Results of Proficiency Test
Transformer Oil (fresh)
November 2019

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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Report: iis19L11

January 2020

CONTENTS

1 INTRODUCTION

Since 2001, the Institute for Interlaboratory Studies organizes a proficiency test for the analysis of Transformer Oil (fresh) every year. During the annual proficiency testing program of 2019/2020, it was decided to continue with the proficiency tests on Transformer Oil (fresh) in accordance with the latest applicable version of the specification IEC60296 and ASTM D3487.
In this interlaboratory study 52 laboratories from 31 different countries registered for participation. See appendix 3 for a list of number of participants per country. In this report, the results of the 2019 Transformer Oil (fresh) proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organiser 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 bottle of 1L labelled #19240 of Transformer Oil (fresh). 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 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 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 75 liters of Transformer Oil (fresh) was obtained from a local supplier. After homogenisation 70 amber glass bottles of 1 liter were filled and labelled #19240. The homogeneity of the subsamples #19240 was checked by determination of Density in accordance with ASTM D4052 on 8 stratified randomly selected samples.

	Density at 20°C in kg/m^3
Sample #19240-1	863.96
Sample #19240-2	863.96
Sample #19240-3	863.95
Sample #19240-4	863.96
Sample #19240-5	863.96
Sample #19240-6	863.96
Sample #19240-7	863.96
Sample #19240-8	863.96

Table 1: homogeneity test results of subsamples #19240

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

	Density at 20°C in kg/m^3
r (observed)	0.01
reference test method	ISO3675:98
0.3 x R (ref. test method)	0.36

Table 2: evaluation of the repeatability of subsamples #19240

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

To each of the participating laboratories, 1 bottle of 1L labelled #19240 was sent on October 23, 2019. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Transformer Oil (fresh) 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 #19240: Acidity Total (Potentiometric and Colorimetric), Appearance, Breakdown Voltage, Color ASTM, Density at 20°C, Di-electric loss at 90°C (Di-electric Dissipation Factor and Specific Resistance), Flash Point (C.O.C. and PMcc), Interfacial Surface Tension, Kinematic Viscosity at 40°C, Water and Additives (DBP, DBPC, DBDS, BTA and Irgamet 39). Also extra questions regarding frequency of Di-electric Dissipation Factor and the Breakdown Voltage were requested.

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’ 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 appropriate reference test methods that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendix 1 and 2 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 result tables in appendix 1 or 2. 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.

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. ISO or ASTM reproducibilities, 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. 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 result tables of 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 major problems were encountered with the dispatch of the samples. One participant reported the test results after the final reporting date and four participants did not report any test results at all. Not all participants were able to report test results for all analyses requested.
In total 48 participants reported 377 numerical test results. Observed were 24 outlying test results, which is 6.4% of the numerical test 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 test methods are also in the tables together with the original data. The abbreviations, used in these tables, are explained in appendix 4.

Acidity, Total (Potentiometric): The total Acidity was below the quantification limit of 0.014 mg KOH/g as given in test method EN62021-1:03. Therefore, no z-sores were calculated.

Acidity, Total (Colorimetric): This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after the rejection of the statistical outliers is in agreement with the requirements of ASTM D974:14e2.

Appearance: All reporting laboratories agreed on the appearance of the oil being 'Bright and Clear' or remarked in similar words to this.

Breakdown Voltage: 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 EN60156:95.
In the previous PT of 2018 the difference in consensus value between stirring and not stirring was not significant. In this PT the difference was larger and significant. However, it was decided to calculate the assigned value over all test results as stirring and not stirring is allowed per EN60156:95 and the reproducibility of the group is below the requirements of test method EN60156:95.
The reproducibility of EN60156:95 was determined from Figure 3 of method EN60156:95, according to the iis memo 1702 (see lit. 17).

Color ASTM: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D1500:12(2017). Please note: the test values reported as "text" (e.g. L0.5) were converted to a numerical value before calculating z-scores, see also appendix 1.

Density at 20°C: This determination was problematic for a number of participants. Six statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO3675:98.

DD-Factor: 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 EN60247:04.

Specific Resistance: This determination was problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of EN60247:04. Please note that it is well known that specific resistance of new oils can vary over a wide range. This is due to randomly tiny amounts of impurities (maybe present in the air or in the test cell) which can dramatically change the value. In used oils, however, due to already present ion flow of the polar compounds, these problems are not observed.

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

Flash Point PMcc: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO2719-A:16.

Interfacial Surface Tension: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D971:12.

Kinematic Viscosity: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D445:19 and ISO3104:94.

Water: This determination was problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of EN60814:98.

Anti-oxidant additives: The majority of the participants agreed that DBP (2,6-Di-tertiary-butyl phenol), DBPC (2,6-Ditertiary-butyl paracresol) DBDS (Dibenzyl disulphide), BTA (Benzotriazole) and Irgamet 39 were below the level of quantification. Therefore, these components were not further evaluated. The reported test results are given in appendix 2.

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 * standard deviation) and the target reproducibility derived from literature reference test methods (e.g. ASTM, EN and ISO test methods) are presented in the next table.

Parameter	unit	n	average	2.8 * sd	R(lit)
Acidity, Total (Potentiometric)	mg KOH/g	23	0.009	0.014	(0.002)
Acidity, Total (Colorimetric)	mg KOH/g	19	0.007	0.014	0.04
Appearance		30	B&C	n.a.	n.a.
Breakdown Voltage	kV/2.5 mm	41	65.6	36.2	47.2
Color ASTM		37	0.21	0.28	1
Density at 20°C	kg/m^3	33	863.99	0.74	1.2
Di-electric Dissipation Factor 90°C		34	0.0006	0.0010	0.0014
Specific Resistance at 90°C	GΩm	22	566.5	771.1	594.8
Flash Point C.O.C.	°C	16	155.5	12.4	18
Flash Point PMcc	°C	28	147.1	9.1	10.5
Interfacial Surface Tension	mN/m	33	47.3	5.1	4.7
Kinematic Viscosity at 40°C	mm^2/s	32	9.02	0.14	0.11
Water	mg/kg	35	8.2	5.5	4.3

Table 3: reproducibilities of tests on sample #19240

Results between brackets were near or below detection limit, these results should be used with care

B&C = Bright and Clear

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2019 WITH PREVIOUS PTS.

	November 2019	November 2018	November 2017	November 2016	November 2015
Number of reporting laboratories	48	50	55	51	49
Number of results reported	377	371	405	383	330
Number of statistical outliers	24	24	18	29	26
Percentage statistical outliers	6.4%	6.5%	4.4%	7.6%	7.9%

Table 4: comparison with previous proficiency tests

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.
The performance of the determinations of the proficiency tests was compared against the requirements of the reference test methods. The conclusions are given the following table.

Parameter	November 2019	November 2018	November 2017	November 2016	November 2015
Acidity, Total (Potentiometric)	(--)	(--)	(--)	(--)	(--)
Acidity, Total (Colorimetric)	++	++	++	++	n.e.
Breakdown Voltage	+	+/-	-	++	++
Color ASTM	++	n.e.	n.e.	n.e.	n.e.
Density at 20°C	+	++	++	++	+
Di-electric Dissipation Factor	+	+	+	+	++
Specific Resistance	-	-	--	--	--
Flash Point C.O.C.	+	+	-	+/-	n.e.
Flash Point PMcc	+	+	+/-	+	+/-
Interfacial Surface Tension	+/-	+/-	-	+/-	--
Kinematic Viscosity at 40°C	-	+/-	-	+/-	-
Water	-	+/-	-	+/-	-
DBPC Antioxidant Additive	n.e.	+	+/-	n.e.	n.e.

Table 5. comparison of group performances against the reference test methods
Results between brackets were near or below detection limit, these results should be used with care

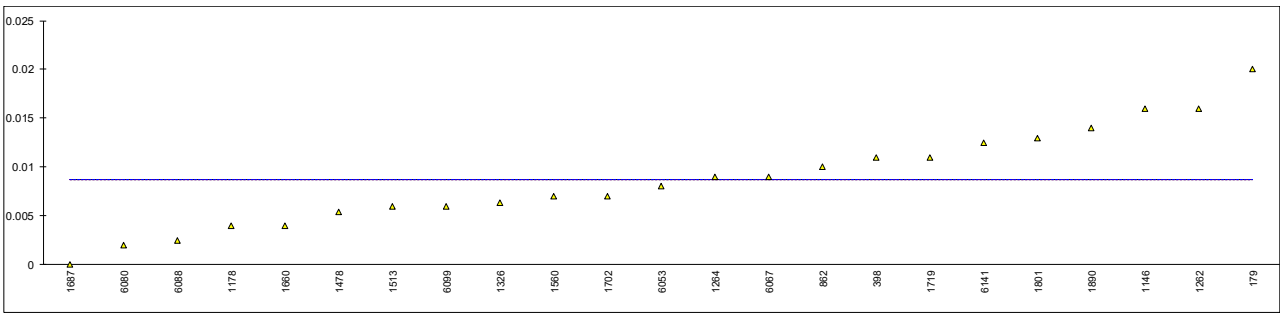
The performance of the determinations against the requirements of the reference test methods is listed in the above table. The following performance categories were used:

