Results of Proficiency Test
Engine Oil (fresh)
June 2019

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1997, a proficiency test for fresh Engine Oil (Lubricating Oil) is organised by the Institute for Interlaboratory Studies every year. During the annual proficiency testing program 2018/2019, it was decided to continue the round robin for the analysis of Engine Oil (fresh) in accordance with the latest applicable version of ASTM D4485 and ACEA European Oil Sequences.
In this interlaboratory study, 80 laboratories in 47 different countries registered for participation. See appendix 2 for the number of participants per country. In this report, the results of the 2019 Engine Oil (fresh) proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory. It was decided to send to each laboratory two bottles (one 1L bottle and one 0.5L bottle) of the same Engine Oil (Fresh), both labelled #19095. 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/IEC17043:2010 (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 organization was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through 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 190 liter bulk material of a SAE 10W-40 Diesel Engine Oil was obtained from a local supplier. After homogenization, 112 amber glass bottles of 1 liter and 112 amber glass bottles of 0.5 liter were filled and both labelled #19095. The homogeneity of the subsamples #19095 was checked by determination of Density at 15°C in accordance with ASTM D4052 on 8 stratified randomly selected samples.

	Density at 15°C in kg/L
Sample #19095-1	0.86478
Sample #19095-2	0.86477
Sample #19095-3	0.86478
Sample #19095-4	0.86478
Sample #19095-5	0.86484
Sample #19095-6	0.86481
Sample #19095-7	0.86488
Sample #19095-8	0.86483

Table 1: homogeneity test results of subsamples #19095

From the above test results the repeatability was calculated and compared with 0.3 times the corresponding reproducibility of the reference method in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Density at 15°C in kg/L
r (observed)	0.00011
reference test method	ISO12185:96
0.3 * R (ref. test method)	0.00015

Table 2: evaluation of the repeatability of the subsamples #19095

The calculated repeatability was less than 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples #19095 was assumed.

To each of the participating laboratories one 1L bottle and one 0.5L bottle both labelled #19095 were sent on May 22, 2019. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of the fresh engine oil packed in amber glass bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine on sample #19095: Acid Number (Total), Base Number (Total), Color (ASTM scale), Conradson Carbon Residue, Ramsbottom Carbon Residue, Carbon Residue (micro method), Density at 15°C, Evaporation loss by Noack, Flash Point COC, Flash Point PMcc, Foaming Tendency, Foam Stability, Kinematic Viscosity at 40°C and at 100°C, Viscosity Index, Viscosity Stabinger at 40°C and at 100°C, Viscosity Apparent (CSS) at -30°C, Viscosity High Temperature High Shear, Nitrogen, Pour Point (manual and automated), Sulfated Ash, Sulfur, Water, Calcium, Phosphorus and Zinc. Also some additional questions were asked about Acid Number (Total) and Foaming Characteristics.

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, 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 evaluations.

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 reanalyzes). Additional or corrected test results are used for data analysis and original results are placed under 'Remarks' in the 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 in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of June 2018 (iis-protocol, version 3.5).
For 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 dataset does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

According to ISO5725 the original test results per determination were submitted to Dixon’s and/or 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 requirements based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1 was met for all evaluated tests, therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.
Finally, the reproducibilities were calculated from the standard deviations by multiplying them with a factor of 2.8.

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made using the sorted data for one determination (see appendix 1). On the Y-axis the reported analysis results are plotted. The corresponding laboratory numbers are 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 “x”. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. 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 or ISO reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study. This target standard deviation was calculated from the literature reproducibility by division with 2.8.

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 result tables of appendix 1.

Absolute values for z<2 are very common and absolute values for z>3 are very rare. Therefore, the usual interpretation of z-scores is as follows:

	|z|	< 1	good
1 <	|z|	< 2	satisfactory
2 <	|z|	< 3	questionable
3 <	|z|		unsatisfactory

4 EVALUATION

In this interlaboratory study some problems with sample dispatch were encountered. Five participant reported after the final reporting date and five participants did not report any test results at all. Not all laboratories were able to report all analyses requested. In total 75 participants reported 1157 numerical test results. Observed were 49 outlying results, which is 4.2%. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

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, see also paragraph 3.1.

4.1 EVALUATION PER TEST

In this section the reported test results are discussed per test. The test methods, which are used by the various laboratories, are taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the reported test results. The abbreviations, used in these tables, are listed in appendix 3.

In the iis PT reports, ASTM methods are referred to with a number (e.g. D1500) and an added designation for the year that the method was adopted or revised (e.g. D1500:12). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D1500:12 (2017)). In the results tables of appendix 1 only the method number and year of adoption or revision (e.g. D1500:12) will be used.

Acid Number (Total): This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with the requirements of inflection point at both titration volumes (60mL and 125mL) from ASTM D664-A:18e2.
When evaluated separately for the type of endpoint the calculated reproducibility of the group using Inflection Point (IP) was still not in agreement with the requirements of inflection point at both titration volumes from test method D664-A:18e2. The calculated reproducibility of the group using BEP (pH 10 and 11) is in agreement with the requirements of BEP (pH 10) from test method D664-A:18e2 for 60 mL, but not for 125 mL.
It is observed that six participants reported to have used BEP (pH 11) as determination end point and six reported to have used BEP (pH 10). In method ASTM D664-A version 2018e2 the Buffer End Point has been changed to pH 10.

Base Number (Total, $HClO_4$): 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 the forward mode of ASTM D2896-A:15.

Color (ASTM scale): 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 D1500:12(2017). Please note: The test values reported as “text”, e.g. L3.0, were converted to a numerical value (L3.0 to 2.75, see also appendix 1) before calculating the z-scores.

Conradson CR: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D189:06(2014).

Ramsbottom CR: This determination may be problematic. Only six participants reported a test result. Therefore, no z-scores were calculated.

Carbon Residue (micro method): This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D4530:15.

Density at 15°C: This determination was not problematic. Eight statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ISO12185:96.

Evaporation loss by Noack: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D5800:18a for procedure B or procedure A.
When evaluated separately for the test results of procedure A and B from ASTM D5800 the calculated reproducibility is also not in agreement with the requirements of both procedures from ASTM D5800:18a. Four laboratories reported a result for method CEC L-40-93. Remarkably, the calculated reproducibility based on these four results is twice as small as the calculated reproducibility for test results according to ASTM D5800 procedure A or B.

Flash Point COC: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is full in agreement with the requirements of ASTM D92:16b.

Flash Point PMcc: 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 D93-A:18.

Foaming Tendency: This determination may be problematic dependent on the sequence reported. No statistical outliers were observed. The calculated reproducibilities for the Sequences I and III are in agreement with the requirements of ASTM D892:13e1 but of Sequence II is not in agreement with the requirements of ASTM D892:13e1.
When evaluated separately for the different type of diffusers a difference in mean values was observed for Sequence II (14.6 vs 23.2 ml Foam for stone and metal diffuser respectively). Still both groups did not meet the requirements of method ASTM D892:13e1.
A new version of method ASTM D892 was published in 2018. In this version, the precision data has been “changed”. In the 2018 version exponential equations were published for Sequence I and III and a linear equation for Sequence II. After investigation, the 2018 reproducibility equations are based on the same underlying round robin data as the precision chart figure 4 of ASTM D892:13e1. However, the equations of sequence I and III are given as exponential equations without an intercept. The consequences for low Foam values (0 - 10 mL) are that the new exponential equations will result in a reproducibility between 0 and 7 mL, while the 2013 linear plots result in a reproducibility of 15 to 16 mL. The 2018 linear equation published for Sequence II is comparable to the linear plot of 2013. Taking all this into account, iis decided for this PT to use the less strict and more realistic precision data of version 2013 to calculate the z-scores. The precision data of the 2018 version are given as reference.

Foam Stability: All reporting participants, but one, agreed on a result of 0 (Nil). Therefore, no z-scores were calculated.

Kin. Viscosity at 40°C: This determination was not problematic. Six statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D445:18.

Kin. Viscosity at 100°C: This determination was not problematic. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D445:18.

Viscosity Index: This determination was problematic. One statistical outlier was observed and six other test results were excluded. One calculation error was observed. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D2270:10(2016).
When the test results of ASTM D445 only were evaluated the calculated reproducibility is the same. It was noticed in another proficiency test iis19L03 of Base Oil that a relatively small bias in the K.V. measurements can give a larger bias in the V.I. calculations.

Visco. Stab. at 40°C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D7042:16e3.

Visco. Stab. at 100°C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements ASTM D7042:16e3.

Visco. App. at -30°C: This determination was not problematic. One statistical outlier was observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5293:17a.

Visco. HTHS: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D4683:17.

Nitrogen: This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with the requirements of ASTM D5762:18a. A possible cause could be that combustion tube temperatures are not adjusted/verified well enough, which can lead to lower temperatures and a low yield.

Pour Point manual: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D97:17b.

Pour Point automated: 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 D5950:14.

Sulfated Ash: 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 D874:13a(2018).

Sulfur: This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility over the test results was very large compared to the requirements of ASTM D4294:16. Therefore, no z-scores were calculated. A possible reason could be that XRF techniques are sensitive to matrix effects and different C/H ratio and/or metal additives should be corrected.

Water: 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 D6304:16e1.

Calcium: 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 D5185:18.

Phosphorus: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D5185:18.

Zinc: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average results, the calculated reproducibilities (2.8 * standard deviation) and the target reproducibilities derived from the literature reference test methods (in casu ASTM and ISO standards) are presented in the next table.

Parameter	unit	n	average	2.8 * sd	R(lit.)
Acid Number (Total)	mg KOH/g	44	3.91	3.19	1.23
Base Number (Total $HClO_4$)	mg KOH/g	43	16.1	0.8	1.1
Color (ASTM scale)		55	2.8	0.7	1
Conradson Carbon Residue	%M/M	16	1.72	0.30	0.36
Ramsbottom Carbon Residue	%M/M	5	1.64	0.53	(0.21)
Carbon Residue (micro method)	%M/M	22	1.79	0.26	0.22
Density at 15°C	kg/L	59	0.8648	0.0005	0.0005
Evaporation loss by Noack	%M/M	17	8.88	2.89	1.23
Flash Point COC	°C	53	231.2	17.4	18
Flash Point PMcc	°C	44	206.9	12.3	14.7
Foaming Tendency, Sequence I	mL	28	3.2	11.6	15.3

Parameter	unit	n	average	2.8 * sd	R(lit.)
Foaming Tendency, Sequence II	mL	31	19.0	37.3	22.3
Foaming Tendency, Sequence III	mL	29	4.0	12.6	15.7
Foam Stability, Sequence I	mL	29	0	n.a.	n.a.
Foam Stability, Sequence II	mL	30	0	n.a.	n.a.
Foam Stability, Sequence III	mL	30	0	n.a.	n.a.
Kinematic Viscosity at 40°C	mm^2/s	59	85.39	0.92	1.04
Kinematic Viscosity at 100°C	mm^2/s	60	13.19	0.20	0.18
Viscosity Index		57	155.4	2.7	2
Viscosity Stabinger at 40°C	mm^2/s	20	85.32	1.02	1.04
Viscosity Stabinger at 100°C	mm^2/s	20	13.24	0.15	0.13
Viscosity Apparent at -30°C	mPa·s	20	11631	652	849
Viscosity HTHS	mPa·s	6	3.83	0.15	0.16
Nitrogen	mg/kg	13	984	646	262
Pour Point, manual	°C	44	-34.4	7.1	9
Pour Point, automated, 1°C int.	°C	18	-36.5	4.0	4.5
Sulfated Ash	%M/M	32	1.90	0.28	0.23
Sulfur	mg/kg	36	3036	1267	(120)
Water	mg/kg	37	308	480	526
Calcium as Ca	mg/kg	48	4759	809	906
Phosphorus as P	mg/kg	50	1176	183	147
Zinc as Zn	mg/kg	51	1333	236	227

Table 3: reproducibilities of tests on sample #19095

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF JUNE 2019 WITH PREVIOUS PTS

	June 2019	June 2018	June 2017	June 2016	June 2015
Number of reporting labs	75	81	67	69	72
Number of test results	1157	1337	940	1007	961
Number of statistical outliers	49	37	45	25	40
Percentage outliers	4.2%	2.8%	4.8%	2.5%	4.2%

Table 4: comparison with previous proficiency tests

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.

The performance of the determinations of the proficiency tests was compared against the requirements of the respective reference test methods. The conclusions are given in the following table.

Parameter	June 2019	June 2018	June 2017	June 2016	June 2015
Acid Number (Total)	--	-	--	--	--
Base Number (Total $HClO_4$)	+	-	-	-	--
Color (ASTM scale)	+	+	-	+	+
Conradson Carbon Residue	+	+/-	+	+	++
Ramsbottom Carbon Residue	(--)	+	+	--	--
Carbon Residue (micro method)	-	+	+/-	+	++
Density at 15°C	+/-	+/-	+	+	--
Evaporation loss by Noack	--	-	+	-	+/-
Flash Point COC	+/-	+	-	+	++
Flash Point PMcc	+	+	+/-	+	++
Foaming Tendency	+/-	+/-	+/-	+/-	+/-
Kinematic Viscosity at 40°C	+	+	+	+/-	+/-
Kinematic Viscosity at 100°C	+/-	+	+	+	++
Viscosity Index	-	+/-	+/-	-	--
Viscosity Stabinger at 40°C	+/-	+/-	-	-	+/-
Viscosity Stabinger at 100°C	+/-	-	-	-	+/-
Viscosity Apparent (CSS)	+	-	+/-	+	+/-
Viscosity HTHS	+/-	+	+	+	+
Nitrogen	--	-	-	-	--
Pour Point, manual	+	+/-	-	+	++
Pour Point, automated, 1°C int.	+	+/-	-	-	--
Sulfated Ash	-	-	+	-	--
Sulfur	(--)	-	-	-	--
Water	+	+	+/-	+	++
Calcium as Ca	+	-	+	--	--
Phosphorus as P	-	-	n.e.	--	--
Zinc as Zn	+/-	+/-	n.e.	--	--

Table 5: comparison determinations of sample #19095 against the reference test methods

N.B. for results between brackets no z-scores were calculated, see paragraph 4.1

The performance of the determinations against the requirements of the reference test methods 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

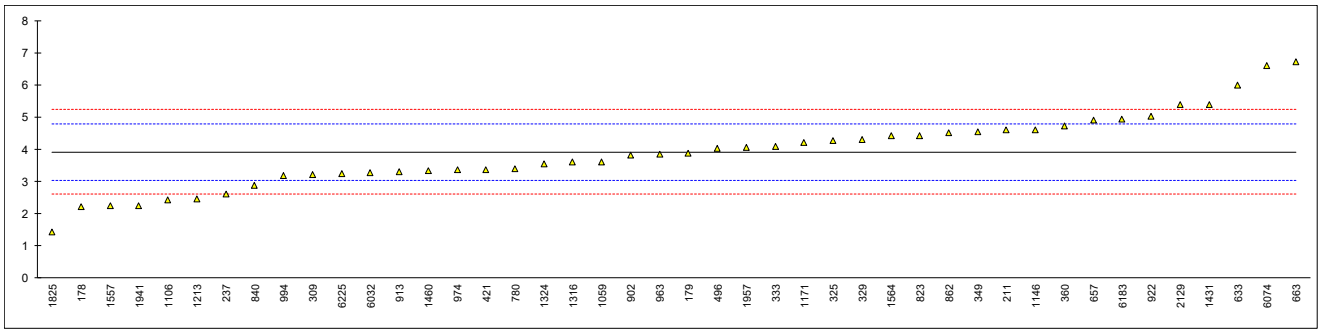
APPENDIX 1

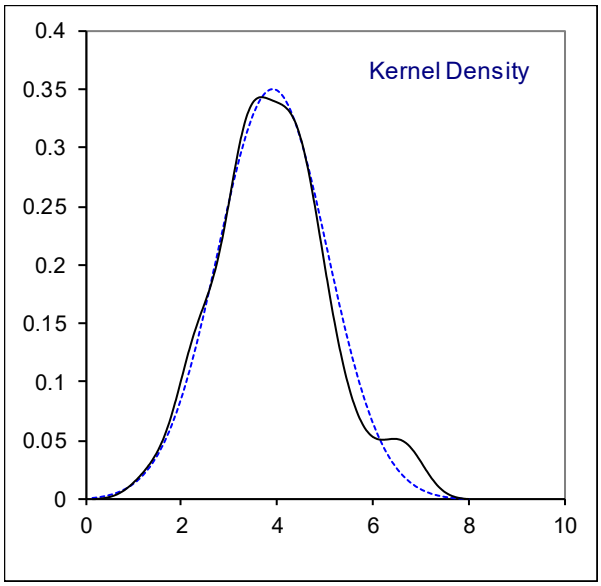
Determination of Acid Number (Total) on sample #19095; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks	end point determination	titration solvent volume
178	INH-1118	2.22		-3.85		---	---
179	D664-A	3.88		-0.08		Inflection Point	125 mL
211	D664-A	4.6		1.56		Buffer End Point (pH 10)	60 mL
219		-----		-----		---	---
237	D664-A	2.62		-2.94		Inflection Point	125 mL
254		-----		-----		---	---
255		-----		-----		---	---
257		-----		-----		---	---
309	D664-A	3.22		-1.58		Buffer End Point (pH 10)	60 mL
325	D664-A	4.27		0.81		Buffer End Point (pH 10)	125 mL
329	D664-A	4.29		0.86		Inflection Point	125 mL
333	D664-A	4.1		0.43		Buffer End Point (pH 10)	60 mL
339		-----		-----		---	---
349	D664-A	4.53		1.40		Inflection Point	125 mL
360	D664-A	4.717		1.83		Inflection Point	60 mL
398		-----		-----		---	---
421	ISO6619	3.37		-1.24		---	---
432		-----		-----		---	---
496	D664-A	4.02		0.24		Buffer End Point (pH 11)	60 mL
614		-----		-----		---	---
633	D664-A	6.0		4.75		Inflection Point	60 mL
634		-----		-----		---	---
657	D664-A	4.90		2.24		Inflection Point	125 mL
663	D664-A	6.729		6.41		Inflection Point	60 mL
780	D664-A	3.40		-1.17		Buffer End Point (pH 10)	60 mL
823	D664-A	4.43		1.18		Inflection Point	125 mL
840	D664-A	2.89		-2.33		Inflection Point	60 mL
862	D664-A	4.52		1.38		Inflection Point	60 mL
875		-----		-----		---	---
902	D664-A	3.82		-0.21		Inflection Point	60 mL
912		-----		-----		---	---
913	D974	3.31		-1.37		---	60 mL
922	D664-A	5.03		2.54		Inflection Point	125 mL
962		-----		-----		---	---
963	D664-A	3.859		-0.12		Inflection Point	60 mL
974	D664-A	3.35		-1.28		Buffer End Point (pH 10)	125 mL
994	D664-A	3.19		-1.64		Inflection Point	125 mL
1011		-----		-----		---	---
1017		-----		-----		---	---
1059	ISO6619	3.61		-0.69		Buffer End Point (pH 11)	60 mL
1106	D664-A	2.4153		-3.41		---	---
1146	D664-A	4.607		1.58		Buffer End Point (pH 11)	125 mL
1150		-----		-----		---	---
1171	ISO6618	4.21		0.68		---	---
1213	D664-A	2.447		-3.33		Buffer End Point (pH 11)	60 mL
1235		-----		-----		---	---
1316	D664-A	3.60		-0.71		Buffer End Point (pH 11)	60 mL
1324	D664-A	3.530		-0.87		Inflection Point	125 mL
1326		-----		-----		---	---
1412		-----		-----		---	---
1431	D664-A	5.3951		3.37		Inflection Point	60 mL
1460	D664-A	3.32		-1.35		Inflection Point	60 mL
1495		-----		-----		---	---
1510		-----		-----		---	---
1557	EN14104	2.23		-3.83		---	---
1564	D664-A	4.41		1.13		Inflection Point	60 mL
1748		-----		-----		---	---
1799		-----		-----		---	60 mL
1825	ISO6618	1.43		-5.65		---	---
1850		-----		-----		---	---
1877		-----		-----		---	---
1883		-----		-----		---	---
1941	ISO6619	2.25		-3.78		Inflection Point	60 mL
1957	D664-A	4.06		0.33		Buffer End Point (pH 11)	125 mL
1969		-----		-----		---	---
1971		-----		-----		---	---
2129	D664-A	5.381		3.34		Inflection Point	125 mL
6016		-----		-----		---	---
6032	D664-A	3.26		-1.49		Inflection Point	60 mL
6034		-----		-----		---	---
6074	D664-A	6.59		6.09		Inflection Point	125 mL
6183	D664-A	4.94		2.34		Inflection Point	125 mL
6197		-----		-----		---	---
6225	D974	3.225		-1.57		---	---

lab	method	value	mark	z(targ)	remarks	end point determination	titration solvent volume
6230		-----		-----		---	---
6248		-----		-----		---	---
6253		-----		-----		---	---
9101		-----		-----		---	---
9142		-----		-----		---	---
9143		-----		-----		---	---

