Institute for
Interlaboratory Studies

Results of Proficiency Test
Biodiesel B100 (100% FAME)
April 2023

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: Mrs. E.R. Montenij-Bos
Correctors: ing. R.J. Starink & ing. A. Ouwerkerk
Approved by: ing. A.S. Noordman-de Neef

Report: iis23G03

July 2023

CONTENTS

1 INTRODUCTION

Since 2008 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Fatty Acid Methyl Esters (FAME) used as Biodiesel B100 in accordance with the latest version of ASTM D6751 and EN14214+A2 twice a year. During the annual proficiency testing program 2022/2023 it was decided to continue the round robin for the analysis of Biodiesel B100.

In this interlaboratory study registered for participation:
- 52 laboratories in 22 countries for regular analyzes in Biodiesel B100 iis23G03
- 27 laboratories in 15 countries on the determination of Metals in Biodiesel iis23G03M
- 32 laboratories in 17 countries on the determination of Total Contamination iis23G03TC
- 22 laboratories in 10 countries on the Cold Soak Test in Biodiesel B100 iis23G03CST

In total 60 laboratories in 24 countries registered for participation in one or more proficiency tests, see appendix 2 for the number of participants per country. In this report the results of the Biodiesel B100 proficiency tests 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.
In this proficiency test the participants received, depending on the registration, from one up to four different samples of Biodiesel B100, see table below.

Sample ID	PT ID	Quantity	Purpose
#23060	iis23G03	1x 1 L + 1x 0.5 L	Regular analyzes
#23061	iis23G03M	1x 0.1 L	Metal analyzes
#23062	iis23G03TC	1x 1 L	Total Contamination
#23063	iis23G03CST	1x 0.5 L	Cold Soak Test

Table 1: samples used in Biodiesel B100 iis23G03

Participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

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

2.2 PROTOCOL

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

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

For the preparation of the sample for the regular analyzes in Biodiesel B100 a batch of approximately 200 liters of Rapeseed Methyl Ester (RME) was obtained from a local supplier. After homogenization 80 amber glass bottles of 1 L and 80 amber glass bottles of 0.5 L were filled for the regular round and labelled #23060.
The homogeneity of the subsamples was checked by the determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/m^3
sample #23060-1	883.46
sample #23060-2	883.46
sample #23060-3	883.46
sample #23060-4	883.47
sample #23060-5	883.49
sample #23060-6	883.46
sample #23060-7	883.47
sample #23060-8	883.47

Table 2: homogeneity test results of subsamples #23060

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

	Density at 15 °C in kg/m^3
r (observed)	0.03
reference test method	ISO12185:96
0.3 x R (reference test method)	0.15

Table 3: evaluation of the repeatability of subsamples #23060

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

For the preparation of the sample for the analyzes of Metals in Biodiesel B100 a batch of approximately 5 L biodiesel was selected and spiked with Phosphorus, Sodium, Potassium and Calcium. After homogenization 50 PE bottles of 100 mL were filled and labelled #23061. The homogeneity of the subsamples was checked by the determination of Sodium and Potassium in accordance with EN14538 on 8 stratified randomly selected subsamples.

	Sodium in mg/kg	Potassium in mg/kg
sample #23061-1	11.86	11.84
sample #23061-2	11.73	11.47
sample #23061-3	11.43	11.62
sample #23061-4	11.38	11.69
sample #23061-5	11.79	11.79
sample #23061-6	11.57	11.55
sample #23061-7	12.00	11.79
sample #23061-8	11.45	11.43

Table 4: homogeneity test results of subsamples #23061

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

	Sodium in mg/kg	Potassium in mg/kg
r (observed)	0.64	0.43
reference test method	EN14107:03	EN14108:03
0.3 x R (reference test method)	1.33	1.92

Table 5: evaluation of the repeatabilities of subsamples #23061

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

For the preparation of the sample for the determination of Total Contamination in Biodiesel B100 a batch of approximately 100 liters of Biodiesel B100 was obtained by a local supplier. A defined volume of freshly prepared and well shaken dust suspension of Arizona Dust material in a lubricating oil was added to empty amber glass bottle of 1 L by means of a calibrated pipette. The addition was checked by weighing the bottle before and after the addition. In total 50 bottles were prepared and subsequently filled up with 1 L Biodiesel B100 and homogenized. The subsamples were labelled #23062. A random subsample and a blank B100 sample from the batch were taken to check the Total Contamination.

For the preparation of the sample for the Cold Soak Test in Biodiesel B100 a batch of approximately 60 liters of Rapeseed Methyl Ester (RME) was obtained from a local supplier. After homogenization 40 amber glass bottles of 0.5 L were filled and labelled #23063.
The homogeneity of the subsamples was checked by the determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/m^3
sample #23063-1	883.81
sample #23063-2	883.81
sample #23063-3	883.81
sample #23063-4	883.81
sample#23063- 5	883.81
sample #23063-6	883.82
sample #23063-7	883.81
sample #23063-8	883.81

Table 6: homogeneity test results of subsamples #23063

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

	Density at 15 °C in kg/m^3
r (observed)	0.01
reference test method	ISO12185:96
0.3 x R (reference test method)	0.15

Table 7: evaluation of the repeatability of subsamples #23063

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 March 29, 2023. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of the Biodiesel B100 packed in amber glass bottles and PE bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The requested analyzes for the Biodiesel B100 samples are in accordance with the requirements of EN14214:12+A2:19 and/or ASTM D6751:20a.

Parameter	EN14214:12+A2:19	Parameter	ASTM D6751:20a
Acid Value	EN14104	Acid Number	ASTM D664
Calorific Value	DIN51900		
		Carb. Res. 100% FAME	ASTM D4530
CFPP	EN116		
Cloud Point	EN23015	Cloud Point	ASTM D2500
Copper Strip Corrosion	ISO2160	Copper Strip Corrosion	ASTM D130
Density at 15 °C	ISO12185		
		Distillation	ASTM D1160
Flash Point (Recc)	ISO3679		
Flash Point (PMcc)	ISO2719	Flash Point	ASTM D93
Iodine Value	EN14111		
Kin. Viscosity at 40 °C	ISO3104	Kin. Viscosity at 40 °C	ASTM D445
Oxidation Stability	EN14112	Oxidation Stability	EN15751
Sulfated Ash	ISO3987	Sulfated Ash	ASTM D874
Sulfur	ISO20846	Sulfur	ASTM D5453
Water	ISO12937	Water and Sediment	ASTM D2709
Cetane Number	EN5165	Cetane Number	ASTM D613
		Derived Cetane Number	ASTM D7668
Calcium + Magnesium	EN14538	Calcium + Magnesium	EN14538
Phosphorus	EN14107	Phosphorus	ASTM D4951
Potassium + Sodium	EN14108/14109	Potassium + Sodium	EN14538
Polyunsaturated esters	EN15779		
Methanol	EN14110	Methanol	EN14110
mono-, di-, tri-Glycerides	EN14105	Monoglyceride content	ASTM D6584
Free + Total Glycerol	EN14105	Free + Total Glycerol	ASTM D6584
Total ester content	EN14103		
Linolenic Acid	EN14103		
Total Contamination	EN12662		
Cold Soak Filterability			ASTM D7501

Table 8: requirements and test methods acc. to specifications EN14214:12+A2:19 and/or ASTM D6751:20a.

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

To get comparable test results, a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods (when applicable) that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/.

The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyzes). Additional or corrected test results are used for data analysis and the original test results are placed under 'Remarks' in the result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

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

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

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used.

Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

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

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

3.2 GRAPHICS

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

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

3.3 Z-SCORES

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

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

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

The z-scores were calculated according to:

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

The $z_{(target)}$ scores are listed in the 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 problems were encountered with the dispatch of the samples.
For the regular Biodiesel PT: four participants did not report any test results. Five other participants reported test results after the final reporting date.
For the Metals in Biodiesel PT: five participants did not report any test results. Three other participants reported test results after the final reporting date.
For the Total Contamination PT: seven participants did not report any test results. Two other participants reported test results after the final reporting date.
For the Cold Soak Test PT: two participants did not report any test results. Four other participants reported test results after the final reporting date.
Not all participants were able to report all tests requested.

In total 57 participants reported 748 numerical test results. Observed were 34 outlying test results, which is 4.5%. 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 3.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D4530) and an added designation for the year that the test method was adopted or revised (e.g. D4530:15). When a method has been reapproved an “R” will be added and the year of approval (e.g. D4530:15R20).

sample #23060

Acid Value: 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 EN14104:21 and EN14214:12+A2:19.

Total Acid Number: 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 method B of ASTM D664:18e2.

Cloud Point: 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 ASTM D2500:23 and EN14214:12+A2:19.

Cold Filter Plugging Point: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of EN116:15 and EN14214:12+A2:19.

Carbon Residue on 100% sample: This determination may not be problematic. All reported test results were near or below the application range of ASTM D4530:15R20 or ISO10370:14. Therefore, no z-scores are calculated.

Copper Corrosion 3 hrs. at 50 °C: This determination was not problematic. All reporting participants agreed on a test result of 1(1a/1b).

Density at 15 °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 ISO12185:96.

Flash Point PMcc: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not agreement with the requirements of ASTM D93-C:20 or ISO2719-C:16.

Flash Point recc: Two test results were reported. Therefore, no z-scores are calculated.

Iodine Value: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN14111:22.

Kinematic Viscosity at 40 °C: This determination was problematic depending on the test method used. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO3104-A:20 but is in agreement with the requirements of ASTM D445:21a.

Oxidation Stability: 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 EN15751:14 and EN14112:20.

Pour Point: 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 ISO3016:19.

Sulfated Ash: This determination may not be problematic. Almost all reported test results were near or below the application range of ASTM D874:23. Therefore, no z-scores are calculated.

Sulfur: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO20846:19 and ASTM D5453:19a.

Water: 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 ISO12937:00 and ASTM D6304-A:20.

Water and Sediment: This determination may not be problematic. All reported test results were near or below the application range of ASTM D2709:16. Therefore, no z-scores are calculated.

Calorific Value: The determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D240:19.

Distillation at 10 mmHg: This determination was not problematic for 80% and 90% recovered but it was problematic for 95% recovered. No statistical outliers were observed over the three parameters. The calculated reproducibilities for 80% and 90% recovered are in agreement with the requirements of ASTM D1160:18. For 95% recovered the calculated reproducibility is not in agreement with the requirements of ASTM D1160:18.

Methanol: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of EN14110:19.

Monoglycerides: 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 EN14105:20.

Diglycerides: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of EN14105:20.

Triglycerides: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is agreement with the requirements of EN14105:20.

Free Glycerol: 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 EN14105:20.

Total Glycerol: 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 EN14105:20.

Total Ester content (FAME): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is agreement with the requirements of EN14103:20.

Linolenic Acid Methyl Ester: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of EN14103:20.

Polyunsaturated Methyl Esters: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all agreement with the requirements of EN15779:09+A1:13.

sample #23061

Sum Ca + Mg: This determination was very problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the requirements of EN14538:06.

Phosphorus: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of EN14107:03.

Potassium: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN14109:03.

Sodium: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN14108:03.

Sum K + Na: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of EN14538:06.

sample #23062

In the past there was some discussion about method EN12662 version 2014 for determining Total Contamination in Biodiesel (neat FAME or B100). The CEN/TC 19 working group published a letter in September 2015 (see lit. 13) about this issue. In short, for FAME blends (B100) either EN12662:1998 or EN12662:2008 should be used and not EN12662:2014. Also, the latest version of EN14214:12+A2:19 states that EN12662 version 2008 should be used or EN12662:1998 as alternative. The method EN12662:2014 is not mentioned anymore in the specification (see also iis memo 1903, lit 14). It was therefore decided to exclude the test results which were determined according EN12662:2014.

Total Contamination: This determination was problematic. No statistical outliers were observed but four test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of EN12662:08 (or EN12662:98).

sample #23063

Filter Blocking Potential by Cold Soak Test: This determination was problematic for a number of laboratories. Two statistical outliers were observed and one other test result was excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D7501:22.

Filter Blocking Tendency: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D2068-B:20 nor with the requirements of IP387-B:14R22.

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)
Acid Value	mg KOH/g	25	0.49	0.06	0.06
Total Acid Number	mg KOH/g	22	0.47	0.06	0.13
Cloud Point	°C	30	-4.8	3.0	5
Cold Filter Plugging Point	°C	30	-15.6	1.9	3.9
Carbon Residue (100% sample)	%M/M	18	<0.1	n.e.	n.e.
Copper Corrosion, 3 hrs at 50 °C		31	1(1a/1b)	n.a.	n.a.
Density at 15 °C	kg/m^3	45	883.5	0.2	0.5
Flash Point PMcc	°C	27	151.7	24.2	14.7
Flash Point recc	°C	2	n.e.	n.e.	n.e.
Iodine Value	g I_2/100 g	26	113.0	6.4	5
Kinematic Viscosity at 40 °C	mm^2/s	37	4.467	0.067	0.037

Parameter	unit	n	average	2.8 * sd	R(lit)
Oxidation Stab. Induction period	hours	21	4.4	0.9	1.2
Pour Point	°C	15	-38	5	9
Sulfated Ash	%M/M	21	<0.005	n.e.	n.e.
Sulfur	mg/kg	27	2.2	1.3	1.4
Water	mg/kg	36	376	71	133
Water and Sediment	%V/V	9	<0.01	n.e.	n.e.
Calorific Value Gross	MJ/kg	6	39.9	0.4	0.4
80% recovered, as AET	°C	5	353.0	2.7	4.6
90% recovered, as AET	°C	5	355.0	3.6	4.6
95% recovered, as AET	°C	5	361.5	8.2	4.6
Methanol	%M/M	22	0.046	0.017	0.013
Monoglycerides	%M/M	26	0.336	0.076	0.128
Diglycerides	%M/M	25	0.114	0.041	0.050
Triglycerides	%M/M	24	0.058	0.075	0.070
Free Glycerol	%M/M	24	0.002	0.003	0.006
Total Glycerol	%M/M	24	0.109	0.029	0.032
Total Ester content	%M/M	30	97.5	2.5	4.2
Linolenic Acid Methyl Ester	%M/M	23	9.64	0.41	0.66
Polyunsaturated Methyl Esters	%M/M	7	0.21	0.54	0.27

Table 9: reproducibilities of tests on sample #23060

Parameter	unit	n	average	2.8 * sd	R(lit)
Sum of Calcium and Magnesium	mg/kg	17	13.0	6.3	3.1
Phosphorus	mg/kg	17	5.1	1.4	1.0
Potassium	mg/kg	17	9.9	6.8	5.5
Sodium	mg/kg	17	8.9	4.4	3.7
Sum of Potassium and Sodium	mg/kg	17	18.9	9.1	4.6
Total Contamination	mg/kg	20	14.4	10.4	4.3
Filter Blocking Potential (CSFT)	s	6	98.8	25.8	29.0
Filter Blocking Tendency (FBT)		11	1.04	0.09	0.07

Table 10: reproducibilities of tests on samples #23061, #23062 and #23063

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF APRIL 2023 WITH PREVIOUS PTS

	April 2023	November 2022	April 2022	October 2021	April 2021
Number of reporting laboratories	57	63	61	63	67
Number of test results	748	948	892	962	1108
Number of statistical outliers	34	23	38	31	45
Percentage of statistical outliers	4.5%	2.4%	4.3%	3.2%	4.1%

Table 11: 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 the following table.

Parameter	April 2023	November 2022	April 2022	October 2021	April 2021
Acid Value	+/-	+	+	+/-	-
Total Acid Number	++	+	++	+	+
Cloud Point	+	+	+	++	+
Cold Filter Plugging Point	++	+	+	+	+
Density at 15 °C	++	++	+	+	+
Flash Point PMcc	-	+/-	-	-	-
Flash Point recc.	n.e.	+	++	+	+
Iodine Value	-	-	+	+/-	-
Kinematic Viscosity at 40 °C	-	+/-	+	-	+/-
Oxidation Stab. Induction period	+	+	+	+/-	+
Pour Point	+	++	++	+	+
Sulfur	+/-	+	+	+	+
Water	+	+	+	++	+
Calorific Value Gross	+/-	+	-	--	--
Distillation at 10 mmHg	+/-	n.e.	-	--	-
Methanol	-	-	-	-	+/-
Monoglycerides	+	+	+	-	+
Diglycerides	+	-	+/-	+	-
Triglycerides	+/-	+	++	++	+
Free Glycerol	++	+	+	++	+
Total Glycerol	+/-	-	+	-	+
Total Ester content	+	+	+	+/-	+
Linolenic Acid Methyl Ester	+	+	+/-	--	+/-
Polyunsaturated Methyl Esters	--	-	--	-	n.e.
Sum of Calcium and Magnesium	--	-	-	-	+
Phosphorus	-	--	--	--	-

Parameter	April 2023	November 2022	April 2022	October 2021	April 2021
Potassium	-	+	+	+	+
Sodium	-	+/-	-	-	-
Sum of Potassium and Sodium	--	-	--	+/-	-
Total Contamination	--	(--)	-	--	--
Filter Blocking Potential (CSFT)	+	n.a.	-	n.a.	(--)
Filter Blocking Tendency (FBT)	-	n.a.	+	n.a.	(--)

Table 12: comparison of determinations to the reference test methods

For results between brackets no z-scores are calculated.

