Institute for
Interlaboratory Studies

Results of Proficiency Test
Base Oil
May 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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

Report: iis22L03

August 2022

CONTENTS

1 INTRODUCTION 3

2 SET UP 3

2.1 ACCREDITATION 3

2.2 PROTOCOL 3

2.3 CONFIDENTIALITY STATEMENT 3

2.4 SAMPLES 4

2.5 STABILITY OF THE SAMPLES 4

2.6 ANALYZES 5

3 RESULTS 5

3.1 STATISTICS 5

3.2 GRAPHICS 6

3.3 Z-SCORES 7

4 EVALUATION 7

4.1 EVALUATION PER TEST 8

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES 10

4.3 COMPARISON OF THE PROFICIENCY TEST OF MAY 2022 WITH PREVIOUS PTS 11

Appendices:

1. Data, statistical and graphic results 12
2. Number of participants per country 48
3. Abbreviations and literature 49

1 INTRODUCTION

Since 2013 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Base Oil every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Base Oil.

In this interlaboratory study 63 laboratories in 32 countries registered for participation, see appendix 2 for the number of participants per country. In this report the results of the 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/IEC17025 accredited laboratory.
It was decided to send one sample of Base Oil in a 1 liter bottle labelled #22075.
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

A batch of approximately 110 liters of Base Oil was obtained from a local supplier. After homogenization 85 amber glass bottles of 1 L were filled and labelled #22075.
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 #22075-1	0.86487
sample #22075-2	0.86487
sample #22075-3	0.86485
sample #22075-4	0.86486
sample #22075-5	0.86487
sample #22075-6	0.86487
sample #22075-7	0.86486
sample #22075-8	0.86487

Table 1: homogeneity test results of subsamples #22075

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 2: evaluation of the repeatability of subsamples #22075

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 one 1 L bottle of Base Oil labelled #22075 was sent on April 13, 2022. 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 ANALYZES

The participants were requested to determine: Total Acid Number, Air Release time at 50 °C, Color ASTM, Conradson Carbon Residue, Ramsbottom Carbon Residue, Density at 15 °C, Evaporation loss by Noack, Flash Point C.O.C., Kinematic Viscosity at 40 °C and 100 °C, Viscosity Index, Kinematic Viscosity Stabinger at 40 °C and 100 °C, Pour Point (Manual and Automated 1 °C interval), Rust Prevention (ASTM D665, proc. B, 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 (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

Some problems were encountered with the dispatch of the samples due to COVID-19 pandemic. Therefore, the reporting time on the data entry portal was extended with another week. Five participants reported test results after the extended reporting date and three other participants did not report any test results. Not all participants were able to report all tests requested.
In total 60 participants reported 516 numerical test results. Observed were 16 outlying test results, which is 3.1%. 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. D1500) and an added designation for the year that the test method was adopted or revised (e.g. D1500:12). When a method has been reapproved an “R” will be added and the year of approval (e.g. D1500:12R17).

Total Acid Number: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D974:21.

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 D3427:19.

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. All reporting participants agreed on a test result of less than 0.1 %M/M. Therefore, no z-scores are calculated.

Ramsbottom Carbon Residue: This determination was problematic. Only six participants reported a test result. No statistical outliers were observed. It was decided not to calculate z-scores.

Density at 15 °C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ISO12185:96.

Evaporation loss by Noack: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D5800-B:21.

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

Kin. 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.

Kin. Viscosity at 100 °C: This determination was not problematic. Five statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D445:21e1.

Viscosity Index: This determination was not problematic. Two statistical outliers were observed and five other test results were excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D2270:10R16.

Kin. 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.

Kin. Viscosity Stabinger at 100 °C: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D7042:21a.

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 D5950:14R20.

Rust prevention: Only six participants reported a test result. Five participants agreed on the presence of rust (Fail / Severe rusting) and one other participant reported ‘no corrosion’.

Sulfur: This determination was not problematic. The majority of the reporting participants agreed on a concentration level of less than 17 mg/kg. Therefore, no z-scores are calculated.

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

Water Separability: This determination was not problematic. One statistical outlier was observed over three parameters. All calculated reproducibilities after rejection of the statistical outlier are in agreement with the requirements of ASTM D1401:21.

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 table.

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Acid Number	mg KOH/g	24	0.009	0.012	0.04
Air Release time at 50 °C	minutes	14	2.24	1.70	1.63
Color ASTM		50	0.23	0.19	1
Conradson Carbon Residue	%M/M	25	<0.1	n.e.	n.e.
Ramsbottom Carbon Residue	%M/M	6	0.053	0.070	(0.028)
Density at 15 °C	kg/L	54	0.8649	0.0005	0.0005
Evaporation loss by Noack	%M/M	22	8.90	1.24	1.23
Flash Point C.O.C.	°C	44	232	16	18
Kinematic Viscosity at 40 °C	mm^2/s	50	41.50	0.35	0.56
Kinematic Viscosity at 100 °C	mm^2/s	45	6.409	0.045	0.122
Viscosity Index		41	103.1	1.7	2
Kin. Viscosity Stabinger at 40 °C	mm^2/s	12	41.56	0.33	0.24
Kin. Viscosity Stabinger at 100 °C	mm^2/s	12	6.440	0.056	0.033
Pour Point Manual	°C	32	-19.0	5.4	9
Pour Point Automated Δ1 °C	°C	19	-19.4	3.9	4.5
Rust Prevention (synth.seawater)		5	Fail	n.a.	n.a.
Sulfur	mg/kg	31	<17	n.e.	n.e.
Water	mg/kg	36	18.1	24.8	18.0
Water Separability at 54 °C					
Time to reach ≤ 3 mL	minutes	20	3.4	5.8	20
Time to reach 37 mL of water	minutes	19	3.0	6.1	20
Time to complete break	minutes	19	4.2	3.7	20

Table 3: reproducibilities of tests on sample #22075
For results between brackets no z-scores are calculated.

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF MAY 2022 WITH PREVIOUS PTS

	May 2022	May 2021	May 2020	May 2019	May 2018
Number of reporting laboratories	60	67	53	59	57
Number of test results	516	599	444	567	462
Number of statistical outliers	16	15	12	15	19
Percentage of statistical outliers	3.1%	2.5%	2.7%	2.6%	4.1%

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 reference test methods. The conclusions are given in the following table.

Parameter	May 2022	May 2021	May 2020	May 2019	May 2018
Total Acid Number	++	++	++	++	+/-
Air Release time at 50 °C	+/-	-	n.e.	+/-	+/-
Color ASTM	++	++	++	++	n.e.
Conradson Carbon Residue	n.e.	n.e.	n.e.	+/-	++
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.	+/-
Kin. Viscosity Stabinger at 40 °C	-	-	+/-	+	+/-
Kin. Viscosity Stabinger at 100 °C	-	--	--	-	-
Pour Point Manual	+	+	--	++	--
Pour Point Automated Δ1 °C	+	-	--	+	-
Sulfur	n.e.	n.e.	n.e.	+	n.e.
Water	-	-	++	++	++
Water Separability at 54 °C	++	++	++	++	++

Table 5: comparison of determinations to the reference test methods

For results between brackets no z-scores are calculated.

The following performance categories were used:

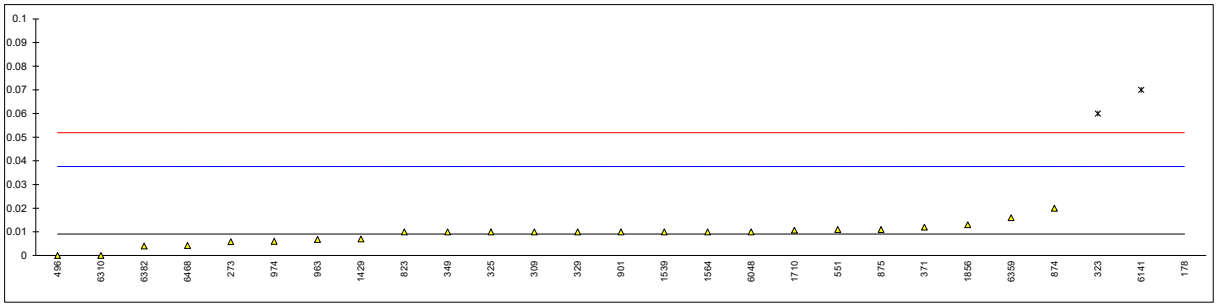
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test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

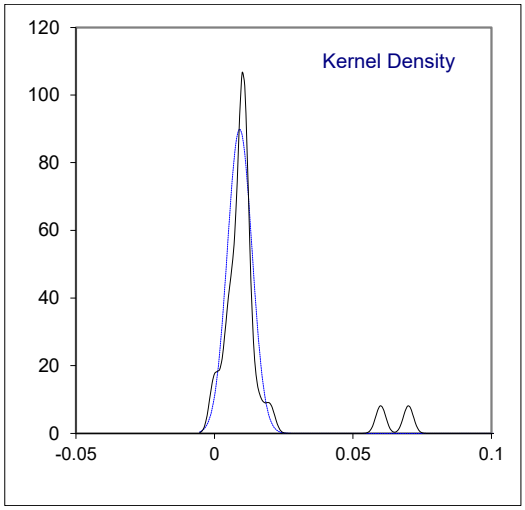
APPENDIX 1

Determination of Total Acid Number on sample #22075; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
173		-----		-----	
178	D974	0.22	R(0.01)	14.77	
179		-----		-----	
237	D974	<0.02		-----	
273	D974	0.0058		-0.23	
309		0.01		0.07	
311		-----		-----	
323	D974	0.06	R(0.05)	3.57	
325	D664-A	0.01		0.07	
329	D664-A	0.01		0.07	
333		-----		-----	
343	D664-A	<0,05		-----	
349	D664-A	0.01		0.07	
369		-----		-----	
371	D974	0.012		0.21	
396		-----		-----	
432		-----		-----	
480		-----		-----	
496	D974	0.0		-0.63	
551	D974	0.011		0.14	
601		-----		-----	
603		-----		-----	
614	D974	<0.02		-----	
657	D974	<0.02		-----	
781	D974	<0.02		-----	
785		-----		-----	
823	D664-A	0.01		0.07	
862		-----		-----	
874	D974	0.02		0.77	
875	D664	0.011		0.14	
886		-----		-----	
901	D974	0.01		0.07	
912	D974	<0.01		-----	
922	D664-A	<0.01		-----	
962		-----		-----	
963	D974	0.0068		-0.16	
974	D974	0.006		-0.21	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429	D974	0.007		-0.14	
1539	ISO6618	0.01		0.07	
1564	D664-A	0.01		0.07	
1710	D664-A	0.0107		0.11	
1728		-----		-----	
1748		-----		-----	
1833	ISO6618	<0.1		-----	
1856	ISO6618	0.013		0.28	
1877		-----		-----	
6048	D974	0.01		0.07	
6113		-----		-----	
6141	D974	0.07	R(0.01)	4.27	
6310	D664-A	0.00		-0.63	
6324		-----		-----	
6359	D664-A	0.016		0.49	
6382	EN62021-1	0.004		-0.35	
6394		-----	W	-----	test result withdrawn, reported 0.03
6442		-----		-----	
6468	D974	0.0042		-0.34	

normality	suspect
n	24
outliers	3
mean (n)	0.0091
st.dev. (n)	0.00444
R(calc.)	0.0124
st.dev.(D974:21)	0.01429
R(D974:21)	0.04

