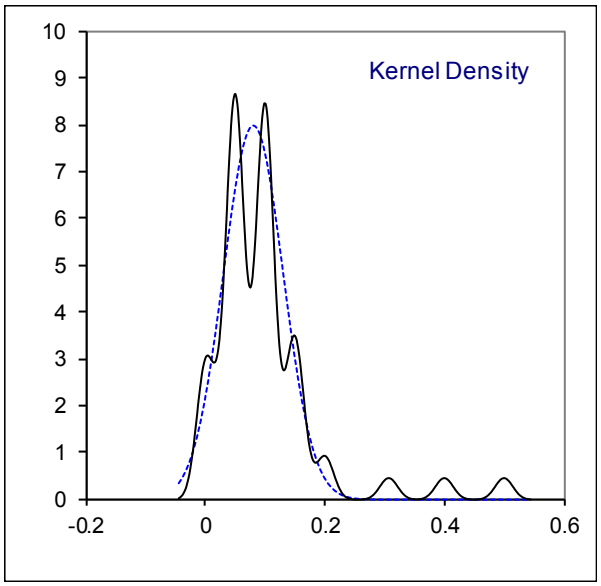
Determination of BS&W on sample #17215; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4007	0.05		-0.47	970	D4007	0.10		0.31
62	D4007	0.15		1.09	971	D4007	0.10		0.31
90		-----		-----	974	D4007	0.15		1.09
92		-----		-----	991		-----		-----
120	D4007	0.10		0.31	992		-----		-----
131	D4007	0.20		1.87	994		-----		-----
140	D4007	0.00		-1.26	995		-----		-----
150	D4007	0		-1.26	997		-----		-----
154	D4007	0.10		0.31	998		-----		-----
158		-----		-----	1011		-----		-----
159	D4007	0.0	C	-1.26	1039		-----		-----
167	D4007	0.050		-0.47	1040		-----		-----
168		-----		-----	1056		-----		-----
171	D4007	0.05		-0.47	1065		-----		-----
175		-----		-----	1089		-----		-----
186		-----		-----	1106	D4007	0		-1.26
203		-----		-----	1109	D4007	0.05		-0.47
225	D4007	0.05		-0.47	1236		-----		-----
238		-----		-----	1248		-----		-----
273		-----		-----	1259	D4007	<0,05		-----
311		-----		-----	1320		-----		-----
314		-----		-----	1340	ISO9030	0.05		-0.47
332		-----		-----	1357	D4007	0.1		0.31
333		-----		-----	1360		-----		-----
334		-----		-----	1397		-----		-----
335		-----		-----	1412	D4007	0.10		0.31
336		-----		-----	1460	D4007	0.10		0.31
391		-----		-----	1556	ISO3734	0.050		-0.47
398		-----		-----	1613	D4007	0.10		0.31
399		-----		-----	1654		-----		-----
402	ISO9030	0.075		-0.08	1656		-----		-----
442		-----		-----	1714		-----		-----
444		-----		-----	1720		-----		-----
445	D4007	0.200		1.87	1728		0.307	R(0.01)	3.55
446		-----		-----	1759	ISO9030	0.025		-0.86
447		-----		-----	1776		-----		-----
485		-----		-----	1796		-----		-----
494		-----		-----	1810		-----		-----
511	D4007	0.15		1.09	1811		-----		-----
525	D4007	0.1		0.31	1815		-----		-----
529	D4007	0.05		-0.47	1842		-----		-----
541		-----		-----	1849	D4007	0.4	C,R(0.01)	5.00
551	D4007	0.15		1.09	1858		-----		-----
557	D4007	0.050		-0.47	1862		-----		-----
574	D4007	0.05		-0.47	1928		-----		-----
575		-----		-----	1929		-----		-----
593	D4007	0.150		1.09	1930		-----		-----
602	D4007	0.05		-0.47	1957	D4007	0		-1.26
603		-----		-----	1960		-----		-----
605	D4007	0.05		-0.47	1967		-----		-----
608	D4007	0.0		-1.26	1995		-----		-----
609	D4007	0.05		-0.47	6016	D4007	0.05		-0.47
621		-----		-----	6091		-----		-----
657	D4007	0.10		0.31	6159		-----		-----
663	D4007	0.10		0.31	6160		-----		-----
704	D4007	0.10		0.31	6161	D4007	0.1		0.31
732		-----		-----	6166		-----		-----
739		-----		-----	9051		0.1342		0.84
742		-----		-----	9052		0.1546		1.16
749		-----		-----	9057		-----		-----
750		-----		-----	9060	D4007	0.05		-0.47
751		-----		-----	9063		-----		-----
752		-----		-----	9132	D4007	0.10		0.31
753		-----		-----	9133	D4007	0.10		0.31
781	D4007	0.025		-0.86	9134	D4007	0.10		0.31
785		-----		-----	9135	D4007	0.10		0.31
840	D4007	0.10		0.31	9136	D4007	0.05		-0.47
862		-----		-----	9139	D4007	0.05		-0.47
874	D4007	0.05		-0.47	9145	D4007	0.5	R(0.01)	6.56
875		-----		-----	9146	D4007	<0.1		-----
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963	D4007	0.15		1.09					

normality	OK
n	55
outliers	3
mean (n)	0.080
st.dev. (n)	0.0499
R(calc.)	0.140
st.dev.(D4007:11e1)	0.0639
R(D4007:11e1)	0.179

Lab 159 first reported: 0.60
Lab 1849 first reported: 1.3



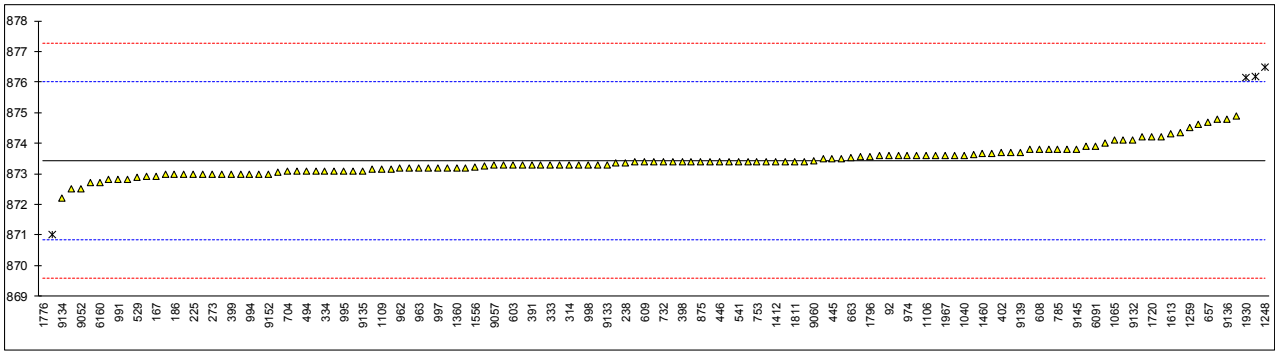


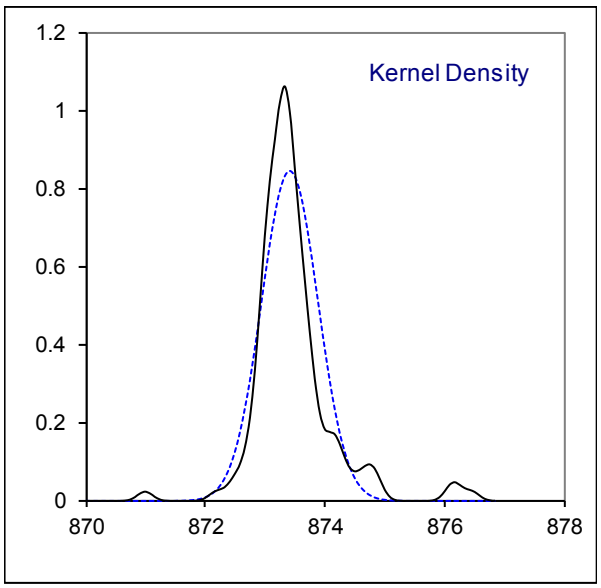
Determination of Density at 15°C on sample #17215; results in kg/m^3

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D5002	873.7		0.21	970	D4052	873.3		-0.10
62	D5002	873.8		0.29	971	D5002	873.2		-0.17
90	D5002	873.6		0.14	974	D5002	873.6		0.14
92	D5002	873.6		0.14	991	D1298	872.8		-0.49
120	D4052	873		-0.33	992	D1298	872.7		-0.56
131	D5002	874.6	C	0.91	994	D5002	873.0		-0.33
140	D5002	873.1		-0.25	995	D5002	873.1		-0.25
150	D5002	873.5		0.06	997	D5002	873.2		-0.17
154	D5002	873.0	C	-0.33	998	D4052	873.3		-0.10
158		-----		-----	1011	D5002	873.6		0.14
159	D5002	873.4		-0.02	1039	ISO12185	873.2		-0.17
167	D5002	872.9		-0.41	1040	ISO12185	873.61		0.14
168		-----		-----	1056	D5002	873.4		-0.02
171	D5002	873.0		-0.33	1065	D4052	874.1	C	0.53
175	D5002	873.27		-0.12	1089	D5002	874.1		0.53
186	D5002	873.0	C	-0.33	1106	D5002	873.6		0.14
203	D5002	873.61		0.14	1109	D5002	873.15		-0.21
225	D5002	873.0		-0.33	1236	D5002	873.8		0.29
238	D5002	873.37		-0.04	1248	D5002	876.47	R(0.01)	2.37
273	D5002	873.0		-0.33	1259	D5002	874.5		0.84
311	D5002	873.4		-0.02	1320		-----		-----
314	D5002	873.3		-0.10	1340	ISO12185	873.35		-0.06
332	D5002	873.14		-0.22	1357	D5002	873.55		0.10
333	D5002	873.3		-0.10	1360	ISO12185	873.2		-0.17
334	D5002	873.1		-0.25	1397	ISO12185	873.0		-0.33
335	D5002	873.4		-0.02	1412	D5002	873.4		-0.02
336	D5002	872.8		-0.49	1460	D4052	873.68		0.20
391	D5002	873.3		-0.10	1556	ISO12185	873.22		-0.16
398	D5002	873.4		-0.02	1613	D5002	874.3		0.68
399	D4052	873.0		-0.33	1654	D4052	873.297		-0.10
402	D4052	873.7		0.21	1656	D5002	873.4		-0.02
442	IP365	873.3		-0.10	1714	D5002	873.58		0.12
444	D5002	873.4		-0.02	1720	D5002	874.2		0.60
445	D5002	873.5		0.06	1728	D5002	873.17		-0.20
446	D5002	873.4		-0.02	1759	ISO3675	874.2		0.60
447	D4052	873.3		-0.10	1776	ISO12185	855.90	R(0.01)	-13.64
485	D5002	873.3		-0.10	1796	D5002	873.57		0.11
494	D4052	873.1		-0.25	1810	ISO12185	873.3		-0.10
511		-----		-----	1811	D5002	873.4		-0.02
525	D7042	874.9		1.15	1815	ISO12185	874.35		0.72
529	D5002	872.88		-0.42	1842		-----		-----
541	D5002	873.40		-0.02	1849	ISO3675	873.5		0.06
551	D5002	873.1		-0.25	1858	D1298	873.6		0.14
557	D5002	876.194	R(0.01)	2.16	1862	D5002	873.68	C	0.20
574	D4052	873.4		-0.02	1928	ISO12185	873.1		-0.25
575		-----		-----	1929	ISO12185	873.2		-0.17
593	D4052	872.9	C	-0.41	1930	ISO12185	876.14	R(0.01)	2.11
602	D1298	873.0	C	-0.33	1957		-----		-----
603	D4052	873.3		-0.10	1960		-----		-----
605	D5002	874.8		1.07	1967	D1298	873.6		0.14
608	D5002	873.8		0.29	1995	D4052	873.9		0.37
609	D5002	873.4		-0.02	6016	D5002	873.4		-0.02
621		-----		-----	6091	IP365	873.9	C	0.37
657	D5002	874.7	C	0.99	6159		-----		-----
663	D5002	873.52		0.07	6160	D5002	872.7		-0.56
704	D5002	873.08		-0.27	6161	D5002	872.81		-0.48
732	D5002	873.4		-0.02	6166		-----		-----
739	GOST R51069	873.1		-0.25	9051		872.5		-0.72
742		-----		-----	9052	D5002	872.5		-0.72
749	GOST R51069	873.0		-0.33	9057	D5002	873.29		-0.10
750	D1298	874.2		0.60	9060	D5002	873.44	C	0.01
751	D1298	874.0		0.45	9063	D1298	871.0	R(0.01)	-1.89
752	D5002	873.4		-0.02	9132	D5002	874.1		0.53
753	D5002	873.4		-0.02	9133	D5002	873.3		-0.10
781	D5002	873.8		0.29	9134	D5002	872.2		-0.95
785	D5002	873.8		0.29	9135	D5002	873.1		-0.25
840	D5002	873.06		-0.28	9136	D5002	874.8		1.07
862	D5002	873.62		0.15	9139	D5002	873.7		0.21
874	D5002	873.4		-0.02	9145	D4052	873.8		0.29
875	D5002	873.4		-0.02	9146		-----		-----
904	D5002	873.2		-0.17	9151		-----		-----
962	D5002	873.2		-0.17	9152	D5002	873		-0.33
963	D5002	873.2		-0.17					

normality	suspect
n	126
outliers	5
mean (n)	873.42
st.dev. (n)	0.471
R(calc.)	1.32
st.dev.(D5002:16)	1.285
R(D5002:16)	3.60

Lab 131 first reported: 928.8
Lab 154 reported: 0.8730 kg/m³
Lab 186 reported: 0.8730 kg/m³
Lab 593 reported: 0.8729 kg/m³
Lab 602 reported: 0.8730 kg/m³
Lab 657 first reported: 878.9
Lab 1065 reported: 0.8741 kg/m³
Lab 1862 reported: 0.87368 kg/m³
Lab 6091 first reported: 0.8739 kg/m³
Lab 9060 reported: 0.87344 kg/m³



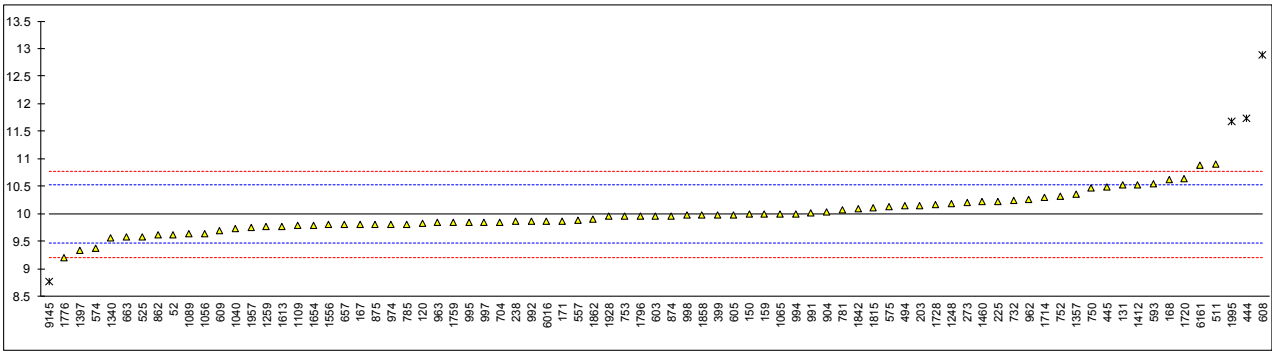


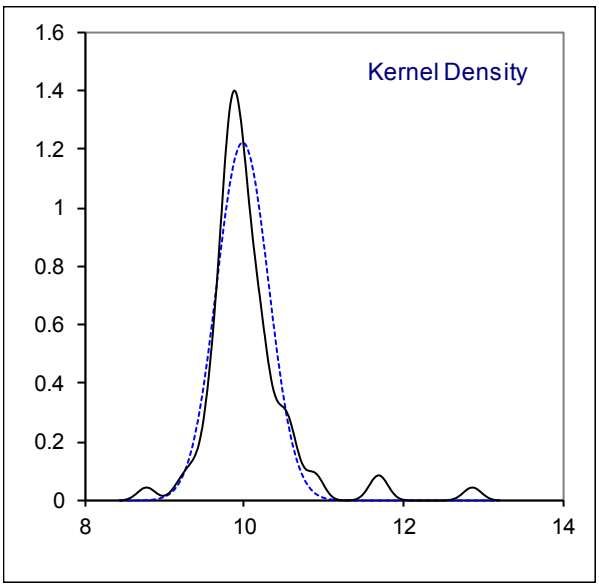
Determination of Kinematic Viscosity at 40 °C on sample #17215; results in mm^2/s

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D445	9.617		-1.40	970		-----		-----
62		-----		-----	971		-----		-----
90		-----		-----	974	D445	9.814		-0.66
92		-----		-----	991	D445	10.021		0.13
120	D445	9.821		-0.63	992	D445	9.863		-0.47
131	D445	10.53		2.06	994	D445	10.002		0.05
140		-----		-----	995	D445	9.843		-0.55
150	D445	9.989		0.01	997	D445	9.851		-0.52
154		-----		-----	998	D445	9.97		-0.07
158		-----		-----	1011		-----		-----
159	D445	9.994		0.02	1039		-----		-----
167	D445	9.805		-0.69	1040	D7042	9.7338		-0.96
168	D445	10.62		2.40	1056	D7042	9.64		-1.32
171	D445	9.873		-0.43	1065	D445	10.00		0.05
175		-----		-----	1089	D445	9.6305		-1.35
186		-----		-----	1106		-----		-----
203	D445	10.155		0.63	1109	D445	9.7848		-0.77
225	D445	10.22		0.88	1236		-----		-----
238	D445	9.8559		-0.50	1248	IP71Mod.	10.18		0.73
273	D445	10.21		0.84	1259	D445	9.76104		-0.86
311		-----		-----	1320		-----		-----
314		-----		-----	1340	ISO3104	9.566		-1.60
332		-----		-----	1357	D445	10.358		1.40
333		-----		-----	1360		-----		-----
334		-----		-----	1397	D7042	9.344		-2.44
335		-----		-----	1412	D445	10.53		2.06
336		-----		-----	1460	D445	10.2164		0.87
391		-----		-----	1556	ISO3104	9.803		-0.70
398		-----		-----	1613	D445	9.769		-0.83
399	D445	9.979		-0.03	1654	D445	9.7873		-0.76
402		-----		-----	1656		-----		-----
442		-----		-----	1714	D7042	10.303	C	1.20
444	D445	11.729	R(0.01)	6.60	1720	D7042	10.641		2.48
445	D445	10.48		1.87	1728	D445	10.161		0.66
446		-----		-----	1759	In house	9.84		-0.56
447		-----		-----	1776	D7042	9.1985		-2.99
485		-----		-----	1796	D445	9.9594		-0.11
494	D445	10.140		0.58	1810		-----		-----
511	D445	10.9025		3.47	1811		-----		-----
525	D7042	9.5841		-1.53	1815	ISO3104	10.117		0.49
529		-----		-----	1842	IP71	10.09		0.39
541		-----		-----	1849		-----		-----
551		-----		-----	1858	D445	9.9787		-0.03
557	D445	9.8830804125		-0.40	1862	D445	9.9098		-0.29
574	D7042	9.378		-2.31	1928	ISO3104	9.9491		-0.15
575	D445	10.121		0.51	1929		-----		-----
593	D445	10.54		2.09	1930		-----		-----
602		-----		-----	1957	D445	9.7471		-0.91
603	D445	9.964		-0.09	1960		-----		-----
605	D445	9.984		-0.01	1967		-----		-----
608	D445	12.88	R(0.01)	10.96	1995	D445	11.67	R(0.01)	6.37
609	D445	9.691		-1.12	6016	D445	9.863		-0.47
621		-----		-----	6091		-----		-----
657	D445	9.804		-0.70	6159		-----		-----
663	D445	9.5792		-1.55	6160		-----		-----
704	D445	9.8525		-0.51	6161	D445	10.881392		3.39
732	D445	10.24		0.96	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750	D445	10.47		1.83	9060		-----		-----
751		-----		-----	9063		-----		-----
752	D445	10.3110		1.23	9132		-----		-----
753	D445	9.954		-0.13	9133		-----		-----
781	D445	10.08		0.35	9134		-----		-----
785	D445	9.815		-0.65	9135		-----		-----
840		-----		-----	9136		-----		-----
862	D445	9.6116		-1.42	9139		-----		-----
874	D445	9.967		-0.08	9145	D7042	8.7759	R(0.05)	-4.59
875	D445	9.809		-0.68	9146		-----		-----
904	D445	10.03	C	0.16	9151		-----		-----
962	D445	10.26		1.03	9152		-----		-----
963	D445	9.839		-0.56					

normality	OK
n	75
outliers	4
mean (n)	9.9875
st.dev. (n)	0.32634
R(calc.)	0.9138
st.dev.(D445:17a)	0.26397
R(D445:17a)	0.7391