The following performance categories were used:

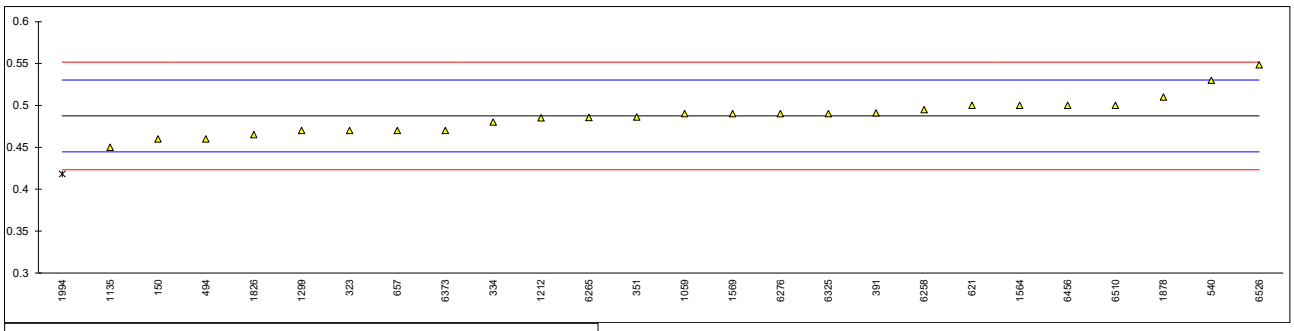
++ : group performed much better than the reference test method
+ : group performed better than the reference test method
+/- : group performance equals the reference test method
- : group performed worse than the reference test method
-- : group performed much worse than the reference test method
n.e.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

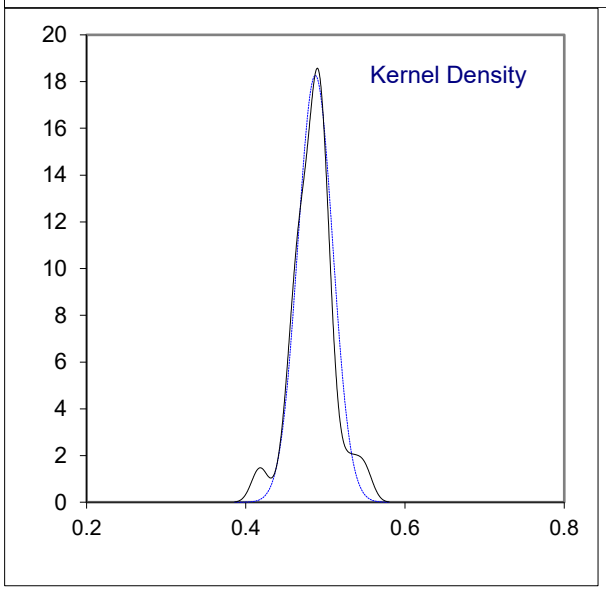
APPENDIX 1

Determination of Acid Value on sample #23060; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
150	EN14104	0.46		-1.28	
171		-----		-----	
300		-----		-----	
323	EN14104	0.47		-0.81	
328		-----		-----	
334	EN14104	0.48		-0.35	
335		-----		-----	
351	EN14104	0.486		-0.07	
381		-----		-----	
391	EN14104	0.491		0.17	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494	EN14104	0.46	C	-1.28	first reported 0.40
511		-----		-----	
540	EN14104	0.53		1.99	
551		-----		-----	
558		-----		-----	
621	EN14104	0.50		0.59	
631		-----		-----	
657	EN14104	0.47		-0.81	
863		-----		-----	
1011		-----		-----	
1059	EN14104	0.49		0.12	
1134		-----		-----	
1135	EN14104	0.45		-1.75	
1212	EN14104	0.4851		-0.11	
1299	EN14104	0.47		-0.81	
1494		-----		-----	
1564	EN14104	0.50		0.59	
1569	EN14104	0.49		0.12	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	D644-B	0.465		-1.05	
1878	EN14104	0.51		1.05	
1994	EN14104	0.418	D(0.05)	-3.24	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	EN14104	0.495		0.35	
6259		-----		-----	
6265	EN14104	0.4854		-0.10	
6276	EN14104	0.49	C	0.12	first reported 0.5597
6314		-----		-----	
6325	EN14104	0.49		0.12	
6373	EN14104	0.47		-0.81	
6447		-----		-----	
6456	EN14104	0.50		0.59	
6510	EN14104	0.50		0.59	
6526	EN14104	0.5484		2.84	

	normality	suspect
	n	25
	outliers	1
	mean (n)	0.4874
	st.dev. (n)	0.02185
	R(calc.)	0.0612
	st.dev.(EN14104:21)	0.02143
	R(EN14104:21)	0.06
Compare		
	R(EN14214:12+A2:19)	0.06

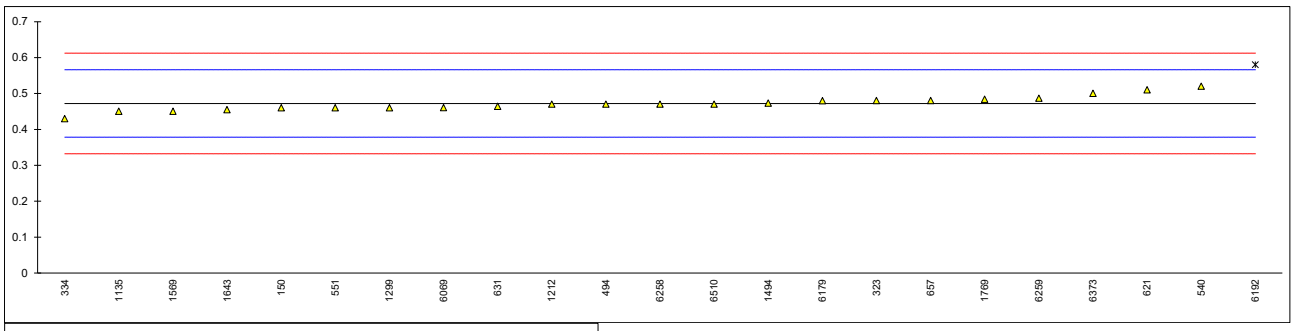

0.6
0.55
0.5
0.45
0.4
0.35
0.3
1994
1135
150
494
1826
1299
323
657
6373
334
1212
6265
351
1059
1569
6276
6325
391
6258
621
1564
6456
6510
1878
540
6526

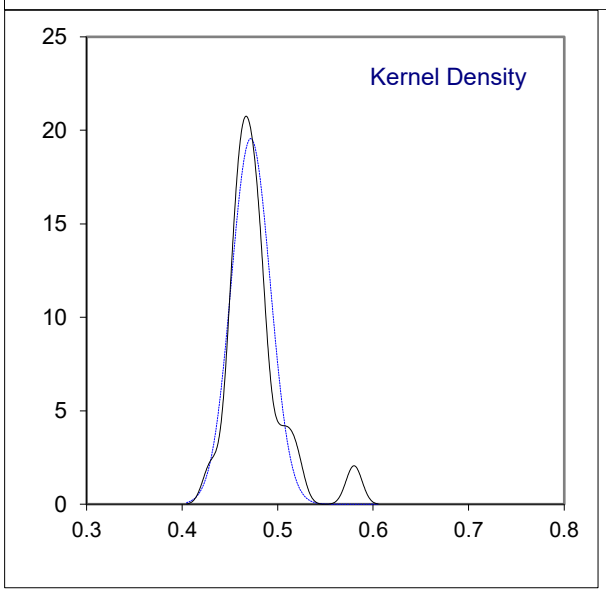

Kernel Density
20
18
16
14
12
10
8
6
4
2
0
0.2
0.4
0.6
0.8

Determination of Total Acid Number on sample #23060; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
150	D664-B	0.46		-0.25	
171		-----		-----	
300		-----		-----	
323	D664-B	0.48		0.17	
328		-----		-----	
334	D664-B	0.43		-0.90	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494	D664-B	0.47	C	-0.04	first reported 0.40
511		-----		-----	
540	D664-B	0.52		1.03	
551	D664-B	0.46		-0.25	
558		-----		-----	
621	D664-B	0.51		0.81	
631	D974	0.464		-0.17	
657	D664-B	0.48		0.17	
863		-----		-----	
1011		-----		-----	
1059		-----		-----	
1134		-----		-----	
1135	D664-B	0.45		-0.47	
1212	D664-B	0.47		-0.04	
1299	D664-B	0.460		-0.25	
1494	D664-B	0.473		0.02	
1564		-----		-----	
1569	D664-B	0.45		-0.47	
1634		-----		-----	
1643	D664-B	0.455		-0.36	
1706		-----		-----	
1769	D664-B	0.4834		0.25	
1826		-----		-----	
1878		-----		-----	
1994		-----		-----	
6069	D664-B	0.4601		-0.25	
6179	D664-B	0.4798		0.17	
6192		0.58	R(0.01)	2.31	
6258	D664-B	0.47		-0.04	
6259	D664-B	0.4866		0.31	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325		-----		-----	
6373	D664-B	0.50		0.60	
6447		-----		-----	
6456		-----		-----	
6510	D664-B	0.47		-0.04	
6526		-----		-----	

normality	OK
n	22
outliers	1
mean (n)	0.4719
st.dev. (n)	0.02040
R(calc.)	0.0571
st.dev.(D664-B:18e2)	0.04681
R(D664-B:18e2)	0.1311

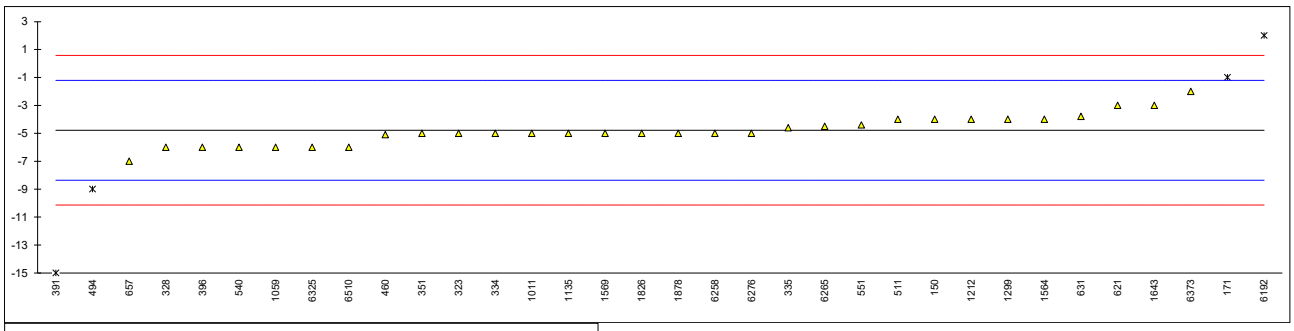

0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
334
1135
1569
1643
150
551
1299
6069
631
1212
494
6258
6510
1494
6179
323
657
1769
6259
6373
621
540
6192

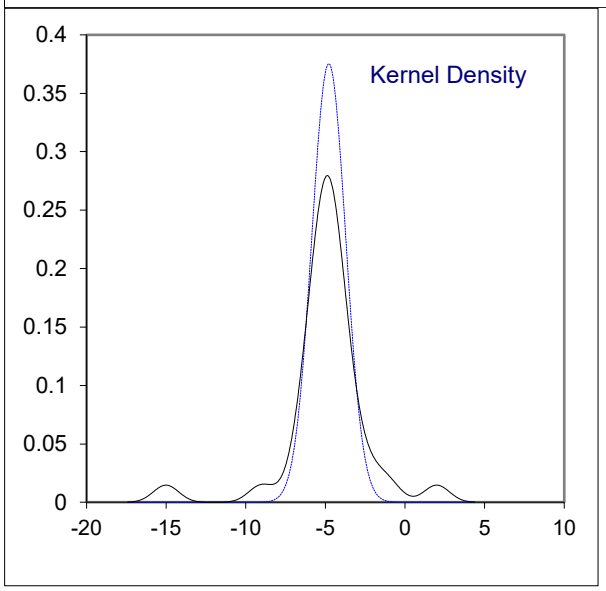

Kernel Density
25
20
15
10
5
0
0.3
0.4
0.5
0.6
0.7
0.8

Determination of Cloud Point on sample #23060; results in °C

lab	method	value	mark	z(targ)	remarks
150	EN23015	-4		0.44	
171	D2500	-1	R(0.05)	2.12	
300		-----		-----	
323	D2500	-5		-0.12	
328	D2500	-6		-0.68	
334	D2500	-5		-0.12	
335	D2500	-4.6		0.10	
351	D7683	-5		-0.12	
381		-----		-----	
391	D2500	-15	R(0.01)	-5.72	
396	ISO3015	-6		-0.68	
445		-----		-----	
460	IP219	-5.1		-0.18	
494	D2500	-9	R(0.05)	-2.36	
511	D2500	-4		0.44	
540	D2500	-6		-0.68	
551	D2500	-4.4		0.21	
558		-----		-----	
621	D2500	-3		1.00	
631	D5773	-3.8		0.55	
657	D2500	-7		-1.24	
863		-----		-----	
1011	D2500	-5		-0.12	
1059	ISO3015	-6		-0.68	
1134		-----		-----	
1135	D2500	-5		-0.12	
1212	D7689	-4		0.44	
1299	D2500	-4		0.44	
1494		-----		-----	
1564	D5772	-4.0		0.44	
1569	EN23015	-5		-0.12	
1634		-----		-----	
1643	D2500	-3		1.00	
1706		-----		-----	
1769		-----		-----	
1826	D2500	-5		-0.12	
1878	ISO3015	-5		-0.12	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		2	R(0.01)	3.80	
6258	ISO3015	-5		-0.12	
6259		-----		-----	
6265	ISO3015	-4.5		0.16	
6276	ISO22995	-5.0		-0.12	
6314		-----		-----	
6325	D2500	-6		-0.68	
6373	ISO3015	-2		1.56	
6447		-----		-----	
6456		-----		-----	
6510	D2500	-6		-0.68	
6526		-----		-----	

	normality	OK
	n	30
	outliers	4
	mean (n)	-4.78
	st.dev. (n)	1.063
	R(calc.)	2.98
	st.dev.(D2500:23)	1.786
	R(D2500:23)	5
Compare		
	R(EN14214:12+A2:19)	4

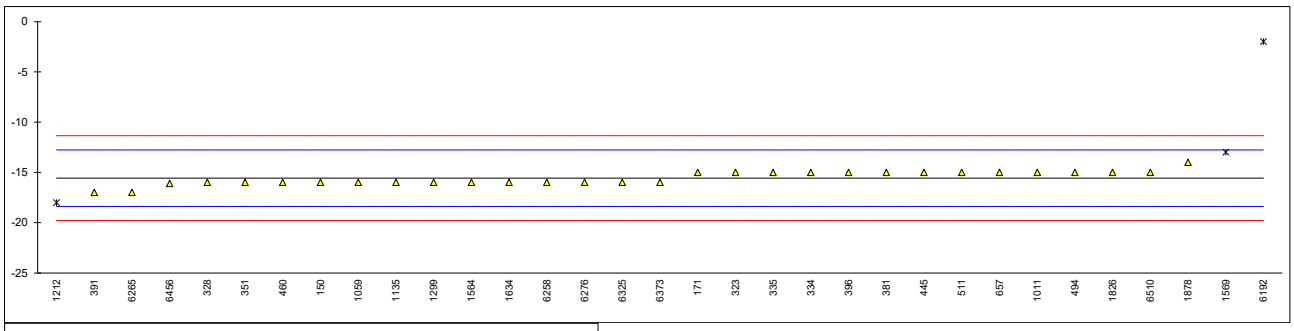

3
1
-1
-3
-5
-7
-9
-11
-13
-15
391
494
657
328
396
540
1059
6325
6510
460
351
323
334
1011
1135
1569
1826
1878
6258
6276
335
6265
551
511
150
1212
1299
1564
631
621
1643
6373
171
6192

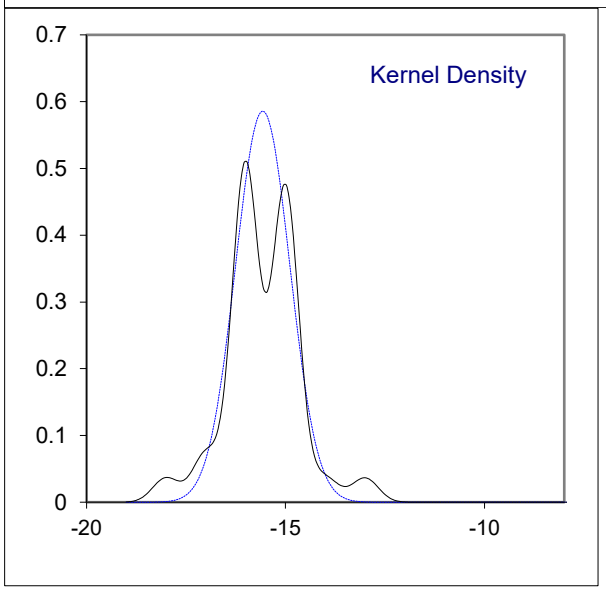

Kernel Density
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-20
-15
-10
-5
0
5
10

Determination of Cold Filter Plugging Point (CFPP) on sample #23060; results in °C

lab	method	value	mark	z(targ)	remarks
150	EN116	-16		-0.31	
171	D6371	-15		0.41	
300		-----		-----	
323	EN116	-15		0.41	
328	EN116	-16		-0.31	
334	EN116	-15		0.41	
335	EN116	-15		0.41	
351	EN116	-16		-0.31	
381	EN116	-15		0.41	
391	EN116	-17		-1.02	
396	EN116	-15		0.41	
445	EN116	-15		0.41	
460	EN116	-16.0		-0.31	
494	EN116	-15		0.41	
511	D6371	-15		0.41	
540		-----		-----	
551		-----		-----	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	IP309	-15		0.41	
863		-----		-----	
1011	EN116	-15		0.41	
1059	EN116	-16		-0.31	
1134		-----		-----	
1135	EN116	-16		-0.31	
1212	EN116	-18	R(0.05)	-1.73	
1299	EN116	-16		-0.31	
1494		-----		-----	
1564	EN116	-16		-0.31	
1569	EN116	-13	R(0.05)	1.83	
1634	EN116	-16		-0.31	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	EN116	-15		0.41	
1878	EN116	-14		1.12	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-2	R(0.01)	9.66	
6258	EN116	-16		-0.31	
6259		-----		-----	
6265	EN116	-17.0		-1.02	
6276	EN116	-16		-0.31	
6314		-----		-----	
6325	EN116	-16		-0.31	
6373	EN116	-16		-0.31	
6447		-----		-----	
6456	Calculated	-16.1		-0.38	
6510	EN116	-15		0.41	
6526		-----		-----	

	normality	OK
	n	30
	outliers	3
	mean (n)	-15.57
	st.dev. (n)	0.681
	R(calc.)	1.91
	st.dev.(EN116:15)	1.405
	R(EN116:15)	3.93
Compare		
	R(EN14214:12+A2:19)	3.93


0
-5
-10
-15
-20
-25
1212
391
6265
6456
328
351
460
150
1059
1135
1299
1564
1634
6258
6276
6325
6373
171
323
335
334
396
381
445
511
657
1011
494
1826
6510
1878
1569
6192


Kernel Density
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-20
-15
-10

Determination of Carbon Residue on 100% sample on sample #23060; results in %M/M

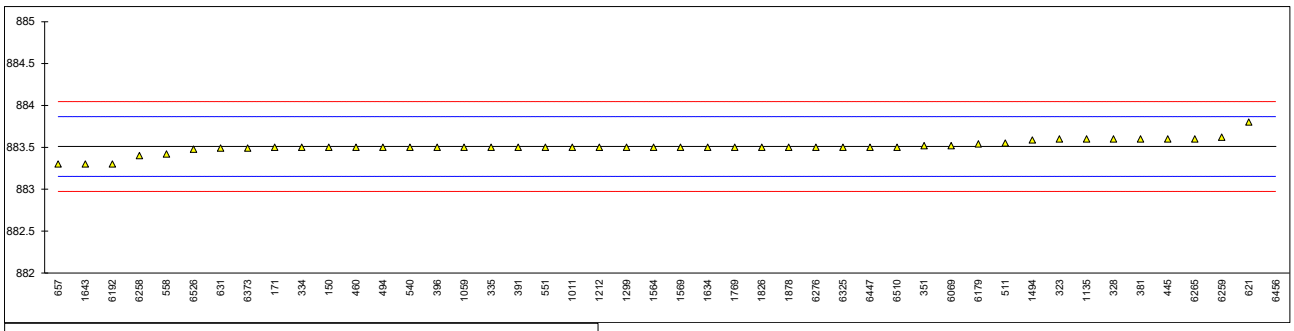
lab	method	value	mark	z(targ)	remarks
150	D4530	<0.10		-----	
171	D4530	<0.10		-----	
300		-----		-----	
323	D4530	0.03		-----	
328		-----		-----	
334	D4530	0.03		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	D4530	<0.01		-----	
460		-----		-----	
494	D4530	0.016		-----	
511		-----		-----	
540		-----		-----	
551	D4530	<0.01		-----	
558		-----		-----	
621	D189	<0.1		-----	
631	D4530	<0.1		-----	
657	D4530	<0.10		-----	
863		-----		-----	
1011		-----		-----	
1059	ISO10370	<0,01		-----	
1134		-----		-----	
1135	EN10370	0.01		-----	
1212	EN10370	<0,10		-----	
1299		-----		-----	
1494		-----		-----	
1564		-----		-----	
1569	EN10370	<0.10		-----	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	D4530	0.02		-----	
1878		-----		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	ISO10370	0.02		-----	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325		-----		-----	
6373	ISO10370	0		-----	
6447		-----		-----	
6456		-----		-----	
6510	D4530	0.01		-----	
6526		-----		-----	
	n	18			
	mean (n)	<0.10			Application range ASTM D4530:15R20: 0.1 - 30%M/M Application range ASTM ISO 10370:14: 0.10 - 30.0%M/M

