Results of Proficiency Test
Base Oil
May 2019

Organised by: Institute for Interlaboratory Studies
Spijkenisse, The Netherlands

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CONTENTS

1 INTRODUCTION

Since 2013, the Institute for Interlaboratory Studies (iis) organizes a proficiency test for Base Oil every year. During the annual proficiency testing program 2018/2019, it was decided to continue the round robin for the analysis of Base Oil.
In this interlaboratory study 63 laboratories in 34 different countries registered for participation. See appendix 2 for the number of participants per country. In this report, the results of the 2019 Base Oil 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 analyses for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. It was decided to send one sample of Base Oil in a 1 litre bottle labelled #19080.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

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

2.2 PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organization, 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

Approximately 200 litres of Base Oil was obtained from a local supplier. After homogenisation, 80 amber glass bottles of 1 litre were filled and labelled #19080. The homogeneity of the subsamples #19080 was checked by determination of Density at 15°C in accordance with ISO 12185 and Kinematic Viscosity at 40°C in accordance with ASTM D445 on 8 stratified randomly selected samples.

	Density at 15°C in kg/L	Kinematic Viscosity at 40°C in mm^2/s
Sample #19080-1	0.86707	21.12
Sample #19080-2	0.86706	21.12
Sample #19080-3	0.86707	21.12
Sample #19080-4	0.86705	21.12
Sample #19080-5	0.86707	21.12
Sample #19080-6	0.86706	21.12
Sample #19080-7	0.86707	21.12
Sample #19080-8	0.86707	21.12

Table 1: homogeneity test results of Base Oil subsamples #19080

From the above test results the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibility of the reference test methods in agreement with the procedure of ISO 13528, Annex B2 in the next table.

	Density at 15°C in kg/L	Kinematic Viscosity at 40°C in mm^2/s
r (observed)	0.00002	0.00
reference test method	ASTM D4052:18a	ASTM D445:18
0.3 x R (ref. test method)	0.00015	0.09

Table 2: evaluation of the repeatabilities of subsamples #19080

The calculated repeatabilities were in agreement with 0.3 times the corresponding reproducibility of the reference test methods. Therefore, homogeneity of the subsamples #19080 was assumed.

To each of the participating laboratories, one sample of a 1L amber glass bottle labelled #19080 was sent on May 1st, 2019. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

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

2.6 ANALYSES

The participants were requested to determine on sample #19080: Acid Number (Total), Air-release time at 50°C, Color ASTM, Conradson Carbon Residue, Ramsbottom Carbon Residue, Density at 15°C, Evaporation loss by Noack test, Flash Point C.O.C., Kinematic Viscosity at 40°C and 100°C, Viscosity Index, Viscosity Stabinger at 40°C and 100°C, Pour Point (manual and automated), Rust prevention (synthetic seawater), Sulfur, Water and Water Separability at 54°C.

It was explicitly requested to treat the sample as if it was a routine sample and to report the test results using the indicated units on the report form and not to round the test results, but report as much significant figures as possible. It was also requested not to report 'less than' test results, which are above the detection limit, because such test results cannot be used for meaningful statistical evaluations.

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

3 RESULTS

During five weeks after sample dispatch, the test results of the participants 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 reanalyses). Additional or corrected test results are used for data analysis and original test results are placed under 'Remarks' in the test result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organization, 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.

According to ISO5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value, the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. 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 was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements, e.g. ASTM or IP reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation of this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other targets values were used. In some cases a reproducibility based on former iis proficiency tests could be used.

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test, no problems were encountered during the dispatch of the samples. Four participants did not report any test results at all and three participants reported test results after the final reporting date. In total 59 participants reported 567 test results. Observed were 15 outlying results, which is 2.6% of the numerical results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

Not all original data sets proved to have a normal Gaussian distribution. These are referred to as “not OK” or “suspect”. The statistical evaluation of these data sets should be used with due care, see also paragraph 3.1.

4.1 EVALUATION PER TEST

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

In the iis PT reports, ASTM methods are referred to with a number e.g. D189 and an added designation for the year that the method was adopted or revised e.g. D189:06. If applicable, a designation in parentheses is added to designate the year of reapproval e.g. D189:06(2014). In the results tables of appendix 1 only the method number and year of adoption or revision e.g. D189:06 will be used.

Acid Number (Total): 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 D974:14e2.

Air-release time: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D3427:15.

Color ASTM: This determination was not problematic. Three statistical outliers were observed and two other test results were excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D1500:12(2017).

Conradson CR: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D189:06(2014) and in agreement with the requirements of D4530:15.

Ramsbottom CR: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D524:15.

Density at 15°C: This determination was not problematic. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D4052:18a.

Evaporation loss by Noack test: 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 D5800-B:18a.

Flash Point C.O.C.: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D92:18.

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

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

Viscosity Index: This determination was very problematic. One statistical outlier was observed and two other test results were excluded from the statistical evaluation. The specific Base Oil that was used in this PT was low in viscosity. This low viscosity, especially the Kinematic Viscosity at 100°C, has a major influence on the calculated Viscosity Index causing large variation in the results while the measured kinematic viscosity test results are in agreement with the requirements of ASTM D445:18 (see above). Therefore, it was decided not to calculate z-scores.
For example: KV40°C= 21.24 and KV100°C= 4.198 both with a small

positive z-score. The calculated Viscosity Index according to ASTM D2270 would be 99.3, rounded to 99. However, if this participant would have measured a slightly different value for KV100°C, say the group mean value of 4.163 the Viscosity Index would have been 94.7 rounded to 95. Thus 1% difference in viscosity 100°C results yielded a 4% difference in Viscosity Index.

Viscosity Stab. at 40°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D7042:16e3.

Viscosity Stab. 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 of ASTM D7042:16e3.

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

Pour Point automated: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5950:14.

Rust prevention: Regretfully, only three participants reported a test result. Two participants reported the presence of rust (Fail/ Severe rusting) and 1 participant reported “Pass”.

Sulfur: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with both the requirements of ASTM D4294:16e1 and ASTM D2622:16. It was decided to use ASTM D4294 as reference test method as the majority of the group reported to use this method.

Water: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6304:16e1.

Water separability: This determination was not problematic. In total, two statistical outliers were observed. All calculated reproducibilities after rejection of the statistical outliers are in agreement with the requirements of ASTM D1401:18b. ASTM D1401 describes complete break as ‘40-40-0’ only, whereas a complete break also was interpreted as ‘no emulsion layer present’. Most reporting participants reported the complete break as 40-40-0.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant reference test method and the reproducibility as found for the group of participating

laboratories. The number of significant test results, the average result, the calculated reproducibility (2.8 * sd) and the target reproducibility derived from literature reference test methods (in casu ASTM standards) are compared in the next table.

Parameter	unit	n	average	2.8 * sd	R(lit)
Acid Number, Total	mg KOH/g	32	0.012	0.013	0.04
Air-release time at 50°C	minutes	12	1.4	1.6	1.5
Color ASTM		49	0.77	0.25	1
Conradson Carbon Residue	%M/M	14	0.010	0.021	0.023
Ramsbottom Carbon Residue	%M/M	6	0.052	0.028	0.028
Density at 15°C	kg/L	54	0.8671	0.0004	0.0005
Evaporation loss by Noack	%M/M	26	25.5	2.6	2.7
Flash Point C.O.C.	°C	50	207	14	18
Kinematic Viscosity at 40°C	mm^2/s	53	21.11	0.17	0.29
Kinematic Viscosity at 100°C	mm^2/s	51	4.163	0.045	0.079
Viscosity Index		46	96.5	(5.6)	(2)
Viscosity Stabinger at 40°C	mm^2/s	14	21.13	0.10	0.12
Viscosity Stabinger at 100°C	mm^2/s	13	4.173	0.041	0.027
Pour Point manual	°C	34	-12.3	2.4	9
Pour Point automated (Δ 1°C)	°C	23	-12.9	3.1	4.5
Sulfur	%M/M	30	0.701	0.040	0.058
Water	mg/kg	49	55.4	66.4	187.8
Water Separability at 54°C					
- Time to reach ≤ 3mL	minutes	16	6.3	9.5	20
- Time to reach 37mL of water	minutes	14	5.5	6.6	20
- Time complete break	minutes	13	7.6	11.5	20

Table 3: reproducibilities of tests on sample #19080

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

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

	May 2019	May 2018	May 2017	May 2016	May 2015
Number of reporting laboratories	59	57	56	50	43
Number of test results	567	462	547	542	397
Number of statistical outliers	15	19	19	22	11
Percentage outliers	2.6%	4.1%	3.5%	4.1%	2.8%

Table 4: comparison with previous proficiency tests

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

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

Parameter	May 2019	May 2018	May 2017	May 2016	May 2015
Acid Number, Total	++	+/-	+	++	+
Air-release time at 50°C	+/-	+/-	+	+/-	+
Color ASTM	++	n.e.	n.e.	+	n.e.
Conradson Carbon Residue	+/-	++	+	++	+
Ramsbottom Carbon Residue	+/-	-	+/-	+/-	-
Density at 15°C	+	+/-	+/-	+	-
Evaporation loss by Noack	+/-	+/-	+	+	+
Flash Point C.O.C.	+	+	+/-	+	+
Kinematic Viscosity at 40°C	+	+	++	++	+
Kinematic Viscosity at 100°C	+	++	+	++	++
Viscosity Index	n.e.	+/-	-	--	-
Viscosity Stabinger at 40°C	+	+/-	-	-	--
Viscosity Stabinger at 100°C	-	-	-	-	--
Pour Point manual	++	--	+	++	++
Pour Point automated (Δ 1°C)	+	-	-	+	+/-
Rust Prevention (synth.seawater)	n.e.	n.e.	n.e.	n.e.	n.e.
Sulfur	+	n.e.	n.e.	+/-	n.e.
Water	++	++	++	++	++
Water Separability at 54°C	++	++	++	++	++

Table 5: comparison determinations against the respective reference test methods

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

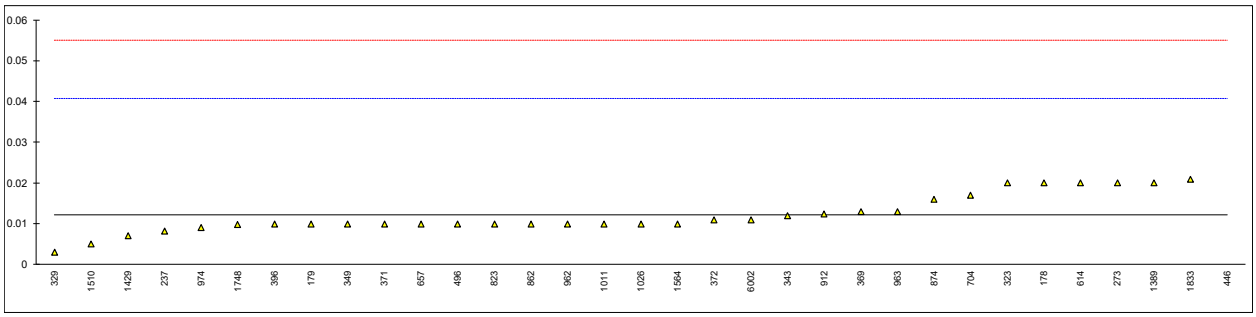
++: group performed much better than the reference test method
+ : group performed better than the reference test method
+/-: group performance equals the reference test method
- : group performed worse than the reference test method
-- : group performed much worse than the reference test method
n.e.: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