Lab 904 first reported: 12.09
Lab 1714 first reported: 12.429



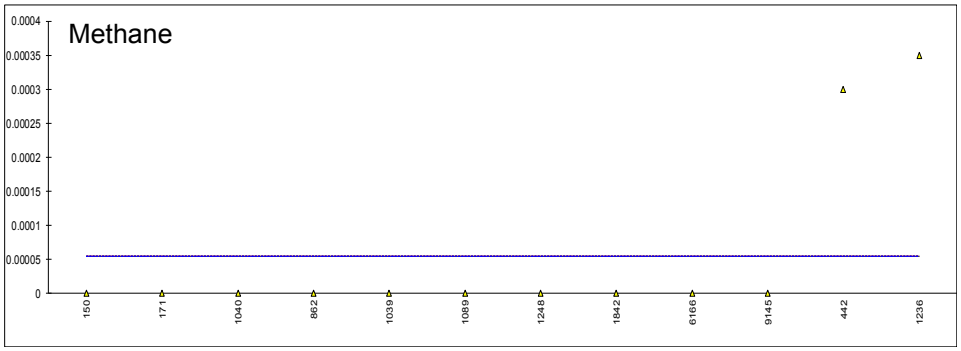


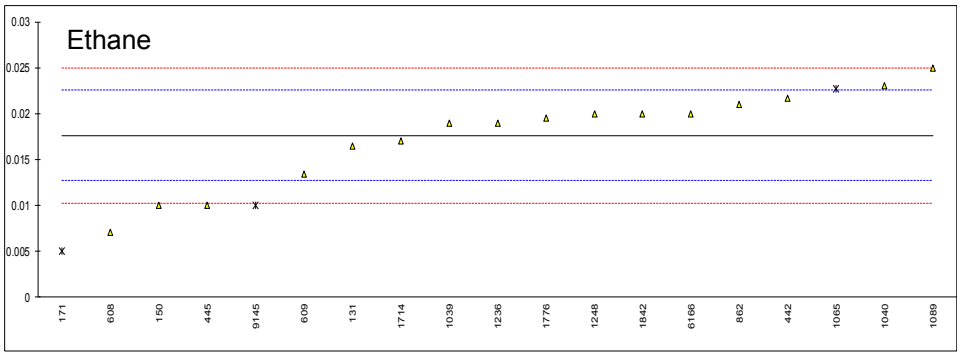
Determination of individual light ends: Methane, Ethane, Propane on sample #17215; results in %M/M

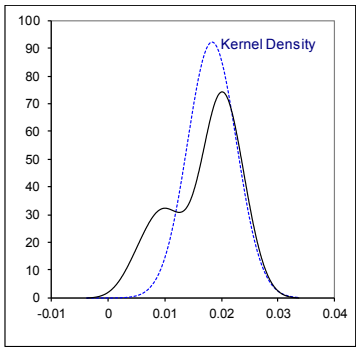
lab	method	Methane	mark	z(targ)	Ethane	mark	z(targ)	Propane	mark	z(targ)
52		-----		-----	-----		-----	-----		-----
62		-----		-----	-----		-----	-----		-----
90		-----		-----	-----		-----	-----		-----
92		-----		-----	-----		-----	-----		-----
120		-----		-----	-----		-----	-----		-----
131		-----		-----	0.0165		-0.46	0.2722		0.57
140		-----		-----	-----		-----	-----		-----
150	IP344	0		-----	0.01		-3.11	0.19		-3.65
154		-----		-----	-----		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159		-----		-----	-----		-----	-----		-----
167		-----		-----	-----		-----	-----		-----
168		-----		-----	-----		-----	-----		-----
171	D7900	0.00		-----	0.005	D(0.01)	-5.14	0.168	D(0.01)	-4.78
175		-----		-----	-----		-----	-----		-----
186		-----		-----	-----		-----	-----		-----
203		-----		-----	-----		-----	-----		-----
225		-----		-----	-----		-----	-----		-----
238		-----		-----	-----		-----	-----		-----
273		-----		-----	-----		-----	-----		-----
311		-----		-----	-----		-----	-----		-----
314		-----		-----	-----		-----	-----		-----
332		-----		-----	-----		-----	-----		-----
333		-----		-----	-----		-----	-----		-----
334		-----		-----	-----		-----	-----		-----
335		-----		-----	-----		-----	-----		-----
336		-----		-----	-----		-----	-----		-----
391		-----		-----	-----		-----	-----		-----
398		-----		-----	-----		-----	-----		-----
399		-----		-----	-----		-----	-----		-----
402		-----		-----	-----		-----	-----		-----
442	IP344	0.0003		-----	0.0217		1.66	0.2867		1.31
444		-----		-----	-----		-----	-----		-----
445	IP344	<0.01		-----	0.01		-3.11	0.24		-1.08
446		-----		-----	-----		-----	-----		-----
447		-----		-----	-----		-----	-----		-----
485		-----		-----	-----		-----	-----		-----
494		-----		-----	-----		-----	-----		-----
511		-----		-----	-----		-----	-----		-----
525		-----		-----	-----		-----	-----		-----
529		-----		-----	-----		-----	-----		-----
541		-----		-----	-----		-----	-----		-----
551		-----		-----	-----		-----	-----		-----
557		-----		-----	-----		-----	-----		-----
574		-----		-----	-----		-----	-----		-----
575		-----		-----	-----		-----	-----		-----
593		-----		-----	-----		-----	-----		-----
602		-----		-----	-----		-----	-----		-----
603		-----		-----	-----		-----	-----		-----
605		-----		-----	-----		-----	-----		-----
608	IP344	<0.01		-----	0.007		-4.33	0.179		-4.21
609	IP344	<0.01		-----	0.0134		-1.72	0.2276		-1.72
621		-----		-----	-----		-----	-----		-----
657		-----		-----	-----		-----	-----		-----
663		-----		-----	-----		-----	-----		-----
704		-----		-----	-----		-----	-----		-----
732		-----		-----	-----		-----	-----		-----
739		-----		-----	-----		-----	-----		-----
742		-----		-----	-----		-----	-----		-----
749		-----		-----	-----		-----	-----		-----
750		-----		-----	-----		-----	-----		-----
751		-----		-----	-----		-----	-----		-----
752		-----		-----	-----		-----	-----		-----
753		-----		-----	-----		-----	-----		-----
781		-----		-----	-----		-----	-----		-----
785		-----		-----	-----		-----	-----		-----
840		-----		-----	-----		-----	-----		-----
862	IP344	0.00	C	-----	0.021	C	1.37	0.184		-3.96
874		-----		-----	-----		-----	-----		-----
875		-----		-----	-----		-----	-----		-----
904		-----		-----	-----		-----	-----		-----
962		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
970		-----		-----	-----		-----	-----		-----
971		-----		-----	-----		-----	-----		-----
974		-----		-----	-----		-----	-----		-----
991		-----		-----	-----		-----	-----		-----
992		-----		-----	-----		-----	-----		-----

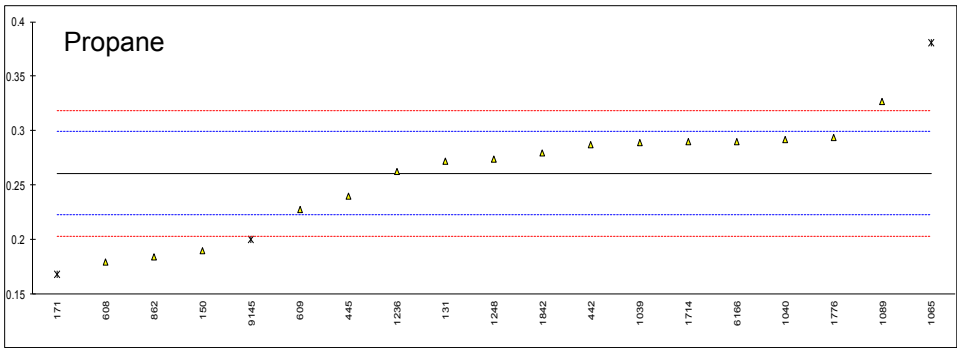
lab	method	Methane	mark	z(targ)	Ethane	mark	z(targ)	Propane	mark	z(targ)
994		-----		-----	-----		-----	-----		-----
995		-----		-----	-----		-----	-----		-----
997		-----		-----	-----		-----	-----		-----
998		-----		-----	-----		-----	-----		-----
1011		-----		-----	-----		-----	-----		-----
1039	D6729	0		-----	0.019		0.56	0.289		1.43
1040	IP344	0		-----	0.0230		2.19	0.2920		1.59
1056		-----		-----	-----		-----	-----		-----
1065	In house	<0.001		-----	0.0227	ex	2.07	0.3811	D(0.01)	6.16
1089	D5134	0.0000		-----	0.0249		2.96	0.3265		3.36
1106		-----		-----	-----		-----	-----		-----
1109		-----		-----	-----		-----	-----		-----
1236	D5134	0.00035		-----	0.019		0.56	0.263		0.10
1248	In house	0.000		-----	0.020		0.97	0.274		0.66
1259		-----		-----	-----		-----	-----		-----
1320		-----		-----	-----		-----	-----		-----
1340		-----		-----	-----		-----	-----		-----
1357		-----		-----	-----		-----	-----		-----
1360		-----		-----	-----		-----	-----		-----
1397		-----		-----	-----		-----	-----		-----
1412		-----		-----	-----		-----	-----		-----
1460		-----		-----	-----		-----	-----		-----
1556		-----		-----	-----		-----	-----		-----
1613		-----		-----	-----		-----	-----		-----
1654		-----		-----	-----		-----	-----		-----
1656		-----		-----	-----		-----	-----		-----
1714	D7900/IP601	<0.01		-----	0.017		-0.25	0.2896		1.46
1720		-----		-----	-----		-----	-----		-----
1728		-----		-----	-----		-----	-----		-----
1759		-----		-----	-----		-----	-----		-----
1776	IP344	<0,01		-----	0.0195		0.76	0.2938		1.68
1796		-----		-----	-----		-----	-----		-----
1810		-----		-----	-----		-----	-----		-----
1811		-----		-----	-----		-----	-----		-----
1815		-----		-----	-----		-----	-----		-----
1842		0.0		-----	0.02	C	0.97	0.28	C	0.97
1849		-----		-----	-----		-----	-----		-----
1858		-----		-----	-----		-----	-----		-----
1862		-----		-----	-----		-----	-----		-----
1928		-----		-----	-----		-----	-----		-----
1929		-----		-----	-----		-----	-----		-----
1930		-----		-----	-----		-----	-----		-----
1957		-----		-----	-----		-----	-----		-----
1960		-----		-----	-----		-----	-----		-----
1967		-----		-----	-----		-----	-----		-----
1995		-----		-----	-----		-----	-----		-----
6016		-----		-----	-----		-----	-----		-----
6091		-----		-----	-----		-----	-----		-----
6159		-----		-----	-----		-----	-----		-----
6160		-----		-----	-----		-----	-----		-----
6161		-----		-----	-----		-----	-----		-----
6166		0.00		-----	0.02		0.97	0.29		1.48
9051		-----		-----	-----		-----	-----		-----
9052		-----		-----	-----		-----	-----		-----
9057		-----		-----	-----		-----	-----		-----
9060		-----		-----	-----		-----	-----		-----
9063		-----		-----	-----		-----	-----		-----
9132		-----		-----	-----		-----	-----		-----
9133		-----		-----	-----		-----	-----		-----
9134		-----		-----	-----		-----	-----		-----
9135		-----		-----	-----		-----	-----		-----
9136		-----		-----	-----		-----	-----		-----
9139		-----		-----	-----		-----	-----		-----
9145	GPA2186	0.0		-----	0.01	ex	-3.11	0.20	ex	-3.13
9146		-----		-----	-----		-----	-----		-----
9151		-----		-----	-----		-----	-----		-----
9152		-----		-----	-----		-----	-----		-----
	normality	not OK			OK			OK		
	n	18			16			16		
	outliers	0			1 (+2 ex)			2 (+1 ex)		
	mean (n)	<0.01			0.0176			0.2611		
	st.dev. (n)	n.a.			0.00505			0.04423		
	R(calc.)	n.a.			0.0141			0.1238		
	st.dev.(IP344:88)	n.a.			0.00245			0.01949		
	R(IP344:88)	n.a.			0.0069			0.0546		

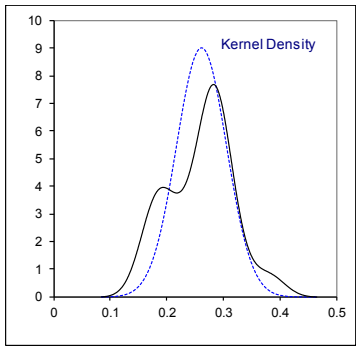
Lab 862 first reported for Methane: 0.022 and for Ethane: 0.286
Lab 1842 first reported for Ethane: 0.03 and for Propane: 0.51
The test results of lab 171, 1065 and 9145 were excluded due to outliers in the other light ends determinations.









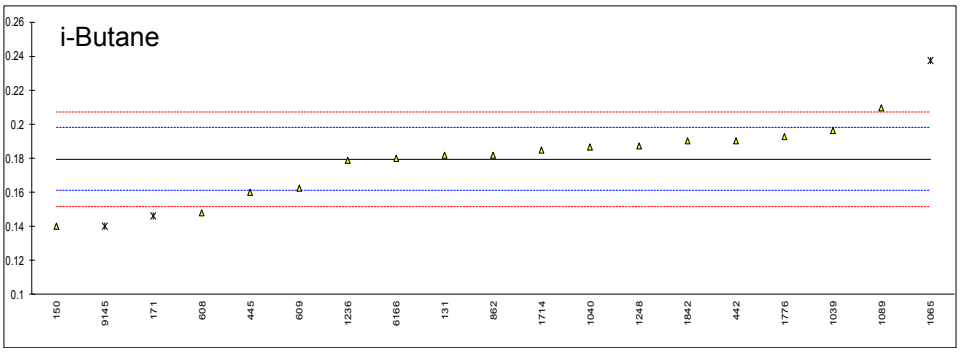


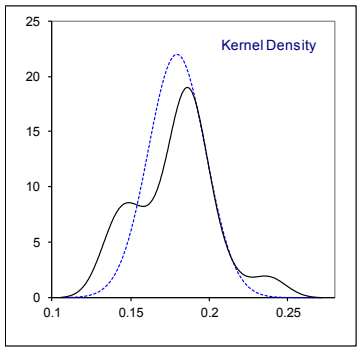
Determination of individual light ends: i-Butane, n-Butane, i-Pentane on sample #17215; results in %M/M

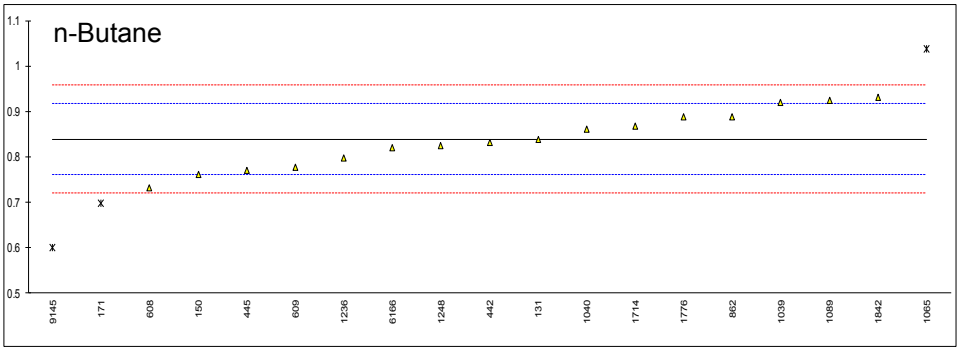
lab	method	i-Butane	mark	z(targ)	n-Butane	mark	z(targ)	i-Pentane	mark	z(targ)
52		-----		-----	-----		-----	-----		-----
62		-----		-----	-----		-----	-----		-----
90		-----		-----	-----		-----	-----		-----
92		-----		-----	-----		-----	-----		-----
120		-----		-----	-----		-----	-----		-----
131	D7900	0.1819		0.26	0.8374		-0.05	0.7028		-0.36
140		-----		-----	-----		-----	-----		-----
150	IP344	0.14		-4.16	0.76		-2.00	0.65		-2.67
154		-----		-----	-----		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159		-----		-----	-----		-----	-----		-----
167		-----		-----	-----		-----	-----		-----
168		-----		-----	-----		-----	-----		-----
171	D7900	0.146	ex	-3.52	0.698	ex	-3.57	0.661	ex	-2.19
175		-----		-----	-----		-----	-----		-----
186		-----		-----	-----		-----	-----		-----
203		-----		-----	-----		-----	-----		-----
225		-----		-----	-----		-----	-----		-----
238		-----		-----	-----		-----	-----		-----
273		-----		-----	-----		-----	-----		-----
311		-----		-----	-----		-----	-----		-----
314		-----		-----	-----		-----	-----		-----
332		-----		-----	-----		-----	-----		-----
333		-----		-----	-----		-----	-----		-----
334		-----		-----	-----		-----	-----		-----
335		-----		-----	-----		-----	-----		-----
336		-----		-----	-----		-----	-----		-----
391		-----		-----	-----		-----	-----		-----
398		-----		-----	-----		-----	-----		-----
399		-----		-----	-----		-----	-----		-----
402		-----		-----	-----		-----	-----		-----
442	IP344	0.1904		1.16	0.8304		-0.23	0.7137		0.11
444		-----		-----	-----		-----	-----		-----
445	IP344	0.16		-2.05	0.77		-1.75	0.67		-1.80
446		-----		-----	-----		-----	-----		-----
447		-----		-----	-----		-----	-----		-----
485		-----		-----	-----		-----	-----		-----
494		-----		-----	-----		-----	-----		-----
511		-----		-----	-----		-----	-----		-----
525		-----		-----	-----		-----	-----		-----
529		-----		-----	-----		-----	-----		-----
541		-----		-----	-----		-----	-----		-----
551		-----		-----	-----		-----	-----		-----
557		-----		-----	-----		-----	-----		-----
574		-----		-----	-----		-----	-----		-----
575		-----		-----	-----		-----	-----		-----
593		-----		-----	-----		-----	-----		-----
602		-----		-----	-----		-----	-----		-----
603		-----		-----	-----		-----	-----		-----
605		-----		-----	-----		-----	-----		-----
608	IP344	0.148		-3.31	0.732		-2.71	0.683		-1.23
609	IP344	0.1625		-1.78	0.7778		-1.55	0.6723		-1.70
621		-----		-----	-----		-----	-----		-----
657		-----		-----	-----		-----	-----		-----
663		-----		-----	-----		-----	-----		-----
704		-----		-----	-----		-----	-----		-----
732		-----		-----	-----		-----	-----		-----
739		-----		-----	-----		-----	-----		-----
742		-----		-----	-----		-----	-----		-----
749		-----		-----	-----		-----	-----		-----
750		-----		-----	-----		-----	-----		-----
751		-----		-----	-----		-----	-----		-----
752		-----		-----	-----		-----	-----		-----
753		-----		-----	-----		-----	-----		-----
781		-----		-----	-----		-----	-----		-----
785		-----		-----	-----		-----	-----		-----
840		-----		-----	-----		-----	-----		-----
862	IP344	0.182	C	0.27	0.889		1.26	0.746		1.53
874		-----		-----	-----		-----	-----		-----
875		-----		-----	-----		-----	-----		-----
904		-----		-----	-----		-----	-----		-----
962		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
970		-----		-----	-----		-----	-----		-----
971		-----		-----	-----		-----	-----		-----
974		-----		-----	-----		-----	-----		-----
991		-----		-----	-----		-----	-----		-----