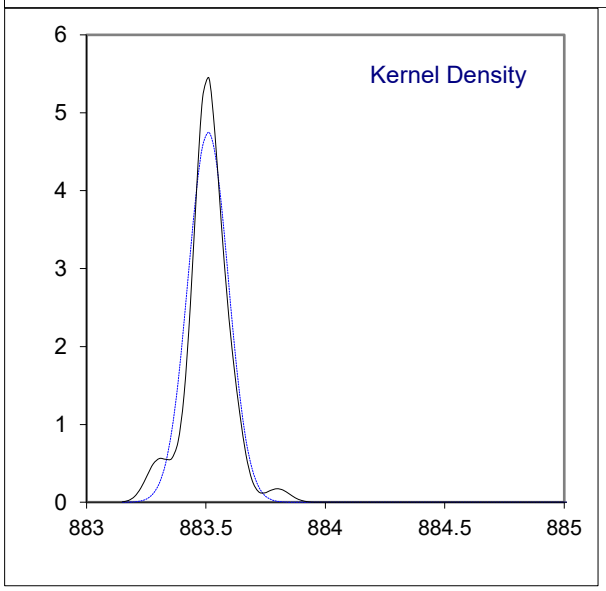
Determination of Copper Corrosion 3 hrs at 50 °C on sample #23060

lab	method	value	mark	z(targ)	remarks
150	D130	1A		-----	
171	D130	1a		-----	
300		-----		-----	
323	D130	1A		-----	
328	D130	1		-----	
334	D130	1		-----	
335	D130	1a		-----	
351	ISO2160	1a		-----	
381	ISO2160	1a		-----	
391	D130	1a		-----	
396	D130	1a		-----	
445	D130	1a		-----	
460		-----		-----	
494	ISO2160	1A		-----	
511	D130	1a		-----	
540	D130	1A		-----	
551	D130	1a		-----	
558		-----		-----	
621	D130	1A		-----	
631	D130	1a		-----	
657	D130	1a		-----	
863		-----		-----	
1011	D130	1b		-----	
1059	ISO2160	1a		-----	
1134		-----		-----	
1135	ISO2160	1A		-----	
1212	ISO2160	1A		-----	
1299	D130	1A		-----	
1494		-----		-----	
1564	D130	1a		-----	
1569	ISO2160	1a		-----	
1634	ISO2160	1a		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826		1A		-----	
1878	ISO2160	1a		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		1a		-----	
6258	ISO2160	1a		-----	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325	D130	1a		-----	
6373	D130	1a		-----	
6447		-----		-----	
6456		-----		-----	
6510	D130	1a		-----	
6526		-----		-----	
	n	31			
	mean (n)	1 (1a/1b)			

Determination of Density at 15 °C on sample #23060; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
150	ISO12185	883.5		-0.05	
171	D4052	883.5		-0.05	
300		-----		-----	
323	ISO12185	883.6		0.51	
328	ISO12185	883.6		0.51	
334	ISO12185	883.5		-0.05	
335	ISO12185	883.5		-0.05	
351	ISO12185	883.52		0.06	
381	ISO12185	883.6		0.51	
391	ISO12185	883.5		-0.05	
396	ISO12185	883.5		-0.05	
445	ISO12185	883.6		0.51	
460	D4052	883.5		-0.05	
494	ISO12185	883.5		-0.05	
511	D4052	883.55		0.23	
540	D4052	883.5	C	-0.05	reported 0.8835 kg/m³
551	D4052	883.5		-0.05	
558	D4052	883.42		-0.50	
621	D4052	883.8		1.63	
631	D4052	883.49		-0.11	
657	D4052	883.3		-1.17	
863		-----		-----	
1011	D4052	883.5		-0.05	
1059	ISO12185	883.5		-0.05	
1134		-----		-----	
1135	ISO12185	883.6		0.51	
1212	ISO12185	883.5		-0.05	
1299	ISO12185	883.5		-0.05	
1494	D4052	883.5867		0.43	
1564	ISO12185	883.5		-0.05	
1569	ISO12185	883.5		-0.05	
1634	ISO12185	883.5		-0.05	
1643	ISO12185	883.3		-1.17	
1706		-----		-----	
1769	D4052	883.50		-0.05	
1826	ISO12185	883.5		-0.05	
1878	ISO12185	883.5		-0.05	
1994		-----		-----	
6069	D4052	883.520		0.06	
6179	D4052	883.54		0.17	
6192	D1298	883.3		-1.17	
6258	ISO12185	883.4		-0.61	
6259	D4052	883.62		0.62	
6265	ISO12185	883.60		0.51	
6276	ISO12185	883.5		-0.05	
6314		-----		-----	
6325	ISO12185	883.5		-0.05	
6373	ISO12185	883.49		-0.11	
6447	D4052	883.5		-0.05	
6456	ISO3675	889.6	R(0.01)	34.11	
6510	ISO12185	883.5		-0.05	
6526	ISO12185	883.475		-0.19	
	normality	not OK			
	n	45			
	outliers	1			
	mean (n)	883.51			
	st.dev. (n)	0.084			
	R(calc.)	0.24			
	st.dev.(ISO12185:96)	0.179			
	R(ISO12185:96)	0.5			

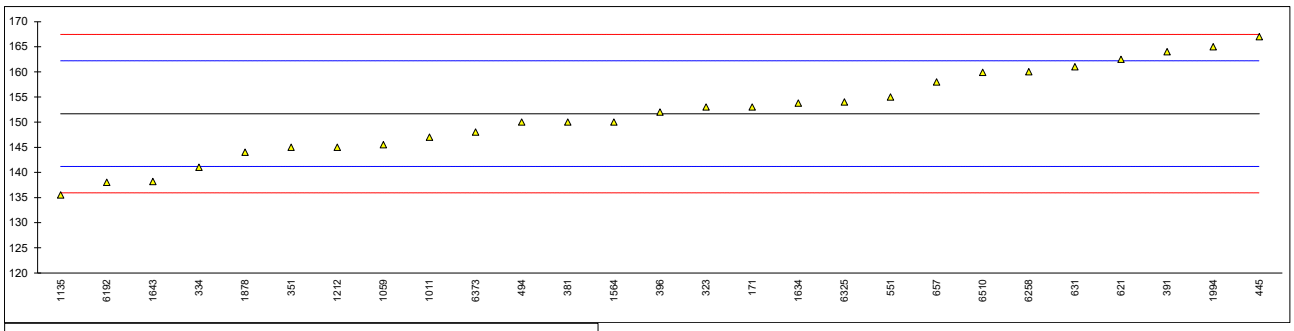

885
884.5
884
883.5
883
882.5
882
657
1643
6192
6258
558
6526
631
6373
171
334
150
460
494
540
396
1059
335
391
551
1011
1212
1299
1564
1569
1634
1769
1826
1878
6276
6325
6447
6510
351
6069
6179
511
1494
323
1135
328
381
445
6265
6259
621
6456

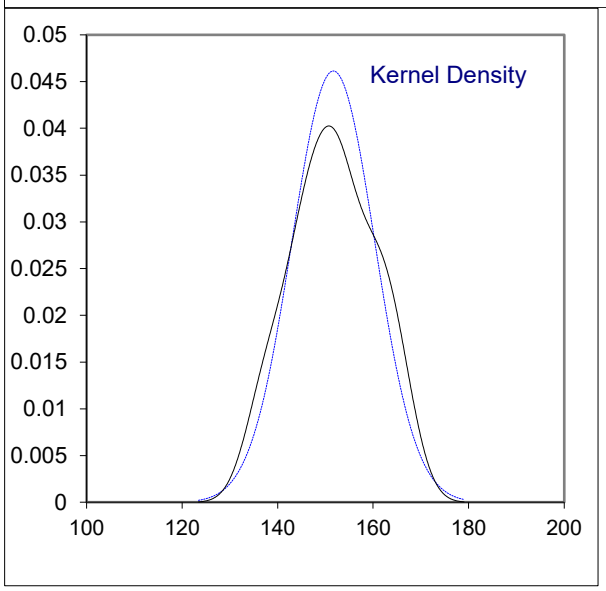

Kernel Density
6
5
4
3
2
1
0
883
883.5
884
884.5
885

Determination of Flash Point PMcc on sample #23060; results in °C

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D93-C	153.0		0.25	
300		-----		-----	
323	D93-C	153.0		0.25	
328		-----		-----	
334	D93-C	141		-2.03	
335		-----		-----	
351	ISO2719-C	145.0		-1.27	
381	D93-C	150		-0.32	
391	ISO2719-C	164		2.35	
396	D93-C	152		0.06	
445	D93-C	167.0		2.92	
460		-----		-----	
494	D93-C	150.0		-0.32	
511		-----		-----	
540		-----		-----	
551	D93-C	155.0		0.63	
558		-----		-----	
621	D93-C	162.5		2.06	
631	D93-A	161.0		1.77	
657	D93-C	158		1.20	
863		-----		-----	
1011	ISO2719-C	147.0		-0.89	
1059	ISO2719-C	145.5		-1.18	
1134		-----		-----	
1135	ISO2719-A	135.5		-3.08	
1212	ISO2719-A	145		-1.27	
1299		-----		-----	
1494		-----		-----	
1564	D93-C	150		-0.32	
1569	ISO2719-C	>160		-----	
1634	D93-C	153.8		0.40	
1643	D93-C	138.2		-2.57	
1706		-----		-----	
1769		-----		-----	
1826		-----		-----	
1878	ISO2719-C	144.0		-1.46	
1994	ISO2719-C	165		2.54	
6069		-----		-----	
6179		-----		-----	
6192	ISO2719-C	138		-2.61	
6258	ISO2719-C	160.0		1.58	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325	ISO2719-C	154.0		0.44	
6373	D93-C	148.0		-0.70	
6447		-----		-----	
6456		-----		-----	
6510	D93-C	159.9		1.57	
6526		-----		-----	

	normality	OK
	n	27
	outliers	0
	mean (n)	151.68
	st.dev. (n)	8.647
	R(calc.)	24.21
	st.dev.(D93-C:20)	5.250
	R(D93-C:20)	14.7
compare		
	R(ISO2719-C:16)	14.7


170
165
160
155
150
145
140
135
130
125
120
1135
6192
1643
334
1878
351
1212
1069
1011
6373
494
381
1564
396
323
171
1634
6325
551
657
6510
6258
631
621
391
1994
445


Kernel Density
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
100
120
140
160
180
200

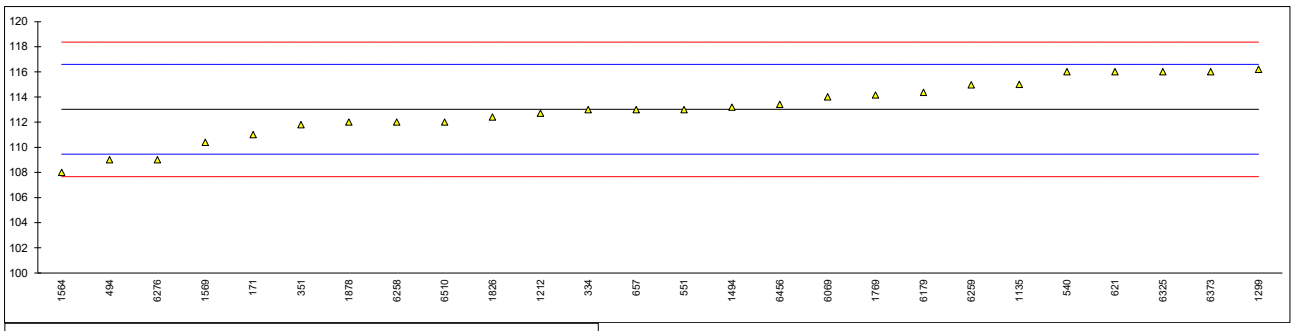
Determination of Flash Point recc on sample #23060; results in °C

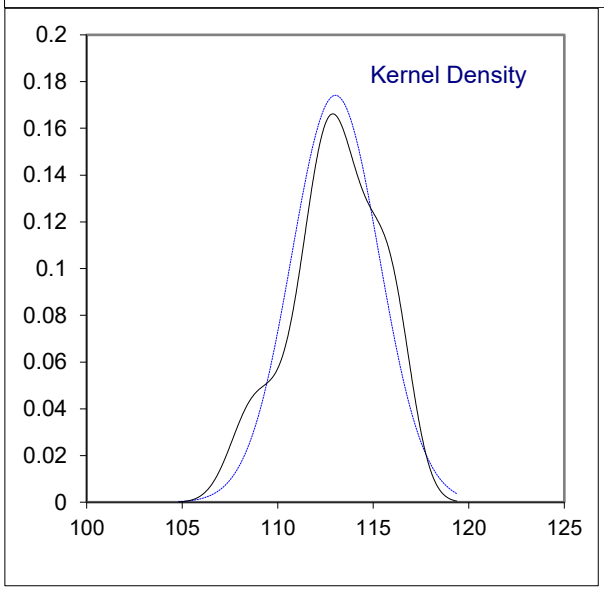
lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494		-----		-----	
511		-----		-----	
540		-----		-----	
551		-----		-----	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657		-----		-----	
863		-----		-----	
1011		-----		-----	
1059		-----		-----	
1134		-----		-----	
1135		-----		-----	
1212		-----		-----	
1299	ISO3679	164.5		-----	
1494		-----		-----	
1564		-----		-----	
1569		-----		-----	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826		-----		-----	
1878		-----		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258		-----		-----	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325		-----		-----	
6373		-----		-----	
6447		-----		-----	
6456		-----		-----	
6510	ISO3679	167.8		-----	
6526		-----		-----	

Determination of Iodine Value on sample #23060; results in g I_2/100 g

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14111	111		-1.13	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334	EN14111	113		-0.01	
335		-----		-----	
351	EN14111	111.8		-0.68	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494	EN16300	109		-2.25	
511		-----		-----	
540	EN14111	116		1.67	
551	EN14111	113		-0.01	
558		-----		-----	
621	EN14111	116		1.67	
631		-----		-----	
657	EN14111	113		-0.01	
863		-----		-----	
1011		-----		-----	
1059		-----		-----	
1134		-----		-----	
1135	EN16300	115		1.11	
1212	EN14111	112.7		-0.18	
1299	EN14111	116.2		1.78	
1494	EN14111	113.1933		0.10	
1564	EN14111	108		-2.81	
1569	EN16300	110.4		-1.47	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	EN14111	114.15		0.63	
1826	EN14111	112.4		-0.35	
1878	EN14111	112		-0.57	
1994		-----		-----	
6069	EN14111	114.005		0.55	
6179	EN14111	114.36		0.75	
6192		-----		-----	
6258	EN14111	112	C	-0.57	first reported 121
6259	EN14111	114.97		1.09	
6265		-----		-----	
6276	EN16300	109		-2.25	
6314		-----		-----	
6325	EN14111	116		1.67	
6373	EN14111	116		1.67	
6447		-----		-----	
6456	EN14111	113.4		0.21	
6510	EN14111	112		-0.57	
6526		-----		-----	

normality	OK
n	26
outliers	0
mean (n)	113.02
st.dev. (n)	2.290
R(calc.)	6.41
st.dev.(EN14111:22)	1.786
R(EN14111:22)	5

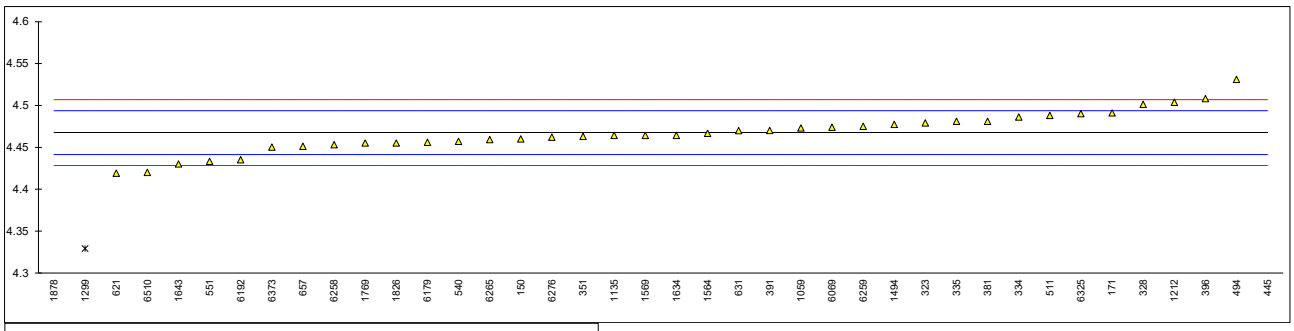

120
118
116
114
112
110
108
106
104
102
100
1564
494
6276
1569
171
351
1878
6258
6510
1826
1212
334
657
551
1494
6456
6069
1769
6179
6259
1135
540
621
6325
6373
1299

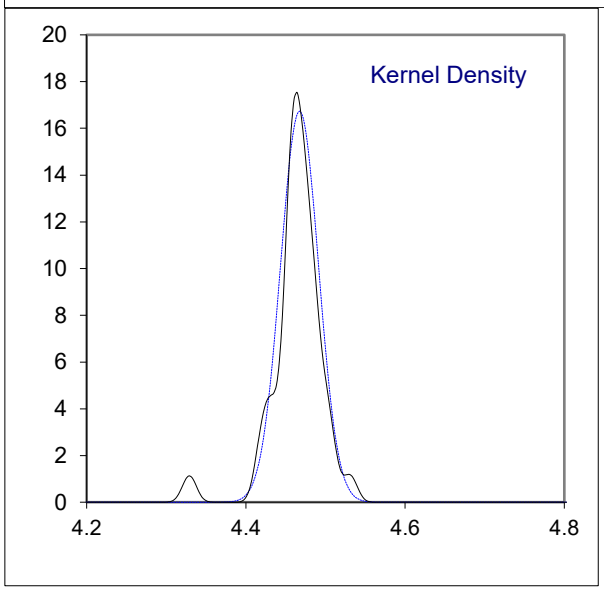

Kernel Density
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
100
105
110
115
120
125

Determination of Kinematic Viscosity at 40 °C on sample #23060; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
150	ISO3104-A	4.460		-0.57	
171	D445	4.491		1.80	
300		-----		-----	
323	D445	4.479		0.88	
328	ISO3104-A	4.501		2.57	
334	ISO3104-A	4.486		1.42	
335	ISO3104-A	4.481		1.04	
351	ISO3104-A	4.463		-0.34	
381	D445	4.481		1.04	
391	D445	4.470		0.20	
396	D445	4.508		3.10	
445	ISO3104-A	5.022	R(0.01)	42.43	
460		-----		-----	
494	ISO3104-A	4.531		4.86	
511	D445	4.488		1.57	
540	D445	4.457		-0.80	
551	D445	4.433		-2.64	
558		-----		-----	
621	D445	4.419	C	-3.71	first reported 4.388
631	D445	4.4698		0.18	
657	D445	4.451		-1.26	
863		-----		-----	
1011		-----		-----	
1059	ISO3104-B	4.473		0.42	
1134		-----		-----	
1135	ISO3104-B	4.464		-0.26	
1212	D7042	4.5037		2.77	
1299	D445	4.329	R(0.01)	-10.59	
1494	D445	4.4773		0.75	
1564	D445	4.4666		-0.06	
1569	ISO3104-B	4.464		-0.26	
1634	ISO3104-A	4.464		-0.26	
1643	D445	4.430		-2.87	
1706		-----		-----	
1769	D445	4.455		-0.95	
1826	ISO3104	4.455		-0.95	
1878	ISO3104-A	4.138	R(0.01)	-25.20	
1994		-----		-----	
6069	D445	4.4738		0.49	
6179	D445	4.4560	C	-0.88	first reported 0.4546
6192	D7042	4.435		-2.48	
6258	ISO3104-A	4.453		-1.11	
6259	D445	4.475		0.58	
6265	In house	4.4592		-0.63	
6276	EN16896	4.462		-0.42	
6314		-----		-----	
6325	D445	4.490		1.73	
6373	D445	4.4502		-1.32	
6447		-----		-----	
6456		-----		-----	
6510	ISO3104-A	4.420		-3.63	
6526		-----		-----	

	normality	OK
	n	37
	outliers	3
	mean (n)	4.4674
	st.dev. (n)	0.02384
	R(calc.)	0.0668
	st.dev.(ISO3104-A:20)	0.01307
	R(ISO3104-A:20)	0.0366
compare		
	R(D445:21e2)	1.001