			Inflection Point only	BEP (pH 10 and 11) only
	normality	OK	OK	OK
	n	44	24	12
	outliers	0	0	0
	mean (n)	3.9131	4.3534	3.7737
	st.dev. (n)	1.14070	1.16883	0.62635
	R(calc.)	3.1940	3.2727	1.7538
	st.dev.(D664-A:18e2)	0.43963	0.47980	-----
	R(D664-A:18e2)	1.2310 IP 60mL	1.3434	-----
	Compare:			
	R(D664-A:18e2)	2.0982 BEP (pH 10) 60 mL	-----	2.0252
	R(D664-A:18e2)	0.9080 IP 125mL	1.0149	-----
	R(D664-A:18e2)	1.3262 BEP (pH 10) 125 mL	-----	1.4835



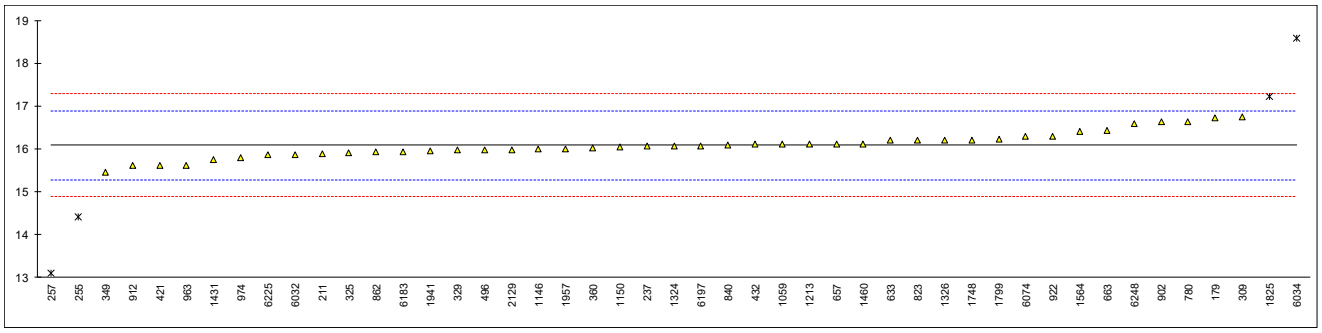


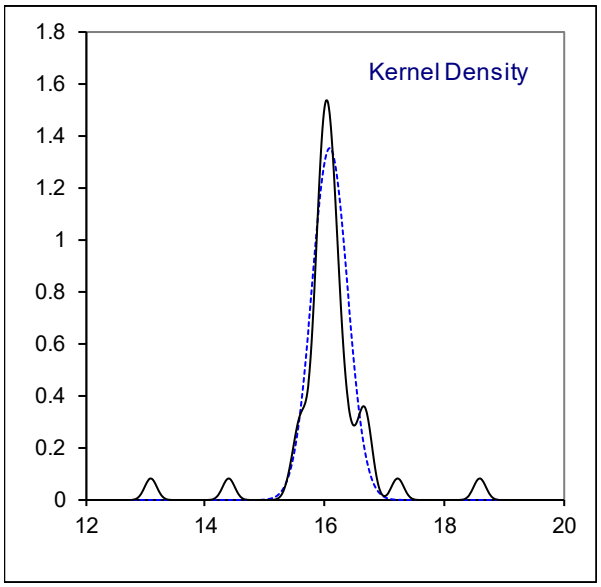
Determination of Base Number (Total, $HClO_4$ titration) on sample #19095; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D2896-A forward	16.72		1.58	
211	D2896-B forward	15.88		-0.51	
219		-----		-----	
237	D2896-A back	16.06		-0.06	
254		-----		-----	
255	D7889	14.40	R(0.01)	-4.19	
257	D7889	13.10	R(0.01)	-7.42	
309	D2896-A forward	16.752		1.66	
325	D2896-B forward	15.9		-0.46	
329	D2896-A forward	15.97		-0.29	
333		-----		-----	
339		-----		-----	
349	D4739	15.46		-1.56	
360	D2896-B forward	16.01		-0.19	
398		-----		-----	
421	ISO3771	15.6		-1.21	
432	D2896-B back	16.10		0.04	
496	D2896-B back	15.98		-0.26	
614		-----		-----	
633	D2896-A forward	16.2		0.28	
634		-----		-----	
657	D2896-B forward	16.12		0.08	
663	D2896-A forward	16.435		0.87	
780	D2896-B forward	16.64		1.38	
823	D2896-A back	16.2		0.28	
840	D2896-B forward	16.09		0.01	
862	D2896-B forward	15.92		-0.41	
875		-----		-----	
902	D2896-B forward	16.64		1.38	
912	D2896-A forward	15.6		-1.21	
913		-----		-----	
922	D2896-B forward	16.3		0.53	
962		-----		-----	
963	D2896-B forward	15.61		-1.18	
974	D2896-A forward	15.80		-0.71	
994		-----		-----	
1011		-----		-----	
1017		-----		-----	
1059	ISO3771	16.1		0.04	
1106		-----		-----	
1146	D2896-A forward	15.995		-0.23	
1150	BDS13727	16.04		-0.11	
1171		-----		-----	
1213	D2896-A forward	16.10		0.04	
1235		-----		-----	
1316		-----		-----	
1324	D2896-A forward	16.06		-0.06	
1326	D2896-B forward	16.20		0.28	
1412		-----		-----	
1431	D2896-B forward	15.750		-0.84	
1460	D2896-B forward	16.12		0.08	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564	D2896-B back	16.4		0.78	
1748	D2896-A back	16.201		0.29	
1799	D2896-B forward	16.23		0.36	
1825	ISO6618	17.22	R(0.05)	2.82	
1850		-----		-----	
1877		-----		-----	
1883		-----		-----	
1941	ISO3771	15.96		-0.31	
1957	D2896-A back	16.0		-0.21	
1969		-----		-----	
1971		-----		-----	
2129	D2896-A forward	15.98		-0.26	
6016		-----		-----	
6032	D2896-B forward	15.87		-0.54	
6034	D2896-A back	18.59	R(0.01)	6.23	
6074	D2896-A back	16.28		0.48	
6183	D2896-A forward	15.92		-0.41	
6197	D2896-B forward	16.06		-0.06	
6225	D2896-A forward	15.86		-0.56	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248	D2896-B forward	16.58		1.23	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	43
outliers	4
mean (n)	16.086
st.dev. (n)	0.2958
R(calc.)	0.828
st.dev.(D2896-A:15 forward)	0.4021
R(D2896-A:15 forward)	1.126





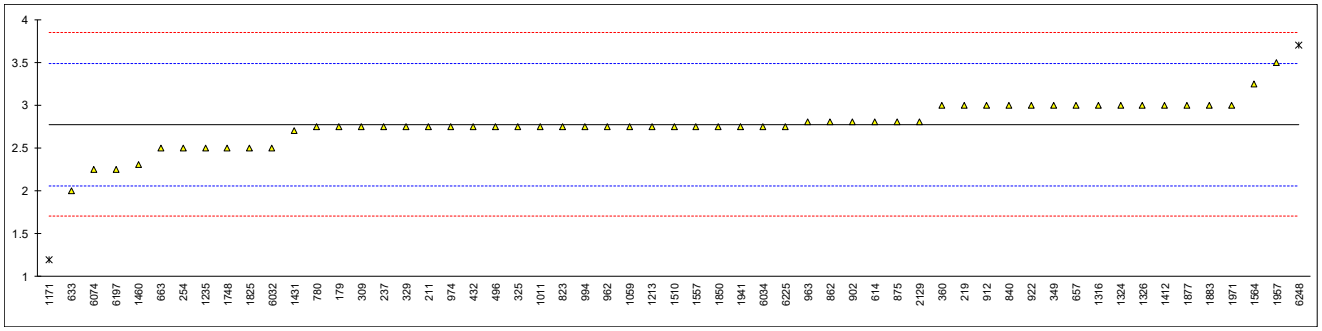
Determination of Color (ASTM scale) on sample #19095

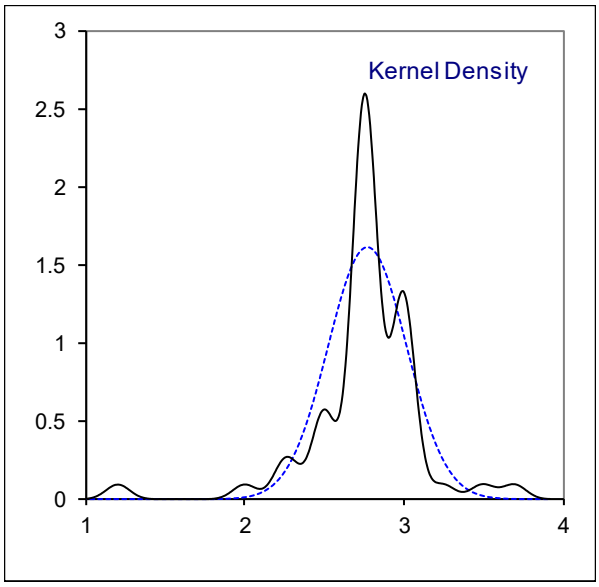
lab	method	reported test value	iis conversion *	mark	z(targ)	remarks
178		-----	-----		-----	
179	D1500	L 3.0	2.75		-0.07	
211	D1500	L 3.0	2.75		-0.07	
219	D1500	3.0	3.0		0.63	
237	D1500	L3.0	2.75		-0.07	
254	D1500	2.5	2.5		-0.77	
255		-----	-----		-----	
257		-----	-----		-----	
309	D1500	L3.0	2.75		-0.07	
325	D6045	L3.0	2.75		-0.07	
329	D1500	L3.0	2.75		-0.07	
333		-----	-----		-----	
339		-----	-----		-----	
349	D6045	3.0	3.0		0.63	
360	D1500	3.0	3.0		0.63	
398		-----	-----		-----	
421		-----	-----		-----	
432	D1500	L3,0	2.75		-0.07	
496	D1500	L 3.0	2.75		-0.07	
614	D1500	2.8	2.8		0.07	
633	D1500	2.0	2.0		-2.17	
634		-----	-----		-----	
657	D1500	3.0	3.0		0.63	
663	D1500	2.5	2.5		-0.77	
780	D1500	L3.0	2.75		-0.07	
823	D1500	L3.0	2.75		-0.07	
840	D1500	3.0	3.0		0.63	
862	D1500	2.8	2.8		0.07	
875	D6045	2.8	2.8		0.07	
902	D1500	2.8	2.8		0.07	
912	D1500	3.0	3.0		0.63	
913		-----	-----		-----	
922	D1500	3.0	3.0		0.63	
962	D1500	L3.0	2.75		-0.07	
963	D1500	2.8	2.8		0.07	
974	D1500	L3.0	2.75		-0.07	
994	D1500	L.3.0	2.75		-0.07	
1011	D1500	L 3.0	2.75		-0.07	
1017		-----	-----		-----	
1059	D1500	L3,0	2.75		-0.07	
1106		-----	-----		-----	
1146		-----	-----		-----	
1150		-----	-----		-----	
1171	D1500	1.20	1.20	R(0.01)	-4.41	
1213	D1500	L 3.0	2.75		-0.07	
1235	ISO2049	2.5	2.5		-0.77	
1316	D1500	3.0	3.0		0.63	
1324	D1500	3.0	3.0		0.63	
1326	D1500	3.0	3.0		0.63	
1412	D1500	3.0	3.0		0.63	
1431	D1500	2.7	2.7		-0.21	
1460	D6045	2.3	2.3		-1.33	
1495		-----	-----		-----	
1510	D1500	L3.0	2.75		-0.07	
1557	ISO2049	L3.0	2.75		-0.07	
1564	D1500	L3.5	3.25		1.33	
1748	D1500	2.5	2.5		-0.77	
1799		-----	-----		-----	
1825	D1500	2.5	2.5		-0.77	
1850	D1500	L 3.0	2.75		-0.07	
1877	D6045	3.0	3.0		0.63	
1883		3	3		0.63	
1941	ISO2049	L3,0	2.75		-0.07	
1957	D1500	3.5	3.5		2.03	
1969		-----	-----		-----	
1971	D1500	3.0	3.0		0.63	
2129	D6045	2.8	2.8		0.07	
6016		-----	-----		-----	
6032	D1500	2.5	2.5		-0.77	
6034	D1500	L3	2.75		-0.07	
6074	D1500	L 2.5	2.25		-1.47	
6183		-----	-----		-----	
6197	D1500	L2.5	2.25		-1.47	
6225	D1500	2.5-3.0	2.75		-0.07	

lab	method	reported test value	iis conversion *	mark	z(targ)	remarks
6230		-----	-----		-----	
6248	D1500	3.7	3.7	R(0.05)	2.59	
6253		-----	-----		-----	
9101		-----	-----		-----	
9142		-----	-----		-----	
9143		-----	-----		-----	

normality	not OK
n	55
outliers	2
mean (n)	2.77
st.dev. (n)	0.248
R(calc.)	0.69
st.dev.(D1500:12)	0.357
R(D1500:12)	1

*) In the calculation of the mean, standard deviation and the reproducibility in this column, a reported value of 'L y' is changed tot y-0.25 (for example L3.0 into 2.75).



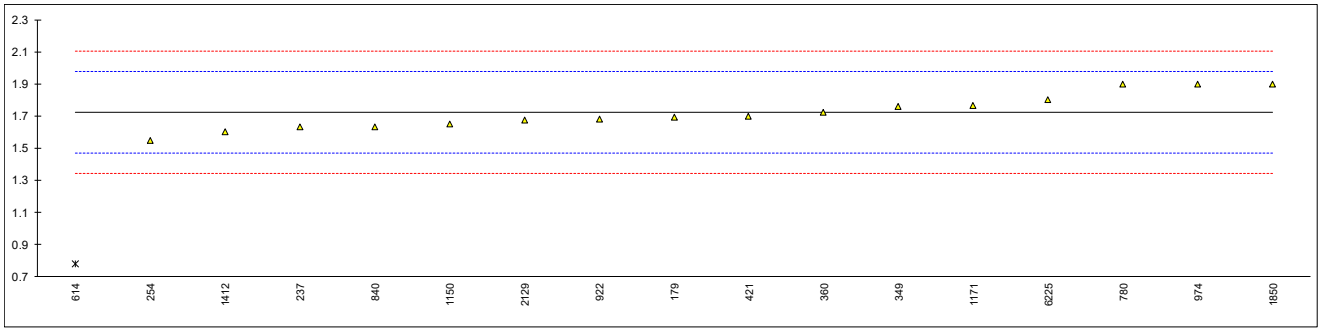


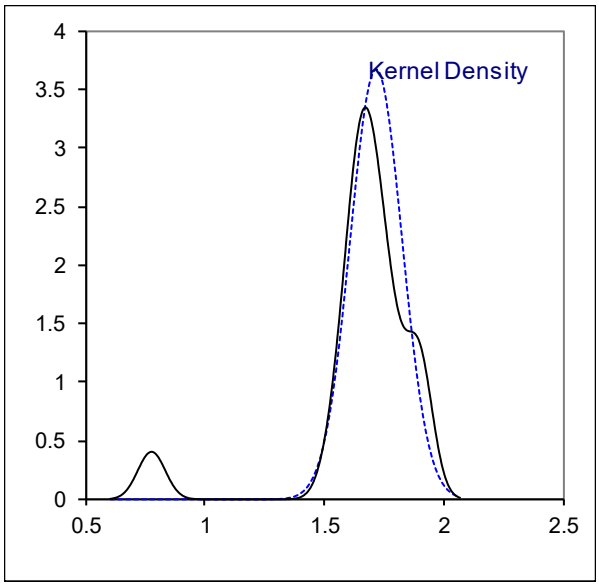
Determination of Conradson Carbon Residue on sample #19095; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D189	1.69		-0.25	
211		-----		-----	
219		-----		-----	
237	D189	1.63		-0.73	
254	D189	1.55		-1.36	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349	D189	1.76		0.30	
360	D189	1.722		0.00	
398		-----		-----	
421	ISO6615	1.70		-0.17	
432		-----		-----	
496		-----		-----	
614	D189	0.78	G(0.01)	-7.43	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780	D189	1.90		1.40	
823		-----		-----	
840	D189	1.633		-0.70	
862		-----		-----	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922	D189	1.68		-0.33	
962		-----		-----	
963		-----		-----	
974	D189	1.90		1.40	
994		-----		-----	
1011		-----		-----	
1017		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150	ISO6615	1.64856		-0.58	
1171	ISO6615	1.766		0.35	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326		-----		-----	
1412	D189	1.60		-0.96	
1431		-----		-----	
1460		-----		-----	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564		-----		-----	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850	D189	1.9		1.40	
1877		-----		-----	
1883		-----		-----	
1941		-----		-----	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129	D189	1.672		-0.39	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074		-----		-----	
6183		-----		-----	
6197		-----		-----	
6225	D189	1.8		0.62	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	16
outliers	1
mean (n)	1.722
st.dev. (n)	0.1085
R(calc.)	0.304
st.dev.(D189:06)	0.1268
R(D189:06)	0.355



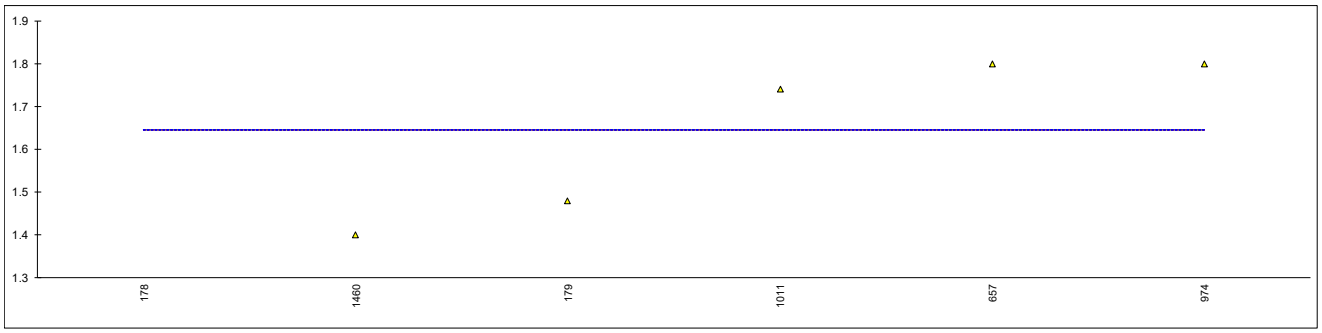


Determination of Ramsbottom Carbon Residue on sample #19095; results in %M/M

lab	method	value	mark	z(targ)	remarks
178	D524	0.02	G(0.01)	-----	Possible false negative test result?
179	D524	1.48		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D524	1.8		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D524	1.80		-----	
994		-----		-----	
1011	D524	1.74		-----	
1017		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326		-----		-----	
1412		-----		-----	
1431		-----		-----	
1460	D524	1.40		-----	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564		-----		-----	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		-----		-----	
1877		-----		-----	
1883		-----		-----	
1941		-----		-----	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074		-----		-----	
6183		-----		-----	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	unknown
n	5
outliers	1
mean (n)	1.644
st.dev. (n)	0.1899
R(calc.)	0.532
st.dev.(D524:15)	(0.0756)
R(D524:15)	(0.212)

