Institute for
Interlaboratory Studies

Results of Proficiency Test
Transformer Oil (used)
November 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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CONTENTS

1 INTRODUCTION

Since 2014 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Transformer Oil (used) and a proficiency scheme for the analysis of Furanics in Transformer Oil (used), both based on the latest version of IEC60296 and ASTM D3487, every year. During the annual proficiency testing program 2022/2023 it was decided to continue the round robin for the analysis of Transformer Oil (used) and the round robin for the analysis of Furanics in Transformer Oil (used).

In this interlaboratory study registered for participation:
- 88 laboratories in 40 countries for regular analyzes in Transformer Oil (used) iis22L12
- 55 laboratories in 29 countries on the Furanics analyzes iis22L12F

In total 89 laboratories in 40 countries registered for participation in one or two proficiency tests, see appendix 3 for the number of participants per country. In this report the results of the proficiency tests on Transformer Oil (used) and Furanics in Transformer Oil (used) are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
It was decided to send for the PT on Transformer Oil (used) one sample in a 1 L bottle labelled #22226 and for the PT on Furanics in Transformer Oil (used) one sample in a 100 mL glass bottle labelled #22227.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for the statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

All data presented in this report must be regarded as confidential and for use by the participating companies only. Disclosure of the information in this report is only allowed by means of the entire report. Use of the contents of this report for third parties is only allowed by written permission of the Institute for Interlaboratory Studies. Disclosure of the identity of one or more of the participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

For the preparation of the sample for the regular analyzes in Transformer Oil (used) a batch of approximately 110 liters of Transformer Oil (used) was obtained from a third party. After homogenization 95 amber glass bottles of 1 L were filled and labelled #22226.
The homogeneity of the subsamples was checked by determination of Density at 20 °C in accordance with ASTM D4052 on 8 stratified randomly selected subsamples.

	Density at 20 °C in kg/m^3
sample #22226-1	874.46
sample #22226-2	874.45
sample #22226-3	874.45
sample #22226-4	874.45
sample #22226-5	874.45
sample #22226-6	874.45
sample #22226-7	874.45
sample #22226-8	874.45

Table 1: homogeneity test results of subsamples #22226

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 20 °C in kg/m^3
r (observed)	0.01
reference test method	ISO12185:96
0.3 x R (reference test method)	0.15

Table 2: evaluation of the repeatability of subsamples #22226

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

For the preparation of the sample for the analyzes of Furanics in Transformer Oil (used) a batch of approximately 8 liters of Transformer Oil (used), positive on Furanics was obtained from a third party. After homogenization 65 amber glass bottles of 100 mL were filled and labelled #22227.
The homogeneity of the subsamples was checked by determination of Density at 20 °C in accordance with ASTM D4052 on 8 stratified randomly selected subsamples.

	Density at 20 °C in kg/m^3
sample #22227-1	872.43
sample #22227-2	872.42
sample #22227-3	872.42
sample #22227-4	872.41
sample #22227-5	872.42
sample #22227-6	872.39
sample #22227-7	872.41
sample #22227-8	872.41

Table 3: homogeneity test results of subsamples #22227

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 20 °C in kg/m^3
r (observed)	0.03
reference test method	ISO12185:96
0.3 x R (reference method)	0.15

Table 4: evaluation of the repeatability of subsamples #22227

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

Depending on the registration of the participant the appropriate set of PT samples was sent on October 26, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

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

2.6 ANALYZES

The participants were requested to determine on sample #22226: Total Acid Number (Potentiometric and Colorimetric), Breakdown Voltage, Density at 20 °C, Di-electric Dissipation Factor (DDF) at 90 °C and Specific Resistance at 90 °C, Flash Point (C.O.C. and PMcc), Interfacial Surface Tension, Kinematic Viscosity at 40 °C and Water. Also, some analytical details were asked for the Total Acidity Number (Potentiometric) determination and for the Breakdown Voltage determination.
On sample #22227 it was requested to determine: Total Furanic Compounds, 2-Acetyl Furan, 2-Furfural, 2-Furfurylalcohol, 5-Hydroxy Methyl-2-Furfural and 5-Methyl-2-Furfural.

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

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

3 RESULTS

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

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

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1. was met for all evaluated tests, therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.

Finally, the reproducibilities were calculated from the standard deviations by multiplying them with a factor of 2.8.

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

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

3.3 Z-SCORES

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

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

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. For the PT on Transformer Oil (used) eight participants reported test results after the final reporting date and three other participants did not report any test results. For the PT on Furanics in Transformer Oil (used) six participants reported test results after the final reporting date and eight other participants did not report any test results.
Not all participants were able to report all tests requested.
In total 86 participants reported 674 numerical test results. Observed were 27 outlying test results, which is 4.0%. 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 SAMPLE AND PER TEST

In this section the reported test results are discussed per sample and 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 4.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D1298) and an added designation for the year that the test method was adopted or revised (e.g. D1298:12b). When a method has been reapproved an “R” will be added and the year of approval (e.g. D1298:12bR17).

sample #22226

Total Acid Number (Potentiometric): This determination may be problematic depending on the test method used. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D664-A:18e2, BEP- 60 mL and IP-60 mL, but not in agreement with BEP- 125 mL and IP-125 mL nor with the requirements of EN62021-1:03.
When the test results of ASTM D664 and EN/IEC62021-1 were evaluated separately the calculated reproducibilities after rejection of the statistical outliers are in agreement with the requirements of ASTM D664-A:18e2, BEP- 60 mL and IP-60 mL, but still not in agreement with BEP- 125 mL and IP-125 mL nor with the requirements of EN62021-1:03.

Total Acid Number (Colorimetric): This determination may be problematic depending on the test method used. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D974:22 but not at all in agreement with the requirements of EN62021-2:07.

When the test results of ASTM D974 and EN/IEC62021-2 were evaluated separately the calculated reproducibilities after rejection of the statistical outliers are in agreement with the requirements of ASTM D974:22 but still not in agreement with the requirements of EN62021-2:07.

Breakdown Voltage: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of IEC60156:18.
When the test results with stirring and without stirring were evaluated separately no significant effect is observed.

Density at 20 °C: This determination may be problematic depending on the test method used. Nine statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO12185:96 and ASTM D4052:22 but is in agreement with the requirements of ISO3675:98 and D1298:12bR17.
When the test results of ISO12185/D4052 and ISO3675/D1298 were evaluated separately the calculated reproducibilities after rejection of the statistical outliers are in agreement with all of the respective requirements.

DD-Factor at 90 °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 EN60247:04.

Specific Resistance at 90 °C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of EN60247:04.

Flash Point C.O.C.: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D92:18 and ISO2592:17.

Flash Point PMcc: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ISO2719-A:16, ASTM D93-A:20 and ASTM D93-B:20.

Interfacial Surface Tension: This determination may be problematic depending on the test method used. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirements of ASTM D971:20 but is in agreement with the requirements of IEC62961:18.

Kinematic Viscosity at 40 °C: Until 2017 a precision statement for used oils was not present in ASTM D445. In the 2019 version of ASTM D445 a precision statement is given for used (in-service) formulated oils. However, it appears that this reproducibility is very strict. Therefore, iis has estimated a reproducibility on used oils for Kinematic Viscosity at 40 °C based on previous PTs (see iis memo 1401, lit. 13). This reproducibility has been used for the calculation of the z-scores.
This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of iis memo 1401 and ASTM D7042:21a, but not in agreement with the requirements of ASTM D445:21e1 and ISO3104-A:20.

Water: This determination was not problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of EN60814:98 and ASTM D1533:20.

sample #22227
For the Furanics the observed reproducibilities were compared against the (strict) estimated reproducibilities calculated with the Horwitz equation. It is remarkable that the precision requirements of IEC61198:93 are stricter than with the Horwitz equation.

Total Furanic Compounds: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility calculated with the Horwitz equation but is not in agreement with the strict requirements of IEC61198:93.

2-Furfural: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in full agreement with the estimated reproducibility calculated with the Horwitz equation but is not in agreement with the strict requirements of IEC61198:93.

The participants agreed on a concentration near or below the limit of detection for all other Furanic compounds mentioned in paragraph 2.6. Therefore, no z-scores are calculated for these compounds. 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 reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from reference methods are presented in the next tables.

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Acid Number (Pot. metric)	mg KOH/kg	44	0.019	0.013	0.012
Total Acid Number (Colorimetric)	mg KOH/kg	39	0.019	0.018	0.04
Breakdown Voltage	kV/2.5 mm	77	47.7	32.9	40.0
Density at 20 °C	kg/m^3	49	874.5	0.7	0.5
D-Dissipation Factor 90 °C		70	0.016	0.010	0.017
Specific Resistance at 90 °C	GΩm	51	26.8	16.4	28.2
Flash Point C.O.C.	°C	23	154.9	12.9	18
Flash Point PMcc	°C	39	144.9	8.9	10.3
Interfacial Surface Tension	mN/m	58	27.3	6.1	2.7
Kinematic Viscosity at 40 °C	mm^2/s	45	9.690	0.177	0.174
Water	mg/kg	74	20.16	5.44	6.74

Table 5: reproducibilities of tests on sample #22226

Component	unit	n	average	2.8 * sd	R(target)
Total Furanic Compounds	mg/kg	33	4.96	1.46	1.75
2-Furfural	mg/kg	45	4.92	1.57	1.73

Table 6: reproducibilities of tests on sample #22227

Without further statistical calculations it can be concluded that for many 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 NOVEMBER 2022 WITH PREVIOUS PTS

	November 2022	November 2021	November 2020	November 2019	November 2018
Number of reporting laboratories	86	77	70	70	75
Number of test results	674	822	581	678	805
Number of statistical outliers	27	35	24	24	41
Percentage of statistical outliers	4.0%	4.3%	4.1%	3.5%	5.1%

Table 7: comparison with previous proficiency tests

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

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

Parameter	November 2022	November 2021	November 2020	November 2019	November 2018
Total Acid Number (Pot. metric)	+/-	-	-	-	--
Total Acid Number (Colorimetric)	++	++	++	+	+/-
Breakdown Voltage	+	+/-	-	-	--
Density at 20 °C	-	+	+	-	+/-
D-Dissipation Factor 90 °C	+	+	++	+	++
Specific Resistance at 90 °C	+	-	++	+	+
Flash Point C.O.C.	+	+	+/-	+	+
Flash Point PMcc	+	+	+/-	+	+
Interfacial Surface Tension	--	--	--	--	--
Kinematic Viscosity at 40 °C	+/-	-	+	-	-
Water	+	-	+/-	--	--
Total Furanic Compounds	+	++	+/-	++	++
2-Acetyl Furan	n.e.	+	n.e.	n.e.	+
2-Furfural	+/-	+	+/-	++	+
2-Furfurylalcohol	n.e.	-	n.e.	-	+/-
5-Hydroxymethyl-2-Furfural	n.e.	+/-	n.e.	n.e.	+
5-Methyl-2-Furfural	n.e.	+/-	n.e.	+	+