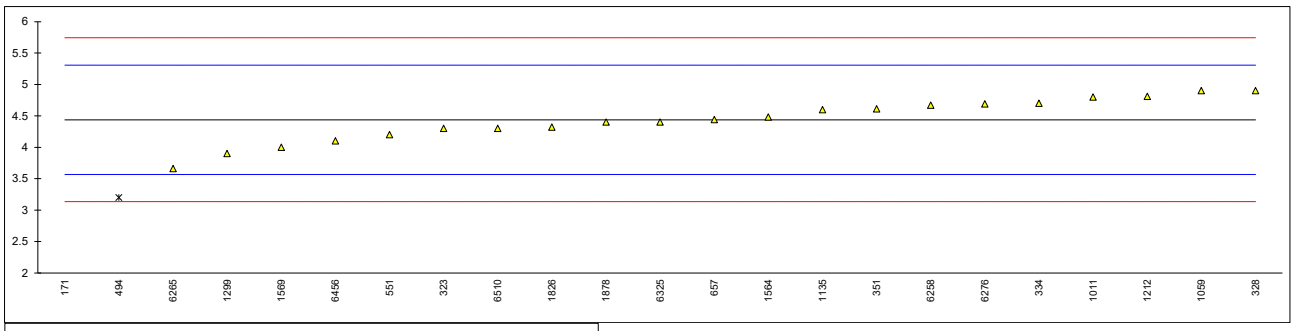

4.6
4.55
4.5
4.45
4.4
4.35
4.3
1878 1299 621 6510 1643 551 6192 6373 657 6258 1769 1826 6179 540 6265 150 6276 351 1135 1569 1634 1564 631 391 1059 6069 6259 1494 323 335 381 334 511 6325 171 328 1212 396 494 445

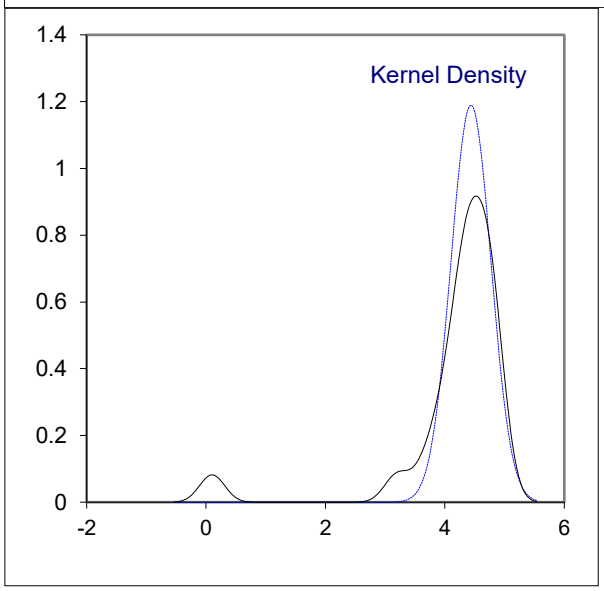

Kernel Density
20
18
16
14
12
10
8
6
4
2
0
4.2
4.4
4.6
4.8

Determination of Oxidation Stability Induction period on sample #23060; results in hours

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN15751	0.1	R(0.01)	-9.98	
300		-----		-----	
323	EN14112	4.3		-0.32	
328	EN15751	4.9		1.06	
334	EN15751	4.7		0.60	
335		-----		-----	
351	EN15751	4.61		0.40	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494	EN15751	3.2	R(0.05)	-2.85	
511		-----		-----	
540		-----		-----	
551	EN14112	4.2		-0.55	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN15751	4.44		0.01	
863		-----		-----	
1011	EN15751	4.8		0.83	
1059	EN15751	4.9		1.06	
1134		-----		-----	
1135	EN14112	4.6		0.37	
1212	EN15751	4.81		0.86	
1299	EN15751	3.9		-1.24	
1494		-----		-----	
1564	EN14112	4.48		0.10	
1569	EN15751	4.0		-1.01	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	EN15751	4.32		-0.27	
1878	EN15751	4.4		-0.09	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	EN14112	4.67		0.54	
6259		-----		-----	
6265	EN15751	3.66		-1.79	
6276	EN15751	4.69		0.58	
6314		-----		-----	
6325	EN15751	4.4		-0.09	
6373		-----		-----	
6447		-----		-----	
6456	EN14112	4.1		-0.78	
6510	EN15751	4.3		-0.32	
6526		-----		-----	

	normality	OK
	n	21
	outliers	2
	mean (n)	4.437
	st.dev. (n)	0.3356
	R(calc.)	0.940
	st.dev.(EN15751:14)	0.4348
	R(EN15751:14)	1.217
compare		
	R(EN14112:20)	0.940

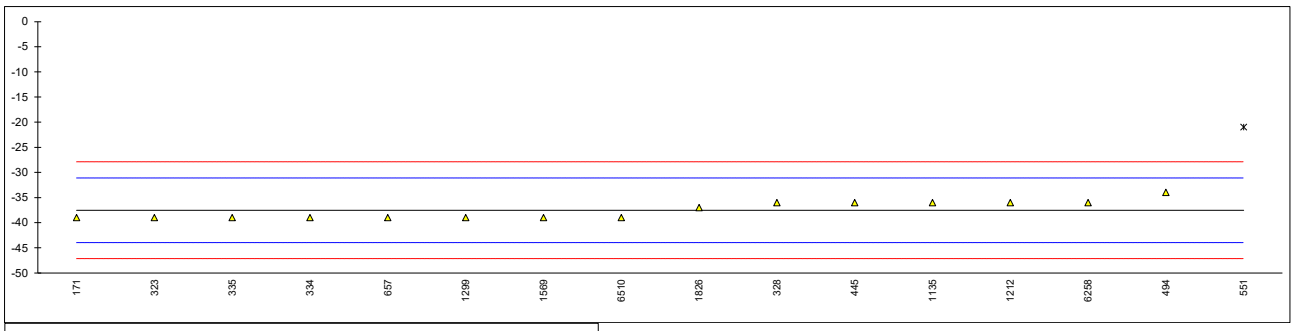

6
5.5
5
4.5
4
3.5
3
2.5
2
171
494
6265
1299
1569
6456
551
323
6510
1826
1878
6325
657
1564
1135
351
6258
6276
334
1011
1212
1059
328

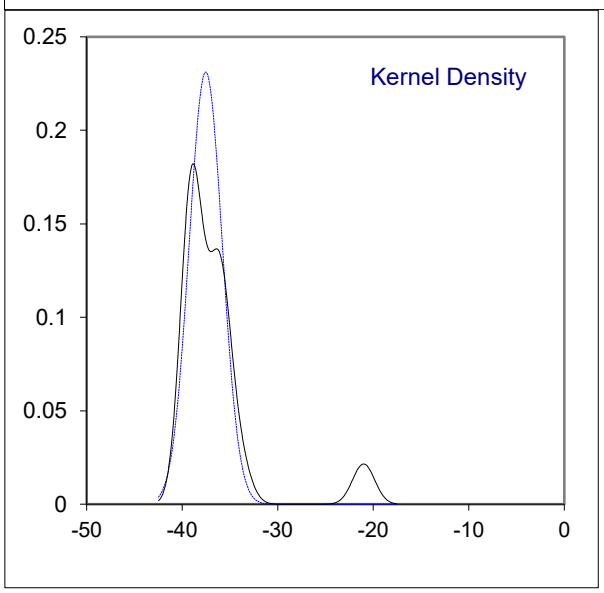

Kernel Density
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-2
0
2
4
6

Determination of Pour Point on sample #23060; results in °C

lab	method	value	mark	z(targ)	remarks
150	ISO3016	<-27		-----	
171	D5950	-39		-0.46	
300		-----		-----	
323	ISO3016	-39		-0.46	
328	ISO3016	-36		0.48	
334	ISO3016	-39		-0.46	
335	ISO3016	-39		-0.46	
351		-----		-----	
381		-----		-----	
391	ISO3016	<-36		-----	
396		-----		-----	
445	ISO3016	-36		0.48	
460		-----		-----	
494	ISO3016	-34		1.10	
511		-----		-----	
540		-----		-----	
551	D5950	-21	C,G(0.01)	5.14	first reported -18
558		-----		-----	
621	D97	<-30		-----	
631	D97	<-33		-----	
657	D97	-39		-0.46	
863		-----		-----	
1011	ISO3016	<-33		-----	
1059		-----		-----	
1134		-----		-----	
1135	ISO3016	-36		0.48	
1212	ISO3016	-36	C	0.48	first reported -21
1299	D97	-39		-0.46	
1494		-----		-----	
1564		-----		-----	
1569	D5950	-39		-0.46	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	ISO3016	-37		0.17	
1878		-----		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	ISO3016	-36		0.48	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325	ISO3016	<-24		-----	
6373		-----		-----	
6447		-----		-----	
6456		-----		-----	
6510	ISO3016	-39		-0.46	
6526		-----		-----	

normality	OK
n	15
outliers	1
mean (n)	-37.5
st.dev. (n)	1.73
R(calc.)	4.8
st.dev.(ISO3016:19)	3.21
R(ISO3016:19)	9


0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
171
323
335
334
657
1299
1569
6510
1826
328
445
1135
1212
6258
494
551


Kernel Density
0.25
0.2
0.15
0.1
0.05
0
-50
-40
-30
-20
-10
0

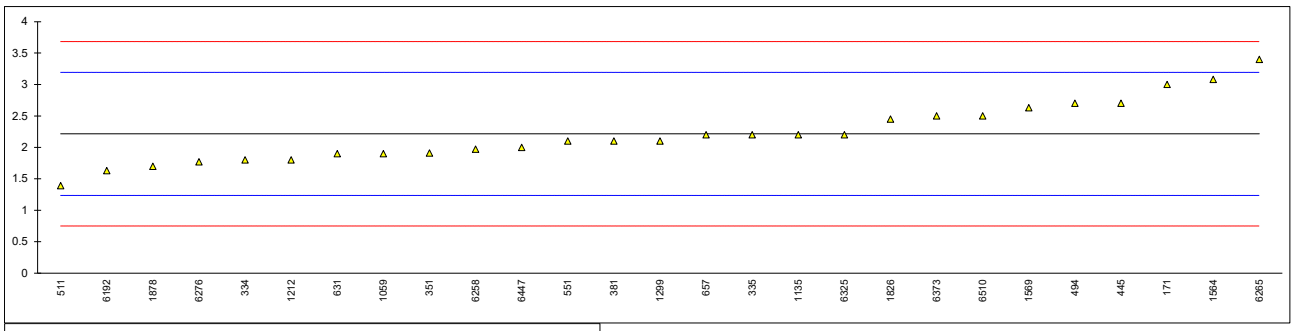
Determination of Sulfated Ash on sample #23060; results in %M/M

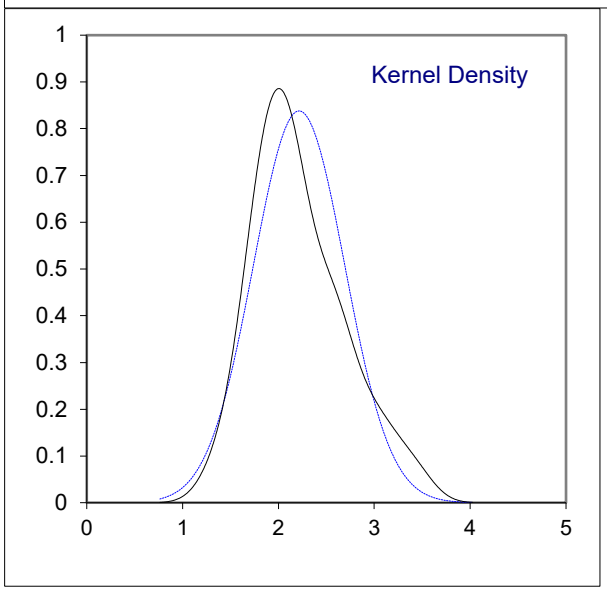
lab	method	value	mark	z(targ)	remarks
150	D874	<0.005		-----	
171	D874	<0.005		-----	
300		-----		-----	
323	ISO3987	0.022	C	-----	first reported 0.020
328		-----		-----	
334		-----		-----	
335		-----		-----	
351	ISO3987	< 0,005		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494	D874	<0,005		-----	
511	D874	<0.005		-----	
540	ISO3987	0.001		-----	
551	D874	<0.005		-----	
558		-----		-----	
621	D874	<0.005		-----	
631	D874	<0.005		-----	
657	D874	<0.005		-----	
863		-----		-----	
1011		-----		-----	
1059	ISO3987	<0,005		-----	
1134		-----		-----	
1135	ISO3987	<0.005		-----	
1212		-----		-----	
1299	ISO3987	<0.005		-----	
1494		-----		-----	
1564	D874	0.009		-----	
1569	D874	<0.005		-----	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826		-----		-----	
1878	ISO3987	0.01		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	ISO3987	0.0001		-----	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325	ISO3987	0.002		-----	
6373	ISO3987	0.000		-----	
6447		-----		-----	
6456		-----		-----	
6510	D874	0.0001		-----	
6526		-----		-----	
	n	21			
	mean (n)	<0.005			Application range ASTM D874:23 >0.005%M/M

Determination of Sulfur on sample #23060; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D5453	3.0		1.60	
300		-----		-----	
323	ISO20846	< 3.0		-----	
328	ISO20846	<3		-----	
334	ISO20846	1.8		-0.85	
335	ISO20846	2.2		-0.03	
351	ISO20846	1.91		-0.63	
381	ISO20846	2.1		-0.24	
391		-----		-----	
396		-----		-----	
445	ISO20846	2.7		0.99	
460		-----		-----	
494	ISO20846	2.7		0.99	
511	D5453	1.39		-1.69	
540		-----		-----	
551	D5453	2.1		-0.24	
558		-----		-----	
621	D4294	<20		-----	
631	D7039	1.90		-0.65	
657	D5453	2.2		-0.03	
863		-----		-----	
1011		-----		-----	
1059	ISO20846	1.9		-0.65	
1134		-----		-----	
1135	ISO20846	2.2		-0.03	
1212	ISO20846	1.8		-0.85	
1299	ISO20884	2.1		-0.24	
1494		-----		-----	
1564	ISO20846	3.08		1.77	
1569	ISO20846	2.63		0.85	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	ISO20846	2.45		0.48	
1878	ISO20846	1.7		-1.06	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		1.63		-1.20	
6258	ISO20846	1.97		-0.50	
6259		-----		-----	
6265	ISO13032	3.4	C	2.42	first reported 8.7
6276	ISO20846	1.77		-0.91	
6314		-----		-----	
6325	ISO20846	2.2		-0.03	
6373	ISO20846	2.5		0.58	
6447	D2622	2		-0.44	
6456		-----		-----	
6510	ISO20846	2.5		0.58	
6526		-----		-----	

	normality	OK
	n	27
	outliers	0
	mean (n)	2.216
	st.dev. (n)	0.4763
	R(calc.)	1.334
	st.dev.(ISO20846:19)	0.4886
	R(ISO20846:19)	1.368
compare		
	R(D5453:19a)	1.334

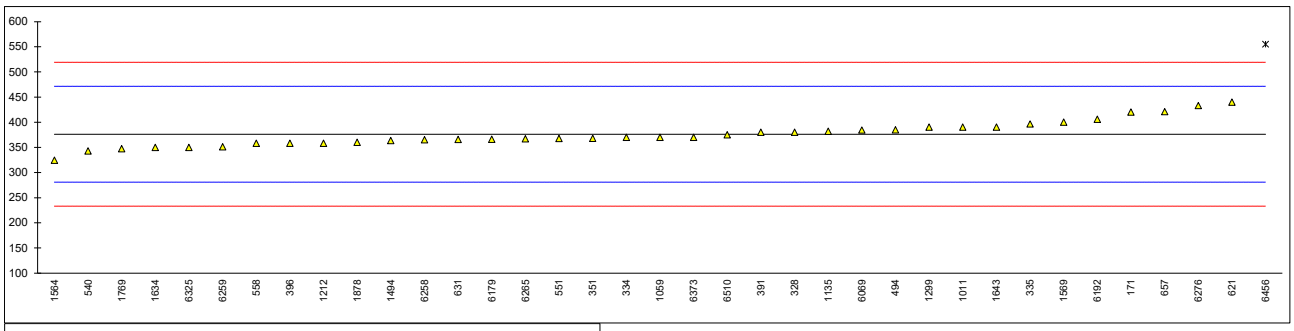

4
3.5
3
2.5
2
1.5
1
0.5
0
511
6192
1878
6276
334
1212
631
1059
351
6258
6447
551
381
1299
657
335
1135
6325
1826
6373
6510
1569
494
445
171
1564
6265

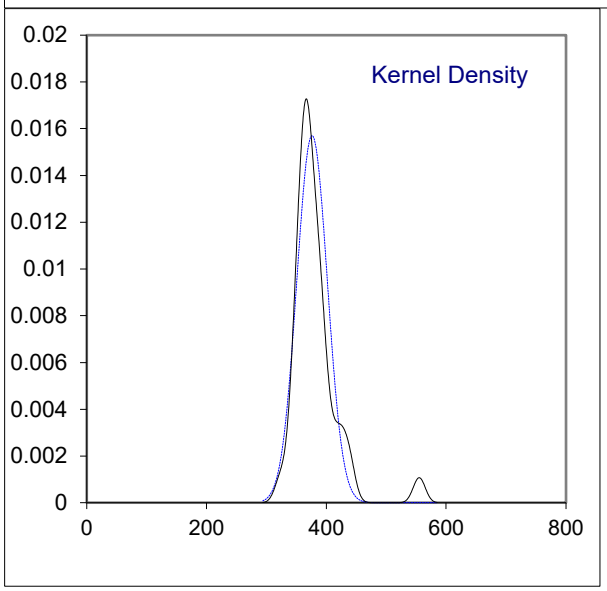

Kernel Density
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5

Determination of Water on sample #23060; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D6304-A	420		0.92	
300		-----		-----	
323		-----		-----	
328	ISO12937	380		0.08	
334	ISO12937	370		-0.13	
335	ISO12937	396.5		0.42	
351	ISO12937	368		-0.17	
381		-----		-----	
391	ISO12937	380		0.08	
396	ISO12937	358		-0.38	
445		-----		-----	
460		-----		-----	
494	ISO12937	385		0.18	
511		-----		-----	
540	ISO12937	343		-0.70	
551	D6304-A:16e1	367.6		-0.18	
558	D6304	358		-0.38	
621	D6304-A:20	440		1.34	
631	D6304-A:20	365.75		-0.22	
657	D6304-A:20	421		0.94	
863		-----		-----	
1011	ISO12937	390		0.29	
1059	ISO12937	370		-0.13	
1134		-----		-----	
1135	ISO12937	382		0.12	
1212	ISO12937	358.2		-0.38	
1299	ISO12937	390		0.29	
1494	E203	363.6		-0.27	
1564	ISO12937	324.4		-1.09	
1569	ISO12937	400		0.50	
1634	ISO12937	349.8		-0.56	
1643	ISO6296	390		0.29	
1706		-----		-----	
1769	ISO12937	347.04		-0.61	
1826		-----		-----	
1878	ISO12937	360		-0.34	
1994		-----		-----	
6069	E203	384.50		0.17	
6179	ISO12937	365.9		-0.22	
6192		405.7		0.62	
6258	ISO12937	365		-0.24	
6259	ISO12937	351.09		-0.53	
6265	ISO12937	367.21		-0.19	
6276	ISO12937	432.87		1.19	
6314		-----		-----	
6325	ISO12937	350		-0.55	
6373	ISO12937	370		-0.13	
6447		-----		-----	
6456	ISO12937	555	R(0.01)	3.75	
6510	ISO12937	375		-0.03	
6526		-----		-----	

	normality	OK
	n	36
	outliers	1
	mean (n)	376.25
	st.dev. (n)	25.396
	R(calc.)	71.11
	st.dev.(ISO12937:00)	47.641
	R(ISO12937:00)	133.40
compare		
	R(D6304-A:20)	153.29