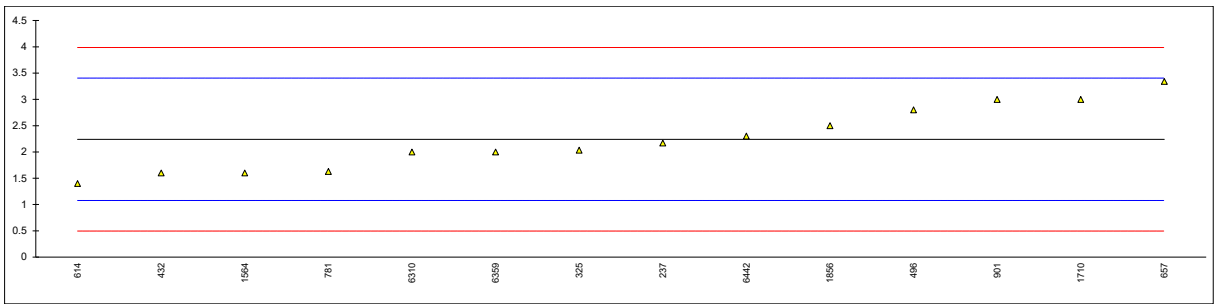

0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
496
63105
6382
6468
273
974
963
1429
823
349
325
309
329
901
1539
1564
6048
1710
551
875
371
1856
6359
874
323
6141
178

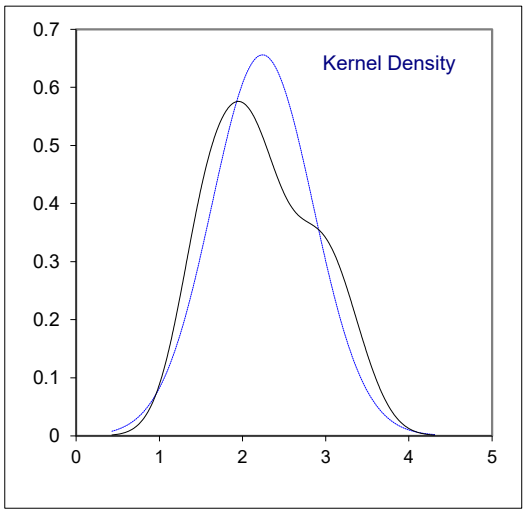

Kernel Density
120
100
80
60
40
20
0
-0.05
0
0.05
0.1

Determination of Air Release time at 50 °C on sample #22075; results in minutes

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237	D3427	2.17		-0.12	
273		-----		-----	
309		-----		-----	
311		-----		-----	
323		-----		-----	
325	D3427	2.03333		-0.36	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396		-----		-----	
432	ISO9120	1.6		-1.10	
480		-----		-----	
496	ISO9120	2.8		0.96	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614	D3427	1.4		-1.45	
657	D3427	3.34		1.89	
781	D3427	1.63		-1.05	
785		-----		-----	
823		-----		-----	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
901	D3427	3.0		1.30	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1539		-----		-----	
1564	D3427	1.6		-1.10	
1710	D3427	3		1.30	
1728		-----		-----	
1748		-----		-----	
1833		-----		-----	
1856	ISO9120	2.5		0.45	
1877		-----		-----	
6048		-----		-----	
6113		-----		-----	
6141		-----		-----	
6310	D3427	2.0		-0.41	
6324		-----		-----	
6359	D3427	2		-0.41	
6382		-----		-----	
6394		-----		-----	
6442	IP313	2.3		0.10	
6468		-----		-----	

normality	OK
n	14
outliers	0
mean (n)	2.241
st.dev. (n)	0.6083
R(calc.)	1.703
st.dev.(D3427:19)	0.5819
R(D3427:19)	1.629


4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
614
432
1564
781
6310
6359
325
237
6442
1856
496
901
1710
657

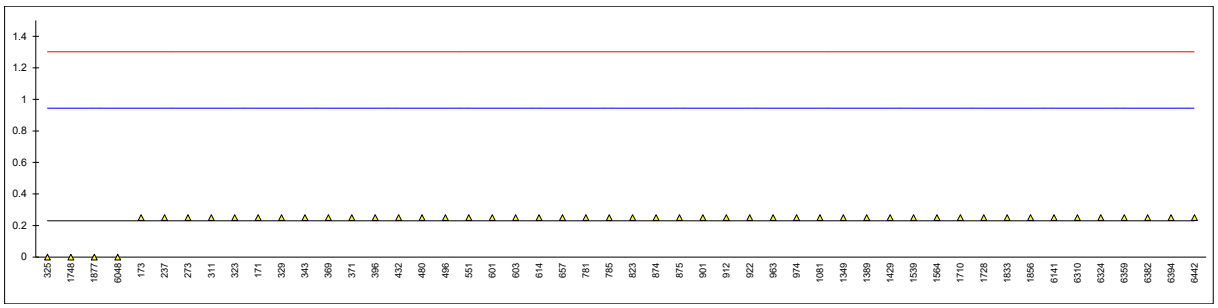

Kernel Density
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5

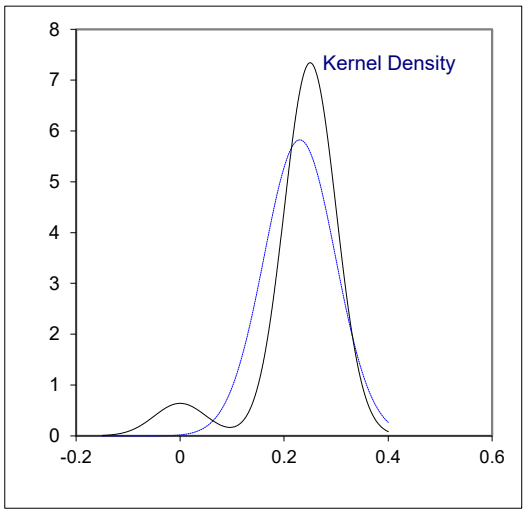
Determination of Color ASTM on sample #22075;

lab	method	reported test value	iis conversion *	mark	z(targ)	remarks
150		-----	-----		-----	
171	D1500	L0.5	0.25		0.06	
173	D1500	L0.5	0.25		0.06	
178		-----	-----		-----	
179		-----	-----		-----	
237	D1500	L0.5	0.25		0.06	
273	D1500	L0.5	0.25		0.06	
309		-----	-----		-----	
311	D1500	L0.5	0.25		0.06	
323	D1500	L0.5	0.25		0.06	
325	D6045	0.0	0.0		-0.64	
329	D1500	L0.5	0.25		0.06	
333		-----	-----		-----	
343	D1500	L0.5	0.25		0.06	
349		-----	-----		-----	
369	D1500	<0.5	0.25		0.06	
371	D6045	L0.5	0.25		0.06	
396	D1500	L 0,5	0.25		0.06	
432	D1500	L0,5	0.25		0.06	
480	D1500	L 0.5	0.25		0.06	
496	D1500	L0.5	0.25		0.06	
551	D1500	<0.5	0.25		0.06	
601	D1500	<0.5	0.25		0.06	
603	D1500	L0.5	0.25		0.06	
614	D1500	<0.5	0.25		0.06	
657	D1500	<0.5	0.25		0.06	
781	D1500	L0.5	0.25		0.06	
785	D6045	<0.5	0.25		0.06	
823	D1500	L0.5	0.25		0.06	
862		-----	-----		-----	
874	D1500	<0.5	0.25		0.06	
875	D6045	<0.5	0.25		0.06	
886		-----	-----		-----	
901	D1500	L0.5	0.25		0.06	
912	D1500	<0.5	0.25		0.06	
922	D1500	L0.5	0.25		0.06	
962		-----	-----		-----	
963	D1500	L0.5	0.25		0.06	
974	D1500	L0.5	0.25		0.06	
982		-----	-----		-----	
1081	D6045	L0.5	0.25		0.06	
1191	D6045	>30	>30		>83.36	value not in terms of Color ASTM
1349	D6045	L0.5	0.25		0.06	
1389	D1500	L0.5	0.25		0.06	
1429	D1500	<0.5	0.25		0.06	
1539	D1500	<0,5	0.25		0.06	
1564	D1500	L0.5	0.25		0.06	
1710	D1500	L0.5	0.25		0.06	
1728	D1500	L0.5	0.25		0.06	
1748	D1500	0	0		-0.64	
1833	D1500	<0.5	0.25		0.06	
1856	D1500	L0,5	0.25		0.06	
1877	D6045	0.0	0.0		-0.64	
6048	D1500	0	0		-0.64	
6113		-----	-----		-----	
6141	D1500	L0.5	0.25		0.06	
6310	D1500	L0.5	0.25		0.06	
6324	D1500	L0.5	0.25		0.06	
6359	D1500	L0,5	0.25		0.06	
6382	ISO2049	L0,5	0.25		0.06	
6394	D1500	L0,5	0.25		0.06	
6442	D6045	L0.5	0.25		0.06	
6468		-----	-----		-----	

normality	not OK
n	50
outliers	0
mean (n)	0.230
st.dev. (n)	0.0685
R(calc.)	0.192
st.dev.(D1500:12R17)	0.3571
R(D1500:12R17)	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 L0.5 into 0.25)


1.4
1.2
1
0.8
0.6
0.4
0.2
0
325
1748
1877
6048
173
237
273
311
323
171
329
343
369
371
396
432
480
496
551
601
603
614
657
781
785
823
874
875
901
912
922
963
974
1081
1349
1389
1429
1539
1564
1710
1728
1833
1856
6141
6310
6324
6359
6382
6394
6442


Kernel Density
8
7
6
5
4
3
2
1
0
-0.2
0
0.2
0.4
0.6

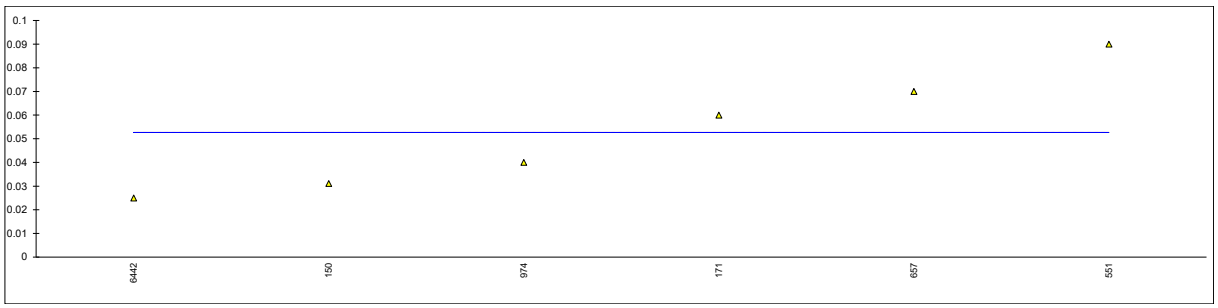
Determination of Conradson Carbon Residue on sample #22075; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	D4530	<0.10		-----	
171	D189	<0.01		-----	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237	D189	<0.1		-----	
273	D189	<0.01		-----	
309		-----		-----	
311		-----		-----	
323		-----		-----	
325	D4530	0.01		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349	D189	0.01		-----	
369	D4530	<0.01		-----	
371	D189	0.0035		-----	
396	D189	<0,01		-----	
432		-----		-----	
480		-----		-----	
496		-----		-----	
551	D4530	0.01		-----	
601		-----		-----	
603		-----		-----	
614	D189	0.021		-----	
657	D4530	<0.10		-----	
781	D4530	<0.10		-----	
785	D4530	<0.01		-----	
823	D189	0.01		-----	
862		-----		-----	
874	D4530	<0.1		-----	
875		-----		-----	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922	D189	<0.01		-----	
962		-----		-----	
963		-----		-----	
974	D189	<0.01		-----	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389	D4530	<0.1		-----	
1429		-----		-----	
1539	ISO6615	0.006		-----	
1564		-----		-----	
1710	ISO10370	0.01		-----	
1728		-----		-----	
1748		-----		-----	
1833	D4530	<0.1		-----	
1856	ISO6615	0.008		-----	
1877		-----		-----	
6048	D4530	0.01		-----	
6113		-----		-----	
6141		-----		-----	
6310		-----		-----	
6324		-----		-----	
6359	D4530	0.00		-----	
6382		-----		-----	
6394		-----		-----	
6442		-----		-----	
6468		-----		-----	
	n	25			
	mean (n)	<0.1			