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

APPENDIX 1

Determination of Acidity, Total (Potentiometric) on sample #19240; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
173		-----		-----	
179	D664	0.02		-----	
325	D664-A	<0.01		-----	
360		-----		-----	
398	D664-A	0.011		-----	
446		-----		-----	
614		-----		-----	
862	D664-A	0.01		-----	
912		-----		-----	
913		-----		-----	
963		-----		-----	
974		-----		-----	
1137		-----		-----	
1146	D664-A	0.016		-----	
1178	IEC62021-1	0.004		-----	
1262	EN62021-1	0.0160		-----	
1264	D664-A	0.009		-----	
1304		-----		-----	
1306		-----		-----	
1326	EN62021-1	0.0063		-----	
1442		-----		-----	
1444		-----		-----	
1461		-----		-----	
1478	IEC62021-1	0.0054		-----	
1513	IEC62021-1	0.006		-----	
1560	IEC62021-1	0.007		-----	
1626		-----		-----	
1660	IEC62021-1	0.004		-----	
1687	D664-A	0.000		-----	
1702	IEC62021-1	0.007		-----	
1719	D664-A	0.011		-----	
1743	EN62021-1	<0.02		-----	
1801	EN62021-1	0.013		-----	
1885		-----		-----	
1890	ISO6619	0.014		-----	
6000		-----		-----	
6015		-----		-----	
6048		-----		-----	
6053	IEC62021-1	0.008	C	-----	first reported 0.083
6067	IEC62021-1	0.009		-----	
6071	D664-A	<0.01		-----	
6080	D664-A	0.002		-----	
6085		-----		-----	
6088	IEC62021-1	0.0025		-----	
6099	IEC62021-1	0.006		-----	
6141	D664-A	0.01250		-----	
6167		-----		-----	
6169		-----		-----	
6181		-----		-----	
6253		-----		-----	
6278		-----		-----	
6280		-----		-----	
	normality	OK			
	n	23			
	outliers	0			
	mean (n)	0.0087			
	st.dev. (n)	0.00499			
	R(calc.)	0.0140			
	st.dev.(EN62021-1:03)	(0.00087)			
	R(EN62021-1:03)	(0.0024)			Quantification limit EN62021-1:03 > 0.014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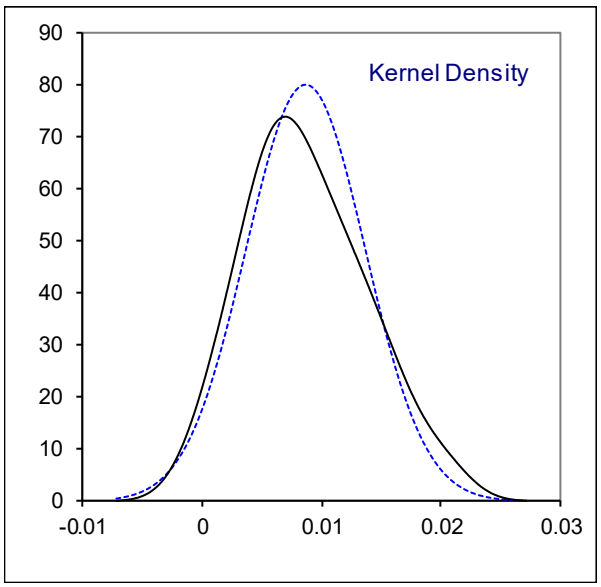
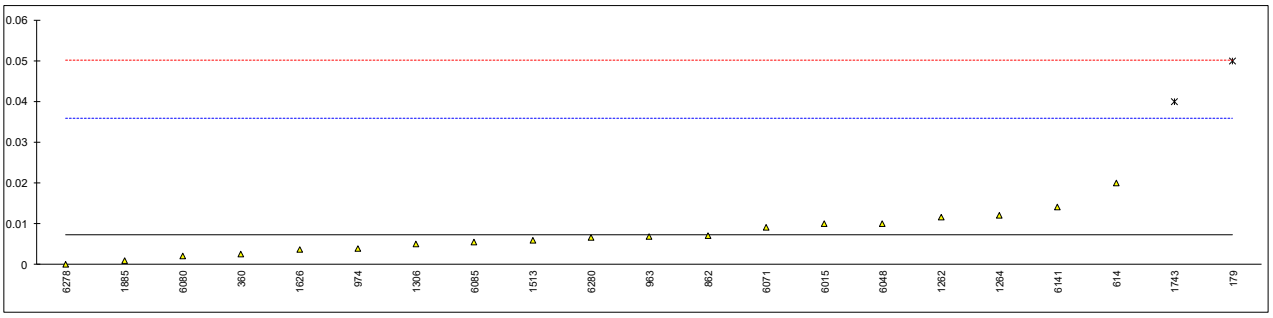
1719
6141
1801
1890
1146
1262
179


Kernel Density
90
80
70
60
50
40
30
20
10
0
-0.01
0
0.01
0.02
0.03

Determination of Acidity, Total (Colorimetric) on sample #19240; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
173		-----		-----	
179	D974	0.05	R(0.01)	3.00	
325		-----		-----	
360	EN62021-2	0.0025		-0.33	
398		-----		-----	
446	D974	<0.02		-----	
614	D974	0.02		0.90	
862	D974	0.007		-0.01	
912		-----		-----	
913	D974	<0.02		-----	
963	D974	0.0068		-0.03	
974	D974	0.004		-0.22	
1137		-----		-----	
1146		-----		-----	
1178		-----		-----	
1262	ISO6618	0.0115		0.30	
1264	D974	0.012		0.34	
1304	in house-122	<0.01		-----	
1306	D974	0.00513		-0.14	
1326		-----		-----	
1442	IEC62021-2	<0,01		-----	
1444		-----		-----	
1461		-----		-----	
1478		-----		-----	
1513	IEC62021-2	0.006		-0.08	
1560		-----		-----	
1626	D974	0.0036		-0.25	
1660		-----		-----	
1687		-----		-----	
1702		-----		-----	
1719		-----		-----	
1743	ISO6618	0.04	C,R(0.01)	2.30	first reported 0.09
1801		-----		-----	
1885	D974	0.001		-0.43	
1890		-----		-----	
6000		-----		-----	
6015	D974	0.010		0.20	
6048	D974	0.01		0.20	
6053		-----		-----	
6067		-----		-----	
6071	D974	0.009		0.13	
6080	D974	0.002		-0.36	
6085	D974	0.0055		-0.12	
6088		-----		-----	
6099		-----		-----	
6141	D974	0.014		0.48	
6167		-----		-----	
6169		-----		-----	
6181		-----		-----	
6253		-----		-----	
6278	D974	0		-0.50	
6280	IEC62021-2	0.0066		-0.04	
	normality	suspect			
	n	19			
	outliers	2			
	mean (n)	0.0072			
	st.dev. (n)	0.00496			
	R(calc.)	0.0139			
	st.dev.(D974:14e2)	0.01429			Compare R(IEC62021-2:07) = 0.03
	R(D974:14e2)	0.04			Quantification limit IEC62021-2:07: > 0.01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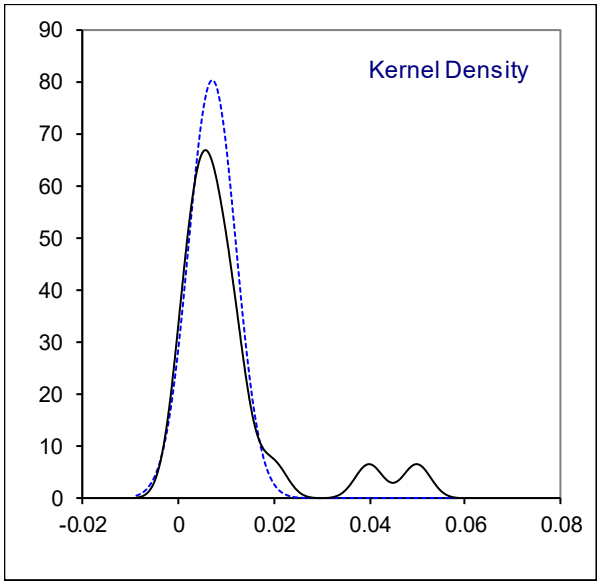
1264
6141
614
1743
179


Kernel Density
90
80
70
60
50
40
30
20
10
0
-0.02
0
0.02
0.04
0.06
0.08

Determination of Appearance on sample #19240;

lab	method	value	mark	z(targ)	remarks
173	Visual	Clear & Bright		-----	
179		-----		-----	
325	Visual	Water White		-----	
360	Visual	Clear and Bright		-----	
398	Visual	Clear & Brigth		-----	
446	Visual	PASS		-----	
614		-----		-----	
862	Visual	Clear & Bright		-----	
912		-----		-----	
913	Visual	Clear & Bright		-----	
963	Visual	Clear & Bright		-----	
974	Visual	C & B		-----	
1137		-----		-----	
1146		-----		-----	
1178	Visual	bright, clear		-----	
1262		bright and clear		-----	
1264	Visual	Clear		-----	
1304		-----		-----	
1306	Visual	Clear		-----	
1326		-----		-----	
1442	Visual	clear		-----	
1444		-----		-----	
1461		-----		-----	
1478	IEC60296	clear		-----	
1513	Visual	Clear		-----	
1560		Clear & Bright		-----	
1626	Visual	Clear&Bright		-----	
1660	Visual	Clear		-----	
1687		-----		-----	
1702	Visual	Clear		-----	
1719		-----		-----	
1743	Visual	Clear		-----	
1801		-----		-----	
1885	Visual	clear bright		-----	
1890	Visual	clear		-----	
6000		-----		-----	
6015		-----		-----	
6048	Visual	clear & bright		-----	
6053		-----		-----	
6067	Visual	Clear		-----	free from sediments and suspended matter
6071		-----		-----	
6080	Visual	clear & bright		-----	
6085		-----		-----	
6088	Visual	bright and clear		-----	
6099	Visual	claire		-----	
6141	Visual	Clear and bright		-----	
6167		-----		-----	
6169		-----		-----	
6181		-----		-----	
6253		-----		-----	
6278	Visual	Clear and Bright		-----	
6280		-----		-----	
	n	30			
	mean (n)	Clear and Bright			