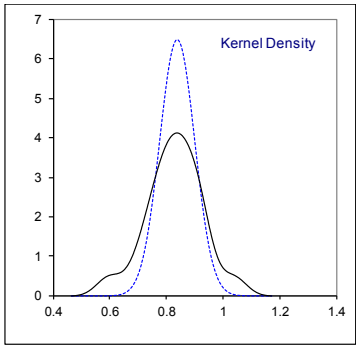
lab	method	i-Butane	mark	z(targ)	n-Butane	mark	z(targ)	i-Pentane	mark	z(targ)
992		-----		-----	-----		-----	-----		-----
994		-----		-----	-----		-----	-----		-----
995		-----		-----	-----		-----	-----		-----
997		-----		-----	-----		-----	-----		-----
998		-----		-----	-----		-----	-----		-----
1011		-----		-----	-----		-----	-----		-----
1039	D6729	0.196		1.75	0.920		2.04	0.747		1.57
1040	IP344	0.1866		0.76	0.8598		0.52	0.7089		-0.10
1056		-----		-----	-----		-----	-----		-----
1065	In house	0.2373	D(0.01)	6.10	1.0385	ex	5.03	1.0856	D(0.01)	16.39
1089	D5134	0.2094		3.16	0.9253		2.17	0.7781		2.93
1106		-----		-----	-----		-----	-----		-----
1109		-----		-----	-----		-----	-----		-----
1236	D5134	0.179		-0.04	0.798		-1.04	0.690		-0.92
1248	In house	0.187		0.80	0.824		-0.39	0.717		0.26
1259		-----		-----	-----		-----	-----		-----
1320		-----		-----	-----		-----	-----		-----
1340		-----		-----	-----		-----	-----		-----
1357		-----		-----	-----		-----	-----		-----
1360		-----		-----	-----		-----	-----		-----
1397		-----		-----	-----		-----	-----		-----
1412		-----		-----	-----		-----	-----		-----
1460		-----		-----	-----		-----	-----		-----
1556		-----		-----	-----		-----	-----		-----
1613		-----		-----	-----		-----	-----		-----
1654		-----		-----	-----		-----	-----		-----
1656		-----		-----	-----		-----	-----		-----
1714	D7900/IP601	0.1849		0.58	0.8679		0.72	0.6956		-0.68
1720		-----		-----	-----		-----	-----		-----
1728		-----		-----	-----		-----	-----		-----
1759		-----		-----	-----		-----	-----		-----
1776	IP344	0.1929		1.42	0.8875		1.22	0.7328		0.95
1796		-----		-----	-----		-----	-----		-----
1810		-----		-----	-----		-----	-----		-----
1811		-----		-----	-----		-----	-----		-----
1815		-----		-----	-----		-----	-----		-----
1842		0.19	C	1.12	0.93	C	2.29	0.76	C	2.14
1849		-----		-----	-----		-----	-----		-----
1858		-----		-----	-----		-----	-----		-----
1862		-----		-----	-----		-----	-----		-----
1928		-----		-----	-----		-----	-----		-----
1929		-----		-----	-----		-----	-----		-----
1930		-----		-----	-----		-----	-----		-----
1957		-----		-----	-----		-----	-----		-----
1960		-----		-----	-----		-----	-----		-----
1967		-----		-----	-----		-----	-----		-----
1995		-----		-----	-----		-----	-----		-----
6016		-----		-----	-----		-----	-----		-----
6091		-----		-----	-----		-----	-----		-----
6159		-----		-----	-----		-----	-----		-----
6160		-----		-----	-----		-----	-----		-----
6161		-----		-----	-----		-----	-----		-----
6166		0.18		0.06	0.82		-0.49	0.71		-0.05
9051		-----		-----	-----		-----	-----		-----
9052		-----		-----	-----		-----	-----		-----
9057		-----		-----	-----		-----	-----		-----
9060		-----		-----	-----		-----	-----		-----
9063		-----		-----	-----		-----	-----		-----
9132		-----		-----	-----		-----	-----		-----
9133		-----		-----	-----		-----	-----		-----
9134		-----		-----	-----		-----	-----		-----
9135		-----		-----	-----		-----	-----		-----
9136		-----		-----	-----		-----	-----		-----
9139		-----		-----	-----		-----	-----		-----
9145	GPA2186	0.14	ex	-4.16	0.60	ex	-6.05	0.53	D(0.01)	-7.92
9146		-----		-----	-----		-----	-----		-----
9151		-----		-----	-----		-----	-----		-----
9152		-----		-----	-----		-----	-----		-----
	normality	OK			OK			OK		
	n	16			16			16		
	outliers	1 (+2 ex)			0 (+3 ex)			2 (+1 ex)		
	mean (n)	0.1794			0.8393			0.7111		
	st.dev. (n)	0.01816			0.06162			0.03500		
	R(calc.)	0.0508			0.1725			0.0980		
	st.dev.(IP344:88)	0.00948			0.03957			0.02286		
	R(IP344:88)	0.0266			0.1108			0.0640		

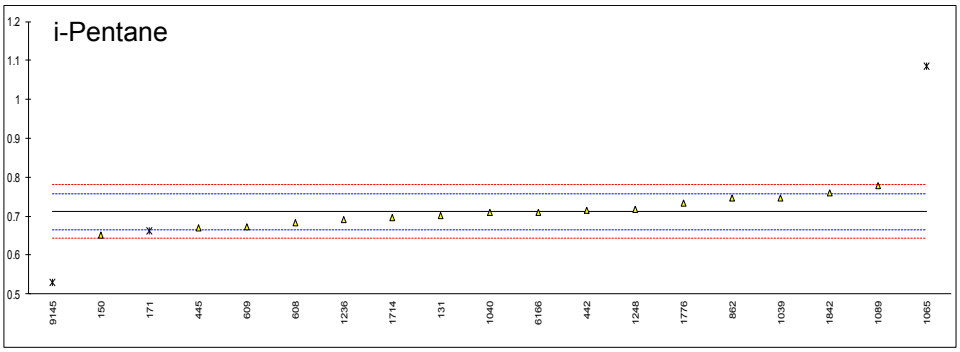
Lab 862 first reported for i-Butane: 0
Lab 1842 first reported for i-Butane: 0.39 for n-Butane: 1.37 and for i-Pentane 1.24
The test results of lab 171, 1065 and 9145 were excluded due to outliers in the other light ends determinations.

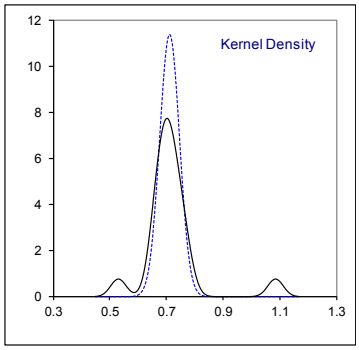










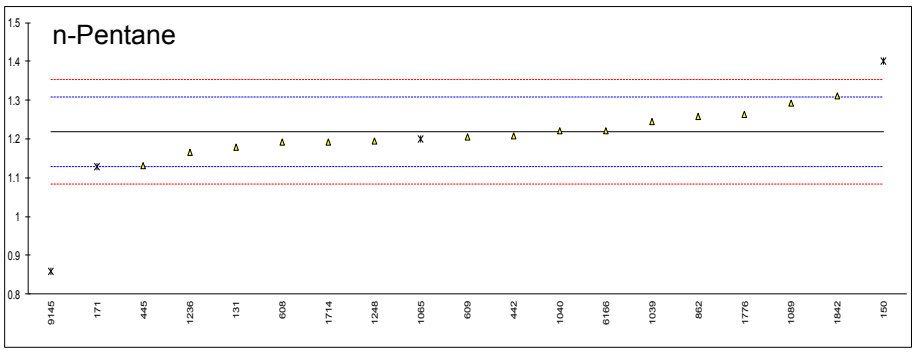


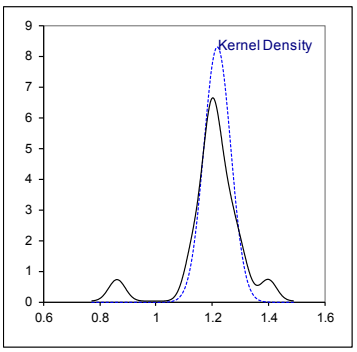
Determination of individual light ends: n-Pent., cyclo-Pent., tot. Hex. on sample #17215; results in %M/M

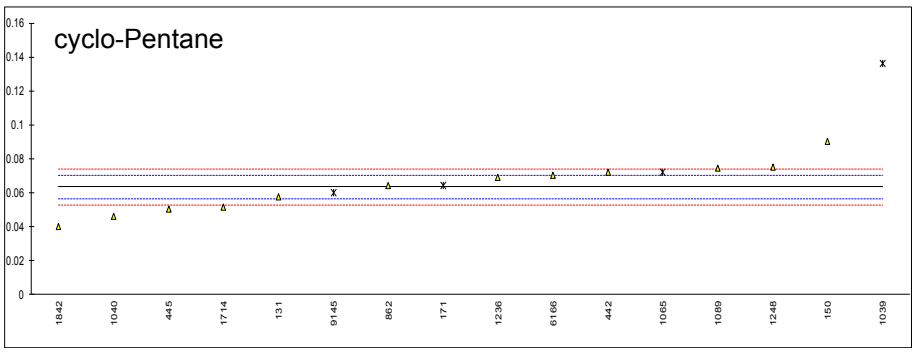
lab	method	n-Pent.	mark	z(targ)	cyclo-P.	mark	z(targ)	tot.Hex.	mark	z(targ)
52		-----		-----	-----		-----	-----		-----
62		-----		-----	-----		-----	-----		-----
90		-----		-----	-----		-----	-----		-----
92		-----		-----	-----		-----	-----		-----
120		-----		-----	-----		-----	-----		-----
131	D7900	1.1789		-0.88	0.0575		-1.63	3.8478	C,D(0.05)	5.72
140		-----		-----	-----		-----	-----		-----
150	IP344	1.40	G(0.05)	4.06	0.09		7.53	3.57		3.99
154		-----		-----	-----		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159		-----		-----	-----		-----	-----		-----
167		-----		-----	-----		-----	-----		-----
168		-----		-----	-----		-----	-----		-----
171	D7900	1.128	ex	-2.01	0.064	ex	0.20	1.279	D(0.05)	-10.26
175		-----		-----	-----		-----	-----		-----
186		-----		-----	-----		-----	-----		-----
203		-----		-----	-----		-----	-----		-----
225		-----		-----	-----		-----	-----		-----
238		-----		-----	-----		-----	-----		-----
273		-----		-----	-----		-----	-----		-----
311		-----		-----	-----		-----	-----		-----
314		-----		-----	-----		-----	-----		-----
332		-----		-----	-----		-----	-----		-----
333		-----		-----	-----		-----	-----		-----
334		-----		-----	-----		-----	-----		-----
335		-----		-----	-----		-----	-----		-----
336		-----		-----	-----		-----	-----		-----
391		-----		-----	-----		-----	-----		-----
398		-----		-----	-----		-----	-----		-----
399		-----		-----	-----		-----	-----		-----
402		-----		-----	-----		-----	-----		-----
442	IP344	1.2071		-0.25	0.0718		2.40	3.0139		0.53
444		-----		-----	-----		-----	-----		-----
445	IP344	1.13		-1.97	0.05		-3.75	2.69		-1.48
446		-----		-----	-----		-----	-----		-----
447		-----		-----	-----		-----	-----		-----
485		-----		-----	-----		-----	-----		-----
494		-----		-----	-----		-----	-----		-----
511		-----		-----	-----		-----	-----		-----
525		-----		-----	-----		-----	-----		-----
529		-----		-----	-----		-----	-----		-----
541		-----		-----	-----		-----	-----		-----
551		-----		-----	-----		-----	-----		-----
557		-----		-----	-----		-----	-----		-----
574		-----		-----	-----		-----	-----		-----
575		-----		-----	-----		-----	-----		-----
593		-----		-----	-----		-----	-----		-----
602		-----		-----	-----		-----	-----		-----
603		-----		-----	-----		-----	-----		-----
605		-----		-----	-----		-----	-----		-----
608	IP344	1.191		-0.61	-----		-----	-----		-----
609	IP344	1.2060		-0.27	-----		-----	-----		-----
621		-----		-----	-----		-----	-----		-----
657		-----		-----	-----		-----	-----		-----
663		-----		-----	-----		-----	-----		-----
704		-----		-----	-----		-----	-----		-----
732		-----		-----	-----		-----	-----		-----
739		-----		-----	-----		-----	-----		-----
742		-----		-----	-----		-----	-----		-----
749		-----		-----	-----		-----	-----		-----
750		-----		-----	-----		-----	-----		-----
751		-----		-----	-----		-----	-----		-----
752		-----		-----	-----		-----	-----		-----
753		-----		-----	-----		-----	-----		-----
781		-----		-----	-----		-----	-----		-----
785		-----		-----	-----		-----	-----		-----
840		-----		-----	-----		-----	-----		-----
862	IP344	1.259		0.91	0.064		0.20	2.924		-0.03
874		-----		-----	-----		-----	-----		-----
875		-----		-----	-----		-----	-----		-----
904		-----		-----	-----		-----	-----		-----
962		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
970		-----		-----	-----		-----	-----		-----
971		-----		-----	-----		-----	-----		-----
974		-----		-----	-----		-----	-----		-----
991		-----		-----	-----		-----	-----		-----
992		-----		-----	-----		-----	-----		-----

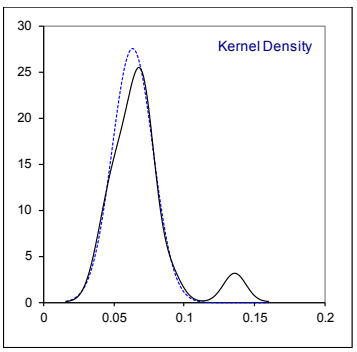
lab	method	n-Pent.	mark	z(targ)	cyclo-P.	mark	z(targ)	tot.Hex.	mark	z(targ)
994		-----		-----	-----		-----	-----		-----
995		-----		-----	-----		-----	-----		-----
997		-----		-----	-----		-----	-----		-----
998		-----		-----	-----		-----	-----		-----
1011		-----		-----	-----		-----	-----		-----
1039	D6729	1.246		0.62	0.136	D(0.01)	20.49	2.976		0.30
1040	IP344	1.2199		0.04	0.0460		-4.87	2.8750		-0.33
1056		-----		-----	-----		-----	-----		-----
1065	In house	1.2006	ex	-0.39	0.0718	ex	2.40	2.4326	ex	-3.08
1089	D5134	1.2914		1.63	0.0746		3.19	3.1274		1.24
1106		-----		-----	-----		-----	-----		-----
1109		-----		-----	-----		-----	-----		-----
1236	D5134	1.166		-1.16	0.069		1.61	2.901		-0.17
1248	In house	1.194		-0.54	0.075		3.30	2.793		-0.84
1259		-----		-----	-----		-----	-----		-----
1320		-----		-----	-----		-----	-----		-----
1340		-----		-----	-----		-----	-----		-----
1357		-----		-----	-----		-----	-----		-----
1360		-----		-----	-----		-----	-----		-----
1397		-----		-----	-----		-----	-----		-----
1412		-----		-----	-----		-----	-----		-----
1460		-----		-----	-----		-----	-----		-----
1556		-----		-----	-----		-----	-----		-----
1613		-----		-----	-----		-----	-----		-----
1654		-----		-----	-----		-----	-----		-----
1656		-----		-----	-----		-----	-----		-----
1714	D7900/IP601	1.1916		-0.59	0.0516		-3.29	6.1900	D(0.05)	20.30
1720		-----		-----	-----		-----	-----		-----
1728		-----		-----	-----		-----	-----		-----
1759		-----		-----	-----		-----	-----		-----
1776	IP344	1.2622		0.98	<0,1		-----	0.0732	D(0.05)	-17.76
1796		-----		-----	-----		-----	-----		-----
1810		-----		-----	-----		-----	-----		-----
1811		-----		-----	-----		-----	-----		-----
1815		-----		-----	-----		-----	-----		-----
1842		1.31	C	2.05	0.04	C	-6.56	2.41	C	-3.22
1849		-----		-----	-----		-----	-----		-----
1858		-----		-----	-----		-----	-----		-----
1862		-----		-----	-----		-----	-----		-----
1928		-----		-----	-----		-----	-----		-----
1929		-----		-----	-----		-----	-----		-----
1930		-----		-----	-----		-----	-----		-----
1957		-----		-----	-----		-----	-----		-----
1960		-----		-----	-----		-----	-----		-----
1967		-----		-----	-----		-----	-----		-----
1995		-----		-----	-----		-----	-----		-----
6016		-----		-----	-----		-----	-----		-----
6091		-----		-----	-----		-----	-----		-----
6159		-----		-----	-----		-----	-----		-----
6160		-----		-----	-----		-----	-----		-----
6161		-----		-----	-----		-----	-----		-----
6166		1.22		0.04	0.07		1.89	-----		-----
9051		-----		-----	-----		-----	-----		-----
9052		-----		-----	-----		-----	-----		-----
9057		-----		-----	-----		-----	-----		-----
9060		-----		-----	-----		-----	-----		-----
9063		-----		-----	-----		-----	-----		-----
9132		-----		-----	-----		-----	-----		-----
9133		-----		-----	-----		-----	-----		-----
9134		-----		-----	-----		-----	-----		-----
9135		-----		-----	-----		-----	-----		-----
9136		-----		-----	-----		-----	-----		-----
9139		-----		-----	-----		-----	-----		-----
9145	GPA2186	0.86	G(0.01)	-7.99	0.06	ex	-0.93	1.85	ex	-6.71
9146		-----		-----	-----		-----	-----		-----
9151		-----		-----	-----		-----	-----		-----
9152		-----		-----	-----		-----	-----		-----
	normality	OK			OK			not OK		
	n	15			12			10		
	outliers	2 (+2 ex)			1 (+3 ex)			4 (+2 ex)		
	mean (n)	1.2182			0.0633			2.9280		
	st.dev. (n)	0.04820			0.01451			0.29970		
	R(calc.)	0.1349			0.0406			0.8391		
	st.dev.(IP344:88)	0.04481			0.00355			0.16071		
	R(IP344:88)	0.1255			0.0099			0.4500		

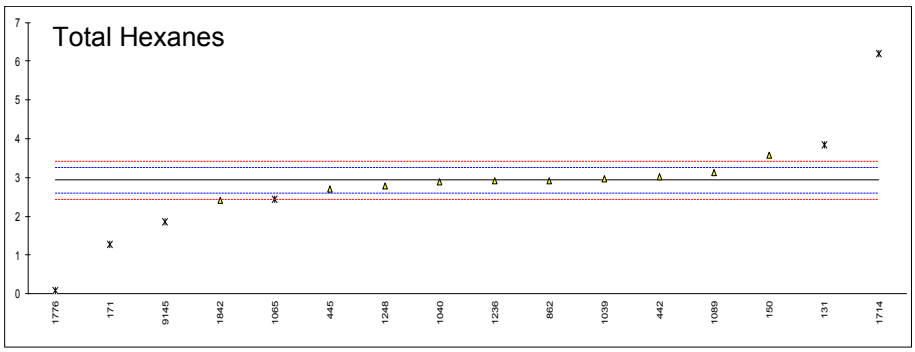
Lab 131 first reported for tot. Hexanes: 3.9737
Lab 1842 first reported for n-Pentane: 1.89, cyclo-Pentane: 0.19 and tot. Hexanes: 3.4
The test results of lab 171, 1065 and 9145 were excluded due to outliers in the other light ends determinations.