Table 8: comparison determinations to the reference test methods

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

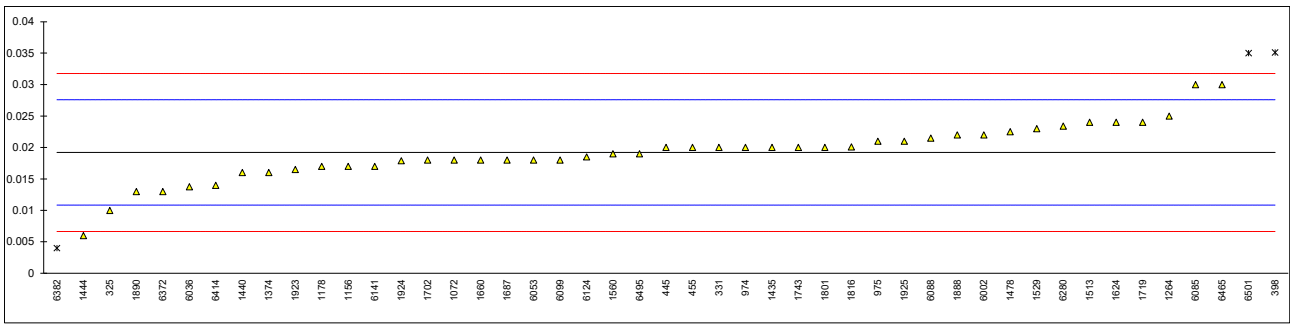
APPENDIX 1

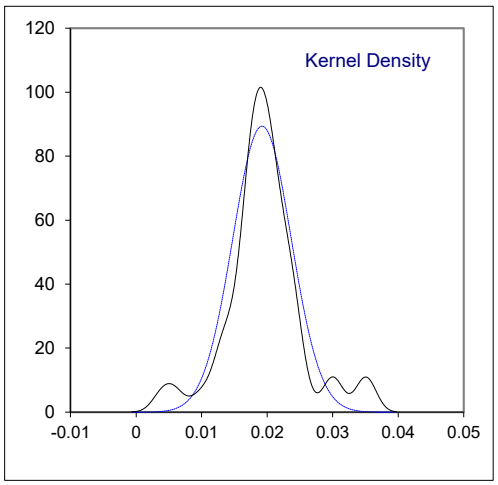
Determination of Total Acid Number (Potentiometric) on sample #22226; results in mg KOH/g

lab	method	value	mark	z(targ)	End point	Vol. solvent	remarks
179		-----		-----	---	---	
237	D664-A	<0.1		-----	Inflection Point	125 mL	
325	D664-A	0.01		-2.20	Buffer End Point pH 10	125 mL	
331	D664-A	0.02		0.19	---	---	
398	D664-A	0.0351	R(0.05)	3.80	Inflection Point	60 mL	
445	D664-A	0.02		0.19	Buffer End Point pH 11	60 mL	
455	EN62021-1	0.02		0.19	Buffer End Point pH 10	60 mL	
511		-----		-----	---	---	
614		-----		-----	---	---	
657	D664-A	<0.1		-----	Inflection Point	60 mL	
780	D664-A	<0.10		-----	Buffer End Point pH 10	60 mL	
862		-----		-----	---	---	
901		-----		-----	---	---	
912		-----		-----	---	---	
963		-----		-----	---	---	
974	D664-A	0.020		0.19	Inflection Point	125 mL	
975	D664-A	0.021		0.43	Inflection Point	60 mL	
1072	In house	0.0180		-0.29	Inflection Point	60 mL	
1135		-----		-----	---	---	
1137		-----		-----	---	---	
1146		<0.1		-----	Buffer End Point pH 10	125 mL	
1156	EN62021-1	0.017		-0.53	---	---	
1178	IEC62021-1	0.017		-0.53	---	---	
1264	D664-A	0.025		1.38	Inflection Point	60 mL	
1304		-----		-----	Buffer End Point pH 10	125 mL	
1306		-----		-----	---	---	
1352		-----		-----	---	---	
1374	D664-A	0.016		-0.77	Inflection Point	60 mL	
1430		-----		-----	---	125 mL	
1435	D664-A	0.02		0.19	---	100 mL	
1440	IEC62021-1	0.016		-0.77	---	---	
1442		-----		-----	Inflection Point	---	
1444	IEC62021-1	0.006		-3.16	---	---	
1458		-----		-----	---	---	
1461		-----		-----	---	---	
1478	IEC62021-1	0.0225		0.79	Buffer End Point pH 11	---	
1505		-----		-----	---	---	
1513	IEC62021-1	0.024		1.15	Buffer End Point pH 11,5	---	
1529	IEC62021-1	0.023		0.91	---	---	
1545		-----		-----	---	---	
1560	IEC62021-1	0.019		-0.05	Buffer End Point pH 11	60 mL	
1624	IEC62021-1	0.024		1.15	Buffer End Point pH 11	60 mL	
1660	IEC62021-1	0.018		-0.29	Buffer End Point pH 10	60 mL	
1687	D664-A	0.018		-0.29	Buffer End Point pH 10	60 mL	
1702	IEC62021-1	0.018		-0.29	Buffer End Point pH 10	60 mL	
1719	D664-A	0.024		1.15	Inflection Point	---	
1743	IEC62021-1	0.02		0.19	Buffer End Point pH 11	60 mL	
1801	EN62021-1	0.02		0.19	Buffer End Point pH 11	125 mL	
1816	EN62021-1	0.0201		0.21	Inflection Point	60 mL	
1841		-----		-----	---	---	
1885		-----		-----	---	---	
1888	EN62021-1	0.022		0.67	Buffer End Point pH 11	60 mL	
1890	ISO6619	0.013		-1.48	Inflection Point	60 mL	
1891		-----		-----	---	---	
1923	EN62021-1	0.0165		-0.65	Buffer End Point pH 11	60 mL	
1924	EN62021-1	0.0179		-0.31	Inflection Point	60 mL	
1925	EN62021-1	0.021		0.43	Buffer End Point pH 11	60 mL	
1958		-----		-----	---	---	
6002	EN62021-1	0.022		0.67	Buffer End Point pH 11	60 mL	
6015		-----		-----	---	---	
6031		-----		-----	---	---	
6036	EN62021-1	0.01375		-1.30	---	---	
6053	IEC62021-1	0.018		-0.29	Buffer End Point pH 11	60 mL	
6085	D8045	0.03		2.58	Inflection Point	60 mL	
6088	IEC62021-1	0.0215		0.55	Inflection Point	60 mL	
6099	IEC62021-1	0.018		-0.29	Buffer End Point pH 11	60 mL	
6124	IEC62021-1	0.0185		-0.17	Buffer End Point pH 11	60 mL	
6141	D664-A	0.017		-0.53	Buffer End Point pH 10	80 mL	
6167		-----		-----	---	---	
6171		-----		-----	---	---	
6278		-----		-----	---	---	
6280	IEC62021-1	0.0234		1.00	---	---	
6322		-----		-----	---	---	
6334		-----		-----	---	---	
6367		-----		-----	---	---	

lab	method	value	mark	z(targ)	End point	Vol. solvent	remarks
6372	IEC62021-1	0.013		-1.48	Buffer End Point pH 11	60 mL	
6382	IEC62021-1	0.004	R(0.05)	-3.64	---	---	
6385		-----		-----	---	---	
6402		-----		-----	---	---	
6414	D664-A	0.014		-1.24	Inflection Point	50 mL	
6422		-----		-----	---	---	
6465	IEC62021-1	0.03		2.58	Buffer End Point pH 11	60 mL	
6482		-----		-----	---	---	
6483		-----		-----	---	---	
6484		-----		-----	---	---	
6495	EN62021-1	0.019		-0.05	Buffer End Point pH 11	40 mL	
6501	IEC62021-1	0.035	R(0.05)	3.77	Buffer End Point pH 11	125 mL	
8001		-----		-----	---	---	

		only D664	only EN/IEC62021-1
normality	suspect	OK	not OK
n	44	12	29
outliers	3	1	2
mean (n)	0.0192	0.0187	0.0193
st.dev. (n)	0.00447	0.00414	0.00427
R(calc.)	0.0125	0.0116	0.0120
st.dev.(D664-A:18e2, BEP 60 mL)	0.00418	0.00409	---
R(D664-A:18e2, BEP 60 mL)	0.0117	0.0114	---
compare			
R(EN62021-1:03)	0.0067	---	0.0067
R(D664-A:18e2, BEP 125 mL)	0.0050	0.0048	---
R(D664-A:18e2, IP 60 mL)	0.0157	0.0154	---
R(D664-A:18e2, IP 125 mL)	0.0035	0.0035	---



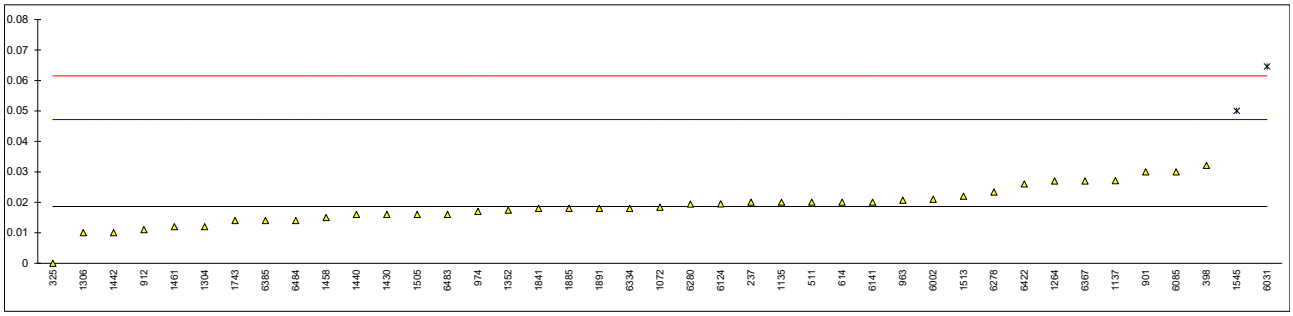


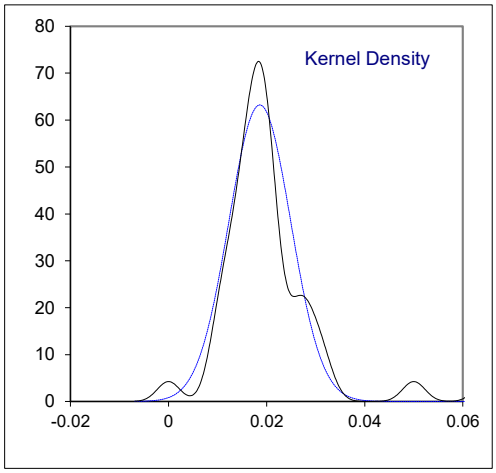
Determination of Total Acid Number (Colorimetric) on sample #22226; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	D974	0.02		0.10	
325	D974	0.00		-1.30	
331		-----		-----	
398	D974	0.0321		0.94	
445		-----		-----	
455		-----		-----	
511	D974	0.02		0.10	
614	D974	0.02		0.10	
657	D974	<0.02		-----	
780	D974	<0.02		-----	
862		-----		-----	
901	D974	0.03		0.80	
912	D974	0.011		-0.53	
963	D974	0.0207		0.15	
974	D974	0.017		-0.11	
975		-----		-----	
1072	IEC62021-2	0.0184		-0.02	
1135	D974	0.02		0.10	
1137	D974	0.0271		0.59	
1146		-----		-----	
1156		-----		-----	
1178		-----		-----	
1264	D974	0.027		0.59	
1304	In house	0.012		-0.46	
1306	D974	0.01		-0.60	
1352	IEC62021-2	0.0174		-0.09	
1374		-----		-----	
1430	EN62021-2	0.0160		-0.18	
1435		-----		-----	
1440	ISO6618	0.016		-0.18	
1442	IEC62021-2	0.01		-0.60	
1444		-----		-----	
1458	D974	0.015		-0.25	
1461		0.012		-0.46	
1478		-----		-----	
1505	D974	0.016		-0.18	
1513	IEC62021-2	0.022		0.24	
1529		-----		-----	
1545	D974	0.05	R(0.01)	2.20	
1560		-----		-----	
1624		-----		-----	
1660		-----		-----	
1687		-----		-----	
1702		-----		-----	
1719		-----		-----	
1743	ISO6618	0.014		-0.32	
1801		-----		-----	
1816		-----		-----	
1841	IEC62021-2	0.018		-0.04	
1885	D974	0.018		-0.04	
1888		-----		-----	
1890		-----		-----	
1891	IEC62021-2	0.018		-0.04	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958	D974	<0.02		-----	
6002	EN62021-2	0.021		0.17	
6015		-----		-----	
6031	D974	0.0646	C,R(0.01)	3.22	first reported 0.0446
6036		-----		-----	
6053		-----		-----	
6085	D974	0.03		0.80	
6088		-----		-----	
6099		-----		-----	
6124	IEC62021-2	0.0195		0.06	
6141	D974	0.02		0.10	
6167		-----		-----	
6171		-----		-----	
6278	D974	0.02336275		0.33	
6280	IEC62021-2	0.0194		0.05	
6322		-----		-----	
6334	IEC62021-2	0.018		-0.04	
6367	IEC62021-2	0.027		0.59	

lab	method	value	mark	z(targ)	remarks
6372		-----		-----	
6382		-----		-----	
6385	D974	0.014		-0.32	
6402		-----		-----	
6414		-----		-----	
6422	IEC62021-2	0.026		0.52	
6465		-----		-----	
6482		-----		-----	
6483	EN62021-2	0.016		-0.18	
6484	EN62021-2	0.014		-0.32	
6495		-----		-----	
6501		-----		-----	
8001		-----		-----	

			only D974/IOS6618/IP139	only EN/IEC62021-2
	normality	suspect	OK	OK
	n	39	22	15
	outliers	2	2	0
	mean (n)	0.0186	0.0191	0.0187
	st.dev. (n)	0.00631	0.00745	0.00427
	R(calc.)	0.0177	0.0209	0.0120
	st.dev.(D974:22)	0.01429	0.01429	---
	R(D974:22)	0.04	0.04	---
	compare			
	R(EN62021-2:07)	0.0037	---	0.0037