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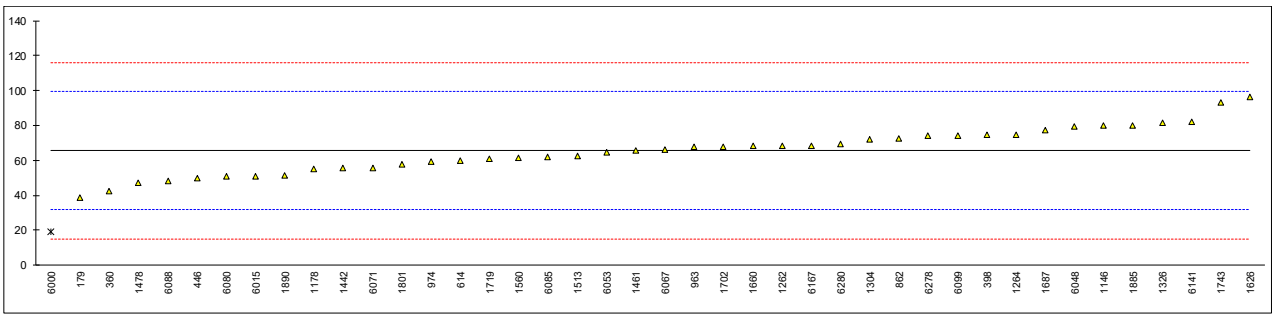
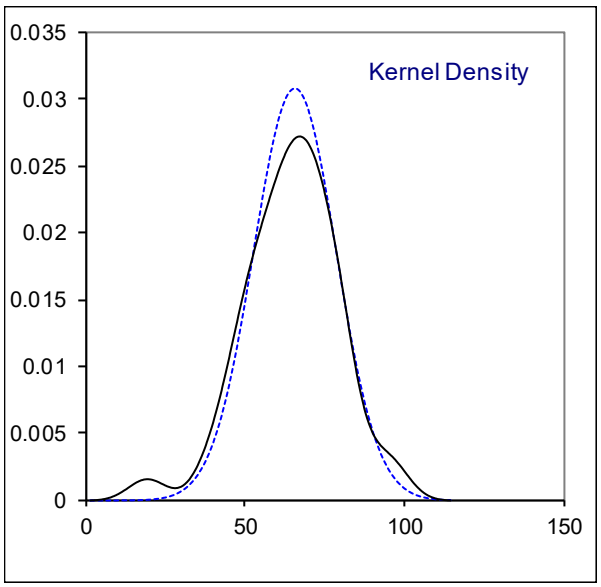
Determination of Breakdown Voltage on sample #19240, results in kV/2.5 mm

lab	method	value	mark	z(targ)	stirred	remarks
173		-----		-----	---	
179	D877	38.9		-1.58	---	
325		-----		-----	---	
360	EN60156	42.5		-1.37	Yes	
398	EN60156	74.56		0.53	No	
446	EN60156	50		-0.92	Yes	
614	EN60156	59.7		-0.35	Yes	
862	IEC60156	72.4		0.41	No	
912		-----		-----	---	
913		-----		-----	---	
963	IEC60156	67.8		0.13	Yes	
974	EN60156	59.4		-0.37	Yes	
1137		-----		-----		
1146	IEC60156	80		0.86	Yes	
1178	EN60156	55.3		-0.61	Yes	
1262	EN60156	68.2		0.16	---	
1264	IEC60156	74.8		0.55	No	
1304	in house-124	71.89		0.38	Yes	
1306		-----		-----	---	
1326	EN60156	81.4		0.94	---	
1442	IEC60156	55.74		-0.58	Yes	
1444		-----		-----	---	
1461	EN60156	65.9		0.02	---	
1478	IEC60156	47.0		-1.10	Yes	
1513	IEC60156	62.3		-0.19	Yes	
1560	IEC60156	61.3		-0.25	Yes	
1626	IEC60156	96.5		1.84	No	
1660	IEC60156	68.2		0.16	Yes	
1687	EN60156	77.2		0.69	No	
1702	IEC60156	67.8		0.13	Yes	
1719	IEC60156	61.1		-0.26	Yes	
1743	IEC60156	93		1.63	No	
1801	EN60156	57.9		-0.45	Yes	
1885	IEC60156	80.0		0.86	No	
1890	IEC60156	51.2		-0.85	Yes	
6000	EN60156	19.2	R(0.05)	-2.75	Yes	
6015	EN60156	51.00		-0.86	Yes	
6048	EN60156	79.7		0.84	Yes	
6053	IEC60156	64.4		-0.07	Yes	
6067	IEC60156	66.2		0.04	Yes	
6071	IEC60156	55.8		-0.58	Yes	
6080	IEC60156	50.8		-0.88	Yes	
6085	EN60156	61.9		-0.22	Yes	
6088	IEC60156	48		-1.04	Yes	
6099	IEC60156	74.3		0.52	No	
6141	IEC60156	82		0.98	Yes	
6167	IEC60156	68.3		0.16	---	
6169		-----		-----	---	
6181		-----		-----	---	
6253		-----		-----	---	
6278	IEC60156	74.0		0.50	No	
6280	IEC60156	69.38		0.23	---	

			Results ‘stirred’	Results ‘not stirred’
	normality	OK	OK	suspect
	n	41	26	9
	outliers	1	1	0
	mean (n)	65.56	60.73	79.64
	st.dev. (n)	12.938	10.360	8.880
	R(calc.)	36.23	29.01	24.86
	st.dev.(EN60156:95)	16.861	16.861	16.861
	R(EN60156:95)	47.21	43.73	57.35

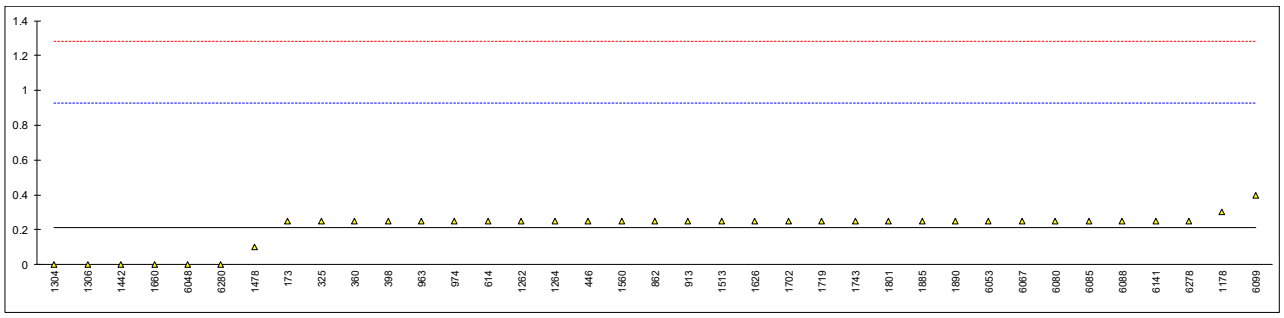

140
120
100
80
60
40
20
0
6000 179 360 1478 6088 446 6080 6015 1890 1178 1442 6071 1801 974 614 1719 1560 6085 1513 6053 1461 6067 963 1702 1660 1262 6167 6280 1304 862 6278 6099 398 1264 1687 6048 1146 1885 1326 6141 1743 1626

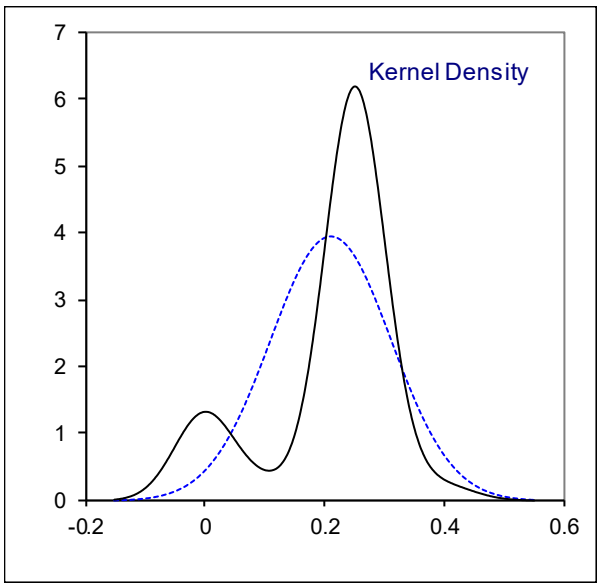

Kernel Density
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
50
100
150

Determination of Color ASTM on sample #19240;