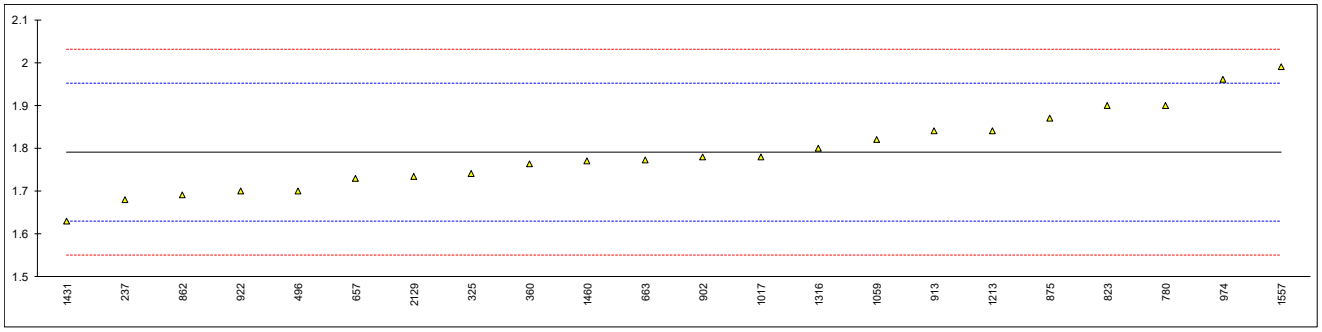


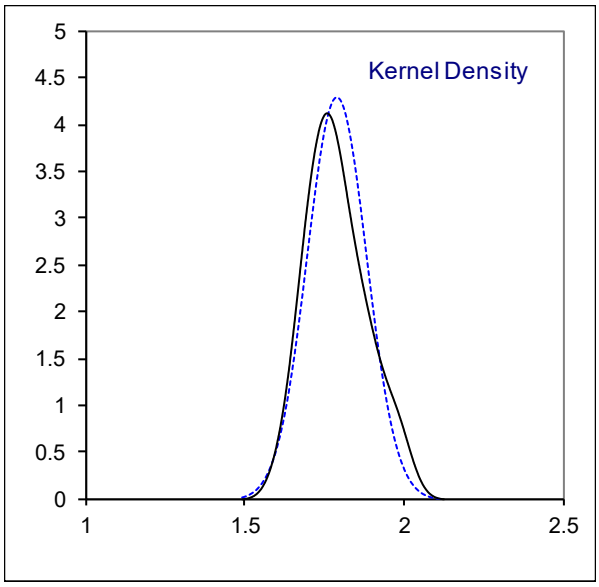
Determination of Carbon Residue (micro method) on sample #19095; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D4530	1.68		-1.38	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325	D4530	1.74		-0.63	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D4530	1.763		-0.34	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496	D4530	1.7003		-1.12	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D4530	1.73		-0.75	
663	D4530	1.772		-0.23	
780	D4530	1.90		1.37	
823	D4530	1.90		1.37	
840		-----		-----	
862	D4530	1.69		-1.25	
875	D4530	1.87		0.99	
902	D4530	1.78		-0.13	
912		-----		-----	
913	D4530	1.84		0.62	
922	D4530	1.70		-1.13	
962		-----		-----	
963		-----		-----	
974	D4530	1.96		2.12	
994		-----		-----	
1011		-----		-----	
1017	ISO10370	1.78		-0.13	
1059	ISO10370	1.82		0.37	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213	D4530	1.84		0.62	
1235		-----		-----	
1316	D4530	1.8		0.12	
1324		-----		-----	
1326		-----		-----	
1412		-----		-----	
1431	D4530	1.629		-2.01	
1460	D4530	1.77		-0.25	
1495		-----		-----	
1510		-----		-----	
1557	ISO10370	1.99		2.49	
1564		-----		-----	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		-----		-----	
1877		-----		-----	
1883		-----		-----	
1941		-----		-----	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129	ISO10370	1.733		-0.72	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074		-----		-----	
6183		-----		-----	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	22
outliers	0
mean (n)	1.790
st.dev. (n)	0.0928
R(calc.)	0.260
st.dev.(D4530:15)	0.0801
R(D4530:15)	0.224



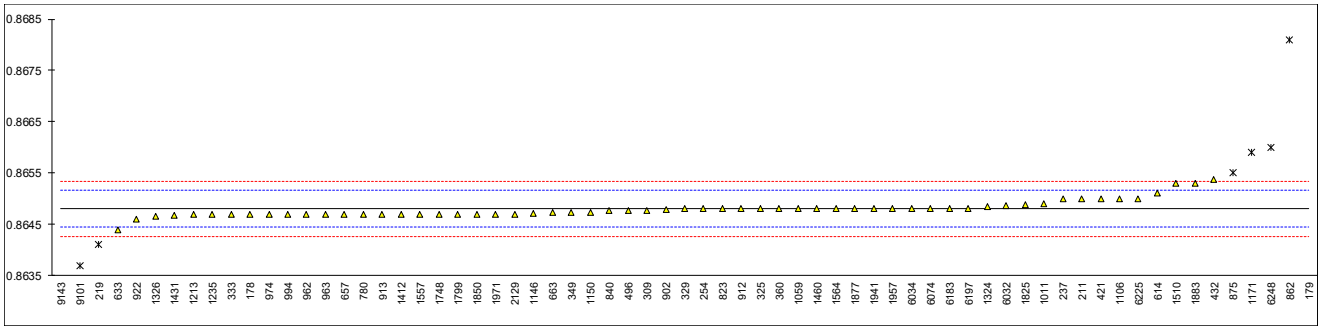


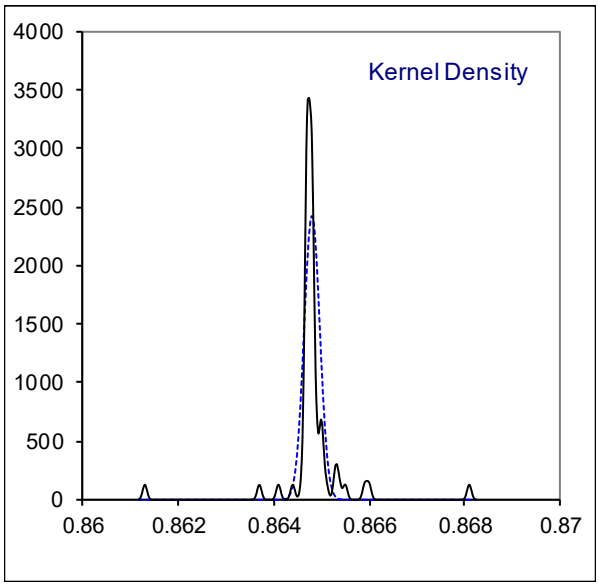
Determination of Density at 15°C on sample #19095; results in kg/L

lab	method	value	mark	z(targ)	remarks
178	D4052	0.8647		-0.57	
179	D4052	0.9647	R(0.01)	559.49	
211	D4052	0.8650		1.11	
219	D1298	0.8641	R(0.01)	-3.93	
237	D4052	0.8650		1.11	
254	D4052	0.8648		-0.01	
255		-----		-----	
257		-----		-----	
309	D4052	0.864775		-0.15	
325	D4052	0.8648		-0.01	
329	D4052	0.8648		-0.01	
333	D4052	0.8647		-0.57	
339		-----		-----	
349	D4052	0.86473		-0.40	
360	ISO12185	0.8648		-0.01	
398		-----		-----	
421	ISO12185	0.8650		1.11	
432	D4052	0.86537		3.18	
496	D4052	0.86477		-0.18	
614	D4052	0.8651		1.67	
633	D4052	0.8644		-2.25	
634		-----		-----	
657	D4052	0.8647		-0.57	
663	D4052	0.86473		-0.40	
780	D4052	0.8647		-0.57	
823	D4052	0.8648		-0.01	
840	D4052	0.86477		-0.18	
862	D4052	0.8681	R(0.01)	18.47	
875	D4052	0.8655	R(0.01)	3.91	
902	D4052	0.86478	C	-0.12	reported: 864.78 kg/L
912	D4052	0.8648		-0.01	
913	D4052	0.8647		-0.57	
922	D4052	0.8646		-1.13	
962	D4052	0.8647		-0.57	
963	D4052	0.8647		-0.57	
974	D4052	0.8647		-0.57	
994	ISO12185	0.8647		-0.57	
1011	D4052	0.8649		0.55	
1017		-----		-----	
1059	D4052	0.8648		-0.01	
1106	D5002	0.8650		1.11	
1146	D4052	0.86472		-0.46	
1150	ISO12185	0.86474		-0.34	
1171	D4052	0.86591	R(0.01)	6.21	
1213	D4052	0.86469		-0.62	
1235	ISO12185	0.86469		-0.62	
1316		-----		-----	
1324	D4052	0.86484		0.22	
1326	D4052	0.86465		-0.85	
1412	D4052	0.8647		-0.57	
1431	D4052	0.86468		-0.68	
1460	D4052	0.8648		-0.01	
1495		-----		-----	
1510	D4052	0.86530		2.79	
1557	ISO3675	0.8647		-0.57	
1564	D4052	0.8648		-0.01	
1748	D4052	0.8647		-0.57	
1799	D7042	0.8647		-0.57	
1825	ISO3675	0.864875		0.41	
1850	D4052	0.8647		-0.57	
1877	D4052	0.8648		-0.01	
1883	D1298	0.8653		2.79	
1941	D4052	0.8648		-0.01	
1957	D4052	0.8648		-0.01	
1969		-----		-----	
1971	D4052	0.8647		-0.57	
2129	D4052	0.8647		-0.57	
6016		-----		-----	
6032	D4052	0.86486		0.33	
6034	D4052	0.8648		-0.01	
6074	D4052	0.8648		-0.01	
6183	D4052	0.8648		-0.01	
6197	D4052	0.86480		-0.01	
6225	D4052	0.8650		1.11	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248	D4052	0.8660	C,R(0.01)	6.71	reported: 866.0 kg/L
6253		-----		-----	
9101	D1298	0.8637	R(0.01)	-6.17	
9142		-----		-----	
9143	D1298	0.8613	R(0.01)	-19.61	

normality	not OK
n	59
outliers	8
mean (n)	0.86480
st.dev. (n)	0.000165
R(calc.)	0.00046
st.dev.(ISO12185:96)	0.000179
R(ISO12185:96)	0.0005



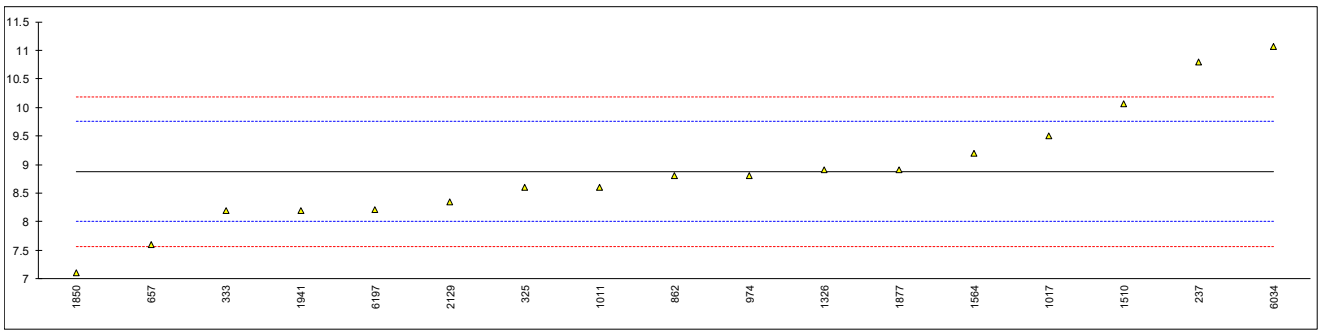


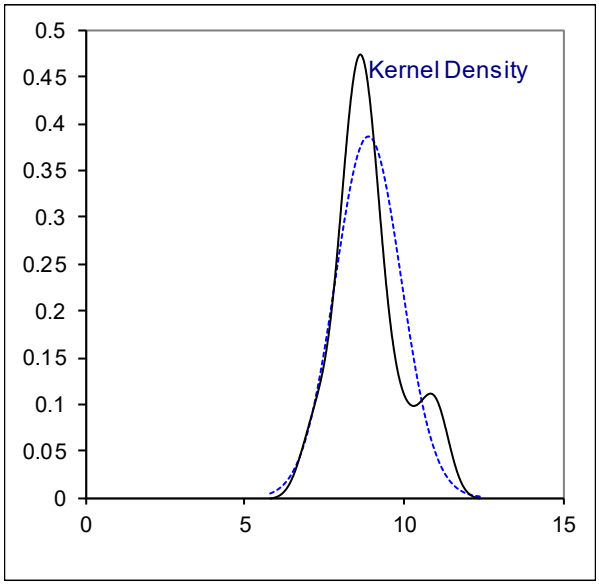
Determination of Evaporation loss by Noack on sample #19095; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D5800-B	10.8		4.40	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325	CEC L-40-93	8.6		-0.63	
329		-----		-----	
333	CEC L-40-93	8.2		-1.55	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5800-B	7.6		-2.92	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D5800-B	8.8		-0.17	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D5800-A	8.8		-0.17	
994		-----		-----	
1011	CEC L-40-93	8.6		-0.63	
1017	CEC L-40-93	9.5		1.43	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326	D5800-A	8.9		0.05	
1412		-----		-----	
1431		-----		-----	
1460		-----		-----	
1495		-----		-----	
1510	D5800-B	10.07		2.73	
1557		-----		-----	
1564	DIN51581	9.2		0.74	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850	DIN51581	7.1		-4.06	
1877	D5800-A	8.9		0.05	
1883		-----		-----	
1941	D5800-A	8.2		-1.55	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129	D5800-A	8.34		-1.23	
6016		-----		-----	
6032		-----		-----	
6034	D5800-A	11.07		5.02	
6074		-----		-----	
6183		-----		-----	
6197	D5800-B	8.214		-1.51	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

		D5800-A / DIN51581 only:	D5800-B only:	CEC only:
normality	OK	not OK	OK	not OK
n	17	8	5	4
outliers	0	0	0	0
mean (n)	8.876	8.814	9.097	8.725
st.dev. (n)	1.0315	1.1208	1.3187	0.5500
R(calc.)	2.888	3.138	3.692	1.540
st.dev.(D5800-B:18a)	0.4373	-----	0.4454	-----
R(D5800-B:18a)	1.225	-----	1.247	-----
Compare				
R(D5800-A:18a)	1.624	1.613	-----	-----



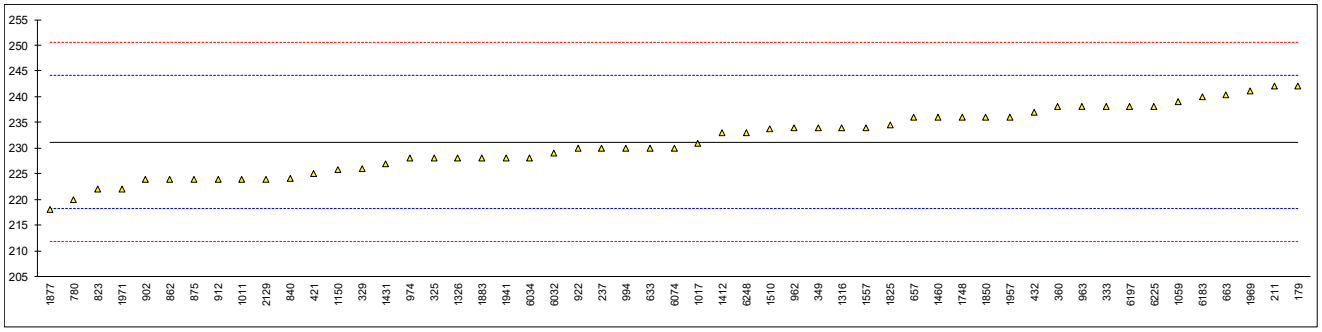


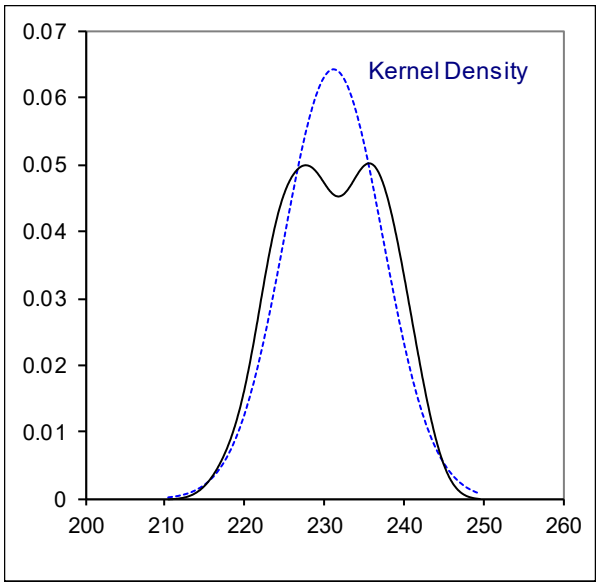
Determination of Flash Point COC on sample #19095; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D92	242		1.68	
211	D92	242		1.68	
219		-----		-----	
237	D92	230		-0.19	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325	D92	228		-0.50	
329	D92	226		-0.81	
333	D92	238		1.06	
339		-----		-----	
349	D92	234		0.44	
360	D92	238		1.06	
398		-----		-----	
421	ISO2592	225		-0.96	
432	D92	237		0.90	
496		-----		-----	
614		-----		-----	
633	D92	230		-0.19	
634		-----		-----	
657	D92	236		0.75	
663	D92	240.35		1.42	
780	D92	220		-1.74	
823	D92	222		-1.43	
840	D92	224.1		-1.10	
862	D92	224		-1.12	
875	D92	224		-1.12	
902	D92	224		-1.12	
912	D92	224		-1.12	
913		-----		-----	
922	D92	230		-0.19	
962	D92	234.0		0.44	
963	D92	238		1.06	
974	D92	228		-0.50	
994	D92	230.0		-0.19	
1011	D92	224		-1.12	
1017	D92	231		-0.03	
1059	ISO2592	239		1.21	
1106		-----		-----	
1146		-----		-----	
1150	ISO2592	225.75		-0.85	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316	D92	234		0.44	
1324		-----		-----	
1326	D92	228		-0.50	
1412	D92	233.0		0.28	
1431	D92	226.95		-0.66	
1460	D92	236		0.75	
1495		-----		-----	
1510	D92	233.8		0.40	
1557	ISO2592	234.0		0.44	
1564		-----		-----	
1748	D92	236		0.75	
1799		-----		-----	
1825	ISO2592	234.5		0.51	
1850	ISO2592	236		0.75	
1877	D92	218		-2.05	
1883	D92	228		-0.50	
1941	ISO2592	228		-0.50	
1957	D92	236		0.75	
1969	ISO2592	241.09		1.54	
1971	D92	222		-1.43	
2129	D92	224.0		-1.12	
6016		-----		-----	
6032	D92	229		-0.34	
6034	D92	228		-0.50	
6074	D92	230		-0.19	
6183	D92	240.0		1.37	
6197	D92	238		1.06	
6225	D92	238		1.06	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248	D92	233		0.28	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	53
outliers	0
mean (n)	231.20
st.dev. (n)	6.211
R(calc.)	17.39
st.dev.(D92:16b)	6.429
R(D92:16b)	18