APPENDIX 1

Determination of Acid Number (Total) on sample #19080; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
150	D664-A	<0.10	C	-----	first reported 0.11
171	D974	<0.02		-----	
173		-----		-----	
178	D974	0.02	C	0.55	first reported 0.06
179	D974	0.01		-0.15	
237	D974	0.0081388		-0.28	
273	D974	0.020		0.55	
311	D664-A	<0.10		-----	
323	D974	0.02		0.55	
325	D664-A	<0.01		-----	
329	D974	0.003		-0.64	
333		-----		-----	
343	D664-A	0.012		-0.01	
349	D664-A	0.01		-0.15	
357		-----		-----	
369	D974	0.013		0.06	
371	D974	0.01		-0.15	
372	D974	0.011		-0.08	
396	D974	0.010		-0.15	
432		-----		-----	
446	D974	0.08	R(0.01)	4.75	
485		-----		-----	
496	D974	0.01		-0.15	
551	D974	<0.02		-----	
601		-----		-----	
603		-----		-----	
614	D664-A	0.02		0.55	
657	D974	0.01		-0.15	
704	D974	0.017		0.34	
785		-----		-----	
823	D974	0.01		-0.15	
862	D974	0.01		-0.15	
874	D974	0.016		0.27	
875		-----		-----	
886		-----		-----	
912	D974	0.0124	C	0.02	first reported 0.124
913		-----		-----	
922	D664-A	<0.01		-----	
962	D974	0.01		-0.15	
963	D974	0.013		0.06	
974	D974	0.009		-0.22	
982		-----		-----	
1011	D664-A	0.01		-0.15	
1026	D664-A	0.01		-0.15	
1081		-----		-----	
1082		-----		-----	
1191		-----		-----	
1243	ISO6618	<0,01		-----	
1349	D664-A	<0.1		-----	
1389	D664-A	0.02		0.55	
1429	D974	0.007		-0.36	
1510	D974	0.005	C	-0.50	first reported 0.045
1564	D664-A	0.01		-0.15	
1728		-----		-----	
1748	D664-A	0.0098		-0.16	
1833	D664-A	0.0209		0.61	
1862		-----		-----	
1877		-----		-----	
6002	D664-A	0.011		-0.08	
6016		-----		-----	
6048	D974	<0,01		-----	
6113		-----		-----	
6183		-----		-----	

normality	OK
n	32
outliers	1
mean (n)	0.0121
st.dev. (n)	0.00467
R(calc.)	0.0131
st.dev.(D974:14e2)	0.01429
R(D974:14e2)	0.04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0.05
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0
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1510
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237
974
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179
349
371
657
496
823
862
962
1011
1026
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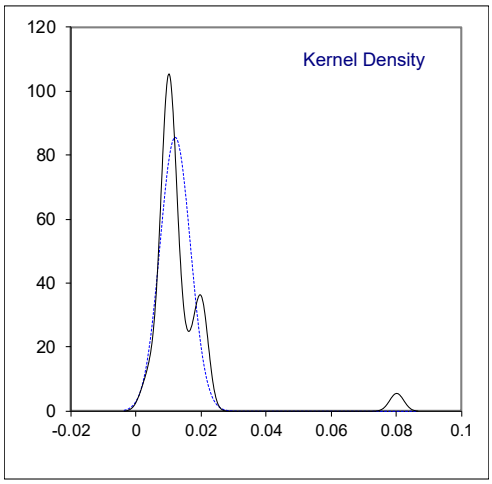
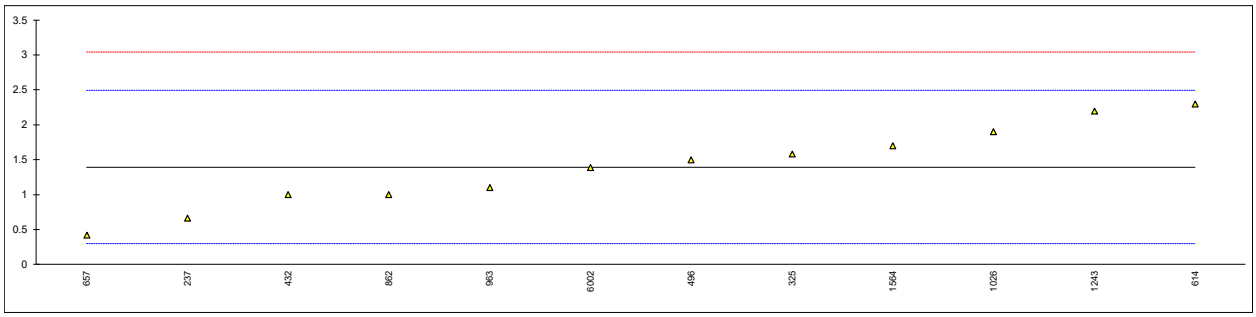
6002
343
912
369
963
874
704
323
178
614
273
1389
1833
446

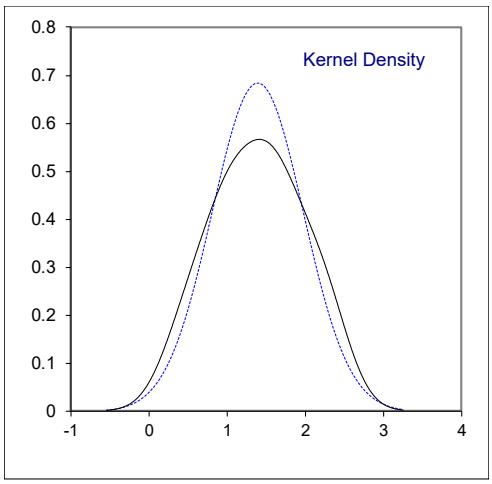

Kernel Density
120
100
80
60
40
20
0
-0.02
0
0.02
0.04
0.06
0.08
0.1

Determination of Air-release time at 50°C on sample #19080; results in minutes

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237	D3427	0.66		-1.34	
273		-----		-----	
311		-----		-----	
323		-----		-----	
325	D3427	1.583333		0.34	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
357		-----		-----	
369		-----		-----	
371		-----		-----	
372		-----		-----	
396		-----		-----	
432	ISO9120	1.0		-0.72	
446		-----		-----	
485		-----		-----	
496	D3427	1.5		0.19	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614	D3427	2.3		1.65	
657	D3427	0.42		-1.78	
704		-----		-----	
785		-----		-----	
823		-----		-----	
862	D3427	1.0		-0.72	
874		-----		-----	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963	D3427	1.1		-0.54	
974		-----		-----	
982		-----		-----	
1011		-----		-----	
1026	D3427	1.9		0.92	
1081		-----		-----	
1082		-----		-----	
1191		-----		-----	
1243	ISO9120	2.2		1.47	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1510		-----		-----	
1564	D3427	1.7		0.55	
1728		-----		-----	
1748		-----		-----	
1833		-----		-----	
1862		-----		-----	
1877		-----		-----	
6002	ISO9120	1.39	C	-0.01	first reported 3.39
6016		-----		-----	
6048		-----		-----	
6113		-----		-----	
6183		-----		-----	

normality	OK
n	12
outliers	0
mean (n)	1.396
st.dev. (n)	0.5840
R(calc.)	1.635
st.dev.(D3427:15)	0.5486
R(D3427:15)	1.536


3.5
3
2.5
2
1.5
1
0.5
0
657
237
432
862
963
6002
496
325
1564
1026
1243
614

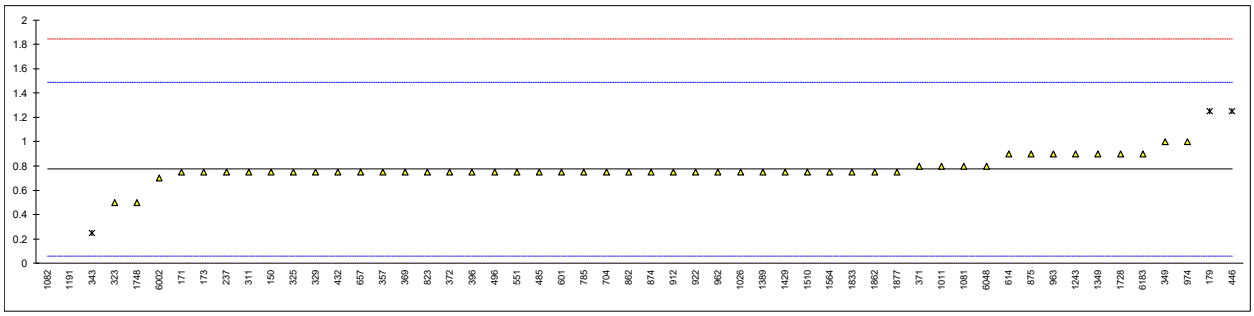

Kernel Density
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-1
0
1
2
3
4

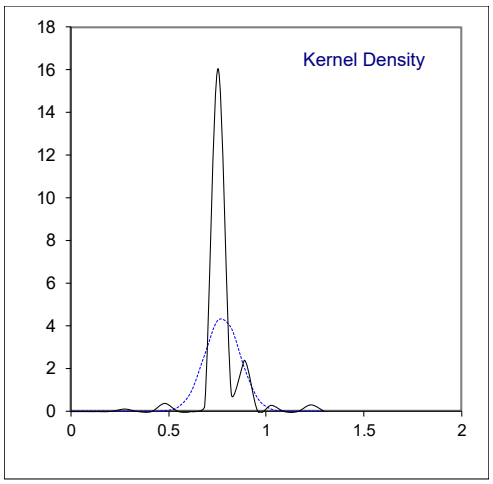
Determination of Color ASTM on sample #19080;

lab	method	reported test value	iis conversion*	mark	z(targ)	remarks
150	D6045	L1.0	0.75		-0.07	
171	D1500	L1.0	0.75		-0.07	
173	D1500	L1.0	0.75		-0.07	
178		-----	-----		-----	
179	D1500	L1.5	1.25	G(0.01)	1.33	
237	D1500	L 1.0	0.75		-0.07	
273		-----	-----		-----	
311	D1500	L1.0	0.75		-0.07	
323	D1500	0.5	0.5		-0.77	
325	D6045	L1.0	0.75		-0.07	
329	D1500	L1.0	0.75		-0.07	
333		-----	-----		-----	
343	D1500	L0.5	0.25	G(0.01)	-1.47	
349	D6045	1.0	1		0.63	
357	D6045	L1,0	0.75		-0.07	
369	D1500	<1.0	0.75		-0.07	
371	D6045	0.8	0.8		0.07	
372	D1500	<1.0	0.75		-0.07	
396	D1500	L1	0.75		-0.07	
432	D1500	L1,0	0.75		-0.07	
446	D1500	<1.5	1.25	G(0.05)	1.33	
485	D1500	L 1.0	0.75		-0.07	
496	D1500	L1.0	0.75		-0.07	
551	D1500	L1.0	0.75		-0.07	
601	D1500	L1.0	0.75		-0.07	
603		-----	-----		-----	
614	D1500	0.9	0.9		0.35	
657	D1500	L1.0	0.75		-0.07	
704	D1500	L 1.0	0.75		-0.07	
785	D6045	<1	0.75		-0.07	
823	D1500	L1.0	0.75		-0.07	
862	D1500	L1.0	0.75		-0.07	
874	D1500	<1.0	0.75		-0.07	
875	D6045	0.9	0.9		0.35	
886		-----	-----		-----	
912	D1500	<1	0.75		-0.07	
913		-----	-----		-----	
922	D1500	L1.0	0.75		-0.07	
962	D1500	L1.0	0.75		-0.07	
963	D1500	0.9	0.9		0.35	
974	D1500	1.0	1		0.63	
982		-----	-----		-----	
1011	D1500	0.8	0.8		0.07	
1026	D1500	L1.0	0.75		-0.07	
1081	D6045	0.8	0.8		0.07	
1082	D6045	-16	-16	ex	-46.97	test value not in terms of ASTM color
1191	D6045	-16	-16	ex	-46.97	test value not in terms of ASTM color
1243	ISO2049	0.9	0.9		0.35	
1349	D6045	0.9	0.9		0.35	
1389	D1500	L1.0	0.75		-0.07	
1429	D1500	L1.0	0.75		-0.07	
1510	D1500	L1.0	0.75		-0.07	
1564	D1500	L1	0.75		-0.07	
1728	D1500	0.9	0.9		0.35	
1748	D1500	0.5	0.5		-0.77	
1833	D1500	<1	0.75		-0.07	
1862	D1500	L1.0	0.75		-0.07	
1877	D6045	L1.0	0.75		-0.07	
6002	In house	0.7	0.7		-0.21	
6016		-----	-----		-----	
6048	D1500	0.8	0.8		0.07	
6113		-----	-----		-----	
6183	D1500	0.9	0.9		0.35	

normality	not OK
n	49
outliers	3 +2ex
mean (n)	0.77
st.dev. (n)	0.090
R(calc.)	0.25
st.dev.(D1500:12)	0.357
R(D1500:12)	1

* In the calculation of the mean, standard deviation and the reproducibility of this column, a reported value of 'L y' is converted by iis into y-0.25 (for example L1.0 into 0.75)

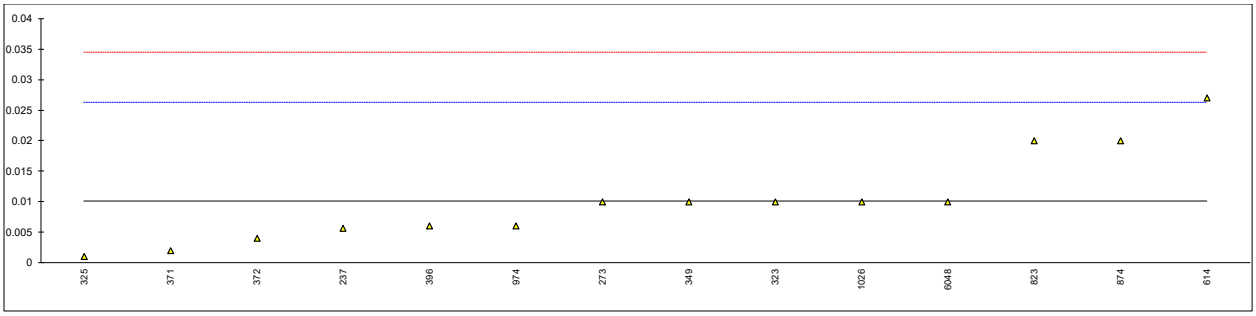

2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1082 1191 343 323 1748 6002 171 173 237 311 150 325 329 432 657 357 369 823 372 396 496 551 485 601 785 704 862 874 912 922 962 1026 1389 1429 1510 1564 1833 1862 1877 371 1011 1081 6048 614 875 963 1243 1349 1728 6183 349 974 179 446