Determination of Ramsbottom Carbon Residue on sample #22075; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	D524	0.0311		-----	
171	D524	0.06		-----	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273		-----		-----	
309		-----		-----	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396		-----		-----	
432		-----		-----	
480		-----		-----	
496		-----		-----	
551	D524	0.09		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D524	0.07		-----	
781		-----		-----	
785		-----		-----	
823		-----		-----	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D524	0.04		-----	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1539		-----		-----	
1564		-----		-----	
1710		-----		-----	
1728		-----		-----	
1748		-----		-----	
1833		-----		-----	
1856		-----		-----	
1877		-----		-----	
6048		-----		-----	
6113		-----		-----	
6141		-----		-----	
6310		-----		-----	
6324		-----		-----	
6359		-----		-----	
6382		-----		-----	
6394		-----		-----	
6442	D524	0.025		-----	
6468		-----		-----	

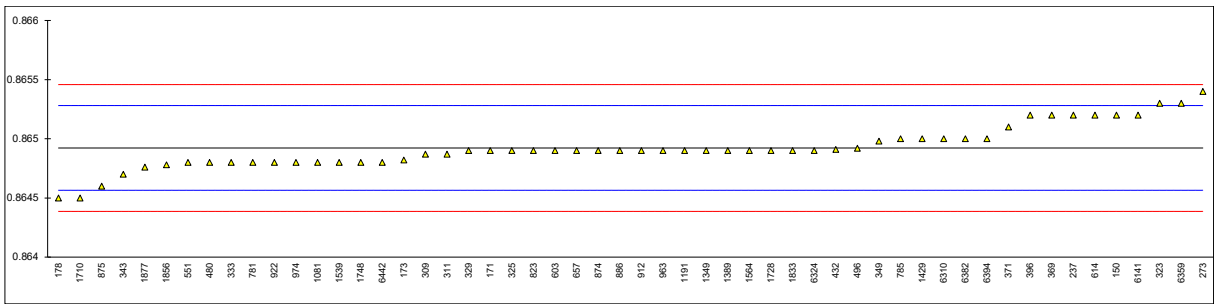
normality	unknown
n	6
outliers	0
mean (n)	0.053
st.dev. (n)	0.0251
R(calc.)	0.070
st.dev.(D524:15R19)	(0.0100)
R(D524:15R19)	(0.028)

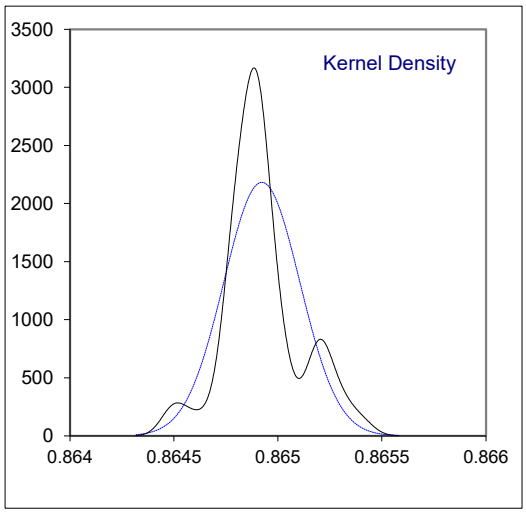

0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
6442
150
974
171
657
551

Determination of Density at 15 °C on sample #22075; results in kg/L

lab	method	value	mark	z(targ)	remarks
150	D4052	0.8652		1.55	
171	D4052	0.8649		-0.13	
173	D4052	0.86482		-0.57	
178	D4052	0.8645		-2.37	
179		-----		-----	
237	D4052	0.8652	C	1.55	first reported 867.0 kg/m^3
273	D4052	0.8654		2.67	
309	D4052	0.86487		-0.29	
311	ISO12185	0.86487		-0.29	
323	ISO12185	0.8653		2.11	
325	D4052	0.8649		-0.13	
329	D4052	0.8649		-0.13	
333	D4052	0.8648		-0.69	
343	D4052	0.8647		-1.25	
349	D4052	0.86498		0.32	
369	D4052	0.8652		1.55	
371	D4052	0.8651		0.99	
396	D4052	0.8652		1.55	
432	D4052	0.86491		-0.07	
480	ISO12185	0.8648		-0.69	
496	ISO12185	0.86492		-0.01	
551	D4052	0.8648		-0.69	
601		-----		-----	
603	D4052	0.8649		-0.13	
614	D4052	0.8652		1.55	
657	D4052	0.8649		-0.13	
781	ISO12185	0.8648		-0.69	
785	ISO12185	0.8650		0.43	
823	D4052	0.8649		-0.13	
862		-----		-----	
874	ISO12185	0.8649		-0.13	
875	ISO12185	0.8646		-1.81	
886	D4052	0.8649		-0.13	
901		-----		-----	
912	D1298	0.8649		-0.13	
922	D4052	0.8648		-0.69	
962		-----		-----	
963	D4052	0.8649		-0.13	
974	D4052	0.8648		-0.69	
982		-----		-----	
1081	D4052	0.8648		-0.69	
1191	ISO12185	0.86490		-0.13	
1349	IP365	0.8649		-0.13	
1389	D4052	0.8649		-0.13	
1429	D4052	0.8650		0.43	
1539	ISO12185	0.8648		-0.69	
1564	D4052	0.8649		-0.13	
1710	ISO12185	0.8645		-2.37	
1728	D4052	0.86490		-0.13	
1748	D4052	0.8648		-0.69	
1833	D4052	0.8649	C	-0.13	first reported 0.8469
1856	ISO12185	0.86478		-0.80	
1877	D4052	0.86476		-0.91	
6048		-----		-----	
6113		-----		-----	
6141	D4052	0.8652		1.55	
6310	D4052	0.8650	C	0.43	first reported 865.0 kg/L
6324	D4052	0.8649		-0.13	
6359	ISO12185	0.8653		2.11	
6382	DIN51757	0.8650		0.43	
6394	D4052	0.8650	C	0.43	first reported 865.4 kg/m^3
6442	D4052	0.8648		-0.69	
6468		-----		-----	

normality	OK
n	54
outliers	0
mean (n)	0.86492
st.dev. (n)	0.000183
R(calc.)	0.00051
st.dev.(ISO12185:96)	0.000179
R(ISO12185:96)	0.0005

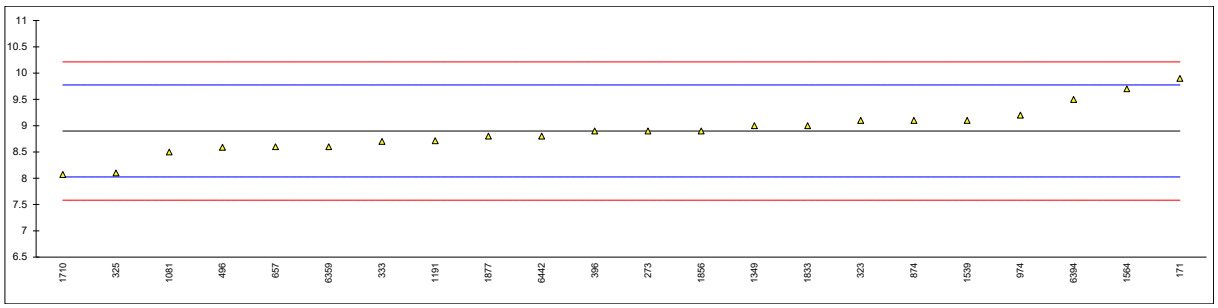

0.866
0.8655
0.865
0.8645
0.864
178 1710 875 343 1877 1856 551 480 333 781 922 974 1081 1539 1748 6442 173 309 311 329 171 325 823 603 657 874 886 912 963 1191 1349 1389 1564 1728 1833 6324 432 496 349 785 1429 6310 6382 6394 371 396 369 237 614 150 6141 323 6359 273

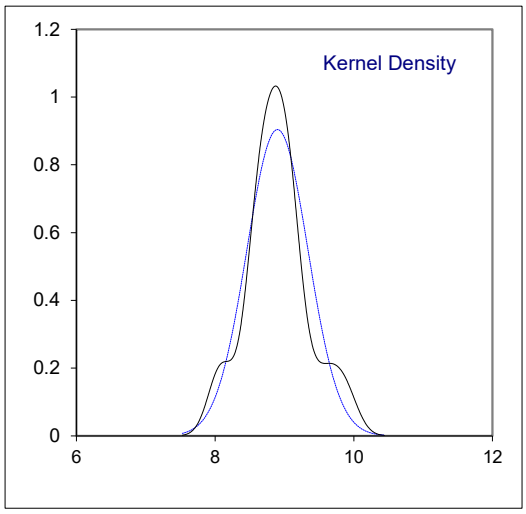

Kernel Density
3500
3000
2500
2000
1500
1000
500
0
0.864
0.8645
0.865
0.8655
0.866

Determination of Evaporation loss by Noack on sample #22075; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D5800-B	9.9		2.28	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273	D5800-B	8.9		0.00	
309		-----		-----	
311		-----		-----	
323	D5800-B	9.1		0.46	
325	CEC L-40-93	8.1		-1.82	
329		-----		-----	
333	CEC L-40-93	8.7		-0.45	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396	D5800-B	8.9		0.00	
432		-----		-----	
480		-----		-----	
496	D5800-B	8.59		-0.70	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D5800-B	8.6		-0.68	
781		-----		-----	
785		-----		-----	
823		-----		-----	
862		-----		-----	
874	D5800-B	9.1		0.46	
875		-----		-----	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D5800-B	9.2		0.69	
982		-----		-----	
1081	D5800-B	8.5		-0.91	
1191	CEC L-40-93	8.715		-0.42	
1349	D5800-B	9.0		0.23	
1389		-----		-----	
1429		-----		-----	
1539	PN-C-04124	9.1		0.46	
1564	D5800-B	9.7		1.83	
1710	D5800-B	8.07		-1.89	
1728		-----		-----	
1748		-----		-----	
1833	D5800-B	9.0		0.23	
1856	PN-C-04121	8.9		0.00	
1877	D5800-B	8.8		-0.23	
6048		-----		-----	
6113		-----		-----	
6141		-----		-----	
6310		-----		-----	
6324		-----		-----	
6359	D5800-B	8.6		-0.68	
6382		-----		-----	
6394	D5800-B	9.5		1.37	
6442	CEC L-40-93	8.8		-0.23	
6468		-----		-----	

normality	OK
n	22
outliers	0
mean (n)	8.899
st.dev. (n)	0.4413
R(calc.)	1.236
st.dev.(D5800-B:21)	0.4382
R(D5800-B:21)	1.227