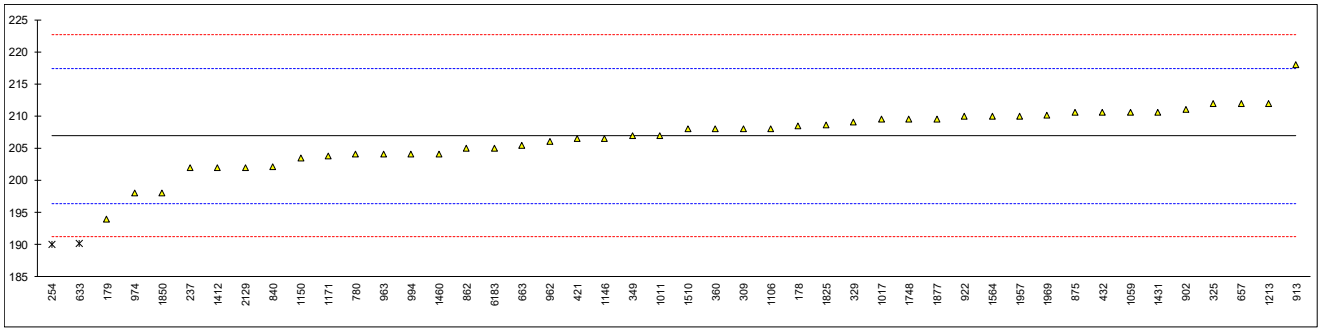


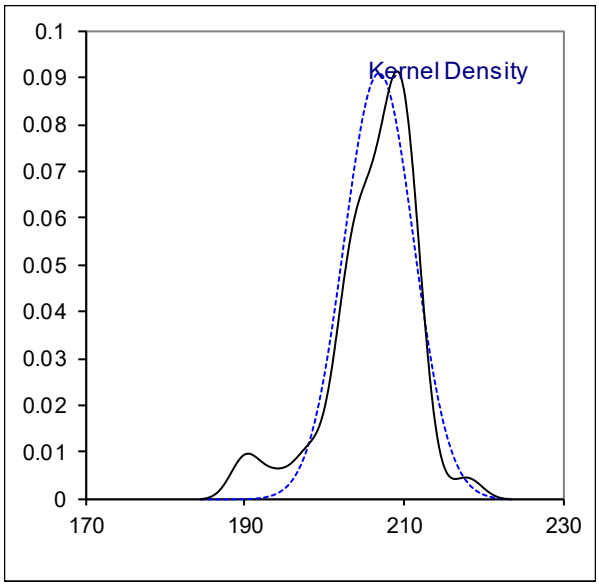
Determination of Flash Point PMcc on sample #19095; results in °C

lab	method	value	mark	z(targ)	remarks
178	D93	208.5		0.31	
179	D93-A	194.0		-2.46	
211		-----		-----	
219		-----		-----	
237	D93-A	202		-0.93	
254	D93-A	190	R(0.05)	-3.22	
255		-----		-----	
257		-----		-----	
309	D93-A	208.0		0.21	
325	D93-A	212		0.97	
329	D93-A	209.0		0.40	
333		-----		-----	
339		-----		-----	
349	D93-A	207		0.02	
360	D93-A	208.0		0.21	
398		-----		-----	
421	ISO2719-A	206.5		-0.08	
432	D93-A	210.5		0.69	
496		-----		-----	
614		-----		-----	
633	D93-A	190.2	R(0.05)	-3.18	
634		-----		-----	
657	D93-A	212		0.97	
663	D93-A	205.4		-0.29	
780	D93-A	204.0		-0.55	
823		-----		-----	
840	D93-A	202.1		-0.91	
862	D93-A	205		-0.36	
875	D93-A	210.5		0.69	
902	D93-A	211		0.78	
912		-----		-----	
913	D93-A	218		2.12	
922	D93-A	210		0.59	
962	D93-A	206.0		-0.17	
963	D93-A	204.0		-0.55	
974	D93-A	198		-1.70	
994	D93-A	204.0		-0.55	
1011	D93-A	207		0.02	
1017	D93-A	209.5		0.50	
1059	ISO2719-A	210.5		0.69	
1106	D93-A	208.0		0.21	
1146	D93-A	206.5		-0.08	
1150	ISO2719-A	203.5		-0.65	
1171	ISO2719-A	203.84		-0.58	
1213	D93-A	212		0.97	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326		-----		-----	
1412	D93-A	202.0		-0.93	
1431	D93-A	210.5		0.69	
1460	D93-A	204		-0.55	
1495		-----		-----	
1510	D93-A	207.95		0.20	
1557		-----		-----	
1564	D93-A	210.0		0.59	
1748	D93-A	209.5		0.50	
1799		-----		-----	
1825	ISO2719-A	208.58		0.32	
1850	ISO2719-B	198		-1.70	
1877	D93-A	209.5		0.50	
1883		-----		-----	
1941		-----		-----	
1957	D93-A	210		0.59	
1969	ISO2719-A	210.09		0.61	
1971		-----		-----	
2129	D93-A	202.0		-0.93	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074		-----		-----	
6183	D93-A	205.0		-0.36	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	suspect
n	44
outliers	2
mean (n)	206.90
st.dev. (n)	4.390
R(calc.)	12.29
st.dev.(D93-A:18)	5.246
R(D93-A:18)	14.69





Determination of Foaming Tendency, 5 min blowing period on sample #19095; results in mL

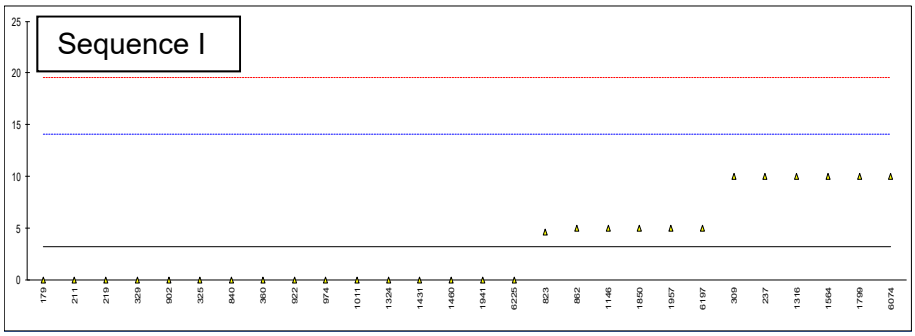
lab	method	sample used	diffuser	Seq. I	mark	z(targ)	Seq. II	mark	z(targ)	Seq. III	mark	z(targ)
178		---	---	-----		-----	-----		-----	-----		-----
179	D892	As received	Metal	0		-0.59	0		-2.39	0		-0.71
211	D892	After agitation A	Stone	0		-0.59	10		-1.13	0		-0.71
219	D892	As received	Stone	0		-0.59	0		-2.39	0		-0.71
237	D892	---	Metal	10		1.24	40		2.64	10		1.08
254		---	---	-----		-----	-----		-----	-----		-----
255		---	---	-----		-----	-----		-----	-----		-----
257		---	---	-----		-----	-----		-----	-----		-----
309	D892	As received	Metal	10		1.24	30		1.38	10		1.08
325	D892	As received	Metal	0		-0.59	20		0.12	0		-0.71
329	D892	After agitation A	Stone	0		-0.59	0		-2.39	0		-0.71
333		---	---	-----		-----	-----		-----	-----		-----
339		---	---	-----		-----	-----		-----	-----		-----
349	IP146 (Altern.)	---	---	-----		-----	-----		-----	-----		-----
360	ISO6247	As received	Stone	0		-0.59	0		-2.39	0		-0.71
398		---	---	-----		-----	-----		-----	-----		-----
421		---	---	-----		-----	-----		-----	-----		-----
432		---	---	-----		-----	-----		-----	-----		-----
496		---	---	-----		-----	-----		-----	-----		-----
614		---	---	-----		-----	-----		-----	-----		-----
633		---	---	-----		-----	-----		-----	-----		-----
634		---	---	-----		-----	-----		-----	-----		-----
657	D892	As received	Stone	NIL		-----	30		1.38	NIL		-----
663		---	---	-----		-----	-----		-----	-----		-----
780		---	---	-----		-----	-----		-----	-----		-----
823	D892	As received	Stone	4.6		0.26	9.6		-1.18	5.3		0.24
840	D892	After agitation A	Stone	0		-0.59	10		-1.13	0		-0.71
862	D892	As received	Metal	5		0.33	15		-0.51	5		0.18
875		---	---	-----		-----	-----		-----	-----		-----
902	D892	After agitation A	Metal	0		-0.59	30		1.38	10		1.08
912		---	---	-----		-----	-----		-----	-----		-----
913		---	---	-----		-----	-----		-----	-----		-----
922	D892	As received	Stone	0		-0.59	0		-2.39	0		-0.71
962		---	---	-----		-----	-----		-----	-----		-----
963		---	---	-----		-----	-----		-----	-----		-----
974	D892	As received	Metal	0		-0.59	10		-1.13	0		-0.71
994		---	---	-----		-----	-----		-----	-----		-----
1011	D892 (Altern.)	After agitation A	Metal	0		-0.59	20		0.12	0		-0.71
1017	D892	As received	Stone	<10		-----	20		0.12	0		-0.71
1059	D892	As received	Metal	nil		-----	40		2.64	nil		-----
1106		---	---	-----		-----	-----		-----	-----		-----
1146	ISO6247	As received	Metal	5		0.33	30		1.38	10		1.08
1150		---	---	-----		-----	-----		-----	-----		-----
1171		---	---	-----		-----	-----		-----	-----		-----
1213		---	---	-----		-----	-----		-----	-----		-----
1235		---	---	-----		-----	-----		-----	-----		-----
1316	D892	As received	Metal	10		1.24	40		2.64	10		1.08
1324	D892	As received	Metal	0		-0.59	10		-1.13	0		-0.71
1326		---	---	-----		-----	-----		-----	-----		-----
1412		---	---	-----		-----	-----		-----	-----		-----
1431	D892	As received	Stone	0		-0.59	20		0.12	0		-0.71
1460	D892	As received	Metal	0		-0.59	30		1.38	10		1.08
1495		---	---	-----		-----	-----		-----	-----		-----
1510		---	---	-----		-----	-----		-----	-----		-----
1557		---	---	-----		-----	-----		-----	-----		-----
1564	D892	As received	Stone	10		1.24	30		1.38	10		1.08
1748		---	---	-----		-----	-----		-----	-----		-----
1799	D892	As received	Metal	10		1.24	40		2.64	10		1.08
1825		---	---	-----		-----	-----		-----	-----		-----
1850	ISO6247	As received	Stone	5		0.33	30		1.38	5		0.18
1877		---	---	-----		-----	-----		-----	-----		-----
1883		---	---	-----		-----	-----		-----	-----		-----
1941	ISO6247	As received	Metal	0		-0.59	10		-1.13	0		-0.71
1957	D892	As received	Metal	5		0.33	20		0.12	5		0.18
1969		---	---	-----		-----	-----		-----	-----		-----
1971		---	---	-----		-----	-----		-----	-----		-----
2129		---	---	-----		-----	-----		-----	-----		-----
6016		---	---	-----		-----	-----		-----	-----		-----
6032		---	---	-----		-----	-----		-----	-----		-----
6034		---	---	-----		-----	-----		-----	-----		-----
6074	D892	As received	Stone	10		1.24	30		1.38	10		1.08
6183		---	---	-----		-----	-----		-----	-----		-----
6197	D892	After agitation A	Metal	5		0.33	10		-1.13	5		0.18
6225	D892	---	---	0		-0.59	5		-1.76	0		-0.71

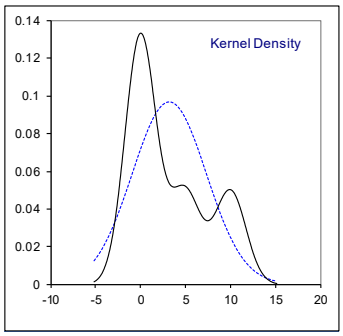
lab	method	sample used	diffuser	Seq. I	mark	z(targ)	Seq. II	mark	z(targ)	Seq. III	mark	z(targ)
6230		---	---	-----		-----	-----		-----	-----		-----
6248		As received	Stone	-----		-----	10/0		-----	-----		-----
6253		---	---	-----		-----	-----		-----	-----		-----
9101		---	---	-----		-----	-----		-----	-----		-----
9142		---	---	-----		-----	-----		-----	-----		-----
9143		---	---	-----		-----	-----		-----	-----		-----
	normality			OK			OK			OK		
	n			28			31			29		
	outliers			0			0			0		
	mean (n)			3.20			19.02			3.98		
	st.dev. (n)			4.125			13.327			4.511		
	R(calc.)			11.55			37.32			12.63		
	st.dev.(D892:13e1)*			5.467			7.953			5.589		
	R(D892:13e1)*			15.31			22.27			15.65		
	Compare:											
	R(D892:18)*			2.81			20.37			6.97		

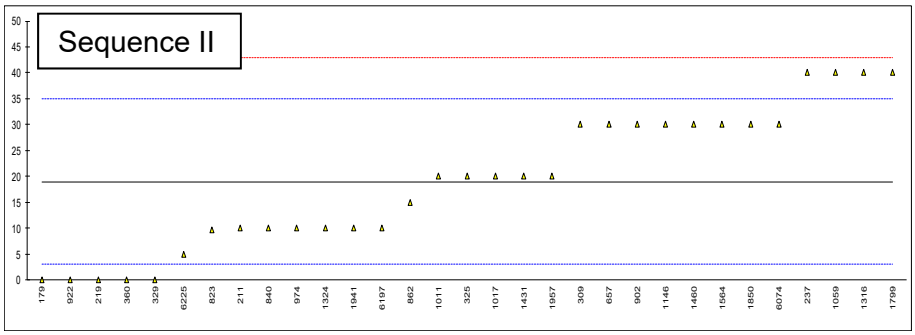
*) see paragraph 4.1 for explanation for the choice of version 2013e1 for evaluation

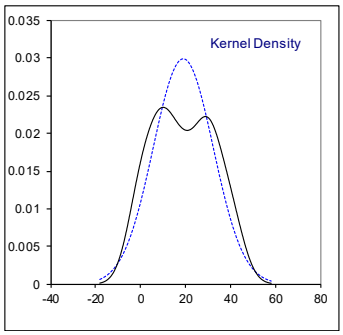
Sequence II - stone or metal diffuser:

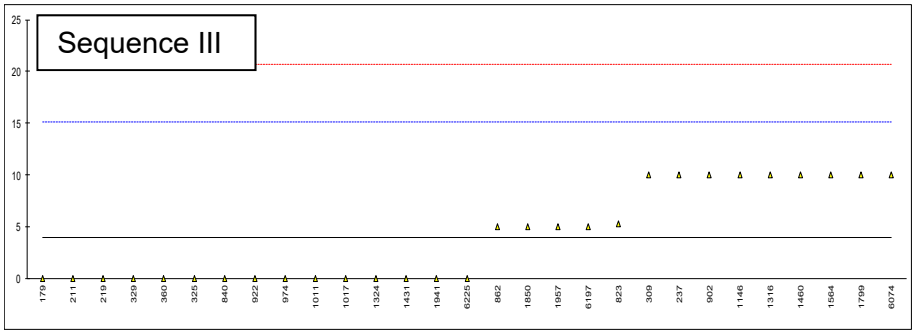
	stone diffuser only	metal diffuser only
normality	OK	OK
n	13	17
outliers	0	0
mean (n)	14.58	23.24
st.dev. (n)	12.672	12.862
R(calc.)	35.48	36.01
st.dev.(D892:13e1)	7.256	8.615
R(D892:13e1)	20.32	24.12

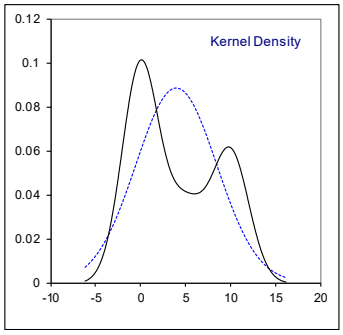












Determination of Foam Stability, 10 min settling point on sample #19095; results in mL

lab	method	Seq. I	mark	z(targ)	Seq. II	mark	z(targ)	Seq. III	mark	z(targ)
178		-----		-----	-----		-----	-----		-----
179	D892	0		-----	0		-----	0		-----
211	D892	0		-----	0		-----	0		-----
219	D892	0		-----	0		-----	0		-----
237	D892	0		-----	0		-----	0		-----
254		-----		-----	-----		-----	-----		-----
255		-----		-----	-----		-----	-----		-----
257		-----		-----	-----		-----	-----		-----
309	D892	0		-----	0		-----	0		-----
325	D892	0		-----	0		-----	0		-----
329	D892	0		-----	0		-----	0		-----
333		-----		-----	-----		-----	-----		-----
339		-----		-----	-----		-----	-----		-----
349		-----		-----	-----		-----	-----		-----
360	ISO6247	0		-----	0		-----	0		-----
398		-----		-----	-----		-----	-----		-----
421		-----		-----	-----		-----	-----		-----
432		-----		-----	-----		-----	-----		-----
496		-----		-----	-----		-----	-----		-----
614		-----		-----	-----		-----	-----		-----
633		-----		-----	-----		-----	-----		-----
634		-----		-----	-----		-----	-----		-----
657	D892	NIL		-----	NIL		-----	NIL		-----
663		-----		-----	-----		-----	-----		-----
780		-----		-----	-----		-----	-----		-----
823		-----		-----	-----		-----	-----		-----
840	D892	0		-----	0		-----	0		-----
862	D892	0		-----	0		-----	0		-----
875		-----		-----	-----		-----	-----		-----
902	D892	0		-----	0		-----	0		-----
912		-----		-----	-----		-----	-----		-----
913		-----		-----	-----		-----	-----		-----
922	D892	0		-----	0		-----	0		-----
962		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
974	D892	0		-----	0		-----	0		-----
994		-----		-----	-----		-----	-----		-----
1011	D892 (Alternative)	0		-----	0		-----	0		-----
1017	D892	0		-----	0		-----	0		-----
1059	D892	nil		-----	0		-----	nil		-----
1106		-----		-----	-----		-----	-----		-----
1146	ISO6247	2		-----	0		-----	0		-----
1150		-----		-----	-----		-----	-----		-----
1171		-----		-----	-----		-----	-----		-----
1213		-----		-----	-----		-----	-----		-----
1235		-----		-----	-----		-----	-----		-----
1316	D892	0		-----	0		-----	0		-----
1324	D892	0		-----	0		-----	0		-----
1326		-----		-----	-----		-----	-----		-----
1412		-----		-----	-----		-----	-----		-----
1431	D892	0		-----	0		-----	0		-----
1460	D892	0		-----	0		-----	0		-----
1495		-----		-----	-----		-----	-----		-----
1510		-----		-----	-----		-----	-----		-----
1557		-----		-----	-----		-----	-----		-----
1564	D892	0		-----	0		-----	0		-----
1748		-----		-----	-----		-----	-----		-----
1799	D892	0		-----	0		-----	0		-----
1825		-----		-----	-----		-----	-----		-----
1850		0		-----	0		-----	0		-----
1877		-----		-----	-----		-----	-----		-----
1883		-----		-----	-----		-----	-----		-----
1941	ISO6247	0		-----	0		-----	0		-----
1957	D892	0		-----	0		-----	0		-----
1969		-----		-----	-----		-----	-----		-----
1971		-----		-----	-----		-----	-----		-----
2129		-----		-----	-----		-----	-----		-----
6016		-----		-----	-----		-----	-----		-----
6032		-----		-----	-----		-----	-----		-----
6034		-----		-----	-----		-----	-----		-----
6074	D892	0		-----	0		-----	0		-----
6183		-----		-----	-----		-----	-----		-----
6197	D892	0		-----	0		-----	0		-----
6225	D892	0		-----	0		-----	0		-----