600
550
500
450
400
350
300
250
200
150
100
1564
540
1769
1634
6325
6259
558
396
1212
1878
1494
6258
631
6179
6265
551
351
334
1059
6373
6510
391
328
1135
6069
494
1299
1011
1643
335
1569
6192
171
657
6276
621
6456


Kernel Density
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
0
200
400
600
800

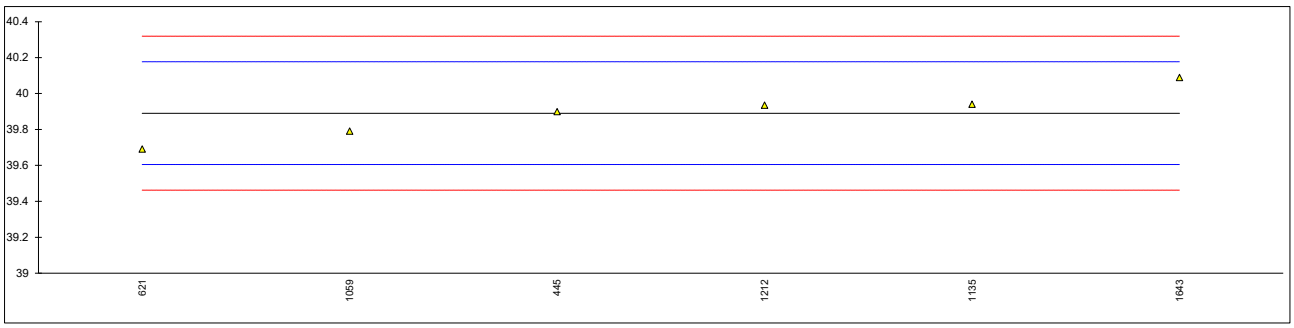
Determination of Water and Sediment on sample #23060; results in %V/V

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D2709	<0.01		-----	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494		-----		-----	
511	D2709	<0.005		-----	
540		-----		-----	
551	D2709	<0.01		-----	
558		-----		-----	
621	D2709	<0.01		-----	
631	D2709	<0.01		-----	
657	D2709	<0.01		-----	
863		-----		-----	
1011		-----		-----	
1059	D2709	<0,05		-----	
1134		-----		-----	
1135	D2709	0.005		-----	
1212		-----		-----	
1299		-----		-----	
1494		-----		-----	
1564		-----		-----	
1569		-----		-----	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826		-----		-----	
1878		-----		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	D2709	0.0		-----	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325		-----		-----	
6373		-----		-----	
6447		-----		-----	
6456		-----		-----	
6510		-----		-----	
6526		-----		-----	
	n	9			
	mean (n)	<0.01			Application range ASTM D2709:22 >0.01%V/V

Determination of Calorific Value Gross at constant volume ($H_{o,v}$) on sample #23060; results in MJ/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171		-----		-----	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	D240	39.89819		0.06	
460		-----		-----	
494		-----		-----	
511		-----		-----	
540		-----		-----	
551		-----		-----	
558		-----		-----	
621	D240	39.69		-1.40	
631		-----		-----	
657		-----		-----	
863		-----		-----	
1011		-----		-----	
1059	D240	39.790		-0.70	
1134		-----		-----	
1135	D240	39.94		0.35	
1212	D240	39.935		0.31	
1299		-----		-----	
1494		-----		-----	
1564		-----		-----	
1569		-----		-----	
1634		-----		-----	
1643	D240	40.0888		1.39	
1706		-----		-----	
1769		-----		-----	
1826		-----		-----	
1878		-----		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258		-----		-----	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325		-----		-----	
6373		-----		-----	
6447		-----		-----	
6456		-----		-----	
6510		-----		-----	
6526		-----		-----	

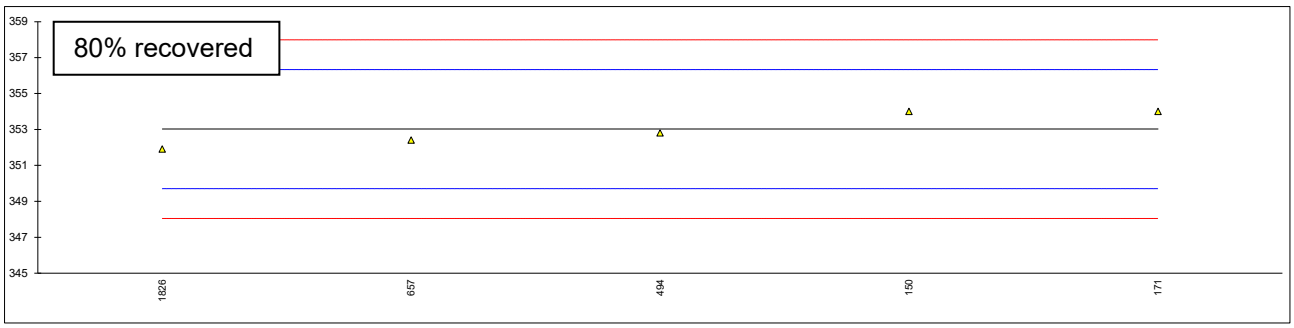
normality	unknown
n	6
outliers	0
mean (n)	39.8903
st.dev. (n)	0.13720
R(calc.)	0.3841
st.dev.(D240:19)	0.14286
R(D240:19)	0.40

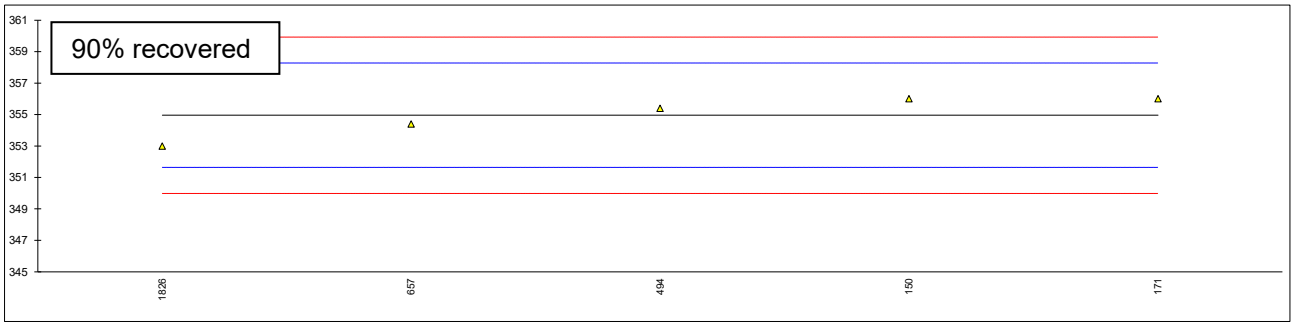

40.4
40.2
40
39.8
39.6
39.4
39.2
39
621
1059
445
1212
1135
1643

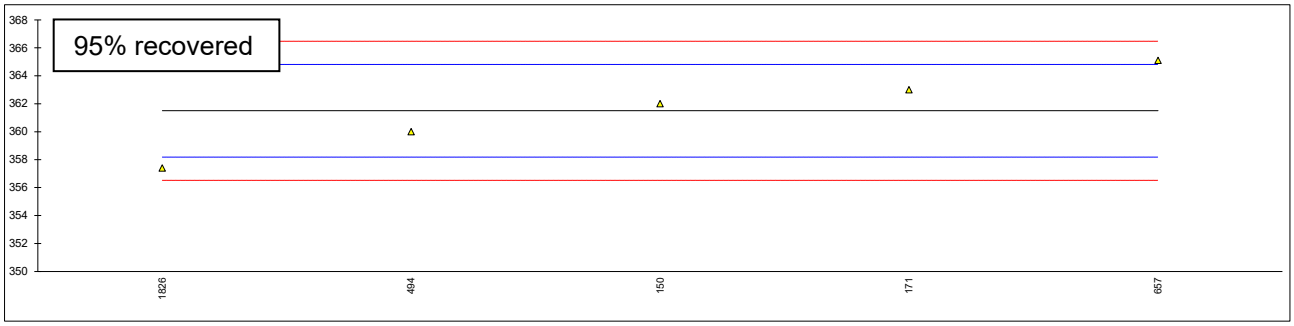
Determination of Distillation at 10 mmHg, % recovered as AET on sample #23060; results in °C

lab	method	80%rec.	mark	z(targ)	90%rec.	mark	z(targ)	95%rec.	mark	z(targ)
150	D1160	354		0.59	356		0.63	362		0.30
171	D1160	354		0.59	356		0.63	363		0.91
300		-----		-----	-----		-----	-----		-----
323		-----		-----	-----		-----	-----		-----
328		-----		-----	-----		-----	-----		-----
334		-----		-----	-----		-----	-----		-----
335		-----		-----	-----		-----	-----		-----
351		-----		-----	-----		-----	-----		-----
381		-----		-----	-----		-----	-----		-----
391		-----		-----	-----		-----	-----		-----
396		-----		-----	-----		-----	-----		-----
445		-----		-----	-----		-----	-----		-----
460		-----		-----	-----		-----	-----		-----
494	D1160	352.8		-0.13	355.4		0.27	360		-0.91
511		-----		-----	-----		-----	-----		-----
540		-----		-----	-----		-----	-----		-----
551		-----		-----	-----		-----	-----		-----
558		-----		-----	-----		-----	-----		-----
621		-----		-----	-----		-----	-----		-----
631		-----		-----	-----		-----	-----		-----
657	D1160	352.4		-0.37	354.4		-0.34	365.1		2.17
863		-----		-----	-----		-----	-----		-----
1011		-----		-----	-----		-----	-----		-----
1059		-----		-----	-----		-----	-----		-----
1134		-----		-----	-----		-----	-----		-----
1135		-----		-----	-----		-----	-----		-----
1212		-----		-----	-----		-----	-----		-----
1299		-----		-----	-----		-----	-----		-----
1494		-----		-----	-----		-----	-----		-----
1564		-----		-----	-----		-----	-----		-----
1569		-----		-----	-----		-----	-----		-----
1634		-----		-----	-----		-----	-----		-----
1643		-----		-----	-----		-----	-----		-----
1706		-----		-----	-----		-----	-----		-----
1769		-----		-----	-----		-----	-----		-----
1826	D1160	351.9		-0.68	353.0		-1.18	357.4		-2.47
1878		-----		-----	-----		-----	-----		-----
1994		-----		-----	-----		-----	-----		-----
6069		-----		-----	-----		-----	-----		-----
6179		-----		-----	-----		-----	-----		-----
6192		-----		-----	-----		-----	-----		-----
6258		-----		-----	-----		-----	-----		-----
6259		-----		-----	-----		-----	-----		-----
6265		-----		-----	-----		-----	-----		-----
6276		-----		-----	-----		-----	-----		-----
6314		-----		-----	-----		-----	-----		-----
6325		-----		-----	-----		-----	-----		-----
6373		-----		-----	-----		-----	-----		-----
6447		-----		-----	-----		-----	-----		-----
6456		-----		-----	-----		-----	-----		-----
6510		-----		-----	-----		-----	-----		-----
6526		-----		-----	-----		-----	-----		-----

normality	unknown	unknown	unknown
n	5	5	5
outliers	0	0	0
mean (n)	353.02	354.96	361.50
st.dev. (n)	0.950	1.276	2.938
R(calc.)	2.66	3.57	8.23
st.dev.(D1160:18)	1.657	1.657	1.657
R(D1160:18)	4.64	4.64	4.64


80% recovered
359
357
355
353
351
349
347
345
1826
657
494
150
171

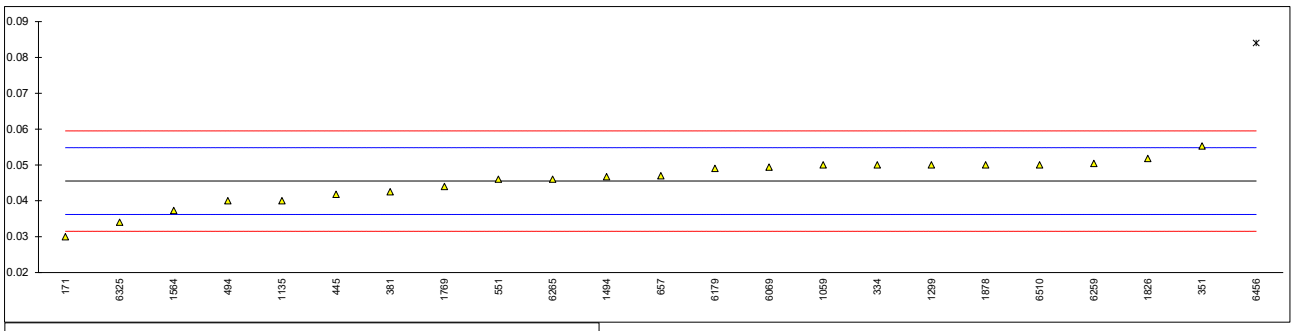

90% recovered
361
359
357
355
353
351
349
347
345
1826
657
494
150
171

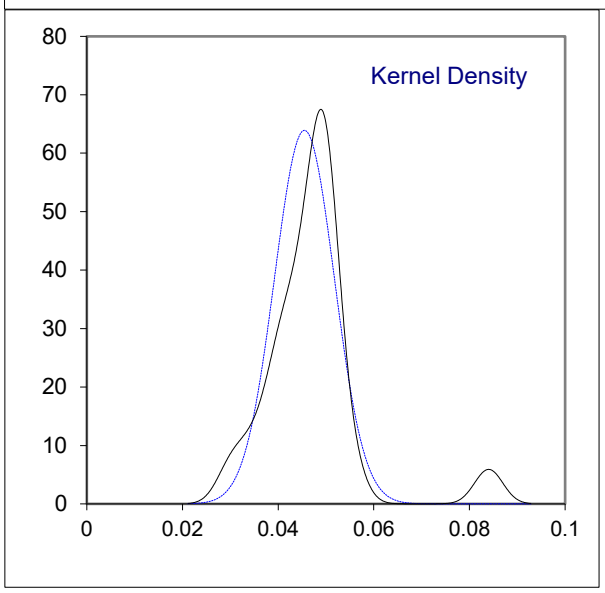

95% recovered
368
366
364
362
360
358
356
354
352
350
1826
494
150
171
657

Determination of Methanol on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14110	0.03		-3.33	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334	EN14110	0.05		0.96	
335		-----		-----	
351	EN14110	0.0553		2.10	
381	EN14110	0.0425		-0.65	
391		-----		-----	
396		-----		-----	
445	EN14110	0.0418		-0.80	
460		-----		-----	
494	EN14110	0.04		-1.18	
511		-----		-----	
540		-----		-----	
551	EN14110	0.046		0.11	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN14110	0.047		0.32	
863		-----		-----	
1011		-----		-----	
1059	EN14110	0.05		0.96	
1134		-----		-----	
1135	EN14110	0.04		-1.18	
1212		-----		-----	
1299	EN14110	0.05		0.96	
1494	EN14110	0.0467		0.26	
1564	EN14110	0.03730		-1.76	
1569		-----		-----	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	EN14110	0.044		-0.32	
1826	EN14110	0.0518		1.35	
1878	EN14110	0.05		0.96	
1994		-----		-----	
6069	EN14110	0.0494		0.83	
6179	EN14110	0.049		0.75	
6192		-----		-----	
6258		-----		-----	
6259	EN14110	0.0504		1.05	
6265	EN14110	0.046		0.11	
6276		-----		-----	
6314		-----		-----	
6325	EN14110	0.034		-2.47	
6373		-----		-----	
6447		-----		-----	
6456	EN14110	0.084	R(0.01)	8.25	
6510	EN14110	0.05		0.96	
6526		-----		-----	

normality	OK
n	22
outliers	1
mean (n)	0.04551
st.dev. (n)	0.006240
R(calc.)	0.01747
st.dev.(EN14110:19)	0.004663
R(EN14110:19)	0.01306

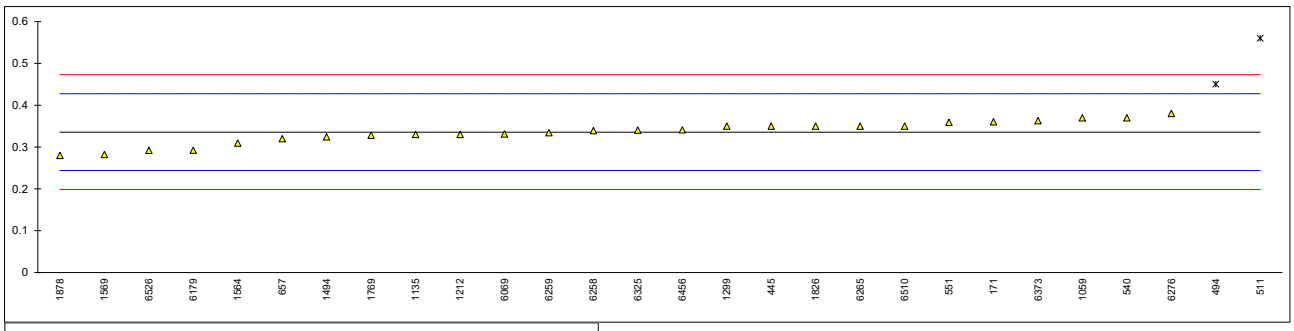

0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
171
6325
1564
494
1135
445
381
1769
551
6265
1494
657
6179
6069
1059
334
1299
1878
6510
6259
1826
351
6456

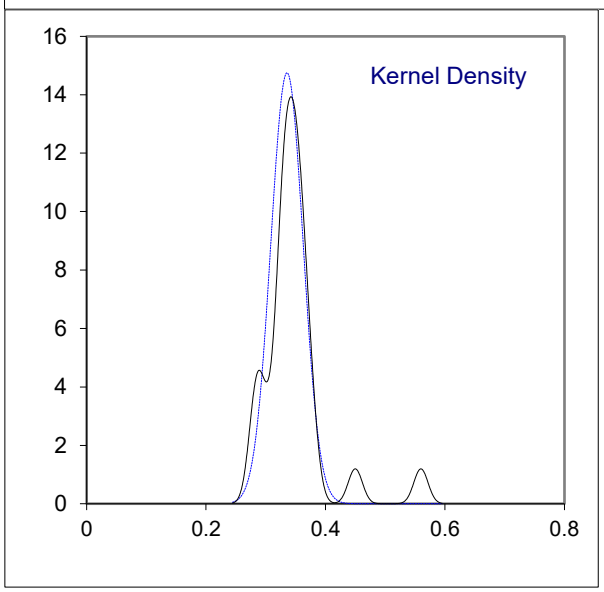

Kernel Density
80
70
60
50
40
30
20
10
0
0
0.02
0.04
0.06
0.08
0.1

Determination of Monoglycerides on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14105	0.36		0.53	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	EN14105	0.35		0.32	
460		-----		-----	
494	EN14105	0.45	R(0.01)	2.50	
511	D6584	0.56	R(0.01)	4.91	
540	EN14105	0.37		0.75	
551	D6584	0.359		0.51	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN14105	0.32		-0.34	
863		-----		-----	
1011		-----		-----	
1059	EN14105	0.37		0.75	
1134		-----		-----	
1135	EN14105	0.33		-0.12	
1212	EN14105	0.33		-0.12	
1299	EN14105	0.35		0.32	
1494	D6584	0.3242		-0.25	
1564	EN14105	0.3092		-0.58	
1569	EN14105	0.282		-1.17	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	D6584	0.328		-0.17	
1826	EN14105	0.35		0.32	
1878	EN14105	0.28		-1.21	
1994		-----		-----	
6069	D6584	0.33100		-0.10	
6179	D6584	0.2922		-0.95	
6192		-----		-----	
6258	EN14105	0.339		0.08	
6259	D6584	0.334		-0.03	
6265	EN14105	0.35		0.32	
6276	EN14105	0.38	C	0.97	first reported 0.41
6314		-----		-----	
6325	EN14105	0.34		0.10	
6373	EN14105	0.363		0.60	
6447		-----		-----	
6456	EN14105	0.341		0.12	
6510	EN14105	0.35		0.32	
6526	EN14105	0.292		-0.95	

normality	OK
n	26
outliers	2
mean (n)	0.33556
st.dev. (n)	0.027050
R(calc.)	0.07574
st.dev.(EN14105:20)	0.045732
R(EN14105:20)	0.12805