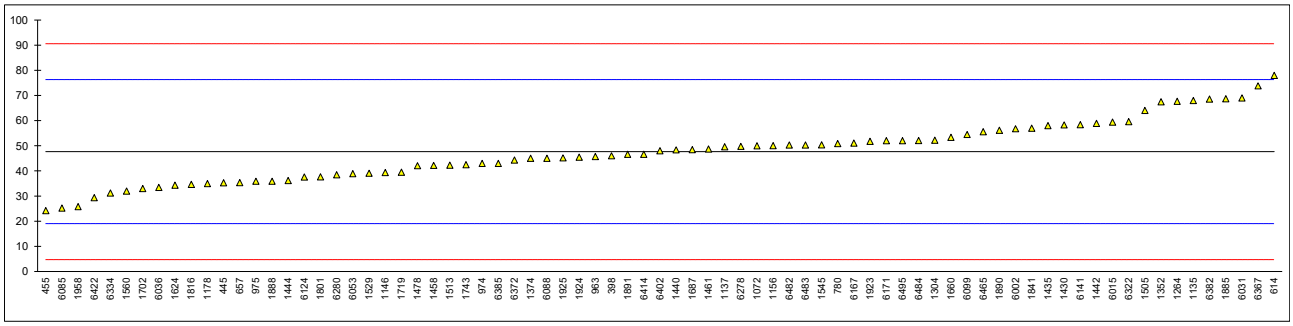


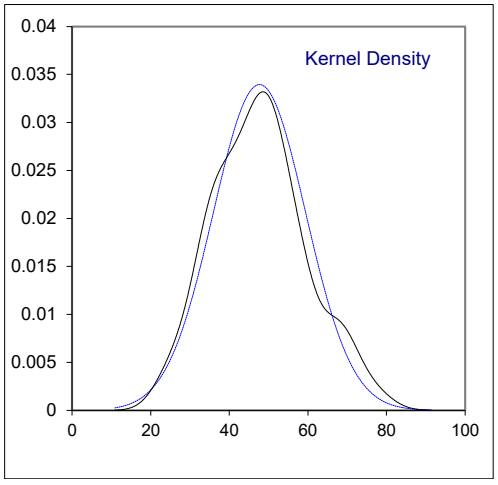
Determination of Breakdown Voltage on sample #22226, results in kV/2.5 mm

lab	method	value	mark	z(targ)	Stirred or not stirred	remarks
179		-----		-----	---	
237		-----		-----	---	
325		-----		-----	---	
331		-----		-----	---	
398	IEC60156	46.0		-0.12	Stirred continuously including breakdowns	
445	EN60156	35.3		-0.86	Not stirred	
455	EN60156	24.2		-1.64	Not stirred	
511		-----		-----	---	
614	IEC60156	78.0		2.12	Stirred continuously including breakdowns	
657	IEC60156	35.40		-0.86	Not stirred	
780	GOST6581	50.9		0.23	Not stirred	
862		-----		-----	---	
901		-----		-----	Stirred continuously including breakdowns	
912		-----		-----	---	
963	IEC60156	45.7		-0.14	Not stirred	
974	EN60156	43		-0.33	---	
975	EN60156	35.9		-0.82	Stirred continuously including breakdowns	
1072	EN60156	50.0		0.16	Stirred continuously excluding breakdowns	
1135	IEC60156	68		1.42	---	
1137	IEC60156	49.6		0.14	Not stirred	
1146	IEC156	39.4		-0.58	Stirred continuously including breakdowns	
1156	EN60156	50.1		0.17	Not stirred	
1178	IEC60156	35.0		-0.89	---	
1264	IEC60156	67.7		1.40	Not stirred	
1304	IEC60156	52.25		0.32	Stirred continuously including breakdowns	
1306		-----		-----	---	
1352	IEC60156	67.5		1.39	Not stirred	
1374	IEC60156	45		-0.19	Stirred continuously excluding breakdowns	
1430	EN60156	58.3		0.74	Stirred continuously including breakdowns	
1435	IEC60156	58.0		0.72	Not stirred	
1440	EN60156	48.4		0.05	---	
1442	IEC60156	58.9		0.79	Stirred continuously excluding breakdowns	
1444	IEC60156	36.2		-0.80	---	
1458	IEC60156	42.2		-0.38	Stirred continuously including breakdowns	
1461	EN60156	48.7		0.07	---	
1478	IEC60156	42.1		-0.39	Stirred continuously excluding breakdowns	
1505	IEC60156	64.1		1.15	---	
1513	IEC60156	42.3		-0.38	Stirred continuously including breakdowns	
1529	IEC60156	39.1		-0.60	Stirred continuously excluding breakdowns	
1545	IEC60156	50.4		0.19	Stirred continuously excluding breakdowns	
1560	IEC60156	32		-1.10	Stirred continuously including breakdowns	
1624	IEC60156	34.3		-0.93	Stirred continuously including breakdowns	
1660	IEC60156	53.4		0.40	Stirred continuously including breakdowns	
1687	IEC60156	48.5		0.06	Stirred continuously excluding breakdowns	
1702	IEC60156	33.05		-1.02	Stirred continuously including breakdowns	
1719	IEC60156	39.5		-0.57	Stirred continuously excluding breakdowns	
1743	IEC60156	42.5		-0.36	Not stirred	
1801	EN60156	37.7		-0.70	Stirred continuously including breakdowns	
1816	EN60156	34.7		-0.91	Stirred continuously including breakdowns	
1841	IEC60156	57.0		0.65	Stirred continuously including breakdowns	
1885	IEC60156	68.7		1.47	---	
1888	EN60156	35.9		-0.82	Stirred continuously including breakdowns	
1890	IEC60156	56.2		0.60	Stirred continuously including breakdowns	
1891	IEC60156	46.6		-0.07	Stirred continuously including breakdowns	
1923	EN60156	51.8		0.29	Stirred continuously including breakdowns	
1924	EN60156	45.5		-0.15	Stirred continuously including breakdowns	
1925	EN60156	45.2		-0.17	Not stirred	
1958	IEC60156	25.8		-1.53	---	
6002	EN60156	56.8		0.64	Stirred continuously including breakdowns	
6015	EN60156	59.40		0.82	Stirred continuously excluding breakdowns	
6031	IEC60156	69.0		1.49	Not stirred	
6036		33.42		-1.00	Stirred continuously including breakdowns	
6053	IEC60156	38.9		-0.61	Stirred continuously including breakdowns	
6085	IEC60156	25.3		-1.56	Stirred continuously including breakdowns	
6088	IEC60156	45		-0.19	Stirred continuously including breakdowns	
6099	IEC60156	54.5		0.48	Not stirred	
6124	IEC60156	37.6		-0.70	Stirred continuously excluding breakdowns	
6141	IEC60156	58.4		0.75	Stirred continuously including breakdowns	
6167	IEC60156	51.1		0.24	Stirred continuously including breakdowns	
6171	EN60156	52.0		0.30	---	
6278	IEC60156	49.8		0.15	Not stirred	
6280	IEC60156	38.5		-0.64	---	
6322	EN60156	59.6		0.83	---	
6334	IEC60156	31.2		-1.15	Stirred continuously excluding breakdowns	
6367	IEC60156	73.8		1.83	Stirred continuously including breakdowns	

lab	method	value	mark	z(targ)	Stirred or not stirred	remarks
6372	IEC60156	44.3		-0.24	Stirred continuously excluding breakdowns	
6382	IEC60156	68.6		1.46	---	
6385	D877	43		-0.33	Not stirred	
6402		48.0		0.02	---	
6414	IEC60156	46.6		-0.07	Stirred continuously including breakdowns	
6422	IEC60156	29.4		-1.28	Stirred continuously including breakdowns	
6465	IEC60156	55.6		0.55	Stirred continuously including breakdowns	
6482	EN60156	50.3		0.18	Stirred continuously excluding breakdowns	
6483	EN60156	50.3		0.18	Not stirred	
6484	EN60156	52.1		0.31	Stirred continuously excluding breakdowns	
6495	EN60156	52		0.30	Stirred continuously including breakdowns	
6501		-----		-----	---	
8001		-----		-----	---	

			only 'stirred'	only 'not stirred'
	normality	OK	OK	OK
	n	77	46	17
	outliers	0	0	0
	mean (n)	47.669	46.244	49.335
	st.dev. (n)	11.7514	11.0069	11.9897
	R(calc.)	32.904	30.819	33.571
	st.dev.(IEC60156:18)	14.3007	13.8732	14.8006
	R(IEC60156:18)	40.042	38.845	41.442