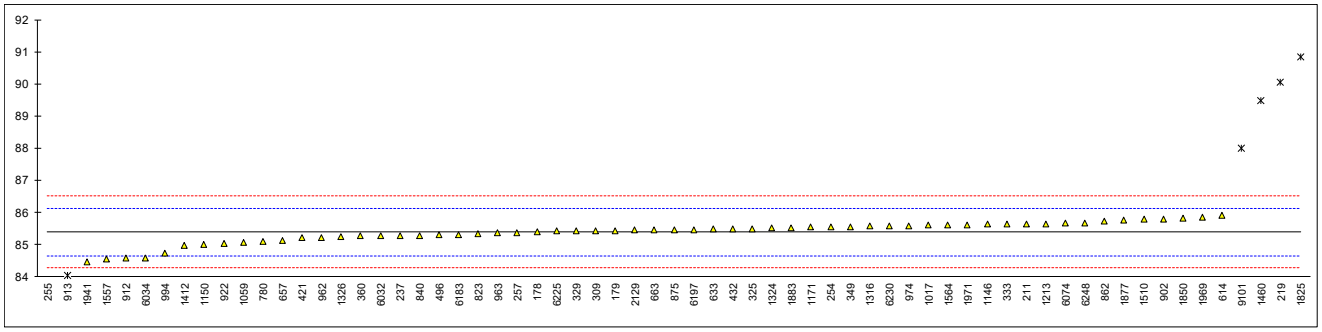
lab	method	Seq. I	mark	z(targ)	Seq. II	mark	z(targ)	Seq. III	mark	z(targ)
6230		-----		-----	-----		-----	-----		-----
6248		-----		-----	-----		-----	-----		-----
6253		-----		-----	-----		-----	-----		-----
9101		-----		-----	-----		-----	-----		-----
9142		-----		-----	-----		-----	-----		-----
9143		-----		-----	-----		-----	-----		-----
	n	29			30			30		
	mean (n)	0			0			0		

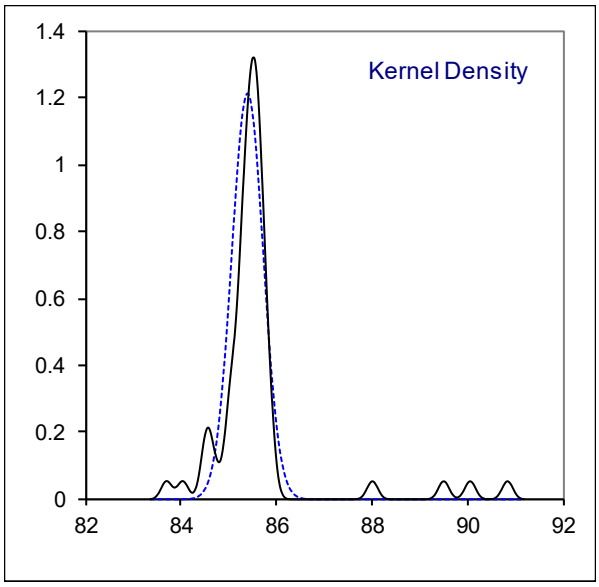
Determination of Kinematic Viscosity at 40°C on sample #19095; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D445	85.40		0.04	
179	D445	85.43		0.12	
211	D445	85.64		0.68	
219	D7279 corr. to D445	90.0433	R(0.01)	12.52	
237	D445	85.2716		-0.31	
254	D445	85.55		0.44	
255	D7279	83.69	R(0.01)	-4.56	
257	D7279	85.36		-0.07	
309	D445	85.42		0.09	
325	D445	85.49		0.28	
329	D445	85.42		0.09	
333	D445	85.64		0.68	
339		-----		-----	
349	D445	85.56		0.47	
360	D445	85.263		-0.33	
398		-----		-----	
421	ISO3104	85.22		-0.44	
432	D445	85.48		0.25	
496	D445	85.297		-0.24	
614	D445	85.90		1.38	
633	D7279 corr. to D445	85.48		0.25	
634		-----		-----	
657	D445	85.11		-0.74	
663	D445	85.448		0.17	
780	D445	85.08		-0.82	
823	D445	85.33		-0.15	
840	D445	85.289		-0.26	
862	D445	85.724		0.91	
875	D445	85.45		0.17	
902	D445	85.79		1.09	
912	D445	84.57		-2.19	
913	D445	84.03	R(0.01)	-3.64	
922	D445	85.02		-0.98	
962	D445	85.22		-0.44	
963	D445	85.36		-0.07	
974	D445	85.59		0.55	
994	D445	84.74		-1.73	
1011		-----		-----	
1017	D445	85.62		0.63	
1059	ISO3104	85.05		-0.90	
1106		-----		-----	
1146	D445	85.634		0.67	
1150	ISO3104	84.9973		-1.04	
1171	ISO3104	85.537		0.41	
1213	D445	85.65		0.71	
1235		-----		-----	
1316	D445	85.57		0.50	
1324	D445	85.530		0.39	
1326	D445	85.23		-0.42	
1412	D445	84.98		-1.09	
1431		-----		-----	
1460	D445	89.49	R(0.01)	11.03	
1495		-----		-----	
1510	D445	85.78		1.06	
1557	ISO3104	84.54		-2.27	
1564	D445	85.62		0.63	
1748		-----		-----	
1799		-----		-----	
1825	ISO3104	90.8251	R(0.01)	14.62	
1850	ISO3104	85.81		1.14	
1877	D445	85.76		1.01	
1883	D445	85.53		0.39	
1941	ISO3104	84.47		-2.46	
1957		-----		-----	
1969	ISO3104	85.8388		1.22	
1971	D445	85.62		0.63	
2129	D445	85.445		0.16	
6016		-----		-----	
6032	D7279 corr. to D445	85.264		-0.33	
6034	D445	84.58		-2.16	
6074	D445	85.67		0.77	
6183	D445	85.32		-0.18	
6197	D445	85.47		0.23	
6225	D445	85.418		0.09	

lab	method	value	mark	z(targ)	remarks
6230	D445	85.57		0.50	
6248	D445	85.68		0.79	
6253		-----		-----	
9101	D445	87.9985	R(0.01)	7.02	
9142		-----		-----	
9143		-----		-----	

normality	suspect
n	59
outliers	6
mean (n)	85.385
st.dev. (n)	0.3287
R(calc.)	0.920
st.dev.(D445:18)	0.3720
R(D445:18)	1.042



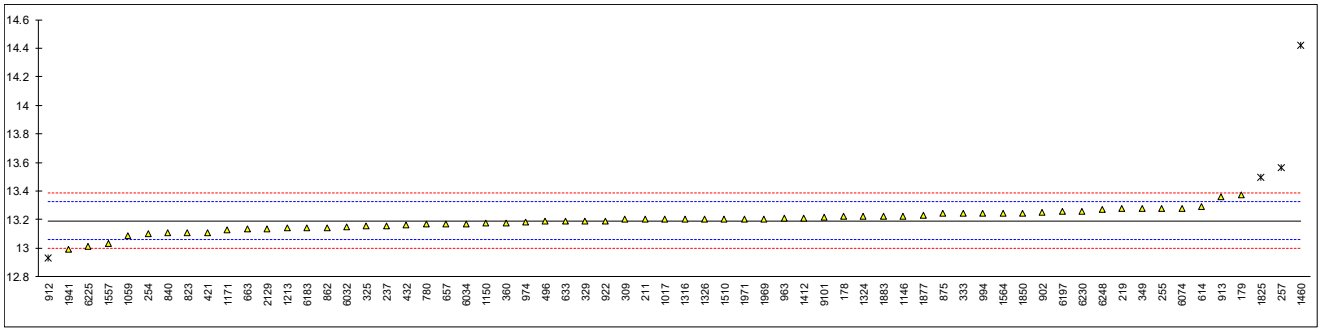


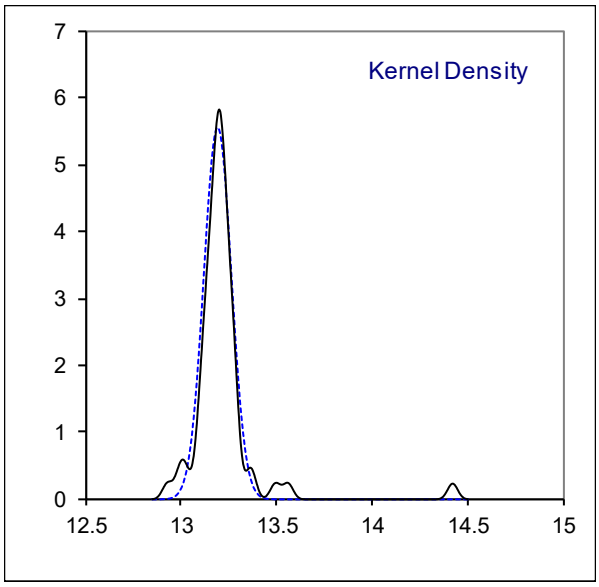
Determination of Kinematic Viscosity at 100°C on sample #19095; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D445	13.22		0.43	
179	D445	13.37		2.74	
211	D445	13.20		0.12	
219	D7279 corr. to D445	13.2793		1.34	
237	D445	13.1561		-0.55	
254	D445	13.10		-1.41	
255	D7279	13.28		1.35	
257	D7279	13.56	R(0.01)	5.66	
309	D445	13.20		0.12	
325	D445	13.155		-0.57	
329	D445	13.19		-0.03	
333	D445	13.24		0.74	
339		-----		-----	
349	D445	13.28		1.35	
360	D445	13.178		-0.21	
398		-----		-----	
421	ISO3104	13.11		-1.26	
432	D445	13.16		-0.49	
496	D445	13.187		-0.08	
614	D445	13.29		1.51	
633	D7279 corr. to D445	13.190		-0.03	
634		-----		-----	
657	D445	13.17		-0.34	
663	D445	13.134		-0.89	
780	D445	13.17		-0.34	
823	D445	13.11		-1.26	
840	D445	13.105		-1.34	
862	D445	13.1413		-0.78	
875	D445	13.24		0.74	
902	D445	13.25		0.89	
912	D445	12.93	R(0.01)	-4.03	
913	D445	13.36		2.58	
922	D445	13.19		-0.03	
962		-----		-----	
963	D445	13.21		0.28	
974	D445	13.18		-0.18	
994	D445	13.24		0.74	
1011		-----		-----	
1017	D445	13.20		0.12	
1059	ISO3104	13.09		-1.57	
1106		-----		-----	
1146	D445	13.225		0.51	
1150	ISO3104	13.1753		-0.26	
1171	ISO3104	13.128		-0.98	
1213	D445	13.14		-0.80	
1235		-----		-----	
1316	D445	13.20		0.12	
1324	D445	13.220		0.43	
1326	D445	13.20		0.12	
1412	D445	13.21		0.28	
1431		-----		-----	
1460	D445	14.42	R(0.01)	18.89	
1495		-----		-----	
1510	D445	13.20		0.12	
1557	ISO3104	13.03		-2.49	
1564	D445	13.24		0.74	
1748		-----		-----	
1799		-----		-----	
1825	ISO3104	13.4943	R(0.01)	4.65	
1850	ISO3104	13.24		0.74	
1877	D445	13.23		0.59	
1883	D445	13.22		0.43	
1941	ISO3104	12.99		-3.11	
1957		-----		-----	
1969	ISO3104	13.2031		0.17	
1971	D445	13.20		0.12	
2129	D445	13.137		-0.85	
6016		-----		-----	
6032	D7279 corr. to D445	13.147		-0.69	
6034	D445	13.17		-0.34	
6074	D445	13.28		1.35	
6183	D445	13.14		-0.80	
6197	D445	13.26		1.05	
6225	D445	13.009		-2.81	

lab	method	value	mark	z(targ)	remarks
6230	D445	13.26		1.05	
6248	D445	13.27		1.20	
6253		-----		-----	
9101	D445	13.2175		0.39	
9142		-----		-----	
9143		-----		-----	

normality	suspect
n	60
outliers	4
mean (n)	13.192
st.dev. (n)	0.0718
R(calc.)	0.201
st.dev.(D445:18)	0.0650
R(D445:18)	0.182



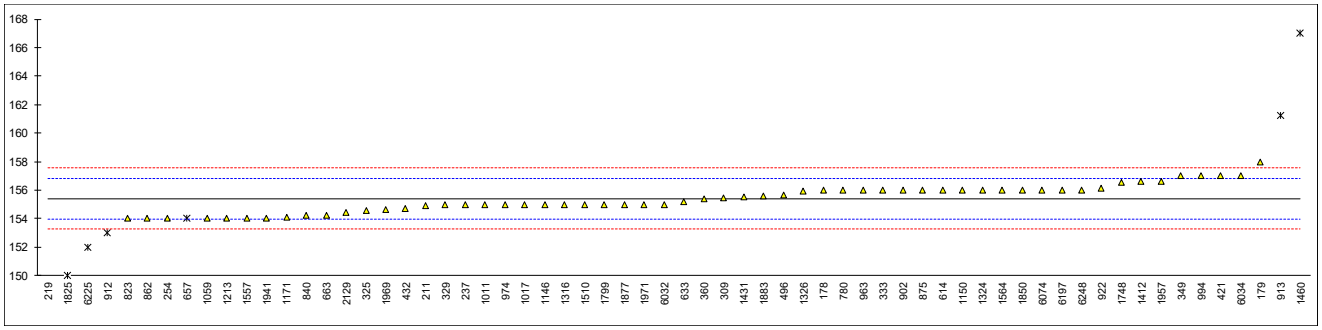


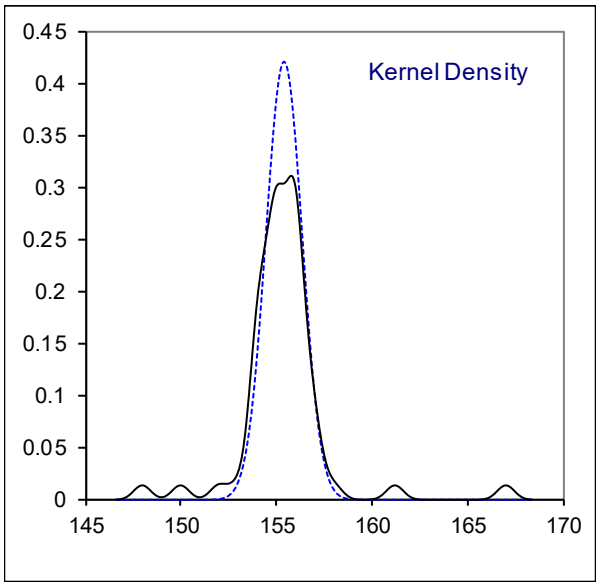
Determination of Viscosity Index on sample #19095

lab	method	value	mark	z(targ)	remarks
178	D2270	156		0.83	
179	D2270	158		3.63	
211	D2270	154.9		-0.71	
219	D2270	148	ex	-10.37	test result excluded, outlier in KV 40°C
237	D2270	155		-0.57	
254	D2270	154		-1.97	
255		-----		-----	
257		-----		-----	
309	D2270	155.468		0.08	
325	D2270	154.6		-1.13	
329	D2270	155		-0.57	
333	D2270	156		0.83	
339		-----		-----	
349	D2270	157		2.23	
360	ISO2909	155.4		-0.01	
398		-----		-----	
421	ISO2909	157		2.23	VI based on Stabinger Viscosity results
432	D2270	154.7		-0.99	
496	D2270	155.68		0.38	
614	D2270	156		0.83	
633	D2270	155.182		-0.32	
634		-----		-----	
657	D2270	154	ex, E	-1.97	test result excluded, calculation error, iis calculated: 156
663	D2270	154.23		-1.65	
780	D2270	156		0.83	
823	D2270	154		-1.97	
840	D2270	154.2		-1.69	
862	D2270	154		-1.97	
875	D2270	156		0.83	
902	D2270	156		0.83	
912	D2270	153	ex	-3.37	test result excluded, outlier in KV 100°C
913	D2270	161.2	ex	8.11	test result excluded, outlier in KV 40°C
922	D2270	156.1		0.97	
962		-----		-----	
963	D2270	156		0.83	
974	D2270	155		-0.57	
994	D2270	157		2.23	
1011	D2270	155		-0.57	VI based on Stabinger Viscosity results
1017	D2270	155		-0.57	
1059	ISO2909	154		-1.97	
1106		-----		-----	
1146	D2270	155		-0.57	
1150	ISO2909	156		0.83	
1171	D2270	154.1		-1.83	
1213	D2270	154		-1.97	
1235		-----		-----	
1316	D2270	155		-0.57	
1324	D2270	156		0.83	
1326	D2270	155.9		0.69	
1412	D2270	156.6		1.67	
1431	D2270	155.5		0.13	VI based on Stabinger Viscosity results
1460	D2270	167	ex	16.23	test results excluded, outlier in KV 40°C and 100°C
1495		-----		-----	
1510	D2270	155		-0.57	
1557	ISO2909	154		-1.97	
1564	D2270	156		0.83	
1748	D2270	156.55		1.60	VI based on Stabinger Viscosity results
1799	D7042	155		-0.57	VI based on Stabinger Viscosity results
1825	ISO2909	150	ex	-7.57	test result excluded, outlier in KV 40°C and 100°C
1850	ISO2909	156		0.83	
1877	D2270	155		-0.57	
1883	D2270	155.60		0.27	
1941	ISO2909	154		-1.97	
1957	D2270	156.6		1.67	VI based on Stabinger Viscosity results
1969	ISO2909	154.67		-1.04	
1971	D2270	155		-0.57	
2129	D2270	154.4		-1.41	
6016		-----		-----	
6032	D2270	155		-0.57	
6034	D2270	157		2.23	
6074	D2270	156		0.83	
6183		-----		-----	
6197	D2270	156		0.83	
6225	D2270	152	R(0.05)	-4.77	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248	D2270	156		0.83	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

		VI based on D445 only:
normality	OK	OK
n	57	51
outliers	1 (+6ex)	1 (+12 ex)
mean (n)	155.41	155.35
st.dev. (n)	0.947	0.943
R(calc.)	2.65	2.64
st.dev.(D2270:10)	0.714	0.714
R(D2270:10)	2	2