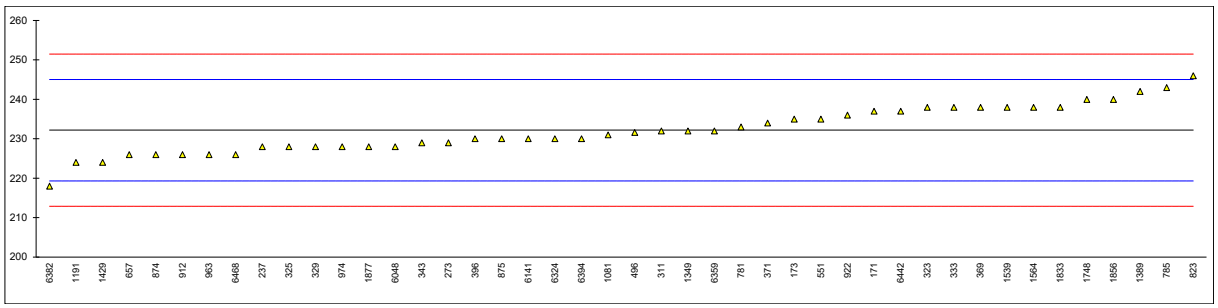

11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
1710
325
1081
496
657
6359
333
1191
1877
6442
396
273
1856
1349
1833
323
874
1539
974
6394
1564
171

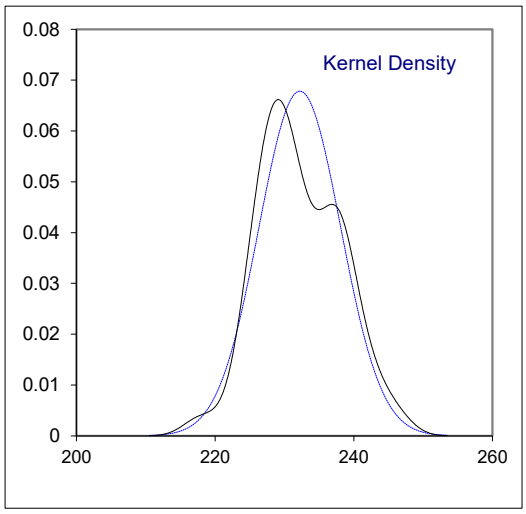

Kernel Density
1.2
1
0.8
0.6
0.4
0.2
0
6
8
10
12

Determination of Flash Point C.O.C. on sample #22075; results in °C

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D92	237		0.75	
173	D92	235		0.44	
178		-----		-----	
179		-----		-----	
237	D92	228		-0.65	
273	D92	229.0		-0.50	
309		-----		-----	
311	D92	232		-0.03	
323	D92	238		0.90	
325	D92	228		-0.65	
329	D92	228.		-0.65	
333	D92	238		0.90	
343	D92	229		-0.50	
349		-----		-----	
369	D92	238.0		0.90	
371	D92	234		0.28	
396	D92	230		-0.34	
432		-----		-----	
480		-----		-----	
496	D92	231.6		-0.09	
551	D92	235		0.44	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D92	226		-0.96	
781	D92	233		0.13	
785	D92	243		1.68	
823	D92	246		2.15	
862		-----		-----	
874	D92	226		-0.96	
875	D92	230		-0.34	
886		-----		-----	
901		-----		-----	
912	D92	226		-0.96	
922	D92	236		0.59	
962		-----		-----	
963	D92	226.0		-0.96	
974	D92	228		-0.65	
982		-----		-----	
1081	D92	231.0		-0.19	
1191	ISO2592	224.0		-1.27	
1349	D92	232		-0.03	
1389	D92	242.0		1.53	
1429	D92	224		-1.27	
1539	ISO2592	238		0.90	
1564	D92	238		0.90	
1710		-----		-----	
1728		-----		-----	
1748	D92	240		1.21	
1833	D92	238		0.90	
1856	ISO2592	240		1.21	
1877	D92	228		-0.65	
6048	ISO2592	228		-0.65	
6113		-----		-----	
6141	D92	230		-0.34	
6310		-----		-----	
6324	D92	230		-0.34	
6359	ISO2592	232		-0.03	
6382	ISO2719	218.0		-2.21	
6394	D92	230		-0.34	
6442	D92	237		0.75	
6468	D92	226		-0.96	

normality	OK
n	44
outliers	0
mean (n)	232.20
st.dev. (n)	5.882
R(calc.)	16.47
st.dev.(D92:18)	6.429
R(D92:18)	18

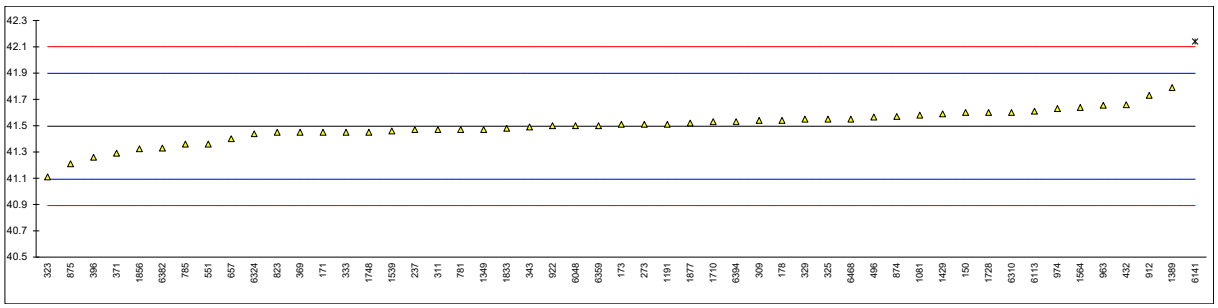

260
250
240
230
220
210
200
6382
1191
1429
657
874
912
963
6468
237
325
329
974
1877
6048
343
273
396
875
6141
6324
6394
1081
496
311
1349
6359
781
371
173
551
922
171
6442
323
333
369
1539
1564
1833
1748
1856
1389
785
823

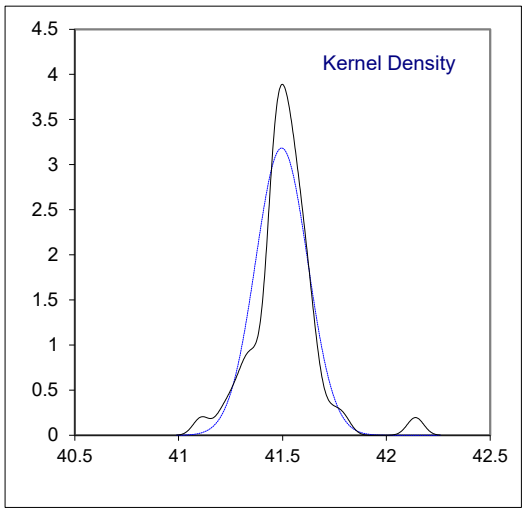

Kernel Density
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
200
220
240
260

Determination of Kinematic Viscosity at 40 °C on sample #22075; results in mm²/s

lab	method	value	mark	z(targ)	remarks
150	D445	41.60		0.52	
171	D445	41.45		-0.23	
173	D445	41.51		0.07	
178	D7279 corrected to D445	41.54		0.22	
179		-----		-----	
237	D445	41.47	C	-0.13	first reported 41.19
273	D445	41.51		0.07	
309	D445	41.54		0.22	
311	D445	41.47		-0.13	
323	D445	41.11		-1.92	
325	D445	41.55		0.27	
329	D445	41.55		0.27	
333	D445	41.45		-0.23	
343	D445	41.49		-0.03	
349		-----		-----	
369	D445	41.45		-0.23	
371	D445	41.29		-1.02	
396	D445	41.26		-1.17	
432	ISO3104	41.66		0.81	
480		-----		-----	
496	D445	41.565		0.34	
551	D445	41.36		-0.67	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D445	41.40		-0.48	
781	D445	41.47		-0.13	
785	D445	41.36		-0.67	
823	D445	41.45		-0.23	
862		-----		-----	
874	D445	41.57		0.37	
875	D445	41.21		-1.42	
886		-----		-----	
901		-----		-----	
912	D445	41.73		1.16	
922	D445	41.50		0.02	
962		-----		-----	
963	D445	41.655		0.79	
974	D445	41.63		0.66	
982		-----		-----	
1081	D445	41.580		0.42	
1191	ISO3104	41.51		0.07	
1349	D445	41.47		-0.13	
1389	D445	41.79		1.46	
1429	D445	41.59		0.47	
1539	ISO3104	41.46		-0.18	
1564	D445	41.638		0.70	
1710	ISO3104	41.53		0.17	
1728	D445	41.60		0.52	
1748	D7042	41.45		-0.23	
1833	ISO3104	41.48		-0.08	
1856	ISO3104	41.324		-0.85	
1877	D445	41.52		0.12	
6048	D445	41.50		0.02	
6113	D445	41.61		0.57	
6141	D445	42.1400	R(0.01)	3.20	
6310	D7279 corrected to D445	41.6		0.52	
6324	D445	41.438		-0.29	
6359	D445	41.50		0.02	
6382	DIN51562-1,2	41.330		-0.82	
6394	D445	41.53		0.17	
6442		-----		-----	
6468	D445	41.55		0.27	

normality	suspect
n	50
outliers	1
mean (n)	41.496
st.dev. (n)	0.1253
R(calc.)	0.351
st.dev.(D445:21e1)	0.2016
R(D445:21e1)	0.564

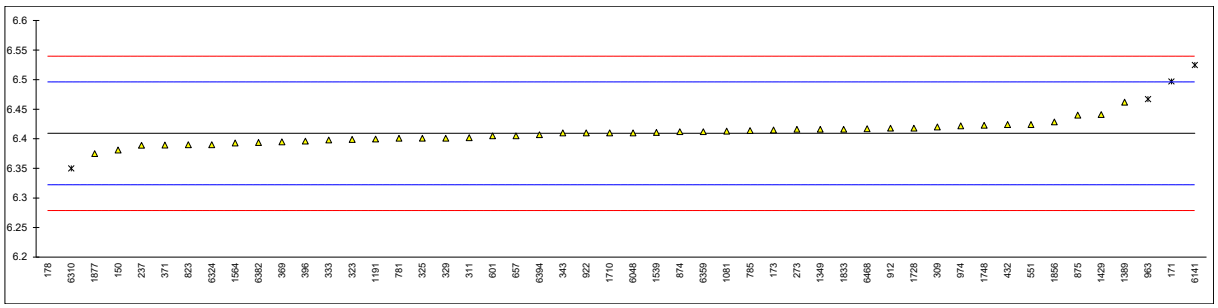

42.3
42.1
41.9
41.7
41.5
41.3
41.1
40.9
40.7
40.5
323 875 396 371 1856 6382 785 551 657 6324 823 369 171 333 1748 1539 237 311 781 1349 1833 343 922 6048 6359 173 273 1191 1877 1710 6394 309 178 329 325 6488 496 874 1061 1429 150 1728 6310 6113 974 1564 963 432 912 1389 6141

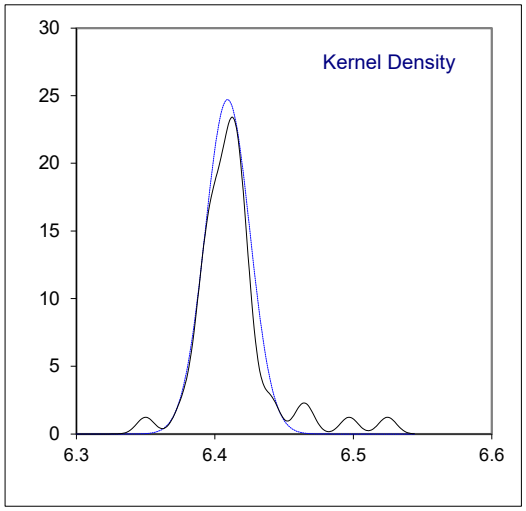

Kernel Density
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
40.5
41
41.5
42
42.5