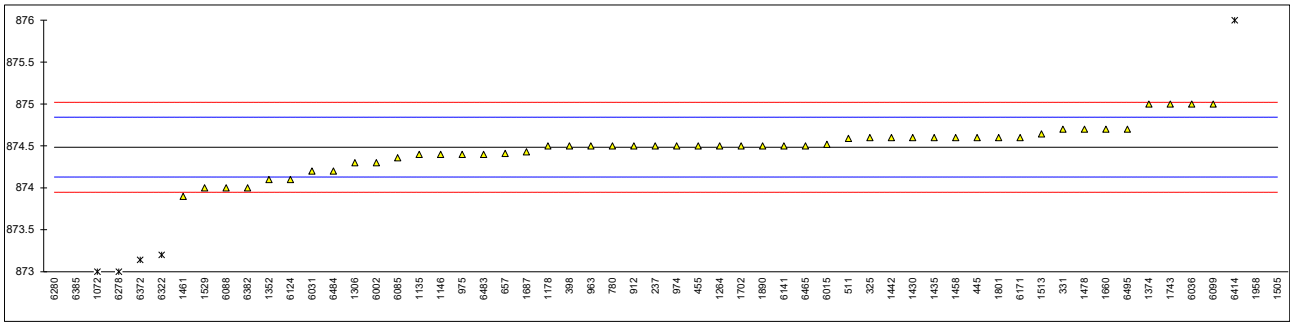


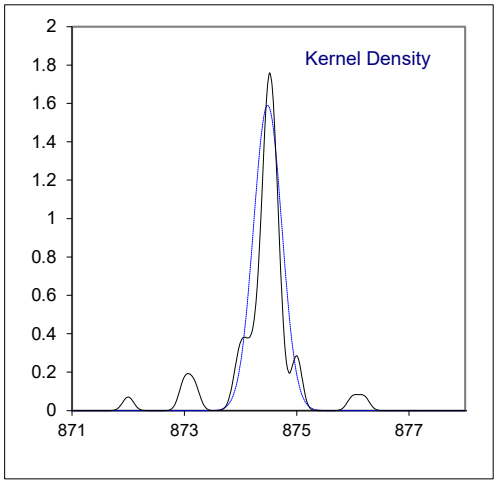
Determination of Density at 20 °C on sample #22226; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	D4052	874.5		0.09	
325	D4052	874.6	C	0.65	first reported 0.8746 kg/m^3
331	ISO12185	874.7		1.21	
398	ISO12185	874.5		0.09	
445	ISO12185	874.6		0.65	
455	IP355	874.5		0.09	
511	D4052	874.59		0.59	
614		-----		-----	
657	D4052	874.41		-0.42	
780	ISO12185	874.5		0.09	
862		-----		-----	
901		-----		-----	
912	D4052	874.5		0.09	
963	D4052	874.5		0.09	
974	D4052	874.5		0.09	
975	D4052	874.4		-0.47	
1072	ISO3675	873.0	R(0.01)	-8.31	
1135	ISO12185	874.4		-0.47	
1137		-----		-----	
1146	D4052	874.4	C	-0.47	first reported 0.8744 kg/m^3
1156		-----		-----	
1178	ISO12185	874.5		0.09	
1264	D4052	874.5		0.09	
1304		-----		-----	
1306	D4052	874.3		-1.03	
1352	D7042	874.1		-2.15	
1374	D4052	875	C	2.89	first reported 875.2
1430	D4052	874.6		0.65	
1435	D4052	874.6		0.65	
1440		-----		-----	
1442	ISO12185	874.60		0.65	
1444		-----		-----	
1458	D4052	874.6		0.65	
1461	ISO3675	873.9		-3.27	
1478	ISO12185	874.7		1.21	
1505	D7042	880.67	C,R(0.01)	34.64	first reported 876.79
1513	ISO12185	874.643		0.89	
1529		874	C	-2.71	first reported 0.874 kg/m^3
1545		-----		-----	
1560		-----		-----	
1624		-----		-----	
1660	D7042	874.7		1.21	
1687	ISO12185	874.43		-0.31	
1702	ISO12185	874.5		0.09	
1719		-----		-----	
1743		875.0	C	2.89	first reported 876.0
1801	ISO3675	874.6	C	0.65	first reported 876.2
1816		-----		-----	
1841		-----		-----	
1885		-----		-----	
1888		-----		-----	
1890	ISO12185	874.5		0.09	
1891		-----		-----	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958	D1298	876.2	C,R(0.01)	9.61	reported 0.8762 kg/m^3
6002	ISO12185	874.3		-1.03	
6015	ISO12185	874.52		0.20	
6031	D1298	874.2		-1.59	
6036		875	C	2.89	first reported 0.875 kg/m^3
6053		-----		-----	
6085	D7042	874.36		-0.70	
6088	ISO3675	874		-2.71	
6099	ISO12185	875.0		2.89	
6124	D7042	874.1	C	-2.15	first reported 0.8741 kg/m^3
6141	D4052	874.5		0.09	
6167		-----		-----	
6171	ISO3675	874.6		0.65	
6278	D1298	873.0	C,R(0.01)	-8.31	first reported 875.5
6280	ISO12185	870	R(0.01)	-25.11	
6322	ISO12185	873.2	C,R(0.01)	-7.19	first reported 0.8770 kg/m^3, reported 0.8732 kg/m^3
6334		-----		-----	
6367		-----		-----	

lab	method	value	mark	z(targ)	remarks
6372	ISO3675	873.14	R(0.01)	-7.53	
6382	DIN51757	874		-2.71	
6385	D1298	872	R(0.01)	-13.91	
6402		-----		-----	
6414		876	R(0.01)	8.49	
6422		-----		-----	
6465	ISO3675	874.5		0.09	
6482		-----		-----	
6483	ISO12185	874.4		-0.47	
6484	ISO12185	874.2		-1.59	
6495	ISO3675	874.7		1.21	
6501		-----		-----	
8001		-----		-----	

			only ISO12185/D4052	only ISO3675/D1298
	normality	OK	not OK	OK
	n	49	33	7
	outliers	9	2	5
	mean (n)	874.485	874.530	874.357
	st.dev. (n)	0.2508	0.1641	0.3207
	R(calc.)	0.702	0.460	0.898
	st.dev.(ISO12185:96)	0.1786	0.1786	---
	R(ISO12185:96)	0.5	0.5	---
	compare			
	R(D4052:22)	0.50	0.50	---
	R(ISO3675:98)	1.2	---	1.2
	R(D1298:12bR17)	1.2	---	1.2



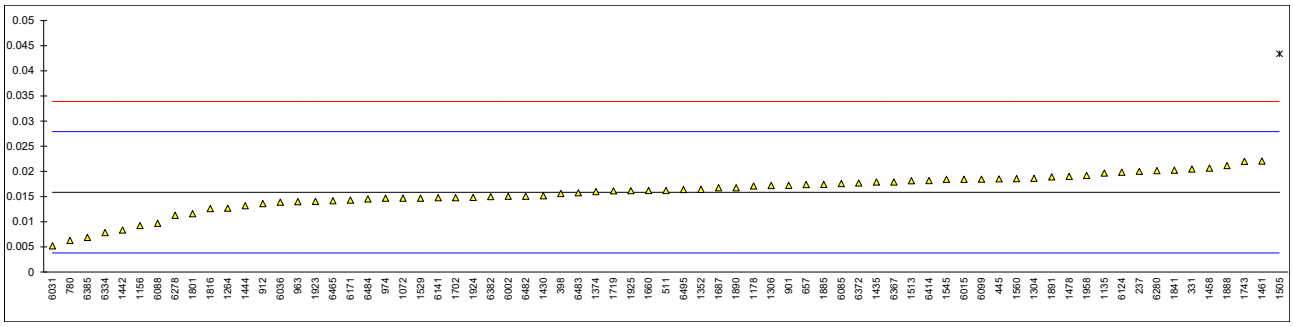


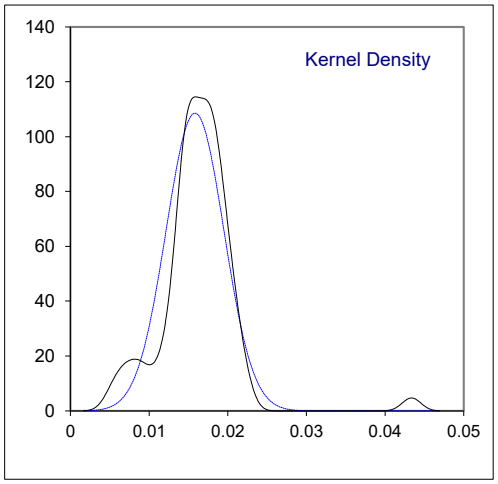
Determination of Di-electric Dissipation Factor (DDF) at 90 °C on sample #22226

lab	method	value	mark	z(targ)	frequency	remarks
179		-----		-----	-----	
237	EN60247	0.020		0.69	50	
325		-----		-----	-----	
331	EN60247	0.02047		0.77	60	
398	EN60247	0.015617		-0.04	50	
445	EN60247	0.0185065		0.44	50	
455		-----		-----	-----	
511	D924	0.016212		0.06	-----	
614		-----		-----	-----	
657	IEC60247	0.017403		0.26	50	
780	GOST6581	0.0063		-1.58	50	
862		-----		-----	-----	
901	EN60247	0.017214		0.23	-----	
912	EN60247	0.0136		-0.37	-----	
963	IEC60247	0.0140		-0.31	60	
974	EN60247	0.0147		-0.19	50	
975		-----		-----	-----	
1072	EN60247	0.01470		-0.19	50	
1135	IEC60247	0.0197		0.64	50	
1137		-----		-----	-----	
1146		-----		-----	-----	
1156	EN60247	0.00923		-1.10	-----	
1178	IEC60247	0.01710		0.21	50.0	
1264	IEC60247	0.0127		-0.52	60	
1304	IEC60247	0.018634		0.46	50	
1306	IEC60247	0.0172		0.23	-----	
1352	IEC60247	0.01642		0.10	50	
1374	IEC60247	0.016		0.03	-----	
1430	EN60247	0.015154		-0.11	-----	
1435	IEC60247	0.0179		0.34	50	
1440		-----		-----	-----	
1442	IEC60247	0.00834		-1.25	55	
1444	EN60247	0.013207		-0.44	-----	
1458	IEC60247	0.020646		0.80	50	
1461	EN60247	0.022078		1.04	-----	
1478	IEC60247	0.019010		0.53	-----	
1505	IEC60247	0.043373	R(0.01)	4.57	-----	
1513	IEC60247	0.018163		0.39	-----	
1529	IEC60247	0.0147		-0.19	-----	
1545	IEC60247	0.01842		0.43	60	
1560	IEC60247	0.018571		0.45	50	
1624		-----		-----	-----	
1660	IEC60247	0.016187		0.06	55	
1687	IEC60247	0.016742		0.15	50	
1702	IEC60247	0.01479		-0.17	50	
1719	IEC60247	0.016145		0.05	-----	
1743	IEC60247	0.022		1.02	-----	
1801	EN60247	0.011618		-0.70	-----	
1816	EN60247	0.0126		-0.54	-----	
1841	IEC60247	0.020243		0.73	50	
1885	IEC60247	0.017413		0.26	-----	
1888	IEC60247	0.021170		0.89	-----	
1890	IEC60247	0.016743		0.15	50	
1891	IEC60247	0.01894		0.51	-----	
1923	EN60247	0.01404		-0.30	-----	
1924	EN60247	0.01485		-0.16	-----	
1925	EN60247	0.016175		0.06	-----	
1958	IEC60247	0.019180		0.55	60	
6002	EN60247	0.01505		-0.13	-----	
6015	EN60247	0.0184325		0.43	50	
6031	IEC60247	0.005202		-1.77	55	
6036		0.013897		-0.32	-----	
6053		-----		-----	-----	
6085	IEC60247	0.017587		0.29	55	
6088	IEC60247	0.0097		-1.02	50	
6099	IEC60247	0.018467		0.44	-----	
6124	IEC60247	0.019851		0.67	55	
6141	IEC60247	0.014778		-0.18	60	
6167		-----		-----	-----	
6171	EN60247	0.01432		-0.25	-----	
6278	IEC60247	0.01128		-0.76	-----	
6280	IEC60247	0.020151		0.72	-----	
6322		-----		-----	-----	
6334	IEC60247	0.007835		-1.33	-----	
6367	IEC60247	0.0179		0.34	-----	

lab	method	value	mark	z(targ)	frequency	remarks
6372	IEC60247	0.01768		0.31	50	
6382	IEC60247	0.014983		-0.14	-----	
6385		0.006868		-1.49	60	
6402		-----		-----	-----	
6414	IEC60247	0.018178		0.39	-----	
6422		-----		-----	-----	
6465	IEC61620	0.01416		-0.28	50	
6482	EN60247	0.015070		-0.13	50	
6483	EN60247	0.015745		-0.02	50	
6484	EN60247	0.01453		-0.22	50	
6495	EN60247	0.016411		0.09	-----	
6501		-----		-----	-----	
8001		-----		-----	-----	

normality	OK
n	70
outliers	1
mean (n)	0.015840
st.dev. (n)	0.0036762
R(calc.)	0.010293
st.dev.(EN60247:04)	0.0060209
R(EN60247:04)	0.016859