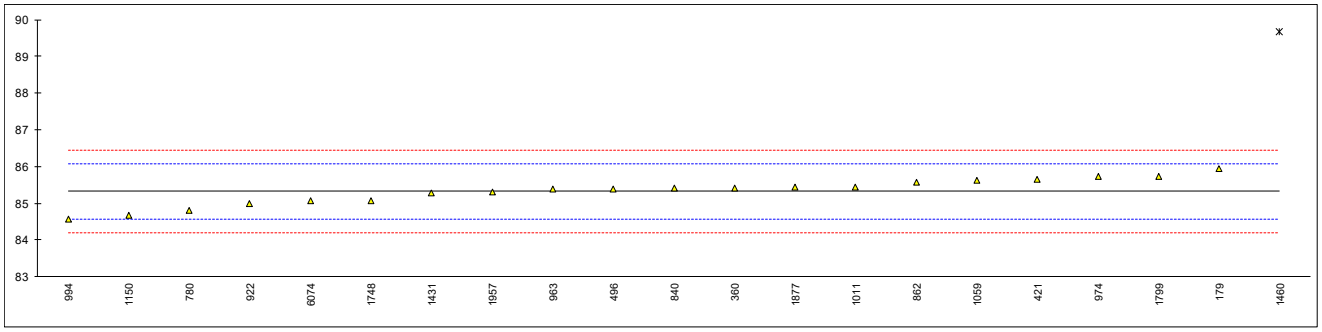


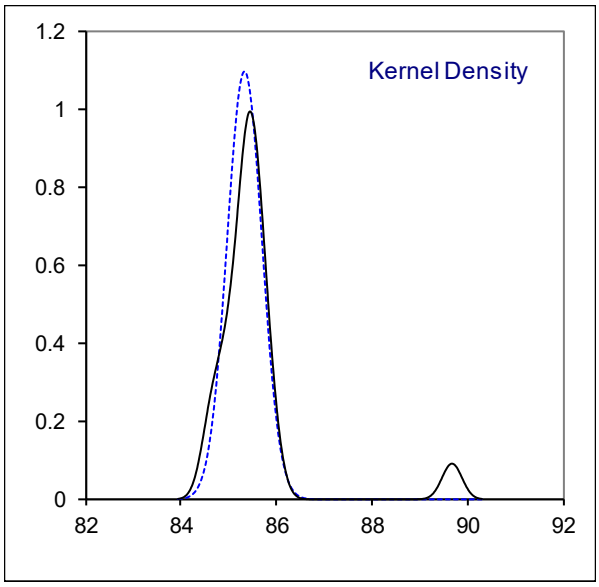
Determination of Viscosity Stabinger at 40°C on sample #19095; results in mm²/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D7042	85.94		1.66	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D7042	85.413		0.24	
398		-----		-----	
421	D7042	85.64		0.85	
432		-----		-----	
496	D7042	85.391		0.18	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780	D7042	84.80		-1.40	
823		-----		-----	
840	D7042	85.399		0.21	
862	D7042	85.574		0.68	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922	D7042	85.00		-0.87	
962		-----		-----	
963	D7042	85.38		0.15	
974	D7042	85.72		1.07	
994	D7042	84.56		-2.05	
1011	D7042	85.44		0.32	
1017		-----		-----	
1059	D7042	85.63		0.83	
1106		-----		-----	
1146		-----		-----	
1150	D7042	84.6844		-1.71	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326		-----		-----	
1412		-----		-----	
1431	D7042	85.276		-0.12	
1460	D7042	89.66	R(0.01)	11.65	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564		-----		-----	
1748	D7042	85.07		-0.68	
1799	D7042	85.74		1.12	
1825		-----		-----	
1850		-----		-----	
1877	D7042	85.43		0.29	
1883		-----		-----	
1941		-----		-----	
1957	D7042	85.30		-0.06	
1969		-----		-----	
1971		-----		-----	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074	D7042	85.06		-0.70	
6183		-----		-----	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	20
outliers	1
mean (n)	85.322
st.dev. (n)	0.3642
R(calc.)	1.020
st.dev.(D7042:16e3)	0.3724
R(D7042:16e3)	1.043



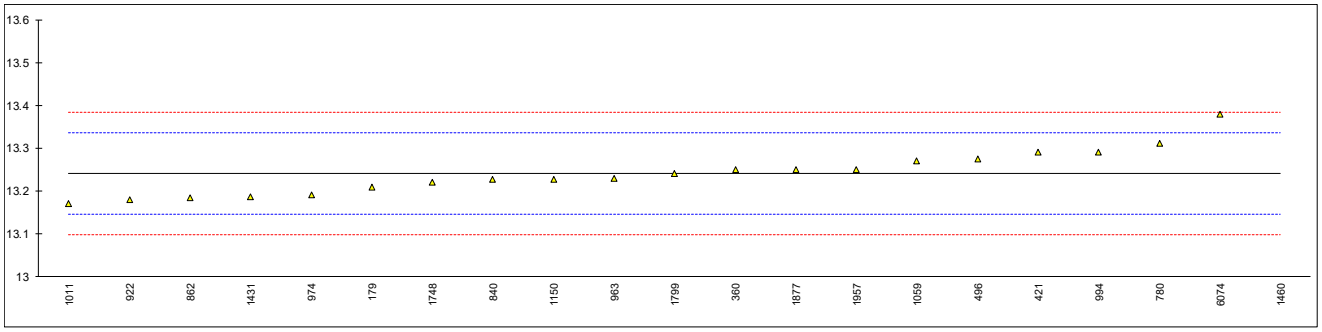


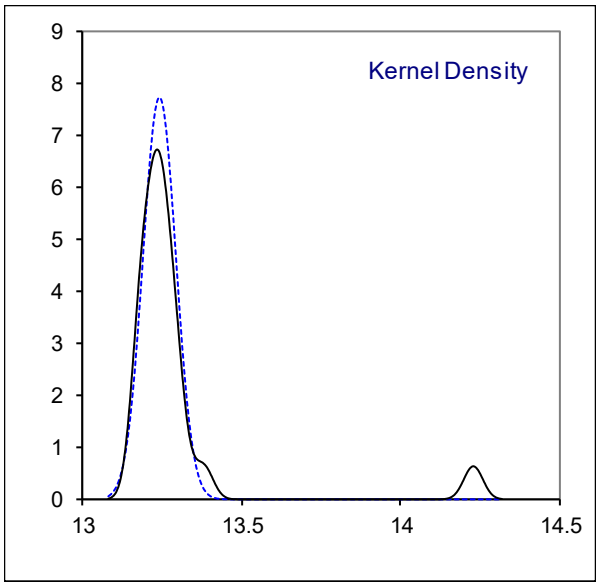
Determination of Viscosity Stabinger at 100°C on sample #19095; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D7042	13.21		-0.66	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D7042	13.250		0.18	
398		-----		-----	
421	D7042	13.29		1.02	
432		-----		-----	
496	D7042	13.274		0.68	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780	D7042	13.31		1.44	
823		-----		-----	
840	D7042	13.227		-0.30	
862	D7042	13.183		-1.23	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922	D7042	13.18		-1.29	
962		-----		-----	
963	D7042	13.23		-0.24	
974	D7042	13.19		-1.08	
994	D7042	13.29		1.02	
1011	D7042	13.17		-1.50	
1017		-----		-----	
1059	D7042	13.27		0.60	
1106		-----		-----	
1146		-----		-----	
1150	D7042	13.2276		-0.29	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326		-----		-----	
1412		-----		-----	
1431	D7042	13.186		-1.16	
1460	D7042	14.23	R(0.01)	20.76	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564		-----		-----	
1748	D7042	13.221		-0.43	
1799	D7042	13.24		-0.03	
1825		-----		-----	
1850		-----		-----	
1877	D7042	13.25		0.18	
1883		-----		-----	
1941		-----		-----	
1957	D7042	13.25		0.18	
1969		-----		-----	
1971		-----		-----	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074	D7042	13.38		2.91	
6183		-----		-----	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	suspect
n	20
outliers	1
mean (n)	13.241
st.dev. (n)	0.0516
R(calc.)	0.145
st.dev.(D7042:16e3)	0.0476
R(D7042:16e3)	0.133



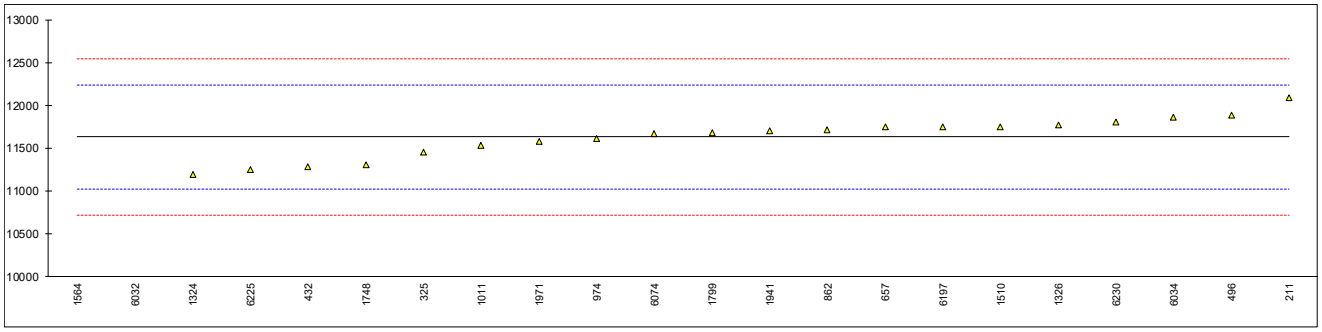


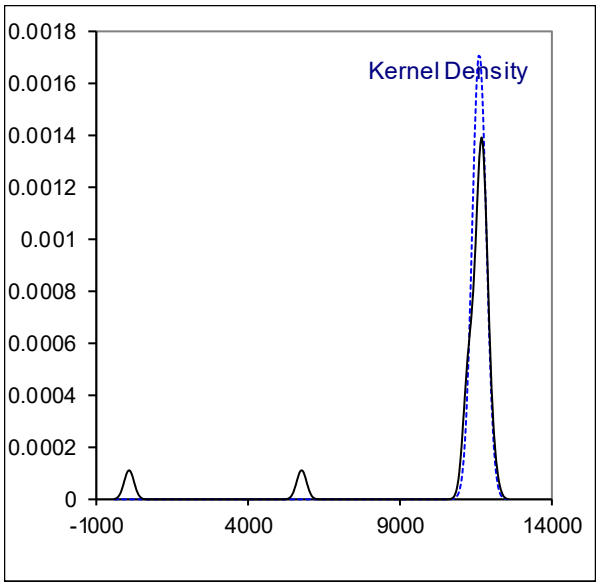
Determination of Viscosity Apparent (CCS) at -30°C on sample #19095; results in mPa·s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211	D5293	12085		1.50	
219		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325	D5293	11450		-0.60	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432	D5293	11288		-1.13	
496	D5293	11889		0.85	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5293	11743		0.37	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D5293	11719		0.29	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D5293	11611		-0.07	
994		-----		-----	
1011	D5293	11536		-0.31	
1017		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324	D5293	11190		-1.45	
1326	D5293	11772		0.46	
1412		-----		-----	
1431		-----		-----	
1460		-----		-----	
1495		-----		-----	
1510	D5293	11747		0.38	
1557		-----		-----	
1564	D5293	115	R(0.01)	-37.98	
1748	D5293	11309		-1.06	
1799	D5293	11676		0.15	
1825		-----		-----	
1850		-----		-----	
1877		-----		-----	
1883		-----		-----	
1941	D5293	11700		0.23	
1957		-----		-----	
1969		-----		-----	
1971	D5293	11580		-0.17	
2129		-----		-----	
6016		-----		-----	
6032	D5293	5789	ex	-19.27	test result excluded, test performed at -25°C
6034	D5293	11860		0.75	
6074	D5293	11670		0.13	
6183		-----		-----	
6197	D5293	11743		0.37	
6225	D5293	11254		-1.24	

lab	method	value	mark	z(targ)	remarks
6230	D5293	11800		0.56	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	20
outliers	1 (+1ex)
mean (n)	11631.1
st.dev. (n)	232.93
R(calc.)	652.2
st.dev.(D5293:17a)	303.24
R(D5293:17a)	849.1



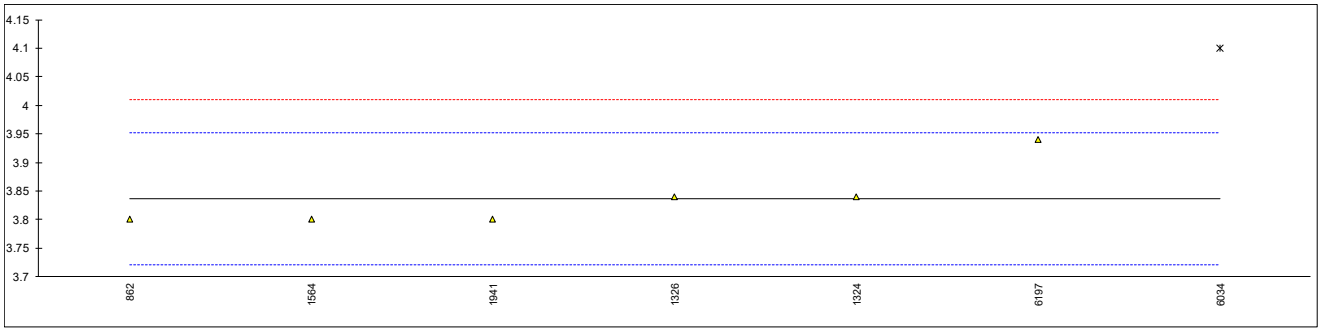


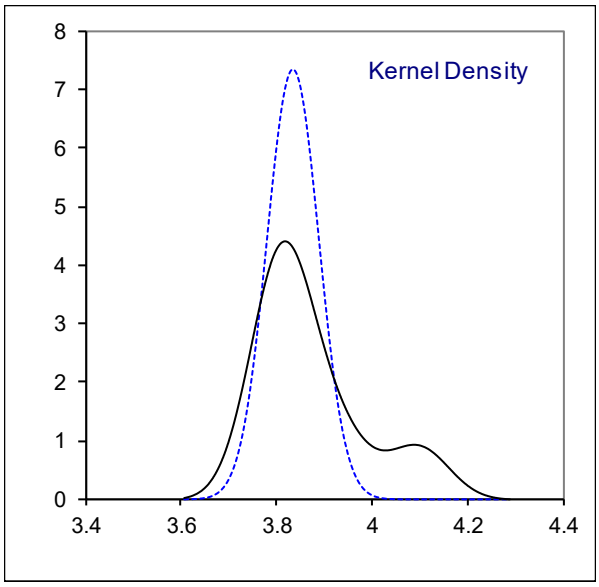
Determination of Viscosity HTHS by Tapered Bearing Simulator on sample #19095; results in mPa·s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D4741	3.80		-0.63	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1011		-----		-----	
1017		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324	D4683	3.840		0.06	
1326	D5481	3.840		0.06	
1412		-----		-----	
1431		-----		-----	
1460		-----		-----	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564	D4683	3.80		-0.63	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		-----		-----	
1877		-----		-----	
1883		-----		-----	
1941	D4683	3.80		-0.63	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034	D5481	4.1	G(0.05)	4.55	
6074		-----		-----	
6183		-----		-----	
6197	D5481	3.94		1.79	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	unknown
n	6
outliers	1
mean (n)	3.834
st.dev. (n)	0.0543
R(calc.)	0.152
st.dev.(D4683:17)	0.0578
R(D4683:17)	0.162



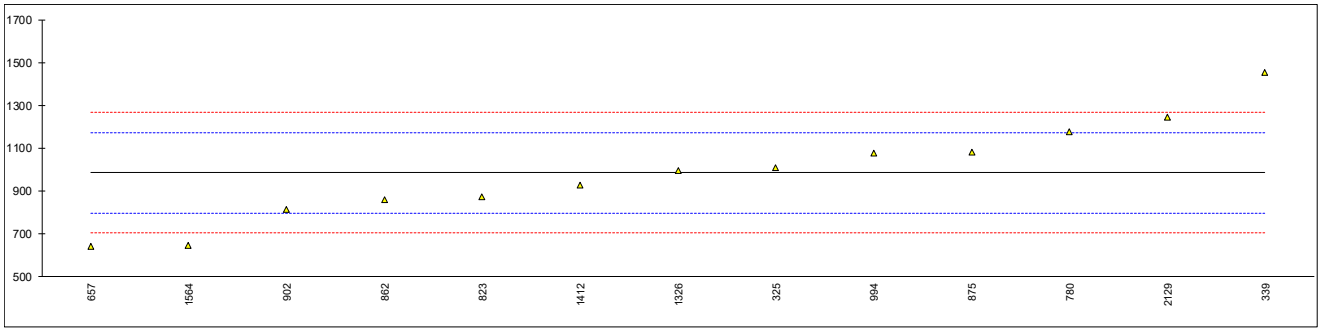


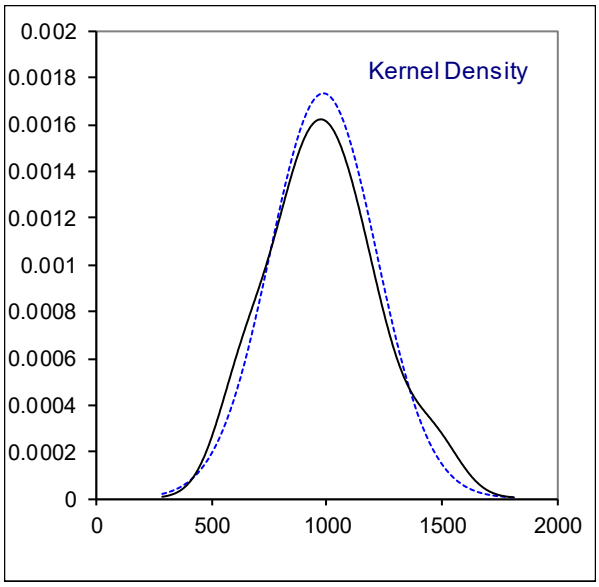
Determination of Nitrogen on sample #19095; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325	D5762	1010		0.27	
329		-----		-----	
333		-----		-----	
339	D5291	1455		5.03	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5762	641		-3.67	
663		-----		-----	
780	D3228	1178		2.07	
823	D5762	872		-1.20	
840		-----		-----	
862	D5762	860		-1.33	
875	D5762	1082		1.04	
902	D5762	812		-1.84	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5762	1076		0.98	
1011		-----		-----	
1017		-----		-----	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316		-----		-----	
1324		-----		-----	
1326	D5762	993		0.09	
1412	D5762	928		-0.60	
1431		-----		-----	
1460		-----		-----	
1495		-----		-----	
1510		-----		-----	
1557		-----		-----	
1564	D5762	647		-3.61	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		-----		-----	
1877		-----		-----	
1883		-----		-----	
1941		-----		-----	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129	D3228	1244		2.78	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074		-----		-----	
6183		-----		-----	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	13
outliers	0
mean (n)	984.46
st.dev. (n)	230.535
R(calc.)	645.50
st.dev.(D5762:18a)	93.524
R(D5762:18a)	261.87