lab	method	reported test value	mark	iis conversion *	mark	z(targ)	remarks
173	D1500	L0.5		0.25		0.11	
179		-----		-----		-----	
325	D6045	L0.5		0.25		0.11	
360	D1500	L 0.5		0.25		0.11	
398	ISO2049	L0,5		0.25		0.11	
446	D1500	<0.5		0.25		0.11	
614	D1500	<0.5		0.25		0.11	
862	D1500	L0.5		0.25		0.11	
912		-----		-----		-----	
913	D1500	L0.5		0.25		0.11	
963	D1500	L0.5		0.25		0.11	
974	D1500	L0.5		0.25		0.11	
1137		-----		-----		-----	
1146		-----		-----		-----	
1178	ISO2049	0.3		0.30		0.25	
1262	ISO2049	L 0.5		0.25		0.11	
1264	D1500	L0.5		0.25		0.11	
1304	in house-131	0.0		0.00		-0.59	
1306	D1500	0.0		0.00		-0.59	
1326		-----		-----		-----	
1442	ISO2049	0		0.00		-0.59	
1444		-----		-----		-----	
1461		-----		-----		-----	
1478	ISO2049	0.1		0.10		-0.31	
1513	ISO2049	L0,5		0.25		0.11	
1560	ISO2049	L0.5		0.25		0.11	
1626	D1500	<0.5		0.25		0.11	
1660	D1500	0.0		0.00		-0.59	
1687		-----		-----		-----	
1702	D1500	L 0.5		0.25		0.11	
1719	D1524	<0.5		0.25		0.11	
1743	ISO2049	L0.5		0.25		0.11	
1801	ISO2049	L0.5		0.25		0.11	
1885	D1500	<0.5	C	0.25		0.11	reported <0.05
1890	D1500	<0.5		0.25		0.11	
6000		-----		-----		-----	
6015		-----		-----		-----	
6048	D1500	0.0		0.00		-0.59	
6053	ISO2049	L0.5		0.25		0.11	
6067	ISO2049	L0.5		0.25		0.11	
6071		-----		-----		-----	
6080	D1500	L0.5		0.25		0.11	
6085	D1500	<0.5		0.25		0.11	
6088	D1500	L0.5		0.25		0.11	
6099	D1500	0.4		0.40		0.53	
6141	D1500	L0.5		0.25		0.11	
6167		-----		-----		-----	
6169		-----		-----		-----	
6181		-----		-----		-----	
6253		-----		-----		-----	
6278	D1500	0.25		0.25		0.11	
6280	D1500	0		0.00		-0.59	
	normality			OK			
	n			37			
	outliers			0			
	mean (n)			0.21			
	st.dev. (n)			0.101			
	R(calc.)			0.28			
	st.dev.(D1500:12)			0.357			
	R(D1500:12)			1			

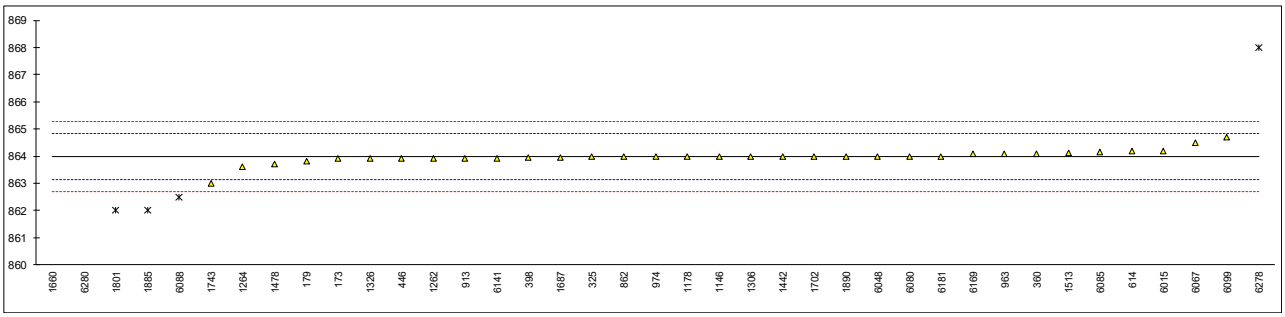
*In the calculation of the mean, standard deviation and the reproducibility in this column, a reported value of ‘L y’ or ‘<y’ is changed into y-0.25 (for example, L0.5 is changed into 0.25).

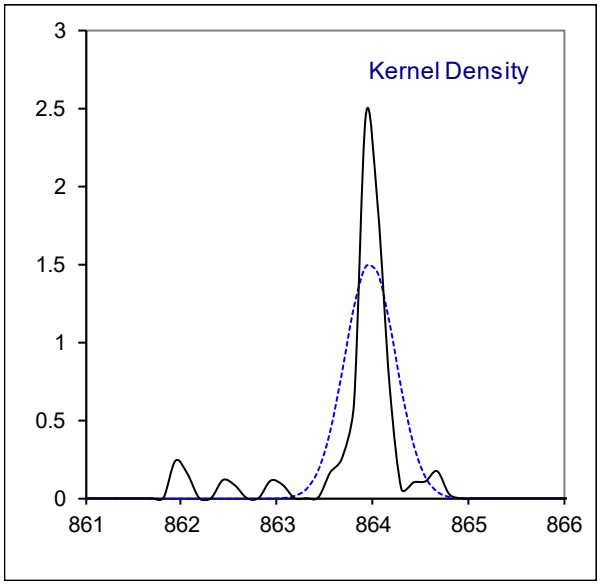

1.4
1.2
1
0.8
0.6
0.4
0.2
0
1304
1306
1442
1660
6048
6280
1478
173
325
360
398
963
974
614
1262
1264
446
1560
862
913
1513
1626
1702
1719
1743
1801
1885
1880
6053
6067
6080
6085
6088
6141
6278
1178
6099


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

Determination of Density at 20°C on sample #19240; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
173	D4052	863.9		-0.20	
179	D4052	863.8		-0.44	
325	D4052	864.0	C	0.03	reported 0.8640 kg/m^3
360	ISO12185	864.1		0.26	
398	ISO12185	863.96		-0.06	
446	D4052	863.9		-0.20	
614	D4052	864.2		0.50	
862	D4052	864.0		0.03	
912		-----		-----	
913	D4052	863.9		-0.20	
963	D4052	864.1		0.26	
974	D4052	864.0		0.03	
1137		-----		-----	
1146	D4052	864.0		0.03	
1178	ISO12185	864.0		0.03	
1262	ISO3675	863.9		-0.20	
1264	D4052	863.6	C	-0.90	first reported 0.8636 kg/m^3
1304		-----		-----	
1306	D4052	864.0		0.03	
1326	D4052	863.9		-0.20	
1442	ISO3675	864.0		0.03	
1444		-----		-----	
1461		-----	W	-----	test result withdrawn. Reported 862.1
1478	ISO12185	863.7		-0.67	
1513	ISO12185	864.113		0.29	
1560		-----		-----	
1626		-----		-----	
1660	D7042	836.6	C,R(0.01)	-63.90	first reported 0.8636 kg/m^3
1687	ISO12185	863.96		-0.06	
1702	ISO3675	864.0	C	0.03	first reported 866.9
1719		-----		-----	
1743		863.0		-2.30	
1801	ISO3675	862.0	R(0.01)	-4.64	
1885	D1298	862.0	C,R(0.01)	-4.64	reported 0.862 kg/m^3
1890	ISO12185	864.0		0.03	
6000		-----		-----	
6015	ISO12185	864.20		0.50	
6048	ISO12185	864.0		0.03	
6053		-----		-----	
6067	ISO12185	864.5		1.20	
6071		-----		-----	
6080	D4052	864.0		0.03	
6085	D7042	864.16		0.40	
6088	ISO3675	862.5	C,R(0.01)	-3.47	first reported 8620.5
6099	ISO12185	864.7		1.66	
6141	D4052	863.9		-0.20	
6167		-----		-----	
6169	ISO12185	864.08		0.22	
6181	ISO12185	864.0		0.03	
6253		-----		-----	
6278	D1298	868	C,R(0.01)	9.36	first reported 0.8680 kg/m^3
6280	ISO12185	850	C,R(0.01)	-32.64	first reported 0.85 kg/m^3
	normality	not OK			
	n	33			
	outliers	6			
	mean (n)	863.987			
	st.dev. (n)	0.2641			
	R(calc.)	0.740			
	st.dev.(ISO3675:98)	0.4286			Compare R(D4052:18a) = R(ISO12185:96) = 0.5
	R(ISO3675:98)	1.2			Compare R(D7042:16e3) = 1.3

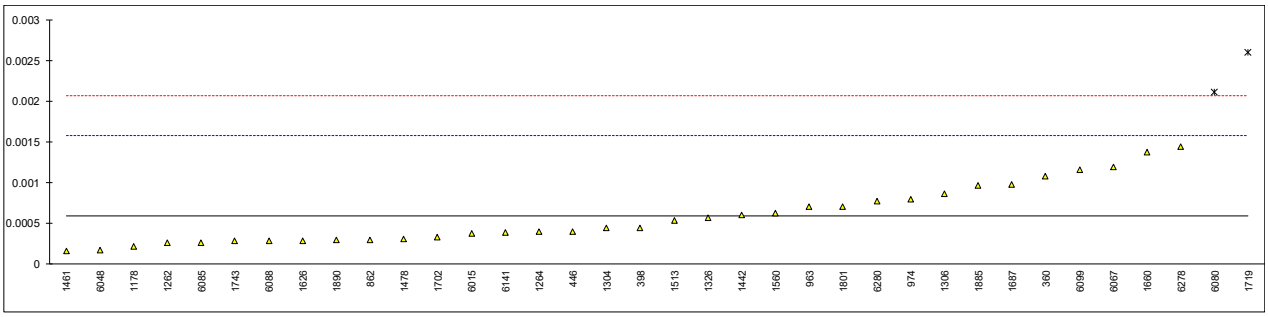

869
868
867
866
865
864
863
862
861
860
1660
6280
1801
1885
6088
1743
1264
1478
179
173
1326
446
1262
913
6141
398
1687
325
862
974
1178
1146
1306
1442
1702
1890
6048
6080
6161
6169
963
360
1513
6085
614
6015
6067
6099
6278