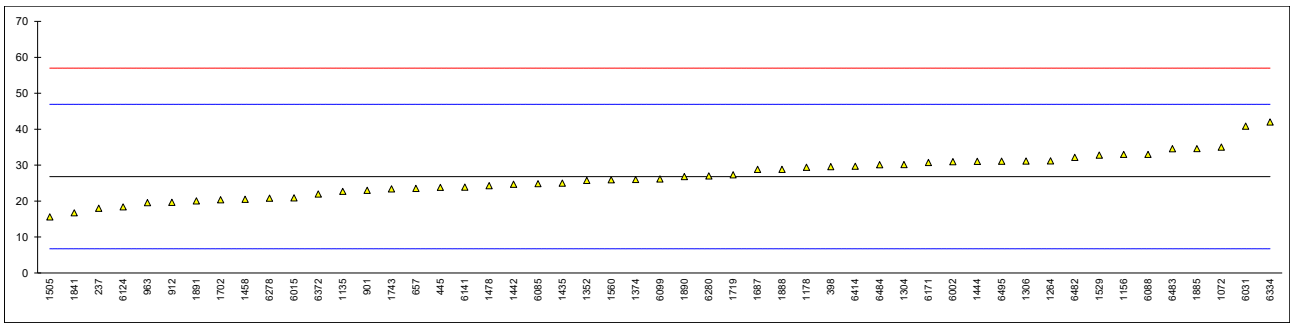


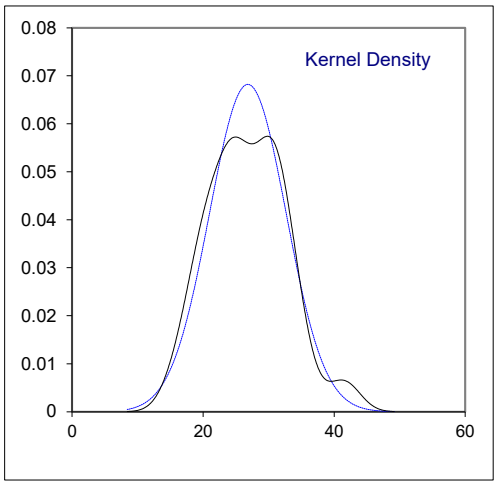
Determination of Specific Resistance at 90 °C on sample #22226; results in GΩm

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	EN60247	18.00		-0.88	
325		-----		-----	
331		-----		-----	
398	EN60247	29.59		0.28	
445	EN60247	23.825		-0.30	
455		-----		-----	
511		-----		-----	
614		-----		-----	
657	IEC60247	23.52		-0.33	
780		-----		-----	
862		-----		-----	
901	EN60247	23		-0.38	
912	EN60247	19.68		-0.71	
963	IEC60247	19.60		-0.72	
974		-----		-----	
975		-----		-----	
1072	EN60247	35.02		0.82	
1135	IEC60247	22.7		-0.41	
1137		-----		-----	
1146		-----		-----	
1156	EN60247	33.0		0.61	
1178	IEC60247	29.4		0.26	
1264	IEC60247	31.185		0.43	
1304	IEC60247	30.14		0.33	
1306		31.14		0.43	
1352	IEC60247	25.75		-0.11	
1374	IEC60247	26		-0.08	
1430		-----		-----	
1435	IEC60247	25.01		-0.18	
1440		-----		-----	
1442	IEC60247	24.70		-0.21	
1444	EN60247	31.07		0.42	
1458	IEC60247	20.5		-0.63	
1461		-----		-----	
1478	IEC60247	24.29		-0.25	
1505	IEC60247	15.59		-1.12	
1513		-----		-----	
1529	IEC60247	32.8		0.59	
1545		-----		-----	
1560	IEC60247	25.9		-0.09	
1624		-----		-----	
1660		-----		-----	
1687	IEC60247	28.86		0.20	
1702	IEC60247	20.36		-0.64	
1719	IEC60247	27.32		0.05	
1743	IEC60247	23.4		-0.34	
1801		-----		-----	
1816		-----		-----	
1841	IEC60247	16.76		-1.00	
1885	IEC60247	34.6		0.77	
1888	IEC60247	28.86		0.20	
1890	IEC60247	26.83		0.00	
1891	IEC60247	20.06		-0.67	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958		-----		-----	
6002	EN60247	30.98		0.41	
6015	EN60247	20.920		-0.59	
6031	IEC60247	40.87		1.40	
6036		-----		-----	
6053		-----		-----	
6085	IEC60247	24.85		-0.20	
6088	IEC60247	33		0.61	
6099	IEC60247	26.15		-0.07	
6124	IEC60247	18.38		-0.84	
6141	IEC60247	23.9		-0.29	
6167		-----		-----	
6171	EN60247	30.73		0.39	
6278	IEC60247	20.83		-0.60	
6280	IEC60247	26.99		0.02	
6322		-----		-----	
6334	IEC60247	42.0		1.51	
6367		-----		-----	

lab	method	value	mark	z(targ)	remarks
6372	IEC60247	21.95		-0.48	
6382		-----		-----	
6385		-----		-----	
6402		-----		-----	
6414	IEC60247	29.69		0.29	
6422		-----		-----	
6465		-----		-----	
6482	EN60247	32.19		0.53	
6483	EN60247	34.58		0.77	
6484	EN60247	30.11		0.33	
6495	EN60247	31.10		0.43	
6501		-----		-----	
8001		-----		-----	

normality	OK
n	51
outliers	0
mean (n)	26.817
st.dev. (n)	5.8490
R(calc.)	16.377
st.dev.(EN60247:04)	10.0565
R(EN60247:04)	28.158



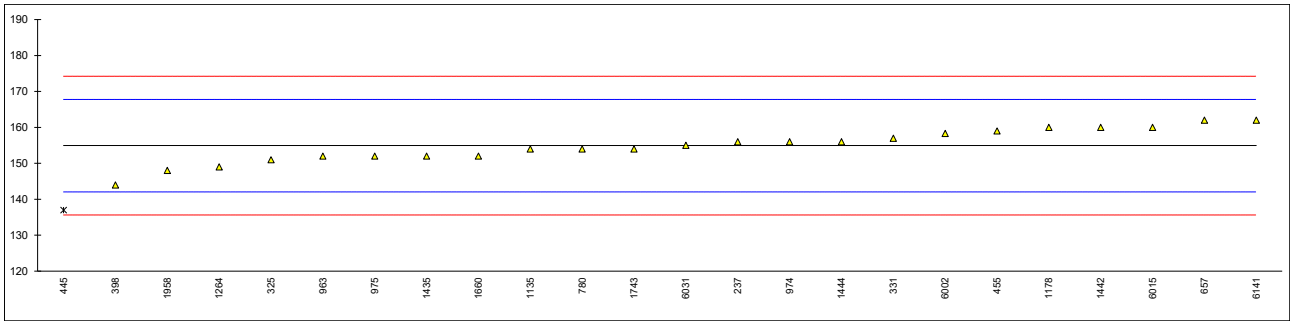


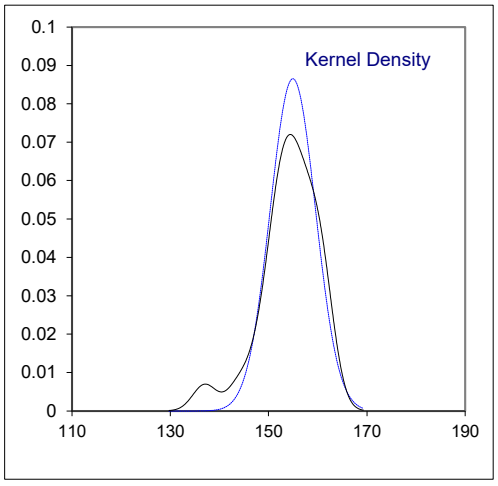
Determination of Flash Point C.O.C. on sample #22226; results in °C

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	D92	156		0.17	
325	D92	151		-0.61	
331	D92	157		0.32	
398	D92	144		-1.70	
445	D92	137	R(0.05)	-2.79	
455	D92	159		0.63	
511		-----		-----	
614		-----		-----	
657	D92	162		1.10	
780	D92	154		-0.14	
862		-----		-----	
901		-----		-----	
912		-----		-----	
963	D92	152.0		-0.46	
974	D92	156		0.17	
975	D92	152.0		-0.46	
1072		-----		-----	
1135	D92	154.0		-0.14	
1137		-----		-----	
1146		-----		-----	
1156		-----		-----	
1178	ISO2592	160.0		0.79	
1264	D92	149		-0.92	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1374		-----		-----	
1430		-----		-----	
1435	D92	152.0		-0.46	
1440		-----		-----	
1442	ISO2592	160		0.79	
1444	D92	156.0		0.17	
1458		-----		-----	
1461		-----		-----	
1478		-----		-----	
1505		-----		-----	
1513		-----		-----	
1529		-----		-----	
1545		-----		-----	
1560		-----		-----	
1624		-----		-----	
1660	D92	152		-0.46	
1687		-----		-----	
1702		-----		-----	
1719		-----		-----	
1743	ISO2592	154		-0.14	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1885		-----		-----	
1888		-----		-----	
1890		-----		-----	
1891		-----		-----	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958	D92	148		-1.08	
6002	ISO2592	158.3		0.52	
6015	ISO2592	160.0		0.79	
6031	D92	155.0		0.01	
6036		-----		-----	
6053		-----		-----	
6085		-----		-----	
6088		-----		-----	
6099		-----		-----	
6124		-----		-----	
6141	D92	162		1.10	
6167		-----		-----	
6171		-----		-----	
6278		-----		-----	
6280		-----		-----	
6322		-----		-----	
6334		-----		-----	
6367		-----		-----	

lab	method	value	mark	z(targ)	remarks
6372		-----		-----	
6382		-----		-----	
6385		-----		-----	
6402		-----		-----	
6414		-----		-----	
6422		-----		-----	
6465		-----		-----	
6482		-----		-----	
6483		-----		-----	
6484		-----		-----	
6495		-----		-----	
6501		-----		-----	
8001		-----		-----	

normality	OK
n	23
outliers	1
mean (n)	154.93
st.dev. (n)	4.611
R(calc.)	12.91
st.dev.(D92:18)	6.429
R(D92:18)	18
compare	
R(ISO2592:17)	18



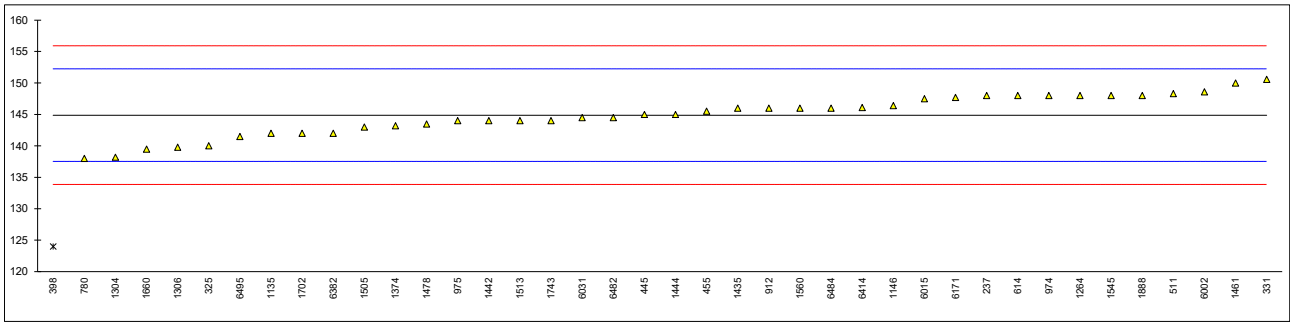


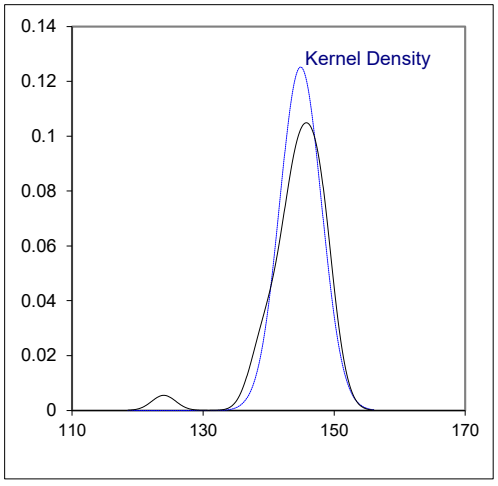
Determination of Flash Point PMcc on sample #22226; results in °C