Determination of Kinematic Viscosity at 100 °C on sample #22075; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150	D445	6.381		-0.65	
171	D445	6.497	R(0.01)	2.02	
173	D445	6.4148		0.13	
178	D7279 corrected to D445	6.11	R(0.01)	-6.88	
179		-----		-----	
237	D445	6.389		-0.46	
273	D445	6.416		0.16	
309	D445	6.420		0.25	
311	D445	6.402		-0.17	
323	D445	6.399		-0.23	
325	D445	6.401		-0.19	
329	D445	6.401		-0.19	
333	D445	6.398		-0.26	
343	D445	6.410		0.02	
349		-----		-----	
369	D445	6.395		-0.33	
371	D445	6.3895		-0.45	
396	D445	6.396		-0.30	
432	ISO3104	6.424	C	0.34	first reported 6.505
480		-----		-----	
496		-----		-----	
551	D445	6.424		0.34	
601	D445	6.405		-0.10	
603		-----		-----	
614		-----		-----	
657	D445	6.405		-0.10	
781	D445	6.401		-0.19	
785	D445	6.414		0.11	
823	ISO3104	6.390		-0.44	
862		-----		-----	
874	D445	6.412		0.06	
875	D445	6.440		0.71	
886		-----		-----	
901		-----		-----	
912	D445	6.418		0.20	
922	D445	6.410		0.02	
962		-----		-----	
963	D445	6.467	R(0.01)	1.33	
974	D445	6.422		0.29	
982		-----		-----	
1081	D445	6.413		0.09	
1191	ISO3104	6.39965		-0.22	
1349	D445	6.416		0.16	
1389	D445	6.462		1.21	
1429	D445	6.441		0.73	
1539	ISO3104	6.411		0.04	
1564	D445	6.393		-0.37	
1710	ISO3104	6.410		0.02	
1728	D445	6.418		0.20	
1748	D7042	6.423		0.32	
1833	ISO3104	6.416		0.16	
1856	ISO3104	6.4285		0.44	
1877	D445	6.375		-0.79	
6048	D445	6.410		0.02	
6113		-----		-----	
6141	D445	6.5247	R(0.01)	2.66	
6310	D7279 corrected to D445	6.35	R(0.01)	-1.36	
6324	D445	6.39		-0.44	
6359	D445	6.412		0.06	
6382	DIN51562-1,2	6.3937		-0.36	
6394	D445	6.407		-0.05	
6442		-----		-----	
6468	D445	6.417		0.18	

normality	suspect
n	45
outliers	5
mean (n)	6.409
st.dev. (n)	0.0161
R(calc.)	0.045
st.dev.(D445:21e1)	0.0435
R(D445:21e1)	0.122

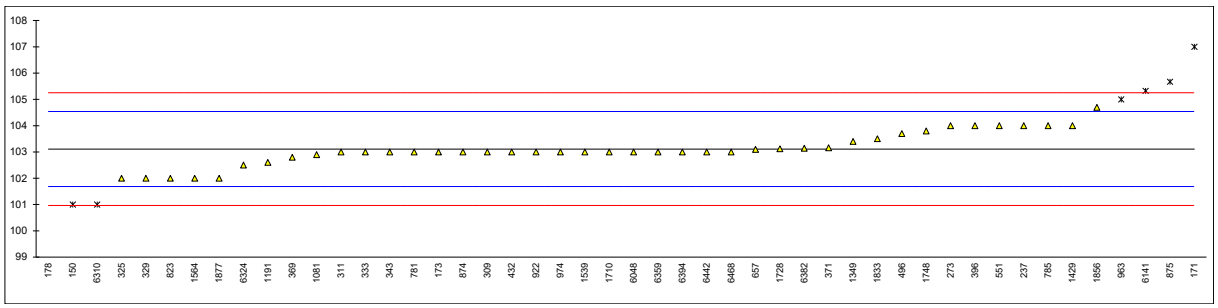

6.6
6.55
6.5
6.45
6.4
6.35
6.3
6.25
6.2
178 6310 1877 150 237 371 823 6324 1564 6382 369 396 333 323 1191 781 325 329 311 601 657 6394 343 922 1710 6048 1539 874 6359 1061 785 173 273 1349 1833 6468 912 1728 309 974 1748 432 551 1656 875 1429 1389 963 171 6141

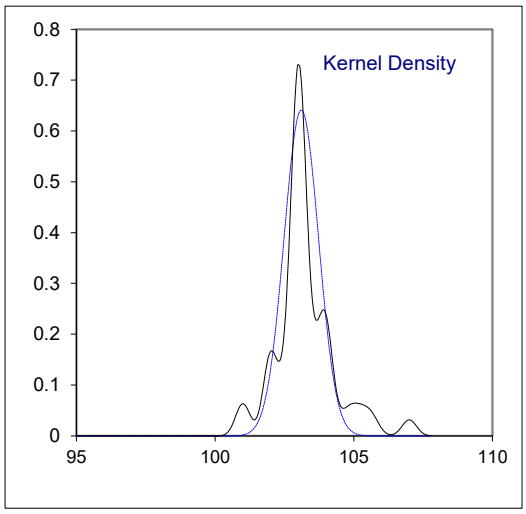

Kernel Density
30
25
20
15
10
5
0
6.3
6.4
6.5
6.6

Determination of Viscosity Index on sample #22075

lab	method	value	mark	z(targ)	remarks
150	D2270	101	R(0.05)	-2.95	
171	D2270	107	ex	5.45	test result excluded as statistical outlier in KV 100 °C
173	D2270	103		-0.15	
178	D2270	90	ex,E	-18.35	test result excluded as statistical outlier in KV 100 °C, iis calc. 89
179		-----		-----	
237	D2270	104	E	1.25	calculation difference iis calculated 102
273	D2270	104	E	1.25	calculation difference iis calculated 103
309	D2270	103		-0.15	
311	D2270	103		-0.15	
323		-----		-----	
325	D2270	102		-1.55	
329	D2270	102		-1.55	
333	D2270	103		-0.15	
343	D2270	103		-0.15	
349		-----		-----	
369	D2270	102.8		-0.43	
371	D2270	103.16		0.07	
396	D2270	104		1.25	
432	ISO2909	103	C	-0.15	first reported 106.5
480		-----		-----	
496	D2270	103.7		0.83	
551	D2270	104		1.25	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D2270	103.1		-0.01	
781	D2270	103		-0.15	
785	D2270	104		1.25	
823	D2270	102		-1.55	
862		-----		-----	
874	D2270	103		-0.15	
875	D2270	105.669	R(0.05)	3.59	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922	D2270	103		-0.15	
962		-----		-----	
963	D2270	105	ex	2.65	test result excluded as statistical outlier in KV 100 °C
974	D2270	103		-0.15	
982		-----		-----	
1081	D2270	102.9		-0.29	
1191	D2270	102.6		-0.71	
1349	D2270	103.4		0.41	
1389		-----		-----	
1429	D2270	104		1.25	
1539	ISO2909	103		-0.15	
1564	D2270	102.000		-1.55	
1710	D2270	103		-0.15	
1728	D2270	103.12		0.02	
1748	D2270	103.8		0.97	
1833	ISO2909	103.5		0.55	
1856	ISO2909	104.7		2.23	
1877	D2270	102		-1.55	
6048	D2270	103		-0.15	
6113		-----		-----	
6141	D2270	105.323	ex	3.10	test result excluded as statistical outlier in KV 40 °C + 100 °C
6310	D2270	101	ex,E	-2.95	test result excluded as statistical outlier in KV 100 °C, iis calc.100
6324	D2270	102.5		-0.85	
6359	D2270	103		-0.15	
6382	ISO2909	103.14		0.05	
6394	D2270	103		-0.15	
6442	D2270	103		-0.15	
6468	D2270	103		-0.15	

normality	OK
n	41
outliers	2 (+ 5ex)
mean (n)	103.11
st.dev. (n)	0.622
R(calc.)	1.74
st.dev.(D2270:10R16)	0.714
R(D2270:10R16)	2

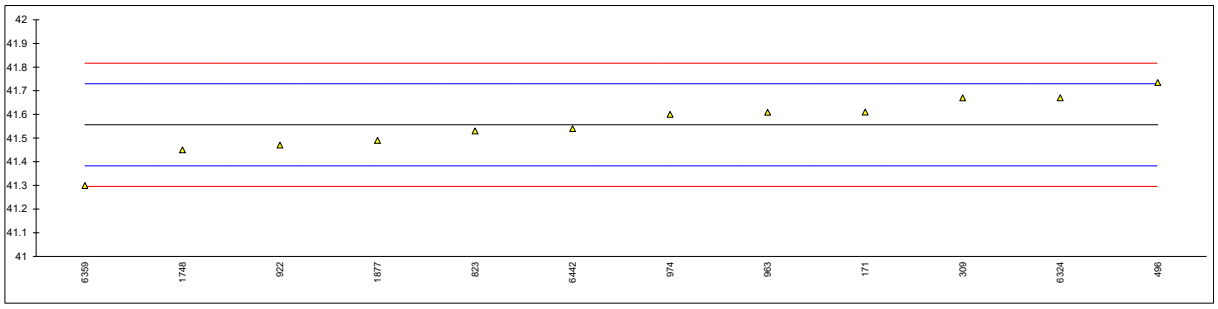

108
107
106
105
104
103
102
101
100
99
178
150
6310
325
329
823
1564
1877
6324
1191
369
1081
311
333
343
781
173
874
309
432
922
974
1539
1710
6048
6359
6394
6442
6468
657
1728
6382
371
1349
1833
496
1748
273
396
551
237
785
1429
1856
963
6141
875
171

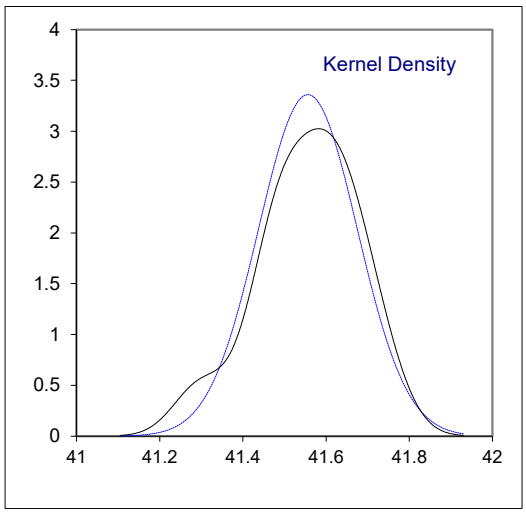

Kernel Density
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
95
100
105
110

