Institute for
Interlaboratory Studies

Results of Proficiency Test
Engine Oil (fresh)
May 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: ing. R.J. Starink
Correctors: ing. G.A. Oosterlaken-Buijs & ing. M. Meijer
Approved by: ing. A.S. Noordman-de Neef

Report: iis22L07

August 2022

CONTENTS

1 INTRODUCTION

Since 1997 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of fresh Engine Oil (Lubricating Oil) based on the latest version of SAE and ASTM D4485 every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Engine Oil (fresh).

In this interlaboratory study 84 laboratories in 43 countries registered for participation, see appendix 2 for the number of participants per country. In this report the results of the 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 one 1 L bottle and one 0.5 L bottle with the same Engine Oil (fresh) both labelled #22085 for the regular analyzes and one separate 0.5 L bottle with Engine Oil (fresh) labelled #22084 for Foam Characteristics only.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/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 of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of 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

For the preparation of the sample for the regular analyzes in Engine Oil (fresh) a batch of approximately 160 liters Engine Oil (fresh) was obtained from a third party. After homogenization 100 amber glass bottles of 1 L and 100 amber glass bottles of 0.5 L were filled and labelled #22085.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/L
sample #22085-1	0.85355
sample #22085-2	0.85356
sample #22085-3	0.85356
sample #22085-4	0.85356
sample #22085-5	0.85355
sample #22085-6	0.85355
sample #22085-7	0.85355
sample #22085-8	0.85355

Table 1: homogeneity test results of subsamples #22085

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

	Density at 15 °C in kg/L
r (observed)	0.00001
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 2: evaluation of the repeatability of subsamples #22085

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

For the preparation of the sample for the analyzes of Foam Characteristics a batch of approximately 65 liters Engine Oil (fresh) was obtained from a third party. After homogenization 100 amber glass bottles of 0.5 L were filled and labelled #22084.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/L
sample #22084-1	0.86752
sample #22084-2	0.86750
sample #22084-3	0.86751
sample #22084-4	0.86751
sample #22084-5	0.86752
sample #22084-6	0.86752
sample #22084-7	0.86752
sample #22084-8	0.86751

Table 3: homogeneity test results of subsamples #22084

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

	Density at 15 °C in kg/L
r (observed)	0.00002
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 4: evaluation of the repeatability of subsamples #22084

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

To each of the participating laboratories a set of a 1 L and a 0.5 L bottle of Engine Oil (fresh) labelled #22085 and one 0.5 L bottle of Engine Oil (fresh) labelled #22084 was sent on April 27, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Engine Oil (fresh) packed in amber glass bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on sample #22085: Total Acid Number, Base Number ($HClO_4$ titration), Color ASTM, Conradson Carbon Residue, Ramsbottom Carbon Residue, Carbon Residue (Micro method), Density at 15 °C, Evaporation loss by Noack, Flash Point C.O.C., Flash Point PMcc, Kinematic Viscosity (40 °C and 100 °C), Viscosity Index, Kinematic Viscosity Stabinger (40 °C and 100 °C), Viscosity Apparent (CCS) at -25 °C, Viscosity HTHS, Nitrogen, Pour Point (Manual and Automated), Sulfated Ash, Sulfur, Water, Calcium, Phosphorus and Zinc.
On sample #22084 it was requested to determine Foam Characteristics only.
Some additional questions were asked about Total Acid Number 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 (when applicable) 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 the original test 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 for proficiency testing in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as ‘<…’ or ‘>…’ were not used in the statistical evaluation.

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

The assigned value is determined by consensus based on the test results of the group of participants after rejection of the statistical outliers and/or suspect data.

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. 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 test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

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 (derived from e.g. ISO or ASTM test methods), the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Seven participants reported test results after the final reporting date and eleven other participants were not able to report any test results. Not all participants were able to report all tests requested.
In total 73 participants reported 1065 numerical test results. Observed were 29 outlying test results, which is 2.7%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

Not all 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 were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 3.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D189) and an added designation for the year that the test method was adopted or revised (e.g. D189:06). When a method has been reapproved an “R” will be added and the year of approval (e.g. D189:06R19).

sample #22084

Foaming Tendency: This determination was very problematic. No statistical outliers were observed over the three sequences. It was decided not to calculate z-scores for the three sequences due to the large difference between the calculated and reference reproducibility.

Foam Stability: This determination was not problematic. Almost all reporting participants agreed on a test result of 0 (Nil). Therefore, no z-scores are calculated.

sample #22085

Total Acid Number: 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 D664-A:18e2 Inflection Point 60 mL nor with Inflection Point 125 mL and Buffer End Point 125 mL but is in agreement with Buffer End Point 60 mL.
When evaluated separately for the type of end point the calculated reproducibility of the group using Inflection Point is still not in agreement with the requirements of D664-A:18e2 at both titration volumes. For the group using BEP only BEP 60 mL is in agreement with the requirements.

Base Number ($HClO_4$ titration): This determination was problematic for a number of laboratories. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D2896-A:21, forward mode.

Color ASTM: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D1500:12R17.

Conradson Carbon Residue: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D189:06R19.

Ramsbottom Carbon Residue: Only three participants reported a test result. Therefore, no -z-scores are calculated.

Carbon Residue (Micro method): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D4530:15R20.

Density at 15 °C: This determination was problematic for a number of laboratories. Six statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO12185:96.

Evaporation loss by Noack: 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 D5800:21 procedure B and A.

Flash Point C.O.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 D92:18.

Flash Point PMcc: 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 D93-A:20.

Kinematic Viscosity at 40 °C: 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 D445:21e1.

Kinematic Viscosity at 100 °C: 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 D445:21e1.

Viscosity Index: This determination was problematic. One statistical outlier was observed and one other test result was excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D2270:10R16.

Kinematic Viscosity Stabinger at 40 °C: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D7042:21a.

Kinematic Viscosity Stabinger at 100 °C: 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 ASTM D7042:21a.

Viscosity Apparent (CCS) at -25 °C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements ASTM D5293:20.

Viscosity HTHS: Only three participants reported a test result. Therefore, no -z-scores are calculated.

Nitrogen: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D5762:18a.

Pour Point Manual: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D97:17b.

Pour Point Automated: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D5950:14R20.

Sulfated Ash: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D874:13aR18.

Sulfur: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D4294:21.

Water: This determination was problematic. Seven statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with ASTM D6304:20 procedure B, A and C.

Calcium: 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.

Phosphorus: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D5185:18.

Zinc: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not 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 reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from reference methods are presented in the next tables.

Parameter	unit	n	average	2.8 * sd	R(lit)
Foaming Tendency, Sequence I	mL	33	3.3	13.4	(2.8)
Foaming Tendency, Sequence II	mL	34	30.5	65.3	(25.4)
Foaming Tendency, Sequence III	mL	32	2.8	12.2	(5.4)
Foam Stability, Sequence I	mL	33	0	n.e.	n.e.
Foam Stability, Sequence II	mL	33	0	n.e.	n.e.
Foam Stability, Sequence III	mL	32	0	n.e.	n.e.

Table 5: reproducibilities of tests on sample #22084

For results between brackets no z-scores were calculated

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Acid Number	mg KOH/g	42	3.37	1.64	1.09
Base Number ($HClO_4$ titration)	mg KOH/g	35	10.74	0.80	0.75
Color ASTM		50	2.4	0.7	1
Conradson Carbon Residue	%M/M	16	1.17	0.28	0.27
Ramsbottom Carbon Residue	%M/M	3	n.e.	n.e.	n.e.
Carbon Residue (Micro method)	%M/M	24	1.18	0.20	0.20
Density at 15 °C	kg/L	55	0.8536	0.0004	0.0005
Evaporation loss by Noack	%M/M	15	8.0	0.9	1.1
Flash Point C.O.C.	°C	52	236	18	18
Flash Point PMcc	°C	46	204	11	14
Kinematic Viscosity at 40 °C	mm^2/s	58	155.80	1.55	1.90
Kinematic Viscosity at 100 °C	mm^2/s	60	23.719	0.273	0.327
Viscosity Index		54	183.7	2.4	2
Kin. Viscosity Stabinger at 40 °C	mm^2/s	26	156.35	2.18	1.81
Kin. Viscosity Stabinger at 100 °C	mm^2/s	25	23.783	0.260	0.200
Viscosity Apparent (CCS) at -25 °C	mPa·s	21	6365	378	465
Viscosity HTHS	mPa·s	3	n.e.	n.e.	n.e.
Nitrogen	mg/kg	12	853	286	227
Pour Point Manual	°C	32	-36.8	15.9	9
Pour Point Automated 1 °C interval	°C	17	-42.7	6.2	4.5
Sulfated Ash	%M/M	36	1.245	0.218	0.167
Sulfur	mg/kg	42	2882	618	326
Water	mg/kg	37	170	233	192
Calcium as Ca	mg/kg	43	2880	444	471
Phosphorus as P	mg/kg	44	1174	195	147

Parameter	unit	n	average	2.8 * sd	R(lit)
Zinc as Zn	mg/kg	45	1268	285	215

Table 6: reproducibilities of tests on sample #22085

For results between brackets no z-scores were calculated

Without further statistical calculations it can be concluded that for several 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 MAY 2022 WITH PREVIOUS PTS

	May 2022	June 2021	June 2020	June 2019	June 2018
Number of reporting laboratories	73	76	62	75	81
Number of test results	1065	1156	961	1157	1337
Number of statistical outliers	29	36	34	49	37
Percentage of statistical outliers	2.7%	3.1%	3.5%	4.2%	2.8%

Table 7: 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 to the requirements of the reference test methods. The conclusions are given in the following table.

Parameter	May 2022	June 2021	June 2020	June 2019	June 2018
Total Acid Number	-	-	--	--	-
Base Number ($HClO_4$ titration)	+/-	+/-	+	+	-
Color ASTM	+	+	+	+	+
Conradson Carbon Residue	+/-	+	+	+	+/-
Ramsbottom Carbon Residue	n.e.	-	n.e.	(--)	+
Carbon Residue (Micro method)	+/-	+	+	-	+
Density at 15 °C	+	+/-	+	+/-	+/-
Evaporation loss by Noack	+	-	+	--	-
Flash Point C.O.C.	+/-	-	+/-	+/-	+
Flash Point PMcc	+	++	+	+	+
Foaming Tendency	(--)	-	-	+/-	+/-
Kinematic Viscosity at 40 °C	+	-	+	+	+
Kinematic Viscosity at 100 °C	+	+	+	+/-	+
Viscosity Index	-	+/-	-	-	+/-
Kin. Viscosity Stabinger at 40 °C	-	-	+/-	+/-	+/-
Kin. Viscosity Stabinger at 100 °C	-	+	+	+/-	-
Viscosity Apparent CCS	+	n.e.	+	+	-
Viscosity HTHS	n.e.	-	-	+/-	+
Nitrogen	-	-	-	--	-

Parameter	May 2022	June 2021	June 2020	June 2019	June 2018
Pour Point Manual	-	+	+/-	+	+/-
Pour Point Automated 1 °C interval	-	-	--	+	+/-
Sulfated Ash	-	-	+/-	-	-
Sulfur	--	-	+-	(--)	-
Water	-	(--)	+	+	+
Calcium as Ca	+	-	-	+	-
Phosphorus as P	-	-	-	-	-
Zinc as Zn	-	-	+	+/-	+/-

Table 8: comparison of determinations to the reference test methods

For results between brackets no z-scores were calculated

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

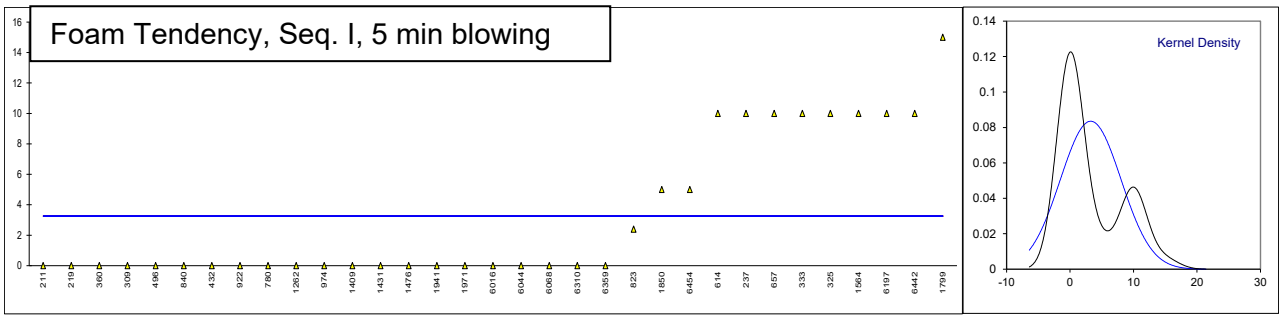
APPENDIX 1

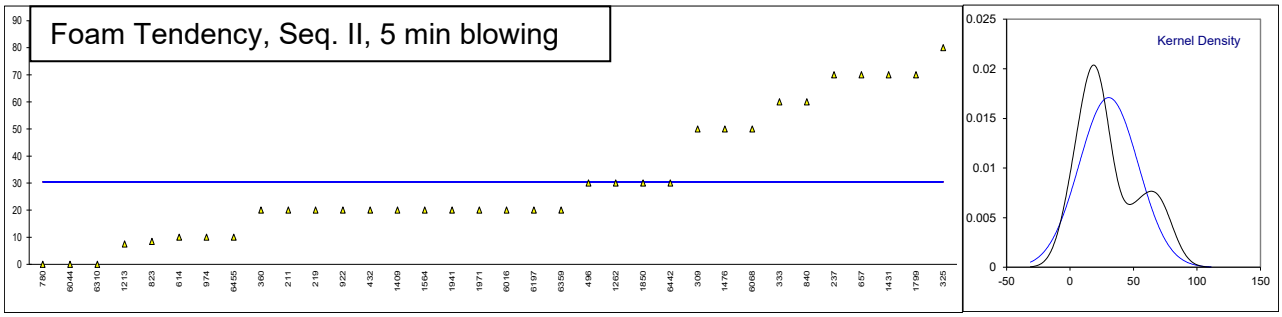
Determination of Foaming Tendency, 5 min blowing period on sample #22084; results in mL