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	D93-B	148.0		0.85	
325	D93-A	140		-1.33	
331	D93-A	150.6		1.56	
398	ISO2719-B	124	R(0.01)	-5.68	
445	ISO2719-A	145.0		0.03	
455	ISO2719-A	145.5		0.17	
511	D93-B	148.3		0.93	
614	D93-A	148		0.85	
657		-----		-----	
780	ISO2719-A	138.0		-1.87	
862		-----		-----	
901		-----		-----	
912	ISO2719	146		0.30	
963		-----		-----	
974	D93-A	148		0.85	
975	D93-A	144.0		-0.24	
1072		-----		-----	
1135	D93-A	142.0		-0.78	
1137		-----		-----	
1146	D93-B	146.4		0.41	
1156		-----		-----	
1178		-----		-----	
1264	D93-A	148		0.85	
1304	In house	138.2		-1.82	
1306		139.8		-1.38	
1352		-----		-----	
1374	D93-A	143.2		-0.46	
1430		-----		-----	
1435	D93-A	146.0		0.30	
1440		-----		-----	
1442	ISO2719-A	144.00		-0.24	
1444	D93-A	145.0		0.03	
1458		-----		-----	
1461	ISO2719-A	150		1.39	
1478	ISO2719-A	143.5		-0.38	
1505	D3828	143.0		-0.51	
1513	ISO2719-A	144.0		-0.24	
1529		-----		-----	
1545	ISO2719-C	148.0		0.85	
1560	ISO2719-A	146		0.30	
1624		-----		-----	
1660	D93-A	139.5		-1.46	
1687		-----		-----	
1702	ISO2719-A	142.0		-0.78	
1719		-----		-----	
1743	ISO2719-A	144		-0.24	
1801		-----		-----	
1816		-----		-----	
1841		-----		-----	
1885		-----		-----	
1888	D93-B	148		0.85	
1890		-----		-----	
1891		-----		-----	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958		-----		-----	
6002	ISO2719-A	148.6		1.01	
6015	ISO2719-A	147.5		0.71	
6031	D93-A	144.5		-0.10	
6036		-----		-----	
6053		-----		-----	
6085		-----		-----	
6088		-----		-----	
6099		-----		-----	
6124		-----		-----	
6141		-----		-----	
6167		-----		-----	
6171	SR5489	147.7		0.77	
6278		-----		-----	
6280		-----		-----	
6322		-----		-----	
6334		-----		-----	
6367		-----		-----	

lab	method	value	mark	z(targ)	remarks
6372		-----		-----	
6382	ISO2719-A	142		-0.78	
6385		-----		-----	
6402		-----		-----	
6414	D93-A	146.1		0.33	
6422		-----		-----	
6465		-----		-----	
6482	ISO2719-A	144.5		-0.10	
6483		-----		-----	
6484	ISO2719-A	146		0.30	
6495	ISO2719-A	141.5		-0.92	
6501		-----		-----	
8001		-----		-----	

normality	OK
n	39
outliers	1
mean (n)	144.88
st.dev. (n)	3.185
R(calc.)	8.92
st.dev.(ISO2719-A:16)	3.674
R(ISO2719-A:16)	10.29
compare	
R(D93-A:20)	10.29
R(D93-B:20)	10



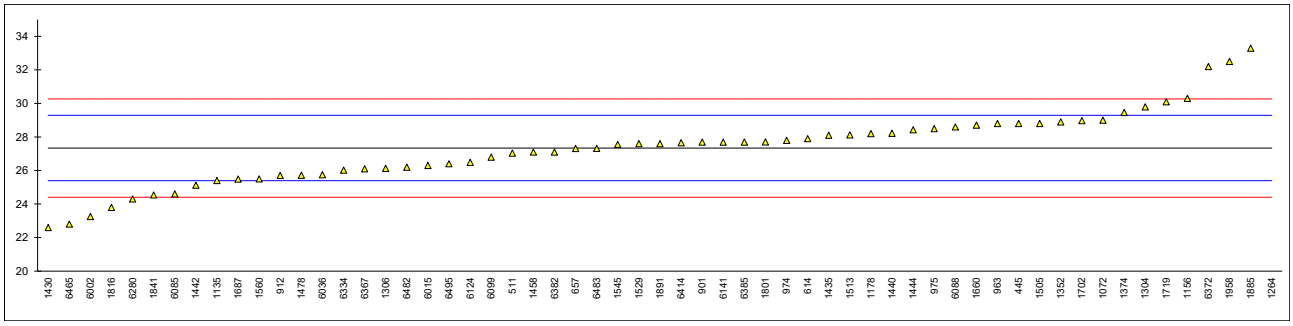


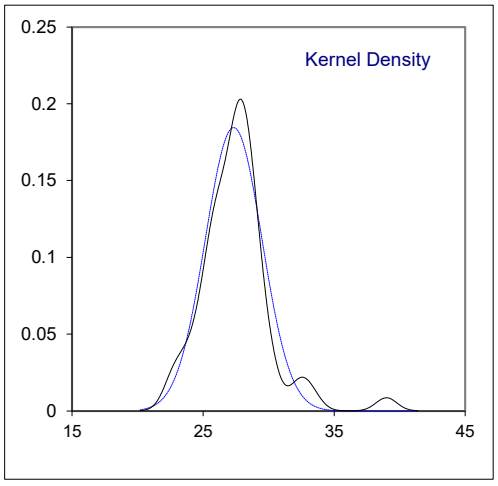
Determination of Interfacial Surface Tension on sample #22226; results in mN/m

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
325		-----		-----	
331		-----		-----	
398		-----		-----	
445	D971	28.8		1.50	
455		-----		-----	
511	D971	27.04		-0.31	
614	D971	27.9		0.58	
657	D971	27.308		-0.03	
780		-----		-----	
862		-----		-----	
901	D971	27.7		0.37	
912	D971	25.7		-1.68	
963	D971	28.8		1.50	
974	D971	27.80		0.47	
975	D971	28.5		1.19	
1072	D971	29.00		1.70	
1135	D971	25.4		-1.98	
1137		-----		-----	
1146		-----		-----	
1156	D971	30.3		3.03	
1178	D971	28.20		0.88	
1264	D971	39	R(0.01)	11.94	
1304	In house	29.80		2.52	
1306	D971	26.13		-1.24	
1352	D971	28.9		1.60	
1374	D971	29.46		2.17	
1430	D971	22.6		-4.85	
1435	D971	28.1		0.78	
1440	D971	28.22		0.90	
1442	IEC62961	25.12		-2.27	
1444	D971	28.43		1.12	
1458	D971	27.1		-0.24	
1461		-----		-----	
1478	D971	25.72		-1.66	
1505	D971	28.8		1.50	
1513	D971	28.12		0.80	
1529	D971	27.6		0.27	
1545	D971	27.56		0.23	
1560	D971	25.5		-1.88	
1624		-----		-----	
1660	D971	28.7	C	1.40	first reported 48.7
1687	D971	25.49		-1.89	
1702	D971	28.98		1.68	
1719	D2285	30.1		2.83	
1743		-----		-----	
1801	D971	27.71		0.38	
1816	EN14210	23.8		-3.62	
1841	D971	24.54		-2.87	
1885	D971	33.3		6.11	
1888		-----		-----	
1890		-----		-----	
1891	D971	27.6		0.27	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958	D971	32.5		5.29	
6002	IEC62961	23.25		-4.19	
6015	D971	26.300		-1.06	
6031		-----		-----	
6036	IEC62961	25.7517		-1.62	
6053		-----		-----	
6085	D971	24.599		-2.81	
6088	ISO6295	28.6		1.29	
6099	ISO6295	26.8		-0.55	
6124	D971	26.48		-0.88	
6141	D971	27.7		0.37	
6167		-----		-----	
6171		-----		-----	
6278		-----		-----	
6280	D971	24.3		-3.11	
6322		-----		-----	
6334	D971	26.02		-1.35	
6367	D971	26.1	C	-1.27	first reported 35

lab	method	value	mark	z(targ)	remarks
6372	IEC62961	32.2		4.98	
6382	ISO6295	27.1		-0.24	
6385	D971	27.7		0.37	
6402		-----		-----	
6414	D971	27.65		0.32	
6422		-----		-----	
6465	ISO6295	22.8		-4.65	
6482	D971	26.2		-1.17	
6483	D971	27.32		-0.02	
6484		-----		-----	
6495	D971	26.4		-0.96	
6501		-----		-----	
8001		-----		-----	

normality	OK
n	58
outliers	1
mean (n)	27.338
st.dev. (n)	2.1622
R(calc.)	6.054
st.dev.(D971:20)	0.9764
R(D971:20)	2.734
compare	
R(IEC62961:18)	10



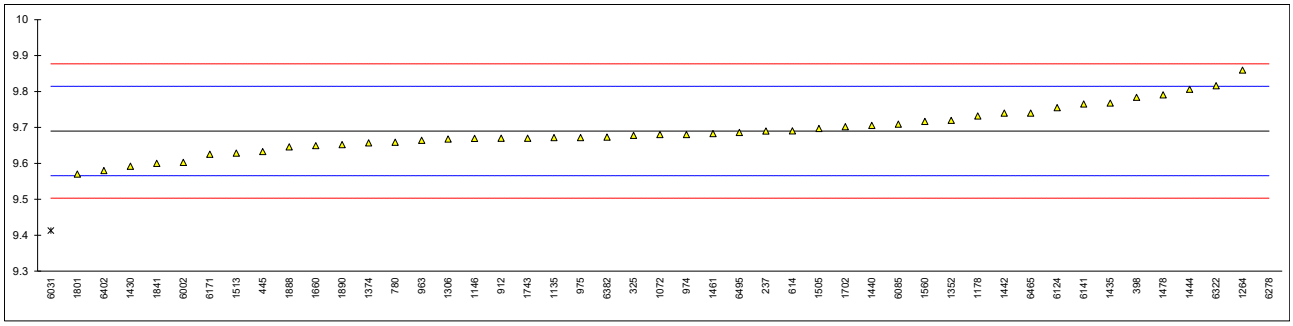


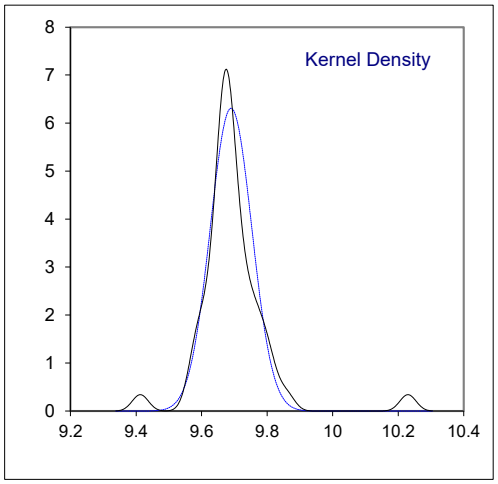
Determination of Kinematic Viscosity at 40 °C on sample #22226; results in mm²/s