Determination of Kinematic Viscosity Stabinger at 40 °C on sample #22075; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D7042	41.61		0.62	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273		-----		-----	
309	D7042	41.67		1.31	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396		-----		-----	
432		-----		-----	
480		-----		-----	
496	D7042	41.735		2.06	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
781		-----		-----	
785		-----		-----	
823	D7042	41.53		-0.30	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922	D7042	41.47		-0.99	
962		-----		-----	
963	D7042	41.609		0.61	
974	D7042	41.60		0.51	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1539		-----		-----	
1564		-----		-----	
1710		-----		-----	
1728		-----		-----	
1748	D7042	41.45		-1.22	
1833		-----		-----	
1856		-----		-----	
1877	D7042	41.49		-0.76	
6048		-----		-----	
6113		-----		-----	
6141		-----		-----	
6310		-----		-----	
6324	D7042	41.67		1.31	
6359	D7042	41.30		-2.96	
6382		-----		-----	
6394		-----		-----	
6442	D7042	41.54		-0.19	
6468		-----		-----	

normality	OK
n	12
outliers	0
mean (n)	41.556
st.dev. (n)	0.1188
R(calc.)	0.333
st.dev.(D7042:21a)	0.0867
R(D7042:21a)	0.243

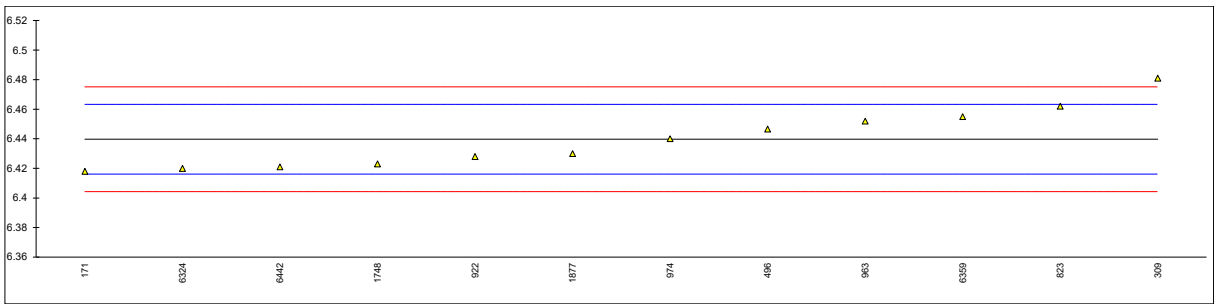

42
41.9
41.8
41.7
41.6
41.5
41.4
41.3
41.2
41.1
41
6359
1748
922
1877
823
6442
974
963
171
309
6324
496

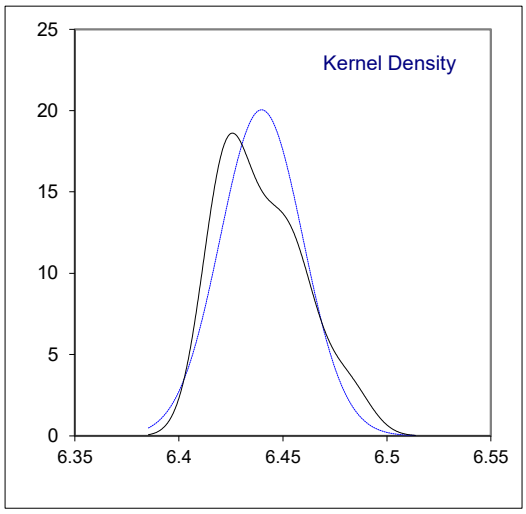

Kernel Density
4
3.5
3
2.5
2
1.5
1
0.5
0
41
41.2
41.4
41.6
41.8
42

Determination of Kinematic Viscosity Stabinger at 100 °C on sample #22075; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D7042	6.418		-1.84	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273		-----		-----	
309	D7042	6.481		3.50	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396		-----		-----	
432		-----		-----	
480		-----		-----	
496	D7042	6.4466		0.58	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
781		-----		-----	
785		-----		-----	
823	D7042	6.462		1.89	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922	D7042	6.428		-0.99	
962		-----		-----	
963	D7042	6.452		1.04	
974	D7042	6.440		0.02	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1539		-----		-----	
1564		-----		-----	
1710		-----		-----	
1728		-----		-----	
1748	D7042	6.423		-1.42	
1833		-----		-----	
1856		-----		-----	
1877	D7042	6.430		-0.82	
6048		-----		-----	
6113		-----		-----	
6141		-----		-----	
6310		-----		-----	
6324	D7042	6.42		-1.67	
6359	D7042	6.455		1.29	
6382		-----		-----	
6394		-----		-----	
6442	D7042	6.421		-1.59	
6468		-----		-----	

normality	OK
n	12
outliers	0
mean (n)	6.440
st.dev. (n)	0.0199
R(calc.)	0.056
st.dev.(D7042:21a)	0.0118
R(D7042:21a)	0.033

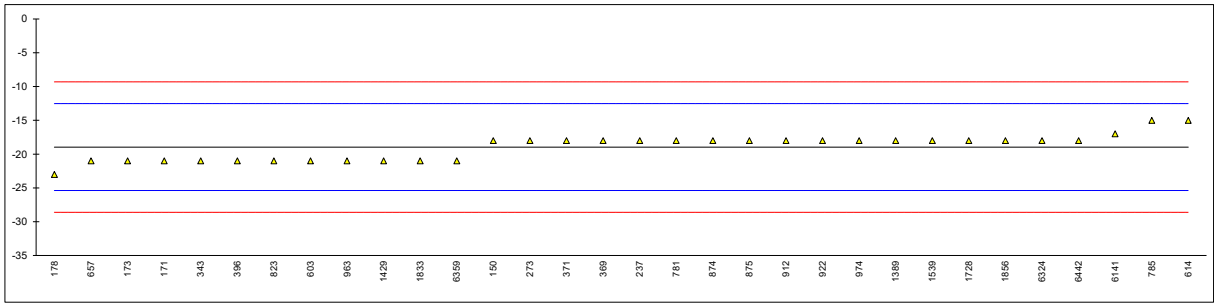

6.52
6.5
6.48
6.46
6.44
6.42
6.4
6.38
6.36
171
6324
6442
1748
922
1877
974
496
963
6359
823
309

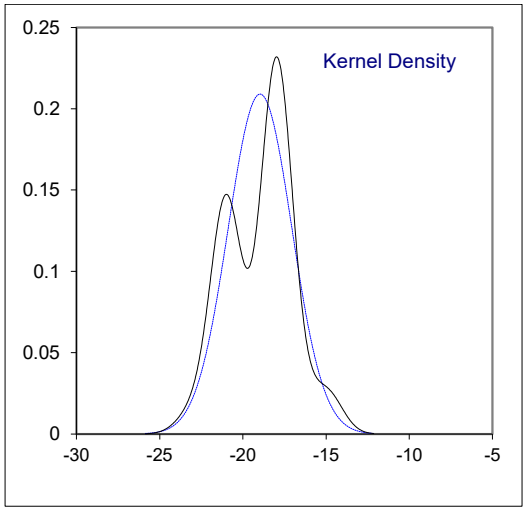

Kernel Density
25
20
15
10
5
0
6.35
6.4
6.45
6.5
6.55

Determination of Pour Point Manual on sample #22075; results in °C

lab	method	value	mark	z(targ)	remarks
150	D97	-18		0.30	
171	D97	-21		-0.63	
173	D97	-21		-0.63	
178	D97	-23		-1.25	
179		-----		-----	
237	D97	-18		0.30	
273	D97	-18		0.30	
309		-----		-----	
311		-----		-----	
323		-----		-----	
325		-----		-----	
329		-----		-----	
333		-----		-----	
343	D97	-21		-0.63	
349		-----		-----	
369	D97	-18		0.30	
371	D97	-18		0.30	
396	D97	-21		-0.63	
432		-----		-----	
480		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603	D97	-21		-0.63	
614	D97	-15		1.23	
657	D97	-21		-0.63	
781	D97	-18		0.30	
785	D97	-15.0		1.23	
823	ISO3016	-21		-0.63	
862		-----		-----	
874	D97	-18		0.30	
875	D97	-18		0.30	
886		-----		-----	
901		-----		-----	
912	D97	-18		0.30	
922	D97	-18		0.30	
962		-----		-----	
963	D97	-21		-0.63	
974	D97	-18		0.30	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389	D97	-18		0.30	
1429	D97	-21		-0.63	
1539	ISO3016	-18		0.30	
1564		-----		-----	
1710		-----		-----	
1728	D97	-18		0.30	
1748		-----		-----	
1833	ISO3016	-21		-0.63	
1856	ISO3016	-18		0.30	
1877		-----		-----	
6048		-----		-----	
6113		-----		-----	
6141	D6892	-17		0.61	
6310		-----		-----	
6324	D97	-18		0.30	
6359	ISO3016	-21		-0.63	
6382		-----		-----	
6394		-----		-----	
6442	D97	-18		0.30	
6468		-----		-----	

normality	OK
n	32
outliers	0
mean (n)	-18.97
st.dev. (n)	1.909
R(calc.)	5.35
st.dev.(D97:17b)	3.214
R(D97:17b)	9

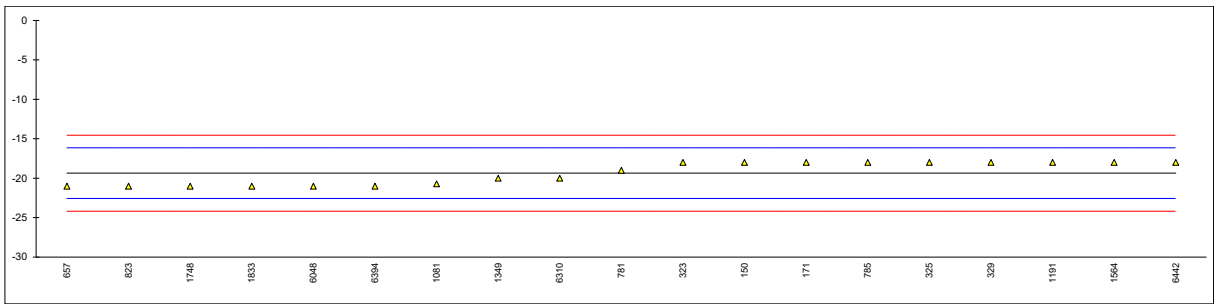

0
-5
-10
-15
-20
-25
-30
-35
178
657
173
171
343
396
823
603
963
1429
1833
6359
150
273
371
369
237
781
874
875
912
922
974
1389
1539
1728
1856
6324
6442
6141
785
614

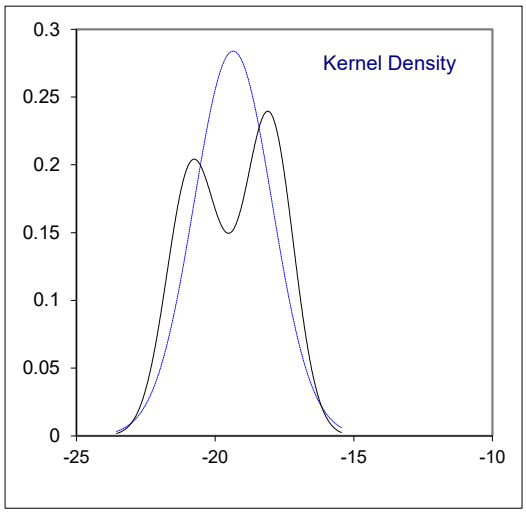

Kernel Density
0.25
0.2
0.15
0.1
0.05
0
-30
-25
-20
-15
-10
-5

Determination of Pour Point Automated 1 °C interval on sample #22075; results in °C

lab	method	value	mark	z(targ)	remarks
150	D5950	-18		0.84	
171	D5950	-18		0.84	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273		-----		-----	
309		-----		-----	
311		-----		-----	
323	D5950	-18		0.84	
325	D5950	-18		0.84	
329	D5950	-18		0.84	
333		-----		-----	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396		-----		-----	
432		-----		-----	
480		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D5950	-21		-1.03	
781	D5950	-19		0.22	
785	D6749	-18.0		0.84	
823	D5949	-21		-1.03	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
982		-----		-----	
1081	D5950	-20.7		-0.84	
1191	D5950	-18		0.84	
1349	D5950	-20		-0.40	
1389		-----		-----	
1429		-----		-----	
1539		-----		-----	
1564	D5949	-18		0.84	
1710		-----		-----	
1728		-----		-----	
1748	D7346	-21		-1.03	
1833	D5950	-21		-1.03	
1856		-----		-----	
1877		-----		-----	
6048	D5950	-21		-1.03	
6113		-----		-----	
6141		-----		-----	
6310	D5950	-20		-0.40	
6324		-----		-----	
6359		-----		-----	
6382		-----		-----	
6394	D5950	-21		-1.03	
6442	D6892	-18		0.84	
6468		-----		-----	

normality	OK
n	19
outliers	0
mean (n)	-19.35
st.dev. (n)	1.405
R(calc.)	3.93
st.dev.(D5950:14R20)	1.607
R(D5950:14R20)	4.5