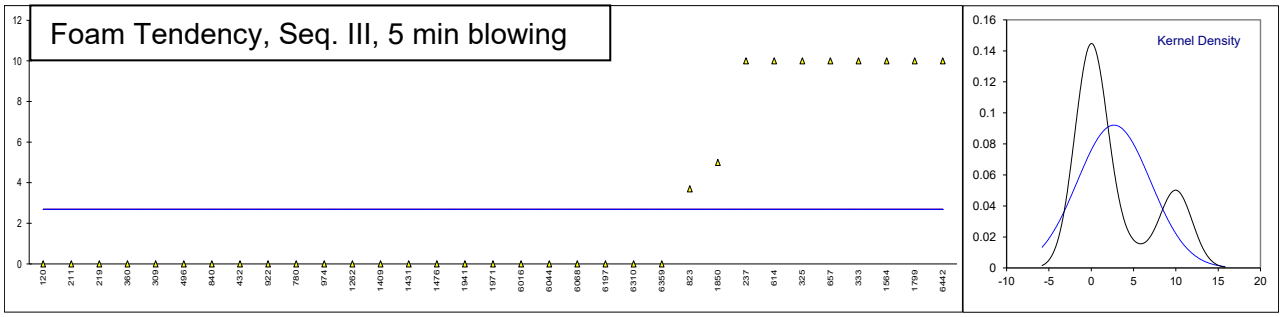
lab	method	sample used	diffuser	Seq I	mark	z(targ)	Seq II	mark	z(targ)	Seq III	mark	z(targ)
120		---	---	-----		-----	-----		-----	-----		-----
178		---	---	-----		-----	-----		-----	-----		-----
179		---	---	-----		-----	-----		-----	-----		-----
211	D892	As received	Stone	0		-----	20		-----	0		-----
219	D892	As received	---	0		-----	20		-----	0		-----
237	D892	Other	Metal	10		-----	70		-----	10		-----
254		---	---	-----		-----	-----		-----	-----		-----
256		---	---	-----		-----	-----		-----	-----		-----
257		---	---	-----		-----	-----		-----	-----		-----
309	D892	As received	Metal	0		-----	50		-----	0		-----
325	D892	As received	Metal	10		-----	80	C	-----	10		-----
329		---	---	-----		-----	-----		-----	-----		-----
333	D892	As received	Metal	10		-----	60		-----	10		-----
339		---	---	-----		-----	-----		-----	-----		-----
349		---	---	-----		-----	-----		-----	-----		-----
360	D892 (Alternative)	---	---	0		-----	20		-----	0		-----
398		---	---	-----		-----	-----		-----	-----		-----
421		---	---	-----		-----	-----		-----	-----		-----
432	D892	As received	Stone	0		-----	20		-----	0		-----
496	D892	After agitation	Metal	0		-----	30		-----	0		-----
614	IP146 (Alternative)	As received	Metal	10		-----	10		-----	10		-----
633		---	---	-----		-----	-----		-----	-----		-----
634		---	---	-----		-----	-----		-----	-----		-----
657	D892	Other	---	10		-----	70		-----	10		-----
780	D892	As received	Stone	0		-----	0		-----	0		-----
823	D892	As received	Stone	2.4		-----	8.4		-----	3.7		-----
840	D892	As received	Metal	0		-----	60		-----	0		-----
862		---	---	-----		-----	-----		-----	-----		-----
875		---	---	-----		-----	-----		-----	-----		-----
912		---	---	-----		-----	-----		-----	-----		-----
922	D892	As received	Stone	0		-----	20		-----	0		-----
962		---	---	-----		-----	-----		-----	-----		-----
963		---	---	-----		-----	-----		-----	-----		-----
974	D892	As received	Metal	0		-----	10		-----	0		-----
994		---	---	-----		-----	-----		-----	-----		-----
1017		---	---	-----		-----	-----		-----	-----		-----
1059		---	---	-----		-----	-----		-----	-----		-----
1091		---	---	-----		-----	-----		-----	-----		-----
1146		---	---	-----		-----	-----		-----	-----		-----
1173		---	---	-----		-----	-----		-----	-----		-----
1213	D892	---	---	-----		-----	7.5		-----	-----		-----
1235		---	---	-----		-----	-----		-----	-----		-----
1262	D892	As received	Stone	0		-----	30		-----	0		-----
1316		---	---	-----		-----	-----		-----	-----		-----
1326		---	---	-----		-----	-----		-----	-----		-----
1328		---	---	-----		-----	-----		-----	-----		-----
1409	ISO6247	As received	Metal	0		-----	20		-----	0		-----
1412		---	---	-----		-----	-----		-----	-----		-----
1431	D892	After agitation	Stone	0		-----	70		-----	0		-----
1438		---	---	-----		-----	-----		-----	-----		-----
1444		---	---	-----		-----	-----		-----	-----		-----
1460		---	---	-----		-----	-----		-----	-----		-----
1476	ISO6247	After agitation	Metal	0		-----	50		-----	0		-----
1557		---	---	-----		-----	-----		-----	-----		-----
1564	D892	As received	Metal	10		-----	20		-----	10		-----
1581		---	---	-----		-----	-----		-----	-----		-----
1720		---	---	-----		-----	-----		-----	-----		-----
1748		---	---	-----		-----	-----		-----	-----		-----
1761		---	---	-----		-----	-----		-----	-----		-----
1797		---	---	-----		-----	-----		-----	-----		-----
1799	D892	After agitation	Metal	15		-----	70		-----	10		-----
1850	ISO6247	As received	Stone	5		-----	30		-----	5		-----
1877		---	---	-----		-----	-----		-----	-----		-----
1941	ISO6247	As received	Metal	0		-----	20		-----	0		-----
1969		---	---	-----		-----	-----		-----	-----		-----
1971	ISO6247	As received	Metal	0		-----	20		-----	0		-----
3179		---	---	-----		-----	-----		-----	-----		-----
6016	D892	After agitation	Stone	0		-----	20		-----	0		-----
6032		---	---	-----		-----	-----		-----	-----		-----
6044	D892	---	---	0		-----	0		-----	0		-----
6068	ISO6247	After agitation	Metal	0		-----	50		-----	0		-----
6183		---	---	-----		-----	-----		-----	-----		-----
6197	D892	After agitation	Stone	10		-----	20		-----	0		-----
6257		---	---	-----		-----	-----		-----	-----		-----

lab	method	sample used	diffuser	Seq I	mark	z(targ)	Seq II	mark	z(targ)	Seq III	mark	z(targ)
6266		---	---	-----		-----	-----		-----	-----		-----
6302		---	---	-----		-----	-----		-----	-----		-----
6310	D892	After agitation	Metal	0		-----	0		-----	0		-----
6359	D892	As received	Metal	0		-----	20		-----	0		-----
6380		---	---	-----		-----	-----		-----	-----		-----
6442	D892	After agitation	Metal	10		-----	30		-----	10		-----
6454	ISO6247	---	---	5		-----	-----		-----	-----		-----
6455	D892	---	---	No Foam		-----	10		-----	No Foam		-----
6492		---	---	-----		-----	-----		-----	-----		-----
6493		---	---	-----		-----	-----		-----	-----		-----
	normality			suspect			OK			suspect		
	n			33			34			32		
	outliers			0			0			0		
	mean (n)			3.3			30.5			2.8		
	st.dev. (n)			4.78			23.33			4.37		
	R(calc.)			13.4			65.3			12.2		
	st.dev.(D892:18)			(1.02)			(9.08)			(1.94)		
	R(D892:18)			(2.8)			(25.4)			(5.4)		

Lab 325 first reported 90







Determination of Foam Stability, 10 min settling point on sample #22084; results in mL

lab	method	Seq I	mark	z(targ)	Seq II	mark	z(targ)	Seq III	mark	z(targ)
120		-----		-----	-----		-----	-----		-----
178		-----		-----	-----		-----	-----		-----
179		-----		-----	-----		-----	-----		-----
211		0		-----	0		-----	0		-----
219	D892	0		-----	0		-----	0		-----
237	D892	0		-----	0		-----	0		-----
254		-----		-----	-----		-----	-----		-----
256		-----		-----	-----		-----	-----		-----
257		-----		-----	-----		-----	-----		-----
309	D892	0		-----	0		-----	0		-----
325	D892	0		-----	0		-----	0		-----
329		-----		-----	-----		-----	-----		-----
333	D892	NUL		-----	NUL		-----	NUL		-----
339		-----		-----	-----		-----	-----		-----
349		-----		-----	-----		-----	-----		-----
360	D892 (Alternative)	0		-----	0		-----	0		-----
398		-----		-----	-----		-----	-----		-----
421		-----		-----	-----		-----	-----		-----
432	D892	0		-----	0		-----	0		-----
496	D892	0		-----	0		-----	0		-----
614	IP146 (Alternative)	0		-----	0		-----	0		-----
633		-----		-----	-----		-----	-----		-----
634		-----		-----	-----		-----	-----		-----
657	D892	0		-----	0		-----	0		-----
780	D892	0		-----	0		-----	0		-----
823	D892	0		-----	0		-----	0		-----
840	D892	0		-----	0		-----	0		-----
862		-----		-----	-----		-----	-----		-----
875		-----		-----	-----		-----	-----		-----
912		-----		-----	-----		-----	-----		-----
922	D892	0		-----	0		-----	0		-----
962		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
974	D892	0		-----	0		-----	0		-----
994		-----		-----	-----		-----	-----		-----
1017		-----		-----	-----		-----	-----		-----
1059		-----		-----	-----		-----	-----		-----
1091		-----		-----	-----		-----	-----		-----
1146		-----		-----	-----		-----	-----		-----
1173		-----		-----	-----		-----	-----		-----
1213	D892	-----		-----	0		-----	-----		-----
1235		-----		-----	-----		-----	-----		-----
1262	D892	0		-----	0		-----	0		-----
1316		-----		-----	-----		-----	-----		-----
1326		-----		-----	-----		-----	-----		-----
1328		-----		-----	-----		-----	-----		-----
1409	ISO6247	0		-----	0		-----	0		-----
1412		-----		-----	-----		-----	-----		-----
1431	D892	0		-----	0		-----	0		-----
1438		-----		-----	-----		-----	-----		-----
1444		-----		-----	-----		-----	-----		-----
1460		-----		-----	-----		-----	-----		-----
1476	ISO6247	0		-----	0		-----	0		-----
1557		-----		-----	-----		-----	-----		-----
1564	D892	0		-----	0		-----	0		-----
1581		-----		-----	-----		-----	-----		-----
1720		-----		-----	-----		-----	-----		-----
1748		-----		-----	-----		-----	-----		-----
1761		-----		-----	-----		-----	-----		-----
1797		-----		-----	-----		-----	-----		-----
1799	D892	0		-----	0		-----	0		-----
1850	ISO6247	0		-----	0		-----	0		-----
1877		-----		-----	-----		-----	-----		-----
1941	ISO6247	0		-----	0		-----	0		-----
1969		-----		-----	-----		-----	-----		-----
1971	ISO6247	0		-----	0		-----	0		-----
3179		-----		-----	-----		-----	-----		-----
6016	D892	0		-----	0		-----	0		-----
6032		-----		-----	-----		-----	-----		-----
6044	D892	0		-----	0		-----	0		-----
6068	ISO6247	0		-----	0		-----	0		-----
6183		-----		-----	-----		-----	-----		-----
6197	D892	0		-----	0		-----	0		-----
6257		-----		-----	-----		-----	-----		-----

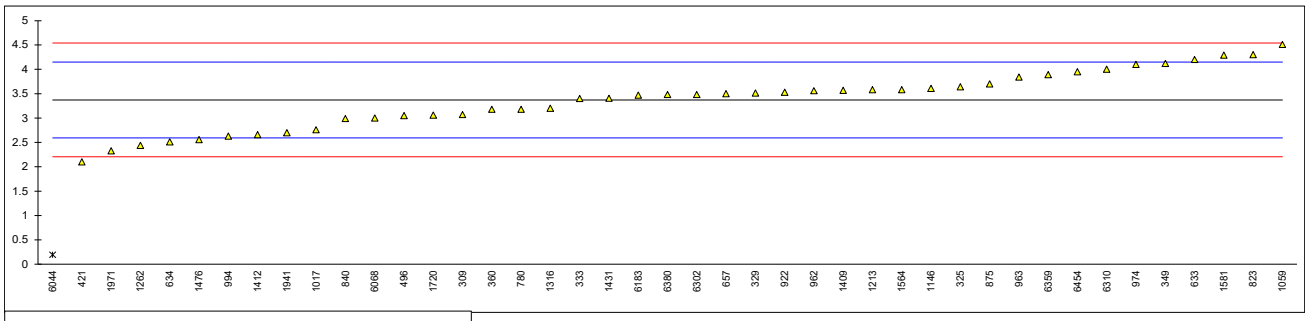
lab	method	Seq I	mark	z(targ)	Seq II	mark	z(targ)	Seq III	mark	z(targ)
6266		-----		-----	-----		-----	-----		-----
6302		-----		-----	-----		-----	-----		-----
6310	D892	0		-----	0		-----	0		-----
6359	D892	0		-----	0		-----	0		-----
6380		-----		-----	-----		-----	-----		-----
6442	D892	0		-----	0		-----	0		-----
6454	ISO6247	0		-----	-----		-----	-----		-----
6455	D892	No Foam		-----	No Foam		-----	No Foam		-----
6492		-----		-----	-----		-----	-----		-----
6493		-----		-----	-----		-----	-----		-----
	n	33			33			32		
	mean(n)	0			0			0		

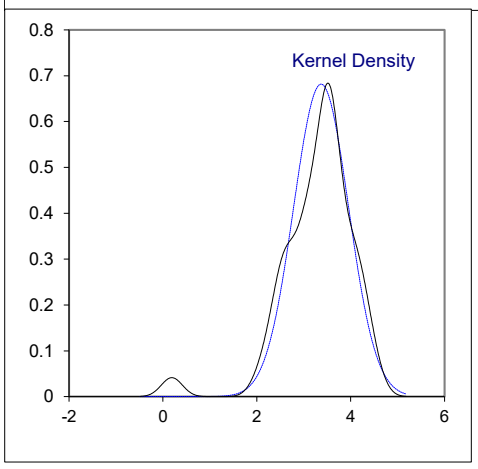
Determination of Total Acid Number on sample #22085; results in mg KOH/g

lab	method	value	mark	z(targ)	End point type	Titration volume	remarks
120		-----		-----	---	---	
178		-----		-----	---	---	
179		-----		-----	---	---	
211		-----		-----	---	---	
219		-----		-----	---	---	
237		-----		-----	---	---	
254		-----		-----	---	---	
256		-----		-----	---	---	
257		-----		-----	---	---	
309	D664-A	3.07		-0.78	---	---	
325	D664-A	3.64		0.69	125 mL	BEP pH 10	
329	D664-A	3.51		0.35	125 mL	BEP pH 10	
333	D664-A	3.4		0.07	125 mL	Inflection Point	
339		-----		-----	---	---	
349	D664-A	4.12		1.92	125 mL	BEP pH 10	
360	D664-A	3.178		-0.50	60 mL	Inflection Point	
398		-----		-----	---	---	
421	ISO6619	2.1		-3.27	---	---	
432		-----		-----	---	---	
496	D664-A	3.05		-0.83	60 mL	BEP pH 10	
614		-----		-----	---	---	
633	D664-A	4.20		2.13	125 mL	Inflection Point	
634	D974	2.51		-2.22	---	---	
657	D664-A	3.50		0.33	125 mL	Inflection Point	
780	D664-A	3.18		-0.49	60 mL	BEP pH 10	
823	D664-A	4.3		2.38	125 mL	Inflection Point	
840	D664-B	2.99		-0.98	60 mL	BEP pH 10	
862		-----		-----	---	---	
875	D664-A	3.7		0.84	---	---	
912		-----		-----	---	---	
922	D664-A	3.53		0.41	125 mL	Inflection Point	
962	D974	3.56		0.48	60 mL	Inflection Point	
963	D664-B	3.84		1.20	60 mL	Inflection Point	
974	D664-A	4.1		1.87	125 mL	Inflection Point	
994	D664-A	2.63		-1.91	60 mL	Inflection Point	
1017	D974	2.76		-1.57	---	---	
1059	ISO6619	4.51		2.92	60 mL	BEP pH 11	
1091		-----		-----	---	---	
1146	D664-A	3.607		0.60	---	---	
1173		-----		-----	---	---	
1213	D664-A	3.580		0.53	---	---	
1235		-----		-----	---	---	
1262	D974	2.44		-2.40	60 mL	Inflection Point	
1316	D664-A	3.20		-0.44	60 mL	BEP pH 10	
1326		-----		-----	---	---	
1328		-----		-----	---	---	
1409	D664-A	3.57		0.51	125 mL	BEP pH 11	
1412	D664-A	2.66		-1.83	---	---	
1431	D664-A	3.407		0.09	60 mL	Inflection Point	
1438		-----		-----	---	---	
1444		-----		-----	---	---	
1460		-----		-----	---	---	
1476	ISO6618	2.5565		-2.10	---	---	
1557		-----		-----	---	---	
1564	D664-A	3.58		0.53	60 mL	Inflection Point	
1581	D664-A	4.29		2.36	125 mL	BEP pH 10	
1720	D974	3.059		-0.80	---	---	
1748		-----		-----	---	---	
1761		-----		-----	---	---	
1797		-----		-----	---	---	
1799		-----		-----	---	---	
1850		-----		-----	---	---	
1877		-----		-----	---	---	
1941	ISO6619	2.70		-1.73	60 mL	Inflection Point	
1969		-----		-----	---	---	
1971	ISO6618	2.326		-2.69	---	---	
3179		-----		-----	---	---	
6016		-----		-----	---	---	
6032		-----		-----	---	---	
6044	D664-A	0.192	R(0.01)	-8.17	---	---	
6068	ISO6618	3.0		-0.96	---	---	
6183	D664-A	3.47		0.25	125 mL	Inflection Point	
6197		-----		-----	---	---	
6257		-----		-----	---	---	

lab	method	value	mark	z(targ)	End point type	Titration volume	remarks
6266		-----		-----	---	BEP pH 10	
6302	D664-A	3.482		0.28	125 mL	BEP pH 10	
6310	D664-A	4.0		1.61	---	---	
6359	D664-A	3.890		1.33	60 mL	BEP pH 10	
6380	D664-A	3.4804		0.28	60 mL	Inflection Point	
6442		-----		-----	---	---	
6454	D664-A	3.95		1.49	125 mL	Inflection Point	
6455		-----		-----	---	---	
6492		-----		-----	---	---	
6493		-----		-----	---	---	

			Inflection Point only	Buffer End Point only
	normality	OK	OK	OK
	n	42	17	12
	outliers	1	0	0
	mean (n)	3.3720	3.4862	3.6193
	st.dev. (n)	0.58508	0.52796	0.49449
	R(calc.)	1.6382	1.4783	1.3846
	st.dev.(D664-A:18e2, IP 60mL)	0.38914	0.39991	---
	R(D664-A:18e2, IP 60mL)	1.0896	1.1197	---
Compare				
	R(D664-A:18e2, IP 125mL)	0.7775	0.8050	
	R(D664-A:18e2, BEP 60mL)	1.8146	---	1.9444
	R(D664-A:18e2, BEP 125mL)	1.1341	---	1.2217