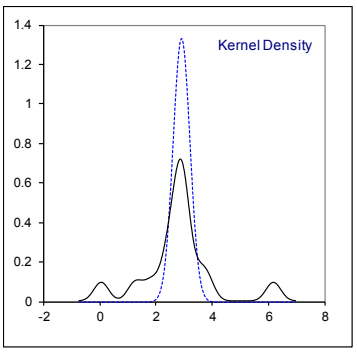












-- Empty page --

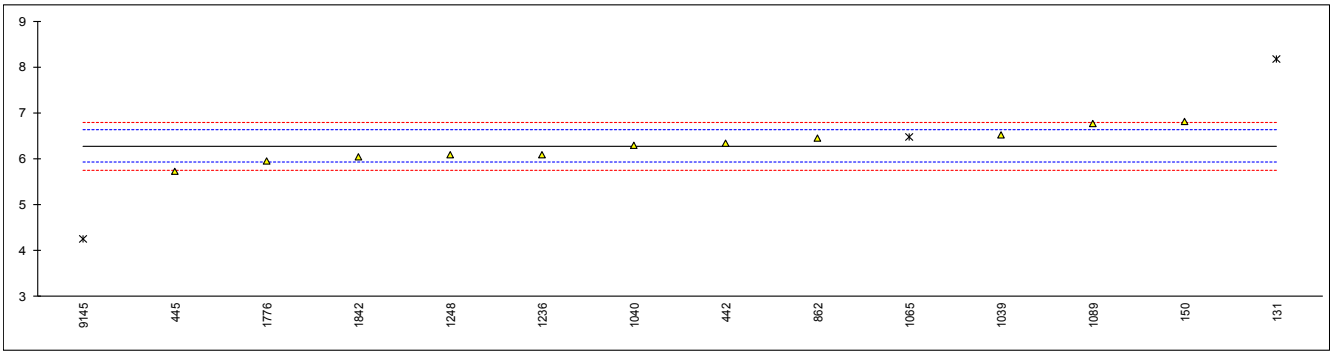
Determination of Total light ends on sample #17215; results in %M/M

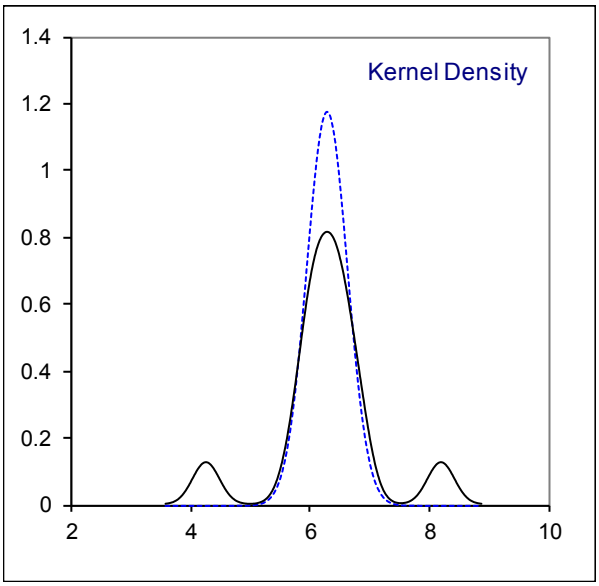
lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	970		-----		-----
62		-----		-----	971		-----		-----
90		-----		-----	974		-----		-----
92		-----		-----	991		-----		-----
120		-----		-----	992		-----		-----
131	D7900	8.1821	E,C,D(0.05)	10.82	994		-----		-----
140		-----		-----	995		-----		-----
150	IP344	6.81		2.95	997		-----		-----
154		-----		-----	998		-----		-----
158		-----		-----	1011		-----		-----
159		-----		-----	1039	D6729	6.529		1.34
167		-----		-----	1040	IP344	6.2835		-0.07
168		-----		-----	1056		-----		-----
171	D7900	5.795	E,ex	-2.87	1065	In house	6.4702	ex	1.00
175		-----		-----	1089	D5134	6.7576		2.65
186		-----		-----	1106		-----		-----
203		-----		-----	1109		-----		-----
225		-----		-----	1236	D5134	6.087		-1.20
238		-----		-----	1248	In house	6.085		-1.21
273		-----		-----	1259		-----		-----
311		-----		-----	1320		-----		-----
314		-----		-----	1340		-----		-----
332		-----		-----	1357		-----		-----
333		-----		-----	1360		-----		-----
334		-----		-----	1397		-----		-----
335		-----		-----	1412		-----		-----
336		-----		-----	1460		-----		-----
391		-----		-----	1556		-----		-----
398		-----		-----	1613		-----		-----
399		-----		-----	1654		-----		-----
402		-----		-----	1656		-----		-----
442	IP344	6.3386		0.25	1714		-----		-----
444		-----		-----	1720		-----		-----
445	IP344	5.73		-3.24	1728		-----		-----
446		-----		-----	1759		-----		-----
447		-----		-----	1776	IP344	5.9425	E,ex	-2.02
485		-----		-----	1796		-----		-----
494		-----		-----	1810		-----		-----
511		-----		-----	1811		-----		-----
525		-----		-----	1815		-----		-----
529		-----		-----	1842		6.04	C	-1.47
541		-----		-----	1849		-----		-----
551		-----		-----	1858		-----		-----
557		-----		-----	1862		-----		-----
574		-----		-----	1928		-----		-----
575		-----		-----	1929		-----		-----
593		-----		-----	1930		-----		-----
602		-----		-----	1957		-----		-----
603		-----		-----	1960		-----		-----
605		-----		-----	1967		-----		-----
608		-----		-----	1995		-----		-----
609		-----		-----	6016		-----		-----
621		-----		-----	6091		-----		-----
657		-----		-----	6159		-----		-----
663		-----		-----	6160		-----		-----
704		-----		-----	6161		-----		-----
732		-----		-----	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750		-----		-----	9060		-----		-----
751		-----		-----	9063		-----		-----
752		-----		-----	9132		-----		-----
753		-----		-----	9133		-----		-----
781		-----		-----	9134		-----		-----
785		-----		-----	9135		-----		-----
840		-----		-----	9136		-----		-----
862	IP344	6.444	E,ex	0.85	9139		-----		-----
874		-----		-----	9145	GPA2186	4.25	D(0.05)	-11.73
875		-----		-----	9146		-----		-----
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963		-----		-----					

	normality	OK

n	9
outliers	2 (+4 ex)
mean (n)	6.2956
st.dev. (n)	0.35490
R(calc.)	0.9937
st.dev.(IP344:88)	0.17439
R(IP344:88)	0.4883

Lab 131 first reported for Total light ends: 3.677; iis calculated for lab 131: 7.095
Lab 171: iis calculated: 4.15
Lab 862: test result was excluded because of a calculation error, iis calculated: 6.27.
Lab 1776: test result was excluded because of a calculation error, iis calculated: 3.4619
Lab 1842 first reported for Total light ends: 9.02
The test results of lab 171, 1065 and 9145 were excluded due to outliers in the other light ends determinations.

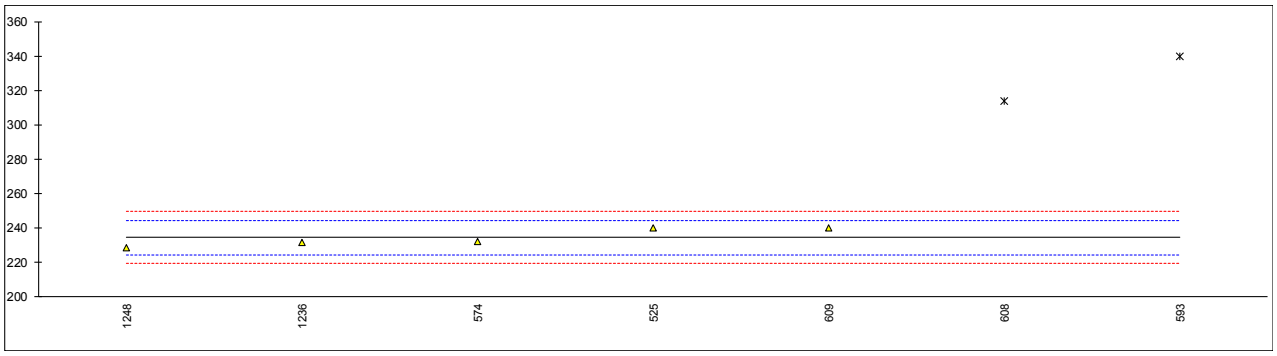




Determination of Molecular Mass, Average on sample #17215; results in g/mol

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	970		-----		-----
62		-----		-----	971		-----		-----
90		-----		-----	974		-----		-----
92		-----		-----	991		-----		-----
120		-----		-----	992		-----		-----
131		-----		-----	994		-----		-----
140		-----		-----	995		-----		-----
150		-----		-----	997		-----		-----
154		-----		-----	998		-----		-----
158		-----		-----	1011		-----		-----
159		-----		-----	1039		-----		-----
167		-----		-----	1040		-----		-----
168		-----		-----	1056		-----		-----
171		-----		-----	1065		-----		-----
175		-----		-----	1089		-----		-----
186		-----		-----	1106		-----		-----
203		-----		-----	1109		-----		-----
225		-----		-----	1236	In house	231.5		-0.58
238		-----		-----	1248	In house	228.7		-1.14
273		-----		-----	1259		-----		-----
311		-----		-----	1320		-----		-----
314		-----		-----	1340		-----		-----
332		-----		-----	1357		-----		-----
333		-----		-----	1360		-----		-----
334		-----		-----	1397		-----		-----
335		-----		-----	1412		-----		-----
336		-----		-----	1460		-----		-----
391		-----		-----	1556		-----		-----
398		-----		-----	1613		-----		-----
399		-----		-----	1654		-----		-----
402		-----		-----	1656		-----		-----
442		-----		-----	1714		-----		-----
444		-----		-----	1720		-----		-----
445		-----		-----	1728		-----		-----
446		-----		-----	1759		-----		-----
447		-----		-----	1776		-----		-----
485		-----		-----	1796		-----		-----
494		-----		-----	1810		-----		-----
511		-----		-----	1811		-----		-----
525	D2503	239.9		1.10	1815		-----		-----
529		-----		-----	1842		-----		-----
541		-----		-----	1849		-----		-----
551		-----		-----	1858		-----		-----
557		-----		-----	1862		-----		-----
574	D2503	231.96		-0.49	1928		-----		-----
575		-----		-----	1929		-----		-----
593	D2502	340	DG(0.01)	21.12	1930		-----		-----
602		-----		-----	1957		-----		-----
603		-----		-----	1960		-----		-----
605		-----		-----	1967		-----		-----
608	In house	314	DG(0.01)	15.92	1995		-----		-----
609	In house	240		1.12	6016		-----		-----
621		-----		-----	6091		-----		-----
657		-----		-----	6159		-----		-----
663		-----		-----	6160		-----		-----
704		-----		-----	6161		-----		-----
732		-----		-----	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750		-----		-----	9060		-----		-----
751		-----		-----	9063		-----		-----
752		-----		-----	9132		-----		-----
753		-----		-----	9133		-----		-----
781		-----		-----	9134		-----		-----
785		-----		-----	9135		-----		-----
840		-----		-----	9136		-----		-----
862		-----		-----	9139		-----		-----
874		-----		-----	9145		-----		-----
875		-----		-----	9146		-----		-----
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963		-----		-----					

normality	unknown
n	5
outliers	2
mean (n)	234.41
st.dev. (n)	5.207
R(calc.)	14.58
st.dev.(D2503:92)	5
R(D2503:92)	14.00

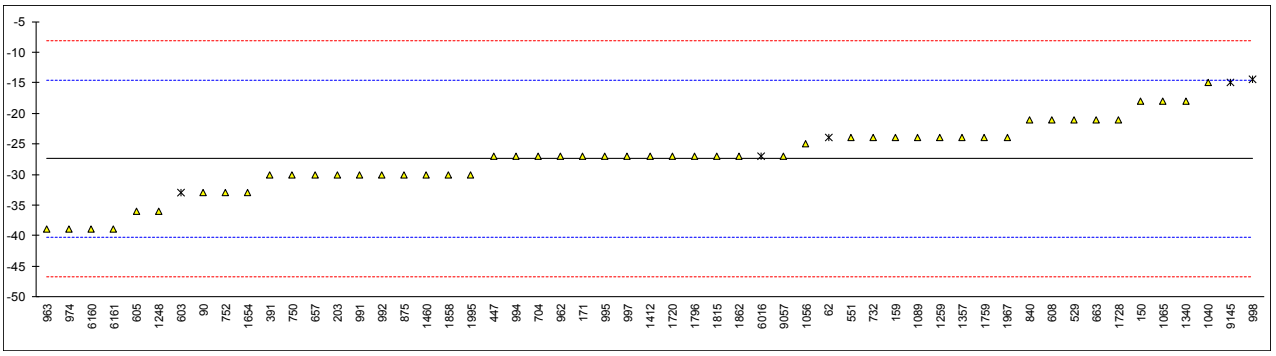


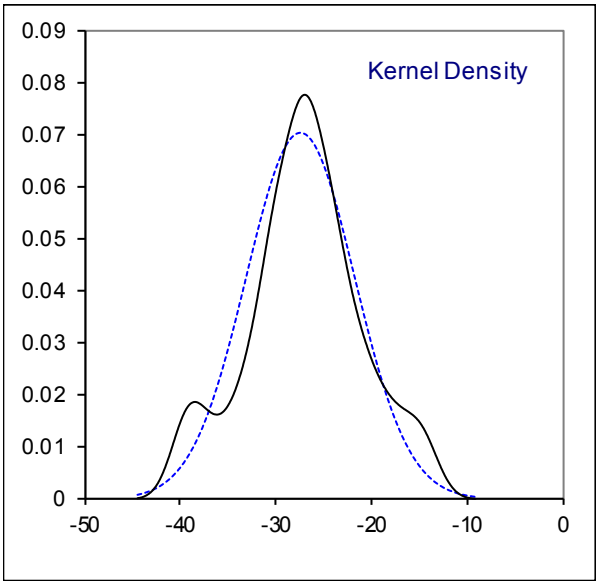
Determination of Pour Point (Maximum) on sample #17215; results in °C

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	970		-----		-----
62	D97	-24	ex	0.53	971	D5853-A	<-36		-----
90	D5853-A	-33		-0.87	974	D5853-A	-39		-1.81
92		-----		-----	991	D5853-A	-30		-0.41
120	D97	<-27		-----	992	D5853-A	-30		-0.41
131		-----		-----	994	D5853-A	-27		0.06
140		-----		-----	995	D5853-A	-27		0.06
150		-18		1.46	997	D5853-A	-27		0.06
154		<-24		-----	998	D97	-14.5	ex	2.00
158		-----		-----	1011	D5853-A	< -36		-----
159	D5853-A	-24		0.53	1039	D5853-A	<-36		-----
167		-----		-----	1040	D5853-A	-15		1.93
168	D97	<-27		-----	1056	D5853-A	-25		0.37
171	D5853-A	-27		0.06	1065	D5853-A	-18.0		1.46
175		-----		-----	1089	D5853-A	-24		0.53
186		-----		-----	1106		-----		-----
203	D5853-A	-30		-0.41	1109		-----		-----
225		-----		-----	1236		-----		-----
238	D5853-A	< - 24		-----	1248	IP441Mod.	-36		-1.34
273	D97	<-24		-----	1259	D5853-A	-24		0.53
311		-----		-----	1320		-----		-----
314		-----		-----	1340	D5853-A	-18		1.46
332		-----		-----	1357	D5853-A	-24.0		0.53
333		-----		-----	1360		-----		-----
334		-----		-----	1397		-----		-----
335		-----		-----	1412	D5853-A	-27		0.06
336		-----		-----	1460	D5853-A	-30.0		-0.41
391	D5853-A	-30		-0.41	1556		-----		-----
398		-----		-----	1613	D5853-A	<-24		-----
399		-----		-----	1654	D5853-A	-33.0		-0.87
402		-----		-----	1656	D5853-A	<-36		-----
442		-----		-----	1714		-----		-----
444		-----		-----	1720	D5853-A	-27		0.06
445	D5853-A	<-36		-----	1728	D5853-A	-21		0.99
446		-----		-----	1759	D5853-A	-24		0.53
447	D5853-A	-27		0.06	1776		-----		-----
485		-----		-----	1796	D5853-A	-27		0.06
494		-----		-----	1810		-----		-----
511		-----		-----	1811		-----		-----
525		-----		-----	1815	D5853-A	-27.0		0.06
529	D5853-A	-21		0.99	1842		-----		-----
541		-----		-----	1849		-----		-----
551	D5853-A	-24		0.53	1858	D5853-A	-30		-0.41
557		-----		-----	1862	D5853-A	-27		0.06
574	D5853-A	<-36		-----	1928		-----		-----
575	D5853-A	<-27		-----	1929		-----		-----
593		-----		-----	1930		-----		-----
602		-----		-----	1957		-----		-----
603	D97	-33	ex	-0.87	1960		-----		-----
605	D5853-A	-36		-1.34	1967	D5853-A	-24		0.53
608	D5853-A	-21		0.99	1995		-30		-0.41
609		-----		-----	6016	D97	-27	ex	0.06
621		-----		-----	6091		-----		-----
657	D5853-A	-30		-0.41	6159		-----		-----
663	D5853-A	-21		0.99	6160	D5853-A	-39		-1.81
704	D5853-A	-27		0.06	6161	D5853-A	-39		-1.81
732	D5853-A	-24		0.53	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-27		0.06
750	D5853-A	-30		-0.41	9060		-----		-----
751	D5853-A	≤-36		-----	9063		-----		-----
752	D5853-A	-33		-0.87	9132		-----		-----
753	D5853-A	<=-36		-----	9133		-----		-----
781	D5853-A	<=-36		-----	9134		-----		-----
785		-----		-----	9135		-----		-----
840	D5853-A	-21		0.99	9136		-----		-----
862	D5853-A	<-36		-----	9139		-----		-----
874		-----		-----	9145	D97	-15	ex	1.93
875	D5853-A	-30		-0.41	9146		-----		-----
904	D5853-A	> -36		-----	9151		-----		-----
962	D5853-A	-27		0.06	9152		-----		-----
963	D5853-A	-39		-1.81					

normality	OK
n	50
outliers	0 (+5ex)
mean (n)	-27.4
st.dev. (n)	5.66
R(calc.)	15.9
st.dev.(D5853-A:17)	6.43
R(D5853-A:17)	18.0

Test results of lab 62, 120, 168, 273, 603, 998, 6016 and 9145 were excluded as the method used is not intended for crude oils (see §4)