0
-5
-10
-15
-20
-25
-30
657
823
1748
1833
6048
6394
1081
1349
6310
781
323
150
171
785
325
329
1191
1564
6442


Kernel Density
0.3
0.25
0.2
0.15
0.1
0.05
0
-25
-20
-15
-10

Determination of Rust prevention, proc. B, synthetic seawater on sample #22075

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237		-----		-----	
273		-----		-----	
309		-----		-----	
311		-----		-----	
323		-----		-----	
325	D665	severe		-----	
329		-----		-----	
333		-----		-----	
343		-----		-----	
349		-----		-----	
369		-----		-----	
371		-----		-----	
396		-----		-----	
432		-----		-----	
480		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657		-----		-----	
781	D665	Fail/Severe		-----	
785		-----		-----	
823		-----		-----	
862		-----		-----	
874		-----		-----	
875		-----		-----	
886		-----		-----	
901	D665	Fail		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
982		-----		-----	
1081		-----		-----	
1191		-----		-----	
1349		-----		-----	
1389		-----		-----	
1429		-----		-----	
1539		-----		-----	
1564	D665	No pasa		-----	
1710		-----		-----	
1728		-----		-----	
1748		-----		-----	
1833		-----		-----	
1856	ISO7120	no corrosion		-----	possibly a false positive test result?
1877		-----		-----	
6048		-----		-----	
6113		-----		-----	
6141		-----		-----	
6310		-----		-----	
6324		-----		-----	
6359		-----		-----	
6382		-----		-----	
6394		-----		-----	
6442	D665	Dont Pass		-----	
6468		-----		-----	
	n	5			
	mean (n)	Fail			

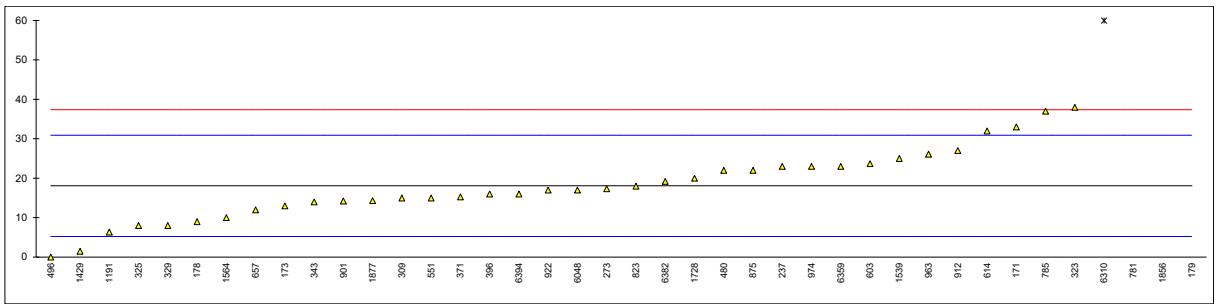
Determination of Sulfur on sample #22075; results in mg/kg

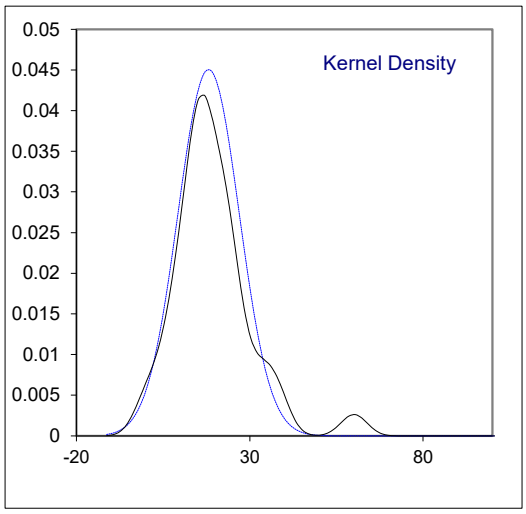
lab	method	value	mark	z(targ)	remarks
150	D2622	<3.0		-----	
171		-----		-----	
173		-----		-----	
178		-----		-----	
179		-----		-----	
237	D4294	<17		-----	
273	D5453	<1		-----	
309	D2622	0.724		-----	
311		-----		-----	
323	ISO20884	<5		-----	
325	D5185	<50		-----	
329	D5185	<50		-----	
333		-----		-----	
343	IP336	<300		-----	
349		-----		-----	
369	D4294	<10		-----	
371	D5453	1.53		-----	
396	D4294	<0,01		-----	
432		-----		-----	
480		-----		-----	
496		-----		-----	
551		-----		-----	
601		-----		-----	
603		-----		-----	
614		-----		-----	
657	D5453	1.6		-----	
781	D4294	<20		-----	
785	ISO20884	1.0		-----	
823	D5453	<1.0		-----	
862		-----		-----	
874	D2622	<3		-----	
875	D2622	1.49		-----	
886	D4294	<0.01		-----	
901		-----		-----	
912	D4294	<17		-----	
922	D4294	<17		-----	
962		-----		-----	
963		-----		-----	
974	D4294	<17		-----	
982		-----		-----	
1081	D2622	1.6		-----	
1191	ISO8754	2.4		-----	
1349	D7039	1.32		-----	
1389		-----		-----	
1429	D4294	0.01		-----	
1539		-----		-----	
1564	D4294	7		-----	
1710	D4294	<17		-----	
1728	D2622	2		-----	
1748		-----		-----	
1833	ISO8754	<0.03		-----	
1856		-----		-----	
1877		-----		-----	
6048	D4294	<5		-----	
6113		-----		-----	
6141	D4294	0		-----	
6310	D7751	3		-----	
6324	D4294	<17		-----	
6359		-----	W	-----	test result withdrawn, reported 2891
6382	ISO8754	0		-----	
6394	D5453	1.42		-----	
6442		-----		-----	
6468		-----		-----	
	n	31			
	mean (n)	<17			application range D4294:21: 17 mg/kg – 4.6 %M/M application range D2622:21: 3 mg/kg – 4.6 %M/M

Determination of Water on sample #22075; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D6304-A:20	<20		-----	
171	D6304-A:20	33		2.32	
173	D6304-C:20	12.961		-0.80	
178	D6304-C:20	9		-1.41	
179	D6304-C:20	459	R(0.01)	68.56	
237	D6304-C:16e1	23		0.77	
273	D6304-A:16e1	17.3		-0.12	
309	D6304-A:20	15		-0.48	
311	D6304-A:16e1	<30		-----	
323	D6304-A:20	38		3.10	
325	D6304-C:20	8		-1.57	
329	D6304-C:20	8		-1.57	
333		-----		-----	
343	D6304-A:16e1	14		-0.63	
349		-----		-----	
369	ISO12937	<30		-----	
371	D6304-C:20	15.26		-0.44	
396	D6304-A:20	16		-0.32	
432		-----		-----	
480	D6304-A:20	22		0.61	
496	D6304-B:20	0.001		-2.81	
551	D6304-A:16e1	15		-0.48	
601		-----		-----	
603	D6304-A:20	23.7		0.87	
614	D6304-B:20	32		2.16	
657	D6304-A:20	12		-0.95	
781	D6304-B:20	119	R(0.01)	15.69	
785	D6304-A:20	37.0		2.94	
823	D6304-A:20	18		-0.01	
862		-----		-----	
874		-----		-----	
875	D6304	22		0.61	
886		-----		-----	
901	D6304-A:20	14.2		-0.60	
912	D6304-C:20	27		1.39	
922	D6304-A:20	17		-0.17	
962		-----		-----	
963	D6304-A	26.1		1.25	
974	D6304-A:20	23		0.77	
982		-----		-----	
1081		-----		-----	
1191	D6304-C:20	6.35		-1.82	
1349		-----		-----	
1389		-----		-----	
1429	IP438	1.47		-2.58	
1539	D95	25		1.08	
1564	D6304-B:20	10		-1.26	
1710		-----	W	-----	test result withdrawn, reported 131
1728	D6304-A:20	20		0.30	
1748		-----		-----	
1833	ISO12937	<30		-----	
1856	ISO3733	300	R(0.01)	43.84	
1877	D6304-C:20	14.3		-0.59	
6048	ISO51777	17		-0.17	
6113		-----		-----	
6141		-----		-----	
6310	D6304-C:16e1	60	R(0.01)	6.52	
6324		-----		-----	
6359	D6304-A:20	23		0.77	
6382	EN60814	19.2		0.17	
6394	D6304-C:20	16.0		-0.32	
6442		-----		-----	
6468		-----		-----	

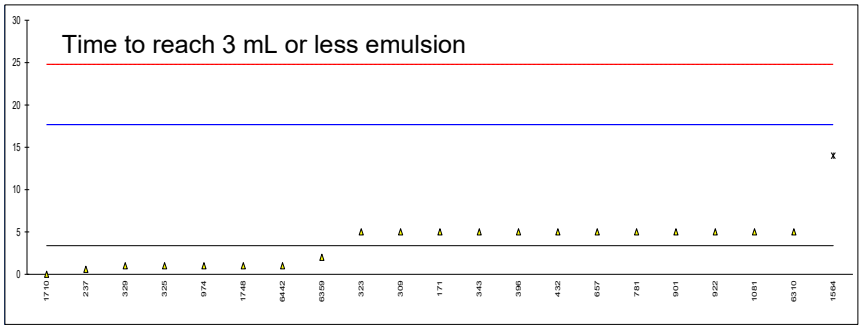
normality	OK		
n	36		
outliers	4		
mean (n)	18.08		
st.dev. (n)	8.851		
R(calc.)	24.78		
st.dev.(D6304-A:20)	6.431		
R(D6304-A:20)	18.01		range 20 – 2500 mg/kg
compare			
R(D6304-B:20)	78.06		range 30 – 2100 mg/kg
R(D6304-C:20)	11.26		range 20 – 360 mg/kg

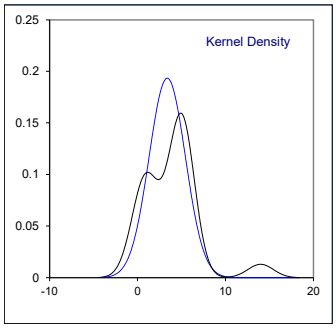

60
50
40
30
20
10
0
498
1429
1191
325
329
178
1564
657
173
343
901
1877
309
551
371
396
6394
922
6048
273
823
6382
1728
480
875
237
974
6359
603
1539
963
912
614
171
785
323
6310
781
1856
179