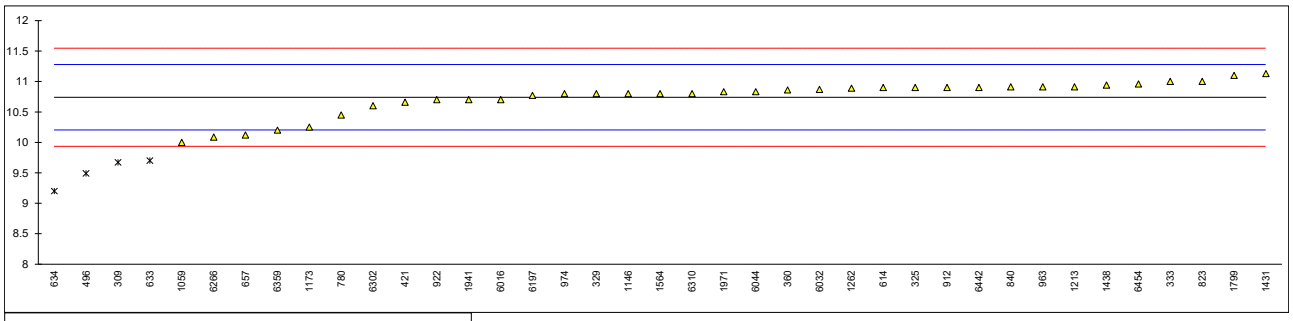


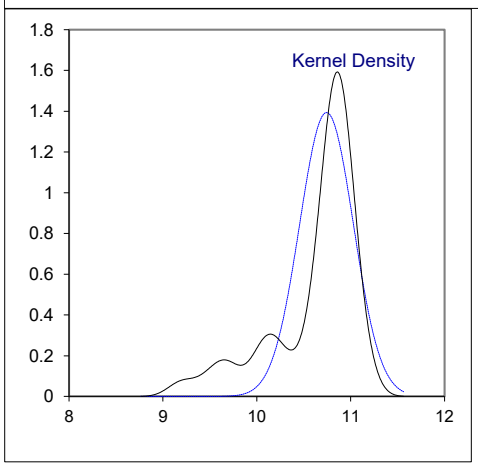
Determination of Base Number ($HClO_4$ titration) on sample #22085; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D2896-A forward	9.67	C,R(0.05)	-3.99	First reported 9.14
325	D2896-B forward	10.9		0.59	
329	D2896-B forward	10.8		0.22	
333	D4739	11		0.96	
339		-----		-----	
349		-----		-----	
360	D2896-B forward	10.86		0.44	
398		-----		-----	
421	ISO3771	10.66	C	-0.31	First reported 9.7
432		-----		-----	
496	D2896-B back	9.49	R(0.05)	-4.66	
614	D2896-A forward	10.9		0.59	
633	D2896-A forward	9.7	C,R(0.05)	-3.88	First reported 9.63
634	D2896-A forward	9.2	C,R(0.05)	-5.74	First reported 9.4
657	D2896-B forward	10.12		-2.32	
780	D2896-B forward	10.45		-1.09	
823	D2896-A back	11.0		0.96	
840	D2896-B forward	10.91		0.62	
862		-----		-----	
875		-----		-----	
912	D2896	10.9		0.59	
922	D2896-B forward	10.7		-0.16	
962		-----		-----	
963	D2896-A back	10.91		0.62	
974	D2896-A forward	10.8		0.22	
994		-----		-----	
1017		-----		-----	
1059	ISO3771	10.0		-2.76	
1091		-----		-----	
1146	D2896-A forward	10.8		0.22	
1173	In house	10.25		-1.83	
1213	D2896-B forward	10.910		0.62	
1235		-----		-----	
1262	D2896-B back	10.89		0.55	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431	D2896-B forward	11.1273		1.43	
1438	D2896-A forward	10.94		0.74	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564	D2896-B forward	10.8	C	0.22	First reported 12.0
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799	D2896-B back	11.1		1.33	
1850		-----		-----	
1877		-----		-----	
1941	ISO3771	10.7	C	-0.16	First reported 9.7
1969		-----		-----	
1971	ISO3771	10.83		0.33	
3179		-----		-----	
6016	D2896-B forward	10.70		-0.16	
6032	D2896-B forward	10.87		0.48	
6044	D2896-A back	10.83		0.33	
6068		-----		-----	
6183		-----		-----	
6197	D2896-B forward	10.77		0.10	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266	D2896-B back	10.087		-2.44	
6302	D2896-B forward	10.602		-0.52	
6310	D2896-B forward	10.8		0.22	
6359	D2896-B forward	10.2		-2.02	
6380		-----		-----	
6442	D2896-A back	10.9	C	0.59	First reported 0.63
6454	D2896-A forward	10.96		0.81	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	suspect
n	35
outliers	4
mean (n)	10.742
st.dev. (n)	0.2862
R(calc.)	0.801
st.dev.(D2896-A:21 forward)	0.2686
R(D2896-A:21 forward)	0.752





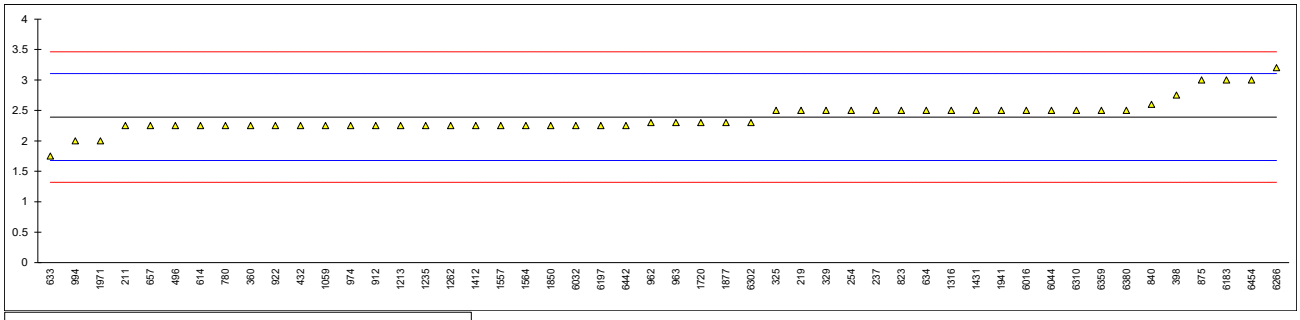
Determination of Color ASTM on sample #22085

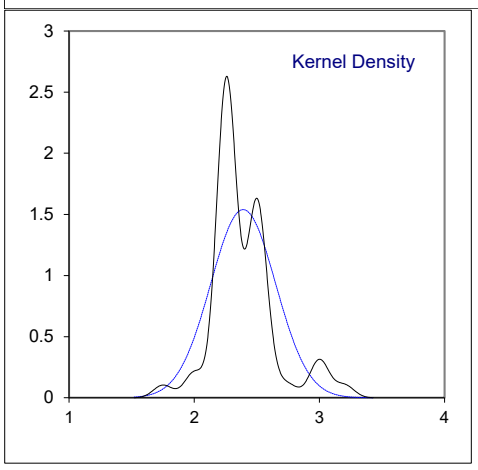
lab	method	value	iis conversion *)	mark	z(targ)	remarks
120		-----	-----		-----	
178		-----	-----		-----	
179		-----	-----		-----	
211	D1500	L2.5	2.25		-0.39	
219	D1500	2.5	2.5		0.31	
237	D1500	2.5	2.5		0.31	
254	D1500	2.5	2.5		0.31	
256		-----	-----		-----	
257		-----	-----		-----	
309		-----	-----		-----	
325	D6045	2.5	2.5		0.31	
329	D1500	2.5	2.5		0.31	
333		-----	-----		-----	
339		-----	-----		-----	
349		-----	-----		-----	
360	D1500	L2.5	2.25		-0.39	
398	D1500	L3,0	2.75		1.01	
421		-----	-----		-----	
432	D1500	L2,5	2.25		-0.39	
496	D1500	2.25	2.25		-0.39	
614	D1500	<2.5	2.25		-0.39	
633	D1500	L2.0	1.75		-1.79	
634	D1500	2.5	2.5		0.31	
657	D1500	L2.5	2.25		-0.39	
780	D1500	L2.5	2.25		-0.39	
823	D1500	2.5	2.5		0.31	
840	D6045	2.6	2.6		0.59	
862		-----	-----		-----	
875	D6045	3.0	3.0		1.71	
912	D1500	<2.5	2.25		-0.39	
922	D1500	L2.5	2.25		-0.39	
962	D1500	2.3	2.3		-0.25	
963	D1500	2.3	2.3		-0.25	
974	D1500	L2.5	2.25		-0.39	
994	D1500	2.0	2.0		-1.09	
1017		-----	-----		-----	
1059	D1500	L2,5	2.25		-0.39	
1091		-----	-----		-----	
1146		-----	-----		-----	
1173		-----	-----		-----	
1213	D1500	L2.5	2.25		-0.39	
1235	ISO2049	L2,5	2.25		-0.39	
1262	D1500	L 2.5	2.25		-0.39	
1316	D1500	2.5	2.5		0.31	
1326		-----	-----		-----	
1328		-----	-----		-----	
1409		-----	-----		-----	
1412	D1500	L2.5	2.25		-0.39	
1431	D1500	2.5	2.5		0.31	
1438		-----	-----		-----	
1444		-----	-----		-----	
1460		-----	-----		-----	
1476		-----	-----		-----	
1557	ISO2049	L2.5	2.25		-0.39	
1564	D1500	L2.5	2.25		-0.39	
1581		-----	-----		-----	
1720	D1500	2.3	2.3		-0.25	
1748		-----	-----		-----	
1761		-----	-----		-----	
1797		-----	-----		-----	
1799		-----	-----		-----	
1850	ISO2049	L2,5	2.25		-0.39	
1877	D6045	2.3	2.3		-0.25	
1941	ISO2049	2.5	2.5		0.31	
1969		-----	-----		-----	
1971	D1500	2.0	2.0		-1.09	
3179		-----	-----		-----	
6016	D1500	2.5	2.5		0.31	
6032	D1500	2.25	2.25		-0.39	
6044	D1500	2.5	2.5		0.31	
6068		-----	-----		-----	
6183	D6045	3.00	3.00		1.71	
6197	D1500	L2.5	2.25		-0.39	
6257		-----	-----		-----	

lab	method	value	iis conversion *)	mark	z(targ)	remarks
6266	D1500	3.2	3.2		2.27	
6302	D6045	2.3	2.3		-0.25	
6310	D1500	2.5	2.5		0.31	
6359	D1500	2.5	2.5		0.31	
6380	D1500	2.5	2.5		0.31	
6442	D6045	L2.5	2.25		-0.39	
6454	D6045	3	3		1.71	
6455		-----	-----		-----	
6492		-----	-----		-----	
6493		-----	-----		-----	

normality	not OK
n	50
outliers	0
mean (n)	2.39
st.dev. (n)	0.259
R(calc.)	0.73
st.dev.(D1500:12R17)	0.357
R(D1500:12R17)	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 L3.5 into 3.25)



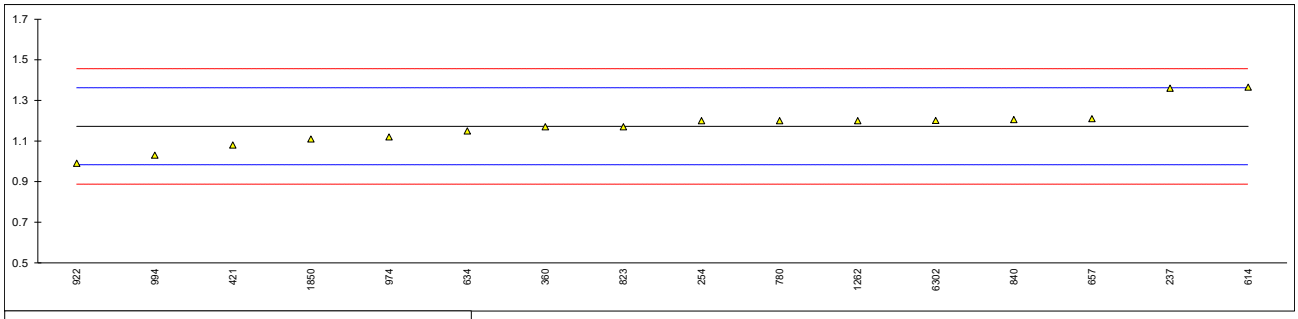


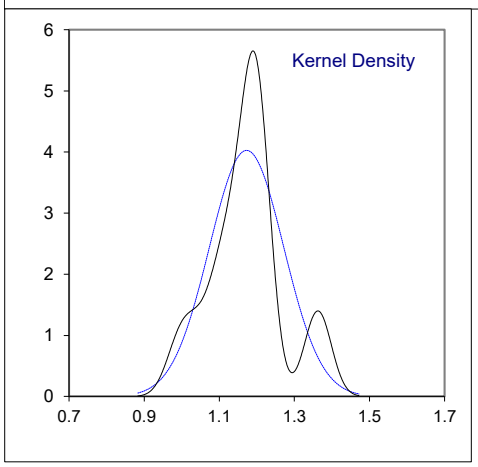
Determination of Conradson Carbon Residue on sample #22085; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D189	1.36		1.98	
254	D189	1.2		0.29	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	ISO6615	1.17		-0.03	
398		-----		-----	
421	ISO6615	1.08		-0.98	
432		-----		-----	
496		-----		-----	
614	D189	1.365		2.03	
633		-----		-----	
634	D189	1.15		-0.24	
657	D189	1.21		0.39	
780	D189	1.20		0.29	
823	D189	1.17		-0.03	
840	D189	1.206		0.35	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922	D189	0.99		-1.93	
962		-----		-----	
963		-----		-----	
974	D189	1.12		-0.56	
994	D189	1.03		-1.50	
1017		-----		-----	
1059		-----		-----	
1091		-----		-----	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D189	1.20		0.29	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564		-----		-----	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	D189	1.11		-0.66	
1877		-----		-----	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044		-----		-----	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D189	1.201		0.30	
6310		-----		-----	
6359		-----		-----	
6380		-----		-----	
6442		-----		-----	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	16
outliers	0
mean (n)	1.173
st.dev. (n)	0.0991
R(calc.)	0.277
st.dev.(D189:06R19)	0.0948
R(D189:06R19)	0.265





Determination of Ramsbottom Carbon Residue on sample #22085; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D524	0.678		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D524	1.03		-----	
994		-----		-----	
1017		-----		-----	
1059		-----		-----	
1091		-----		-----	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262		-----		-----	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564		-----		-----	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850		-----		-----	
1877		-----		-----	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044		-----		-----	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

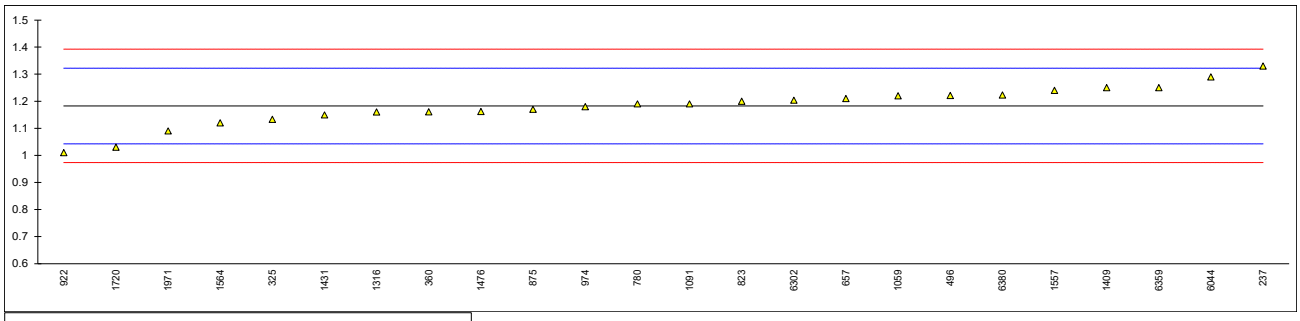
lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302		-----		-----	
6310		-----		-----	
6359		-----		-----	
6380		-----		-----	
6442	D524	1.14		-----	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	
	n	3			

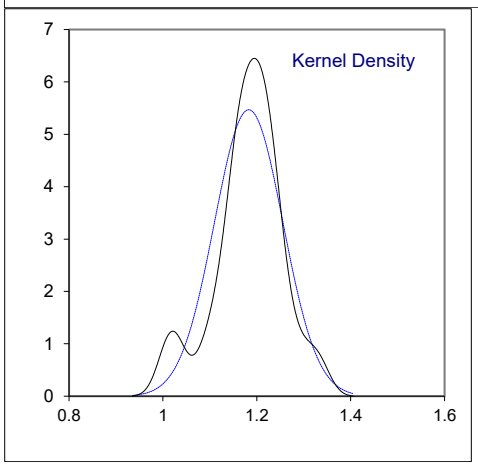
Determination of Carbon Residue (Micro method) on sample #22085; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D4530	1.33		2.11	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325	D4530	1.133		-0.71	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	ISO10370	1.161		-0.31	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496	D4530	1.221		0.55	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D4530	1.21		0.39	
780	D4530	1.19		0.11	
823	ISO10370	1.20		0.25	
840		-----		-----	
862		-----		-----	
875	D4530	1.17		-0.18	
912		-----		-----	
922	D4530	1.01		-2.47	
962		-----		-----	
963		-----		-----	
974	D4530	1.18		-0.04	
994		-----		-----	
1017		-----		-----	
1059	ISO10370	1.22		0.53	
1091	D4530	1.19		0.11	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262		-----		-----	
1316	D4530	1.16		-0.32	
1326		-----		-----	
1328		-----		-----	
1409	ISO10370	1.25		0.96	
1412		-----		-----	
1431	D4530	1.149645		-0.47	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO10370	1.162		-0.30	
1557	ISO10370	1.24		0.82	
1564	D4530	1.12		-0.90	
1581		-----		-----	
1720	D4530	1.03		-2.18	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850		-----		-----	
1877		-----		-----	
1941		-----		-----	
1969		-----		-----	
1971	ISO10370	1.09		-1.33	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044	D4530	1.29		1.54	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D4530	1.204		0.31	
6310		-----		-----	
6359	D4530	1.25		0.96	
6380	D4530	1.2230		0.58	
6442		-----		-----	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	24
outliers	0
mean (n)	1.183
st.dev. (n)	0.0730
R(calc.)	0.204
st.dev.(D4530:15R20)	0.0699
R(D4530:15R20)	0.196