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	D445	9.690		0.00	
325	D445	9.678		-0.19	
331		-----		-----	
398	D445	9.7838		1.51	
445	D445	9.633		-0.91	
455		-----		-----	
511		-----		-----	
614	D7042	9.6903		0.01	
657		-----		-----	
780	D445	9.6588		-0.50	
862		-----		-----	
901		-----		-----	
912	D445	9.67		-0.32	
963	D445	9.664		-0.42	
974	D445	9.680		-0.16	
975	D445	9.672		-0.29	
1072	ISO3104	9.68		-0.16	
1135	D445	9.672		-0.29	
1137		-----		-----	
1146	D445	9.6695		-0.33	
1156		-----		-----	
1178	D7042	9.7320		0.67	
1264	D7042	9.8597		2.72	
1304		-----		-----	
1306	D445	9.668		-0.35	
1352	D7042	9.7197		0.48	
1374	D445	9.657		-0.53	
1430	D445	9.592		-1.57	
1435	D7042	9.7679		1.25	
1440	D445	9.70551		0.25	
1442	D7042	9.74		0.80	
1444	D445	9.806		1.86	
1458		-----		-----	
1461	ISO3104	9.6829		-0.11	
1478	D7042	9.7907		1.62	
1505	D7042	9.6969		0.11	
1513	ISO3104	9.6286		-0.99	
1529		-----		-----	
1545		-----		-----	
1560	ISO3104	9.717		0.43	
1624		-----		-----	
1660	D7042	9.6495		-0.65	
1687		-----		-----	
1702	D7042	9.7018		0.19	
1719		-----		-----	
1743	D7279 corr. to D445	9.67		-0.32	
1801	ISO3104	9.5705		-1.92	
1816		-----		-----	
1841	D445	9.6		-1.44	
1885		-----		-----	
1888	D445	9.646		-0.71	
1890	ISO3104	9.6522		-0.61	
1891		-----		-----	
1923		-----		-----	
1924		-----		-----	
1925		-----		-----	
1958		-----		-----	
6002	ISO3104	9.603		-1.40	
6015		-----		-----	
6031	D445	9.413	C,R(0.01)	-4.45	first reported 9.562
6036		-----		-----	
6053		-----		-----	
6085	D7042	9.7096		0.32	
6088		-----		-----	
6099		-----		-----	
6124	D7042	9.75497	C	1.04	first reported 9.8356
6141	D445	9.7655		1.21	
6167		-----		-----	
6171	ISO3104	9.62545		-1.04	
6278	D445	10.23	C,R(0.01)	8.67	first reported 9.5213
6280		-----		-----	
6322	D7042	9.816		2.02	
6334		-----		-----	
6367		-----		-----	

lab	method	value	mark	z(targ)	remarks
6372		-----		-----	
6382	DIN51562-1	9.673		-0.27	
6385		-----		-----	
6402		9.58		-1.77	
6414		-----		-----	
6422		-----		-----	
6465	ISO3104	9.74	C	0.80	first reported 10.45
6482		-----		-----	
6483		-----		-----	
6484		-----		-----	
6495	ISO3104	9.6861		-0.06	
6501		-----		-----	
8001		-----		-----	

normality	OK
n	45
outliers	2
mean (n)	9.6900
st.dev. (n)	0.06322
R(calc.)	0.1770
st.dev.(iis memo 1401)	0.06229
R(iis memo 1401)	0.1744
compare	
R(D445:21e1)	0.0297
R(ISO3104-A:20)	0.1182
R(D7042:21a)	0.3666



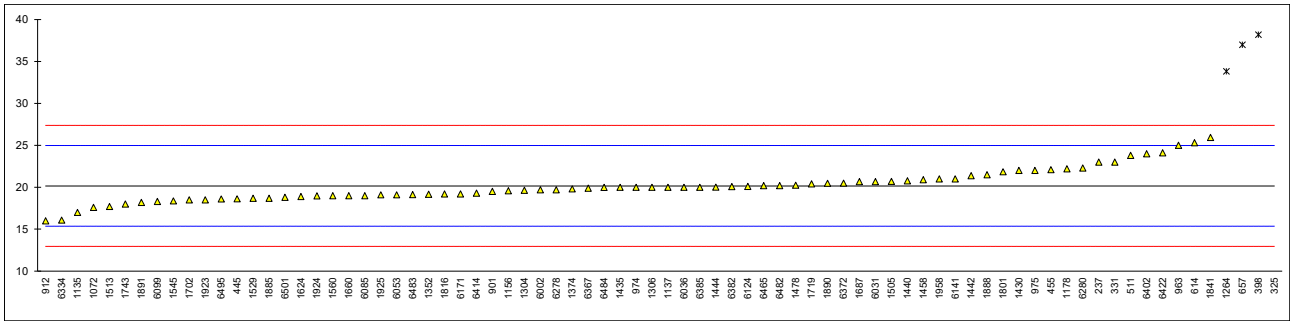


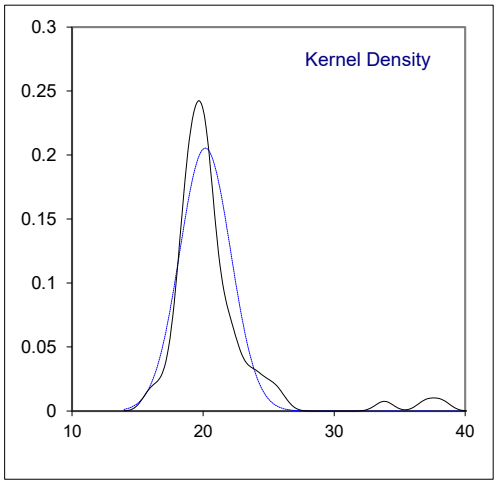
Determination of Water on sample #22226; results in mg/kg

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237	D6304-C:16e1	23	C	1.18	first reported 30
325	D6304-C:20	66	R(0.01)	19.06	
331	D6304	23	C	1.18	first reported 29
398	D6304-C	38.2	R(0.01)	7.50	
445	IEC60814	18.625		-0.64	
455	D1533	22.1		0.81	
511	D1533	23.8		1.51	
614	IEC60814	25.3		2.14	
657	D6304-A:20	37	C,R(0.01)	7.00	first reported 29.73
780	D6304-B	<30		-----	
862		-----		-----	
901	D1533	19.5		-0.28	
912	IS13567	16		-1.73	
963	D1533	25.0		2.01	
974	D1533	20		-0.07	
975	D1533	22.0		0.76	
1072	EN60814	17.6		-1.07	
1135	IEC60814	17		-1.31	
1137	ISO10337	20		-0.07	
1146	D6304-B:20	<100		-----	
1156	EN60814	19.6		-0.23	
1178	IEC60814	22.2		0.85	
1264	D1533	33.83	R(0.01)	5.68	
1304	In house	19.65		-0.21	
1306	D1533	20		-0.07	
1352	IEC60814	19.17		-0.41	
1374	IEC60814	19.8		-0.15	
1430		22		0.76	
1435	IEC60814	20		-0.07	
1440	EN60814	20.77		0.25	
1442	IEC60814	21.38		0.51	
1444	D1533	20.01493333		-0.06	
1458	IEC60814	20.9		0.31	
1461		-----		-----	
1478	IEC60814	20.25		0.04	
1505	D1533	20.7		0.22	
1513	IEC60814	17.7		-1.02	
1529	IEC60814	18.7		-0.61	
1545	IEC60814	18.37		-0.75	
1560	IEC60814	19		-0.48	
1624	IEC60814	18.9		-0.52	
1660	IEC60814	19		-0.48	
1687	IEC60814	20.669		0.21	
1702	IEC60814	18.5		-0.69	
1719	IEC60814	20.4		0.10	
1743	IEC60814	18		-0.90	
1801	EN60814	21.85		0.70	
1816	EN60814	19.2		-0.40	
1841	IEC60814	25.945		2.40	
1885	D1533	18.7		-0.61	
1888	EN60814	21.5	C	0.56	first reported 25.11
1890	IEC60814	20.47		0.13	
1891	IEC60814	18.2		-0.82	
1923	EN60814	18.5		-0.69	
1924	EN60814	18.98		-0.49	
1925	EN60814	19.1		-0.44	
1958	IEC60814	21		0.35	
6002	EN60814	19.7		-0.19	
6015		-----		-----	
6031	IEC60814	20.67		0.21	
6036	EN60814	20		-0.07	
6053	IEC60814	19.10		-0.44	
6085	D6304-C:16e1	19.0		-0.48	
6088		-----		-----	
6099	IEC60814	18.3	C	-0.77	first reported 12.2
6124	IEC60814	20.1		-0.03	
6141	D1533	21		0.35	
6167		-----		-----	
6171	EN60814	19.2		-0.40	
6278	D1533	19.700		-0.19	
6280	IEC60814	22.29		0.88	
6322		-----		-----	
6334	IEC60814Mod.	16.09		-1.69	
6367	IEC60814	19.9		-0.11	

lab	method	value	mark	z(targ)	remarks
6372	IEC60814	20.5		0.14	
6382	IEC60814	20.077		-0.04	
6385	D1533	20		-0.07	
6402		24.0		1.60	
6414	IEC60814	19.3		-0.36	
6422	IEC60814	24.11	C	1.64	first reported 28.55
6465	IEC60814	20.2		0.02	
6482	EN60814	20.2		0.02	
6483	EN60814	19.14		-0.42	
6484	EN60814	19.98		-0.08	
6495	EN60814	18.6		-0.65	
6501	IEC60814	18.8		-0.57	
8001		-----		-----	

normality	suspect
n	74
outliers	4
mean (n)	20.162
st.dev. (n)	1.9430
R(calc.)	5.440
st.dev.(EN60814:98)	2.4055
R(EN60814:98)	6.735
compare	
R(D1533:20)	14

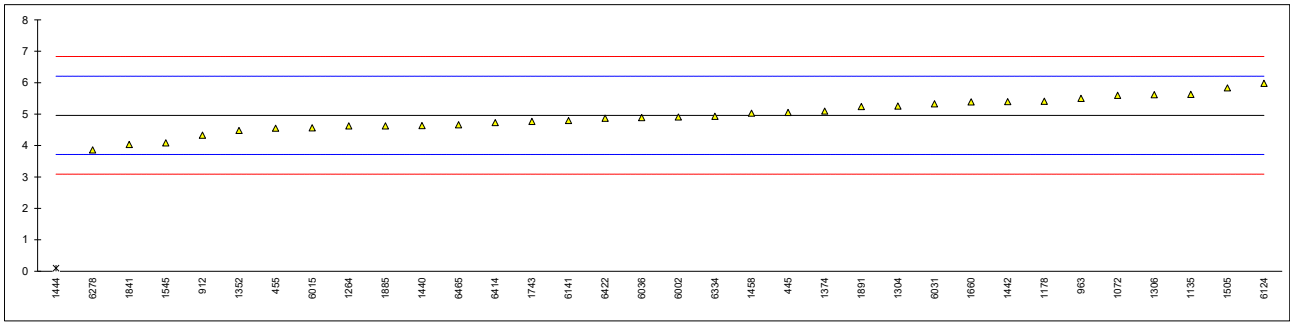


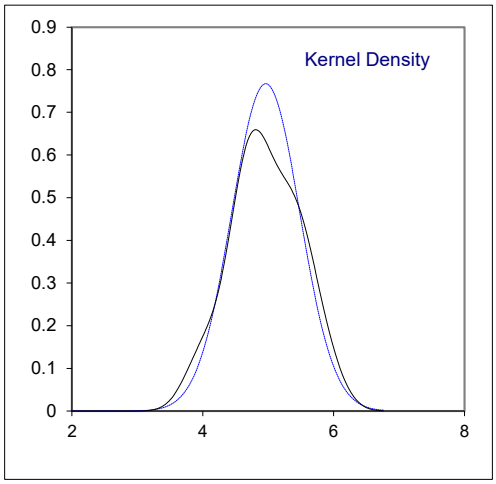


Determination of Total Furanic Compounds on sample #22227; results in mg/kg

lab	method	value	mark	z(targ)	remarks
331		-----		-----	
445	IEC61198	5.05351		0.15	
455	EN61198	4.55		-0.66	
614		-----		-----	
780	RD 34.43.206	<0.1		<-7.79	possibly a false negative test result?
862		-----		-----	
912	IEC61198	4.331		-1.01	
963	D5837	5.50		0.86	
975		-----		-----	
1072	EN61198	5.601		1.02	
1135	IEC61198	5.63		1.07	
1137		-----		-----	
1156		-----		-----	
1178	IEC61198	5.4127		0.72	
1264	D5837	4.626		-0.54	
1304	In house	5.259		0.48	
1306	D5837	5.62		1.05	
1352	IEC61198	4.4824		-0.77	
1374	D5837	5.097		0.22	
1430		-----		-----	
1435		-----		-----	
1440	EN61198	4.635		-0.52	
1442	IEC61198	5.40	C	0.70	first reported <0.05
1444	D5837	0.266041	R(0.01)	-7.53	
1458	IEC61198	5.03	C	0.11	first reported <0.01
1478		-----		-----	
1505	D5837	5.836	C	1.40	first reported 9.681
1513		-----		-----	
1529		-----	W	-----	test result withdrawn, reported 0
1545	IEC61198	4.0846		-1.41	
1560		-----	W	-----	test result withdrawn, reported not detected
1660	IEC61198	5.39		0.69	
1702		-----		-----	
1743	IEC61198	4.77		-0.31	
1801		-----		-----	
1841	IEC61198	4.03296		-1.49	
1872		-----		-----	
1885	D5837	4.627		-0.54	
1888		-----		-----	
1891	IEC61198	5.245		0.45	
1958		-----		-----	
6002	EN61198	4.91		-0.08	
6015	EN61198	4.5675		-0.63	
6031	IEC61198	5.330		0.59	
6036		4.889		-0.12	
6085		-----		-----	
6124	IEC61198	5.9810		1.63	
6141	D5837	4.797		-0.26	
6278	D5837	3.862		-1.76	
6334	IEC61198	4.932		-0.05	
6402		-----		-----	
6414	D5837	4.73		-0.37	
6422	IEC61198	4.87		-0.15	
6465	IEC61198	4.66		-0.48	
8001		-----		-----	

normality	OK
n	33
outliers	1
mean (n)	4.9619
st.dev. (n)	0.51984
R(calc.)	1.4555
st.dev.(Horwitz)	0.62382
R(Horwitz)	1.7467
compare	
R(IEC61198:93)	0.4962