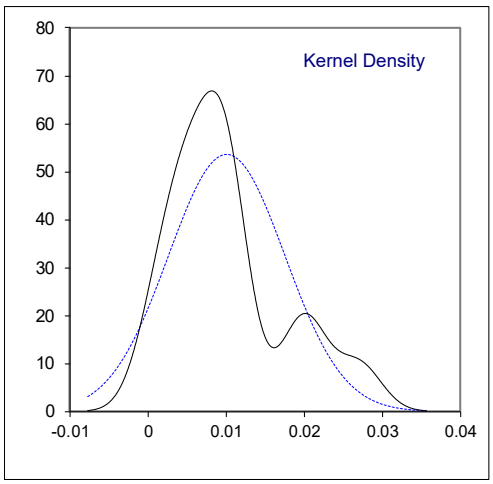

Kernel Density
18
16
14
12
10
8
6
4
2
0
0
0.5
1
1.5
2

Determination of Conradson Carbon Residue on sample #19080; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	D4530	<0.10		-----	
171	D189	<0.01		-----	
173		-----		-----	
178		-----		-----	
179	D189	<0.01		-----	
237	D189	0.005621		-0.55	
273	D189	0.01		-0.01	
311	D4530	<0.10		-----	
323	D4530	0.01		-0.01	
325	D4530	0.001		-1.12	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349	D189	0.01		-0.01	
357		-----		-----	
369	D4530	<0.01		-----	
371	D189	0.002		-1.00	
372	D189	0.004		-0.75	
396	D189	0.006		-0.51	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496		-----		-----	
551	D4530	L0.10		-----	
601		-----		-----	
603		-----		-----	
614	D189	0.027		2.08	
657	D4530	<0.10		-----	
704	D4530	< 0.1		-----	
785	D4530	<0.10		-----	
823	D189	0.02		1.22	
862	D4530	<0.01		-----	
874	D4530	0.02		1.22	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922	D189	<0.01		-----	
962		-----		-----	
963		-----		-----	
974	D189	0.006		-0.51	
982		-----		-----	
1011		-----		-----	
1026	D4530	0.01		-0.01	
1081		-----		-----	
1082		-----		-----	
1191		-----		-----	
1243	ISO6615	<0,01		-----	
1349		-----		-----	
1389	D4530	<0.10	C	-----	first reported 0.55
1429		-----		-----	
1510		-----		-----	
1564		-----		-----	
1728		-----		-----	
1748		-----		-----	
1833	D4530	<0,1		-----	
1862		-----		-----	
1877		-----		-----	
6002		-----		-----	
6016		-----		-----	
6048	D4530	0.01		-0.01	
6113		-----		-----	
6183		-----		-----	

	normality	suspect
	n	14
	outliers	0
	mean (n)	0.0101
	st.dev. (n)	0.00745
	R(calc.)	0.0209
	st.dev.(D189:06)	0.00811
	R(D189:06)	0.0227
Compare		
	R(D4530:15)	0.1409

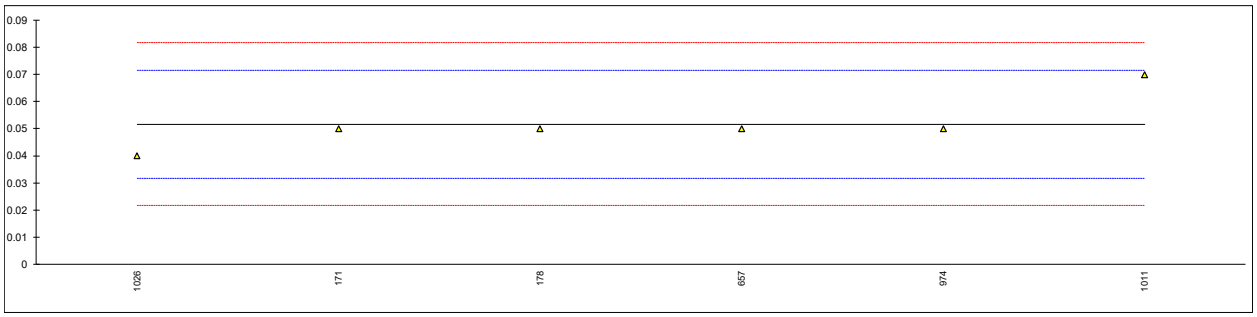

0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
325
371
372
237
396
974
273
349
323
1026
6048
823
874
614


Kernel Density
80
70
60
50
40
30
20
10
0
-0.01
0
0.01
0.02
0.03
0.04

Determination of Ramsbottom Carbon Residue on sample #19080; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D524	0.05		-0.17	
173		-----		-----	
178	D524	0.05		-0.17	
179		-----		-----	
237		-----		-----	
273		-----		-----	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
357		-----		-----	
369		-----		-----	
371		-----		-----	
372		-----		-----	
396		-----		-----	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D524	0.05		-0.17	
704		-----		-----	
785		-----		-----	
823		-----		-----	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D524	0.05		-0.17	
982		-----		-----	
1011	D524	0.07		1.84	
1026	D524	0.04		-1.17	
1081		-----		-----	
1082		-----		-----	
1191		-----		-----	
1243		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1510		-----		-----	
1564		-----		-----	
1728		-----		-----	
1748		-----		-----	
1833		-----		-----	
1862		-----		-----	
1877		-----		-----	
6002		-----		-----	
6016		-----		-----	
6048		-----		-----	
6113		-----		-----	
6183		-----		-----	

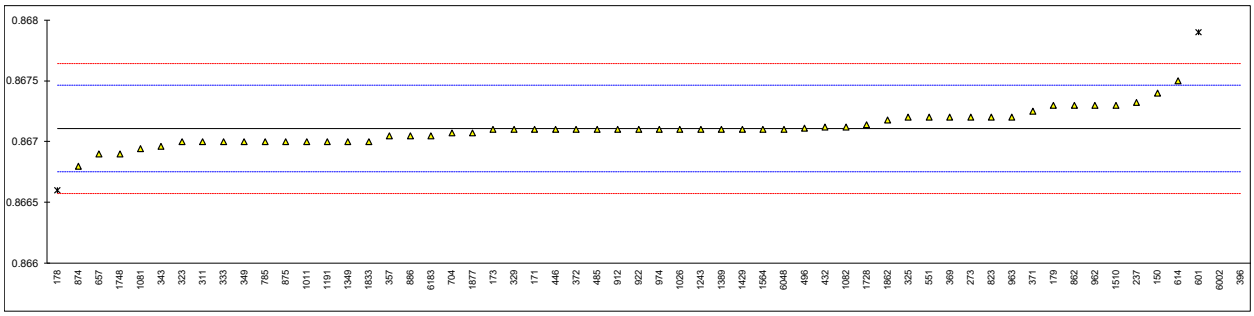
normality	unknown
n	6
outliers	0
mean (n)	0.0517
st.dev. (n)	0.00983
R(calc.)	0.0275
st.dev.(D524:15)	0.00998
R(D524:15)	0.0279

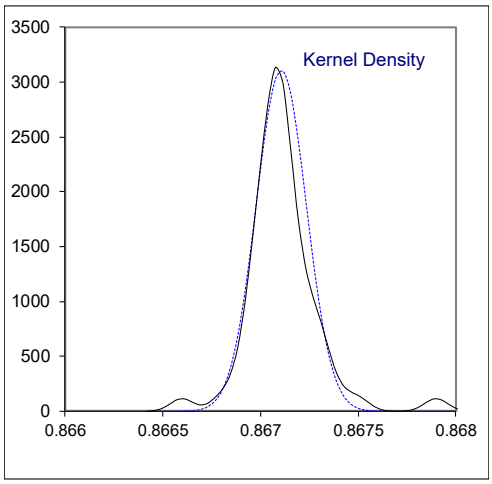

0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1026
171
178
657
974
1011

Determination of Density at 15°C on sample #19080; results in kg/L

lab	method	value	mark	z(targ)	remarks
150	D4052	0.8674		1.64	
171	D4052	0.8671		-0.04	
173	D4052	0.8671		-0.04	
178	D4052	0.8666	R(0.01)	-2.84	
179	D4052	0.8673		1.08	
237	D4052	0.86732		1.19	
273	D4052	0.8672		0.52	
311	D4052	0.8670		-0.60	
323	D4052	0.8670		-0.60	
325	D4052	0.8672		0.52	
329	D4052	0.8671		-0.04	
333	D4052	0.8670		-0.60	
343	D4052	0.86696		-0.83	
349	D4052	0.8670		-0.60	
357	D4052	0.86705		-0.32	
369	D4052	0.8672		0.52	
371	D4052	0.86725		0.80	
372	D4052	0.8671		-0.04	
396	D4052	0.8761	R(0.01)	50.36	
432	D4052	0.86712		0.07	
446	D4052	0.8671		-0.04	
485	D4052	0.8671	C	-0.04	first reported 0.8671 kg/m^3
496	D4052	0.86711		0.01	
551	D4052	0.8672		0.52	
601	D1298	0.8679	R(0.01)	4.44	
603		-----		-----	
614	D4052	0.8675		2.20	
657	D4052	0.8669		-1.16	
704	D4052	0.86707		-0.21	
785	D4052	0.8670		-0.60	
823	D4052	0.8672		0.52	
862	D4052	0.8673		1.08	
874	D4052	0.8668		-1.72	
875	D4052	0.8670		-0.60	
886	D4052	0.86705		-0.32	
912	D4052	0.8671		-0.04	
913		-----		-----	
922	D4052	0.8671		-0.04	
962	D4052	0.8673		1.08	
963	D4052	0.8672		0.52	
974	D4052	0.8671		-0.04	
982		-----		-----	
1011	D4052	0.8670		-0.60	
1026	D4052	0.8671		-0.04	
1081	D4052	0.86694		-0.94	
1082	ISO12185	0.86712		0.07	
1191	ISO12185	0.8670		-0.60	
1243	ISO12185	0.8671		-0.04	
1349	IP365	0.8670		-0.60	
1389	D4052	0.8671		-0.04	
1429	D4052	0.8671		-0.04	
1510	D4052	0.86730		1.08	
1564	D4052	0.8671		-0.04	
1728	D4052	0.86714		0.18	
1748	D4052	0.8669		-1.16	
1833	ISO12185	0.8670		-0.60	
1862	D4052	0.86718		0.41	
1877	D4052	0.86707		-0.21	
6002	ISO12185	0.8686	R(0.01)	8.36	
6016		-----		-----	
6048	ISO12185	0.8671		-0.04	
6113		-----		-----	
6183	D4052	0.86705		-0.32	

normality	suspect
n	54
outliers	4
mean (n)	0.86711
st.dev. (n)	0.000128
R(calc.)	0.00036
st.dev.(D4052:18a)	0.000179
R(D4052:18a)	0.0005

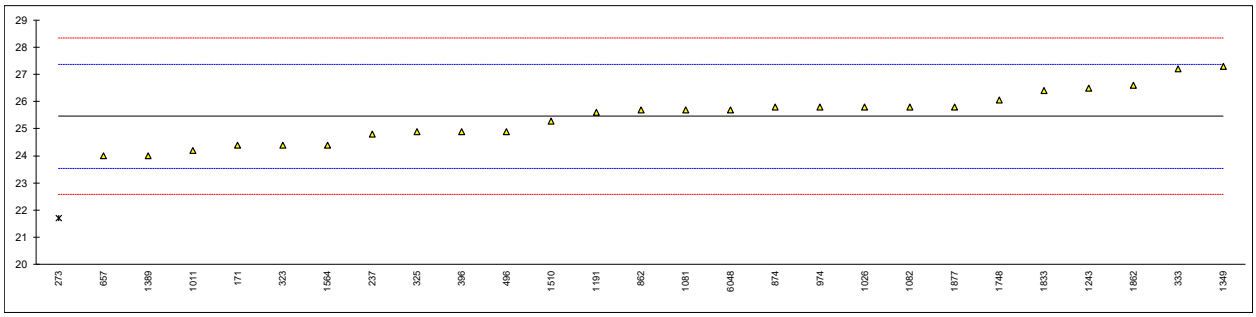

0.868
0.8675
0.867
0.8665
0.866
178 874 657 1748 1081 343 323 311 333 349 785 875 1011 1191 1349 1833 357 886 6183 704 1877 173 329 171 446 372 485 912 922 974 1026 1243 1389 1429 1564 6048 496 432 1082 1728 1862 325 551 369 273 823 963 371 179 862 962 1510 237 150 614 601 6002 396

