

**Results of Proficiency Test
Biodiesel 100% FAME (B100)
May 2017**

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1991, the Institute for Interlaboratory Studies organises every year proficiency tests (PT) for Fatty Acid Methyl Esters (FAME) used as Biodiesel B100. In the annual proficiency testing program of 2016/2017, it was decided to continue the May proficiency tests on Biodiesel B100 in accordance with the latest applicable version of ASTM D6751 specification and additional tests (e.g. EN14214:2012+A1:2014/AC:2014).

In these interlaboratory studies, in total, 44 laboratories from 23 different countries registered for participation. See appendix 2 for a list of number of participants per study and per country. In this report the results of the 2017 Biodiesel B100 ASTM proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

In this proficiency test on Biodiesel B100, a sample of Rapeseed methyl ester was used. Sample analyses for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. In this proficiency test, the participants received, depending on the registration, from one up to five different samples of Biodiesel B100, see table below.

Samples	Amount in L	Purpose	Spiked
#17065	1.5	For regular analysis	--
#17066	2	Cetane Number &DCN	--
#17067	0.1	Analysis of Phosphorus, Potassium, Sodium and Calcium & Magnesium	Phosphorus, Sodium, Calcium
#17068	1	Total Contamination test	Arizona dust
#17069	0.5	Cold Soak Test / Filter Blocking	--

Table 1: five different Biodiesel B100 samples used in iis17G02ASTM

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

2.1 ACCREDITATION

The Institute for Interlaboratory Studies (iis) in Spijkensisse, the Netherlands, is accredited in agreement with ISO/IEC 17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). These PTs fall 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 organisation 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 March 2017 (iis-protocol, version 3.4). 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

The necessary bulk material, 2 drums, with in total approximately 400 L of Biodiesel (100% RME) for this PT was obtained from an European producer.

Biodiesel B100 #17065

After fit-for-use testing and homogenisation of one drum, 64 amber glass bottles of 1L and 64 amber glass bottles of 0.5L, were filled, closed with inner and outer caps and labelled #17065. The homogeneity of the subsamples #17065 was checked by the determination of Density in accordance with ASTM D4052 on 8 stratified randomly selected samples:

	Density at 15°C in kg/m ³
sample #17065-1	881.92
sample #17065-2	881.90
sample #17065-3	881.91
sample #17065-4	881.91
sample #17065-5	881.90
sample #17065-6	881.90
sample #17065-7	881.89
sample #17065-8	881.89

Table 2: homogeneity test results of subsamples #17065

From the above test results, the calculated repeatability was calculated and compared with 0.3 times the reproducibilities (R) 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 (ref. test method)	0.15

Table 3: evaluation of the repeatability of subsamples #17065

Biodiesel B100 Cetane Number #17066

After fit-for-use testing and homogenisation of the second drum, 68 amber glass bottles of 1L were filled, closed with inner and outer caps and labelled #17066. The homogeneity of the subsamples #17066 was checked by the determination of Density in accordance with ASTM D4052 on 8 stratified randomly selected samples:

	Density at 15°C in kg/m ³
sample #17066-1	882.93
sample #17066-2	882.92
sample #17066-3	882.93
sample #17066-4	882.93
sample #17066-5	882.93
sample #17066-6	882.92
sample #17066-7	882.93
sample #17066-8	882.92

Table 4: homogeneity test results of subsamples #17066

From the above test results, the calculated repeatability was calculated and compared with 0.3 times the reproducibilities (R) 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 (ref. test method)	0.15

Table 5: evaluation of the repeatability of subsamples #17066

Metals in Biodiesel B100 #17067

From the remaining batch used for sample #17065, approx. 6 litres (5.3 kg) were spiked with Calcium (approx. 6 mg/kg), Phosphorus (approx. 9 mg/kg) and Sodium (approx. 6 mg/kg). After homogenisation, the material was subsequently divided over 59 HDPE bottles of 0.1L and labelled #17067. The homogeneity of the subsamples #17067 was checked by determination of Phosphorus in accordance with EN14107 and Sodium in accordance with EN14214 on 8 stratified randomly selected samples:

	Phosphorus in mg/kg	Sodium in mg/kg
sample #17067-1	8.4	5.2
sample #17067-2	8.6	5.0
sample #17067-3	8.6	5.0
sample #17067-4	8.3	5.1
sample #17067-5	8.5	5.0
sample #17067-6	8.4	5.0
sample #17067-7	8.4	5.0
sample #17067-8	8.4	5.1

Table 6: homogeneity test results of subsamples #17067

From the above test results, the calculated repeatability was calculated and compared with 0.3 times the reproducibilities (R) of the reference test method in agreement with the procedure of ISO13528, Annex B2 in the next table:

	Phosphorus in mg/kg	Sodium in mg/kg
r (observed)	0.3	0.2
reference test method	EN14107:03	EN14214:14
0.3 x R (ref. test method)	0.5	1.1

Table 7: evaluation of the repeatability of subsamples #17067

Total Contamination #17068

Into 41 amber glass bottles 1 ml of a freshly prepared and ultrasonically homogenized 15 g/kg Arizona Dust in oil suspension was pipetted. The addition was checked by weighing each bottle before and after the addition of the oil suspension. Subsequently, each bottle with inner and outer caps was filled with one litre Biodiesel B100, coming from the remaining batch used for sample #17065. The bottles were labelled #17068.