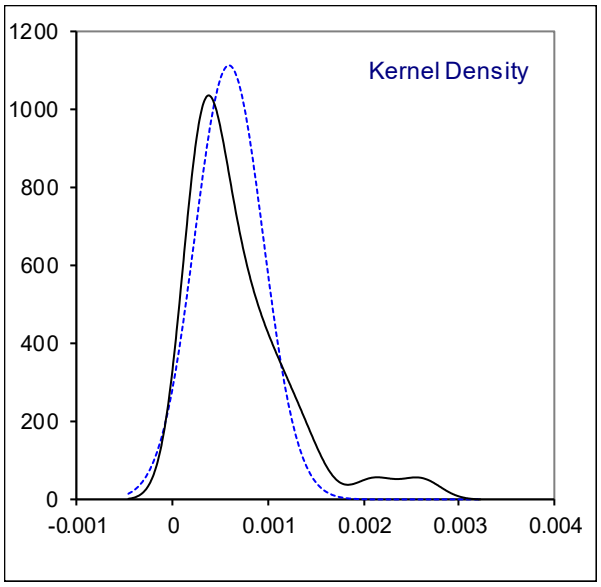

Kernel Density
3
2.5
2
1.5
1
0.5
0
861
862
863
864
865
866

Determination of Di-electric Dissipation Factor (DDF) at 90°C on sample #19240

lab	method	value	mark	z(targ)	frequency	
173		-----		-----	-----	
179		-----		-----	-----	
325		-----		-----	-----	
360	EN60247	0.00108		1.00	50	
398	EN60247	0.000445		-0.29	60	
446	EN60247	0.0004		-0.38	50	
614		-----		-----	-----	
862	IEC60247	0.0003		-0.58	-----	
912		-----		-----	-----	
913		-----		-----	-----	
963	EN60247	0.0007		0.23	-----	
974	EN60247	0.000801		0.44	60	
1137		-----		-----	-----	
1146		-----		-----	-----	
1178	IEC60247	0.00022		-0.74	50.0	
1262	EN60247	0.00026		-0.66	50	
1264	IEC60247	0.000396		-0.39	50	
1304	in house-125	0.000439		-0.30	50	
1306	IEC60247	0.000859		0.55	-----	
1326	EN60247	0.000566		-0.04	50	
1442	IEC60247	0.000599		0.03	50	
1444		-----		-----	-----	
1461	EN60247	0.000158		-0.87	-----	
1478	IEC60247	0.000308	C	-0.56	50	first reported 0.003087
1513	IEC60247	0.00053		-0.11	-----	
1560	IEC60247	0.000625		0.08	50	
1626	IEC60247	0.00029		-0.60	-----	
1660	IEC60247	0.001379		1.61	60	
1687	EN60247	0.00098		0.80	50	
1702	IEC60247	0.00033		-0.52	-----	
1719	IEC60247	0.0026	R(0.01)	4.09	50	
1743	IEC60247	0.00028	C	-0.62	-----	first reported 0.00487
1801	EN60247	0.000701		0.23	-----	
1885	IEC60247	0.00096		0.76	-----	
1890	IEC60247	0.000293		-0.60	50	
6000		-----		-----	-----	
6015	EN60247	0.0003720		-0.43	50	
6048	EN60247	0.000174		-0.84	60	
6053		-----		-----	-----	
6067	IEC60247	0.001188		1.22	50	
6071		-----		-----	-----	
6080	IEC60247	0.002105	R(0.01)	3.08	-----	
6085	IEC60247	0.00026		-0.66	-----	
6088	IEC60247	0.00028		-0.62	-----	
6099	IEC60247	0.001161		1.17	-----	
6141	IEC60247	0.000389		-0.40	60	
6167		-----		-----	-----	
6169		-----		-----	-----	
6181		-----		-----	-----	
6253		-----		-----	-----	
6278	IEC60247	0.00144		1.73	-----	
6280	IEC60247	0.000770	C	0.37	-----	first reported 0.077

normality	OK
n	34
outliers	2
mean (n)	0.000586
st.dev. (n)	0.0003592
R(calc.)	0.001006
st.dev.(EN60247:04)	0.0004929
R(EN60247:04)	0.001380

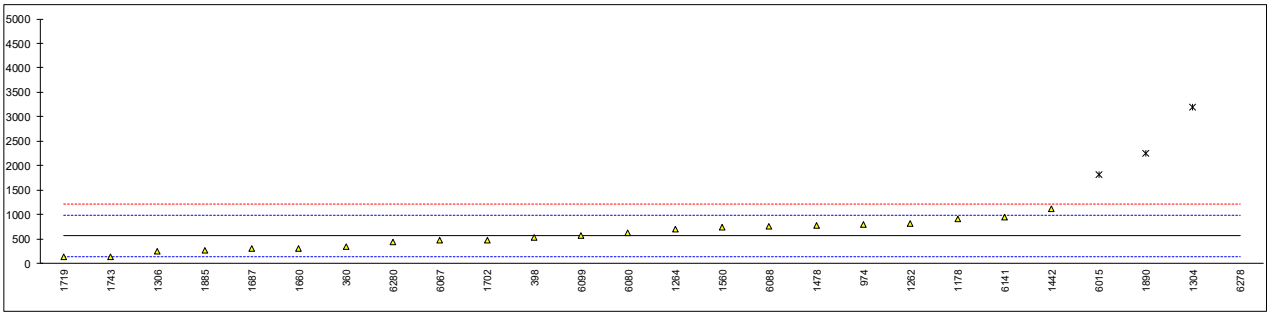

0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1461 6048 1178 1262 6085 1743 6088 1626 1890 862 1478 1702 6015 6141 1264 446 1304 398 1513 1326 1442 1560 963 1601 6280 974 1306 1885 1687 360 6099 6067 1660 6278 6080 1719

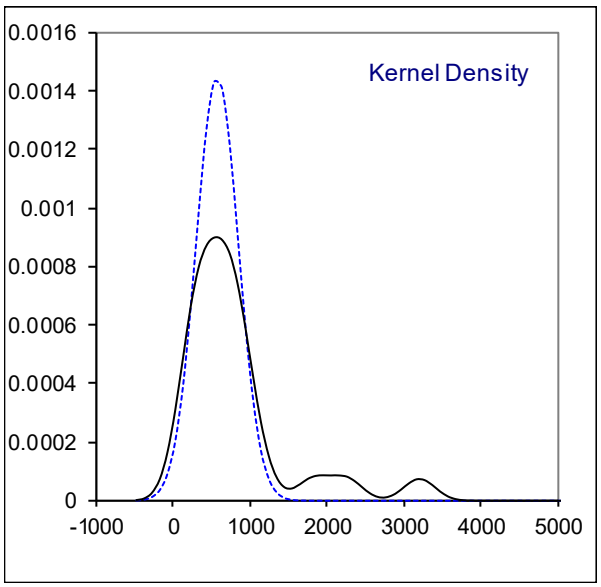

Kernel Density
1200
1000
800
600
400
200
0
-0.001
0
0.001
0.002
0.003
0.004

Determination of Specific Resistance at 90°C on sample #19240; results in GΩm

lab	method	value	mark	z(targ)	remarks
173		-----		-----	
179		-----		-----	
325		-----		-----	
360	EN60247	341.9		-1.06	
398	EN60247	528.22		-0.18	
446		-----		-----	
614		-----		-----	
862		-----		-----	
912		-----		-----	
913		-----		-----	
963		-----		-----	
974	EN60247	806.4		1.13	
1137		-----		-----	
1146		-----		-----	
1178	IEC60247	916.3		1.65	
1262	EN60247	820.2		1.19	
1264	IEC60247	707.1	C	0.66	first reported 3690
1304	in house-125	3195	R(0.01)	12.37	
1306	IEC60247	254.68		-1.47	
1326		-----		-----	
1442	IEC60247	1114.510		2.58	
1444		-----		-----	
1461		-----		-----	
1478	IEC60247	782.92		1.02	
1513		-----		-----	
1560	IEC60247	732.37		0.78	
1626		-----		-----	
1660	IEC60247	311.40		-1.20	
1687	EN60247	303.28		-1.24	
1702	IEC60247	481.18		-0.40	
1719	IEC60247	134.85		-2.03	
1743	IEC60247	145		-1.98	
1801		-----		-----	
1885	IEC60247	273		-1.38	
1890	IEC60247	2245	R(0.01)	7.90	
6000		-----		-----	
6015	EN60247	1815.0	R(0.01)	5.88	
6048		-----		-----	
6053		-----		-----	
6067	IEC60247	474.046		-0.44	
6071		-----		-----	
6080	IEC60247	635.00		0.32	
6085		-----		-----	
6088		750		0.86	
6099	IEC60247	569.59		0.01	
6141	IEC60247	950.31		1.81	
6167		-----		-----	
6169		-----		-----	
6181		-----		-----	
6253		-----		-----	
6278	IEC60247	24715	R(0.01)	113.68	
6280	IEC60247	430		-0.64	

normality	OK
n	22
outliers	4
mean (n)	566.47
st.dev. (n)	275.377
R(calc.)	771.06
st.dev.(EN60247:04)	212.425
R(EN60247:04)	594.79

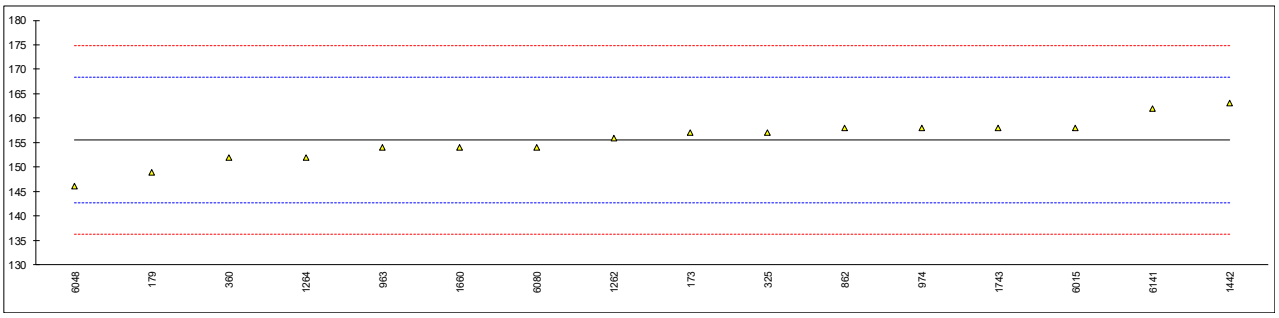

5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1719
1743
1306
1885
1687
1660
360
6280
6067
1702
398
6099
6080
1264
1560
6088
1478
974
1262
1178
6141
1442
6015
1890
1304
6278