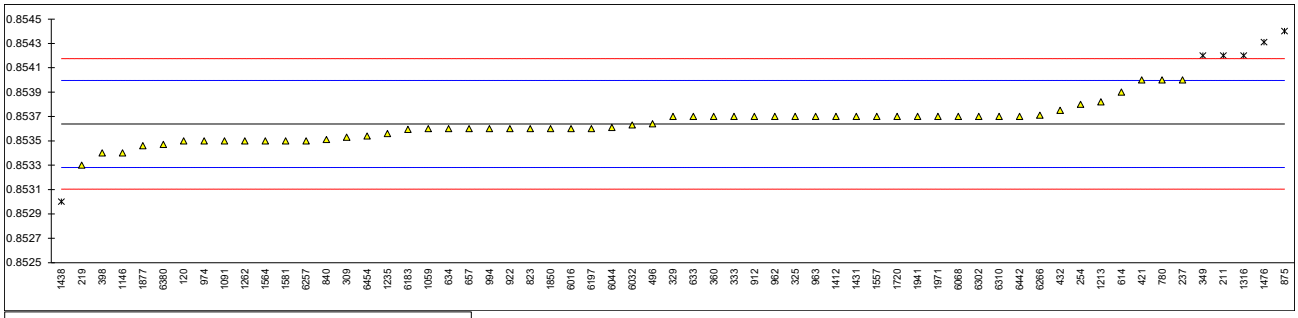


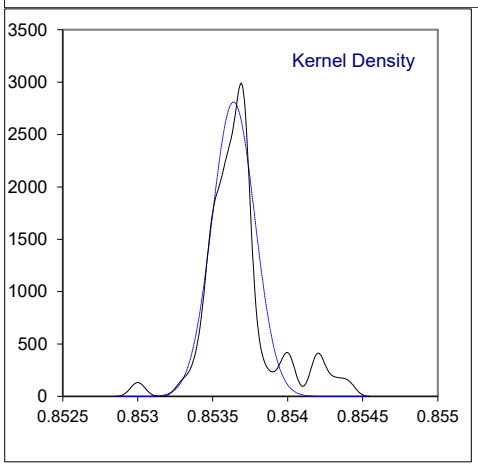
Determination of Density at 15 °C on sample #22085; results in kg/L

lab	method	value	mark	z(targ)	remarks
120	D4052	0.8535		-0.78	
178		-----		-----	
179		-----		-----	
211	D4052	0.8542	R(0.05)	3.14	
219	D1298	0.8533		-1.90	
237	D4052	0.8540		2.02	
254	D4052	0.8538		0.90	
256		-----		-----	
257		-----		-----	
309	D4052	0.85353		-0.61	
325	D4052	0.8537		0.34	
329	D4052	0.8537		0.34	
333	D4052	0.8537		0.34	
339		-----		-----	
349	D4052	0.8542	R(0.05)	3.14	
360	D4052	0.8537		0.34	
398	ISO12185	0.8534		-1.34	
421	ISO12185	0.8540	C	2.02	First reported 867.8 kg/m3
432	D4052	0.85375		0.62	
496	ISO12185	0.85364		0.01	
614	D4052	0.8539		1.46	
633	D4052	0.8537		0.34	
634	D4052	0.8536		-0.22	
657	D4052	0.8536		-0.22	
780	ISO12185	0.8540		2.02	
823	D4052	0.8536		-0.22	
840	D4052	0.85351		-0.72	
862		-----		-----	
875	ISO12185	0.8544	R(0.05)	4.26	
912	ISO12185	0.8537		0.34	
922	D4052	0.8536		-0.22	
962	D4052	0.8537		0.34	
963	D4052	0.8537		0.34	
974	D4052	0.8535		-0.78	
994	ISO12185	0.8536		-0.22	
1017		-----		-----	
1059	ISO12185	0.8536		-0.22	
1091	D4052	0.8535		-0.78	
1146	D4052	0.8534		-1.34	
1173		-----		-----	
1213	D4052	0.85382		1.02	
1235	ISO12185	0.85356		-0.44	
1262	ISO12185	0.8535		-0.78	
1316	D4052	0.8542	R(0.05)	3.14	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D4052	0.8537		0.34	
1431	D4052	0.8537		0.34	
1438	D1298	0.853	R(0.05)	-3.58	
1444		-----		-----	
1460		-----		-----	
1476	ISO12185	0.85431	R(0.05)	3.76	
1557	ISO3675	0.8537	C	0.34	First reported 853.3 kg/m3
1564	D4052	0.8535		-0.78	
1581	D7042	0.8535		-0.78	
1720	D4052	0.8537		0.34	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	D4052	0.8536		-0.22	
1877	D4052	0.85346		-1.00	
1941	D4052	0.8537		0.34	
1969		-----		-----	
1971	ISO12185	0.8537		0.34	
3179		-----		-----	
6016	D4052	0.8536		-0.22	
6032	D4052	0.85363		-0.05	
6044	D4052	0.85361		-0.16	
6068	ISO12185	0.8537		0.34	
6183	D4052	0.853594		-0.25	
6197	D4052	0.8536		-0.22	
6257	ISO12185	0.8535	C	-0.78	First reported 854.34 kg/m3

lab	method	value	mark	z(targ)	remarks
6266	D4052	0.85371		0.40	
6302	D4052	0.8537		0.34	
6310	D4052	0.8537	C	0.34	First reported 853.7 kg/L
6359		-----	W	-----	Test result withdrawn, reported 0.8543
6380	D4052	0.85347		-0.94	
6442	D4052	0.8537		0.34	
6454	D4052	0.85354		-0.55	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	suspect
n	55
outliers	6
mean (n)	0.85364
st.dev. (n)	0.000142
R(calc.)	0.00040
st.dev.(ISO12185:96)	0.000179
R(ISO12185:96)	0.0005



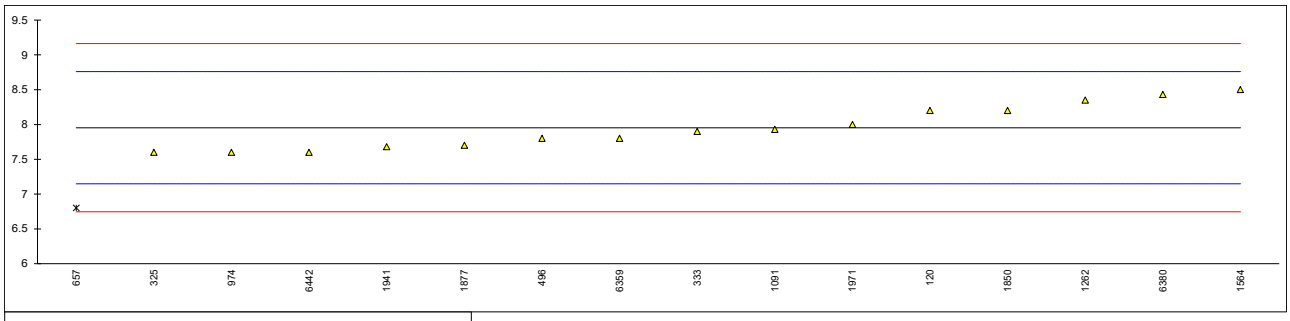


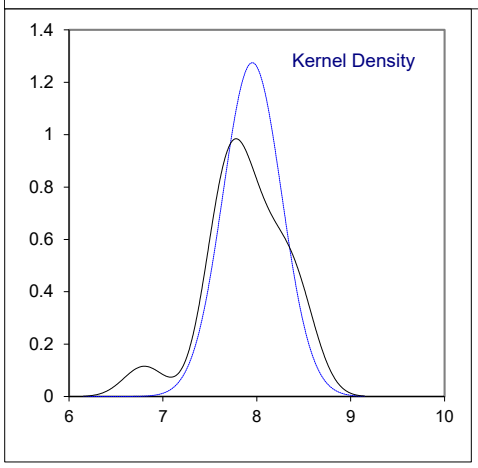
Determination of Evaporation loss by Noack on sample #22085; results in %M/M

lab	method	value	mark	z(targ)	remarks
120	CEC L-40-93	8.2		0.61	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325	CEC L-40-93	7.6		-0.88	
329		-----		-----	
333	CEC L-40-93	7.9		-0.13	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496	D5800-B	7.80		-0.38	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5800-B	6.8	G(0.05)	-2.86	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D5800-B	7.6		-0.88	
994		-----		-----	
1017		-----		-----	
1059		-----		-----	
1091	D5800-B	7.93		-0.06	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D5800-A	8.35		0.99	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564	DIN51581	8.5		1.36	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	D5800-B	8.2		0.61	
1877	D5800-B	7.7		-0.63	
1941	D5800-A	7.68		-0.68	
1969		-----		-----	
1971	PN-C-04124	8.0		0.12	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044		-----		-----	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302		-----		-----	
6310		-----		-----	
6359	D5800-B	7.8		-0.38	
6380	D5800-B	8.43		1.18	
6442	CEC L-40-93	7.6		-0.88	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

	normality	OK
	n	15
	outliers	1
	mean (n)	7.953
	st.dev. (n)	0.3129
	R(calc.)	0.876
	st.dev.(D5800-B:21)	0.4030
	R(D5800-B:21)	1.128
Compare		
	R(D5800-A:21)	1.455



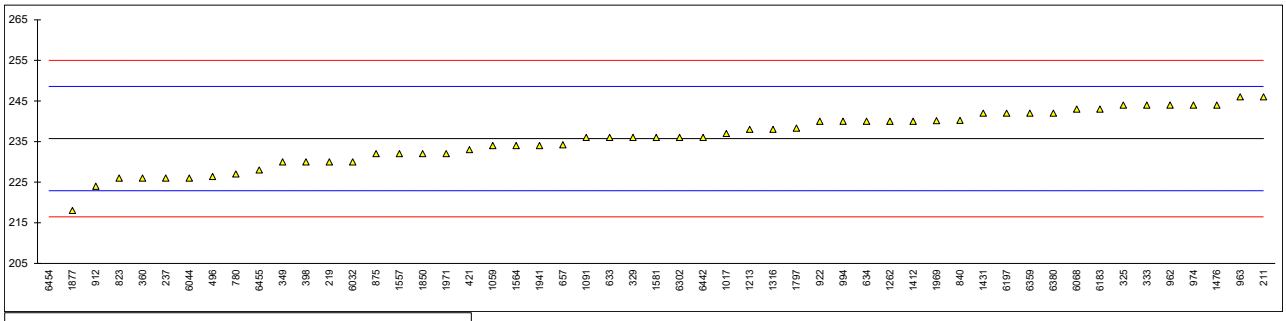


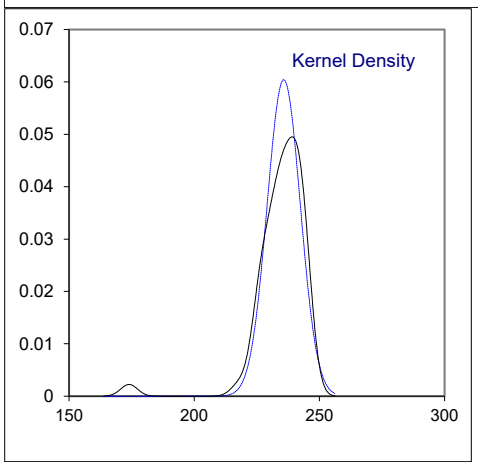
Determination of Flash Point C.O.C. on sample #22085; results in °C

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211	D92	246		1.60	
219	D92	230.0		-0.89	
237	D92	226		-1.51	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325	D92	244		1.29	
329	D92	236		0.04	
333	D92	244		1.29	
339		-----		-----	
349	D92	230		-0.89	
360	ISO2592	226		-1.51	
398	D92	230		-0.89	
421	ISO2592	233		-0.43	
432		-----		-----	
496	D92	226.4		-1.45	
614		-----		-----	
633	D92	236		0.04	
634	D92	240		0.66	
657	D92	234.2		-0.24	
780	D92	227		-1.36	
823	D92	226		-1.51	
840	D92	240.2		0.69	
862		-----		-----	
875	D92	232		-0.58	
912	D92	224		-1.83	
922	D92	240		0.66	
962	D92	244.0		1.29	
963	D92	246.0		1.60	
974	D92	244		1.29	
994	D92	240.0		0.66	
1017	D92	237		0.20	
1059	ISO2592	234		-0.27	
1091	D92	236		0.04	
1146		-----		-----	
1173		-----		-----	
1213	D92	238		0.35	
1235		-----		-----	
1262	D92	240		0.66	
1316	D92	238		0.35	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D92	240.0		0.66	
1431	D92	242.0		0.97	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO2592	244		1.29	
1557	ISO2592	232.0		-0.58	
1564	D92	234		-0.27	
1581	D92	236.0		0.04	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797	ISO2592	238.3		0.40	
1799		-----		-----	
1850	ISO2592	232		-0.58	
1877	D92	218		-2.76	
1941	ISO2592	234		-0.27	
1969	ISO2592	240.15		0.69	
1971	ISO2592	232		-0.58	
3179		-----		-----	
6016		-----		-----	
6032	D92	230		-0.89	
6044	D92	226		-1.51	
6068	ISO2592	243		1.13	
6183	D92	243.0		1.13	
6197	D92	242		0.97	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D92	236		0.04	
6310		-----		-----	
6359	D92	242		0.97	
6380	D92	242.0		0.97	
6442	D92	236		0.04	
6454	D92	174	R(0.01)	-9.60	
6455	D92	228		-1.20	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	52
outliers	1
mean (n)	235.74
st.dev. (n)	6.605
R(calc.)	18.49
st.dev.(D92:18)	6.429
R(D92:18)	18



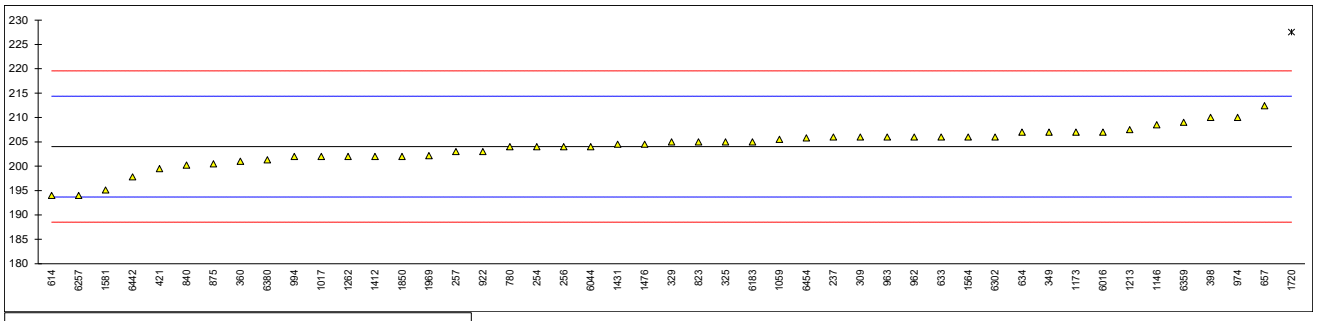


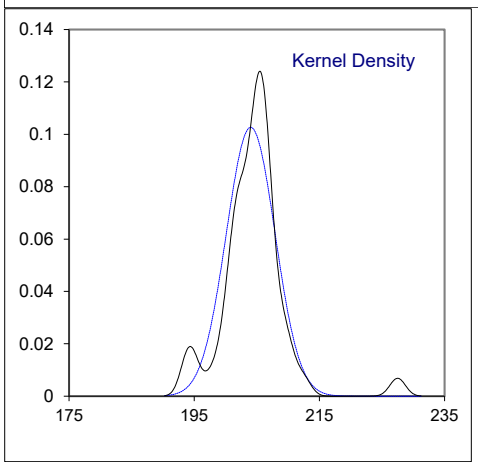
Determination of Flash Point PMcc on sample #22085; results in °C