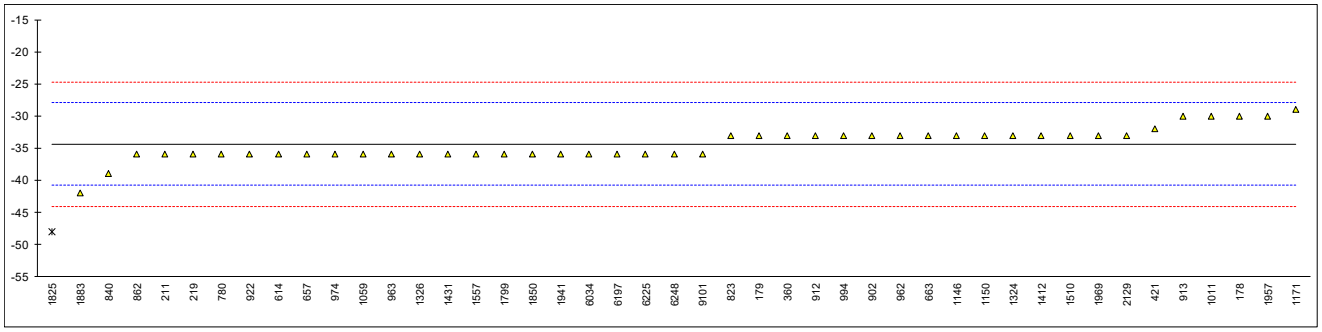


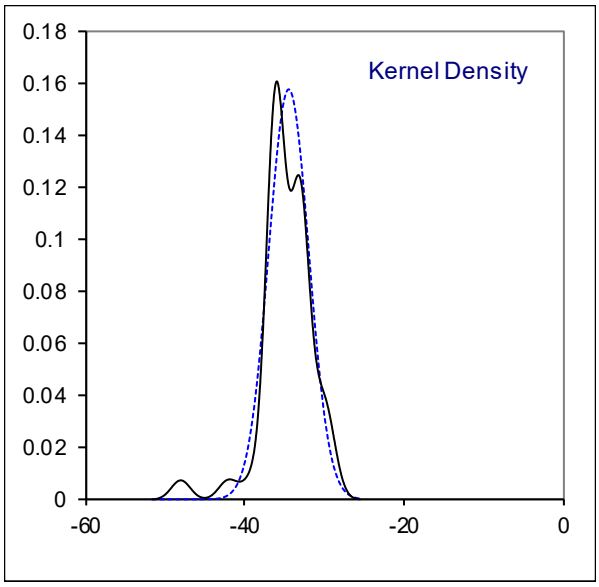
Determination of Pour Point, Manual on sample #19095; results in °C

lab	method	value	mark	z(targ)	remarks
178	D97	-30		1.36	
179	D97	-33		0.43	
211	D97	-36		-0.50	
219	D97	-36		-0.50	
237		-----		-----	
254	D97	<-18		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D97	-33		0.43	
398		-----		-----	
421	ISO3016	-32		0.74	
432		-----		-----	
496		-----		-----	
614	D97	-36		-0.50	
633		-----		-----	
634		-----		-----	
657	D97	-36		-0.50	
663	D97	-33		0.43	
780	D97	-36		-0.50	
823	D97	-33		0.43	
840	D97	-39		-1.44	
862	D97	-36		-0.50	
875		-----		-----	
902	D97	-33		0.43	
912	D97	-33		0.43	
913	D97	-30		1.36	
922	D97	-36		-0.50	
962	D97	-33		0.43	
963	D97	-36		-0.50	
974	D97	-36		-0.50	
994	D97	-33		0.43	
1011	D97	-30		1.36	
1017		-----		-----	
1059	ISO3016	-36		-0.50	
1106		-----		-----	
1146	D97	-33		0.43	
1150	ISO3016	-33		0.43	
1171	ISO3016	-29.0		1.68	
1213	D97	<-27		-----	
1235		-----		-----	
1316		-----		-----	
1324	D97	-33		0.43	
1326	D97	-36		-0.50	
1412	D97	-33		0.43	
1431	D97	-36		-0.50	
1460		-----		-----	
1495		-----		-----	
1510	D97	-33		0.43	
1557	ISO3016	-36		-0.50	
1564		-----		-----	
1748		-----		-----	
1799	D97	-36		-0.50	
1825	D97	-48	R(0.01)	-4.24	
1850	ISO3016	-36		-0.50	
1877		-----		-----	
1883	D97	-42		-2.37	
1941	ISO3016	-36		-0.50	
1957	D97	-30		1.36	
1969	ISO3016	-33		0.43	
1971		-----		-----	
2129	D97	-33.0		0.43	
6016		-----		-----	
6032		-----		-----	
6034	D97	-36		-0.50	
6074		-----		-----	
6183		-----		-----	
6197	D97	-36		-0.50	
6225	D97	-36		-0.50	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248	D97	-36		-0.50	
6253		-----		-----	
9101	D97	-36.0		-0.50	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	44
outliers	1
mean (n)	-34.39
st.dev. (n)	2.526
R(calc.)	7.07
st.dev.(D97:17b)	3.214
R(D97:17b)	9



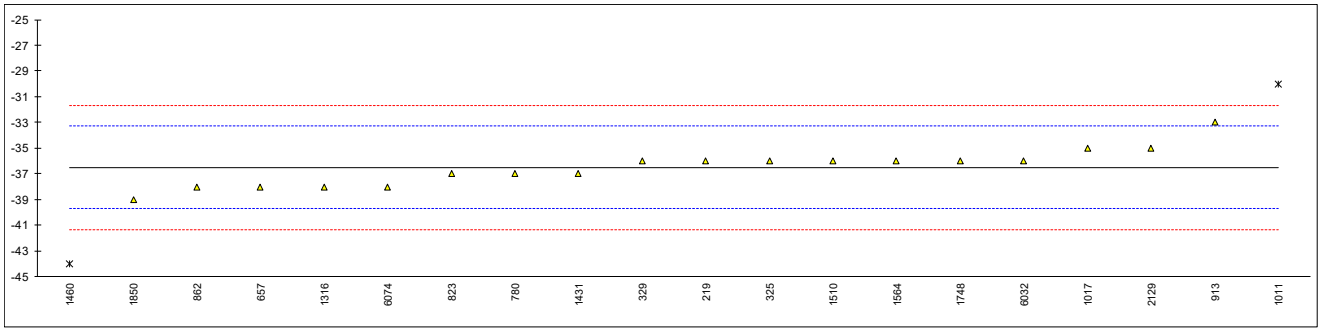


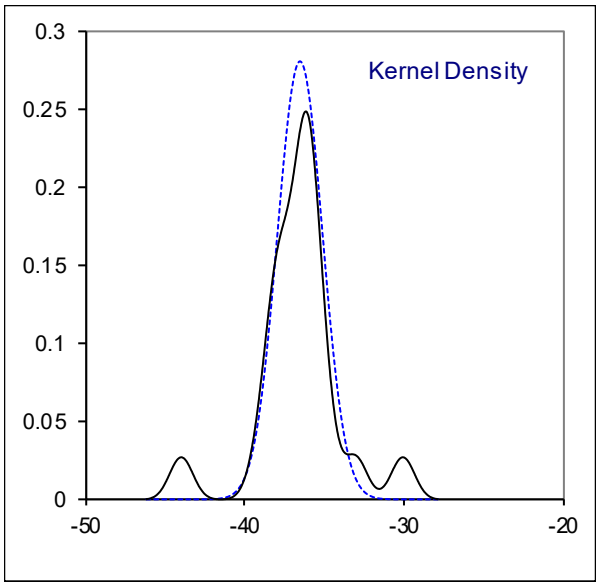
Determination of Pour Point, Automated, 1°C interval on sample #19095; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
219	D5950	-36		0.31	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325	D5950	-36		0.31	
329	INH-852	-36		0.31	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5950	-38		-0.93	
663		-----		-----	
780	D5950	-37		-0.31	
823	D5950	-37		-0.31	
840		-----		-----	
862	D5950	-38		-0.93	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913	D6749	-33		2.18	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1011	D6892	-30	R(0.01)	4.04	
1017	D5950	-35		0.93	
1059		-----		-----	
1106		-----		-----	
1146		-----		-----	
1150		-----		-----	
1171		-----		-----	
1213		-----		-----	
1235		-----		-----	
1316	D5950	-38.0		-0.93	
1324		-----		-----	
1326		-----		-----	
1412		-----		-----	
1431	D5950	-37		-0.31	
1460	D5949	-44	R(0.01)	-4.67	
1495		-----		-----	
1510	D5950	-36		0.31	
1557		-----		-----	
1564	D5950	-36		0.31	
1748	D7346	-36		0.31	
1799		-----		-----	
1825		-----		-----	
1850	D5950	-39		-1.56	
1877		-----		-----	
1883		-----		-----	
1941		-----		-----	
1957		-----		-----	
1969		-----		-----	
1971		-----		-----	
2129	D5950	-35.0		0.93	
6016		-----		-----	
6032	D5950	-36		0.31	
6034		-----		-----	
6074	D5949	-38		-0.93	
6183		-----		-----	
6197		-----		-----	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	18
outliers	2
mean (n)	-36.50
st.dev. (n)	1.425
R(calc.)	3.99
st.dev.(D5950:14)	1.607
R(D5950:14)	4.5



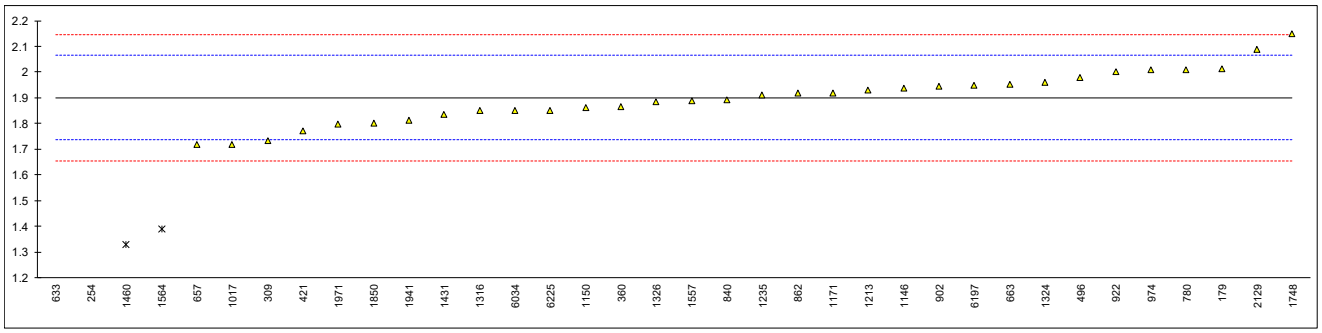


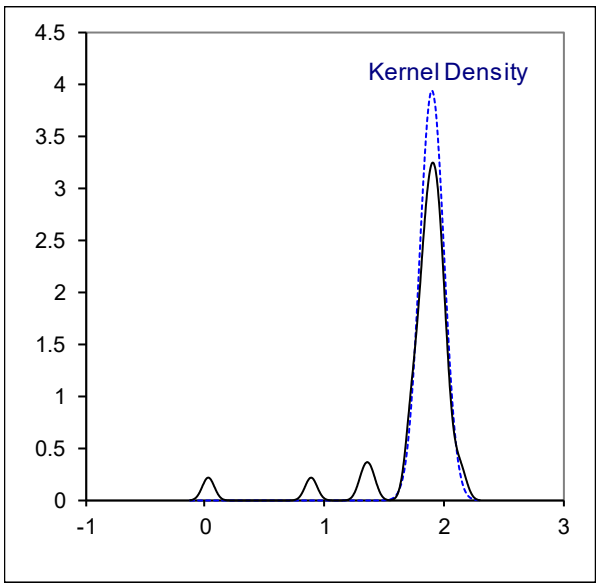
Determination of Sulfated Ash on sample #19095; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D874	2.014		1.39	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254	D874	0.89	R(0.01)	-12.31	
255		-----		-----	
257		-----		-----	
309	D874	1.735		-2.01	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D874	1.865		-0.43	
398		-----		-----	
421	ISO3987	1.77		-1.59	
432		-----		-----	
496	D874	1.979		0.96	
614		-----		-----	
633	D874	0.03	R(0.01)	-22.79	
634		-----		-----	
657	D874	1.72		-2.19	
663	D874	1.9514		0.62	
780	D874	2.01		1.34	
823		-----		-----	
840	D874	1.891		-0.11	
862	D874	1.919		0.23	
875		-----		-----	
902	D874	1.946		0.56	
912		-----		-----	
913		-----		-----	
922	D874	2.00		1.22	
962		-----		-----	
963		-----		-----	
974	D874	2.01		1.34	
994		-----		-----	
1011		-----		-----	
1017	D874	1.72		-2.19	
1059		-----		-----	
1106		-----		-----	
1146	D874	1.9381		0.46	
1150	ISO3987	1.86		-0.49	
1171	ISO3987	1.919		0.23	
1213	D874	1.93		0.36	
1235	ISO3987	1.9098		0.12	
1316	D874	1.85		-0.61	
1324	D874	1.960		0.73	
1326	D874	1.886		-0.17	
1412		-----		-----	
1431	D874	1.8338		-0.81	
1460	D874	1.33	R(0.01)	-6.95	
1495		-----		-----	
1510		-----		-----	
1557	ISO3987	1.89		-0.12	
1564	D874	1.39	R(0.01)	-6.22	
1748	D874	2.15		3.04	
1799		-----		-----	
1825		-----		-----	
1850	ISO3987	1.80		-1.22	
1877		-----		-----	
1883		-----		-----	
1941	ISO3987	1.814		-1.05	
1957		-----		-----	
1969		-----		-----	
1971	D874	1.796		-1.27	
2129	D874	2.088		2.29	
6016		-----		-----	
6032		-----		-----	
6034	D874	1.85		-0.61	
6074		-----		-----	
6183		-----		-----	
6197	D874	1.95		0.61	
6225	D874	1.85		-0.61	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	32
outliers	4
mean (n)	1.900
st.dev. (n)	0.1012
R(calc.)	0.283
st.dev.(D874:13a)	0.0821
R(D874:13a)	0.230



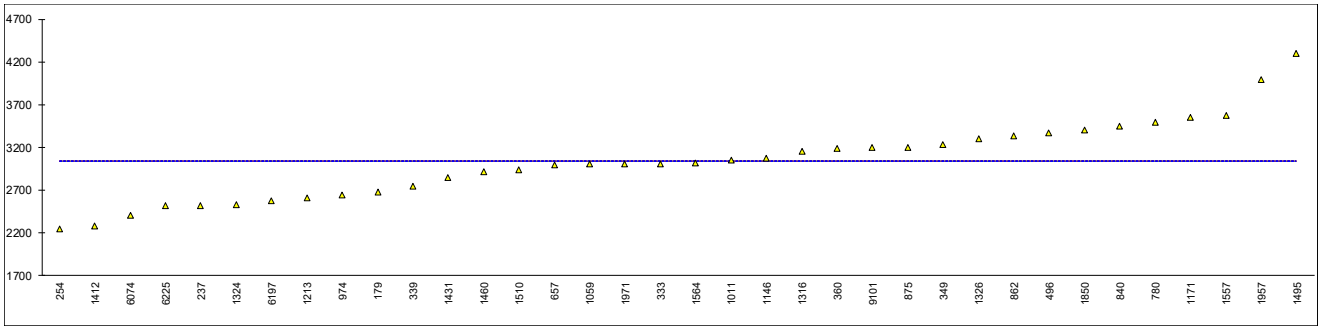


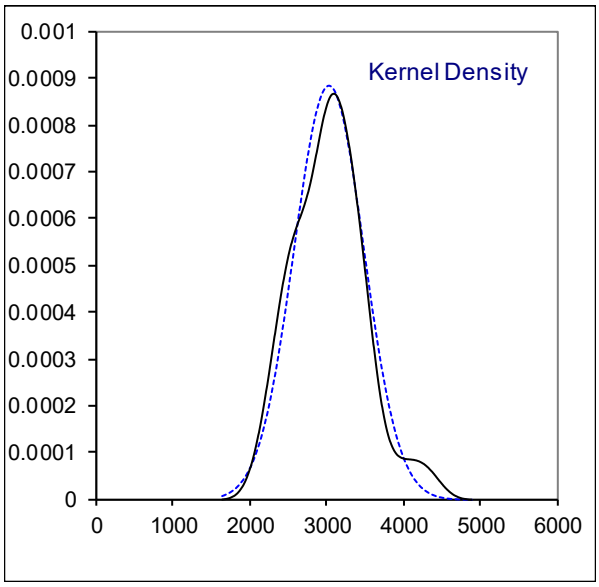
Determination of Sulfur on sample #19095; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D4294	2682	C	-----	reported: 0.2682 mg/kg
211		-----		-----	
219		-----		-----	
237	D5453	2520		-----	
254	D4294	2246		-----	
255		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333	D4294	3010		-----	
339	INH-165	2750		-----	
349	D2622	3229		-----	
360	ISO8754	3189		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496	D2622	3364.2		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D4294	2994		-----	
663		-----		-----	
780	D4294	3490		-----	
823		-----		-----	
840	D4294	3446		-----	
862	D2622	3330		-----	
875	D4294	3201		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D4294	2640		-----	
994		-----		-----	
1011	D6481	3055		-----	
1017		-----		-----	
1059	ISO14596Mod.	3000		-----	
1106		-----		-----	
1146	D4294	3070		-----	
1150		-----		-----	
1171	D4294	3544.2		-----	
1213	D4294	2610		-----	
1235		-----		-----	
1316	D7751	3150		-----	
1324	D4294	2527		-----	
1326	D4294	3304		-----	
1412	D4294	2281		-----	
1431	D4294	2847		-----	
1460	D4294	2914		-----	
1495	IP PM-ED/09	4293.5		-----	
1510	D4294	2940		-----	
1557	ISO8754	3573		-----	
1564	D5453	3020	C	-----	reported: 0.302 mg/kg
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850	ISO8754	3400	C	-----	reported: 0.34 mg/kg
1877		-----		-----	
1883		-----		-----	
1941		-----		-----	
1957	D4294	3990	C	-----	reported: 0.399 mg/kg
1969		-----		-----	
1971	ISO8754	3000	C	-----	reported: 030 mg/kg
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		-----		-----	
6074	D2622	2400	C	-----	reported: 0.24 mg/kg
6183		-----		-----	
6197	D4294	2571		-----	
6225	D4294	2515.3		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101	D4294	3200.3		-----	
9142		-----		-----	
9143		-----		-----	

			D4294 only:
	normality	OK	OK
	n	36	21
	outliers	0	0
	mean (n)	3036.0	2953.5
	st.dev. (n)	452.36	446.83
	R(calc.)	1266.6	1251.1
	st.dev.(D4294:16e1)	(120.35)	(118.23)
	R(D4294:16e1)	(337.0)	(331.0)



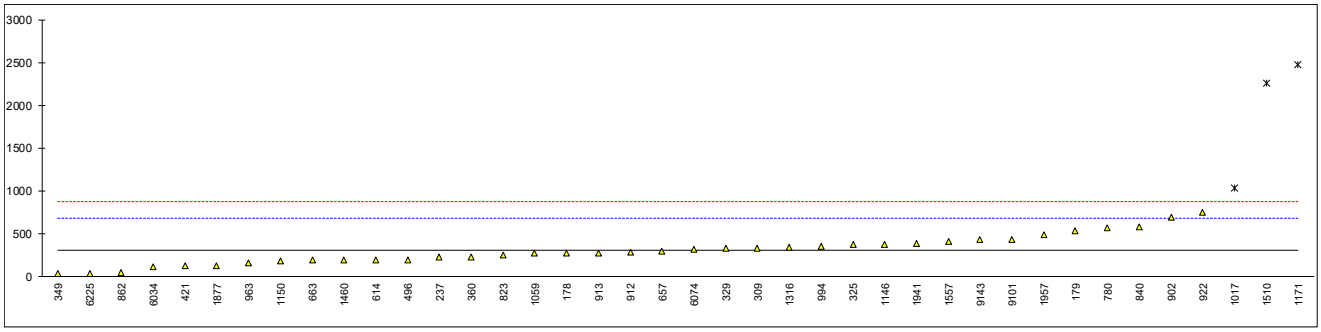


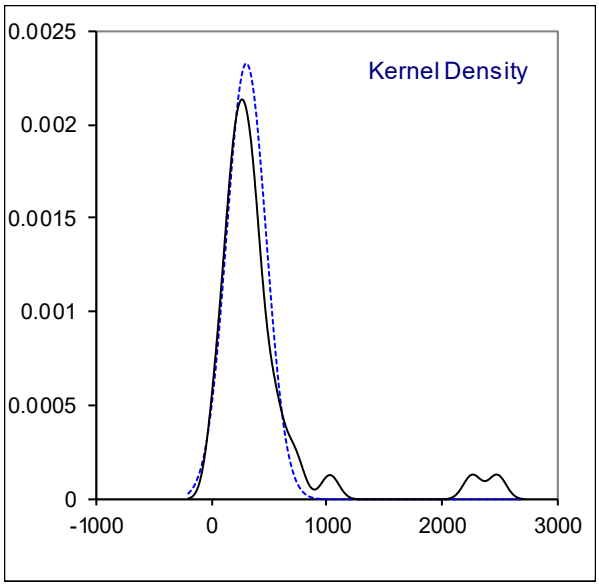
Determination of Water on sample #19095; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D6304	273		-0.19	
179	D6304-C	533		1.20	
211		-----		-----	
219		-----		-----	
237	D6304-C	225		-0.44	
254		-----		-----	
255		-----		-----	
257		-----		-----	
309	D6304-C	335.5		0.14	
325	D6304-C	374		0.35	
329	D6304-C	329		0.11	
333		-----		-----	
339		-----		-----	
349	D6304-C	36		-1.45	
360	D6304-C	229.6		-0.42	
398		-----		-----	
421	D6304-C	123		-0.99	
432		-----		-----	
496	D6304-C	200		-0.58	
614	D6304-C	197.5		-0.59	
633		-----		-----	
634		-----		-----	
657	D6304-C	295.8		-0.07	
663	D6304-C	190		-0.63	
780	D6304-C	565		1.37	
823	D6304-C	248		-0.32	
840	D6304-C	580.5		1.45	
862	D6304-C	43		-1.41	
875		-----		-----	
902	D6304-C	689.7		2.03	
912	D6304-A	280		-0.15	
913	D6304-C	276.3		-0.17	
922	D6304-A	750		2.35	
962		-----		-----	
963	D6304-C	165		-0.76	
974		-----		-----	
994	IP438	350		0.22	
1011		-----		-----	
1017	D6304-C	1032	R(0.01)	3.85	
1059	D6304-C	270		-0.20	
1106		-----		-----	
1146	D6304-C	380		0.38	
1150	ISO12937	180		-0.68	
1171	ISO12937	2478.5	R(0.01)	11.55	
1213		-----		-----	
1235		-----		-----	
1316	D6304-C	340		0.17	
1324		-----		-----	
1326		-----		-----	
1412		-----		-----	
1431		-----		-----	
1460	D6304-A	190		-0.63	
1495		-----		-----	
1510	D6304-A	2263.3	R(0.01)	10.40	
1557	ISO12937	415		0.57	
1564		-----		-----	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		-----		-----	
1877	D6304-C	126		-0.97	
1883		-----		-----	
1941	D6304-C	388		0.42	
1957	D6304-C	491		0.97	
1969		-----		-----	
1971		-----		-----	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034	D6304-A	120		-1.00	
6074	D6304-C	319		0.06	
6183		-----		-----	
6197		-----		-----	
6225	D6304-A	37.4		-1.44	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101	D6304	431.85		0.66	
9142		-----		-----	
9143	D4006	430.9	C	0.65	first reported: 0.05 mg/kg

normality	OK
n	37
outliers	3
mean (n)	308.326
st.dev. (n)	171.3781
R(calc.)	479.859
st.dev.(D6304:16e1)	187.8974
R(D6304:16e1)	526.113