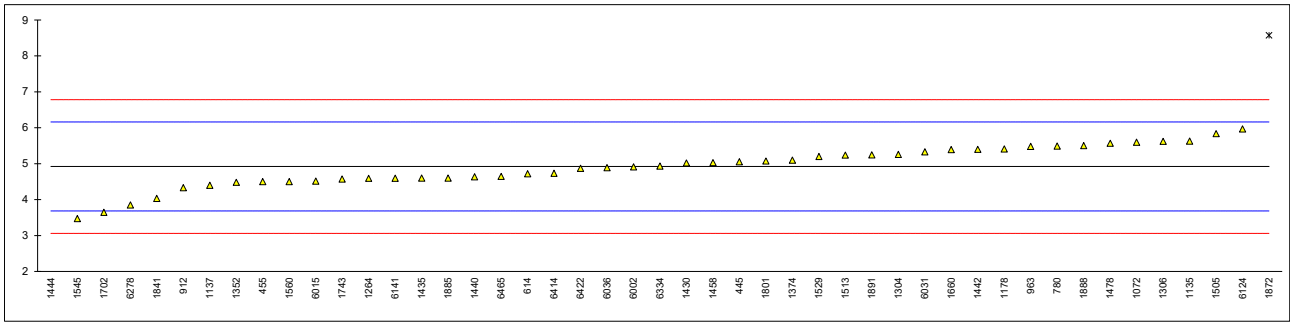

8
7
6
5
4
3
2
1
0
1444
6278
1841
1545
912
1352
455
6015
1264
1885
1440
6465
6414
1743
6141
6422
6036
6002
6334
1458
445
1374
1891
1304
6031
1660
1442
1178
963
1072
1306
1135
1505
6124

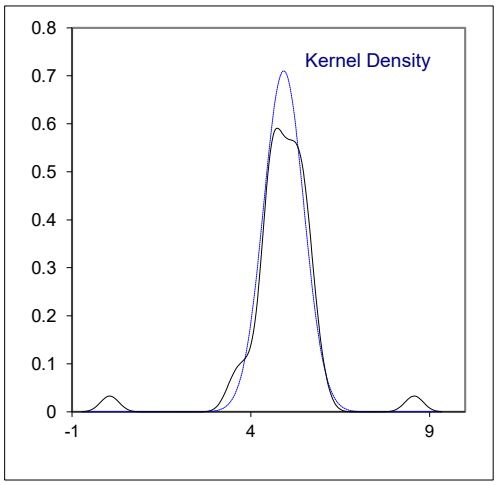

Kernel Density
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2
4
6
8

Determination of 2-Furfural on sample #22227; results in mg/kg

lab	method	value	mark	z(targ)	remarks
331		-----		-----	
445	IEC61198	5.05351		0.21	
455	EN61198	4.5		-0.68	
614	IEC61198	4.72		-0.32	
780	RD 34.43.206	5.49		0.92	
862		-----		-----	
912	IEC61198	4.331		-0.95	
963	D5837	5.48		0.90	
975		-----		-----	
1072	EN61198	5.596		1.09	
1135	IEC61198	5.63		1.14	
1137	D5837	4.398		-0.84	
1156		-----		-----	
1178	IEC61198	5.4127		0.79	
1264	D5837	4.592		-0.53	
1304	In house	5.259		0.55	
1306	D5837	5.6215		1.13	
1352	IEC61198	4.4824		-0.71	
1374	D5837	5.097		0.28	
1430	EN61198	5.02		0.16	
1435	IEC61198	4.60		-0.52	
1440	EN61198	4.635		-0.46	
1442	IEC61198	5.40	C	0.77	first reported <0.05
1444	D5837	0.054703	R(0.01)	-7.86	
1458	IEC61198	5.03		0.18	
1478	IEC61198	5.566		1.04	
1505	D5837	5.836		1.48	
1513	IEC61198	5.239		0.51	
1529	IEC61198	5.2		0.45	
1545	IEC61198	3.4716		-2.34	
1560	IEC61198	4.501		-0.68	
1660	IEC61198	5.39		0.76	
1702	IEC61198	3.646		-2.06	
1743	IEC61198	4.57		-0.57	
1801	EN61198	5.07195		0.24	
1841	IEC61198	4.03296		-1.43	
1872	EN61198	8.57	C,R(0.01)	5.89	first reported 6.82
1885	D5837	4.601		-0.52	
1888		5.50		0.93	
1891	IEC61198	5.245		0.52	
1958		-----		-----	
6002	EN61198	4.91		-0.02	
6015	EN61198	4.5136		-0.66	
6031	IEC61198	5.330		0.66	
6036		4.889		-0.05	
6085		-----		-----	
6124	IEC61198	5.9646		1.68	
6141	D5837	4.5971		-0.52	
6278	D5837	3.853		-1.72	
6334	IEC61198	4.932		0.02	
6402		-----		-----	
6414	D5837	4.73		-0.31	
6422	IEC61198	4.87		-0.08	
6465	IEC61198	4.6446		-0.45	
8001		-----		-----	

normality	OK
n	45
outliers	2
mean (n)	4.9212
st.dev. (n)	0.56170
R(calc.)	1.5728
st.dev.(Horwitz)	0.61947
R(Horwitz)	1.7345
compare	
R(IEC61198:93)	0.4921


9
8
7
6
5
4
3
2
1444 1545 1702 6278 1841 912 1137 1352 455 1560 6015 1743 1264 6141 1435 1885 1440 6465 614 6414 6422 6036 6002 6334 1430 1458 445 1801 1374 1529 1513 1891 1304 6031 1660 1442 1178 963 780 1888 1478 1072 1306 1135 1505 6124 1872


Kernel Density
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-1
4
9

APPENDIX 2

Other reported Furanics in sample #22227; results in mg/kg

lab	2-Acetyl Furan		2-Furfurylalcohol		5-Hydroxy Methyl-2-Furfural		5-Methyl-2-Furfural	
331	-----		-----		-----		-----	
445	<0.05		<0.05		<0.05		<0.05	
455	0.05		0.01		0.01		0.01	
614	0.02		<0.01		<0.01		0.02	
780	<0.1		<0.1		<0.1		<0.1	
862	-----		-----		-----		-----	
912	<0.050		<0.050		<0.050		<0.050	
963	0.01		<0.01		0.01		<0.01	
975	-----		-----		-----		-----	
1072	0.005		<0,01		<0,01		<0,01	
1135	0		0		0		0	
1137	-----		-----		-----		-----	
1156	-----		-----		-----		-----	
1178	0.0001		0.0001		0.0001		0.0001	
1264	0.002		0.001		0.018		0.013	
1304	0.000		0.000		0.000		0.000	
1306	0		0		0		0	
1352	-----		-----		-----		-----	
1374	0		0		0		<0.01	
1430	<0.01		<0.04		<0.02		<0.03	
1435	<0.03		<0.03		<0.03		<0.03	
1440	0.000		0.000		0.000		0.000	
1442	<0.05	C	<0,05		<0,05		<0,05	
1444	0.012837		0.198501		Not Detected		Not Detected	
1458	<0.01		<0.01		<0.01		<0.01	C
1478	0.006		0.000	C	0.000		0.000	
1505	<0.01	C	<0.01	C	<0.01	C	<0.01	C
1513	<0,05		<0,05		<0,05		<0,05	
1529	0		0		0		0	
1545	0.0045		0.0000		0.5544		0.0541	
1560	Not Detected		Not Detected		Not Detected		Not Detected	
1660	0.00		0.00		0.00		0.00	
1702	Not Detected		Not Detected		Not Detected		Not Detected	
1743	<0.05		<0.05		<0.05		<0.05	
1801	-----		-----		-----		-----	
1841	0		0		0		0	
1872	<0.05		<0.05		<0.05		<0.05	
1885	0.009		<0.001		0.011		0.006	
1888	<0.05		<0.05		<0.05		<0.05	
1891	<0.01		<0.01		<0.01		<0.01	
1958	-----		-----		-----		-----	
6002	<0.01		<0.01		<0.01		<0.01	
6015	0.0079		0.0057		0.0333		0.0072	
6031	Not Detected		Not Detected		Not Detected		Not Detected	
6036	0		0		0		0	
6085	-----		-----		-----		-----	
6124	0.0072		0.0026		Not detected		0.0065	
6141	0.017		0.0036		0.184	C	0	
6278	0.001		0.000		0.003		0.005	
6334	<0.05		<0.05		<0.05		<0.05	
6402	-----		-----		-----		-----	
6414	0.0		0.0		0.0		0.0	
6422	<0.05		<0.05		<0.05		<0.05	
6465	0.0054		0.0064		0.0104		0.0052	
8001	-----		-----		-----		-----	

Lab 1442: first reported 5.40
Lab 1458: first reported 5.03
Lab 1478: first reported 2.277
Lab 1505: first reported 1.337, 1.108, 0.701 and 0.699 respectively
Lab 6141: first reported 0.1263

APPENDIX 3

Number of participants per country

7 labs in	AUSTRALIA
4 labs in	BELGIUM
1 lab in	BOTSWANA
5 labs in	BULGARIA
1 lab in	CANADA
1 lab in	CHINA, People's Republic
1 lab in	CROATIA
4 labs in	FRANCE
5 labs in	GERMANY
2 labs in	GREECE
1 lab in	INDIA
1 lab in	IRELAND
3 labs in	ITALY
1 lab in	KOREA, Republic of
1 lab in	KUWAIT
2 labs in	MALAYSIA
2 labs in	MOROCCO
3 labs in	NETHERLANDS
1 lab in	NEW ZEALAND
1 lab in	NIGERIA
1 lab in	NORWAY
1 lab in	PAKISTAN
1 lab in	PERU
1 lab in	PHILIPPINES
2 labs in	POLAND
1 lab in	PORTUGAL
1 lab in	QATAR
4 labs in	ROMANIA
1 lab in	RUSSIAN FEDERATION
3 labs in	SAUDI ARABIA
2 labs in	SINGAPORE
1 lab in	SLOVENIA
1 lab in	SOUTH AFRICA
9 labs in	SPAIN
2 labs in	SWITZERLAND
2 labs in	TURKEY
4 labs in	UNITED ARAB EMIRATES
3 labs in	UNITED KINGDOM
1 lab in	UNITED STATES OF AMERICA
1 lab in	URUGUAY

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	= 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

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