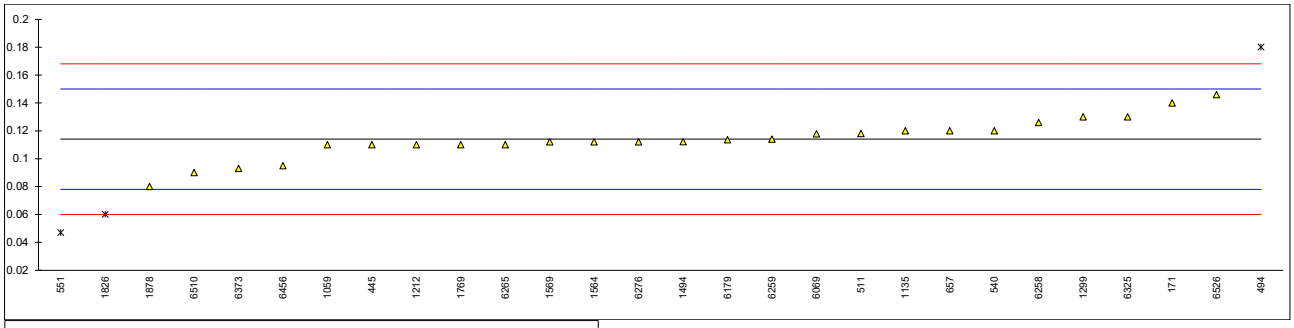

0.6
0.5
0.4
0.3
0.2
0.1
0
1878
1569
6526
6179
1564
657
1494
1769
1135
1212
6069
6259
6258
6325
6456
1299
445
1826
6265
6510
551
171
6373
1059
540
6276
494
511

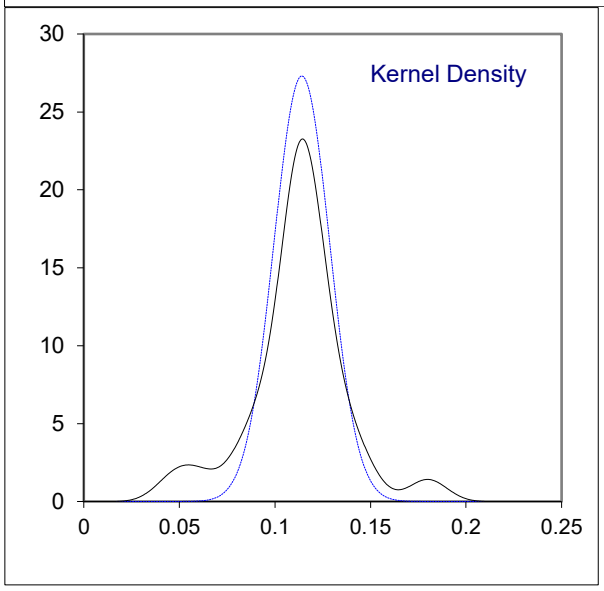

Kernel Density
16
14
12
10
8
6
4
2
0
0
0.2
0.4
0.6
0.8

Determination of Diglycerides on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14105	0.14		1.44	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	EN14105	0.11		-0.23	
460		-----		-----	
494	EN14105	0.18	R(0.05)	3.66	
511	D6584	0.118		0.22	
540	EN14105	0.12		0.33	
551	D6584	0.047	R(0.05)	-3.73	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN14105	0.12		0.33	
863		-----		-----	
1011		-----		-----	
1059	EN14105	0.11		-0.23	
1134		-----		-----	
1135	EN14105	0.12		0.33	
1212	EN14105	0.11		-0.23	
1299	EN14105	0.13		0.89	
1494	D6584	0.1121		-0.11	
1564	EN14105	0.1120		-0.11	
1569	EN14105	0.112		-0.11	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	D6584	0.110		-0.23	
1826	EN14105	0.06	R(0.05)	-3.00	
1878	EN14105	0.08		-1.89	
1994		-----		-----	
6069	D6584	0.11775		0.21	
6179	D6584	0.1136		-0.03	
6192		-----		-----	
6258	EN14105	0.126		0.66	
6259	D6584	0.114		0.00	
6265	EN14105	0.11		-0.23	
6276	EN14105	0.112		-0.11	
6314		-----		-----	
6325	EN14105	0.13		0.89	
6373	EN14105	0.093		-1.17	
6447		-----		-----	
6456	EN14105	0.095		-1.06	
6510	EN14105	0.09		-1.34	
6526	EN14105	0.146		1.77	

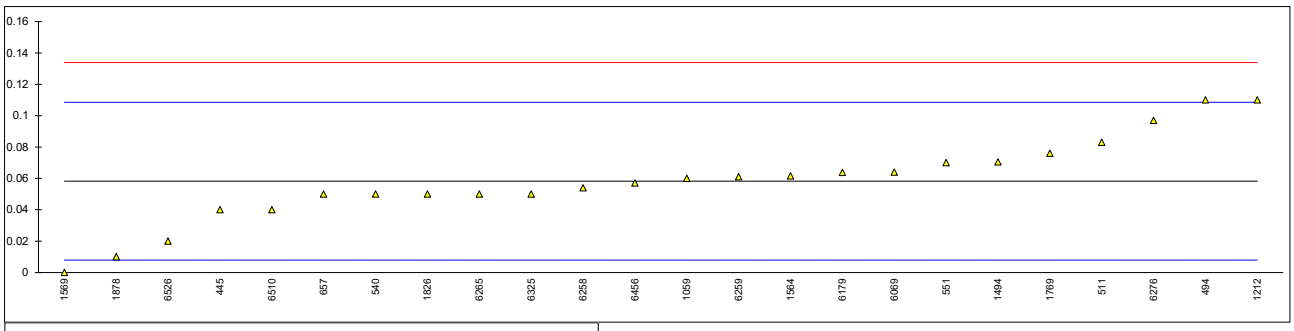
normality	OK
n	25
outliers	3
mean (n)	0.11406
st.dev. (n)	0.014611
R(calc.)	0.04091
st.dev.(EN14105:20)	0.018000
R(EN14105:20)	0.05040

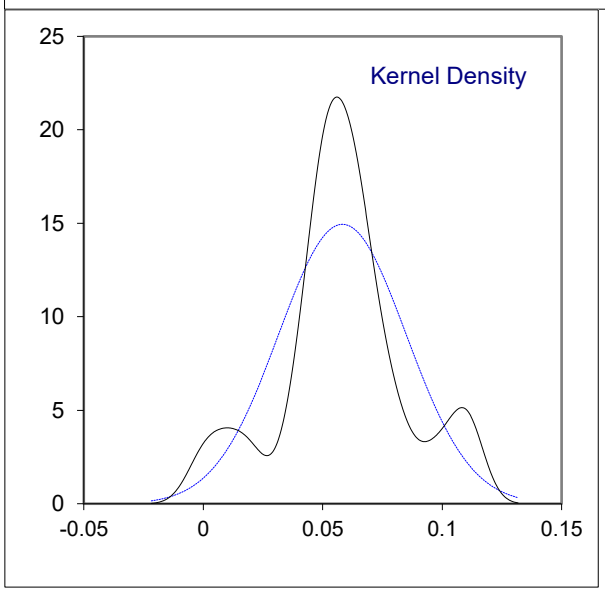

0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
551
1826
1878
6510
6373
6456
1059
445
1212
1769
6265
1569
1564
6276
1494
6179
6259
6069
511
1135
657
540
6258
1299
6325
171
6526
494


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

Determination of Triglycerides on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14105	<0.10		-----	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	EN14105	0.04		-0.72	
460		-----		-----	
494	EN14105	0.11		2.05	
511	D6584	0.083		0.98	
540	EN14105	0.05		-0.33	
551	D6584	0.070		0.47	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN14105	0.05		-0.33	
863		-----		-----	
1011		-----		-----	
1059	EN14105	0.06		0.07	
1134		-----		-----	
1135	EN14105	<0.10		-----	
1212	EN14105	0.11		2.05	
1299	EN14105	<0.10		-----	
1494	D6584	0.0705		0.49	
1564	EN14105	0.0616		0.13	
1569	EN14105	0		-2.31	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	D6584	0.076		0.70	
1826	EN14105	0.05		-0.33	
1878	EN14105	0.01		-1.92	
1994		-----		-----	
6069	D6584	0.06398		0.23	
6179	D6584	0.0638		0.22	
6192		-----		-----	
6258	EN14105	0.054		-0.17	
6259	D6584	0.061		0.11	
6265	EN14105	0.05		-0.33	
6276	EN14105	0.097		1.54	
6314		-----		-----	
6325	EN14105	0.05		-0.33	
6373	EN14105	<0.01		-----	
6447		-----		-----	
6456	EN14105	0.057		-0.05	
6510	EN14105	0.04		-0.72	
6526	EN14105	0.020		-1.52	
	normality	OK			
	n	24			
	outliers	0			
	mean (n)	0.05824			
	st.dev. (n)	0.026678			
	R(calc.)	0.07470			
	st.dev.(EN14105:20)	0.025186			
	R(EN14105:20)	0.07052			

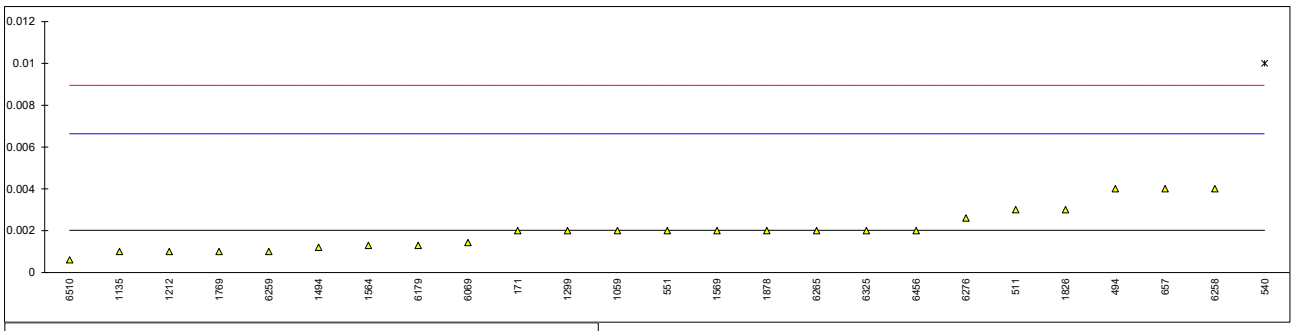

0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1569
1878
6526
445
6510
657
540
1826
6265
6325
6258
6456
1059
6259
1564
6179
6069
551
1494
1769
511
6276
494
1212

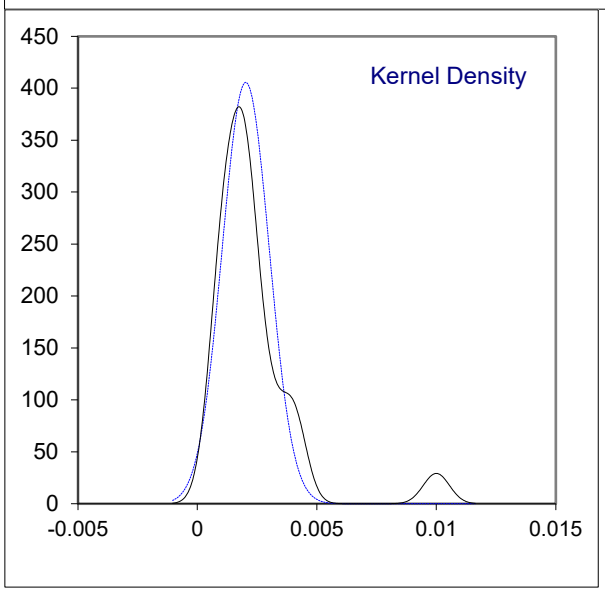

Kernel Density
25
20
15
10
5
0
-0.05
0
0.05
0.1
0.15

Determination of Free Glycerol on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14105	0.002		-0.01	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351	EN14105	< 0,005		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445		-----		-----	
460		-----		-----	
494	EN14105	0.004		0.86	
511	D6584	0.003		0.43	
540	EN14105	0.01	R(0.01)	3.45	
551	D6584	0.002		-0.01	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN14105	0.004		0.86	
863		-----		-----	
1011		-----		-----	
1059	EN14105	0.002		-0.01	
1134		-----		-----	
1135	EN14105	0.001		-0.44	
1212	EN14105	0.001		-0.44	
1299	EN14105	0.002		-0.01	
1494	D6584	0.0012		-0.35	
1564	EN14105	0.0013		-0.31	
1569	EN14105	0.002		-0.01	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	D6584	0.001		-0.44	
1826	EN14105	0.003		0.43	
1878	EN14105	0.002		-0.01	
1994		-----		-----	
6069	D6584	0.00143		-0.25	
6179	D6584	0.0013		-0.31	
6192		-----		-----	
6258	EN14105	0.004		0.86	
6259	D6584	0.001		-0.44	
6265	EN14105	0.002		-0.01	
6276	EN14105	0.0026		0.25	
6314		-----		-----	
6325	EN14105	0.002		-0.01	
6373	EN14105	<0.001		-----	
6447		-----		-----	
6456	EN14105	0.002		-0.01	
6510	EN14105	0.0006	C	-0.61	first reported 0.006
6526		-----		-----	

normality	OK
n	24
outliers	1
mean (n)	0.00202
st.dev. (n)	0.000984
R(calc.)	0.00275
st.dev.(EN14105:20)	0.002311
R(EN14105:20)	0.00647

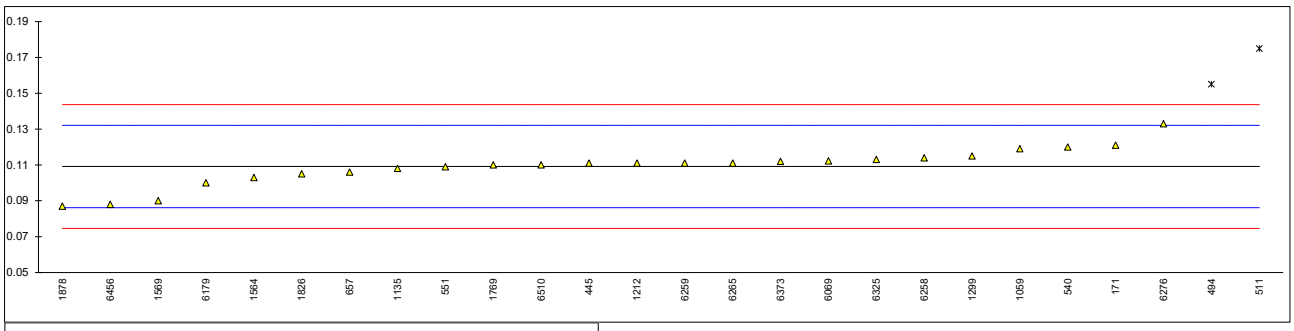

0.012
0.01
0.008
0.006
0.004
0.002
0
6510
1135
1212
1769
6259
1494
1564
6179
6069
171
1299
1069
551
1569
1878
6265
6325
6456
6276
511
1826
494
657
6258
540

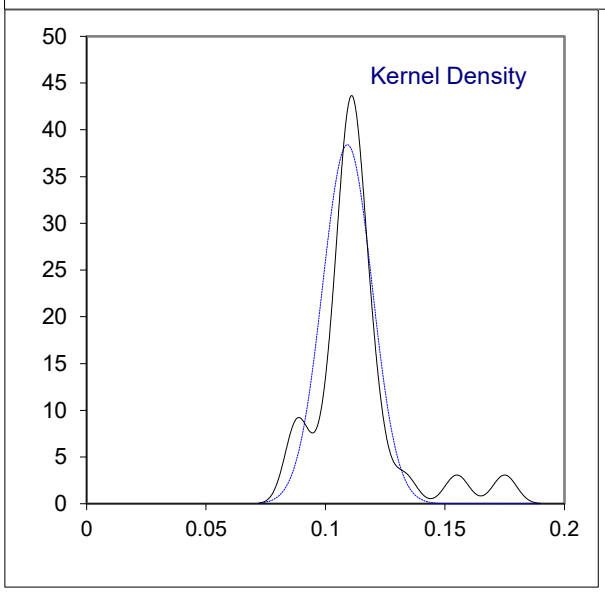

Kernel Density
450
400
350
300
250
200
150
100
50
0
-0.005
0
0.005
0.01
0.015

Determination of Total Glycerol on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14105	0.121		1.03	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334		-----		-----	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	EN14105	0.111		0.16	
460		-----		-----	
494	EN14105	0.155	R(0.01)	3.98	
511	D6584	0.175	R(0.01)	5.72	
540	EN14105	0.12		0.94	
551	D6584	0.109		-0.01	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN14105	0.106		-0.27	
863		-----		-----	
1011		-----		-----	
1059	EN14105	0.119		0.86	
1134		-----		-----	
1135	EN14105	0.108		-0.10	
1212	EN14105	0.111		0.16	
1299	EN14105	0.115		0.51	
1494		-----		-----	
1564	EN14105	0.103		-0.53	
1569	EN14105	0.090		-1.66	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769	D6584	0.110		0.08	
1826	EN14105	0.105		-0.36	
1878	EN14105	0.087		-1.92	
1994		-----		-----	
6069	D6584	0.11226		0.27	
6179	D6584	0.100		-0.79	
6192		-----		-----	
6258	EN14105	0.114		0.42	
6259	D6584	0.111		0.16	
6265	EN14105	0.111		0.16	
6276	EN14105	0.133		2.07	
6314		-----		-----	
6325	EN14105	0.113		0.34	
6373	EN14105	0.112		0.25	
6447		-----		-----	
6456	EN14105	0.088		-1.83	
6510	EN14105	0.110		0.08	
6526		-----		-----	

normality	suspect
n	24
outliers	2
mean (n)	0.1091
st.dev. (n)	0.01039
R(calc.)	0.0291
st.dev.(EN14105:20)	0.01152
R(EN14105:20)	0.0323

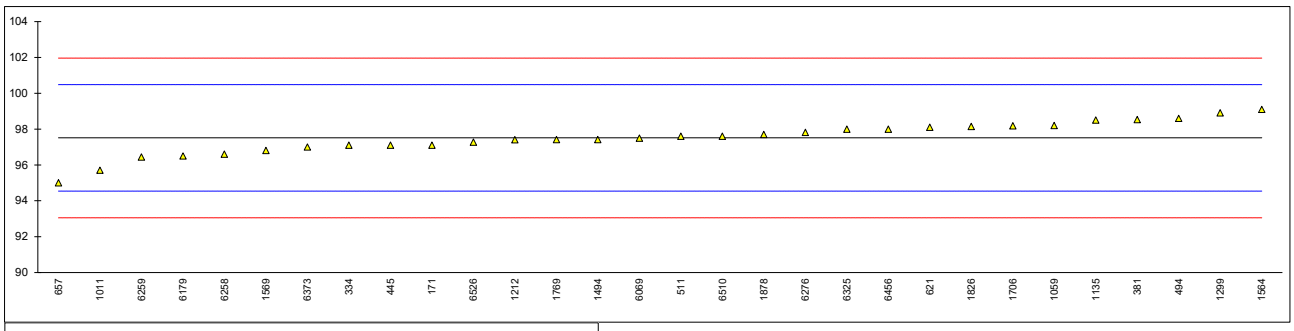

0.19
0.17
0.15
0.13
0.11
0.09
0.07
0.05
1878
6456
1569
6179
1564
1826
657
1135
551
1769
6510
445
1212
6259
6265
6373
6069
6325
6258
1299
1059
540
171
6276
494
511