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D93-A	206.0		0.38	
254	D93-A	204		-0.01	
256	D93-A	204.0		-0.01	
257	D3828	203		-0.20	
309	D93-B	206.0		0.38	
325	D93-A	205.0		0.19	
329	D93-A	205		0.19	
333		-----		-----	
339		-----		-----	
349	D93-A	207		0.57	
360	ISO2719-A	201.0		-0.59	
398	D93-B	210		1.15	
421	ISO2719-A	199.5	C	-0.88	First reported 197.0
432		-----		-----	
496		-----		-----	
614	D93-A	194		-1.94	
633	D93-A	206.0		0.38	
634	D93-A	207.0		0.57	
657	D93-A	212.4		1.62	
780	D93-A	204.0		-0.01	
823	ISO2719-A	205.0		0.19	
840	D93-A	200.2		-0.74	
862		-----		-----	
875	D93-A	200.5		-0.68	
912		-----		-----	
922	D93-A	203		-0.20	
962	D93-A	206.0		0.38	
963	D93-A	206.0		0.38	
974	D93-A	210		1.15	
994	D93-B	202.0		-0.39	
1017	D93-A	202.0		-0.39	
1059	ISO2719-A	205.5		0.28	
1091		-----		-----	
1146	D93-A	208.5		0.86	
1173	D93-A	207.0		0.57	
1213	D93-A	207.5		0.67	
1235		-----		-----	
1262	D93-A	202.0		-0.39	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D93	202.0		-0.39	
1431	D93-A	204.5		0.09	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO2719-A	204.5		0.09	
1557		-----		-----	
1564	D93-A	206.0		0.38	
1581	D93-B	195.1		-1.73	
1720	D93-A	227.5	C,R(0.01)	4.54	First reported 224.0
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	ISO2719-A	202		-0.39	
1877		-----		-----	
1941		-----		-----	
1969	ISO2719-A	202.16		-0.36	
1971		-----		-----	
3179		-----		-----	
6016	D93-A	207		0.57	
6032		-----		-----	
6044	D93-A	204		-0.01	
6068		-----		-----	
6183	D93-A	205.0		0.19	
6197		-----		-----	
6257	ISO2719-A	194.0	C	-1.94	First reported 185.0

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D93-B	206		0.38	
6310		-----		-----	
6359	D93-A	209		0.96	
6380	D93-A	201.3		-0.53	
6442	D93-A	197.8		-1.20	
6454	D93-A	205.8		0.34	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	suspect
n	46
outliers	1
mean (n)	204.03
st.dev. (n)	3.888
R(calc.)	10.89
st.dev.(D93-A:20)	5.174
R(D93-A:20)	14.49



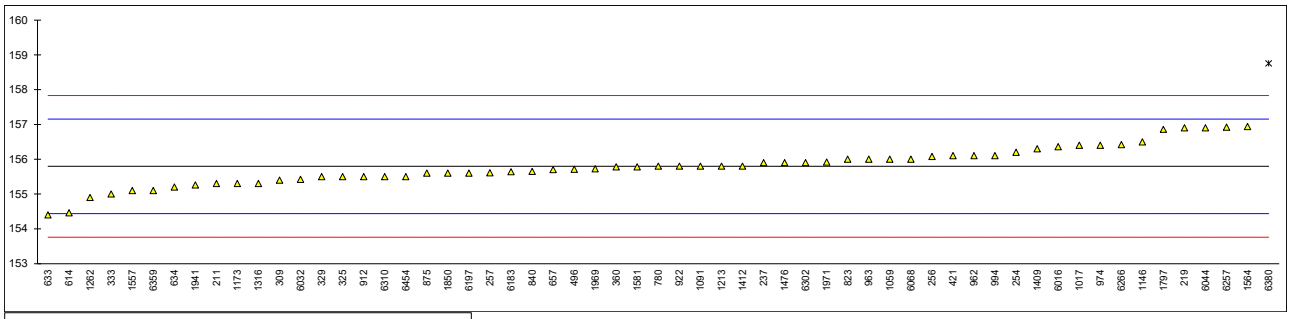


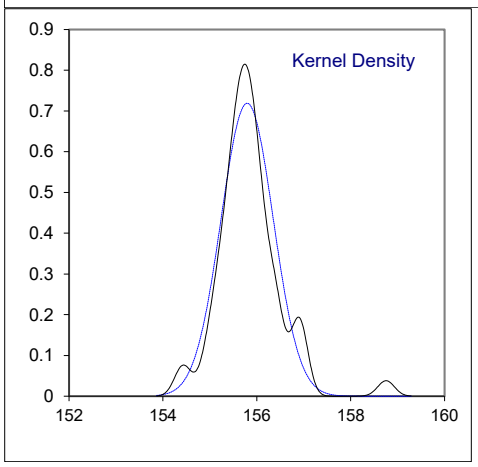
Determination of Kinematic Viscosity at 40 °C on sample #22085; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211	D445	155.3		-0.73	
219	D7279	156.9		1.63	
237	D445	155.9		0.15	
254	D445	156.2		0.60	
256	D445	156.08		0.42	
257	D7279 corrected to D445	155.61		-0.27	
309	D445	155.4		-0.58	
325	D445	155.5		-0.44	
329	D445	155.5		-0.44	
333	D445	155.0		-1.17	
339		-----		-----	
349		-----		-----	
360	ISO3104	155.78		-0.02	
398		-----		-----	
421	ISO3104	156.1		0.45	
432		-----		-----	
496	D7279 corrected to D445	155.71		-0.13	
614	D7042	154.46		-1.97	
633	D445	154.4	C	-2.06	First reported 158.0
634	D445	155.2		-0.88	
657	D445	155.7		-0.14	
780	D445	155.8		0.01	
823	D445	156.0		0.30	
840	D445	155.65		-0.21	
862		-----		-----	
875	D445	155.6		-0.29	
912	D445	155.5		-0.44	
922	D445	155.8		0.01	
962	D445	156.1		0.45	
963	D445	156.0		0.30	
974	D445	156.4		0.89	
994	D445	156.1		0.45	
1017	D445	156.4		0.89	
1059	ISO3104	156.0		0.30	
1091	D445	155.8		0.01	
1146	D445	156.5		1.04	
1173	D445	155.30		-0.73	
1213	D445	155.8		0.01	
1235		-----		-----	
1262	D445	154.9		-1.32	
1316	ISO3104	155.3		-0.73	
1326		-----		-----	
1328		-----		-----	
1409	D445	156.3		0.74	
1412	D445	155.80		0.01	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO3104	155.9		0.15	
1557	ISO3104	155.1		-1.02	
1564	D445	156.940		1.69	
1581	D7042	155.78		-0.02	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797	ISO3104	156.86		1.57	
1799		-----		-----	
1850	ISO3104	155.6		-0.29	
1877		-----		-----	
1941	ISO3104	155.26		-0.79	
1969	ISO3104	155.7228		-0.11	
1971	ISO3104	155.92		0.18	
3179		-----		-----	
6016	D7042	156.360		0.83	
6032	D7279 corrected to D445	155.42		-0.55	
6044	D445	156.9		1.63	
6068	ISO3104	156.0		0.30	
6183	D445	155.64		-0.23	
6197	D445	155.6		-0.29	
6257	ISO3104	156.92	C	1.66	First reported 153.8

lab	method	value	mark	z(targ)	remarks
6266	D7042	156.42		0.92	
6302	D445	155.901		0.16	
6310	D7279 corrected to D445	155.5		-0.44	
6359	D445	155.1		-1.02	
6380	D445	158.754	C,R(0.01)	4.36	First reported 157.978
6442		-----		-----	
6454	D445	155.50		-0.44	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	58
outliers	1
mean (n)	155.795
st.dev. (n)	0.5547
R(calc.)	1.553
st.dev.(D445:21e1)	0.6788
R(D445:21e1)	1.901



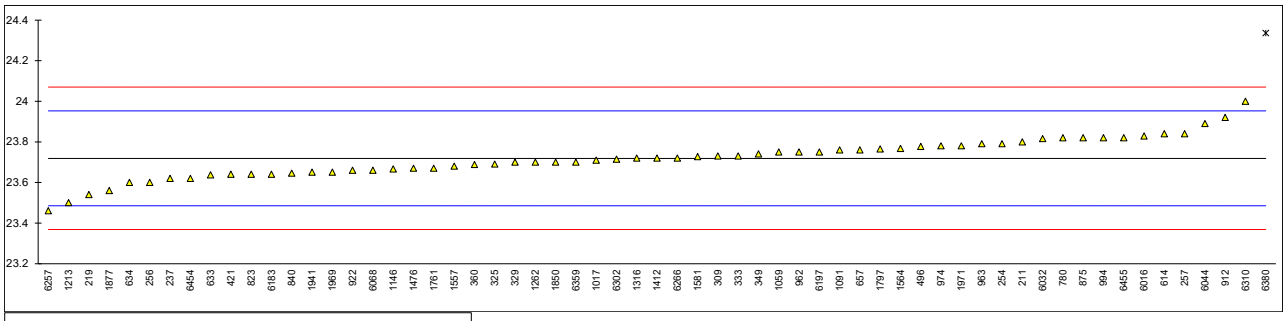


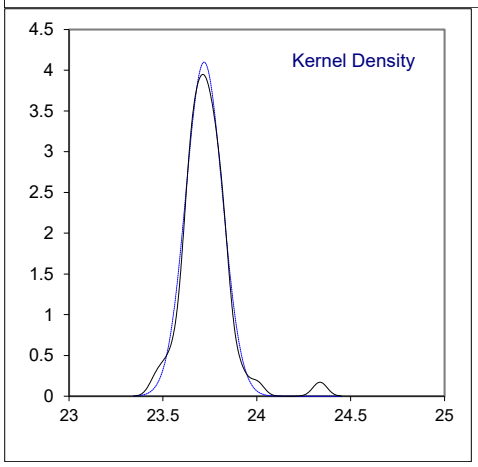
Determination of Kinematic Viscosity at 100 °C on sample #22085; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211	D445	23.80		0.69	
219	D7279	23.54		-1.53	
237	D445	23.62		-0.85	
254	D445	23.79		0.61	
256	D445	23.60		-1.02	
257	D7279 corrected to D445	23.84		1.04	
309	D445	23.73		0.10	
325	D445	23.69		-0.25	
329	D445	23.70		-0.16	
333	D445	23.73		0.10	
339		-----		-----	
349	D445	23.74		0.18	
360	ISO3104	23.688		-0.26	
398		-----		-----	
421	ISO3104	23.64		-0.67	
432		-----		-----	
496	D7279 corrected to D445	23.777		0.50	
614	D7042	23.84		1.04	
633	D445	23.637		-0.70	
634	D445	23.60		-1.02	
657	D445	23.76		0.35	
780	D445	23.82		0.87	
823	ISO3104	23.64		-0.67	
840	D445	23.645		-0.63	
862		-----		-----	
875	D445	23.82		0.87	
912	D445	23.92		1.72	
922	D445	23.66		-0.50	
962	D445	23.75		0.27	
963	D445	23.79		0.61	
974	D445	23.78		0.52	
994	D445	23.82		0.87	
1017	D445	23.71		-0.08	
1059	ISO3104	23.75		0.27	
1091	D445	23.76		0.35	
1146	D445	23.666		-0.45	
1173		-----		-----	
1213	D445	23.50		-1.87	
1235		-----		-----	
1262	D445	23.70		-0.16	
1316	ISO3104	23.72		0.01	
1326		-----		-----	
1328		-----		-----	
1409		-----	W	-----	Test result withdrawn, reported 23.27
1412	D445	23.72		0.01	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO3104	23.67		-0.42	
1557	ISO3104	23.68		-0.33	
1564	D445	23.767		0.41	
1581	D7042	23.727		0.07	
1720		-----		-----	
1748		-----		-----	
1761	ISO3104	23.67		-0.42	
1797	ISO3104	23.765		0.39	
1799		-----		-----	
1850	ISO3104	23.70		-0.16	
1877	D445	23.56	C	-1.36	First reported at Kin. Viscosity at 40 °C
1941	ISO3104	23.65		-0.59	
1969	ISO3104	23.6506		-0.58	
1971	ISO3104	23.780		0.52	
3179		-----		-----	
6016	D7042	23.829		0.94	
6032	D7279 corrected to D445	23.816		0.83	
6044	D445	23.89		1.46	
6068	ISO3104	23.66		-0.50	
6183	D445	23.64		-0.67	
6197	D445	23.75		0.27	
6257	ISO3104	23.46		-2.21	

lab	method	value	mark	z(targ)	remarks
6266	D7042	23.72		0.01	
6302	D445	23.714		-0.04	
6310	D7279 corrected to D445	24		2.40	
6359	D445	23.70		-0.16	
6380	D445	24.336	C,R(0.01)	5.28	First reported 24.107
6442		-----		-----	
6454	D445	23.62		-0.85	
6455	D445	23.82		0.87	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	60
outliers	1
mean (n)	23.7189
st.dev. (n)	0.09735
R(calc.)	0.2726
st.dev.(D445:21e1)	0.11690
R(D445:21e1)	0.3273



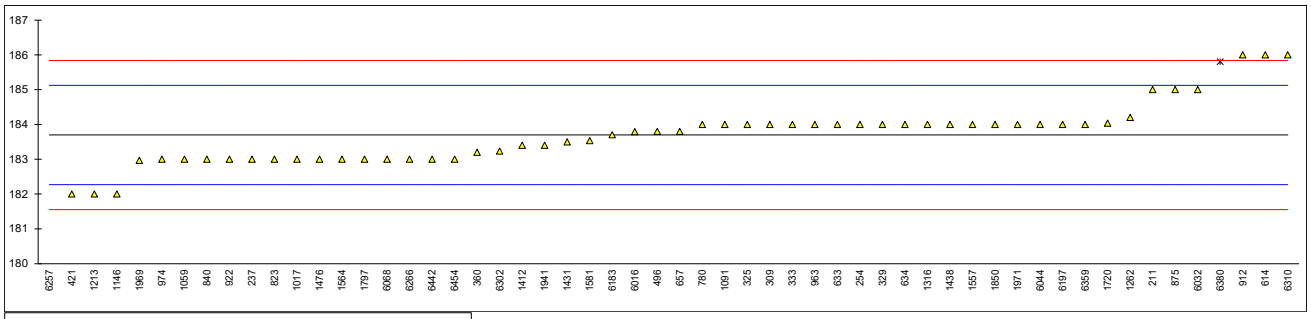


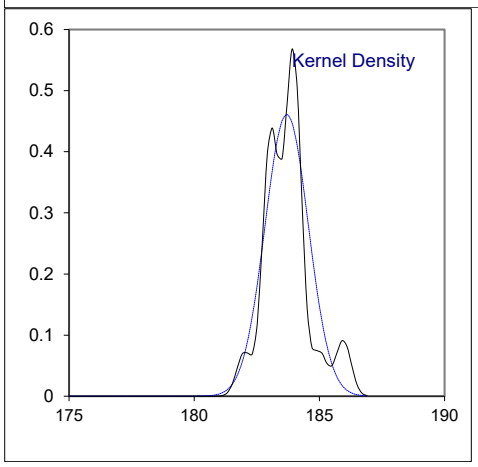
Determination of Viscosity Index on sample #22085;

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211	D2270	185		1.83	
219		-----		-----	
237	D2270	183		-0.97	
254	D2270	184		0.43	
256		-----		-----	
257		-----		-----	
309	D2270	184		0.43	
325	D2270	184		0.43	
329	D2270	184		0.43	
333	D2270	184		0.43	
339		-----		-----	
349		-----		-----	
360	ISO2909	183.2		-0.69	
398		-----		-----	
421	ISO2909	182		-2.37	
432		-----		-----	
496	D2270	183.8		0.15	
614	D2270	186		3.23	
633	D2270	184	C	0.43	First reported 180
634	D2270	184		0.43	
657	D2270	183.8		0.15	
780	D2270	184		0.43	
823	D2270	183		-0.97	
840	D2270	183.0		-0.97	
862		-----		-----	
875	D2270	185		1.83	
912	D2270	186		3.23	
922	D2270	183		-0.97	
962		-----		-----	
963	D2270	184		0.43	
974	D2270	183		-0.97	
994		-----		-----	
1017	D2270	183		-0.97	
1059	ISO2909	183		-0.97	
1091	D2270	184		0.43	
1146	D2270	182		-2.37	
1173		-----		-----	
1213	D2270	182		-2.37	
1235		-----		-----	
1262	D2270	184.2		0.71	
1316	D2270	184		0.43	
1326		-----		-----	
1328		-----		-----	
1409		-----	W	-----	Test result withdrawn, reported 179
1412	D2270	183.40		-0.41	
1431	D2270	183.5		-0.27	
1438	D2270	184		0.43	
1444		-----		-----	
1460		-----		-----	
1476	ISO2909	183		-0.97	
1557	ISO2909	184		0.43	
1564	D2270	183		-0.97	
1581	D2270	183.533		-0.23	
1720	D2270	184.037		0.48	
1748		-----		-----	
1761		-----		-----	
1797	ISO2909	183		-0.97	
1799		-----		-----	
1850	ISO2909	184		0.43	
1877		-----		-----	
1941	ISO2909	183.4		-0.41	
1969	ISO2909	182.97		-1.02	
1971	ISO2909	184		0.43	
3179		-----		-----	
6016	D2270	183.79		0.13	
6032	D2270	185		1.83	
6044	D2270	184		0.43	
6068	ISO2909	183		-0.97	
6183	D2270	183.7		0.01	
6197	D2270	184		0.43	
6257	ISO2909	137	C,R(0.01),E	-65.37	First reported 138. Iis calculated 180.7

lab	method	value	mark	z(targ)	remarks
6266	D2270	183.0		-0.97	
6302	D2270	183.23		-0.65	
6310	D2270	186		3.23	
6359	D2270	184		0.43	
6380	D2270	185.8	ex,C	2.95	Test result excluded, outlier in KV 40 and 100 °C, fr.1847.631
6442	D2270	183		-0.97	
6454	D2270	183		-0.97	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	suspect
n	54
outliers	1 + 1ex
mean (n)	183.70
st.dev. (n)	0.866
R(calc.)	2.42
st.dev.(D2270:10R16)	0.714
R(D2270:10R16)	2