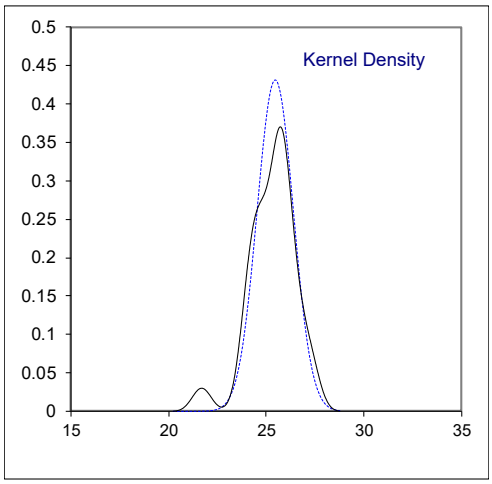

Kernel Density
3500
3000
2500
2000
1500
1000
500
0
0.866
0.8665
0.867
0.8675
0.868

Determination of Evaporation loss by Noack test on sample #19080; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D5800-B	24.4		-1.10	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237	D5800-B	24.8		-0.69	
273	D5800-A	21.7	R(0.05)	-3.92	
311		-----		-----	
323	D5800-B	24.4		-1.10	
325	CEC L-40-93	24.9		-0.58	
329		-----		-----	
333	CEC L-40-93	27.2		1.82	
343		-----		-----	
349		-----		-----	
357		-----		-----	
369		-----		-----	
371		-----		-----	
372		-----		-----	
396	D5800-B	24.9		-0.58	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496	D5800-B	24.9		-0.58	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D5800-B	24.0		-1.52	
704		-----		-----	
785		-----		-----	
823		-----		-----	
862	D5800-B	25.7		0.25	
874	D5800-B	25.8		0.36	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D5800-B	25.8		0.36	
982		-----		-----	
1011	CEC L-40-93	24.2		-1.31	
1026	CEC L-40-93	25.8		0.36	
1081	D5800-B	25.7		0.25	
1082	D5800-B	25.8		0.36	
1191	D5800-B	25.6		0.15	
1243	DIN51581	26.49		1.08	
1349	D5800-B	27.3		1.92	
1389	D5800-B	24.0		-1.52	
1429		-----		-----	
1510	D5800-B	25.27		-0.20	
1564	CEC L-40-93	24.4		-1.10	
1728		-----		-----	
1748	D5800-B	26.05		0.62	
1833	D5800-B	26.4		0.98	
1862	D5800-B	26.6	C	1.19	first reported 23.4
1877	D5800-B	25.8		0.36	
6002		-----		-----	
6016		-----		-----	
6048	DIN51581	25.7		0.25	
6113		-----		-----	
6183		-----		-----	

normality	OK
n	26
outliers	1
mean (n)	25.458
st.dev. (n)	0.9254
R(calc.)	2.591
st.dev.(D5800-B:18a)	0.9581
R(D5800-B:18a)	2.683

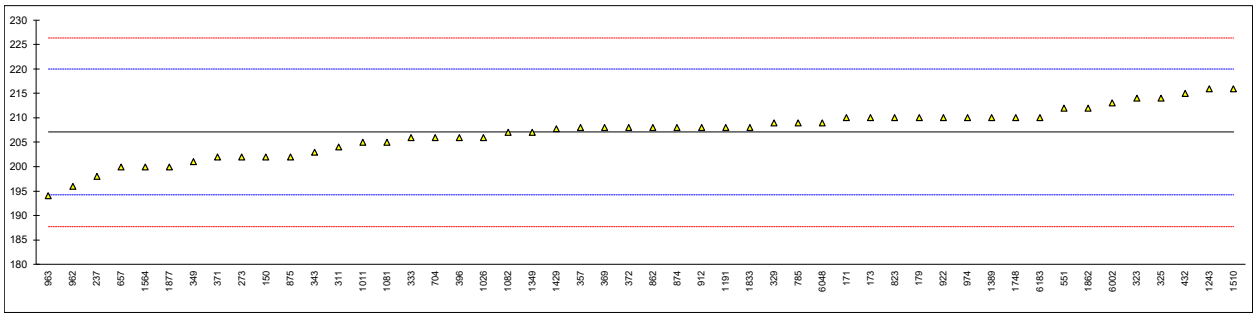

29
28
27
26
25
24
23
22
21
20
273
657
1389
1011
171
323
1564
237
325
396
496
1510
1191
862
1081
6048
874
974
1026
1082
1877
1748
1833
1243
1862
333
1349

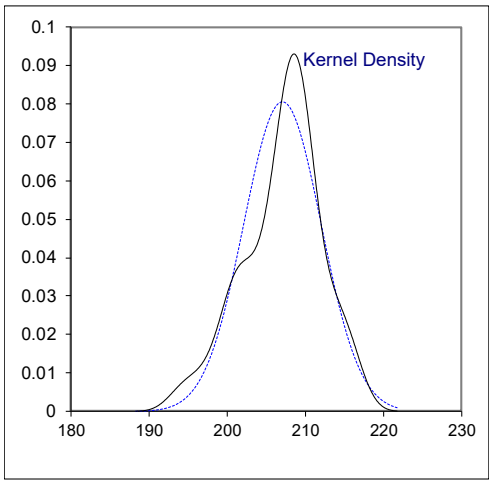

Kernel Density
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15
20
25
30
35

Determination of Flash Point C.O.C. on sample #19080; results in °C

lab	method	value	mark	z(targ)	remarks
150	D92	202		-0.79	
171	D92	210		0.46	
173	D92	210		0.46	
178		-----		-----	
179	D92	210		0.46	
237	D92	198		-1.41	
273	D92	202		-0.79	
311	D92	204		-0.48	
323	D92	214.0		1.08	
325	D92	214		1.08	
329	D92	209		0.30	
333	D92	206		-0.16	
343	D92	203		-0.63	
349	D92	201		-0.94	
357	D92	208.0		0.15	
369	D92	208.0		0.15	
371	D92	202		-0.79	
372	D92	208		0.15	
396	D92	206		-0.16	
432	D92	215.0		1.24	
446		-----		-----	
485		-----		-----	
496		-----		-----	
551	D92	212		0.77	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D92	200		-1.10	
704	D92	206.0		-0.16	
785	D92	209		0.30	
823	D92	210		0.46	
862	D92	208		0.15	
874	D92	208		0.15	
875	D92	202		-0.79	
886		-----		-----	
912	D92	208		0.15	
913		-----		-----	
922	D92	210		0.46	
962	D92	196.0		-1.72	
963	D92	194		-2.03	
974	D92	210		0.46	
982		-----		-----	
1011	D92	205		-0.32	
1026	D92	206		-0.16	
1081	D92	205.0		-0.32	
1082	ISO2592	207		-0.01	
1191	ISO2592	208		0.15	
1243	ISO2592	216		1.39	
1349	D92	207.1		0.01	
1389	D92	210.0		0.46	
1429	D92	207.8		0.12	
1510	D92	216.0		1.39	
1564	D92	200		-1.10	
1728		-----		-----	
1748	D92	210		0.46	
1833	D92	208		0.15	
1862	D92	212		0.77	
1877	D92	200		-1.10	
6002	ISO2592	213		0.92	
6016		-----		-----	
6048	ISO2592	209		0.30	
6113		-----		-----	
6183	D92	210		0.46	

normality	OK
n	50
outliers	0
mean (n)	207.06
st.dev. (n)	4.954
R(calc.)	13.87
st.dev.(D92:18)	6.429
R(D92:18)	18

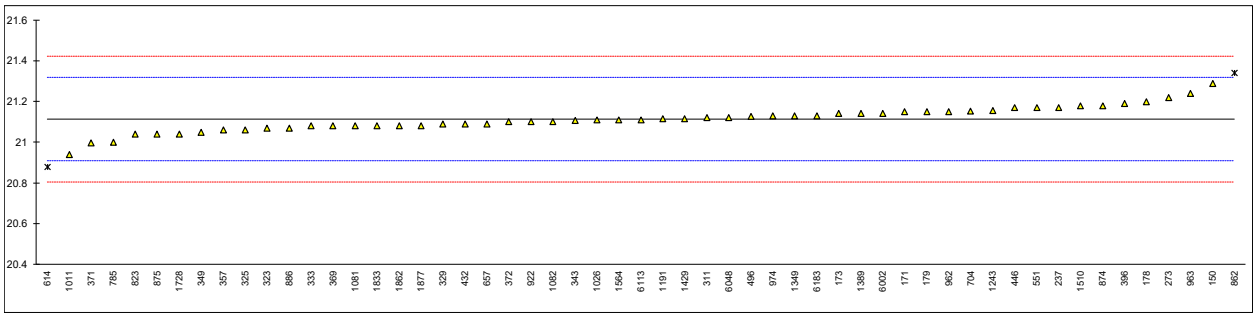

230
225
220
215
210
205
200
195
190
185
180
963
962
237
657
1564
1877
349
371
273
150
875
343
311
1011
1081
333
704
396
1026
1082
1349
1429
357
369
372
862
874
912
1191
1833
329
785
6048
171
173
823
179
922
974
1389
1748
6183
551
1862
6002
323
325
432
1243
1510

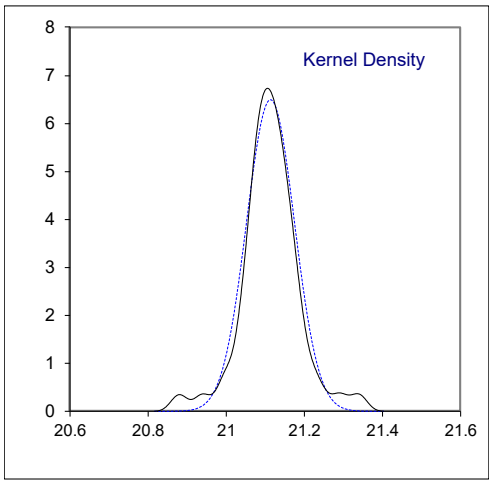

Kernel Density
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
180
190
200
210
220
230

Determination of Kinematic Viscosity at 40°C on sample #19080; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150	D445	21.29		1.72	
171	D445	21.15		0.35	
173	D445	21.14		0.26	
178	D445	21.2		0.84	
179	D445	21.15		0.35	
237	D445	21.1704		0.55	
273	D445	21.22		1.04	
311	D445	21.12		0.06	
323	D445	21.07		-0.43	
325	D445	21.06		-0.52	
329	D445	21.09		-0.23	
333	D445	21.08		-0.33	
343	D445	21.107		-0.07	
349	D445	21.05		-0.62	
357	D445	21.06	C	-0.52	first reported 98.28
369	D445	21.08		-0.33	
371	D445	20.997		-1.14	
372	D445	21.10		-0.13	
396	D445	21.19		0.74	
432	D445	21.09		-0.23	
446	D445	21.17		0.55	
485		-----		-----	
496	D445	21.126		0.12	
551	D445	21.17		0.55	
601		-----		-----	
603		-----		-----	
614	D445	20.88	R(0.05)	-2.28	
657	D445	21.09		-0.23	
704	D445	21.153		0.38	
785	D445	21.00		-1.11	
823	D445	21.04		-0.72	
862	D445	21.3398	R(0.05)	2.20	
874	D445	21.18		0.65	
875	D445	21.04		-0.72	
886	D445	21.07		-0.43	
912		-----		-----	
913		-----		-----	
922	D445	21.10		-0.13	
962	D445	21.15		0.35	
963	D445	21.24		1.23	
974	D445	21.13		0.16	
982		-----		-----	
1011	D445	20.94		-1.69	
1026	D445	21.11		-0.04	
1081	D445	21.08		-0.33	
1082	ISO3104	21.102		-0.11	
1191	ISO3104	21.114		0.00	
1243	D7279 corr. to D445	21.155		0.40	
1349	D445	21.13		0.16	
1389	D445	21.14		0.26	
1429	D445	21.116		0.02	
1510	D445	21.178		0.63	
1564	D445	21.11		-0.04	
1728	D445	21.04		-0.72	
1748		-----		-----	
1833	D445	21.08		-0.33	
1862	D445	21.080		-0.33	
1877	D445	21.08		-0.33	
6002	ISO3104	21.142		0.28	
6016		-----		-----	
6048	D445	21.12		0.06	
6113	D445	21.11		-0.04	
6183	D445	21.13		0.16	

normality	suspect
n	53
outliers	2
mean (n)	21.114
st.dev. (n)	0.0614
R(calc.)	0.172
st.dev.(D445:18)	0.1026
R(D445:18)	0.287