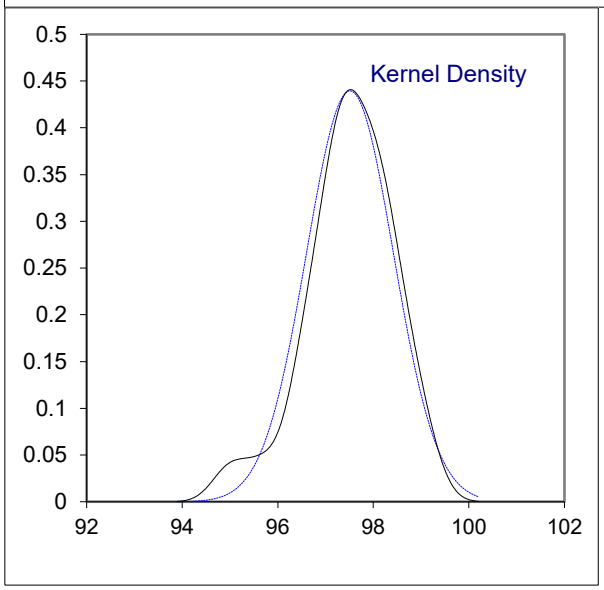

Kernel Density
50
45
40
35
30
25
20
15
10
5
0
0
0.05
0.1
0.15
0.2

Determination of Total Ester content (FAME) on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14103	97.1		-0.28	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334	EN14103:2020	97.1		-0.28	
335		-----		-----	
351		-----		-----	
381	EN14103:2020	98.53		0.69	
391		-----		-----	
396		-----		-----	
445	EN14103:2020	97.1		-0.28	
460		-----		-----	
494	EN14103:2020	98.6		0.73	
511	EN14103:2020	97.6		0.06	
540		-----		-----	
551		-----		-----	
558		-----		-----	
621	EN14103:2020	98.1		0.40	
631		-----		-----	
657	EN14103:2011	95		-1.69	
863		-----		-----	
1011	EN14103:2011	95.7		-1.22	
1059	EN14103:2020	98.2		0.46	
1134		-----		-----	
1135	EN14103:2011	98.5		0.67	
1212	EN14103:2020	97.4		-0.07	
1299	EN14103:2020	98.9		0.94	
1494	EN14103:2011	97.4150		-0.06	
1564	EN14103:2011	99.1		1.07	
1569	EN14103:2020	96.8		-0.48	
1634		-----		-----	
1643		-----		-----	
1706	EN14103:2011	98.180		0.45	
1769	EN14103:2020	97.41		-0.07	
1826	EN14103	98.15		0.43	
1878	EN14103:2020	97.7		0.13	
1994		-----		-----	
6069	EN14103:2020	97.500		-0.01	
6179	EN14103:2020	96.5		-0.68	
6192		-----		-----	
6258	EN14103:2020	96.6		-0.61	
6259	EN14103:2020	96.44		-0.72	
6265		-----		-----	
6276	EN14103:2011	97.82		0.21	
6314		-----		-----	
6325	EN14103:2011	98.0		0.33	
6373	EN14103:2011	97.0		-0.34	
6447		-----		-----	
6456	EN14103:2011	98.0		0.33	
6510	EN14103:2011	97.6		0.06	
6526	EN14103:2020	97.27		-0.16	

normality	OK
n	30
outliers	0
mean (n)	97.5105
st.dev. (n)	0.90795
R(calc.)	2.5423
st.dev.(EN14103:20)	1.48571
R(EN14103:20)	4.16

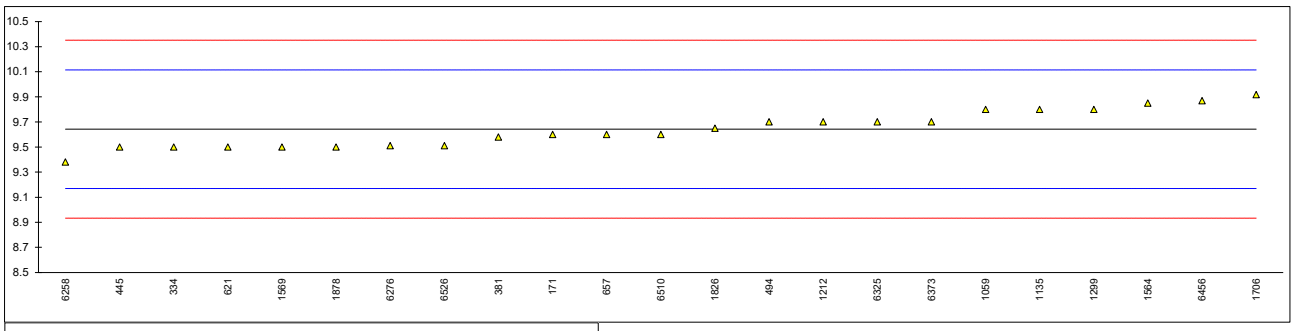

104
102
100
98
96
94
92
90
657
1011
6259
6179
6258
1569
6373
334
445
171
6526
1212
1769
1494
6069
511
6510
1878
6276
6325
6456
621
1826
1706
1059
1135
381
494
1299
1564

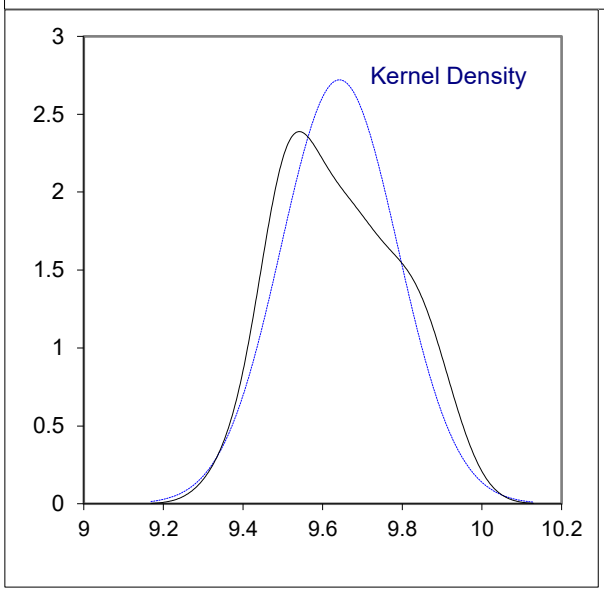

Kernel Density
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
92
94
96
98
100
102

Determination of Linolenic Acid Methyl Ester content on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14103	9.6		-0.18	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334	EN14103:2020	9.5		-0.60	
335		-----		-----	
351		-----		-----	
381	EN14103:2020	9.58		-0.26	
391		-----		-----	
396		-----		-----	
445	EN14103:2020	9.5		-0.60	
460		-----		-----	
494	EN14103:2020	9.7		0.24	
511		-----		-----	
540		-----		-----	
551		-----		-----	
558		-----		-----	
621	EN14103:2020	9.5		-0.60	
631		-----		-----	
657	EN14103:2011	9.6		-0.18	
863		-----		-----	
1011		-----		-----	
1059	EN14103:2020	9.8		0.67	
1134		-----		-----	
1135	EN14103:2011	9.8		0.67	
1212	EN14103:2020	9.7		0.24	
1299	EN14103:2020	9.8		0.67	
1494		-----		-----	
1564	EN14103:2011	9.85		0.88	
1569	EN14103:2020	9.5		-0.60	
1634		-----		-----	
1643		-----		-----	
1706	EN14103:2011	9.918		1.17	
1769		-----		-----	
1826	EN14103	9.65		0.03	
1878	EN14103:2020	9.5		-0.60	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	EN14103:2020	9.38		-1.11	
6259		-----		-----	
6265		-----		-----	
6276	EN14103:2011	9.51		-0.56	
6314		-----		-----	
6325	EN14103:2011	9.7		0.24	
6373	EN14103:2011	9.7		0.24	
6447		-----		-----	
6456	EN14103:2011	9.87		0.96	
6510	EN14103:2011	9.6		-0.18	
6526	EN14103:2020	9.51		-0.56	

normality	OK
n	23
outliers	0
mean (n)	9.6421
st.dev. (n)	0.14667
R(calc.)	0.4107
st.dev.(EN14103:20)	0.23643
R(EN14103:20)	0.6620

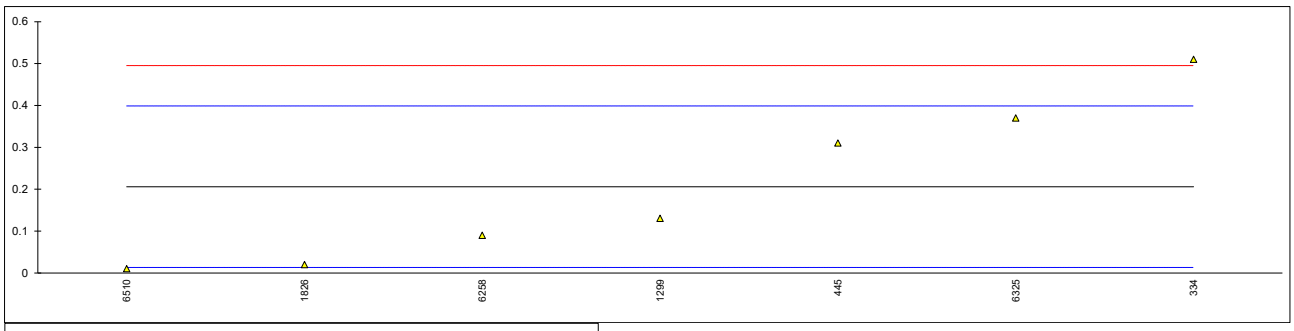

10.5
10.3
10.1
9.9
9.7
9.5
9.3
9.1
8.9
8.7
8.5
6258
445
334
621
1569
1878
6276
6526
381
171
657
6510
1826
494
1212
6325
6373
1059
1135
1299
1564
6456
1706

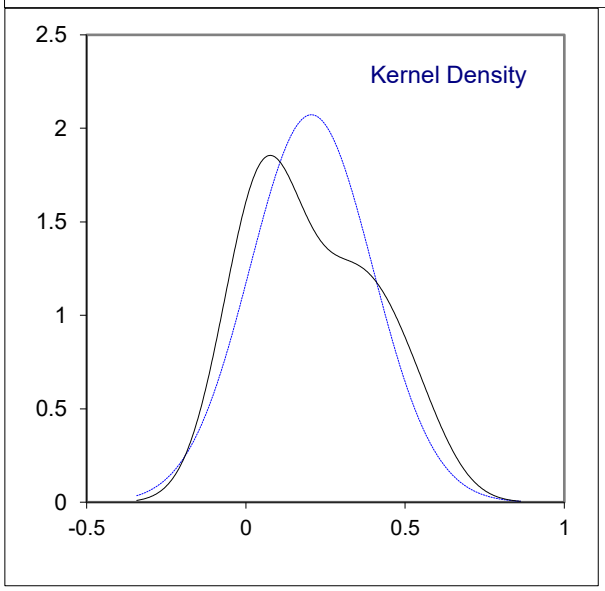

Kernel Density
3
2.5
2
1.5
1
0.5
0
9
9.2
9.4
9.6
9.8
10
10.2

Determination of Polyunsaturated (multiple double bonds) Methyl Esters on sample #23060; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN15779	<0.30		-----	
300		-----		-----	
323		-----		-----	
328		-----		-----	
334	EN15779	0.51		3.16	
335		-----		-----	
351		-----		-----	
381		-----		-----	
391		-----		-----	
396		-----		-----	
445	EN15779	0.31		1.08	
460		-----		-----	
494		-----		-----	
511		-----		-----	
540		-----		-----	
551		-----		-----	
558		-----		-----	
621		-----		-----	
631		-----		-----	
657	EN15779	<0.60		-----	
863		-----		-----	
1011		-----		-----	
1059		-----		-----	
1134		-----		-----	
1135	EN15779	<0.60		-----	
1212		-----		-----	
1299	EN15779	0.13		-0.79	
1494		-----		-----	
1564		-----		-----	
1569		-----		-----	
1634		-----		-----	
1643		-----		-----	
1706		-----		-----	
1769		-----		-----	
1826	EN15779	0.02		-1.93	
1878	EN15779	<0.60		-----	
1994		-----		-----	
6069		-----		-----	
6179		-----		-----	
6192		-----		-----	
6258	EN15779	0.09		-1.20	
6259		-----		-----	
6265		-----		-----	
6276		-----		-----	
6314		-----		-----	
6325	EN15779	0.37		1.70	
6373	EN15779	<0.60		-----	
6447		-----		-----	
6456	Calculated	<0,6		-----	
6510	EN15779	0.01		-2.03	
6526		-----		-----	

normality	unknown
n	7
outliers	0
mean (n)	0.2057
st.dev. (n)	0.19251
R(calc.)	0.5390
st.dev.(EN15779:09+A1:13)	0.09643
R(EN15779:09+A1:13)	0.27

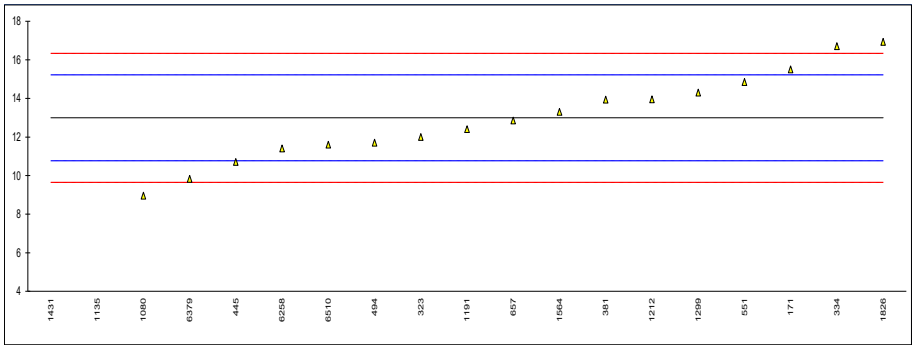

0.6
0.5
0.4
0.3
0.2
0.1
0
6510
1828
6258
1299
445
6325
334

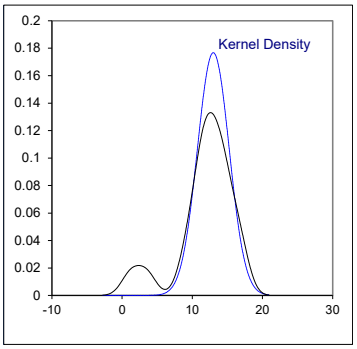

Kernel Density
2.5
2
1.5
1
0.5
0
-0.5
0
0.5
1

Determination of sum of Calcium and Magnesium as Ca + Mg on sample #23061; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14538	15.5		2.25	
300		-----		-----	
323	EN14538	12.0	C	-0.89	first reported 6.0
334	EN14538	16.7		3.32	
381	D7111	13.93		0.84	
445	EN14538	10.7		-2.06	
494	EN14538	11.7		-1.16	
540		-----		-----	
551	UOP389	14.85		1.66	
657	EN14538	12.85		-0.13	
1080	EN14538	8.96		-3.62	
1134		-----		-----	
1135	EN14538	3.5	DG(0.01)	-8.51	
1191	D5185	12.403		-0.53	
1212	EN14538	13.95		0.86	
1299	EN14538	14.3		1.17	
1431		1.219	DG(0.01)	-10.56	
1564	EN14538	13.30		0.27	
1643		-----	W	-----	test result withdrawn, reported 34.179
1826	EN14538	16.927		3.53	
6258	EN14538	11.4		-1.43	
6265		-----		-----	
6276		-----		-----	
6373		-----		-----	
6379	D8110	9.8305		-2.84	
6510	EN14538	11.6		-1.25	

normality	OK
n	17
outliers	2
mean (n)	12.994
st.dev. (n)	2.2580
R(calc.)	6.322
st.dev.(EN14538:06)	1.1150
R(EN14538:06)	3.122

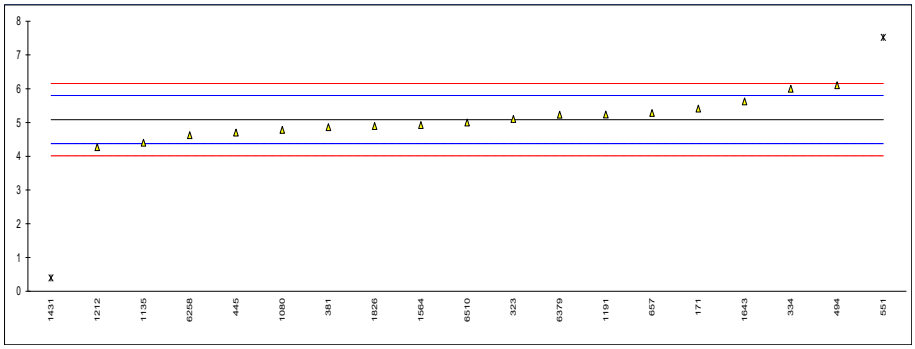


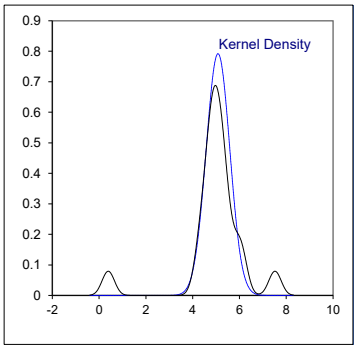


Determination of Phosphorus as P on sample #23061; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	D4951	5.41	C	0.91	first reported 54.1
300		-----		-----	
323	EN14107	5.1	C	0.05	first reported <4.0
334	EN14107	6		2.56	
381	EN14107	4.86		-0.63	
445	EN14107	4.7		-1.07	
494	EN14107	6.1		2.84	
540		-----		-----	
551	UOP389	7.52	G(0.01)	6.81	
657	EN14107	5.28		0.55	
1080	D4951	4.78		-0.85	
1134		-----		-----	
1135	EN14107	4.4		-1.91	
1191	D5185	5.235		0.42	
1212	EN14107	4.27		-2.28	
1299		-----		-----	
1431		0.395	G(0.01)	-13.11	
1564	EN14107	4.92		-0.46	
1643	D5185	5.625		1.51	
1826	EN14107	4.8915		-0.54	
6258	EN14107	4.62		-1.30	
6265		-----		-----	
6276		-----		-----	
6373		-----		-----	
6379	D8110	5.2305		0.41	
6510	EN14107	5.0		-0.23	

normality	OK
n	17
outliers	2
mean (n)	5.084
st.dev. (n)	0.5037
R(calc.)	1.410
st.dev.(EN14107:03)	0.3575
R(EN14107:03)	1.001

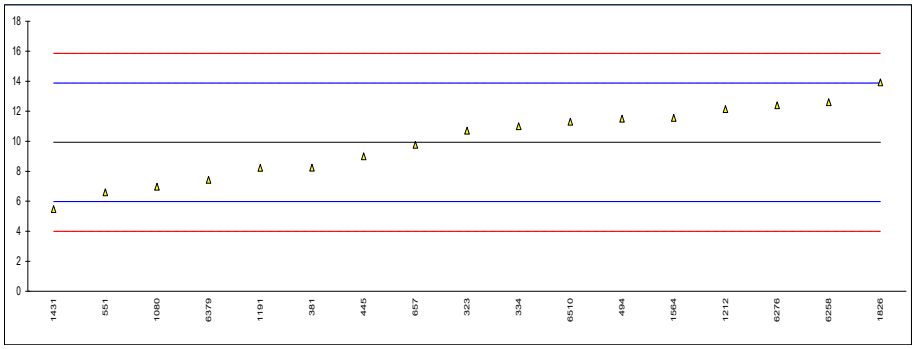


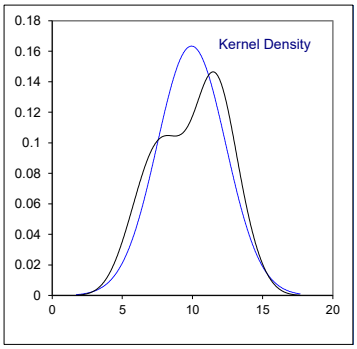


Determination of Potassium as K on sample #23061; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14538	>10		-----	
300		-----		-----	
323	EN14109	10.7	C	0.39	first reported 5.4
334	EN14538	11		0.54	
381	D7111	8.23		-0.86	
445	EN14538	9.0		-0.47	
494	EN14109	11.5		0.79	
540		-----		-----	
551	UOP389	6.59		-1.69	
657	EN14538	9.76		-0.09	
1080	EN14538	6.97		-1.50	
1134		-----		-----	
1135		-----		-----	
1191	D8110	8.2274		-0.86	
1212	EN14538	12.14		1.12	
1299		-----		-----	
1431		5.470		-2.26	
1564	EN14538	11.55		0.82	
1643		-----	W	-----	test result withdrawn, reported 15.03
1826	EN14109	13.92		2.02	
6258	EN14538	12.6		1.35	
6265		-----		-----	
6276	In house	12.4		1.25	
6373		-----		-----	
6379	D8110	7.4315		-1.26	
6510	EN14109	11.3		0.69	

normality	OK
n	17
outliers	0
mean (n)	9.929
st.dev. (n)	2.4427
R(calc.)	6.840
st.dev.(EN14109:03)	1.9772
R(EN14109:03)	5.536