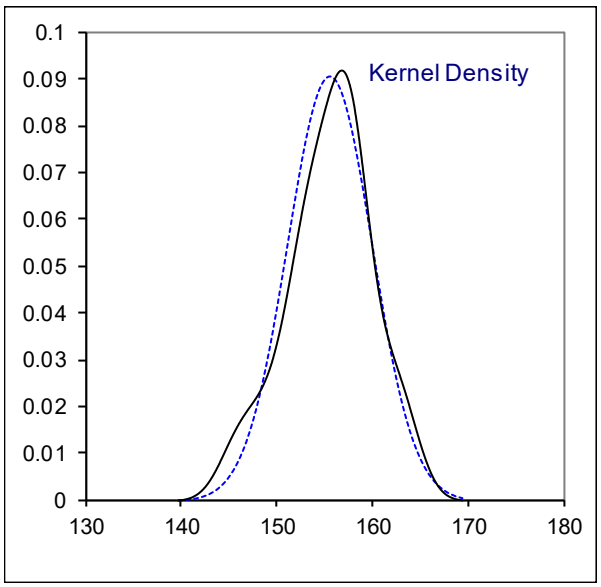

Kernel Density
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
-1000
0
1000
2000
3000
4000
5000

Determination of Flash Point C.O.C. on sample #19240; results in °C

lab	method	value	mark	z(targ)	remarks
173	D92	157		0.23	
179	D92	149		-1.01	
325	D92	157		0.23	
360	ISO2592	152		-0.54	
398		-----		-----	
446		-----		-----	
614		-----		-----	
862	D92	158		0.39	
912		-----		-----	
913		-----		-----	
963	D92	154		-0.23	
974	D92	158.0		0.39	
1137		-----		-----	
1146		-----		-----	
1178		-----		-----	
1262	D92	156		0.08	
1264	D92	152		-0.54	
1304		-----		-----	
1306		-----		-----	
1326		-----		-----	
1442	D92	163		1.17	
1444		-----		-----	
1461		-----		-----	
1478		-----		-----	
1513		-----		-----	
1560		-----		-----	
1626		-----		-----	
1660	D92	154		-0.23	
1687		-----		-----	
1702		-----		-----	
1719		-----		-----	
1743	ISO2592	158		0.39	
1801		-----		-----	
1885		-----		-----	
1890		-----		-----	
6000		-----		-----	
6015	ISO2592	158.0		0.39	
6048	ISO2592	146		-1.48	
6053		-----		-----	
6067		-----		-----	
6071		-----		-----	
6080	D92	154.0		-0.23	
6085		-----		-----	
6088		-----		-----	
6099		-----		-----	
6141	D92	162		1.01	
6167		-----		-----	
6169		-----		-----	
6181		-----		-----	
6253		-----		-----	
6278		-----		-----	
6280		-----		-----	

normality	OK	
n	16	
outliers	0	
mean (n)	155.50	
st.dev. (n)	4.412	
R(calc.)	12.35	
st.dev.(D92:18)	6.429	
R(D92:18)	18	R(D92:18) = R(ISO2592:17)

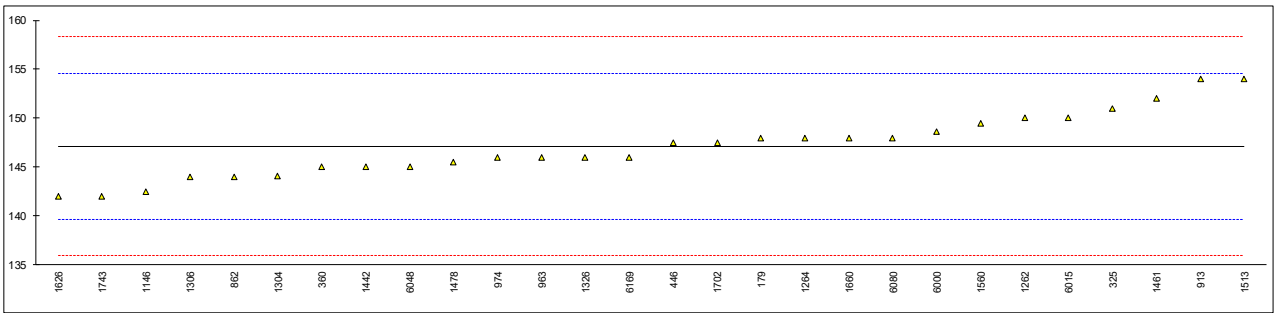

180
175
170
165
160
155
150
145
140
135
130
6048
179
360
1264
963
1660
6080
1262
173
325
862
974
1743
6015
6141
1442

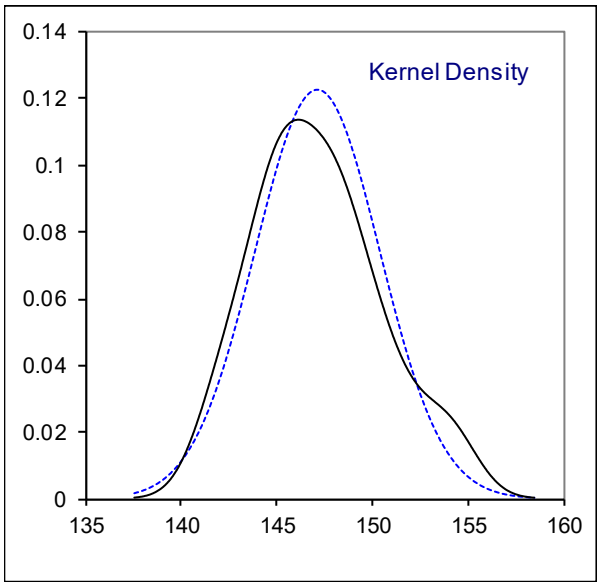

Kernel Density
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
130
140
150
160
170
180

Determination of Flash Point PMcc on sample #19240; results in °C

lab	method	value	mark	z(targ)	remarks
173		-----		-----	
179	D93	148		0.24	
325	D93-A	151.0		1.04	
360	ISO2719-A	145.0		-0.57	
398		-----		-----	
446	D93-A	147.5		0.10	
614		-----		-----	
862	D93-A	144		-0.83	
912		-----		-----	
913	D93-A	154		1.84	
963	D93-A	146		-0.30	
974	D93-A	146.0		-0.30	
1137		-----		-----	
1146	D93-A	142.5		-1.24	
1178		-----		-----	
1262	ISO2719-A	150.0		0.77	
1264	D93-A	148		0.24	
1304	in house-115	144.1		-0.81	
1306	D93-A	144		-0.83	
1326	D93-A	146.0		-0.30	
1442	ISO2719-A	145.0		-0.57	
1444		-----		-----	
1461	ISO2719-A	152		1.31	
1478	ISO2719-A	145.5		-0.43	
1513	ISO2719-A	154.0		1.84	
1560	ISO2719-A	149.5		0.64	
1626	D93-A	142.0		-1.37	
1660	D93-A	148		0.24	
1687		-----		-----	
1702	ISO2719-A	147.5		0.10	
1719		-----		-----	
1743	ISO2719-A	142		-1.37	
1801		-----		-----	
1885		-----		-----	
1890		-----		-----	
6000	ISO2719-A	148.64		0.41	
6015	ISO2719-A	150.0		0.77	
6048	D93-A	145		-0.57	
6053		-----		-----	
6067		-----		-----	
6071		-----		-----	
6080	D93-A	148.0		0.24	
6085		-----		-----	
6088		-----		-----	
6099		-----		-----	
6141		-----		-----	
6167		-----		-----	
6169	ISO2719-A	146.0		-0.30	
6181		-----		-----	
6253		-----		-----	
6278		-----		-----	
6280		-----		-----	

normality	OK	
n	28	
outliers	0	
mean (n)	147.12	
st.dev. (n)	3.249	
R(calc.)	9.10	
st.dev.(ISO2719-A:16)	3.731	
R(ISO2719-A:16)	10.45	R(ISO2719-A:16) = R(D93-A:18)

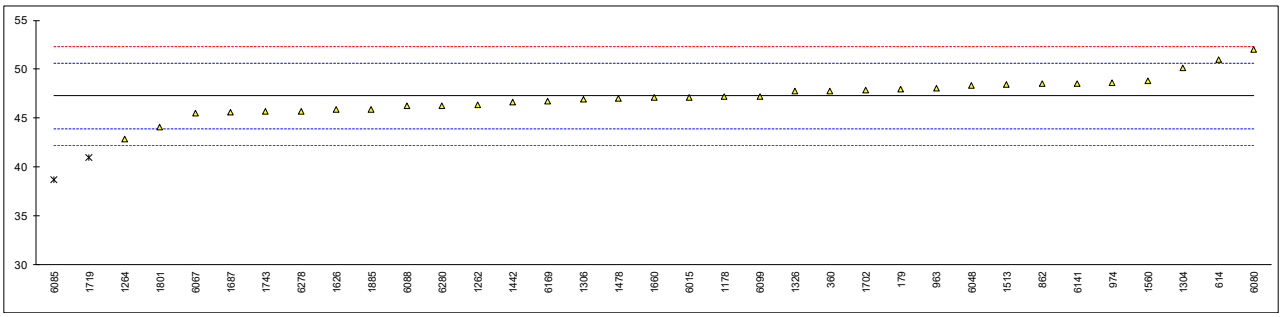

160
155
150
145
140
135
1626
1743
1146
1306
862
1304
360
1442
6048
1478
974
963
1326
6169
446
1702
179
1264
1660
6080
6000
1560
1262
6015
325
1461
913
1513