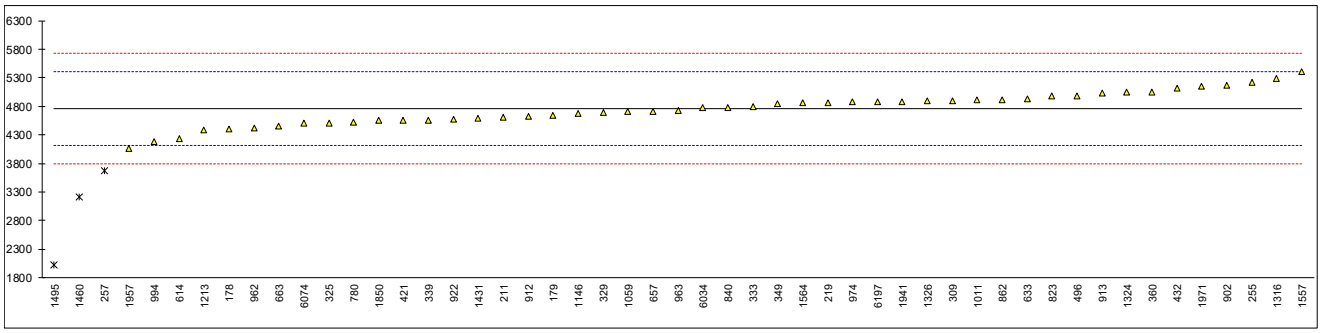


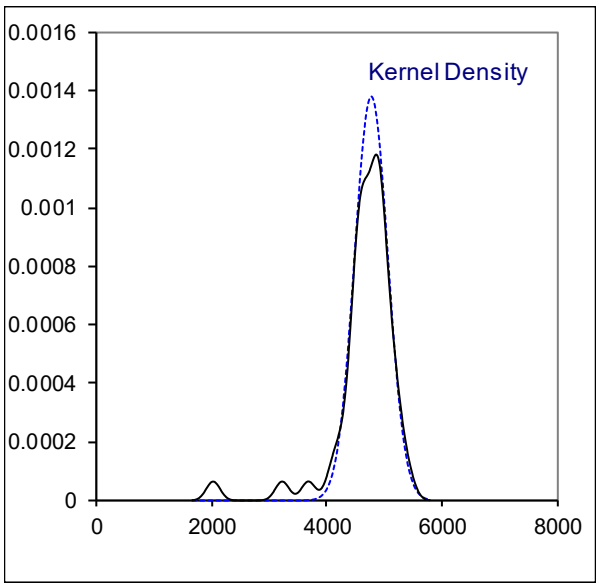
Determination of Calcium as Ca on sample #19095; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	4400		-1.11	
179	D5185	4636		-0.38	
211	D6595	4600		-0.49	
219	D5185	4863		0.32	
237		-----		-----	
254		-----		-----	
255		5227		1.45	
257	D6595	3668	R(0.05)	-3.37	
309	D5185	4900.4		0.44	
325	D5185	4514		-0.76	
329	D7751	4698		-0.19	
333		4787		0.09	
339	INH-169	4560		-0.62	
349	D5185	4854		0.29	
360	D5185	5057		0.92	
398		-----		-----	
421	D5185	4552		-0.64	
432	D5185	5110		1.08	
496	D5185	4977		0.67	
614	D5185	4235		-1.62	
633	D6595	4934		0.54	
634		-----		-----	
657	D5185	4718		-0.13	
663	D5185	4462.4		-0.92	
780	D5185	4523		-0.73	
823	D5185	4976		0.67	
840	D5185	4779		0.06	
862	D5185	4920		0.50	
875		-----		-----	
902	D5185	5173		1.28	
912		4619		-0.43	
913	D5185	5036		0.86	
922	D5185	4568		-0.59	
962		4425		-1.03	
963	D5185	4722.2		-0.11	
974	D5185	4881		0.38	
994	D5185	4175		-1.81	
1011	D5185	4910		0.47	
1017		-----		-----	
1059	In house	4715		-0.14	
1106		-----		-----	
1146	In house	4670		-0.28	
1150		-----		-----	
1171		-----		-----	
1213	D5185	4380		-1.17	
1235		-----		-----	
1316	D5185	5280		1.61	
1324	D5185	5050		0.90	
1326		4890		0.40	
1412		-----		-----	
1431	In house	4588		-0.53	
1460	D4951	3215	R(0.01)	-4.78	
1495	IP PM-ED/09	2016.6	R(0.01)	-8.48	
1510		-----		-----	
1557		5414		2.02	
1564	D4951	4855		0.30	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		4550		-0.65	
1877		-----		-----	
1883		-----		-----	
1941		4886		0.39	
1957	D5185	4066		-2.14	
1969		-----		-----	
1971	D4951	5150		1.21	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		4771		0.04	
6074	D6595	4507		-0.78	
6183		-----		-----	
6197		4884		0.39	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	48
outliers	3
mean (n)	4759.33
st.dev. (n)	288.833
R(calc.)	808.73
st.dev.(D5185:18)	323.402
R(D5185:18)	905.57



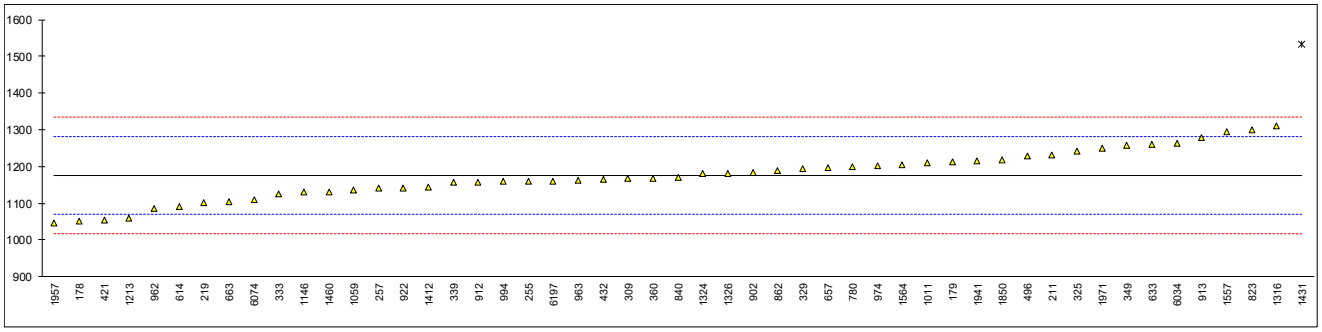


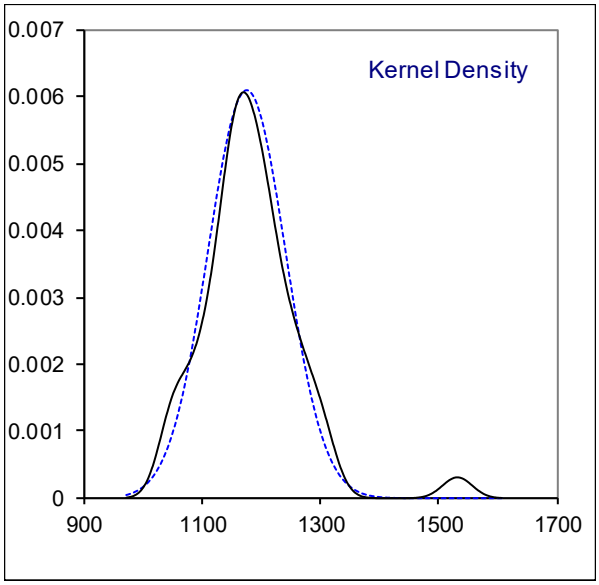
Determination of Phosphorus as P on sample #19095; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1050		-2.39	
179	D5185	1213		0.71	
211	D6595	1230		1.03	
219	D5185	1101		-1.42	
237		-----		-----	
254		-----		-----	
255		1160		-0.30	
257	D6595	1142		-0.64	
309	D5185	1166.8		-0.17	
325	D5185	1242		1.26	
329	D7751	1195		0.37	
333		1126		-0.94	
339	INH-169	1157		-0.35	
349	D5185	1257		1.55	
360	D5185	1168		-0.15	
398		-----		-----	
421	D5185	1053		-2.33	
432	D5185	1166		-0.18	
496	D5185	1228		0.99	
614	D5185	1090		-1.63	
633	D6595	1261		1.62	
634		-----		-----	
657	D5185	1197		0.41	
663	D5185	1103.1		-1.38	
780	D5185	1200		0.46	
823	D5185	1301		2.38	
840	D5185	1171		-0.09	
862	D5185	1190		0.27	
875		-----		-----	
902	D5185	1184		0.16	
912		1158		-0.33	
913	D5185	1280		1.98	
922	D5185	1142		-0.64	
962		1085		-1.72	
963	D5185	1162.9		-0.24	
974	D5185	1202		0.50	
994	D5185	1159		-0.32	
1011	D5185	1209		0.63	
1017		-----		-----	
1059	In house	1136		-0.75	
1106		-----		-----	
1146	In house	1131		-0.85	
1150		-----		-----	
1171		-----		-----	
1213	D5185	1058		-2.23	
1235		-----		-----	
1316	D5185	1310		2.55	
1324	D5185	1180		0.08	
1326		1180		0.08	
1412	D5185	1144		-0.60	
1431	In house	1532	R(0.01)	6.77	
1460	D4951	1131		-0.85	
1495		-----		-----	
1510		-----		-----	
1557		1295		2.27	
1564	D4951	1204		0.54	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		1218		0.80	
1877		-----		-----	
1883		-----		-----	
1941		1215		0.75	
1957	D5185	1047		-2.44	
1969		-----		-----	
1971	D4951	1250		1.41	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		1263		1.66	
6074	D6595	1110		-1.25	
6183		-----		-----	
6197		1160		-0.30	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	OK
n	50
outliers	1
mean (n)	1175.64
st.dev. (n)	65.495
R(calc.)	183.39
st.dev.(D5185:18)	52.656
R(D5185:18)	147.44



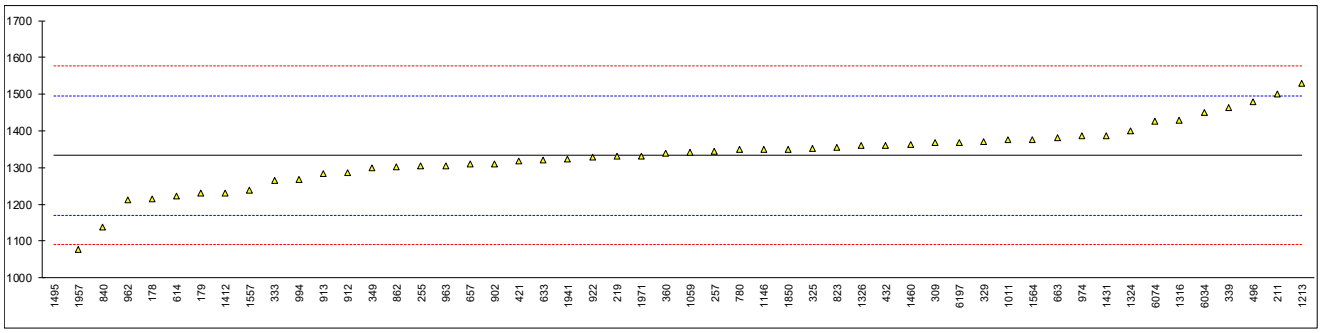


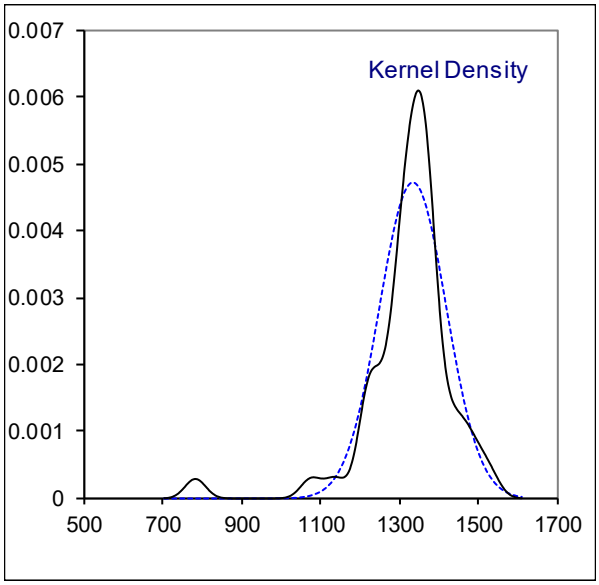
Determination of Zinc as Zn on sample #19095; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1214		-1.47	
179	D5185	1230		-1.27	
211	D6595	1500		2.05	
219	D5185	1330		-0.04	
237		-----		-----	
254		-----		-----	
255		1305		-0.35	
257	D6595	1344		0.13	
309	D5185	1368.4		0.43	
325	D5185	1353		0.24	
329	D7751	1371		0.46	
333		1266		-0.83	
339	INH-169	1462		1.59	
349	D5185	1299		-0.42	
360	D5185	1340		0.08	
398		-----		-----	
421	D5185	1318		-0.19	
432	D5185	1361		0.34	
496	D5185	1479		1.79	
614	D5185	1222		-1.37	
633	D6595	1320		-0.16	
634		-----		-----	
657	D5185	1309		-0.30	
663	D5185	1380.2		0.58	
780	D5185	1350		0.21	
823	D5185	1354		0.25	
840	D5185	1137		-2.42	
862	D5185	1303		-0.37	
875		-----		-----	
902	D5185	1310		-0.29	
912		1285		-0.60	
913	D5185	1284		-0.61	
922	D5185	1328		-0.07	
962		1211		-1.51	
963	D5185	1305.6		-0.34	
974	D5185	1386		0.65	
994	D5185	1268		-0.81	
1011	D5185	1376		0.53	
1017		-----		-----	
1059	In house	1342		0.11	
1106		-----		-----	
1146	In house	1350		0.21	
1150		-----		-----	
1171		-----		-----	
1213	D5185	1530		2.42	
1235		-----		-----	
1316	D5185	1430		1.19	
1324	D5185	1400		0.82	
1326		1360		0.33	
1412	D5185	1230		-1.27	
1431	In house	1387		0.66	
1460	D4951	1362		0.35	
1495	IP PM-ED/09	783.5	R(0.01)	-6.77	
1510		-----		-----	
1557		1238		-1.17	
1564	D4951	1376		0.53	
1748		-----		-----	
1799		-----		-----	
1825		-----		-----	
1850		1350		0.21	
1877		-----		-----	
1883		-----		-----	
1941		1323		-0.13	
1957	D5185	1076		-3.17	
1969		-----		-----	
1971	D4951	1330		-0.04	
2129		-----		-----	
6016		-----		-----	
6032		-----		-----	
6034		1451		1.45	
6074	D6595	1427		1.15	
6183		-----		-----	
6197		1369		0.44	
6225		-----		-----	

lab	method	value	mark	z(targ)	remarks
6230		-----		-----	
6248		-----		-----	
6253		-----		-----	
9101		-----		-----	
9142		-----		-----	
9143		-----		-----	

normality	suspect
n	51
outliers	1
mean (n)	1333.34
st.dev. (n)	84.379
R(calc.)	236.26
st.dev.(D5185:18)	81.162
R(D5185:18)	227.25





APPENDIX 2

Number of participants per country

1 lab in AUSTRALIA
1 lab in AUSTRIA
2 labs in AZERBAIJAN
4 labs in BELGIUM
1 lab in BOSNIA and HERZEGOVINA
1 lab in BRUNEI
2 labs in BULGARIA
3 labs in CHINA, People's Republic
1 lab in CROATIA
1 lab in CZECH REPUBLIC
1 lab in EGYPT
2 labs in FRANCE
2 labs in GERMANY
1 lab in GREECE
2 labs in INDIA
1 lab in ITALY
3 labs in JORDAN
1 lab in KAZAKHSTAN
1 lab in KENYA
1 lab in LEBANON
1 lab in MACEDONIA
1 lab in MALAYSIA
3 labs in MOROCCO
2 labs in NETHERLANDS
4 labs in NIGERIA
1 lab in PAKISTAN
1 lab in PERU
2 labs in PHILIPPINES
1 lab in POLAND
1 lab in PORTUGAL
1 lab in ROMANIA
2 labs in RUSSIAN FEDERATION
3 labs in SAUDI ARABIA
2 labs in SERBIA
2 labs in SINGAPORE
1 lab in SLOVENIA
2 labs in SOUTH KOREA
3 labs in SPAIN
1 lab in SWEDEN
2 labs in TANZANIA
1 lab in THAILAND
1 lab in TUNISIA
2 labs in TURKEY
1 lab in UNITED ARAB EMIRATES
3 labs in UNITED KINGDOM
2 labs in UNITED STATES OF AMERICA
2 labs in VIETNAM

APPENDIX 3

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
ex	= test result excluded from the statistical evaluation
W	= test result withdrawn on request of participant
fr.	= first reported
n.a.	= not applicable
n.e.	= not evaluated
SDS	= Safety Data Sheet

Literature:

1 iis Interlaboratory Studies, Protocol for the Organization, Statistics and Evaluation, June 2018
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3 ASTM E1301:89
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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
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12 J.N. Miller, Analyst, 118, 455, (1993)
13 Analytical Methods Committee Technical brief, No 4, January 2001.
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15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)