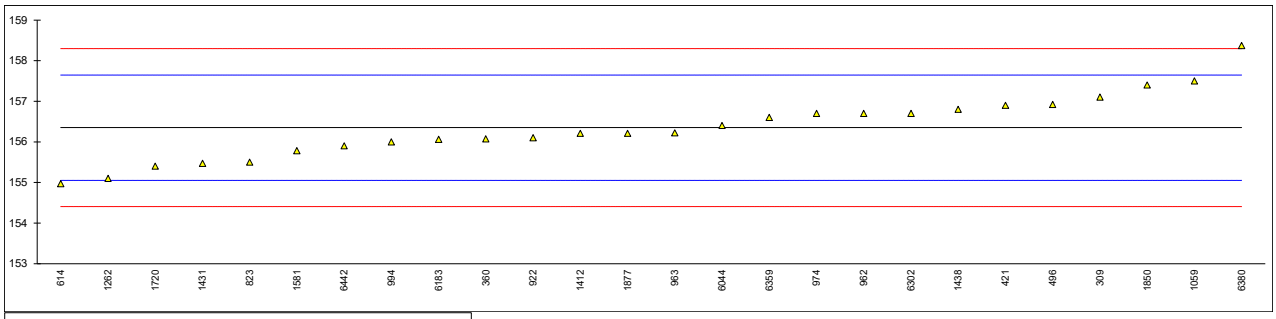


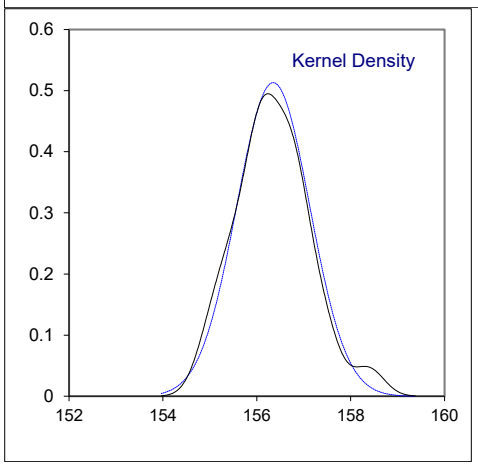
Determination of Kinematic Viscosity Stabinger at 40 °C on sample #22085; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D7042	157.1		1.16	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D7042	156.07		-0.43	
398		-----		-----	
421	D7042	156.9		0.85	
432		-----		-----	
496	D7042	156.92		0.88	
614	D7042	154.97		-2.13	
633		-----		-----	
634		-----		-----	
657		-----		-----	
780		-----		-----	
823	D7042	155.5		-1.31	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922	D7042	156.1		-0.38	
962	D7042	156.7		0.54	
963	D7042	156.22		-0.20	
974	D7042	156.7		0.54	
994	D7042	156.0		-0.54	
1017		-----		-----	
1059	D7042	157.5		1.78	
1091		-----		-----	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D7042	155.1		-1.93	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D7042	156.21		-0.21	
1431	D7042	155.47		-1.36	
1438	D7042	156.8		0.70	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564		-----		-----	
1581	D7042	155.78		-0.88	
1720	D7042	155.4		-1.46	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	D7042	157.4		1.62	
1877	D7042	156.21		-0.21	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044	D7042	156.4		0.08	
6068		-----		-----	
6183	D7042	156.06		-0.45	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D7042	156.7		0.54	
6310		-----		-----	
6359	D7042	156.6		0.39	
6380	D7042	158.37		3.12	
6442	D7042	155.9		-0.69	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	26
outliers	0
mean (n)	156.349
st.dev. (n)	0.7779
R(calc.)	2.178
st.dev.(D7042:21a)	0.6481
R(D7042:21a)	1.815



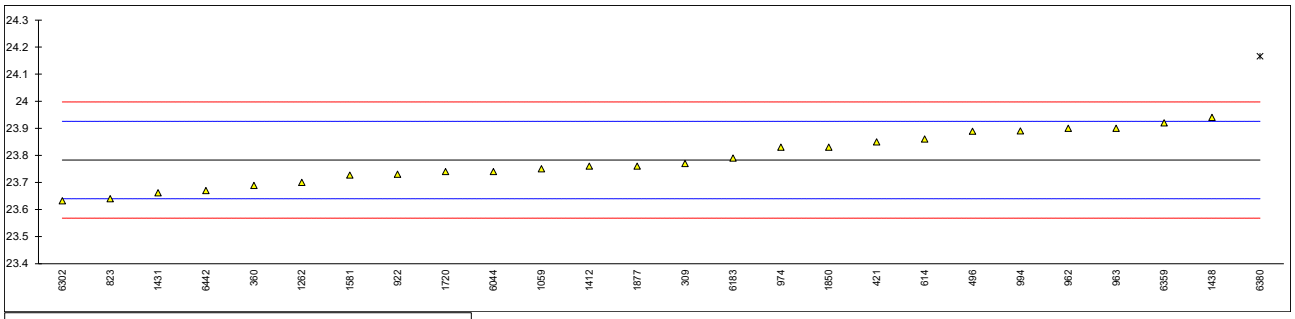


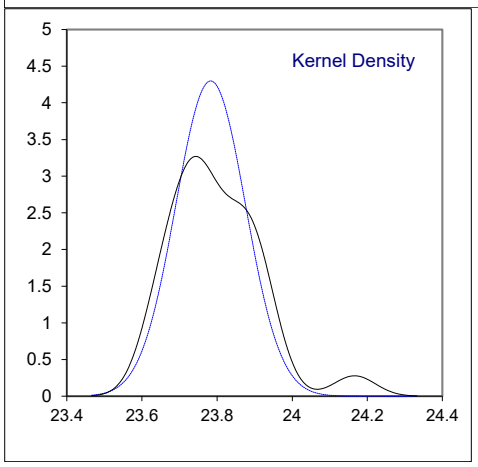
Determination of Kinematic Viscosity Stabinger at 100 °C on sample #22085; results in mm²/s

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D7042	23.77	C	-0.18	First reported 22.81
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	D7042	23.689		-1.31	
398		-----		-----	
421	D7042	23.85		0.94	
432		-----		-----	
496	D7042	23.889		1.49	
614	D7042	23.86		1.08	
633		-----		-----	
634		-----		-----	
657		-----		-----	
780		-----		-----	
823	D7042	23.64		-2.00	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922	D7042	23.73		-0.74	
962	D7042	23.90		1.64	
963	D7042	23.90		1.64	
974	D7042	23.83		0.66	
994	D7042	23.89		1.50	
1017		-----		-----	
1059	D7042	23.75		-0.46	
1091		-----		-----	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D7042	23.70		-1.16	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D7042	23.76		-0.32	
1431	D7042	23.6615		-1.70	
1438	D7042	23.94		2.20	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564		-----		-----	
1581	D7042	23.727		-0.78	
1720	D7042	23.74		-0.60	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	D7042	23.83		0.66	
1877	D7042	23.76		-0.32	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044	D7042	23.74		-0.60	
6068		-----		-----	
6183	D7042	23.79		0.10	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D7042	23.632		-2.11	
6310		-----		-----	
6359	D7042	23.92		1.92	
6380	D7042	24.166	R(0.05)	5.36	
6442	D7042	23.67		-1.58	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	25
outliers	1
mean (n)	23.7827
st.dev. (n)	0.09283
R(calc.)	0.2599
st.dev.(D7042:21a)	0.07151
R(D7042:21a)	0.2002



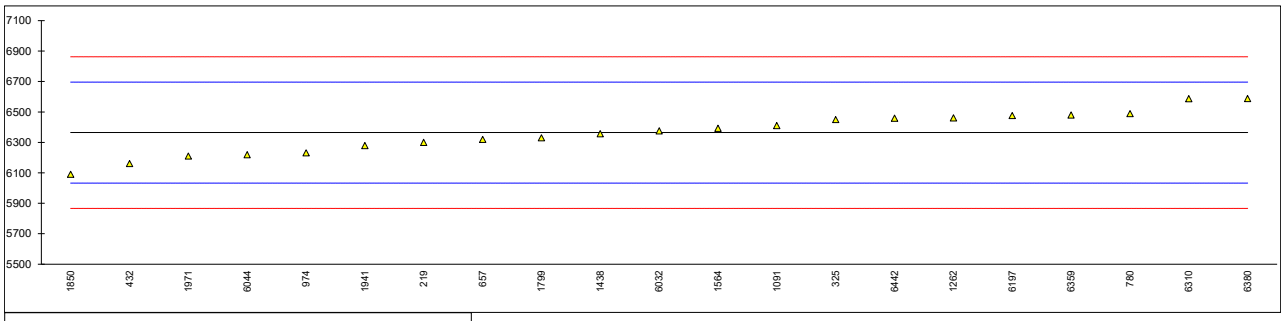


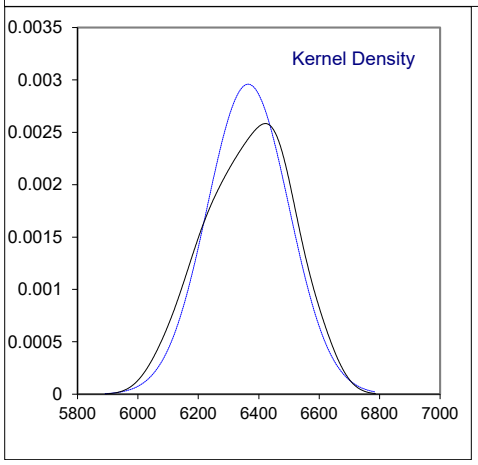
Determination of Viscosity Apparent (CCS) at -25 °C on sample #22085; results in mPa·s

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219	D5293	6300		-0.39	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325	D5293	6450		0.51	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432	D5293	6160		-1.23	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5293	6319.5		-0.27	
780	D5293	6488		0.74	
823		-----		-----	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D5293	6231		-0.81	
994		-----		-----	
1017		-----		-----	
1059		-----		-----	
1091	D5293	6410		0.27	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D5293	6460		0.57	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431		-----		-----	
1438	D5293	6357		-0.05	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564	D5293	6393		0.17	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799	D5293	6330		-0.21	
1850	D5293	6090		-1.66	
1877		-----		-----	
1941	D5293	6278		-0.52	
1969		-----		-----	
1971	D5293	6210		-0.93	
3179		-----		-----	
6016		-----		-----	
6032	D5293	6375		0.06	
6044	D5293	6218		-0.88	
6068		-----		-----	
6183		-----		-----	
6197	D5293	6476		0.67	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302		-----		-----	
6310	D5293	6587		1.34	
6359	D5293	6480		0.69	
6380	D5293	6588		1.35	
6442	D5293	6458		0.56	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	21
outliers	0
mean (n)	6364.69
st.dev. (n)	134.886
R(calc.)	377.68
st.dev.(D5293:20)	165.937
R(D5293:20)	464.62





Determination of Viscosity HTHS on sample #22085; results in mPa·s

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496	D4683	5.49		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1017		-----		-----	
1059		-----		-----	
1091		-----		-----	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262		-----		-----	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564	D4683	5.77		-----	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850		-----		-----	
1877		-----		-----	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044		-----		-----	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

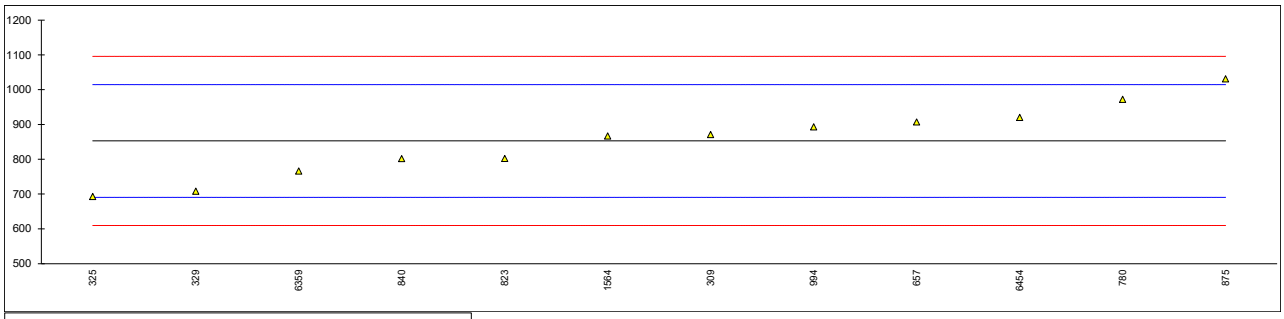
lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302		-----		-----	
6310		-----		-----	
6359	D4683	5.48		-----	
6380		-----		-----	
6442		-----		-----	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	
	n	3			

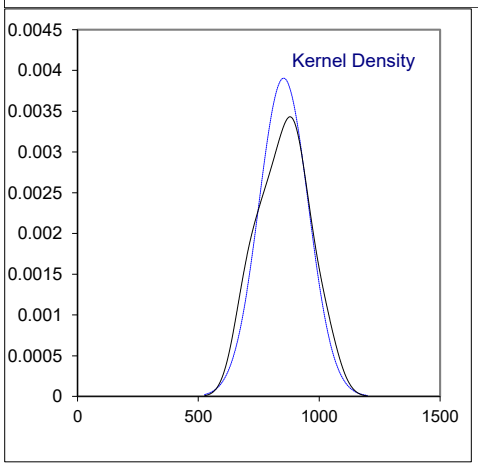
Determination of Nitrogen on sample #22085; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D5762	871		0.23	
325	D5762	693		-1.97	
329	D5762	708		-1.79	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360		-----		-----	
398		-----		-----	
421		-----		-----	
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5762	907.1		0.67	
780	D5762	972		1.47	
823	D5762	802		-0.63	
840	D3228	801.7		-0.63	
862		-----		-----	
875	D5762	1031		2.20	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5762	893		0.50	
1017		-----		-----	
1059		-----		-----	
1091		-----		-----	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262		-----		-----	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431		-----		-----	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557		-----		-----	
1564	D5762	867		0.18	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850		-----		-----	
1877		-----		-----	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044		-----		-----	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302		-----		-----	
6310		-----		-----	
6359	D3228	766		-1.07	
6380		-----		-----	
6442		-----		-----	
6454	D5762	920		0.83	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	12
outliers	0
mean (n)	852.65
st.dev. (n)	102.161
R(calc.)	286.05
st.dev.(D5762:18a)	81.002
R(D5762:18a)	226.80



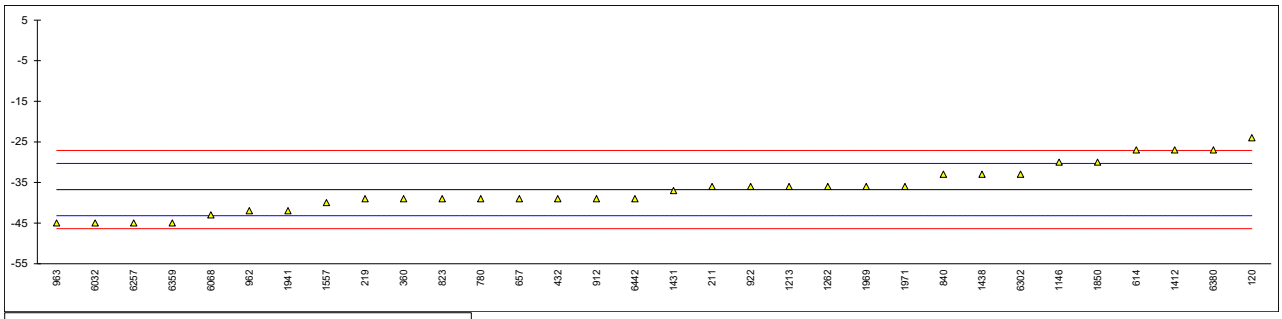


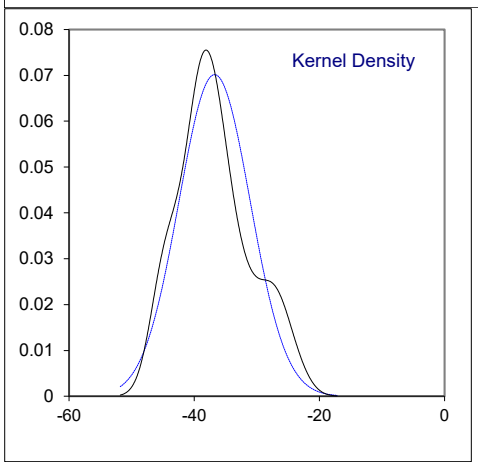
Determination of Pour Point Manual on sample #22085; results in °C

lab	method	value	mark	z(targ)	remarks
120	D97	-24		3.97	
178		-----		-----	
179		-----		-----	
211	D97	-36		0.23	
219	D97	-39		-0.70	
237	D97	<-21		-----	
254	D97	<-18		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	ISO3016	-39		-0.70	
398		-----		-----	
421		-----		-----	
432	D97	-39		-0.70	
496		-----		-----	
614	D97	-27		3.03	
633		-----		-----	
634	D97	<-24		-----	
657	D97	-39.0		-0.70	
780	D97	-39		-0.70	
823	ISO3016	-39		-0.70	
840	D97	-33		1.17	
862		-----		-----	
875		-----		-----	
912	D97	-39		-0.70	
922	D97	-36		0.23	
962	D97	-42		-1.63	
963	D97	-45		-2.57	
974		-----		-----	
994		-----		-----	
1017		-----		-----	
1059	ISO3016	<-33		-----	
1091		-----		-----	
1146	D97	-30		2.10	
1173		-----		-----	
1213	D97	-36		0.23	
1235		-----		-----	
1262	D97	-36		0.23	
1316		-----		-----	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D97	-27		3.03	
1431	D97	-37		-0.08	
1438	D97	-33		1.17	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557	ISO3016	-40		-1.01	
1564		-----		-----	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	ISO3016	-30		2.10	
1877		-----		-----	
1941	ISO3016	-42		-1.63	
1969	ISO3016	-36		0.23	
1971	ISO3016	-36		0.23	
3179		-----		-----	
6016		-----		-----	
6032	D97	-45		-2.57	
6044		-----		-----	
6068	ISO3016	-43		-1.94	
6183		-----		-----	
6197		-----		-----	
6257	ISO3016	-45.0		-2.57	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D97	-33		1.17	
6310		-----		-----	
6359	D97	-45		-2.57	
6380	D97	-27		3.03	
6442	D97	-39		-0.70	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	32
outliers	0
mean (n)	-36.75
st.dev. (n)	5.685
R(calc.)	15.92
st.dev.(D97:17b)	3.214
R(D97:17b)	9