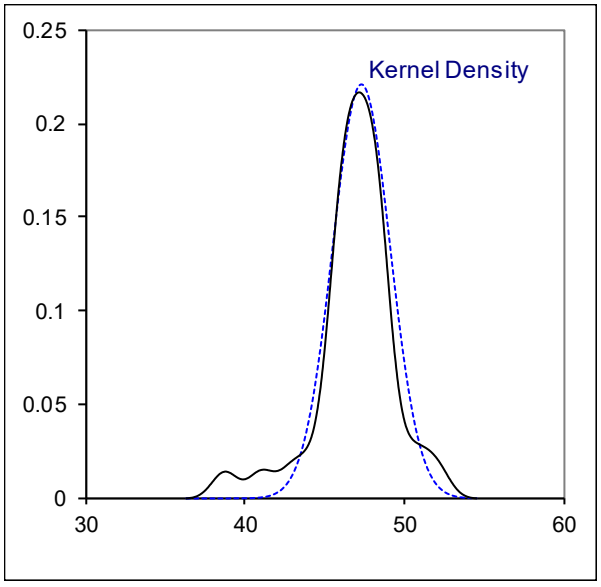

Kernel Density
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
135
140
145
150
155
160

Determination of Interfacial Surface Tension on sample #19240; results in mN/m

lab	method	value	mark	z(targ)	remarks
173		-----		-----	
179	D971	48		0.43	
325		-----		-----	
360	D971	47.8		0.31	
398		-----		-----	
446		-----		-----	
614	D971	51		2.21	
862	D971	48.5		0.73	
912		-----		-----	
913		-----		-----	
963	D971	48.1		0.49	
974	D971	48.6		0.79	
1137		-----		-----	
1146		-----		-----	
1178	D971	47.2		-0.04	
1262	D971	46.4		-0.52	
1264	D971	42.8845		-2.60	
1304	in house-123	50.10		1.67	
1306	D971	46.93		-0.20	
1326	D971	47.776		0.30	
1442	IEC92961	46.64		-0.38	
1444		-----		-----	
1461		-----		-----	
1478	D971	47.0		-0.16	
1513	D971	48.44		0.69	
1560	D971	48.8		0.90	
1626	D971	45.86		-0.84	
1660	D971	47.1		-0.10	
1687	D971	45.6		-0.99	
1702	D971	47.885		0.36	
1719	D2285	41	R(0.05)	-3.72	
1743	D971	45.7		-0.93	
1801	D971	44.09		-1.89	
1885	D971	45.9		-0.81	
1890		-----		-----	
6000		-----		-----	
6015	D971	47.120		-0.09	
6048	D971	48.3		0.61	
6053		-----		-----	
6067	D971	45.5		-1.05	
6071		-----		-----	
6080	D971	52.07		2.84	
6085	D971	38.705	R(0.05)	-5.08	
6088	ISO6295	46.28		-0.59	
6099	EN14210	47.2		-0.04	
6141	D971	48.54		0.75	
6167		-----		-----	
6169	EN14210	46.747		-0.31	
6181		-----		-----	
6253		-----		-----	
6278	D971	45.7		-0.93	
6280		46.3		-0.58	

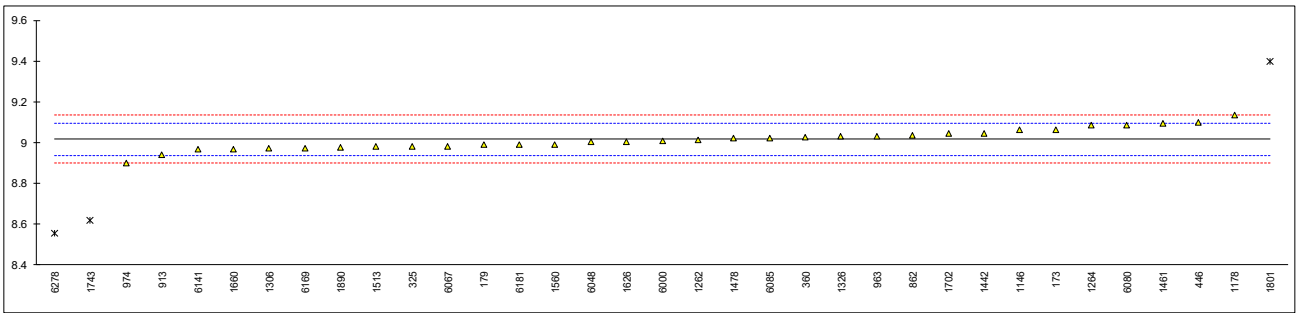
normality	suspect
n	33
outliers	2
mean (n)	47.275
st.dev. (n)	1.8064
R(calc.)	5.058
st.dev.(D971:12)	1.6884
R(D971:12)	4.727

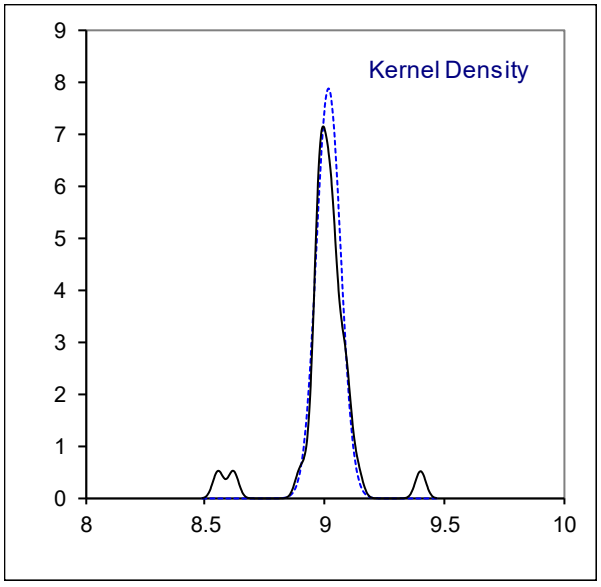

55
50
45
40
35
30
6085
1719
1264
1801
6067
1687
1743
6278
1626
1885
6088
6280
1262
1442
6169
1306
1478
1660
6015
1178
6099
1326
360
1702
179
963
6048
1513
862
6141
974
1560
1304
614
6080


Kernel Density
0.25
0.2
0.15
0.1
0.05
0
30
40
50
60

Determination of Kinematic Viscosity at 40°C on sample #19240; results in mm^2/s

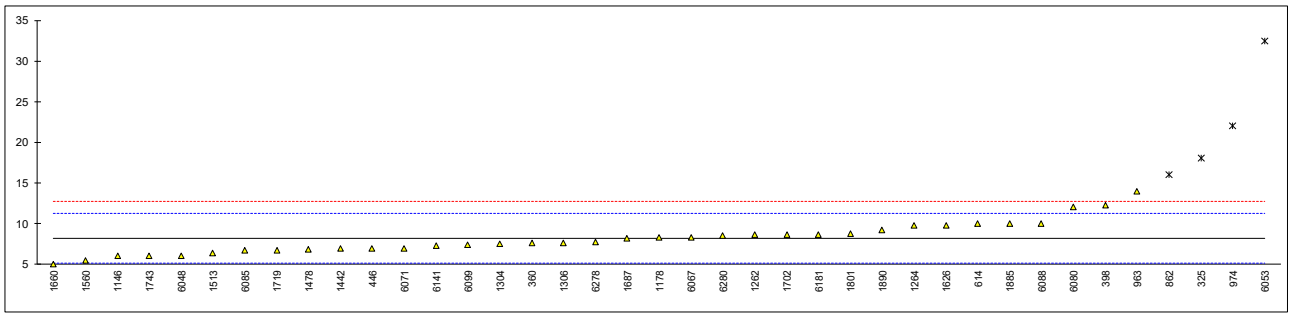
lab	method	value	mark	z(targ)	remarks
173	D445	9.064		1.21	
179	D445	8.99		-0.68	
325	D445	8.9815		-0.89	
360	ISO3104	9.0266		0.26	
398		-----		-----	
446	D445	9.097		2.05	
614		-----		-----	
862	D445	9.0346		0.46	
912		-----		-----	
913	D445	8.941	C	-1.92	first reported 8.108
963	D445	9.033		0.42	
974	D445	8.899		-2.99	
1137		-----		-----	
1146	D445	9.0633		1.19	
1178	ISO3104	9.1373		3.07	
1262	ISO3104	9.013		-0.09	
1264	D7042	9.0836		1.71	
1304		-----		-----	
1306	D445	8.970		-1.19	
1326	D445	9.030		0.34	
1442	D7042	9.0447	C	0.72	first reported 7.6918
1444		-----		-----	
1461	ISO3104	9.0953		2.00	
1478	D7042	9.0234		0.17	
1513	ISO3104	8.981		-0.91	
1560	ISO3104	8.992		-0.63	
1626	D445	9.004		-0.32	
1660	D7042	8.9685		-1.22	
1687		-----		-----	
1702	D7042	9.0443		0.71	
1719		-----		-----	
1743	D7279 corr. to D445	8.620	C,R(0.01)	-10.09	first reported 8.690
1801	ISO3104	9.40	R(0.01)	9.76	
1885		-----		-----	
1890	ISO3104	8.9783		-0.97	
6000	ISO3104	9.009531		-0.18	
6015		-----		-----	
6048	D445	9.003		-0.35	
6053		-----		-----	
6067	ISO3104	8.983		-0.85	
6071		-----		-----	
6080	D445	9.087		1.79	
6085	D7042	9.0236		0.18	
6088		-----		-----	
6099		-----		-----	
6141	D7279 corr. to D445	8.9663		-1.28	
6167		-----		-----	
6169	EN16896	8.9724		-1.12	
6181	ISO3104	8.99		-0.68	
6253		-----		-----	
6278	D445	8.557	R(0.01)	-11.70	
6280		-----		-----	
					Only D445 test results
	normality	OK			OK
	n	32			14
	outliers	3			1
	mean (n)	9.017			9.014
	st.dev. (n)	0.0507			0.0558
	R(calc.)	0.142			0.156
	st.dev.(D445:19)	0.0393			0.0393
	R(D445:19)	0.110			0.110
Compare					
	R(ISO3104:96)	0.069			
	R(D7042:16e3)	0.213			