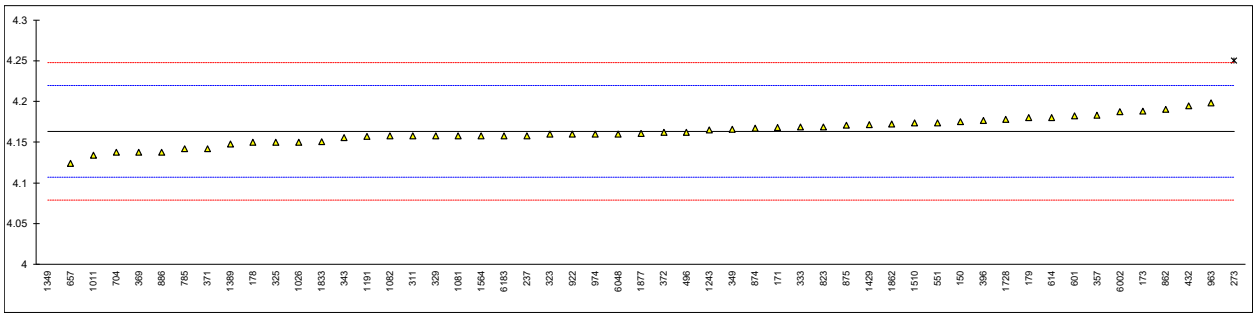

21.6
21.4
21.2
21
20.8
20.6
20.4
614 1011 371 785 823 875 1728 349 357 325 323 886 333 369 1081 1833 1862 1877 329 432 657 372 922 1082 343 1026 1564 6113 1191 1429 311 6048 496 974 1349 6183 173 1389 6002 171 179 962 704 1243 446 551 237 1510 874 396 178 273 963 150 862

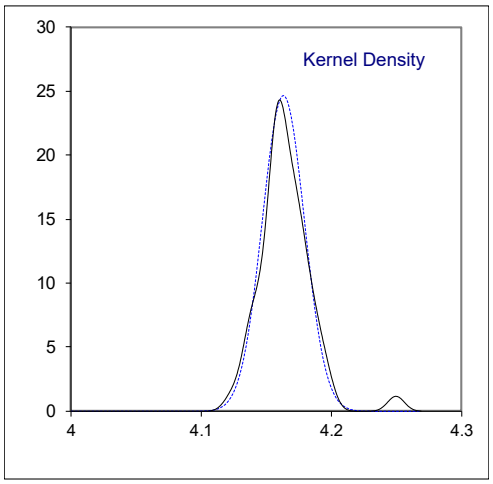

Kernel Density
8
7
6
5
4
3
2
1
0
20.6
20.8
21
21.2
21.4
21.6

Determination of Kinematic Viscosity at 100°C on sample #19080; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150	D445	4.175		0.41	
171	D445	4.168		0.16	
173	D445	4.188		0.87	
178	D445	4.15		-0.47	
179	D445	4.180		0.59	
237	D445	4.15825		-0.18	
273	D445	4.250	R(0.01)	3.07	
311	D445	4.158		-0.19	
323	D445	4.160		-0.12	
325	D445	4.150		-0.47	
329	D445	4.158		-0.19	
333	D445	4.169		0.20	
343	D445	4.1556		-0.27	
349	D445	4.166		0.09	
357	D445	4.183	C	0.70	first reported 11.84
369	D445	4.138		-0.90	
371	D445	4.142		-0.76	
372	D445	4.162		-0.05	
396	D445	4.177		0.48	
432	D445	4.195		1.12	
446		-----		-----	
485		-----		-----	
496	D445	4.1626		-0.03	
551	D445	4.174		0.38	
601	D445	4.1827		0.68	
603		-----		-----	
614	D445	4.18		0.59	
657	D445	4.124		-1.39	
704	D445	4.1380		-0.90	
785	D445	4.142		-0.76	
823	D445	4.169		0.20	
862	D445	4.1901		0.95	
874	D445	4.167		0.13	
875	D445	4.171		0.27	
886	D445	4.138		-0.90	
912		-----		-----	
913		-----		-----	
922	D445	4.160		-0.12	
962		-----		-----	
963	D445	4.198		1.23	
974	D445	4.160		-0.12	
982		-----		-----	
1011	D445	4.134		-1.04	
1026		4.15		-0.47	
1081	D445	4.158		-0.19	
1082	ISO3104	4.1577		-0.20	
1191	ISO3104	4.157		-0.23	
1243	D7279 corr. to D445	4.165		0.06	
1349	D445	3.968	R(0.01)	-6.92	
1389	D445	4.148		-0.54	
1429	D445	4.172		0.31	
1510	D445	4.1739		0.37	
1564	D445	4.158		-0.19	
1728	D445	4.178		0.52	
1748		-----		-----	
1833	D445	4.151		-0.44	
1862	D445	4.1727		0.33	
1877	D445	4.161		-0.08	
6002	ISO3104	4.1878		0.87	
6016		-----		-----	
6048	D445	4.160		-0.12	
6113		-----		-----	
6183	D445	4.158		-0.19	

normality	OK
n	51
outliers	2
mean (n)	4.1634
st.dev. (n)	0.01616
R(calc.)	0.0452
st.dev.(D445:18)	0.02825
R(D445:18)	0.0791

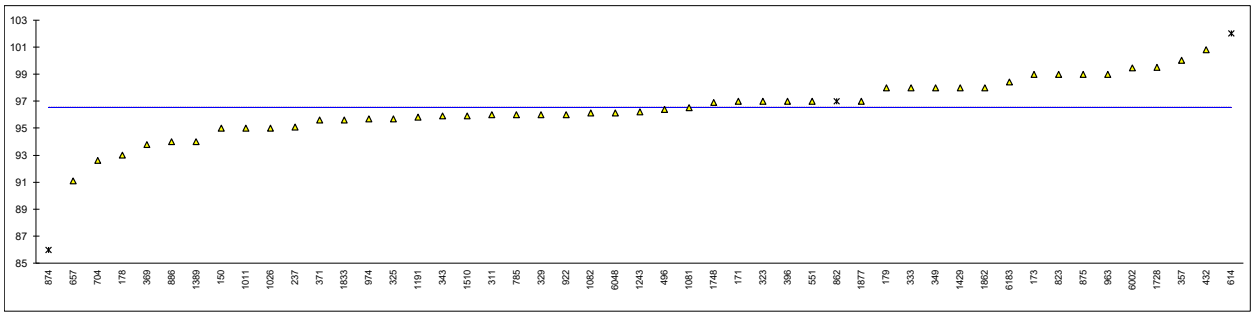

4.3
4.25
4.2
4.15
4.1
4.05
4
1349 657 1011 704 369 886 785 371 1389 178 325 1026 1833 343 1191 1082 311 329 1081 1564 6183 237 323 922 974 6048 1877 372 496 1243 349 874 171 333 823 875 1429 1862 1510 551 150 396 1728 179 614 601 357 6002 173 862 432 963 273

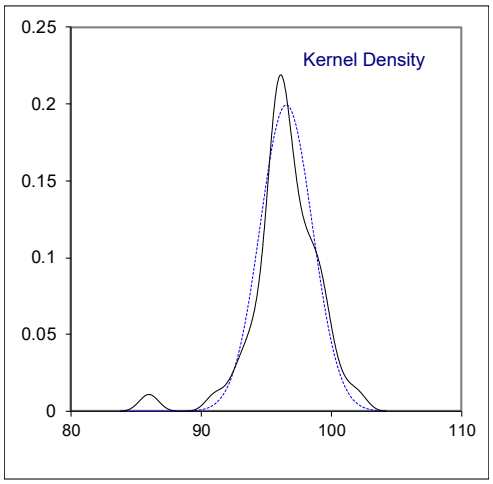

Kernel Density
30
25
20
15
10
5
0
4
4.1
4.2
4.3

Determination of Viscosity Index on sample #19080

lab	method	value	mark	z(targ)	remarks
150	D2270	95		-----	
171	D2270	97		-----	
173	D2270	99		-----	
178	D2270	93		-----	
179	D2270	98		-----	
237	D2270	95.085		-----	
273		-----		-----	
311	D2270	96		-----	
323	D2270	97		-----	
325	D2270	95.7		-----	
329	D2270	96		-----	
333	D2270	98		-----	
343	D2270	95.9		-----	
349	D2270	98		-----	
357	D2270	100		-----	
369	D2270	93.78		-----	
371	D2270	95.60		-----	
372		-----		-----	
396	D2270	97		-----	
432	D2270	100.8		-----	
446		-----		-----	
485		-----		-----	
496	D2270	96.4		-----	
551	D2270	97		-----	
601		-----		-----	
603		-----		-----	
614	D2270	102	ex	-----	excluded, outlier at viscosity 40°C
657	D2270	91.1		-----	
704	D2270	92.6		-----	
785		96		-----	
823	D2270	99		-----	
862	D2270	97	ex	-----	excluded, outlier at viscosity 40°C
874	D2270	86	R(0.01),E	-----	calculation error? iis calculated 96
875	D2270	99		-----	
886	D2270	94		-----	
912		-----		-----	
913		-----		-----	
922	D2270	96		-----	
962		-----		-----	
963	D2270	99		-----	
974	D2270	95.67		-----	
982		-----		-----	
1011	D2270	95		-----	
1026	D2270	95		-----	
1081	D2270	96.5		-----	
1082	D2270	96.1		-----	
1191	D2270	95.8		-----	
1243	ISO2909	96.2		-----	
1349		-----		-----	
1389	D2270	94		-----	
1429	D2270	98		-----	
1510	D2270	95.9		-----	
1564		-----		-----	
1728	D2270	99.5		-----	
1748	D2270	96.9		-----	
1833	D2270	95.6		-----	
1862	D2270	98		-----	
1877	D2270	97		-----	
6002	ISO2909	99.4687		-----	
6016		-----		-----	
6048	D2270	96.12		-----	
6113		-----		-----	
6183	D2270	98.4	E	-----	calculation error? iis calculated 95.7

normality	OK
n	46
outliers	1 +2ex
mean (n)	96.52
st.dev. (n)	2.003
R(calc.)	5.61
st.dev.(D2270:10)	(0.714)
R(D2270:10)	(2)

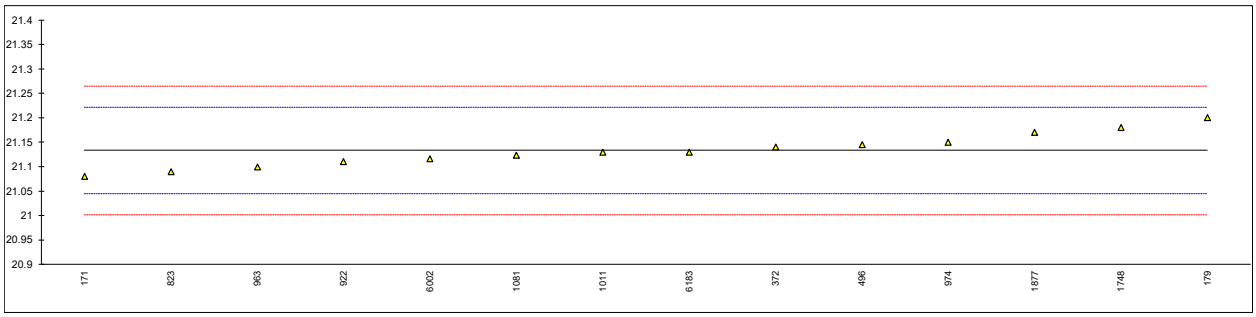

103
101
99
97
95
93
91
89
87
85
874 657 704 178 369 886 1389 150 1011 1026 237 371 1833 974 325 1191 343 1510 311 785 329 922 1082 6048 1243 496 1081 1748 171 323 396 551 862 1877 179 333 349 1429 1862 6183 173 823 875 963 6002 1728 357 432 614