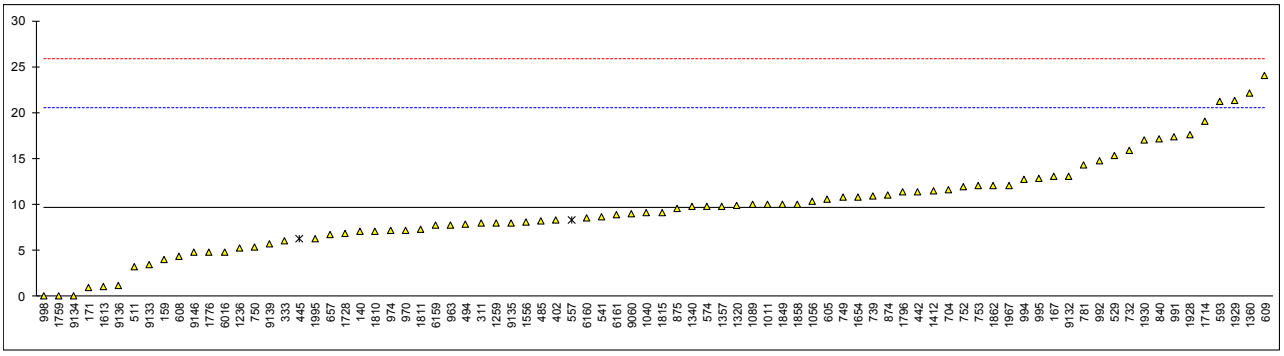


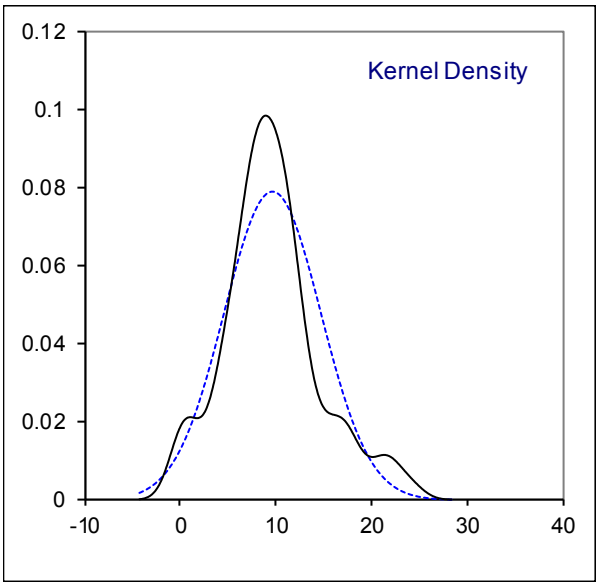
Determination of Salt as Chloride on sample #17215; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	970	D3230	7.13		-0.46
62		-----		-----	971		-----		-----
90		-----		-----	974	D3230	7.13		-0.46
92		-----		-----	991	D3230	17.4		1.43
120		-----		-----	992	D3230	14.8		0.95
131		-----		-----	994	D3230	12.715		0.57
140	D3230	7		-0.48	995	D3230	12.8		0.58
150		-----		-----	997		-----		-----
154		-----		-----	998	D3230	0.0		-1.77
158		-----		-----	1011	D3230	10		0.07
159	D3230	4.0		-1.04	1039		-----		-----
167	D3230	13		0.62	1040	D3230	9.05		-0.11
168		-----		-----	1056	D3230	10.3		0.12
171	D3230	0.9176	C	-1.61	1065		-----		-----
175		-----		-----	1089	D3230	9.95		0.06
186		-----		-----	1106		-----		-----
203		-----		-----	1109		-----		-----
225		-----		-----	1236	D3230	5.21		-0.81
238		-----		-----	1248		-----		-----
273		-----		-----	1259	D3230	8.00		-0.30
311	D3230	8		-0.30	1320	In house	9.9		0.05
314		-----		-----	1340	UOP22	9.79		0.03
332		-----		-----	1357	D3230	9.797		0.03
333	D3230	6		-0.67	1360		22.15		2.31
334		-----		-----	1397		-----		-----
335		-----		-----	1412	D3230	11.5		0.34
336		-----		-----	1460		-----		-----
391		-----		-----	1556	D3230	8.12		-0.28
398		-----		-----	1613	D3230	1.04		-1.58
399		-----		-----	1654	D3230	10.83		0.22
402	D3230	8.24		-0.26	1656	D3230	<3.5		-----
442	IP265	11.382		0.32	1714	D6470	19.07		1.74
444		-----		-----	1720		-----		-----
445	IP265	6.2	ex	-0.63	1728		6.81		-0.52
446		-----		-----	1759	In house	0.00		-1.77
447		-----		-----	1776	D3230	4.81		-0.89
485	D3230	8.13		-0.28	1796	D3230	11.3		0.31
494	D3230	7.8		-0.34	1810	D3230	7.1		-0.47
511	D3230	3.18		-1.19	1811	D3230	7.25		-0.44
525		-----		-----	1815	D3230	9.14		-0.09
529	D3230	15.362		1.06	1842		-----		-----
541	D3230	8.6		-0.19	1849	D3230	10.0		0.07
551		-----		-----	1858	D3230	10		0.07
557	D6470	8.304190	ex	-0.24	1862	D3230	12		0.44
574	D3230	9.791		0.03	1928		17.57		1.46
575		-----		-----	1929		21.30		2.15
593	D3230	21.18		2.13	1930	DIN51576	17.01		1.36
602		-----		-----	1957		-----		-----
603		-----		-----	1960		-----		-----
605	D3230	10.6		0.18	1967	D3230	12		0.44
608	D3230	4.3		-0.98	1995	D3230	6.30		-0.61
609	D3230	24.073		2.66	6016	D3230	4.83		-0.88
621		-----		-----	6091		-----		-----
657	IP265	6.67		-0.55	6159	D3230	7.696		-0.36
663		-----		-----	6160	D3230	8.532		-0.20
704	D3230	11.6		0.36	6161	D3230	8.82522		-0.15
732	GOST21534	15.9		1.15	6166		-----		-----
739	GOST21534	10.9		0.23	9051		-----		-----
742		-----		-----	9052		-----		-----
749	GOST21534	10.8		0.22	9057		-----		-----
750	D3230	5.3		-0.80	9060	D3230	9		-0.12
751		-----		-----	9063		-----		-----
752	D3230	11.90		0.42	9132	D3230	13.06		0.63
753	D3230	12		0.44	9133	D3230	3.4		-1.15
781	D3230	14.3		0.86	9134	D3230	0		-1.77
785		-----		-----	9135	D3230	8.0		-0.30
840	D6470	17.1		1.38	9136	D3230	1.1		-1.57
862		-----		-----	9139	D3230	5.7		-0.72
874	D3230	11		0.25	9145		-----		-----
875	D3230	9.5		-0.02	9146	In house	4.8		-0.89
904		-----		-----	9151		-----		-----
962		-----		-----	9152	D3230	<100		-----
963	D3230	7.7		-0.36					

normality	OK
n	80
outliers	0 (+ 2ex)
mean (n)	9.631
st.dev. (n)	5.0702
R(calc.)	14.197
st.dev.(D3230:13)	5.4674
R(D3230:13)	15.309

Lab 171 reported 9176 mg/kg
Lab 445 excluded, reported in a deviating unit 6.2 mg/L
Lab 557 excluded, reported salt as NaCl



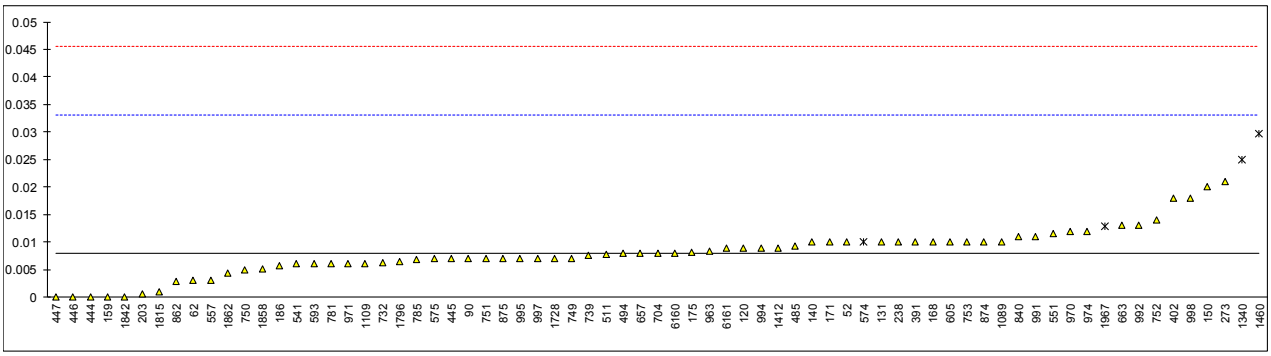


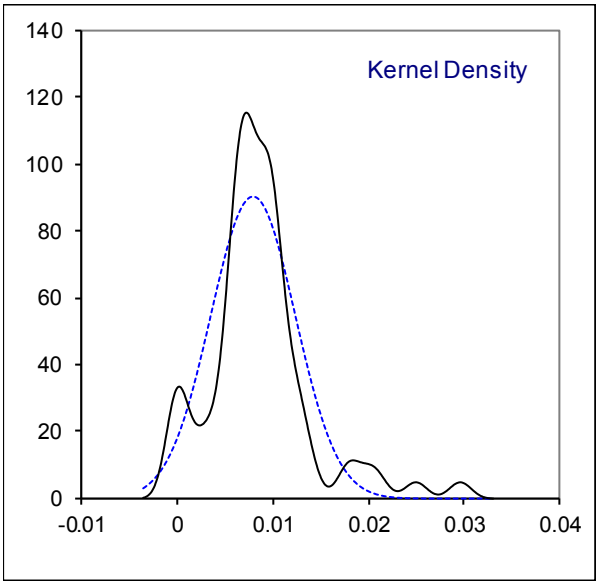
Determination of Sediment (Extraction method) ASTM D473 on sample #17215; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D473	0.01		0.16	970	D473	0.012		0.32
62	D473	0.003		-0.40	971	D473	0.006		-0.16
90	D473	0.007		-0.08	974	D473	0.012		0.32
92		-----		-----	991	D473	0.011		0.24
120	D473	0.009		0.08	992	D473	0.013		0.40
131	D473	0.01		0.16	994	D473	0.009		0.08
140	D473	0.01		0.16	995	D473	0.007		-0.08
150	D473	0.02		0.96	997	D473	0.007		-0.08
154	D473	<0.01		-----	998	D473	0.018		0.80
158		-----		-----	1011		-----		-----
159	D473	0.0		-0.64	1039		-----		-----
167		-----		-----	1040		-----		-----
168	D473	0.01		0.16	1056		-----		-----
171	D473	0.01		0.16	1065		-----		-----
175	D473	0.0082		0.01	1089	D473	0.010		0.16
186	D473	0.0057		-0.19	1106		-----		-----
203	D473	0.00068		-0.59	1109	D473	0.006		-0.16
225		-----		-----	1236		-----		-----
238	D473	0.010		0.16	1248		-----		-----
273	D473	0.021		1.04	1259		-----		-----
311	D473	<0.01		-----	1320		-----		-----
314		-----		-----	1340	ISO9030	0.025	R(0.05)	1.36
332	D473	< 0.01		-----	1357		-----		-----
333	D473	<0.01		-----	1360		-----		-----
334		-----		-----	1397		-----		-----
335	D473	<0.01		-----	1412	D473	0.009		0.08
336	D473	<0.01		-----	1460	D473	0.02963	R(0.01)	1.73
391	D473	0.01		0.16	1556	ISO3735	<0,01		-----
398		-----		-----	1613		-----	W	-----
399		-----		-----	1654		-----		-----
402	D473	0.018		0.80	1656	D473	<0.01		-----
442		-----		-----	1714		-----		-----
444	D473	0		-0.64	1720		-----		-----
445	D473	0.007		-0.08	1728	D473	0.007		-0.08
446	D473	0		-0.64	1759		-----		-----
447	D473	0		-0.64	1776		-----		-----
485	D473	0.0092		0.09	1796	D473	0.0065		-0.12
494	D473	0.008		0.00	1810		-----		-----
511	D473	0.0078		-0.02	1811		-----		-----
525		-----		-----	1815	ISO3735	0.001		-0.56
529		-----		-----	1842	D473	0.0		-0.64
541	D473	0.006		-0.16	1849		-----		-----
551	D473	0.0116		0.29	1858	D473	0.0052		-0.22
557	D473	0.0030392457		-0.40	1862	D473	0.0043		-0.30
574	D473	0.01	ex	0.16	1928		-----		-----
575	D473	0.007		-0.08	1929		-----		-----
593	D473	0.006		-0.16	1930		-----		-----
602		-----		-----	1957		-----		-----
603		-----		-----	1960		-----		-----
605	D473	0.01		0.16	1967	D473	0.0128	ex	0.38
608		-----		-----	1995		-----		-----
609		-----		-----	6016		-----		-----
621		-----		-----	6091		-----		-----
657	D473	0.008		0.00	6159		-----		-----
663	D473	0.013		0.40	6160	D473	0.008		0.00
704	D473	0.008		0.00	6161	D473	0.0089236		0.07
732	D473	0.0063		-0.14	6166		-----		-----
739	GOST6370	0.0075		-0.04	9051		-----		-----
742		-----		-----	9052		-----		-----
749	GOST6370	0.0071		-0.07	9057		-----		-----
750	D473	0.005		-0.24	9060		-----		-----
751	D473	0.007		-0.08	9063		-----		-----
752	D473	0.014		0.48	9132		-----		-----
753	D473	0.01		0.16	9133		-----		-----
781	D473	0.006		-0.16	9134		-----		-----
785	D473	0.0069		-0.09	9135		-----		-----
840	D473	0.011		0.24	9136		-----		-----
862	D473	0.0028		-0.42	9139		-----		-----
874	D473	0.01		0.16	9145		-----		-----
875	D473	0.007		-0.08	9146		-----		-----
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963	D473	0.0083		0.02					

normality	suspect
n	67
outliers	2 (+2 ex)
mean (n)	0.00802
st.dev. (n)	0.004407
R(calc.)	0.01234
st.dev.(D473:07e1)	0.012516
R(D473:07e1)	0.03504

Lab 1613 first reported: 0.058
Test results of lab 574 and 1967 were excluded as the test values were reported in a different unit (%M/M).



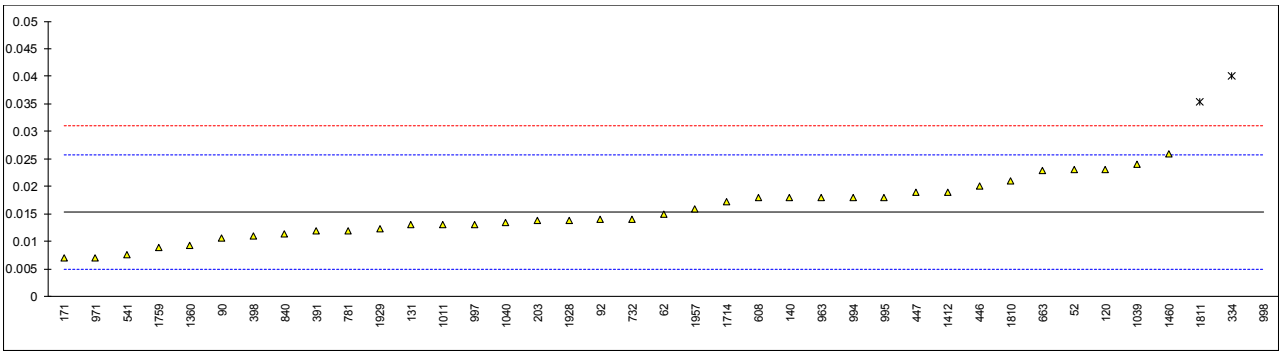


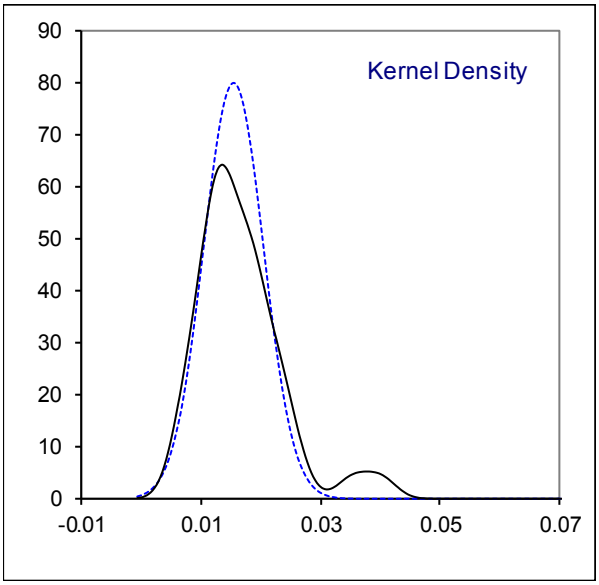
Determination of Sediment (Membrane filtration) ASTM D4807 on sample #17215; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4807	0.023		1.46	970		-----		-----
62	D4807	0.015		-0.07	971	D4807	0.007		-1.61
90	D4807	0.0107		-0.90	974		-----		-----
92	D4807	0.014		-0.26	991		-----		-----
120	D4807	0.023		1.46	992		-----		-----
131	D4807	0.013		-0.46	994	D4807	0.018		0.50
140	D4807	0.018		0.50	995	D4807	0.018		0.50
150		-----		-----	997	D4807	0.0131		-0.44
154		-----		-----	998	D4807	0.1565	R(0.01)	27.10
158		-----		-----	1011	D4807	0.013		-0.46
159		-----		-----	1039	D4807	0.024		1.66
167		-----		-----	1040	D4807	0.0135		-0.36
168		-----		-----	1056		-----		-----
171	D4807	0.007		-1.61	1065		-----		-----
175		-----		-----	1089		-----		-----
186		-----		-----	1106		-----		-----
203	D4807	0.0139		-0.28	1109		-----		-----
225		-----		-----	1236		-----		-----
238		-----		-----	1248		-----		-----
273		-----		-----	1259		-----		-----
311		-----		-----	1320		-----		-----
314		-----		-----	1340		-----		-----
332		-----		-----	1357		-----		-----
333		-----		-----	1360		0.0093		-1.17
334	D4807	0.04	R(0.05)	4.73	1397		-----		-----
335		-----		-----	1412	D4807	0.019		0.70
336		-----		-----	1460	D4807	0.025999	C	2.04
391	D4807	0.012		-0.65	1556		-----		-----
398	D4807	0.0109		-0.86	1613		-----		-----
399		-----		-----	1654		-----		-----
402		-----		-----	1656		-----		-----
442		-----		-----	1714	D4807	0.0172		0.35
444		-----		-----	1720		-----		-----
445		-----		-----	1728		-----		-----
446	D4807	0.020		0.89	1759	D4807	0.009		-1.22
447	D4807	0.019		0.70	1776		-----		-----
485		-----		-----	1796		-----		-----
494		-----		-----	1810	D4807	0.021	C	1.08
511		-----		-----	1811	D4807	0.0353	R(0.05)	3.83
525		-----		-----	1815		-----		-----
529		-----		-----	1842		-----		-----
541	D4807	0.0075		-1.51	1849		-----		-----
551		-----		-----	1858		-----		-----
557		-----		-----	1862		-----		-----
574		-----		-----	1928		0.0139		-0.28
575		-----		-----	1929		0.0124		-0.57
593		-----		-----	1930		-----		-----
602		-----		-----	1957	D4807	0.01597		0.11
603		-----		-----	1960		-----		-----
605		-----		-----	1967		-----		-----
608	D4807	0.018		0.50	1995		-----		-----
609		-----		-----	6016		-----		-----
621		-----		-----	6091		-----		-----
657		-----		-----	6159		-----		-----
663	D4807	0.0228		1.43	6160		-----		-----
704		-----		-----	6161		-----		-----
732	D4807	0.014		-0.26	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750		-----		-----	9060		-----		-----
751		-----		-----	9063		-----		-----
752		-----		-----	9132		-----		-----
753		-----		-----	9133		-----		-----
781	D4807	0.012		-0.65	9134		-----		-----
785		-----		-----	9135		-----		-----
840	D4807	0.0114		-0.76	9136		-----		-----
862		-----		-----	9139		-----		-----
874		-----		-----	9145		-----		-----
875		-----		-----	9146		-----		-----
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963	D4807	0.018		0.50					

normality	OK
n	36
outliers	3
mean (n)	0.0154
st.dev. (n)	0.00500
R(calc.)	0.0140
st.dev.(D4807:05)	0.00521
R(D4807:05)	0.0146