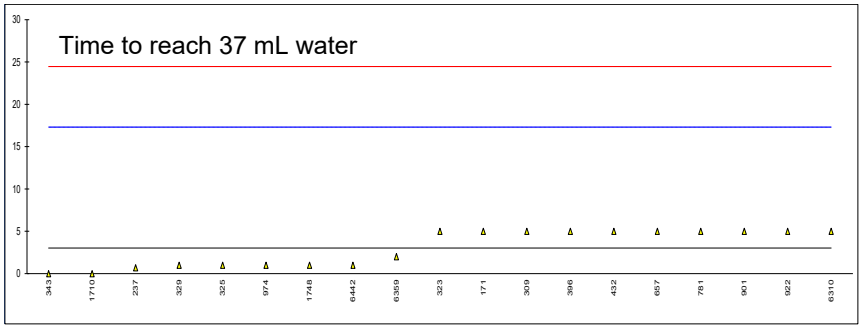

Kernel Density
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
-20
30
80

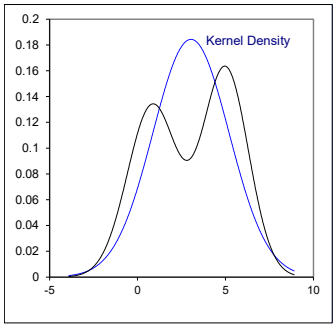
Determination of Water Separability at 54 °C, distilled water on sample #22075; results in minutes

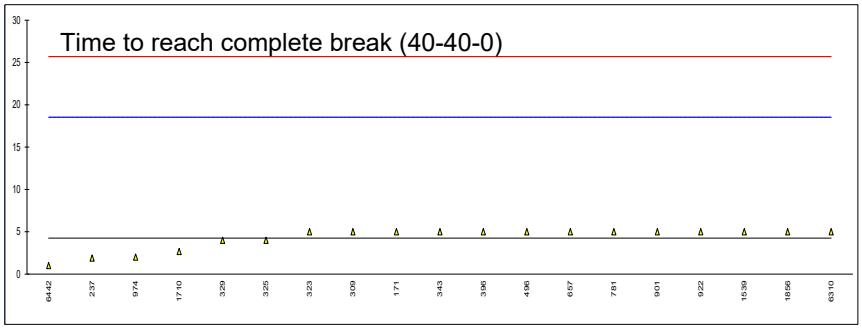
lab	method	3 mL or less emulsion		z(targ)	37 mL of water	z(targ)	complete break (40-40-0)	z(targ)	test aborted	time test aborted
150	D1401	-----		-----	-----	-----	-----	-----		-----
171	D1401	5		0.23	5	0.27	5	0.11	No	-----
173		-----		-----	-----	-----	-----	-----		-----
178		-----		-----	-----	-----	-----	-----		-----
179		-----		-----	-----	-----	-----	-----		-----
237	D1401	0.6		-0.39	0.7	-0.33	1.9	-0.33	No	-----
273		-----		-----	-----	-----	-----	-----		-----
309	D1401	5		0.23	5	0.27	5	0.11	Yes	5
311		-----		-----	-----	-----	-----	-----		-----
323	D1401	5		0.23	5	0.27	5	0.11	No	-----
325	D1401	1		-0.33	1	-0.29	4	-0.03	No	-----
329	D1401	1		-0.33	1	-0.29	4	-0.03	No	-----
333		-----		-----	-----	-----	-----	-----		-----
343	D1401	5		0.23	0	-0.43	5	0.11	No	-----
349		-----		-----	-----	-----	-----	-----		-----
369		-----		-----	-----	-----	-----	-----		-----
371		-----		-----	-----	-----	-----	-----		-----
396	D1401	5		0.23	5	0.27	5	0.11	No	-----
432	D1401	5		0.23	5	0.27	>30	-----	Yes	30
480		-----		-----	-----	-----	-----	-----		-----
496	D1401	-----		-----	-----	-----	5	0.11	No	-----
551		-----		-----	-----	-----	-----	-----		-----
601		-----		-----	-----	-----	-----	-----		-----
603		-----		-----	-----	-----	-----	-----		-----
614	D1401	<1		-----	<1	-----	<1	-----	No	-----
657	D1401	5		0.23	5	0.27	5	0.11	No	-----
781	D1401	5		0.23	5	0.27	5	0.11	No	-----
785		-----		-----	-----	-----	-----	-----		-----
823	D1401	<1		-----	<1	-----	<1	-----	No	-----
862		-----		-----	-----	-----	-----	-----		-----
874		-----		-----	-----	-----	-----	-----		-----
875		-----		-----	-----	-----	-----	-----		-----
886		-----		-----	-----	-----	-----	-----		-----
901	D1401	5		0.23	5	0.27	5	0.11	Yes	5
912		-----		-----	-----	-----	-----	-----		-----
922	D1401	5		0.23	5	0.27	5	0.11	No	-----
962		-----		-----	-----	-----	-----	-----		-----
963		-----		-----	-----	-----	-----	-----		-----
974	D1401	1		-0.33	1	-0.29	2	-0.31	No	-----
982		-----		-----	-----	-----	-----	-----		-----
1081		5		0.23	-----	-----	-----	-----	No	-----
1191		-----		-----	-----	-----	-----	-----		-----
1349		-----		-----	-----	-----	-----	-----		-----
1389		-----		-----	-----	-----	-----	-----		-----
1429		-----		-----	-----	-----	-----	-----		-----
1539	ISO6614	-----		-----	-----	-----	5	0.11		-----
1564		14	G1	1.49	-----	-----	-----	-----		-----
1710	ISO6614	0		-0.47	0	-0.43	2.67	-0.22	No	5
1728		-----		-----	-----	-----	-----	-----		-----
1748	D1401	1		-0.33	1	-0.29	-----	-----	Yes	-----
1833		-----		-----	-----	-----	-----	-----		-----
1856	ISO6614	-----		-----	-----	-----	5	0.11		-----
1877		-----		-----	-----	-----	-----	-----		-----
6048		-----		-----	-----	-----	-----	-----		-----
6113		-----		-----	-----	-----	-----	-----		-----
6141		-----		-----	-----	-----	-----	-----		-----
6310	D1401	5		0.23	5	0.27	5	0.11	No	-----
6324		-----		-----	-----	-----	-----	-----		-----
6359	ISO6614	2		-0.19	2	-0.15	-----	-----	Yes	2
6382		-----		-----	-----	-----	-----	-----		-----
6394		-----		-----	-----	-----	-----	-----		-----
6442	D1401	1		-0.33	1	-0.29	1	-0.45		-----
6468		-----		-----	-----	-----	-----	-----		-----
	normality	OK			OK		suspect			
	n	20			19		19			
	outliers	1			0		0			
	mean (n)	3.38			3.04		4.24			
	st.dev. (n)	2.063			2.164		1.314			
	R(calc.)	5.78			6.06		3.68			
	st.dev.(D1401:21)	7.143			7.143		7.143			
	R(D1401:21)	20			20		20			

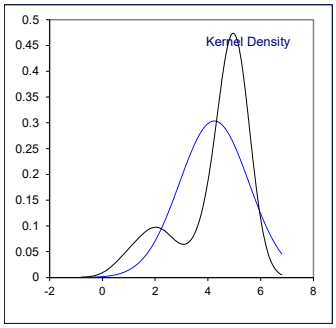

Time to reach 3 mL or less emulsion
1710 237 329 325 974 1748 6442 6359 323 309 171 343 396 432 657 781 901 922 1081 6310 1564


Kernel Density


Time to reach 37 mL water
343 1710 237 329 325 974 1748 6442 6359 323 171 309 396 432 657 781 901 922 6310


Kernel Density


Time to reach complete break (40-40-0)
6442 237 974 1710 329 325 323 309 171 343 396 496 657 781 901 922 1539 1856 6310


Kernel Density

Determination of Water Separability at 54 °C, distilled water sample #22075; results in mL

lab	method	oil phase	mark	water phase	mark	emulsion phase	mark
150	D1401	-----		-----		-----	
171	D1401	39		41		<1	
173		-----		-----		-----	
178		-----		-----		-----	
179		-----		-----		-----	
237	D1401	40.0		40.0		0	
273		-----		-----		-----	
309	D1401	40		40		0	
311		-----		-----		-----	
323	D1401	-----		-----		-----	
325	D1401	-----		-----		-----	
329	D1401	-----		-----		-----	
333		-----		-----		-----	
343	D1401	40		40		0	
349		-----		-----		-----	
369		-----		-----		-----	
371		-----		-----		-----	
396	D1401	-----		-----		-----	
432	D1401	41		39		0	
480		-----		-----		-----	
496	D1401	40		40		0	
551		-----		-----		-----	
601		-----		-----		-----	
603		-----		-----		-----	
614	D1401	40		40		0	
657	D1401	40		40		0	
781	D1401	40		40		0	
785		-----		-----		-----	
823	D1401	40		40		0	
862		-----		-----		-----	
874		-----		-----		-----	
875		-----		-----		-----	
886		-----		-----		-----	
901	D1401	40		40		0	
912		-----		-----		-----	
922	D1401	40		40		0	
962		-----		-----		-----	
963		-----		-----		-----	
974	D1401	40		40		0	
982		-----		-----		-----	
1081		-----		-----		-----	
1191		-----		-----		-----	
1349		-----		-----		-----	
1389		-----		-----		-----	
1429		-----		-----		-----	
1539	ISO6614	-----		-----		-----	
1564		-----		-----		-----	
1710	ISO6614	40		40		0	
1728		-----		-----		-----	
1748	D1401	40		40		0	
1833		-----		-----		-----	
1856	ISO6614	-----		-----		-----	
1877		-----		-----		-----	
6048		-----		-----		-----	
6113		-----		-----		-----	
6141		-----		-----		-----	
6310	D1401	40		40		0	
6324		-----		-----		-----	
6359	ISO6614	42		38		0	
6382		-----		-----		-----	
6394		-----		-----		-----	
6442	D1401	-----		-----		-----	
6468		-----		-----		-----	

APPENDIX 2

Number of participants per country

1 lab in AUSTRALIA
1 lab in AUSTRIA
5 labs in BELGIUM
1 lab in BRAZIL
1 lab in CHINA, People's Republic
1 lab in FINLAND
1 lab in FRANCE
3 labs in GERMANY
1 lab in HUNGARY
1 lab in INDIA
1 lab in IRAN, Islamic Republic of
1 lab in ITALY
1 lab in JORDAN
1 lab in KOREA, Republic of
2 labs in LATVIA
2 labs in MALAYSIA
3 labs in NETHERLANDS
1 lab in NIGERIA
2 labs in PAKISTAN
4 labs in POLAND
1 lab in PORTUGAL
1 lab in ROMANIA
4 labs in RUSSIAN FEDERATION
3 labs in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SOUTH AFRICA
5 labs in SPAIN
2 labs in TAIWAN
3 labs in TURKEY
1 lab in UNITED ARAB EMIRATES
2 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),D1	= outlier in Dixon's outlier test
D(0.05),D5	= straggler in Dixon's outlier test
G(0.01),G1	= outlier in Grubbs' outlier test
G(0.05), G5	= straggler in Grubbs' outlier test
DG(0.01), DG1	= outlier in Double Grubbs' outlier test
DG(0.05), DG5	= straggler in Double Grubbs' outlier test
R(0.01), R1	= outlier in Rosner's outlier test
R(0.05),R5	= 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)