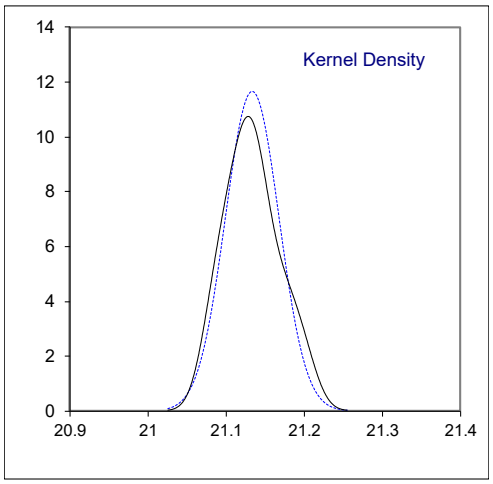

Kernel Density
0.25
0.2
0.15
0.1
0.05
0
80
90
100
110

Determination of Viscosity Stabinger at 40°C on sample #19080; results in mm²/s

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D7042	21.08		-1.21	
173		-----		-----	
178		-----		-----	
179	D7042	21.20		1.52	
237		-----		-----	
273		-----		-----	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
357		-----		-----	
369		-----		-----	
371		-----		-----	
372	D7042	21.14		0.15	
396		-----		-----	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496	D7042	21.145		0.27	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
704		-----		-----	
785		-----		-----	
823	D7042	21.09		-0.98	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922	D7042	21.11		-0.53	
962		-----		-----	
963	D7042	21.10		-0.75	
974	D7042	21.15		0.38	
982		-----		-----	
1011	D7042	21.13		-0.07	
1026		-----		-----	
1081	D7042	21.124		-0.21	
1082		-----		-----	
1191		-----		-----	
1243		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1510		-----		-----	
1564		-----		-----	
1728		-----		-----	
1748	D7042	21.18		1.06	
1833		-----		-----	
1862		-----		-----	
1877	D7042	21.17		0.83	
6002	D7042	21.116		-0.39	
6016		-----		-----	
6048		-----		-----	
6113		-----		-----	
6183	D7042	21.13		-0.07	

normality	OK
n	14
outliers	0
mean (n)	21.133
st.dev. (n)	0.0342
R(calc.)	0.096
st.dev.(D7042:16e3)	0.0441
R(D7042:16e3)	0.123

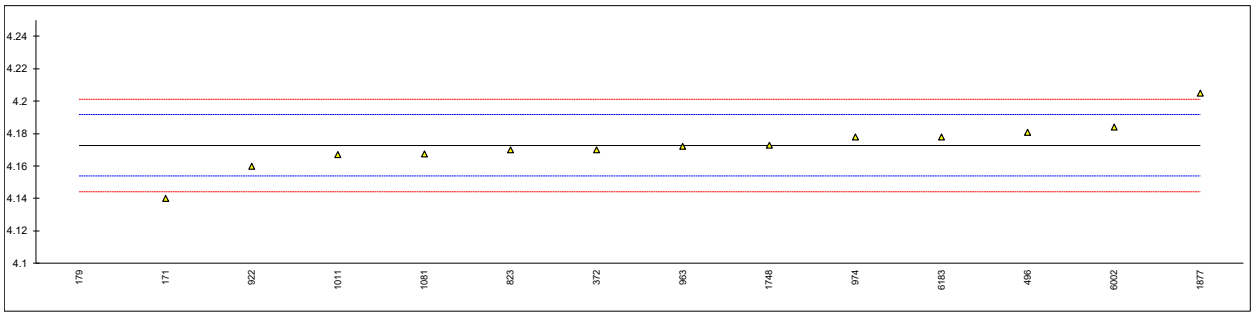

21.4
21.35
21.3
21.25
21.2
21.15
21.1
21.05
21
20.95
20.9
171
823
963
922
6002
1081
1011
6183
372
496
974
1877
1748
179

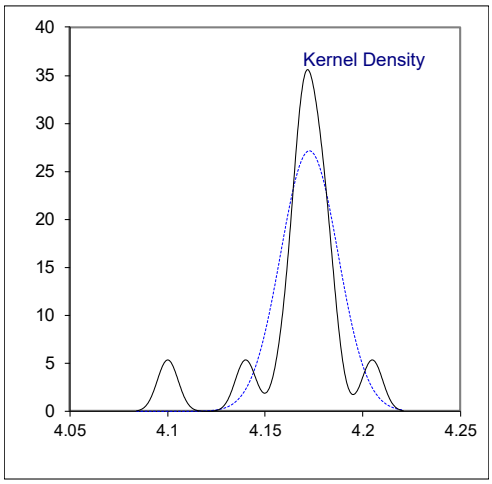

Kernel Density
14
12
10
8
6
4
2
0
20.9
21
21.1
21.2
21.3
21.4

Determination of Viscosity Stabinger at 100°C on sample #19080; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D7042	4.140		-3.45	
173		-----		-----	
178		-----		-----	
179	D7042	4.1	D(0.01)	-7.68	
237		-----		-----	
273		-----		-----	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
357		-----		-----	
369		-----		-----	
371		-----		-----	
372	D7042	4.170		-0.28	
396		-----		-----	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496	D7042	4.1807		0.85	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
704		-----		-----	
785		-----		-----	
823	D7042	4.17		-0.28	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922	D7042	4.160		-1.34	
962		-----		-----	
963	D7042	4.172		-0.07	
974	D7042	4.178		0.56	
982		-----		-----	
1011	D7042	4.167		-0.60	
1026		-----		-----	
1081	D7042	4.1673		-0.57	
1082		-----		-----	
1191		-----		-----	
1243		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1510		-----		-----	
1564		-----		-----	
1728		-----		-----	
1748	D7042	4.173		0.03	
1833		-----		-----	
1862		-----		-----	
1877	D7042	4.205		3.41	
6002	D7042	4.184		1.19	
6016		-----		-----	
6048		-----		-----	
6113		-----		-----	
6183	D7042	4.178		0.56	

normality	not OK
n	13
outliers	1
mean (n)	4.1727
st.dev. (n)	0.01472
R(calc.)	0.0412
st.dev.(D7042:16e3)	0.00946
R(D7042:16e3)	0.0265

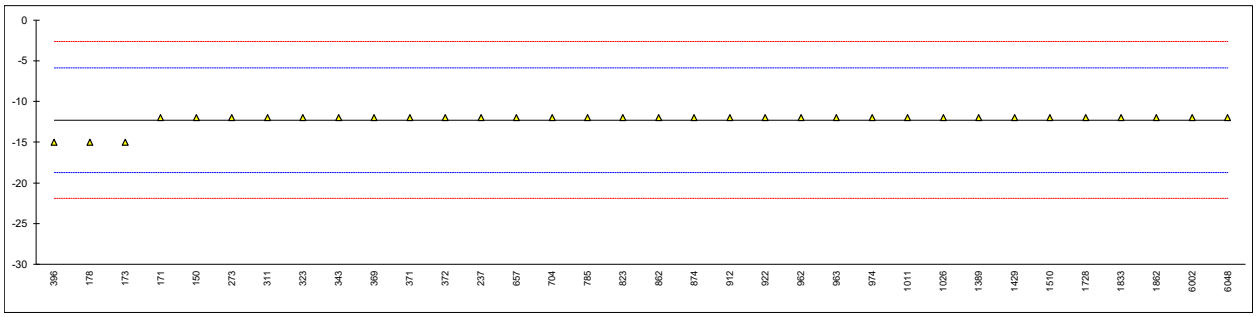

4.24
4.22
4.2
4.18
4.16
4.14
4.12
4.1
179
171
922
1011
1081
823
372
963
1748
974
6183
496
6002
1877

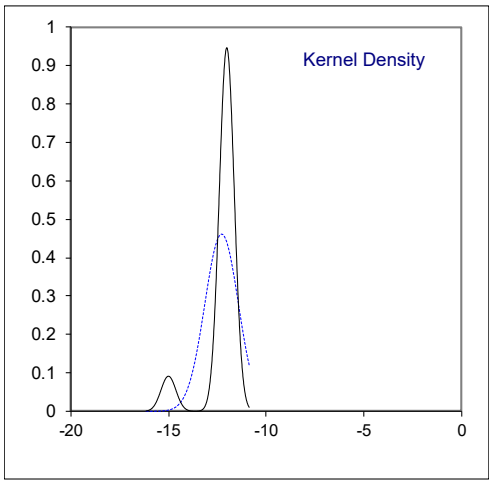

Kernel Density
40
35
30
25
20
15
10
5
0
4.05
4.1
4.15
4.2
4.25

Determination of Pour Point manual on sample #19080; results in °C

lab	method	value	mark	z(targ)	remarks
150	D97	-12		0.08	
171	D97	-12		0.08	
173	D97	-15	C	-0.85	first reported -18
178	D97	-15	C	-0.85	first reported -24
179		-----		-----	
237	D97	-12		0.08	
273	D97	-12		0.08	
311	D97	-12		0.08	
323	D97	-12		0.08	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343	D97	-12		0.08	
349		-----		-----	
357		-----		-----	
369	D97	-12		0.08	
371	D97	-12		0.08	
372	D97	-12		0.08	
396	D97	-15		-0.85	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D97	-12		0.08	
704	D97	-12		0.08	
785	ISO3016	-12.0		0.08	
823	D97	-12		0.08	
862	D97	-12		0.08	
874	D97	-12		0.08	
875		-----		-----	
886		-----		-----	
912	D97	-12		0.08	
913		-----		-----	
922	D97	-12		0.08	
962	D97	-12		0.08	
963	D97	-12		0.08	
974	D97	-12		0.08	
982		-----		-----	
1011	D97	-12		0.08	
1026	D97	-12		0.08	
1081		-----		-----	
1082		-----		-----	
1191		-----		-----	
1243		-----		-----	
1349		-----		-----	
1389	D97	-12		0.08	
1429	D97	-12		0.08	
1510	D97	-12		0.08	
1564		-----		-----	
1728	D97	-12		0.08	
1748		-----		-----	
1833	D97	-12		0.08	
1862	D97	-12		0.08	
1877		-----		-----	
6002	ISO3016	-12		0.08	
6016		-----		-----	
6048	ISO3016	-12		0.08	
6113		-----		-----	
6183		-----		-----	

normality	not OK
n	34
outliers	0
mean (n)	-12.26
st.dev. (n)	0.864
R(calc.)	2.42
st.dev.(D97:17b)	3.214
R(D97:17b)	9

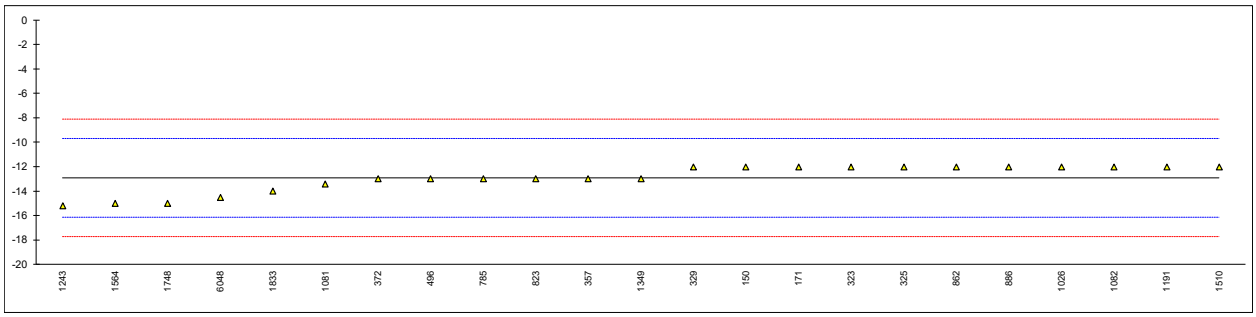

0
-5
-10
-15
-20
-25
-30
396
178
173
171
150
273
311
323
343
369
371
372
237
657
704
785
823
862
874
912
922
962
963
974
1011
1026
1389
1429
1510
1728
1833
1862
6002
6048

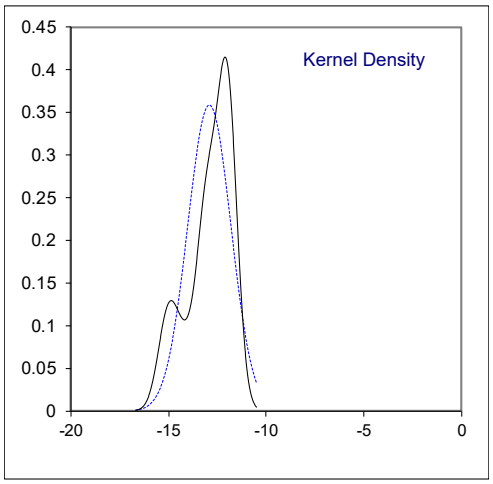

Kernel Density
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-20
-15
-10
-5
0

Determination of Pour Point automated 1°C int. on sample #19080; results in °C

lab	method	value	mark	z(targ)	remarks
150	D5950	-12		0.57	
171	D5950	-12		0.57	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273		-----		-----	
311		-----		-----	
323	D5950	-12		0.57	
325	D5950	-12		0.57	
329	D97	-12		0.57	
333		-----		-----	
343		-----		-----	
349		-----		-----	
357	D5950	-13		-0.05	
369		-----		-----	
371		-----		-----	
372	D5950	-13		-0.05	
396		-----		-----	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496	D5950	-13		-0.05	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
704		-----		-----	
785	D6749	-13.0		-0.05	
823	D5950	-13		-0.05	
862	D5950	-12		0.57	
874		-----		-----	
875		-----		-----	
886	D5950	-12		0.57	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
982		-----		-----	
1011		-----		-----	
1026	D5950	-12		0.57	
1081	In house	-13.4		-0.30	
1082	D5950	-12		0.57	
1191	D5950	-12		0.57	
1243	D7346	-15.2		-1.42	
1349	Conversion	-13		-0.05	
1389		-----		-----	
1429		-----		-----	
1510	D5950	-12		0.57	
1564	D5949	-15		-1.30	
1728		-----		-----	
1748	D7346	-15		-1.30	
1833	D5950	-14		-0.67	
1862		-----		-----	
1877		-----		-----	
6002		-----		-----	
6016		-----		-----	
6048	D7346	-14.5		-0.98	
6113		-----		-----	
6183		-----		-----	

normality	OK
n	23
outliers	0
mean (n)	-12.92
st.dev. (n)	1.110
R(calc.)	3.11
st.dev.(D5950:14)	1.607
R(D5950:14)	4.5