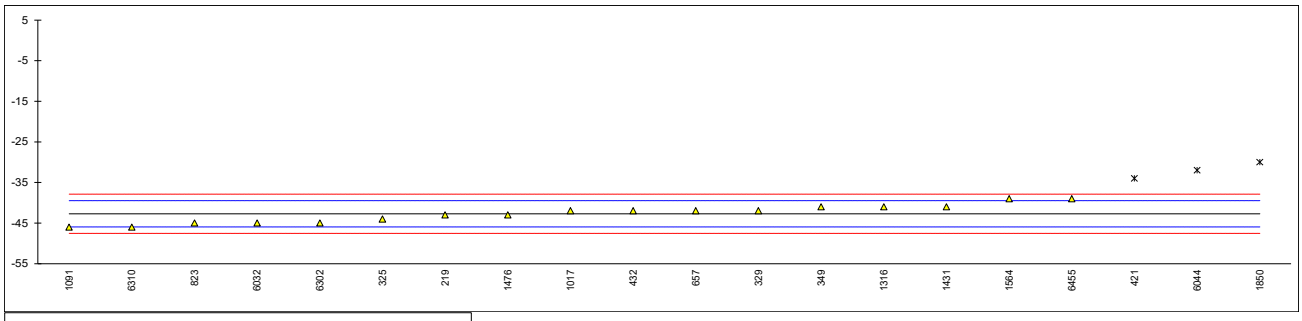


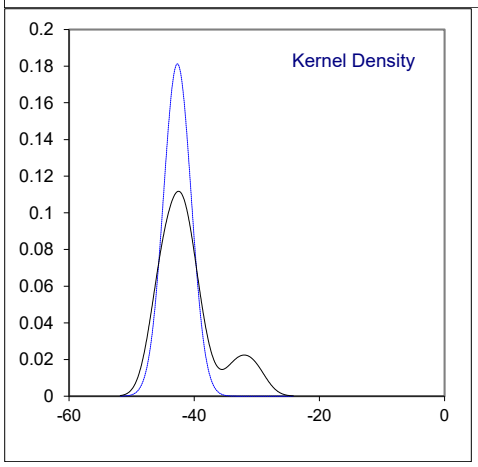
Determination of Pour Point Automated 1 °C interval on sample #22085; results in °C

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219	D5950	-43		-0.18	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
325	D5950	-44		-0.81	
329	D5950	-42		0.44	
333		-----		-----	
339		-----		-----	
349	D5950	-41		1.06	
360		-----		-----	
398		-----		-----	
421	D6749	-34	C,R(0.05)	5.42	First reported -38
432	D5950	-42		0.44	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D5950	-42.0		0.44	
780		-----		-----	
823	D5950	-45		-1.43	
840		-----		-----	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1017	D5950	-42		0.44	
1059		-----		-----	
1091	D5950	-46		-2.05	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262		-----		-----	
1316	D5950	-41.0		1.06	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431	D5950	-41		1.06	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO3016	-43		-0.18	
1557		-----		-----	
1564	D5950	-39		2.31	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850		-30	R(0.05)	7.91	
1877		-----		-----	
1941		-----		-----	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016		-----		-----	
6032	D5950	-45		-1.43	
6044	D5950	-32	R(0.05)	6.66	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D7346	-45		-1.43	
6310	D5950	-46		-2.05	
6359		-----		-----	
6380		-----		-----	
6442		-----		-----	
6454		-----		-----	
6455	D5950	-39		2.31	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	17
outliers	3
mean (n)	-42.71
st.dev. (n)	2.201
R(calc.)	6.16
st.dev.(D5950:14R20)	1.607
R(D5950:14R20)	4.5



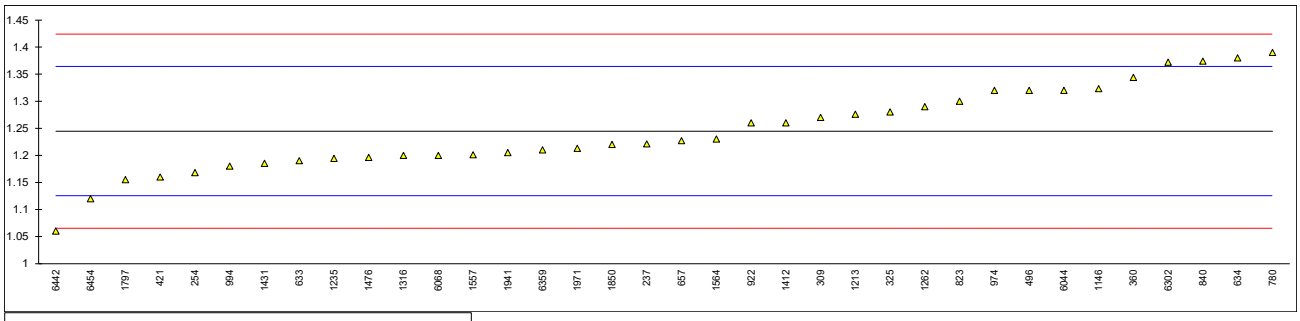


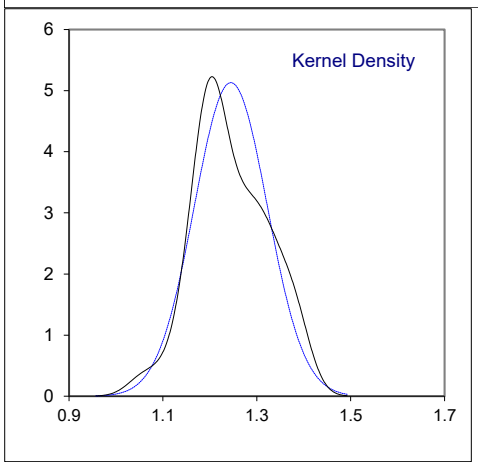
Determination of Sulfated Ash on sample #22085; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D874	1.221		-0.40	
254	D874	1.168		-1.29	
256		-----		-----	
257		-----		-----	
309	D874	1.27		0.42	
325	D874	1.28		0.59	
329		-----		-----	
333		-----		-----	
339		-----		-----	
349		-----		-----	
360	ISO3987	1.344		1.66	
398		-----		-----	
421	ISO3987	1.16		-1.42	
432		-----		-----	
496	D874	1.320		1.26	
614		-----		-----	
633	D874	1.19		-0.92	
634	D874	1.38		2.26	
657	D874	1.227		-0.30	
780	D874	1.39		2.43	
823	D874	1.30		0.92	
840	D874	1.374		2.16	
862		-----		-----	
875		-----		-----	
912		-----		-----	
922	D874	1.26		0.25	
962		-----		-----	
963		-----		-----	
974	D874	1.32		1.26	
994	D874	1.18		-1.09	
1017		-----		-----	
1059		-----		-----	
1091		-----		-----	
1146	D874	1.323		1.31	
1173		-----		-----	
1213	D874	1.276		0.52	
1235	ISO3987	1.19435		-0.84	
1262	D874	1.29		0.76	
1316	D874	1.20		-0.75	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D874	1.26		0.25	
1431	D874	1.18529		-1.00	
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO3987	1.1961		-0.82	
1557	ISO3987	1.201		-0.73	
1564	D874	1.23		-0.25	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797	ISO3987	1.155		-1.50	
1799		-----		-----	
1850	ISO3987	1.22		-0.42	
1877		-----		-----	
1941	ISO3987	1.205		-0.67	
1969		-----		-----	
1971	ISO3987	1.213		-0.53	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044	D874	1.32		1.26	
6068	ISO3987	1.20		-0.75	
6183		-----		-----	
6197		-----		-----	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D874	1.372		2.13	
6310		-----		-----	
6359	D874	1.21		-0.58	
6380		-----		-----	
6442	D874	1.06		-3.09	
6454	D874	1.12		-2.09	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	36
outliers	0
mean (n)	1.2449
st.dev. (n)	0.07775
R(calc.)	0.2177
st.dev.(D874:13aR18)	0.05977
R(D874:13aR18)	0.1674



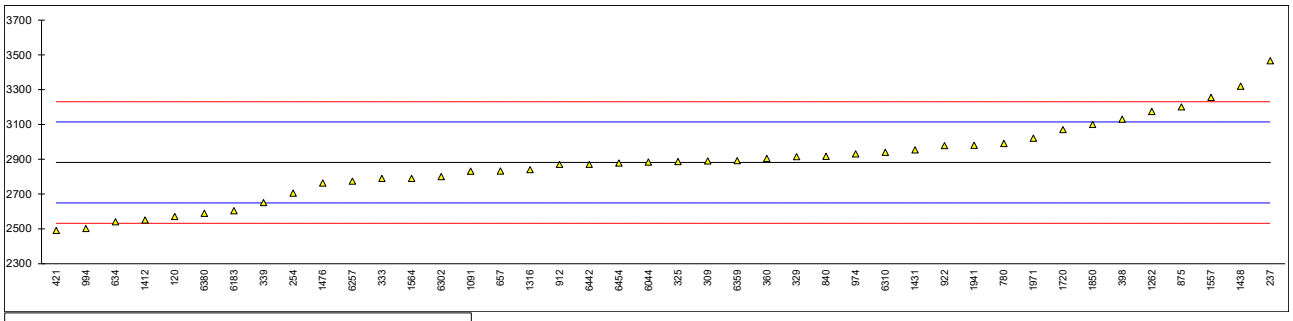


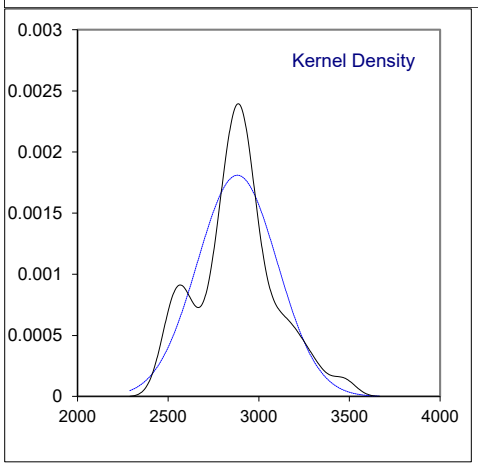
Determination of Sulfur on sample #22085; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120	D4294	2570.6		-2.67	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D4294	3466		5.02	
254	D4294	2705		-1.52	
256		-----		-----	
257		-----		-----	
309	D2622	2890	C	0.07	First reported 3590
325	D5185	2886		0.04	
329	D4294	2914		0.28	
333	D4294	2790		-0.79	
339	INH-024	2650		-1.99	
349		-----		-----	
360	ISO8754	2904		0.19	
398	ISO8754	3130		2.13	
421	ISO8754	2490	C	-3.37	First reported 2050
432		-----		-----	
496		-----		-----	
614		-----		-----	
633		-----		-----	
634	D4294	2540		-2.94	
657	D4294	2832	C	-0.43	First reported 0.2832 mg/kg
780	D4294	2990	C	0.93	Reported 0.299 mg/kg
823		-----		-----	
840	D4294	2917		0.30	
862		-----		-----	
875	D4294	3200		2.74	
912	D4294	2870		-0.10	
922	D4294	2978		0.83	
962		-----		-----	
963		-----		-----	
974	D4294	2930		0.42	
994	D4294	2501	C	-3.27	First reported 1930
1017		-----		-----	
1059		-----		-----	
1091	D2622	2831		-0.44	
1146		-----		-----	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D4294	3174		2.51	
1316	D7751	2840		-0.36	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D4294	2550		-2.85	
1431	D4294	2953		0.61	
1438	D4294	3320		3.77	
1444		-----		-----	
1460		-----		-----	
1476	D2622	2762.7		-1.02	
1557	ISO8754	3255		3.21	
1564	D4294	2790		-0.79	
1581		-----		-----	
1720	D4294	3070.0		1.62	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	ISO8754	3100	C	1.88	First reported 0.31 mg/kg
1877		-----		-----	
1941	ISO8754	2980		0.85	
1969		-----		-----	
1971	ISO8754	3021		1.20	
3179		-----		-----	
6016		-----		-----	
6032		-----		-----	
6044	D5185	2884		0.02	
6068		-----		-----	
6183	D2622	2603.28		-2.39	
6197		-----		-----	
6257	ISO8754	2773.7		-0.93	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D2622	2800		-0.70	
6310	D7751	2940		0.50	
6359	D2622	2891		0.08	
6380	D5185	2589.488		-2.51	
6442	D6481	2870		-0.10	
6454	D4294	2878		-0.03	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	42
outliers	0
mean (n)	2881.7
st.dev. (n)	220.55
R(calc.)	617.5
st.dev.(D4294:21)	116.36
R(D4294:21)	325.8



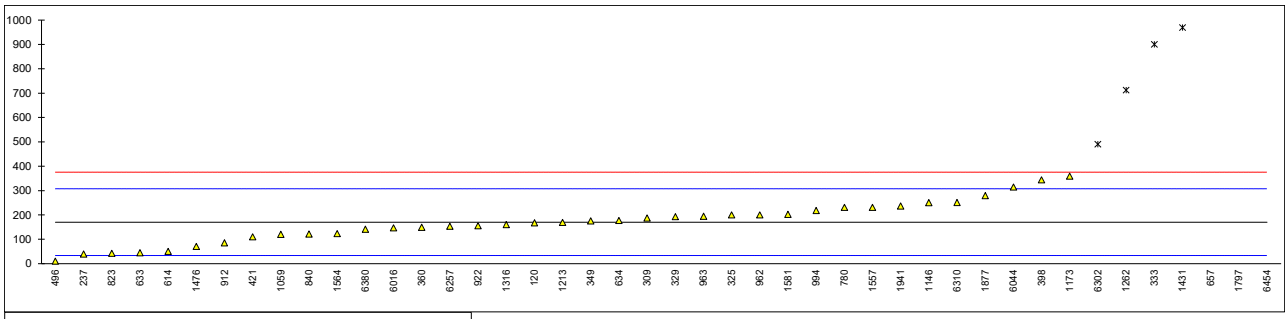


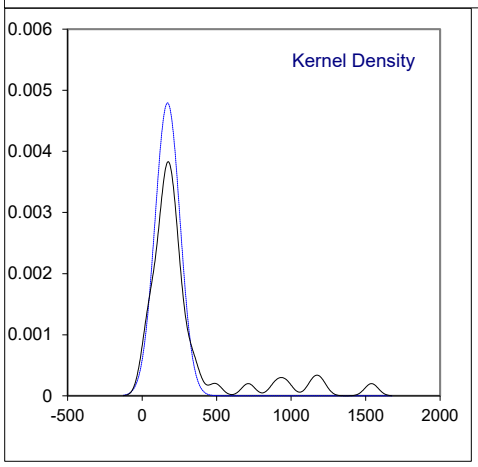
Determination of Water on sample #22085; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120	D6304	167.65		-0.04	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219		-----		-----	
237	D6304-C:16e1	39		-1.91	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D6304-C:20	187		0.24	
325	D6304-C:20	200		0.43	
329	D6304-C:20	193		0.33	
333	D6304-A:20	900	R(0.01)	10.64	
339		-----		-----	
349	D6304-C:20	175		0.07	
360	D6304-B:20	149.1		-0.31	
398	D6304-C:16e1	344		2.53	
421	D6304-B:20	110		-0.88	
432		-----		-----	
496	D6304-B:20	10		-2.34	
614	D6304-B:20	50		-1.75	
633	D6304-B:20	44.9		-1.83	
634	D6304-B:20	177		0.10	
657	D6304-A:20	1148	C,R(0.01)	14.26	First reported 1275
780	D6304-B:20	231		0.89	
823	D6304-C:20	42		-1.87	
840	D6304-B:20	121.3		-0.71	
862		-----		-----	
875		-----		-----	
912	D6304	85		-1.24	
922	D6304-A:16e1	155		-0.22	
962	D6304-C:16e1	200		0.43	
963	D6304-C:16e1	194.5		0.35	
974		-----		-----	
994	D6304-C:20	218		0.70	
1017		-----		-----	
1059	D6304-B:20	120		-0.73	
1091		-----		-----	
1146	D6304-B:20	250		1.16	
1173	IP438	358.7		2.75	
1213	D6304-B:20	169	C	-0.02	First reported 890.1
1235		-----		-----	
1262	D6304-A:20	712.2	C,R(0.01)	7.90	First reported 1122
1316	D6304-B:20	160		-0.15	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412		-----		-----	
1431	D6304-A:16e1	968.79	C,R(0.01)	11.65	First reported 796
1438		-----		-----	
1444		-----		-----	
1460		-----		-----	
1476	ISO12937	70.5		-1.46	
1557	ISO12937	231		0.89	
1564	D6304-B:20	123		-0.69	
1581	D6304-A:20	202.2		0.47	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797	SR13484	1200	C,R(0.01)	15.02	First reported 0.060%M/M
1799		-----		-----	
1850		-----		-----	
1877	D6304-C:20	279		1.59	
1941	D6304-B:20	236		0.96	
1969		-----		-----	
1971		-----		-----	
3179		-----		-----	
6016	D6304-A:20	146.8		-0.34	
6032		-----		-----	
6044	D6304-C:16e1	314		2.10	
6068		-----		-----	
6183		-----		-----	
6197		-----		-----	
6257	ISO12937	153.5		-0.24	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D6304-A:16e1	490	C,R(0.05)	4.66	First reported 1280
6310	D6304-C:16e1	251		1.18	
6359		-----		-----	
6380	D6304-A:16e1	141.35		-0.42	
6442		-----		-----	
6454	D6304-A:20	1540	R(0.01)	19.98	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

	normality	OK
	n	37
	outliers	7
	mean (n)	170.26
	st.dev. (n)	83.215
	R(calc.)	233.00
	st.dev.(D6304-B:20)	68.557
	R(D6304-B:20)	191.96
Compare		
	R(D6304-A:20)	87.61
	R(D6304-C:20)	68.56