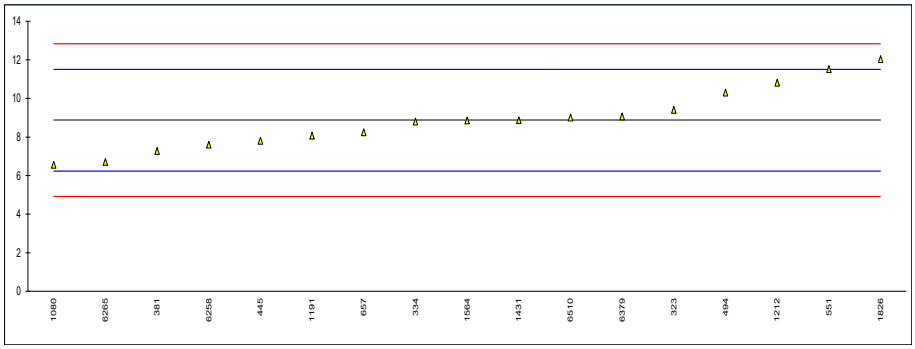


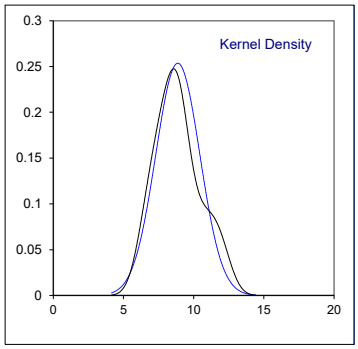


Determination of Sodium as Na on sample #23061; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14538	>10		-----	
300		-----		-----	
323	EN14108	9.4	C	0.40	first reported 4.8
334	EN14538	8.8		-0.06	
381	D7111	7.27		-1.22	
445	EN14538	7.8		-0.82	
494	EN14108	10.3		1.08	
540		-----		-----	
551	UOP389	11.52		2.01	
657	EN14538	8.24		-0.48	
1080	EN14538	6.56		-1.76	
1134		-----		-----	
1135		-----		-----	
1191	D8110	8.0639		-0.62	
1212	EN14538	10.81		1.47	
1299		-----		-----	
1431		8.870		0.00	
1564	EN14538	8.85		-0.02	
1643		-----	W	-----	test result withdrawn, reported 13.14
1826	EN14108	12.03		2.39	
6258	EN14538	7.6		-0.97	
6265	EN14538	6.7	C	-1.65	first reported 3.5
6276		-----		-----	
6373		-----		-----	
6379	D8110	9.0590		0.14	
6510	EN14108	9.0		0.09	

normality	OK
n	17
outliers	0
mean (n)	8.875
st.dev. (n)	1.5725
R(calc.)	4.403
st.dev.(EN14108:03)	1.3175
R(EN14108:03)	3.689

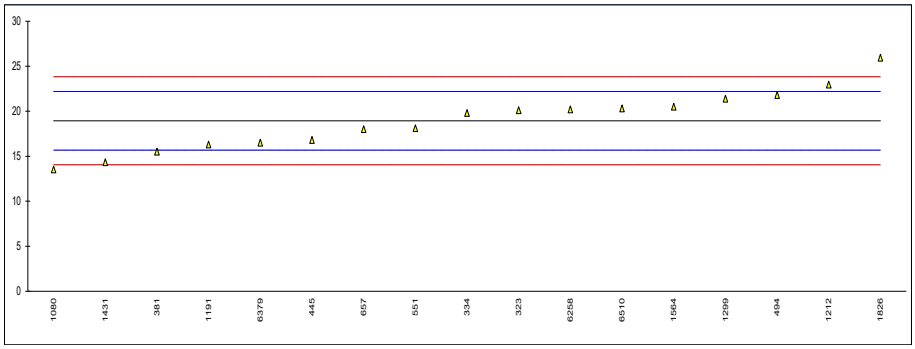


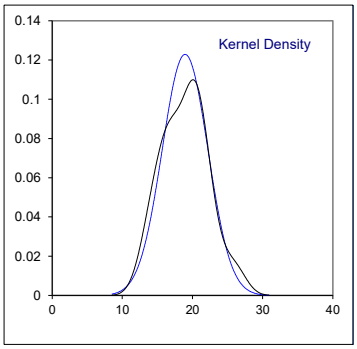


Determination of Sum of Potassium and Sodium as K + Na on sample #23061; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
171	EN14538	>10		-----	
300		-----		-----	
323	EN14538	20.1	C	0.71	first reported 10.2
334	EN14538	19.8		0.53	
381	D7111	15.5		-2.12	
445	EN14538	16.8		-1.32	
494	EN14538	21.8		1.75	
540		-----		-----	
551	UOP389	18.11		-0.51	
657	EN14538	18		-0.58	
1080	EN14538	13.53		-3.33	
1134		-----		-----	
1135		-----		-----	
1191	D8110	16.2913		-1.63	
1212	EN14538	22.95		2.46	
1299	EN14538	21.4		1.51	
1431		14.34		-2.83	
1564	EN14538	20.5		0.96	
1643		-----	W	-----	test result withdrawn, reported 28.17
1826	EN14538	25.95		4.30	
6258	EN14538	20.2		0.77	
6265		-----		-----	
6276		-----		-----	
6373		-----		-----	
6379	D8110	16.4905		-1.51	
6510	EN14538	20.3		0.83	

normality	OK
n	17
outliers	0
mean (n)	18.945
st.dev. (n)	3.2484
R(calc.)	9.096
st.dev.(EN14538:06)	1.6284
R(EN14538:06)	4.559





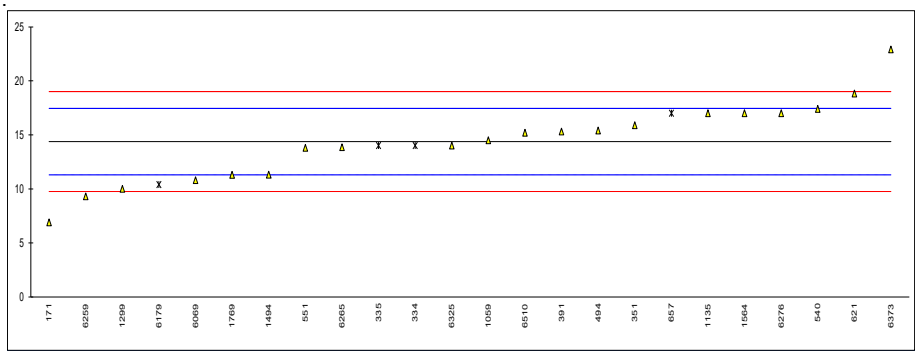
Determination of Total Contamination on sample #23062; results in mg/kg

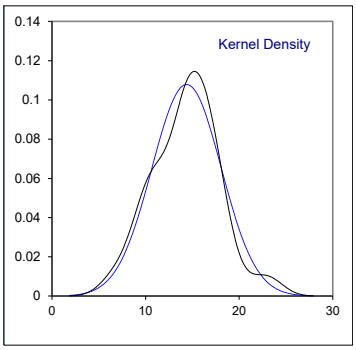
lab	method	value	mark	z(targ)	Complete	Vol.filtered (mL)	Stopped (min)
150		-----		-----		-----	-----
171	EN12662:2008	6.9		-4.86		300	6.65
300		-----		-----		-----	-----
323	EN12662:2008	< 12.0		-----	Yes	-----	-----
334	EN12662:2014	14	ex	-0.25	Yes	-----	-----
335	EN12662:2014	14.0	ex	-0.25	Yes	-----	-----
351	EN12662:1998	15.9		0.98	Yes	300	yes
391	EN12662:2008	15.3		0.59	Yes	-----	-----
445		-----		-----		-----	-----
494	EN12662:1998	15.4		0.66		-----	-----
540	EN12662:1998	17.4		1.96	Yes	400	12
551	EN12662:2008	13.8		-0.38	Yes	300	-----
621	EN12662:2008	18.83		2.88	Yes	300	-----
657	EN12662:2014	17.0	ex	1.70	Yes	300	-----
1059	EN12662:1998	14.5		0.07	Yes	-----	-----
1134		-----		-----		-----	-----
1135	EN12662:1998	17		1.70	Yes	300	1.02
1212		-----		-----		-----	-----
1299	EN12662:1998	10.0		-2.85	Yes	300	-----
1494	EN12662:2008	11.312		-1.99	Yes	800	-----
1564	EN12662:2008	17		1.70	Yes	800	25
1769	EN12662:2008	11.30		-2.00	Yes	800	-----
1826		-----		-----		-----	-----
6069	EN12662:2008	10.80		-2.33		-----	-----
6179	EN12662:2014	10.40	ex	-2.59	Yes	-----	-----
6259	EN12662:2008	9.31		-3.29		-----	-----
6265	EN12662:1998	13.86		-0.34	Yes	369	5
6276	EN12662:1998	17		1.70		-----	-----
6314		-----		-----		-----	-----
6325	EN12662:1998	14		-0.25	Yes	-----	-----
6373	EN12662:1998	22.9		5.52	Yes	-----	-----
6510	EN12662:1998	15.2		0.53	Yes	-----	-----

normality	OK
n	20
outliers	0 +4ex
mean (n)	14.386
st.dev. (n)	3.7013
R(calc.)	10.364
st.dev.(EN12662:08)	1.5413
R(EN12662:08)	4.316

ex = excluded from statistical analysis. Test result has been excluded because EN12662:2014 is not applicable to FAME (B100) according to CEN/TC 19 Committee, instead either method EN12662:1998 or EN12662:2008 should be used. See also iis memo 1903.

.

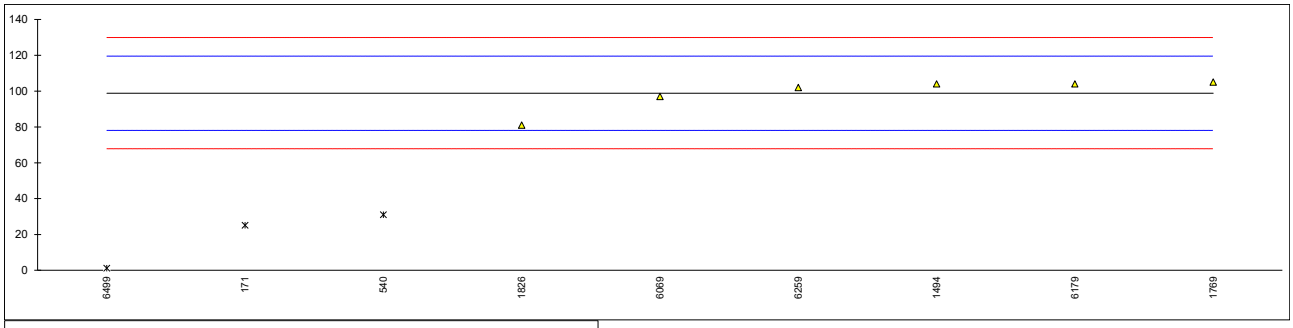


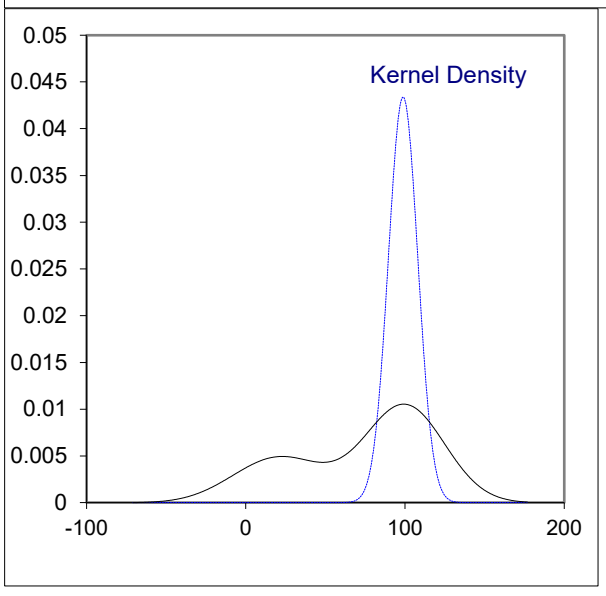


Determination of Filter Blocking Potential by Cold Soak Filterability Test (CSFT) on sample #23063; results in s

lab	method	value	mark	z(targ)	Vol. (mL) at time >720sec	remarks
150		-----		-----	-----	
171	D7501	25	DG(0.01)	-7.13	<1	
323		-----		-----	-----	
494		-----		-----	-----	
540	D7501	31	DG(0.01)	-6.55	0	
657		-----		-----	-----	
1082		-----		-----	-----	
1134		-----		-----	-----	
1135		-----		-----	-----	
1191		-----		-----	-----	
1212		-----		-----	-----	
1402		-----		-----	-----	
1494	D7501	104		0.50	-----	
1769	D7501	105		0.60	-----	
1826	D7501	81		-1.72	300	
1953		-----		-----	-----	
6069	D7501	97.0		-0.18	-----	
6179	D7501	104		0.50	-----	
6259	D7501	102		0.31	-----	
6265		-----		-----	-----	
6276		-----		-----	-----	
6499	IP PM-EA	1.05	ex	-9.44	300	see below table
	normality	not OK				
	n	6				
	outliers	2 +1ex				
	mean (n)	98.83				
	st.dev. (n)	9.196				
	R(calc.)	25.75				
	st.dev.(D7501:22)	10.357				
	R(D7501:22)	29.00				

Lab 6499: IP PM-EA reports Filter Blocking Tendency and not Filter Blocking Potential

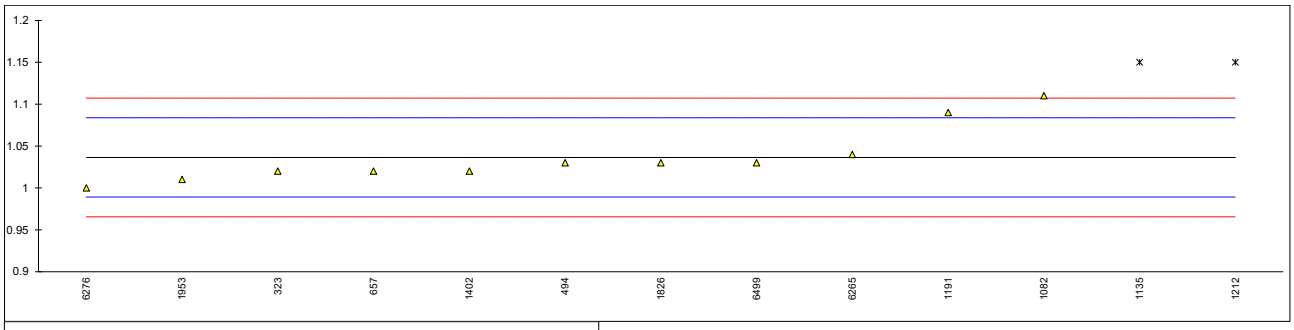


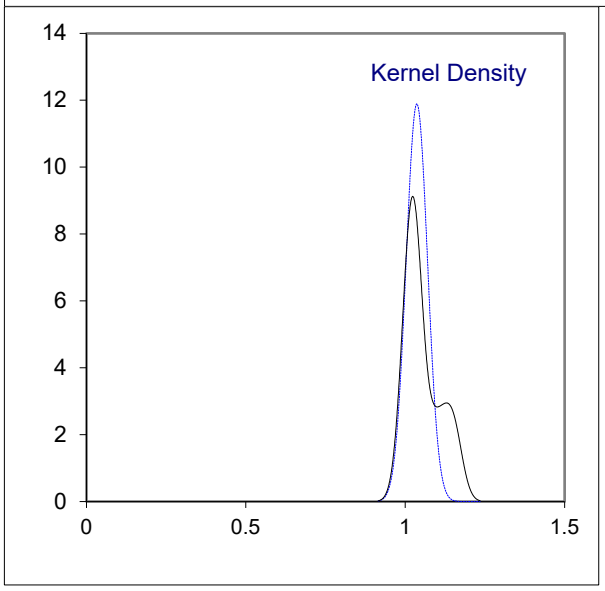


Determination of Filter Blocking Tendency (FBT) on sample #23063

lab	method	value	mark	z(targ)	press. End test (kPa)	vol. pumped (mL)	remarks
150		-----		-----	-----	-----	
171		-----		-----	-----	-----	
323	D2068-B	1.02		-0.69	20	300	
494	D2068-B	1.03		-0.27	25	300	
540		-----		-----	-----	-----	
657	IP387-B	1.02		-0.69	20	300	
1082	IP387-A	1.11		3.12	50	300	
1134		-----		-----	-----	-----	
1135	IP387-B	1.15	DG(0.05)	4.81	58	300	
1191	IP387-B	1.09		2.27	45	300	
1212	IP387-B	1.15	DG(0.05)	4.81	60	300	
1402	IP387-B	1.02		-0.69	20	300	
1494		-----		-----	72	-----	
1769		-----		-----	-----	-----	
1826	D2086-B	1.03		-0.27	25	300	
1953	D2068-A	1.01		-1.12	-----	-----	
6069		-----		-----	-----	-----	
6179		-----		-----	-----	-----	
6259		-----		-----	-----	-----	
6265	IP387-B	1.04		0.15	30	310	
6276		1.00		-1.54	-----	-----	
6499	IP387-B	1.03		-0.27	25	-----	

	normality	not OK
	n	11
	outliers	2
	mean (n)	1.036
	st.dev. (n)	0.0335
	R(calc.)	0.094
	st.dev.(D2068-B:20)	0.0236
	R(D2068-B:20)	0.066
Compare		
	IP387-B:14R22	0.066





APPENDIX 2

Number of participants per country

2 labs in ARGENTINA
1 lab in AUSTRIA
3 labs in BELGIUM
2 labs in BRAZIL
1 lab in CHINA, People's Republic
5 labs in COLOMBIA
3 labs in FINLAND
4 labs in FRANCE
1 lab in GERMANY
4 labs in GREECE
1 lab in HUNGARY
1 lab in INDONESIA
3 labs in ITALY
4 labs in NETHERLANDS
1 lab in PERU
1 lab in PHILIPPINES
3 labs in PORTUGAL
1 lab in SERBIA
1 lab in SINGAPORE
1 lab in SLOVENIA
6 labs in SPAIN
2 labs in SWEDEN
7 labs in UNITED KINGDOM
2 labs in UNITED STATES OF AMERICA

APPENDIX 3

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
8 J.N. Miller, Analyst, 118, 455, (1993)
9 Analytical Methods Committee, Technical Brief, No 4, January 2001
10 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)
11 W. Horwitz and R. Albert, J. AOAC Int, 79, 3, 589-621, (1996)
12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)
13 Letter of CEN: CEN/TC 19 explanation on total contamination test result and applicability for FAME, dated 16-9-2015 and issued by Ortwin Costenoble on behalf of Liesbeth Jansen (CEN/TC 19 Chairman) and Nigel Elliot (CEN/TC 19/WG 24 Convenor).
14 iis memo 1903, Biodiesel B100 (100% FAME) for Total Contamination EN12662.