0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
1243
1564
1748
6048
1833
1081
372
496
785
823
357
1349
329
150
171
323
325
862
886
1026
1062
1191
1510


Kernel Density
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-20
-15
-10
-5
0

Determination of Rust prevention (synthetic seawater) on sample #19080

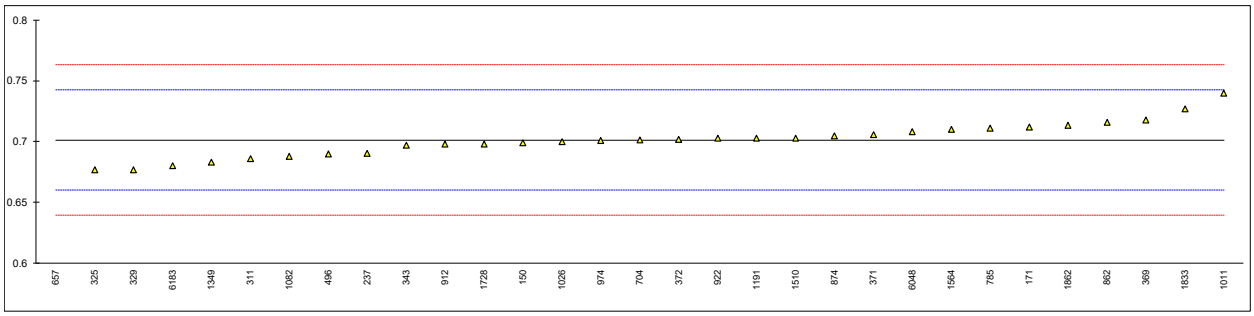
lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
173		-----		-----	
178		-----		-----	
179	D665	Fail		-----	
237		-----		-----	
273		-----		-----	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
357		-----		-----	
369		-----		-----	
371		-----		-----	
372		-----		-----	
396		-----		-----	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
704		-----		-----	
785		-----		-----	
823		-----		-----	
862	D665	severe rusting		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
982		-----		-----	
1011		-----		-----	
1026	D665	Pass		-----	
1081		-----		-----	
1082		-----		-----	
1191		-----		-----	
1243		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1510		-----		-----	
1564		-----		-----	
1728		-----		-----	
1748		-----		-----	
1833		-----		-----	
1862		-----		-----	
1877		-----		-----	
6002		-----		-----	
6016		-----		-----	
6048		-----		-----	
6113		-----		-----	
6183		-----		-----	
	reported	2 fail, 1 pass			

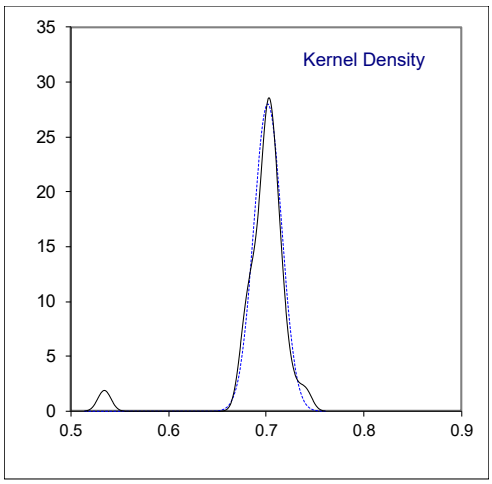
--- EMPTY PAGE ---

Determination of Sulfur on sample #19080; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	D4294	0.699		-0.12	
171	D2622	0.7120		0.51	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237	D4294	0.6902		-0.54	
273		-----		-----	
311	D2622	0.686		-0.75	
323		-----		-----	
325	INH-4927	0.6767		-1.20	
329	D2622	0.6767		-1.20	
333		-----		-----	
343	IP336	0.697		-0.21	
349		-----		-----	
357		-----		-----	
369	D4294	0.718		0.80	
371	D4294	0.706		0.22	
372	D4294	0.702		0.03	
396		-----		-----	
432		-----		-----	
446		-----		-----	
485		-----		-----	
496	D2622	0.69001		-0.55	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D5453	0.5342	R(0.01)	-8.10	
704	ISO20846	0.7016		0.01	
785	D4294	0.711		0.46	
823		-----		-----	
862	D2622	0.716		0.71	
874	D4294	0.705	C	0.17	reported 0.705 mg/kg
875		-----		-----	
886		-----		-----	
912	D4294	0.6980		-0.17	
913		-----		-----	
922	D4294	0.703		0.08	
962		-----		-----	
963		-----		-----	
974	D4294	0.701		-0.02	
982		-----		-----	
1011	IP336	0.74		1.87	
1026	D2622	0.70		-0.07	
1081		-----		-----	
1082	D4294	0.688		-0.65	
1191	D4294	0.703		0.08	
1243		-----		-----	
1349	IP336	0.683		-0.89	
1389		-----		-----	
1429		-----		-----	
1510	D4294	0.703		0.08	
1564	D4294	0.710		0.42	
1728	D4294	0.698		-0.17	
1748		-----		-----	
1833	IP336	0.727		1.24	
1862	D4294	0.7134		0.58	
1877		-----		-----	
6002		-----		-----	
6016		-----		-----	
6048	D4294	0.708		0.32	
6113		-----		-----	
6183	D2622	0.6801		-1.03	

	normality	OK
	n	30
	outliers	1
	mean (n)	0.7014
	st.dev. (n)	0.01424
	R(calc.)	0.0399
	st.dev.(D4294:16e1)	0.02065
	R(D4294:16e1)	0.0578
Compare		
	R(D2622:16)	0.0517

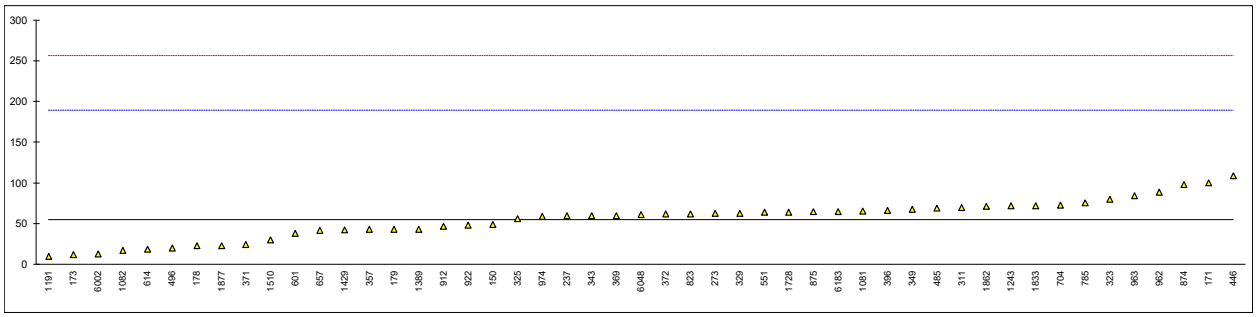

0.8
0.75
0.7
0.65
0.6
657
325
329
6183
1349
311
1082
496
237
343
912
1728
150
1026
974
704
372
922
1191
1510
874
371
6048
1564
785
171
1862
862
369
1833
1011

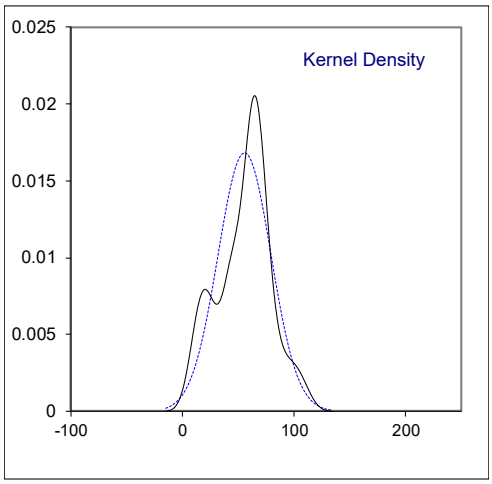

Kernel Density
35
30
25
20
15
10
5
0
0.5
0.6
0.7
0.8
0.9

Determination of Water on sample #19080; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D6304-A	49		-0.09	
171	D6304-A	100		0.67	
173	D6304-C	12		-0.65	
178	D6304-C	23		-0.48	
179	D6304-C	43		-0.18	
237	D6304-C	59.5		0.06	
273	EN60814	63		0.11	
311	D6304-A	70		0.22	
323	D6304-A	80		0.37	
325	D6304-C	56		0.01	
329	D6304-A	63		0.11	
333		-----		-----	
343	D6304-A	59.5		0.06	
349	D6304-A	68		0.19	
357	D6304-A	43		-0.18	
369	ISO12937	59.8		0.07	
371	D6304-A	24.5		-0.46	
372	D6304-A	62		0.10	
396	D6304-A	66		0.16	
432		-----		-----	
446	D6304-A	109		0.80	
485	D6304-A	69		0.20	
496	D6304-C	20		-0.53	
551	D6304-A	64		0.13	
601	D6304-A	38.5		-0.25	
603		-----		-----	
614	D6304-C	18.5		-0.55	
657	D6304-C	42	C	-0.20	first reported 0.01 mg/kg
704	D6304-A	73		0.26	
785	ISO12937	76		0.31	
823	D6304-A	62		0.10	
862		-----		-----	
874	D6304-A	98	C	0.64	reported 98 %M/M
875	D6304	65		0.14	
886		-----		-----	
912	D6304-C	47		-0.12	
913		-----		-----	
922	D6304-A	48		-0.11	
962	D6304-A	89		0.50	
963	D6304-A	84		0.43	
974	D6304-A	59		0.05	
982		-----		-----	
1011		-----		-----	
1026	D6304-C	<10		-----	
1081	D6304-A	65.6216		0.15	
1082	D6304-C	17		-0.57	
1191	D6304-C	10		-0.68	
1243	ISO12937	72		0.25	
1349		-----		-----	
1389	D6304-A	43		-0.18	
1429	IP438	42.5		-0.19	
1510	D6304-A	30		-0.38	
1564		-----		-----	
1728	D6304-A	64		0.13	
1748		-----		-----	
1833	D6304-A	72		0.25	
1862	D6304-A	71.2		0.24	
1877	D6304-C	23		-0.48	
6002	ISO12937	12.81		-0.63	
6016		-----		-----	
6048	ISO12937	61		0.08	
6113		-----		-----	
6183	D6304-A	65.0		0.14	

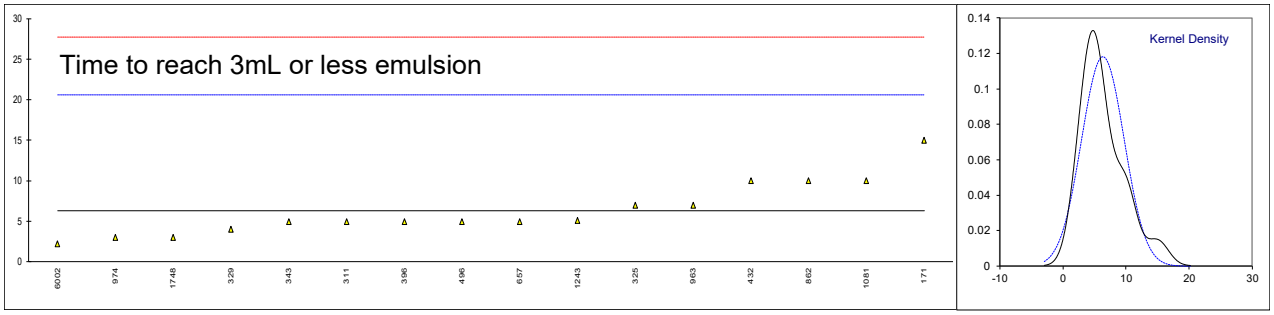
normality	OK
n	49
outliers	0
mean (n)	55.36
st.dev. (n)	23.707
R(calc.)	66.38
st.dev.(D6304:16e1)	67.052
R(D6304:16e1)	187.75