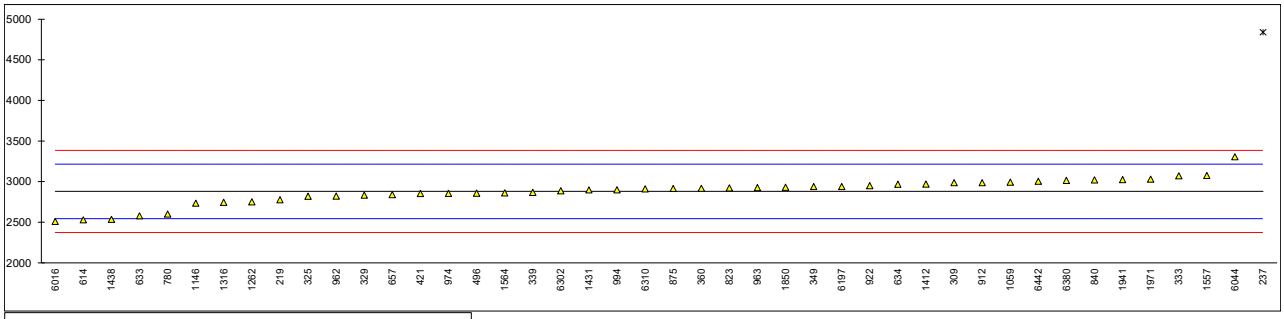


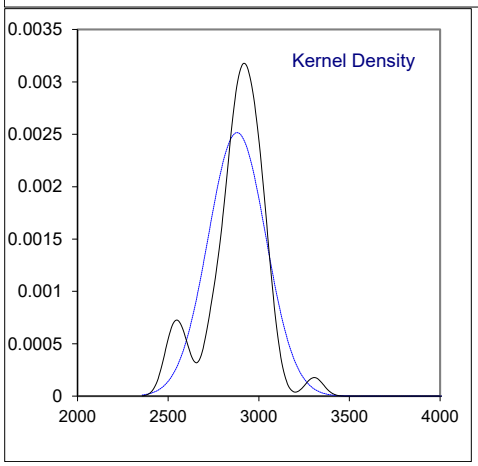
Determination of Calcium as Ca on sample #22085; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219	D5185	2775		-0.62	
237	D5185	4840	R(0.01)	11.64	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D5185	2986		0.63	
325	D5185	2819		-0.36	
329	D5185	2833		-0.28	
333	D5185	3072		1.14	
339	INH-047	2867		-0.08	
349	D5185	2939		0.35	
360	D5185	2918		0.22	
398		-----		-----	
421	D5185	2854	C	-0.16	First reported 1584
432		-----		-----	
496	D5185	2858		-0.13	
614	D5185	2530		-2.08	
633	D6595	2579		-1.79	
634	D6595	2968		0.52	
657	D5185	2839	C	-0.24	First reported 3358
780	D5185	2600		-1.66	
823	D5185	2923		0.25	
840	D4951	3020		0.83	
862		-----		-----	
875	D5185	2915		0.21	
912	D5185	2986		0.63	
922	D5185	2950		0.41	
962	D5185	2821		-0.35	
963	D5185	2927.04		0.28	
974	D5185	2856		-0.14	
994	D5185	2900		0.12	
1017		-----		-----	
1059	In house	2994		0.68	
1091		-----		-----	
1146	In house	2733.4		-0.87	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D5185	2750		-0.77	
1316	D5185	2745		-0.80	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D5185	2970		0.53	
1431	D7751	2896.5		0.10	
1438		2534		-2.06	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557	In house	3075		1.16	
1564	D4951	2861		-0.11	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	In house	2930		0.30	
1877		-----		-----	
1941	D5185	3024		0.85	
1969		-----		-----	
1971		3030	C	0.89	First reported 0.59 mg/kg
3179		-----		-----	
6016	D6595	2510	C	-2.20	First reported 2352.6
6032		-----		-----	
6044	D5185	3306		2.53	
6068		-----		-----	
6183		-----		-----	
6197		2939		0.35	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D5185	2886		0.03	
6310		2910		0.18	
6359		-----		-----	
6380	D5185	3014.530		0.80	
6442		3004		0.74	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	suspect
n	43
outliers	1
mean (n)	2880.17
st.dev. (n)	158.550
R(calc.)	443.94
st.dev.(D5185:18)	168.336
R(D5185:18)	471.34



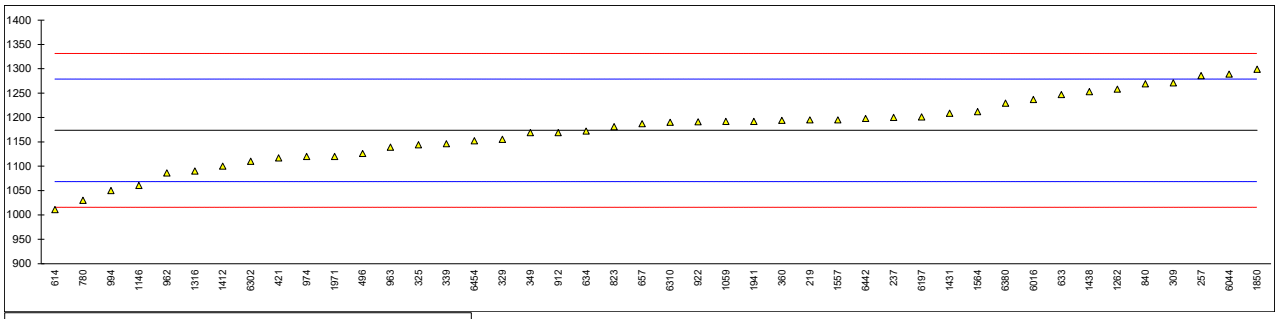


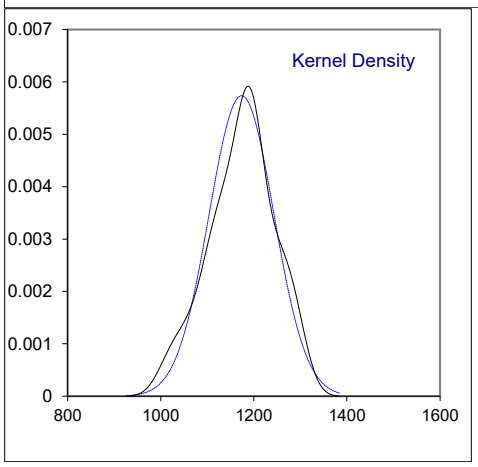
Determination of Phosphorus as P on sample #22085; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219	D5185	1195		0.41	
237	D5185	1200		0.50	
254		-----		-----	
256		-----		-----	
257	D6595	1286		2.14	
309	D5185	1271		1.85	
325	D5185	1144		-0.56	
329	D5185	1155		-0.35	
333	D5185	>1000		-----	
339	INH-047	1146		-0.53	
349	D5185	1169		-0.09	
360	D5185	1194		0.39	
398		-----		-----	
421	D5185	1117	C	-1.08	First reported 757
432		-----		-----	
496	D5185	1126		-0.91	
614	D5185	1011		-3.09	
633	D6595	1247		1.39	
634	D6595	1172		-0.03	
657	D5185	1187		0.25	
780	D5185	1030		-2.73	
823	D5185	1181		0.14	
840	D4951	1269		1.81	
862		-----		-----	
875		-----		-----	
912	D5185	1169		-0.09	
922	D5185	1191		0.33	
962	D5185	1086		-1.67	
963	D5185	1139.13		-0.66	
974	D5185	1120		-1.02	
994	D5185	1050		-2.35	
1017		-----		-----	
1059	In house	1192		0.35	
1091		-----		-----	
1146	In house	1060.4		-2.15	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D5185	1258		1.60	
1316	D5185	1090		-1.59	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D5185	1100		-1.40	
1431	D7751	1208.5		0.66	
1438		1253		1.51	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557	In house	1195		0.41	
1564	D4951	1212		0.73	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	In house	1299		2.38	
1877		-----		-----	
1941	D5185	1192		0.35	
1969		-----		-----	
1971		1120	C	-1.02	First reported 293
3179		-----		-----	
6016	D6595	1236.8		1.20	
6032		-----		-----	
6044	D5185	1289		2.19	
6068		-----		-----	
6183		-----		-----	
6197		1201		0.52	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D5185	1110	C	-1.21	First reported 1438
6310		1190		0.31	
6359		-----		-----	
6380	D5185	1229.536		1.06	
6442		1198		0.46	
6454	D5185	1152		-0.41	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	44
outliers	0
mean (n)	1173.67
st.dev. (n)	69.538
R(calc.)	194.71
st.dev.(D5185:18)	52.612
R(D5185:18)	147.31



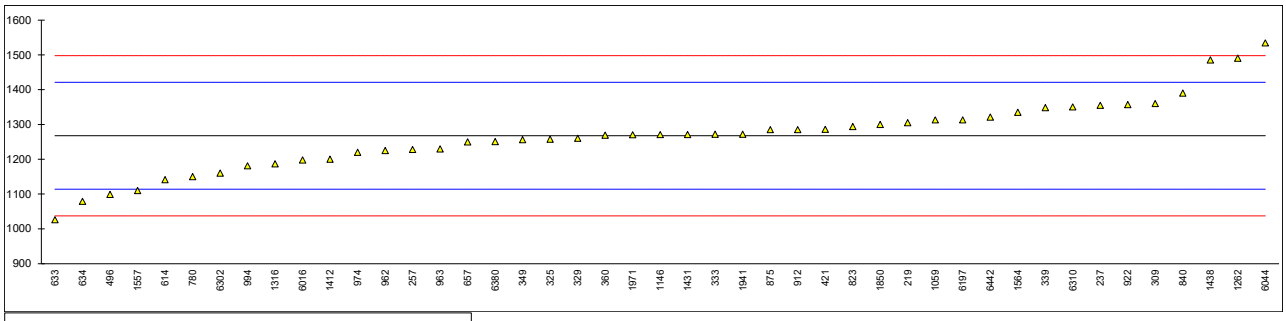


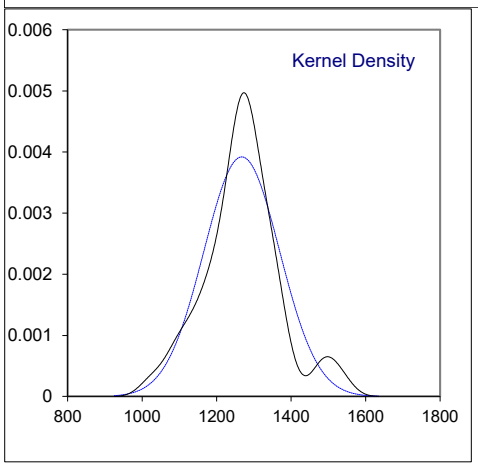
Determination of Zinc as Zn on sample #22085; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
178		-----		-----	
179		-----		-----	
211		-----		-----	
219	D5185	1305		0.49	
237	D5185	1355		1.14	
254		-----		-----	
256		-----		-----	
257	D6595	1228		-0.51	
309	D5185	1360		1.20	
325	D5185	1257.5		-0.13	
329	D5185	1260		-0.10	
333	D5185	1272		0.06	
339	INH-047	1348		1.05	
349	D5185	1256		-0.15	
360	D5185	1269		0.02	
398		-----		-----	
421	D5185	1286	C	0.24	First reported 908
432		-----		-----	
496	D5185	1099		-2.20	
614	D5185	1141		-1.65	
633	D6595	1026		-3.15	
634	D6595	1079		-2.46	
657	D5185	1250		-0.23	
780	D5185	1150		-1.53	
823	D5185	1294		0.34	
840	D4951	1390		1.60	
862		-----		-----	
875	D5185	1285		0.23	
912	D5185	1285		0.23	
922	D5185	1357		1.17	
962	D5185	1225		-0.55	
963	D5185	1229.72		-0.49	
974	D5185	1220		-0.62	
994	D5185	1181		-1.13	
1017		-----		-----	
1059	In house	1313		0.59	
1091		-----		-----	
1146	In house	1270.5		0.04	
1173		-----		-----	
1213		-----		-----	
1235		-----		-----	
1262	D5185	1490		2.90	
1316	D5185	1187		-1.05	
1326		-----		-----	
1328		-----		-----	
1409		-----		-----	
1412	D5185	1200		-0.88	
1431	D7751	1271		0.05	
1438		1485		2.83	
1444		-----		-----	
1460		-----		-----	
1476		-----		-----	
1557	In house	1110		-2.05	
1564	D4951	1335		0.88	
1581		-----		-----	
1720		-----		-----	
1748		-----		-----	
1761		-----		-----	
1797		-----		-----	
1799		-----		-----	
1850	In house	1300		0.42	
1877		-----		-----	
1941	D5185	1272		0.06	
1969		-----		-----	
1971		1270	C	0.03	First reported 0.68 mg/kg
3179		-----		-----	
6016	D6595	1197.9		-0.91	
6032		-----		-----	
6044	D5185	1534		3.47	
6068		-----		-----	
6183		-----		-----	
6197		1313		0.59	
6257		-----		-----	

lab	method	value	mark	z(targ)	remarks
6266		-----		-----	
6302	D5185	1160		-1.40	
6310		1350		1.07	
6359		-----		-----	
6380	D5185	1250.62		-0.22	
6442		1321		0.70	
6454		-----		-----	
6455		-----		-----	
6492		-----		-----	
6493		-----		-----	

normality	OK
n	45
outliers	0
mean (n)	1267.52
st.dev. (n)	101.781
R(calc.)	284.99
st.dev.(D5185:18)	76.766
R(D5185:18)	214.94





APPENDIX 2

Number of participants per country

1 lab in AUSTRALIA
1 lab in AUSTRIA
2 labs in AZERBAIJAN
7 labs in BELGIUM
2 labs in BULGARIA
3 labs in CHINA, People's Republic
1 lab in CROATIA
1 lab in CZECH REPUBLIC
1 lab in EGYPT
3 labs in FRANCE
3 labs in GERMANY
3 labs in GREECE
1 lab in INDIA
1 lab in ISRAEL
1 lab in ITALY
1 lab in JORDAN
1 lab in KAZAKHSTAN
1 lab in KENYA
2 labs in KOREA, Republic of
1 lab in MALAYSIA
2 labs in MOROCCO
2 labs in NETHERLANDS
1 lab in NIGERIA
2 labs in PAKISTAN
2 labs in PERU
2 labs in PHILIPPINES
5 labs in POLAND
1 lab in PORTUGAL
2 labs 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 SPAIN
1 lab in SUDAN
1 lab in SWEDEN
3 labs in TANZANIA
1 lab in TUNISIA
2 labs in UNITED ARAB EMIRATES
3 labs in UNITED KINGDOM
3 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	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
8 J.N. Miller, Analyst, 118, 455, (1993)
9 Analytical Methods Committee, Technical Brief, No 4, January 2001
10 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)
11 W. Horwitz and R. Albert, J. AOAC Int, 79.3, 589-621, (1996)
12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)