Lab 1460 first reported: 0.0324974
Lab 1810 first reported: 0.01



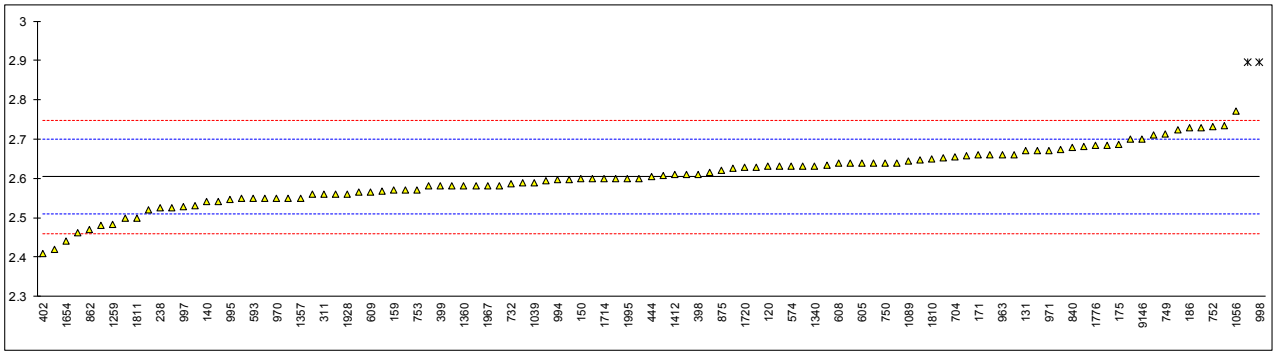


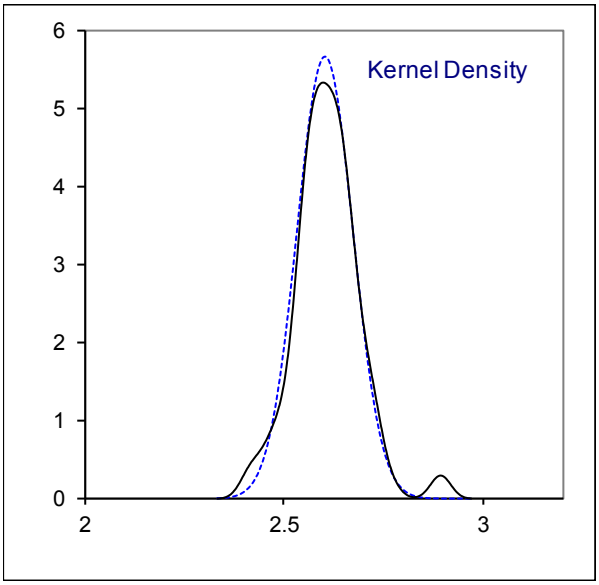
Determination of Sulphur, total on sample #17215; results in %M/M

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4294	2.58		-0.51	970	D4294	2.55		-1.13
62	D4294	2.63		0.53	971	D4294	2.672		1.41
90	D4294	2.559		-0.94	974	D4294	2.63		0.53
92	D4294	2.895	R(0.01)	6.04	991	D4294	2.651		0.97
120	D4294	2.630		0.53	992	D4294	2.633		0.60
131	D4294	2.67153		1.40	994	D4294	2.597		-0.15
140	D4294	2.54		-1.34	995	D4294	2.547		-1.19
150	D4294	2.600		-0.09	997	D4294	2.528		-1.59
154	D4294	2.71		2.20	998	D4294	2.8958	R(0.01)	6.06
158		-----		-----	1011	D4294	2.56		-0.92
159	D4294	2.57		-0.71	1039	ISO14596	2.59		-0.30
167	D4294	2.5638		-0.84	1040	ISO8754	2.58		-0.51
168	D4294	2.73		2.61	1056	D4294	2.77		3.44
171	D4294	2.66		1.16	1065	D4294	2.50		-2.17
175	D4294	2.687		1.72	1089	D4294	2.645		0.85
186	D4294	2.7280	C	2.57	1106		-----		-----
203	D4294	2.734		2.70	1109	D4294	2.55		-1.13
225	D4294	2.64		0.74	1236		-----		-----
238	D4294	2.524		-1.67	1248		-----		-----
273	D4294	2.42		-3.83	1259	D4294	2.483		-2.52
311	D4294	2.56		-0.92	1320		-----		-----
314		-----		-----	1340	ISO8754	2.63		0.53
332		-----		-----	1357	D4294	2.55		-1.13
333		-----		-----	1360	ISO8754	2.58		-0.51
334	D4294	2.57		-0.71	1397		-----		-----
335	D2622	2.55		-1.13	1412	D4294	2.61		0.12
336		-----		-----	1460	D4294	2.7224		2.45
391	D4294	2.55		-1.13	1556	ISO8754	2.647		0.89
398	D4294	2.611		0.14	1613	D4294	2.625		0.43
399	D4294	2.58		-0.51	1654	ISO8754	2.44		-3.42
402	D2622	2.41		-4.04	1656		-----	W	-----
442	IP336	2.684		1.66	1714	D2622	2.60		-0.09
444	D2622	2.604		-0.01	1720	D4294	2.629		0.51
445	D4294	2.590		-0.30	1728	D4294	2.52		-1.75
446		-----		-----	1759		-----		-----
447		-----		-----	1776	ISO8754	2.683		1.64
485	D4294	2.638		0.70	1796	D4294	2.629		0.51
494	D4294	2.461		-2.98	1810	D4294	2.65		0.95
511	D4294	2.66015		1.16	1811	D4294	2.50		-2.17
525		-----		-----	1815	D7039	2.658		1.12
529	D4294	2.4807		-2.57	1842	D2622	2.60		-0.09
541		-----		-----	1849		-----		-----
551	D4294	2.6737		1.44	1858	D4294	2.606		0.03
557	D4294	2.524955		-1.65	1862	D4294	2.597		-0.15
574	D4294	2.63		0.53	1928	ISO8754	2.56		-0.92
575	D4294	2.67156		1.40	1929	ISO8754	2.58		-0.51
593	D4294	2.55		-1.13	1930		-----		-----
602		-----		-----	1957		-----		-----
603	D4294	2.567		-0.78	1960		-----		-----
605	D4294	2.639		0.72	1967	D4294	2.58		-0.51
608	D4294	2.638	C	0.70	1995	D4294	2.6		-0.09
609	D4294	2.565		-0.82	6016	D4294	2.7		1.99
621		-----		-----	6091		-----		-----
657		-----		-----	6159	D4294	2.6001		-0.09
663	D4294	2.540		-1.34	6160	D4294	2.595		-0.19
704	D4294	2.655		1.05	6161	D4294	2.6109		0.14
732	D4294	2.585		-0.40	6166		-----		-----
739		2.682		1.61	9051		-----		-----
742		-----		-----	9052		-----		-----
749		2.713		2.26	9057		-----		-----
750	D4294	2.64		0.74	9060		-----		-----
751	D4294	2.600		-0.09	9063		-----		-----
752	D4294	2.7319		2.65	9132		-----		-----
753	D4294	2.57		-0.71	9133		-----		-----
781	D4294	2.64		0.74	9134		-----		-----
785	D4294	2.582		-0.46	9135		-----		-----
840	D4294	2.678		1.53	9136		-----		-----
862	D2622	2.471		-2.77	9139		-----		-----
874	D4294	2.53		-1.55	9145	D4294	2.616		0.24
875	D4294	2.62		0.33	9146		2.7		1.99
904	D4294	2.66		1.16	9151		-----		-----
962		-----		-----	9152		-----		-----
963	D4294	2.66		1.16					

normality	OK
n	103
outliers	2
mean (n)	2.6043
st.dev. (n)	0.07042
R(calc.)	0.1972
st.dev.(D4294:16e1)	0.04809
R(D4294:16e1)	0.1347

Lab 186 first reported: 0.0057
Lab 608 first reported: 1.779
Lab 1656 first reported: 2.9



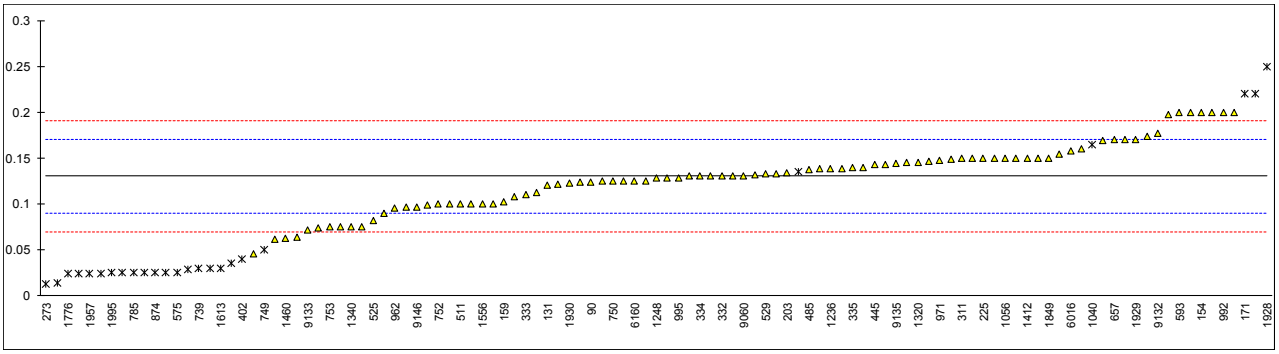


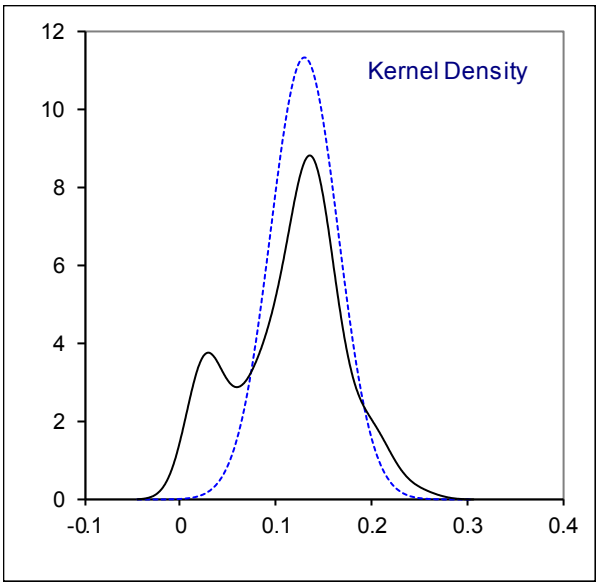
Determination of Water on sample #17215; results in %V/V

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52	D4928	0.13		-0.01	970		-----		-----
62	D6304	0.15		0.99	971	D4928	0.148		0.89
90	D4928	0.124		-0.30	974	D4928	0.1484		0.91
92	D4377	0.122		-0.40	991	D4006	0.200		3.47
120	D4377	0.0239	ex, see §4.1	-5.27	992	D4006	0.200		3.47
131	D4928	0.1205		-0.48	994	D4377	0.174		2.18
140	D4928	0.03	ex, see §4.1	-4.97	995	D4928	0.1283		-0.09
150		-----		-----	997	D4928	0.0133	ex, see §4.1	-5.80
154	D4928	0.20		3.47	998	D4377	0.2		3.47
158		-----		-----	1011	D4928	0.22	R(0.01)	4.46
159	D4377	0.102		-1.40	1039	D4928	0.1450		0.74
167		-----		-----	1040	DIN51777	0.165	ex	1.73
168	D4006	0.10	C	-1.50	1056	D4928	0.150		0.99
171	D4377	0.22	R(0.01)	4.46	1065	D4006	0.075		-2.74
175	D4006	0.10		-1.50	1089	D4928	0.17		1.98
186		-----		-----	1106		-----		-----
203	D4928	0.1343		0.21	1109	D4377	0.13		-0.01
225	D4006	0.150		0.99	1236	D4928	0.139		0.44
238	D4006	0.025	ex, see §4.1	-5.22	1248	D4377Mod.	0.128		-0.11
273	D4928	0.0125	ex, see §4.1	-5.84	1259		-----		-----
311	D4928	0.15		0.99	1320	ISO9029	0.145		0.74
314	D4928	0.13		-0.01	1340	ISO9029	0.075		-2.74
332		0.130		-0.01	1357	D4006	<0.05		-----
333	D4377	0.11		-1.00	1360	D4377	0.15		0.99
334	D4377	0.13		-0.01	1397		-----		-----
335	D4377	0.14		0.49	1412	D4928	0.15		0.99
336		-----		-----	1460	D6304	0.062		-3.38
391	D4377	0.15		0.99	1556	D6304	0.10		-1.50
398	D4377	0.200		3.47	1613	D4377	0.030	ex, see §4.1	-4.97
399		-----		-----	1654		-----		-----
402	D4006	0.04	ex, see §4.1	-4.48	1656		-----		-----
442	IP386	0.097		-1.65	1714	D4006	0.1282		-0.10
444	D4928	0.0244	ex, see §4.1	-5.25	1720		-----		-----
445	IP386	0.143		0.64	1728		-----		-----
446	D4928	0.14		0.49	1759	D4006	0.025	ex, see §4.1	-5.22
447	IP386	0.133		0.14	1776	D6304	0.0235	ex, see §4.1	-5.29
485	D4377	0.1371		0.35	1796	D4006	0.100		-1.50
494	D6304	0.143		0.64	1810	D4377	0.028	ex, see §4.1	-5.07
511	D4006	0.10		-1.50	1811	D4377	0.064		-3.28
525	D4928	0.0813		-2.42	1815	D4377	0.1232		-0.34
529	D4377	0.1327		0.13	1842	D95	0.15		0.99
541	D4928	0.132		0.09	1849	D4377	0.15		0.99
551		-----		-----	1858	D4006	0.1125		-0.88
557		-----		-----	1862	D4006	0.075		-2.74
574	D4377	0.135	ex	0.24	1928	D4377	0.25	R(0.01)	5.95
575	D4377	0.02557	ex, see §4.1	-5.19	1929	D4377	0.17		1.98
593	D4006	0.200		3.47	1930	DIN51777	0.123		-0.35
602		-----		-----	1957	D4377	0.024	ex, see §4.1	-5.27
603	D95	<0.05		-----	1960		-----		-----
605		-----		-----	1967	D4377	0.15424		1.20
608	D4377	0.0613		-3.42	1995	D4928	0.0249	ex, see §4.1	-5.23
609	D4377	0.045		-4.23	6016	D6304	0.158		1.38
621		-----		-----	6091	IP386	0.139		0.44
657	D4377	0.17		1.98	6159	D4006	0.125		-0.26
663	D4377	0.197		3.32	6160	D4006	0.125		-0.26
704	D4377	0.1696		1.96	6161	D4006	0.125		-0.26
732	D6304	0.16		1.48	6166		-----		-----
739	GOST2477	0.03	ex, see §4.1	-4.97	9051		-----		-----
742		-----		-----	9052		-----		-----
749	GOST2477	0.05	R(0.01)	-3.98	9057	D4377	0.108		-1.10
750	D4006	0.125		-0.26	9060	D4377	0.130		-0.01
751		-----		-----	9063	D4928	0.146		0.79
752	D4006	0.100		-1.50	9132	D4928	0.1775		2.35
753	D4006	0.075		-2.74	9133	D4928	0.0716		-2.91
781	D4006	0.025	ex, see §4.1	-5.22	9134		-----		-----
785	D4006	0.025	ex, see §4.1	-5.22	9135	D4928	0.144		0.69
840	D4928	0.099		-1.55	9136	D4928	0.035	ex, see §4.1	-4.72
862		-----		-----	9139		-----		-----
874	D4006	0.025	ex, see §4.1	-5.22	9145	D4928	0.0744		-2.77
875		-----		-----	9146	In house	0.097		-1.65
904	D4928	0.1250	C	-0.26	9151		-----		-----
962	D4377	0.0958		-1.70	9152		0.09		-1.99
963	D4377	0.139		0.44					

normality	OK			
n	88			
outliers	4 (+21 ex)			
mean (n)	0.1301	Spike	0.1%V/V	(recovery < 130%)
st.dev. (n)	0.03529			
R(calc.)	0.0988			
st.dev.(D4377:00)	0.02014			
R(D4377:00)	0.0564			

Lab 168 first reported: 0
Lab 904 first reported: 1250 %V/V
Labs 574 and 1040 were excluded as the test values were reported in a different unit (%M/M)





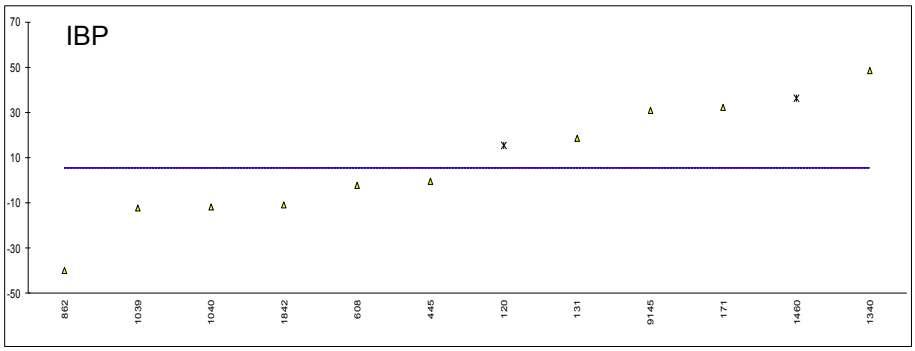
Determination of Simulated Distillation on sample #17215; results in °C

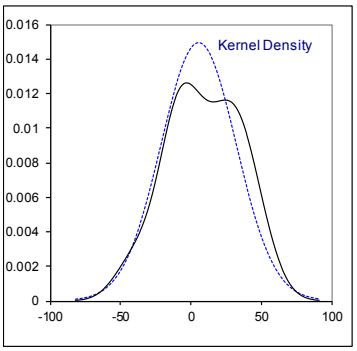
lab	method	IBP	mark	5%rec	mark	10%rec	mark	30%rec	mark
52		-----		-----		-----		-----	
62		-----		-----		-----		-----	
90		-----		-----		-----		-----	
92		-----		-----		-----		-----	
120	D7169	15.4	ex	70.1	ex	92.2	ex	193.9	D(0.01)
131	D7169	18.66		72.75		123.67		255.0	C
140		-----		-----		-----		-----	
150	D7169	<36		65.0		113.8		251.2	
154		-----		-----		-----		-----	
158		-----		-----		-----		-----	
159		-----		-----		-----		-----	
167	D7169	<36		69.71		115.23		242.16	
168		-----		-----		-----		-----	
171	D7169	32.0		63.0		93.0		228.0	
175		-----		-----		-----		-----	
186		-----		-----		-----		-----	
203		-----		-----		-----		-----	
225		-----		-----		-----		-----	
238		-----		-----		-----		-----	
273		-----		-----		-----		-----	
311	D7169	<36		62.0		98.0		227.0	
314		-----		-----		-----		-----	
332		-----		-----		-----		-----	
333		-----		-----		-----		-----	
334		-----		-----		-----		-----	
335		-----		-----		-----		-----	
336		-----		-----		-----		-----	
391		-----		-----		-----		-----	
398		-----		-----		-----		-----	
399		-----		-----		-----		-----	
402		-----		-----		-----		-----	
442		-----		-----		-----		-----	
444		-----		-----		-----		-----	
445	D7169	-0.5		68.5		115.0		242.5	
446		-----		-----		-----		-----	
447		-----		-----		-----		-----	
485		-----		-----		-----		-----	
494		-----		-----		-----		-----	
511		-----		-----		-----		-----	
525		-----		-----		-----		-----	
529		-----		-----		-----		-----	
541		-----		-----		-----		-----	
551		-----		-----		-----		-----	
557		-----		-----		-----		-----	
574		-----		-----		-----		-----	
575		-----		-----		-----		-----	
593		-----		-----		-----		-----	
602		-----		-----		-----		-----	
603		-----		-----		-----		-----	
605		-----		-----		-----		-----	
608	D7169	-2.53		73.83		122.42		249.97	
609		-----		-----		-----		-----	
621		-----		-----		-----		-----	
657		-----		-----		-----		-----	
663		-----		-----		-----		-----	
704		-----		-----		-----		-----	
732		-----		-----		-----		-----	
739		-----		-----		-----		-----	
742		-----		-----		-----		-----	
749		-----		-----		-----		-----	
750		-----		-----		-----		-----	
751		-----		-----		-----		-----	
752		-----		-----		-----		-----	
753		-----		-----		-----		-----	
781		-----		-----		-----		-----	
785		-----		-----		-----		-----	
840		-----		-----		-----		-----	
862	D7169	-40.0		64.5		115.0		275.4	
874		-----		-----		-----		-----	
875		-----		-----		-----		-----	
904		-----		-----		-----		-----	
962		-----		-----		-----		-----	
963		-----		-----		-----		-----	
970		-----		-----		-----		-----	
971		-----		-----		-----		-----	
974		-----		-----		-----		-----	
991		-----		-----		-----		-----	
992		-----		-----		-----		-----	