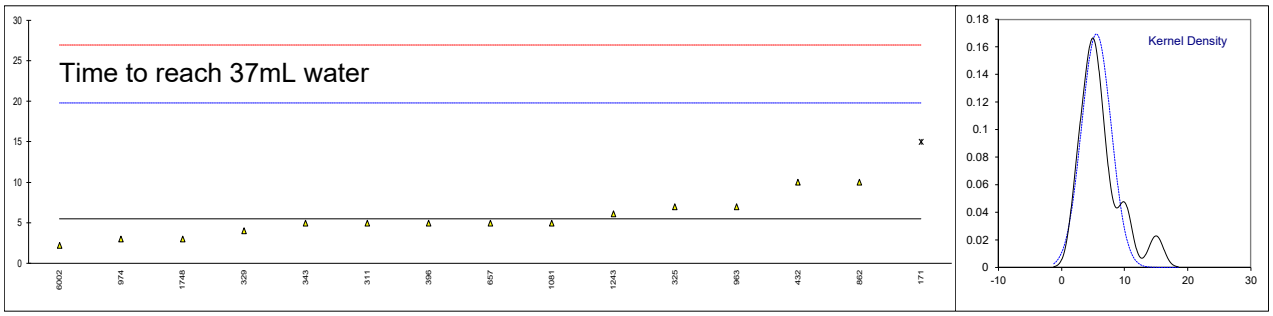

300
250
200
150
100
50
0
1191
173
6002
1082
614
496
178
1877
371
1510
601
657
1429
357
179
1389
912
922
150
325
974
237
343
369
6048
372
823
273
329
551
1728
875
6183
1081
396
349
485
311
1862
1243
1833
704
785
323
963
962
874
171
446

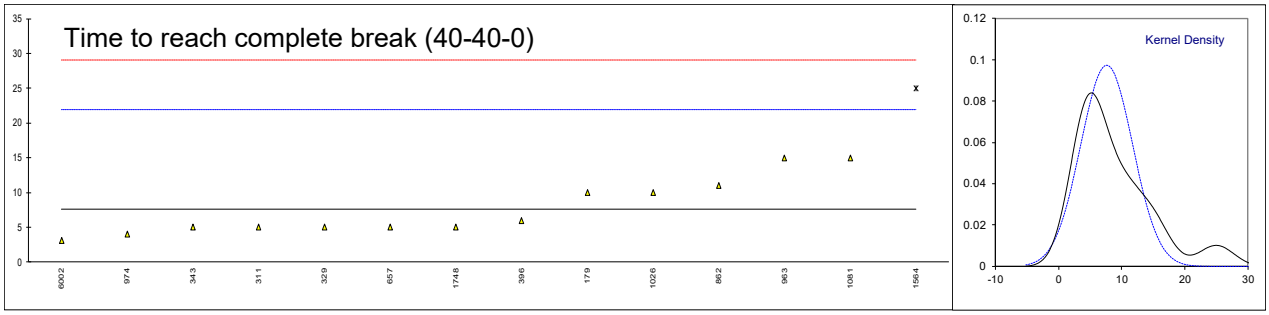

Kernel Density
0.025
0.02
0.015
0.01
0.005
0
-100
0
100
200

Determination of Water Separability at 54°C, distilled water on sample #19080; results in minutes

lab	method	time to reach 3mL or less emulsion	mark	z(targ)	time to reach 37mL of water	mark	z(targ)	time to reach complete break (40-40-0)	mark	z(targ)	test aborted/ time
150		-----		-----	-----		-----	-----		-----	-----
171		15		1.21	15	G(0.05)	1.33	-----		-----	-----
173		-----		-----	-----		-----	-----		-----	-----
178		-----		-----	-----		-----	-----		-----	-----
179	D1401	-----		-----	-----		-----	10		0.33	NO
237	D1401	-----		-----	-----		-----	-----		-----	YES, 30.0
273		-----		-----	-----		-----	-----		-----	-----
311		5		-0.19	5		-0.07	5		-0.37	YES
323		-----		-----	-----		-----	-----		-----	-----
325	D1401	7		0.09	7		0.21	-----		-----	YES, 30
329	D1401	4		-0.33	4		-0.21	5		-0.37	NO
333		-----		-----	-----		-----	-----		-----	-----
343		5		-0.19	5		-0.07	5		-0.37	NO
349		-----		-----	-----		-----	-----		-----	-----
357		-----		-----	-----		-----	-----		-----	-----
369		-----		-----	-----		-----	-----		-----	-----
371		-----		-----	-----		-----	-----		-----	-----
372		-----		-----	-----		-----	-----		-----	-----
396	D1401	5		-0.19	5		-0.07	6		-0.23	NO
432	D1401	10		0.51	10		0.63	>30		-----	YES, 30
446		-----		-----	-----		-----	-----		-----	-----
485		-----		-----	-----		-----	-----		-----	-----
496	D1401	5		-0.19	-----		-----	-----		-----	NO
551		-----		-----	-----		-----	-----		-----	-----
601		-----		-----	-----		-----	-----		-----	-----
603		-----		-----	-----		-----	-----		-----	-----
614		-----		-----	-----		-----	-----		-----	-----
657	D1401	5		-0.19	5		-0.07	5		-0.37	NO
704		-----		-----	-----		-----	-----		-----	-----
785		-----		-----	-----		-----	-----		-----	-----
823	D1401	-----		-----	-----		-----	-----		-----	NO
862	D1401	10		0.51	10		0.63	11		0.47	NO, 11
874		-----		-----	-----		-----	-----		-----	-----
875		-----		-----	-----		-----	-----		-----	-----
886		-----		-----	-----		-----	-----		-----	-----
912		-----		-----	-----		-----	-----		-----	-----
913		-----		-----	-----		-----	-----		-----	-----
922		-----		-----	-----		-----	-----		-----	-----
962		-----		-----	-----		-----	-----		-----	-----
963	D1401	7		0.09	7		0.21	15		1.03	NO
974	D1401	3		-0.47	3		-0.35	4		-0.51	-----
982		-----		-----	-----		-----	-----		-----	-----
1011		-----		-----	-----		-----	-----		-----	-----
1026	D1401	-----		-----	-----		-----	10		0.33	NO
1081	D1401	10		0.51	5		-0.07	15		1.03	NO
1082		-----		-----	-----		-----	-----		-----	-----
1191		-----		-----	-----		-----	-----		-----	-----
1243	ISO6614	5.1		-0.17	6.1		0.08	-----		-----	YES, 20
1349		-----		-----	-----		-----	-----		-----	-----
1389		-----		-----	-----		-----	-----		-----	-----
1429		-----		-----	-----		-----	-----		-----	-----
1510		-----		-----	-----		-----	-----		-----	-----
1564		-----		-----	-----		-----	25	G(0.05)	2.43	-----
1728		-----		-----	-----		-----	-----		-----	-----
1748		3		-0.47	3		-0.35	5		-0.37	YES
1833		-----		-----	-----		-----	-----		-----	-----
1862		-----		-----	-----		-----	-----		-----	-----
1877		-----		-----	-----		-----	-----		-----	-----
6002	ISO6614	2.26		-0.57	2.26		-0.46	3.13		-0.63	NO
6016		-----		-----	-----		-----	-----		-----	-----
6048		-----		-----	-----		-----	-----		-----	-----
6113		-----		-----	-----		-----	-----		-----	-----
6183		-----		-----	-----		-----	-----		-----	-----
normality		not OK			OK			OK			
n		16			14			13			
outliers		0			1			1			
mean (n)		6.34			5.53			7.63			
st.dev. (n)		3.376			2.351			4.102			
R(calc.)		9.45			6.58			11.48			
st.dev.(D1401:18b)		7.143			7.143			7.143			
R(D1401:18b)		20			20			20			


Time to reach 3mL or less emulsion
6002 974 1748 329 343 311 396 496 657 1243 325 963 432 862 1081 171
Kernel Density


Time to reach 37mL water
6002 974 1748 329 343 311 396 657 1081 1243 325 963 432 862 171
Kernel Density


Time to reach complete break (40-40-0)
6002 974 343 311 329 657 1748 396 179 1026 862 963 1081 1564
Kernel Density

Determination of Water Separability at 54°C, distilled water sample #19080; results in mL

lab	method	oil phase	mark	z(targ)	water phase	mark	z(targ)	emulsion phase	mark	z(targ)
150		-----		-----	-----		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
173		-----		-----	-----		-----	-----		-----
178		-----		-----	-----		-----	-----		-----
179	D1401	40		-----	40		-----	0		-----
237	D1401	39	C	-----	38.0		-----	3	C	-----
273		-----		-----	-----		-----	-----		-----
311		42		-----	38		-----	0		-----
323		-----		-----	-----		-----	-----		-----
325	D1401	39		-----	40		-----	1		-----
329		-----		-----	-----		-----	-----		-----
333		-----		-----	-----		-----	-----		-----
343		40		-----	40		-----	0		-----
349		-----		-----	-----		-----	-----		-----
357		-----		-----	-----		-----	-----		-----
369		-----		-----	-----		-----	-----		-----
371		-----		-----	-----		-----	-----		-----
372		-----		-----	-----		-----	-----		-----
396		-----		-----	-----		-----	-----		-----
432	D1401	41		-----	39		-----	0		-----
446		-----		-----	-----		-----	-----		-----
485		-----		-----	-----		-----	-----		-----
496	D1401	42		-----	38		-----	0		-----
551		-----		-----	-----		-----	-----		-----
601		-----		-----	-----		-----	-----		-----
603		-----		-----	-----		-----	-----		-----
614		-----		-----	-----		-----	-----		-----
657	D1401	40		-----	40		-----	0		-----
704		-----		-----	-----		-----	-----		-----
785		-----		-----	-----		-----	-----		-----
823		-----		-----	-----		-----	-----		-----
862	D1401	40		-----	40		-----	0		-----
874		-----		-----	-----		-----	-----		-----
875		-----		-----	-----		-----	-----		-----
886		-----		-----	-----		-----	-----		-----
912		-----		-----	-----		-----	-----		-----
913		-----		-----	-----		-----	-----		-----
922		-----		-----	-----		-----	-----		-----
962		-----		-----	-----		-----	-----		-----
963	D1401	40		-----	40		-----	0		-----
974		-----		-----	-----		-----	-----		-----
982		-----		-----	-----		-----	-----		-----
1011		-----		-----	-----		-----	-----		-----
1026	D1401	40		-----	40		-----	0		-----
1081	D1401	40		-----	40		-----	0		-----
1082		-----		-----	-----		-----	-----		-----
1191		-----		-----	-----		-----	-----		-----
1243	ISO6614	42		-----	38		-----	0		-----
1349		-----		-----	-----		-----	-----		-----
1389		-----		-----	-----		-----	-----		-----
1429		-----		-----	-----		-----	-----		-----
1510		-----		-----	-----		-----	-----		-----
1564		-----		-----	-----		-----	-----		-----
1728		-----		-----	-----		-----	-----		-----
1748		40		-----	40		-----	0		-----
1833		-----		-----	-----		-----	-----		-----
1862		-----		-----	-----		-----	-----		-----
1877		-----		-----	-----		-----	-----		-----
6002	ISO6614	40		-----	40		-----	0		-----
6016		-----		-----	-----		-----	-----		-----
6048		-----		-----	-----		-----	-----		-----
6113		-----		-----	-----		-----	-----		-----
6183		-----		-----	-----		-----	-----		-----

Lab 237 first reported 32 for oil phase and 10 for emulsion phase

APPENDIX 2

Number of participants per country

1 lab in AUSTRALIA
1 lab in AUSTRIA
4 labs in BELGIUM
1 lab in BRAZIL
1 lab in CHINA, People's Republic
1 lab in ESTONIA
3 labs in FINLAND
1 lab in FRANCE
3 labs in GERMANY
2 labs in INDIA
1 lab in IRAN, Islamic Republic of
1 lab in ITALY
1 lab in JORDAN
1 lab in KAZAKHSTAN
2 labs in LATVIA
2 labs in MALAYSIA
3 labs in NETHERLANDS
1 lab in NIGERIA
1 lab in PAKISTAN
2 labs in POLAND
1 lab in PORTUGAL
1 lab in ROMANIA
4 labs in RUSSIAN FEDERATION
2 labs in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SOUTH AFRICA
1 lab in SOUTH KOREA
5 labs in SPAIN
1 lab in TAIWAN
1 lab in TURKEY
1 lab in UKRAINE
1 lab in UNITED ARAB EMIRATES
5 labs in UNITED KINGDOM
5 labs in UNITED STATES OF AMERICA

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	= possibly an error in calculations
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 test result
SDS	= Safety Data Sheet

Literature:

1 iis Interlaboratory Studies, Protocol for the Organization, Statistics and Evaluation, June 2018
2 ASTM E178:08
3 ISO 5725:86
4 ISO 5725, parts 1-6, 1994
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6 ISO17043:2010
7 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
8 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
9 IP 367/84
10 DIN 38402 T41/42
11 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
12 J.N. Miller, Analyst, 118, 455, (1993)
13 Analytical Methods Committee Technical brief, No 4, January 2001.
14 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry 2002, Analyst 2002, 127, 1359-1364
15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)