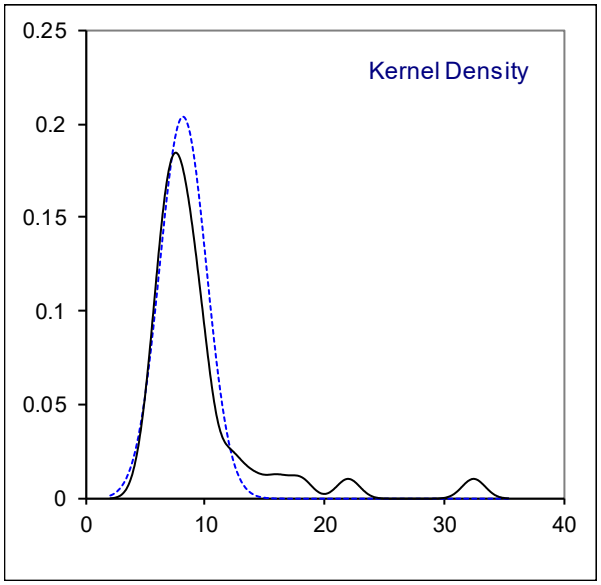

9.6
9.4
9.2
9
8.8
8.6
8.4
6278
1743
974
913
6141
1660
1306
6169
1890
1513
325
6067
179
6161
1560
6048
1626
6000
1262
1478
6085
360
1326
963
862
1702
1442
1146
173
1264
6080
1461
446
1178
1801


Kernel Density
9
8
7
6
5
4
3
2
1
0
8
8.5
9
9.5
10

Determination of Water on sample #19240; results in mg/kg

lab	method	value	mark	z(targ)	remarks
173	D6304-C	<10		-----	
179	D1533	<10		-----	
325	D6304-C	18	R(0.01)	6.41	
360	EN60814	7.6		-0.38	
398	D6304-C	12.3		2.69	
446	IEC60814	7		-0.77	
614	IEC60814	10		1.19	
862	D6304-A	16	R(0.05)	5.11	
912		-----		-----	
913		-----		-----	
963	D1533	14		3.80	
974	D1533	22	C,R(0.01)	9.02	first reported 14
1137		-----		-----	
1146	D6304-C	6		-1.42	
1178	IEC60814	8.3		0.08	
1262	EN60814	8.6		0.28	
1264	D1533	9.766		1.04	
1304	in house-121	7.5		-0.44	
1306	D1533	7.65		-0.34	
1326		-----		-----	
1442	IEC60814	7.00		-0.77	
1444		-----		-----	
1461		-----		-----	
1478	IEC60814	6.8		-0.90	
1513	IEC60814	6.4		-1.16	
1560	IEC60814	5.5		-1.75	
1626	IEC60814	9.8		1.06	
1660	IEC60814	5		-2.07	
1687	EN60814	8.2		0.01	
1702	IEC60814	8.6		0.28	
1719	IEC60814	6.7		-0.96	
1743	IEC60814	6		-1.42	
1801	EN60814	8.75		0.37	
1885	D1533	10		1.19	
1890	IEC60814	9.19		0.66	
6000		-----		-----	
6015		-----		-----	
6048	ISO12937	6		-1.42	
6053	IEC60814	32.5	C,R(0.01)	15.88	first reported 14.7
6067	IEC60814	8.3		0.08	
6071	D1533	7.0		-0.77	
6080	D1533	12		2.49	
6085	IEC60814	6.6924		-0.97	
6088	D1533	10	C	1.19	first reported as Kinematic Viscosity at 40°C
6099	IEC60814	7.4		-0.51	
6141	D1533	7.25		-0.61	
6167		-----		-----	
6169		-----		-----	
6181	ISO12937	8.6		0.28	
6253		-----		-----	
6278	D1533	7.75		-0.28	
6280	IEC60814	8.58		0.26	
	normality	not OK			
	n	35			
	outliers	4			
	mean (n)	8.178			
	st.dev. (n)	1.9593			
	R(calc.)	5.486			Compare R(D1533:12) = 14
	st.dev.(EN60814:98)	1.5320			Compare R(D6304-C:16e1) = 59.602, range 10-25000
	R(EN60814:98)	4.290			Compare R(ISO12937:00) = 19.666


35
30
25
20
15
10
5
1660
1560
1146
1743
6048
1513
6085
1719
1478
1442
446
6071
6141
6099
1304
360
1306
6278
1687
1178
6067
6280
1262
1702
6181
1801
1890
1264
1626
614
1885
6088
6080
398
963
862
325
974
6053


Kernel Density
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40

APPENDIX 2

Determination of 2,6-Ditertiary-butyl phenol (DBP) and 2,6-Ditertiary-butyl paracresol (DBPC); results in %M/M and determination of Dibenzyl disulphide (DBDS), Benzotriazole (BTA) and Irgamet 39; results in mg/kg, all on sample #19240

lab	DBP	DBPC	DBDS	BTA	Irgamet 39	remarks
173	-----	-----	-----	-----	-----	
179	-----	-----	-----	-----	-----	
325	-----	-----	-----	-----	-----	
360	-----	0.01	-----	-----	-----	
398	-----	-----	-----	-----	-----	
446	-----	-----	-----	-----	-----	
614	-----	-----	-----	-----	-----	
862	<0.05	<0.01	11.2	-----	-----	
912	-----	-----	-----	-----	-----	
913	-----	-----	-----	-----	-----	
963	<0.02	-----	-----	-----	<5	
974	-----	-----	-----	-----	-----	
1137	-----	-----	-----	-----	-----	
1146	-----	-----	-----	-----	-----	
1178	-----	0.001	-----	-----	-----	
1262	-----	0	-----	-----	-----	
1264	Not detected	-----	Not detected	Not detected	Not detected	
1304	-----	<0.01	-----	-----	-----	
1306	-----	-----	-----	-----	-----	
1326	-----	-----	-----	-----	-----	
1442	<0,0001	<0,03	<5	<0,04	<5	
1444	-----	-----	-----	-----	-----	
1461	-----	-----	-----	-----	-----	
1478	-----	0.00	-----	-----	-----	
1513	-----	<0,01	<5	-----	<5	
1560	-----	Not detectable	-----	-----	-----	
1626	-----	0.00	-----	-----	-----	
1660	0.00	0.00	0	0	0	
1687	-----	-----	-----	-----	-----	
1702	-----	Not Detected	<5	-----	<1	
1719	-----	-----	-----	-----	-----	
1743	-----	-----	<3	-----	-----	
1801	-----	0.02	-----	-----	-----	
1885	<0.05	-----	-----	-----	-----	
1890	-----	-----	-----	-----	-----	
6000	-----	-----	-----	-----	-----	
6015	-----	0.0000	-----	-----	-----	
6048	-----	-----	-----	-----	-----	
6053	-----	-----	-----	-----	-----	
6067	0.00	0.00	0.00	0.00	0.00	
6071	-----	-----	-----	-----	-----	
6080	-----	<0.1	<5	<10	<10	
6085	-----	-----	-----	-----	-----	
6088	-----	-----	-----	-----	-----	
6099	-----	<0.05	-----	-----	-----	
6141	-----	0	0	0	0	
6167	-----	-----	-----	-----	-----	
6169	-----	-----	-----	-----	-----	
6181	-----	-----	-----	-----	-----	
6253	-----	-----	-----	-----	-----	
6278	0	-----	-----	-----	-----	
6280	-----	-----	-----	-----	-----	

APPENDIX 3

Number of participants per country

3 labs in AUSTRALIA
2 labs in BELGIUM
4 labs in BULGARIA
2 labs in CHINA, People's Republic
1 lab in CROATIA
1 lab in FRANCE
6 labs in GERMANY
1 lab in GREECE
1 lab in HONG KONG
2 labs in INDIA
2 labs in ITALY
1 lab in KUWAIT
1 lab in MALAYSIA
1 lab in MOROCCO
1 lab in NETHERLANDS
1 lab in NEW ZEALAND
1 lab in PHILIPPINES
1 lab in PORTUGAL
1 lab in QATAR
2 labs in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SLOVENIA
1 lab in SOUTH AFRICA
1 lab in SOUTH KOREA
2 labs in SPAIN
1 lab in SWEDEN
1 lab in SWITZERLAND
1 lab in TURKEY
5 labs in UNITED ARAB EMIRATES
3 labs in UNITED KINGDOM
2 labs in UNITED STATES OF AMERICA

APPENDIX 4

Abbreviations

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

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