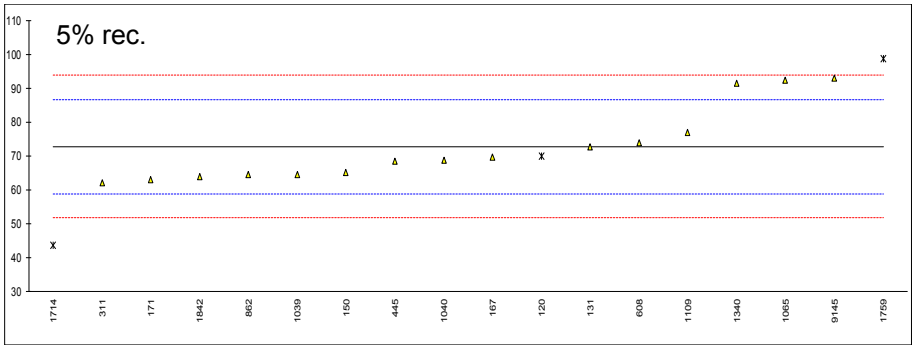
lab	method	IBP	mark	5%rec	mark	10%rec	mark	30%rec	mark
994		-----		-----		-----		-----	
995		-----		-----		-----		-----	
997		-----		-----		-----		-----	
998		-----		-----		-----		-----	
1011		-----		-----		-----		-----	
1039	EN15199-3	-12.2		64.6		110.4		251.1	
1040	D2887	-11.7		68.7		115.2		253.3	
1056		-----		-----		-----		-----	
1065		-----		92.4		113.2		252.4	
1089		-----		-----		-----		-----	
1106		-----		-----		-----		-----	
1109	D7169	<36.0		77.0		117.5		243.5	
1236		-----		-----		-----		-----	
1248		-----		-----		-----		-----	
1259		-----		-----		-----		-----	
1320		-----		-----		-----		-----	
1340	ISO3405	48.5		91.5		122.5		230.5	
1357		-----		-----		-----		-----	
1360		-----		-----		-----		-----	
1397		-----		-----		-----		-----	
1412		-----		-----		-----		-----	
1460	D2887	36.0	ex	-----		79.0	DG(0.05)	199.0	D(0.01)
1556		-----		-----		-----		-----	
1613		-----		-----		-----		-----	
1654		-----		-----		-----		-----	
1656		-----		-----		-----		-----	
1714		<-36.0		43.8	D(0.05)	64.9	DG(0.05)	204.4	D(0.01)
1720		-----		-----		-----		-----	
1728		-----		-----		-----		-----	
1759	D7169	<36		98.6	C,D(0.05)	137.2	ex,C	273.2	ex,C
1776		-----		-----		-----		-----	
1796		-----		-----		-----		-----	
1810		-----		-----		-----		-----	
1811		-----		-----		-----		-----	
1815		-----		-----		-----		-----	
1842	IP545	-11		64		112		241	
1849		-----		-----		-----		-----	
1858		-----		-----		-----		-----	
1862		-----		-----		-----		-----	
1928		-----		-----		-----		-----	
1929		-----		-----		-----		-----	
1930		-----		-----		-----		-----	
1957		-----		-----		-----		-----	
1960		-----		-----		-----		-----	
1967		-----		-----		-----		-----	
1995		-----		-----		-----		-----	
6016		-----		-----		-----		-----	
6091		-----		-----		-----		-----	
6159		-----		-----		-----		-----	
6160		-----		-----		-----		-----	
6161		-----		-----		-----		-----	
6166		-----		-----		-----		-----	
9051		-----		-----		-----		-----	
9052		-----		-----		-----		-----	
9057		-----		-----		-----		-----	
9060		-----		-----		-----		-----	
9063		-----		-----		-----		-----	
9132		-----		-----		-----		-----	
9133		-----		-----		-----		-----	
9134		-----		-----		-----		-----	
9135		-----		-----		-----		-----	
9136		-----		-----		-----		-----	
9139		-----		-----		-----		-----	
9145	D7169	30.7		92.8		127.2		244.6	
9146		-----		-----		-----		-----	
9151		-----		-----		-----		-----	
9152		-----		-----		-----		-----	
	normality	OK		suspect		suspect		suspect	
	n	10		15		15		15	
	outliers	0 (+2 ex)		2 (+1 ex)		2 (+2 ex)		3 (+1 ex)	
	mean (n)	5.19		72.69		114.27		245.84	
	st.dev. (n)	26.689		10.968		9.030		12.228	
	R(calc.)	74.73		30.71		25.28		34.24	
	st.dev.(D7169:16)	(0.889)		7.000		6.964		4.679	
	R(D7169:16)	(2.49)		19.6		19.5		13.1	

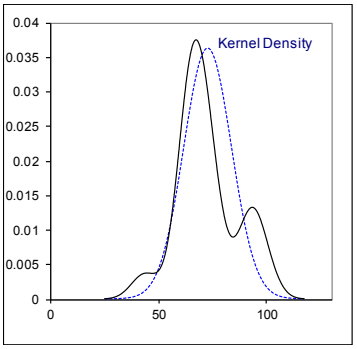
Lab 131 first reported for 30%rec.

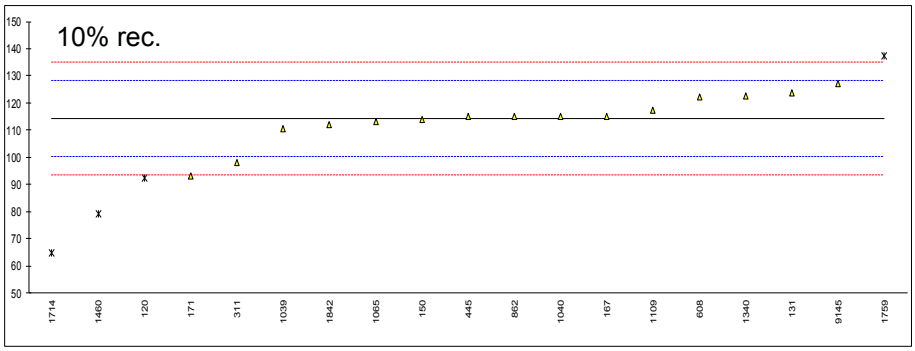
Lab 1759 first reported: 102.6; 151.0; 315.0 respectively
The test results of lab 120, 1460, 1714 and 1759 were excluded due to outlying result in other simulated distillation parameters.

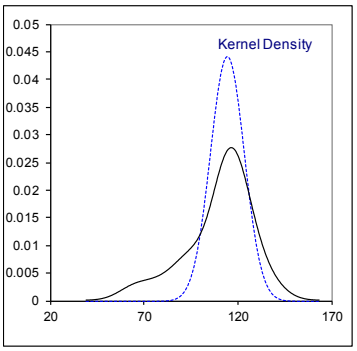


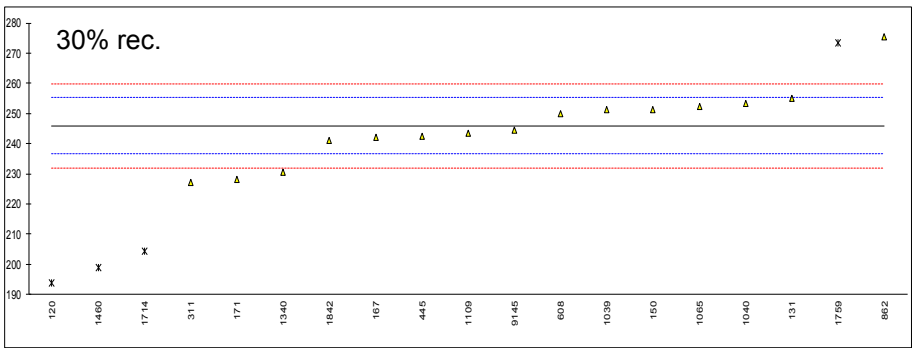


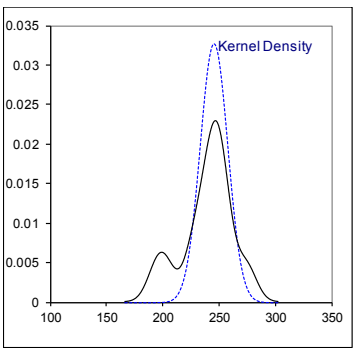












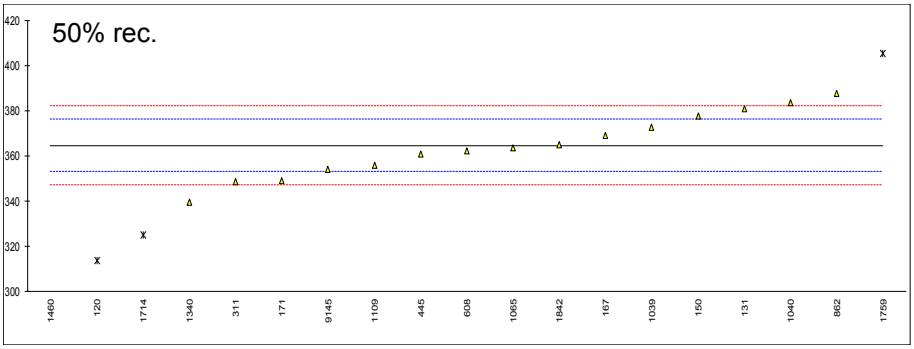
Determination of Simulated Distillation on sample #17215; results in °C, continued

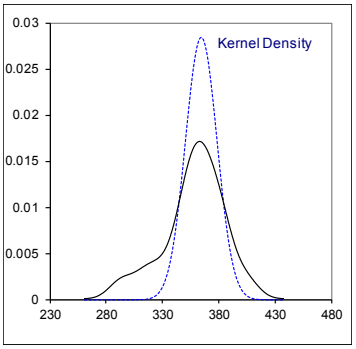
lab	method	50%rec	mark	70%rec	mark	90%rec	mark	FBP	mark
52		-----		-----		-----		-----	
62		-----		-----		-----		-----	
90		-----		-----		-----		-----	
92		-----		-----		-----		-----	
120	D7169	313.5	ex	422.6	D(0.01)	557.1	ex	645.3	ex
131	D7169	381.0	C	499.5	C	-----		719.888	
140		-----		-----		-----		-----	
150	D7169	377.6		516.4		706.8		>720.0	
154		-----		-----		-----		-----	
158		-----		-----		-----		-----	
159		-----		-----		-----		-----	
167	D7169	369.05		510.55		713.13		>720	
168		-----		-----		-----		-----	
171	D7169	349.0		478.0		599.0		651.0	
175		-----		-----		-----		-----	
186		-----		-----		-----		-----	
203		-----		-----		-----		-----	
225		-----		-----		-----		-----	
238		-----		-----		-----		-----	
273		-----		-----		-----		-----	
311	D7169	348.5		476.5		642.5		744.0	
314		-----		-----		-----		-----	
332		-----		-----		-----		-----	
333		-----		-----		-----		-----	
334		-----		-----		-----		-----	
335		-----		-----		-----		-----	
336		-----		-----		-----		-----	
391		-----		-----		-----		-----	
398		-----		-----		-----		-----	
399		-----		-----		-----		-----	
402		-----		-----		-----		-----	
442		-----		-----		-----		-----	
444		-----		-----		-----		-----	
445	D7169	361.0		487.0		636.6		738.8	
446		-----		-----		-----		-----	
447		-----		-----		-----		-----	
485		-----		-----		-----		-----	
494		-----		-----		-----		-----	
511		-----		-----		-----		-----	
525		-----		-----		-----		-----	
529		-----		-----		-----		-----	
541		-----		-----		-----		-----	
551		-----		-----		-----		-----	
557		-----		-----		-----		-----	
574		-----		-----		-----		-----	
575		-----		-----		-----		-----	
593		-----		-----		-----		-----	
602		-----		-----		-----		-----	
603		-----		-----		-----		-----	
605		-----		-----		-----		-----	
608	D7169	362.09		476.32		665.0		>720	
609		-----		-----		-----		-----	
621		-----		-----		-----		-----	
657		-----		-----		-----		-----	
663		-----		-----		-----		-----	
704		-----		-----		-----		-----	
732		-----		-----		-----		-----	
739		-----		-----		-----		-----	
742		-----		-----		-----		-----	
749		-----		-----		-----		-----	
750		-----		-----		-----		-----	
751		-----		-----		-----		-----	
752		-----		-----		-----		-----	
753		-----		-----		-----		-----	
781		-----		-----		-----		-----	
785		-----		-----		-----		-----	
840		-----		-----		-----		-----	
862	D7169	387.8		510.2		662.2		>700.0	
874		-----		-----		-----		-----	
875		-----		-----		-----		-----	
904		-----		-----		-----		-----	
962		-----		-----		-----		-----	
963		-----		-----		-----		-----	
970		-----		-----		-----		-----	
971		-----		-----		-----		-----	
974		-----		-----		-----		-----	
991		-----		-----		-----		-----	
992		-----		-----		-----		-----	

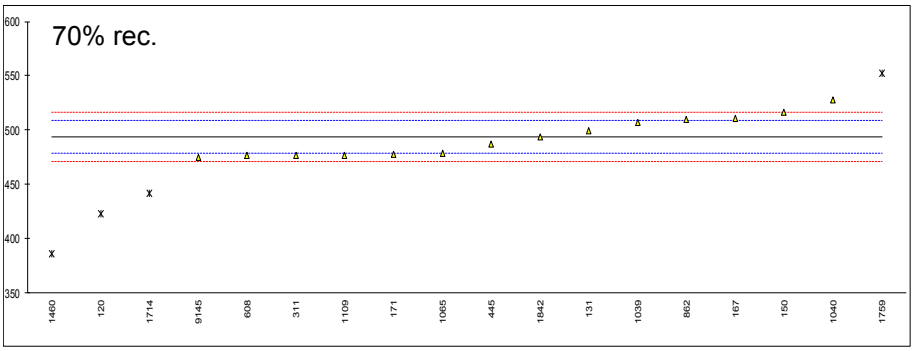
lab	method	50%rec	mark	70%rec	mark	90%rec	mark	FBP	mark
994		-----		-----		-----		-----	
995		-----		-----		-----		-----	
997		-----		-----		-----		-----	
998		-----		-----		-----		-----	
1011		-----		-----		-----		-----	
1039	EN15199-3	372.4		507		685.7		-----	
1040	D2887	383.5		527.3		721.3		-----	
1056		-----		-----		-----		-----	
1065		363.4		478.6		625.2		736.4	
1089		-----		-----		-----		-----	
1106		-----		-----		-----		-----	
1109	D7169	356.0		477.0		644.5		743.5	
1236		-----		-----		-----		-----	
1248		-----		-----		-----		-----	
1259		-----		-----		-----		-----	
1320		-----		-----		-----		-----	
1340	ISO3405	339.5		-----		-----		347.5	
1357		-----		-----		-----		-----	
1360		-----		-----		-----		-----	
1397		-----		-----		-----		-----	
1412		-----		-----		-----		-----	
1460	D2887	293.5	D(0.01)	386.5	D(0.01)	485.0	ex	541.5	ex
1556		-----		-----		-----		-----	
1613		-----		-----		-----		-----	
1654		-----		-----		-----		-----	
1656		-----		-----		-----		-----	
1714		325.0	ex	441.8	ex	582.4	ex	704.6	ex
1720		-----		-----		-----		-----	
1728		-----		-----		-----		-----	
1759	D7169	405.2	ex,C	552.0	C,D(0.01)	-----		705.6	ex
1776		-----		-----		-----		-----	
1796		-----		-----		-----		-----	
1810		-----		-----		-----		-----	
1811		-----		-----		-----		-----	
1815		-----		-----		-----		-----	
1842	IP545	365		494		663		734	
1849		-----		-----		-----		-----	
1858		-----		-----		-----		-----	
1862		-----		-----		-----		-----	
1928		-----		-----		-----		-----	
1929		-----		-----		-----		-----	
1930		-----		-----		-----		-----	
1957		-----		-----		-----		-----	
1960		-----		-----		-----		-----	
1967		-----		-----		-----		-----	
1995		-----		-----		-----		-----	
6016		-----		-----		-----		-----	
6091		-----		-----		-----		-----	
6159		-----		-----		-----		-----	
6160		-----		-----		-----		-----	
6161		-----		-----		-----		-----	
6166		-----		-----		-----		-----	
9051		-----		-----		-----		-----	
9052		-----		-----		-----		-----	
9057		-----		-----		-----		-----	
9060		-----		-----		-----		-----	
9063		-----		-----		-----		-----	
9132		-----		-----		-----		-----	
9133		-----		-----		-----		-----	
9134		-----		-----		-----		-----	
9135		-----		-----		-----		-----	
9136		-----		-----		-----		-----	
9139		-----		-----		-----		-----	
9145	D7169	354.0		474.8		641.4		694.2	
9146		-----		-----		-----		-----	
9151		-----		-----		-----		-----	
9152		-----		-----		-----		-----	
	normality	OK		OK		n.a.		n.a.	
	n	15		14		13		9	
	outliers	1 (+3 ex)		3 (+1 ex)		0 (+3 ex)		0 (+4 ex)	
	mean (n)	360.16		493.80		662.03		678.81	
	st.dev. (n)	18.516		17.898		36.273		127.896	
	R(calc.)	51.84		50.11		101.56		358.11	
	st.dev.(D7169:16)	5.857		7.571		n.a.		n.a.	
	R(D7169:16)	16.4		21.2		n.a.		n.a.	

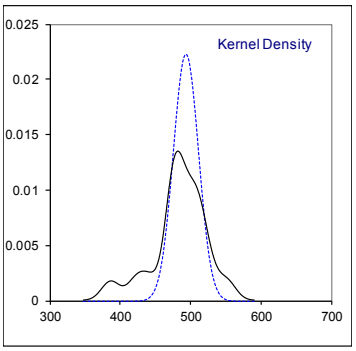
Lab 131 first reported for 50%rec.: 415.57, for 70%rec. :580.5

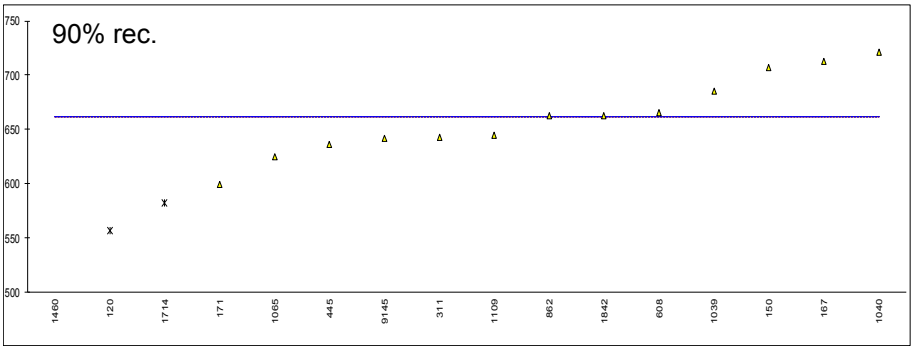
Lab 1759 first reported for 50%rec.: 480.0, for 70%rec. :702.0
The test results of lab 120, 1460, 1714 and 1759 were excluded due to outlying result in other simulated distillation parameters.

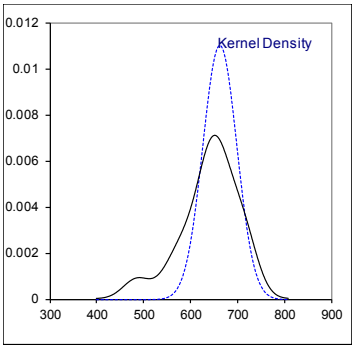


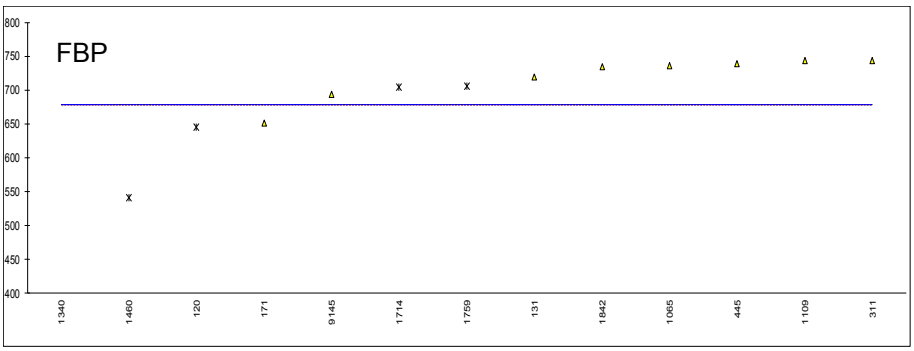


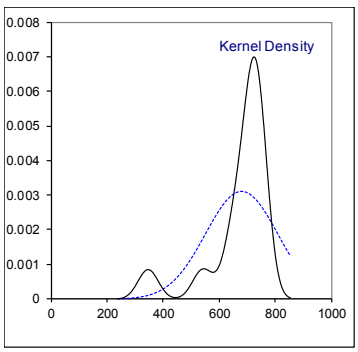












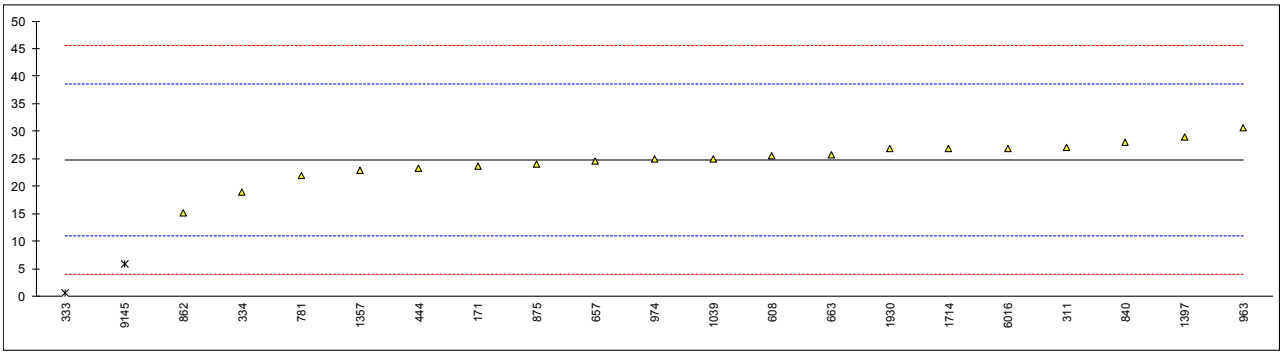
Determination of Mercury, total on sample #17216 results in µg/kg

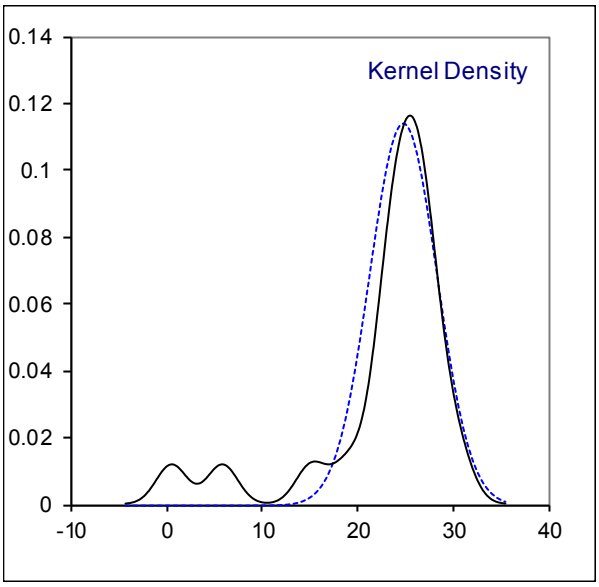
lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
52		-----		-----	970		-----		-----
62		-----		-----	971		-----		-----
90		-----		-----	974	UOP938	25		0.03
92		-----		-----	991		-----		-----
120		-----		-----	992		-----		-----
131		-----		-----	994		-----		-----
140		-----		-----	995		-----		-----
150		-----		-----	997		-----		-----
154		-----		-----	998		-----		-----
158		-----		-----	1011		-----		-----
159		-----		-----	1039	UOP938	25		0.03
167		-----		-----	1040		-----		-----
168		-----		-----	1056		-----		-----
171	UOP938	23.6		-0.17	1065		-----		-----
175		-----		-----	1089		-----		-----
186		-----		-----	1106		-----		-----
203		-----		-----	1109		-----		-----
225		-----		-----	1236		-----		-----
238		-----		-----	1248		-----		-----
273		-----		-----	1259		-----		-----
311	D7623	27		0.32	1320		-----		-----
314		-----		-----	1340		-----		-----
332		-----		-----	1357	UOP938	22.9		-0.27
333	EPA7423	0.6	R(0.01)	-3.50	1360		-----		-----
334	In house	19		-0.84	1397	In house	28.89		0.59
335		-----		-----	1412		-----		-----
336		-----		-----	1460		-----		-----
391		-----		-----	1556		-----		-----
398		-----		-----	1613		-----		-----
399		-----		-----	1654		-----		-----
402		-----		-----	1656		-----		-----
442		-----		-----	1714	UOP938	26.8		0.29
444	UOP938	23.2		-0.23	1720		-----		-----
445		-----		-----	1728		-----		-----
446		-----		-----	1759		-----		-----
447		-----		-----	1776		-----		-----
485		-----		-----	1796		-----		-----
494		-----		-----	1810		-----		-----
511		-----		-----	1811		-----		-----
525		-----		-----	1815		-----		-----
529		-----		-----	1842		-----		-----
541		-----		-----	1849		-----		-----
551		-----		-----	1858		-----		-----
557		-----		-----	1862		-----		-----
574		-----		-----	1928		-----		-----
575		-----		-----	1929		-----		-----
593		-----		-----	1930	D7623	26.79		0.29
602		-----		-----	1957		-----		-----
603		-----		-----	1960		-----		-----
605		-----		-----	1967		-----		-----
608	D7622	25.61		0.12	1995		-----		-----
609		-----		-----	6016	D7622	26.9		0.31
621		-----		-----	6091		-----		-----
657	UOP938	24.6457		-0.02	6159		-----		-----
663	UOP938	25.82		0.15	6160		-----		-----
704		-----		-----	6161		-----		-----
732		-----		-----	6166		-----		-----
739		-----		-----	9051		-----		-----
742		-----		-----	9052		-----		-----
749		-----		-----	9057		-----		-----
750		-----		-----	9060		-----		-----
751		-----		-----	9063		-----		-----
752		-----		-----	9132		-----		-----
753		-----		-----	9133		-----		-----
781	D7622	22		-0.40	9134		-----		-----
785		-----		-----	9135		-----		-----
840	EPA7471B	27.9		0.45	9136		-----		-----
862	UOP938	15.2		-1.39	9139		-----		-----
874		-----		-----	9145	UOP938	5.904	R(0.01)	-2.73
875		24		-0.11	9146		-----		-----
904		-----		-----	9151		-----		-----
962		-----		-----	9152		-----		-----
963	UOP938	30.62		0.84					

normality	not OK
n	19
outliers	2
mean (n)	24.783
st.dev. (n)	3.5048
R(calc.)	9.813
st.dev.(Horwitz)	6.9179
R(Horwitz)	19.370

Spike 24.89 (recovery < 99%)

Compare R(D7623:10) = 8.664 & R(UOP938:10) = 6.278





APPENDIX 2

z-scores of Simulated Distillation on sample #17215

lab	method	IBP	5%rec	10%rec	30%rec	50%rec	70%rec	90%rec	FBP
52		-----	-----	-----	-----	-----	-----	-----	-----
62		-----	-----	-----	-----	-----	-----	-----	-----
90		-----	-----	-----	-----	-----	-----	-----	-----
92		-----	-----	-----	-----	-----	-----	-----	-----
120	D7169	-----	-0.37	-3.17	-11.10	-8.73	-9.40	-----	-----
131	D7169	-----	0.01	1.35	1.96	2.79	0.75	-----	-----
140		-----	-----	-----	-----	-----	-----	-----	-----
150	D7169	-----	-1.10	-0.07	1.15	2.21	2.99	-----	-----
154		-----	-----	-----	-----	-----	-----	-----	-----
158		-----	-----	-----	-----	-----	-----	-----	-----
159		-----	-----	-----	-----	-----	-----	-----	-----
167	D7169	-----	-0.43	0.14	-0.79	0.75	2.21	-----	-----
168		-----	-----	-----	-----	-----	-----	-----	-----
171	D7169	-----	-1.38	-3.05	-3.81	-2.67	-2.09	-----	-----
175		-----	-----	-----	-----	-----	-----	-----	-----
186		-----	-----	-----	-----	-----	-----	-----	-----
203		-----	-----	-----	-----	-----	-----	-----	-----
225		-----	-----	-----	-----	-----	-----	-----	-----
238		-----	-----	-----	-----	-----	-----	-----	-----
273		-----	-----	-----	-----	-----	-----	-----	-----
311	D7169	-----	-1.53	-2.34	-4.03	-2.76	-2.28	-----	-----
314		-----	-----	-----	-----	-----	-----	-----	-----
332		-----	-----	-----	-----	-----	-----	-----	-----
333		-----	-----	-----	-----	-----	-----	-----	-----
334		-----	-----	-----	-----	-----	-----	-----	-----
335		-----	-----	-----	-----	-----	-----	-----	-----
336		-----	-----	-----	-----	-----	-----	-----	-----
391		-----	-----	-----	-----	-----	-----	-----	-----
398		-----	-----	-----	-----	-----	-----	-----	-----
399		-----	-----	-----	-----	-----	-----	-----	-----
402		-----	-----	-----	-----	-----	-----	-----	-----
442		-----	-----	-----	-----	-----	-----	-----	-----
444		-----	-----	-----	-----	-----	-----	-----	-----
445	D7169	-----	-0.60	0.10	-0.71	-0.62	-0.90	-----	-----
446		-----	-----	-----	-----	-----	-----	-----	-----
447		-----	-----	-----	-----	-----	-----	-----	-----
485		-----	-----	-----	-----	-----	-----	-----	-----
494		-----	-----	-----	-----	-----	-----	-----	-----
511		-----	-----	-----	-----	-----	-----	-----	-----
525		-----	-----	-----	-----	-----	-----	-----	-----
529		-----	-----	-----	-----	-----	-----	-----	-----
541		-----	-----	-----	-----	-----	-----	-----	-----
551		-----	-----	-----	-----	-----	-----	-----	-----
557		-----	-----	-----	-----	-----	-----	-----	-----
574		-----	-----	-----	-----	-----	-----	-----	-----
575		-----	-----	-----	-----	-----	-----	-----	-----
593		-----	-----	-----	-----	-----	-----	-----	-----
602		-----	-----	-----	-----	-----	-----	-----	-----
603		-----	-----	-----	-----	-----	-----	-----	-----
605		-----	-----	-----	-----	-----	-----	-----	-----
608	D7169	-----	0.16	1.17	0.88	-0.44	-2.31	-----	-----
609		-----	-----	-----	-----	-----	-----	-----	-----
621		-----	-----	-----	-----	-----	-----	-----	-----
657		-----	-----	-----	-----	-----	-----	-----	-----
663		-----	-----	-----	-----	-----	-----	-----	-----
704		-----	-----	-----	-----	-----	-----	-----	-----
732		-----	-----	-----	-----	-----	-----	-----	-----
739		-----	-----	-----	-----	-----	-----	-----	-----
742		-----	-----	-----	-----	-----	-----	-----	-----
749		-----	-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----	-----
751		-----	-----	-----	-----	-----	-----	-----	-----
752		-----	-----	-----	-----	-----	-----	-----	-----
753		-----	-----	-----	-----	-----	-----	-----	-----
781		-----	-----	-----	-----	-----	-----	-----	-----
785		-----	-----	-----	-----	-----	-----	-----	-----
840		-----	-----	-----	-----	-----	-----	-----	-----
862	D7169	-----	-1.17	0.10	6.32	3.95	2.17	-----	-----
874		-----	-----	-----	-----	-----	-----	-----	-----
875		-----	-----	-----	-----	-----	-----	-----	-----
904		-----	-----	-----	-----	-----	-----	-----	-----
962		-----	-----	-----	-----	-----	-----	-----	-----
963		-----	-----	-----	-----	-----	-----	-----	-----
970		-----	-----	-----	-----	-----	-----	-----	-----
971		-----	-----	-----	-----	-----	-----	-----	-----

lab	method	IBP	5%rec	10%rec	30%rec	50%rec	70%rec	90%rec	FBP
974		-----	-----	-----	-----	-----	-----	-----	-----
991		-----	-----	-----	-----	-----	-----	-----	-----
992		-----	-----	-----	-----	-----	-----	-----	-----
994		-----	-----	-----	-----	-----	-----	-----	-----
995		-----	-----	-----	-----	-----	-----	-----	-----
997		-----	-----	-----	-----	-----	-----	-----	-----
998		-----	-----	-----	-----	-----	-----	-----	-----
1011		-----	-----	-----	-----	-----	-----	-----	-----
1039	EN15199-3	-----	-1.16	-0.56	1.12	1.32	1.74	-----	-----
1040	D2887	-----	-0.57	0.13	1.59	3.22	4.42	-----	-----
1056		-----	-----	-----	-----	-----	-----	-----	-----
1065		-----	2.82	-0.15	1.40	-0.21	-2.01	-----	-----
1089		-----	-----	-----	-----	-----	-----	-----	-----
1106		-----	-----	-----	-----	-----	-----	-----	-----
1109	D7169	-----	0.62	0.46	-0.50	-1.48	-2.22	-----	-----
1236		-----	-----	-----	-----	-----	-----	-----	-----
1248		-----	-----	-----	-----	-----	-----	-----	-----
1259		-----	-----	-----	-----	-----	-----	-----	-----
1320		-----	-----	-----	-----	-----	-----	-----	-----
1340	ISO3405	-----	2.69	1.18	-3.28	-4.29	-----	-----	-----
1357		-----	-----	-----	-----	-----	-----	-----	-----
1360		-----	-----	-----	-----	-----	-----	-----	-----
1397		-----	-----	-----	-----	-----	-----	-----	-----
1412		-----	-----	-----	-----	-----	-----	-----	-----
1460	D2887	-----	-----	-5.07	-10.01	-12.15	-14.17	-----	-----
1556		-----	-----	-----	-----	-----	-----	-----	-----
1613		-----	-----	-----	-----	-----	-----	-----	-----
1654		-----	-----	-----	-----	-----	-----	-----	-----
1656		-----	-----	-----	-----	-----	-----	-----	-----
1714		-----	-4.13	-7.09	-8.86	-6.77	-6.87	-----	-----
1720		-----	-----	-----	-----	-----	-----	-----	-----
1728		-----	-----	-----	-----	-----	-----	-----	-----
1759	D7169	-----	3.70	3.29	5.85	6.92	7.69	-----	-----
1776		-----	-----	-----	-----	-----	-----	-----	-----
1796		-----	-----	-----	-----	-----	-----	-----	-----
1810		-----	-----	-----	-----	-----	-----	-----	-----
1811		-----	-----	-----	-----	-----	-----	-----	-----
1815		-----	-----	-----	-----	-----	-----	-----	-----
1842	IP545	-----	-1.24	-0.33	-1.03	0.06	0.03	-----	-----
1849		-----	-----	-----	-----	-----	-----	-----	-----
1858		-----	-----	-----	-----	-----	-----	-----	-----
1862		-----	-----	-----	-----	-----	-----	-----	-----
1928		-----	-----	-----	-----	-----	-----	-----	-----
1929		-----	-----	-----	-----	-----	-----	-----	-----
1930		-----	-----	-----	-----	-----	-----	-----	-----
1957		-----	-----	-----	-----	-----	-----	-----	-----
1960		-----	-----	-----	-----	-----	-----	-----	-----
1967		-----	-----	-----	-----	-----	-----	-----	-----
1995		-----	-----	-----	-----	-----	-----	-----	-----
6016		-----	-----	-----	-----	-----	-----	-----	-----
6091		-----	-----	-----	-----	-----	-----	-----	-----
6159		-----	-----	-----	-----	-----	-----	-----	-----
6160		-----	-----	-----	-----	-----	-----	-----	-----
6161		-----	-----	-----	-----	-----	-----	-----	-----
6166		-----	-----	-----	-----	-----	-----	-----	-----
9051		-----	-----	-----	-----	-----	-----	-----	-----
9052		-----	-----	-----	-----	-----	-----	-----	-----
9057		-----	-----	-----	-----	-----	-----	-----	-----
9060		-----	-----	-----	-----	-----	-----	-----	-----
9063		-----	-----	-----	-----	-----	-----	-----	-----
9132		-----	-----	-----	-----	-----	-----	-----	-----
9133		-----	-----	-----	-----	-----	-----	-----	-----
9134		-----	-----	-----	-----	-----	-----	-----	-----
9135		-----	-----	-----	-----	-----	-----	-----	-----
9136		-----	-----	-----	-----	-----	-----	-----	-----
9139		-----	-----	-----	-----	-----	-----	-----	-----
9145	D7169	-----	2.87	1.86	-0.27	-1.82	-2.51	-----	-----
9146		-----	-----	-----	-----	-----	-----	-----	-----
9151		-----	-----	-----	-----	-----	-----	-----	-----
9152		-----	-----	-----	-----	-----	-----	-----	-----

APPENDIX 3

Number of participants per country

1 lab in	AFGHANISTAN
1 lab in	ARGENTINA
2 labs in	AUSTRALIA
2 labs in	AZERBAIJAN
1 lab in	BOSNIA and HERZEGOVINA
2 labs in	BRAZIL
1 lab in	BRUNEI
5 labs in	CANADA
1 lab in	CHINA, People's Republic
2 labs in	COLOMBIA
1 lab in	COTE D'IVOIRE
2 labs in	CROATIA
2 labs in	CZECH REPUBLIC
1 lab in	ECUADOR
2 labs in	EGYPT
5 labs in	FRANCE
2 labs in	GEORGIA
3 labs in	GERMANY
1 lab in	INDONESIA
3 labs in	IRAN, Islamic Republic of
1 lab in	ISRAEL
3 labs in	ITALY
1 lab in	JORDAN
2 labs in	KAZAKHSTAN
6 labs in	MALAYSIA
2 labs in	MEXICO
5 labs in	NETHERLANDS
1 lab in	NIGERIA
4 labs in	NORWAY
8 labs in	OMAN
1 lab in	PERU
2 labs in	POLAND
1 lab in	PORTUGAL
2 labs in	ROMANIA
15 labs in	RUSSIAN FEDERATION
3 labs in	SAUDI ARABIA
1 lab in	SERBIA
1 lab in	SINGAPORE
4 labs in	SLOVAKIA
1 lab in	SOUTH AFRICA
1 lab in	ST. LUCIA - WEST INDIES
1 lab in	SUDAN
2 labs in	SWEDEN
1 lab in	THAILAND
3 labs in	TURKEY
2 labs in	TURKMENISTAN
1 lab in	UKRAINE
2 labs in	UNITED ARAB EMIRATES
13 labs in	UNITED KINGDOM
12 labs in	UNITED STATES OF AMERICA
1 lab in	VIETNAM

APPENDIX 4

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= probably an error in calculations
U	= test result probably reported in a different unit
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, March 2017
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, No 4 February 2001.
14 P.J. Lowthian and M. Thompson,The Royal Society of Chemistry 2002, Analyst, 127, 1359-1364 (2002)
15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)