Cold Soak Test / Filter Blocking Tendency #17069

From the remaining batch used for the Cetane Number of Biodiesel, 25 litres were used to fill 48 bottles of 0.5 litre amber glass bottles and labelled #17069. The homogeneity of the subsamples was checked by the determination of density in accordance with ASTM D4052 on 8 stratified randomly selected samples.

	Density at 15°C in kg/m ³
sample #17069-1	882.92
sample #17069-2	882.92
sample #17069-3	882.91
sample #17069-4	882.92
sample #17069-5	882.92
sample #17069-6	882.92
sample #17069-7	882.93
sample #17069-8	882.93

Table 8: homogeneity test results of subsamples #17069

From the above test results, the calculated repeatability was calculated and compared with 0.3 times the reproducibilities (R) 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)	0.02
reference test method	ISO12185:96
0.3 x R (ref. test method)	0.15

Table 9: evaluation of the repeatability of subsamples #17069

The calculated repeatabilities for sample #17065, #17066, #17067, #17068 and #17069 were less than 0.3 times the corresponding reproducibility of the respective reference method. Therefore, homogeneity of the subsamples was assumed.

Depending on the registration of the participant, one 1 litre bottle and 0.5 litre bottle both labelled #17065, two 1 litre bottles labelled #17066, a 100mL bottle labelled #17067, a 1 litre bottle labelled #17068 and/or a 0.5 litre bottle labelled #17069, were dispatched to each of the participating laboratories on April 12, 2017.

2.5 STABILITY OF THE SAMPLES

The stability of the Biodiesel B100, packed in the brown glass bottles, was checked. The material has been found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The tests methods to be used by the participating laboratories should be in accordance with the requirements of ASTM D6751:15 and additional tests (e.g. EN14214:12+A1:14/AC:14):

Parameter	ASTM D6751:15	Parameter	EN14214:12
Acid Number	ASTM D664	Acid Value *)	EN14104 *)
Carbon Residue on 100% FAME	ASTM D4530		
		CFPP	EN116
Cloud Point	ASTM D2500		
Copper Strip Corrosion	ASTM D130	Copper Strip Corrosion	ISO2160
		Density at 15°C	ISO12185
Flash Point	ASTM D93	Flash Point (Recc) *)	ISO3679 *)
		Flash Point (PMcc)	ISO2719
		Iodine Value	EN14111
Kin. Visc. at 40°C	ASTM D445	Kin. Visc. at 40°C	ISO3104
Oxidation Stability	EN15751	Oxidation Stability	EN14112
Sulphated Ash	ASTM D874	Sulphated Ash	ISO3987
Sulphur	ASTM D5453	Sulphur	ISO20846
Water and Sediment	ASTM D2709	Water	ISO12937
Calcium + Magnesium	EN14538	Calcium + Magnesium	EN14538
Phosphorus	ASTM D4951	Phosphorus	EN14107
		Polyunsaturated esters *)	EN15779 *)
Potassium + Sodium	EN14538	Potassium + Sodium	EN14108/14109
Methanol	EN14110	Methanol	EN14110
		mono-, di-, tri-Glycerides	EN14105
Free + Total Glycerin	ASTM D6584	Free + Total Glycerol	EN14105
		FAME content *)	EN14103 *)
		Linolenic Acid *)	EN14103 *)
Distillation; 90% recovered	D1160		
Total Contamination	D7321	Total Contamination	EN12662
Cold Soak Filterability	ASTM D7501		

Table 10: requirements and test methods acc. to specifications ASTM D6751:15 and EN14214:12+A1:14/AC:14

*) not evaluated in this ASTM based round robin

It was explicitly requested to treat the samples as if they were routine samples. Therefore, each laboratory is advised to perform only those analyses that normally are done in daily routine (but the laboratories are allowed to do all analyses). Furthermore, it was requested to report the test results using the indicated units on the report form and not to round the test results, but report as much significant figures as possible. It was also requested not to

report 'less than' test results, which are above the detection limit, because such test results cannot be used for meaningful statistical evaluations.

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

3 RESULTS

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

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of March 2017 (iis-protocol, version 3.4).

For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<...' or '>...' were not used in the statistical evaluation.

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

According to ISO 5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. When the uncertainty passed the evaluation, no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

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

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle. Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also a normal Gauss curve was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

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

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

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

The z-scores were calculated according to:

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

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

Absolute values for $z < 2$ are very common and absolute values for $z > 3$ are very rare.

The usual interpretation of z-scores is as follows:

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

4 EVALUATION

In this proficiency test several problems were encountered during the execution.

For the regular Biodiesel PT (#17065): 3 participants reported test results after the final reporting date and 3 other participant did not report any test results at all.

For the Cetane Number PT (#17066): 1 participant reported test results after the final reporting date and 3 other participant did not report any test results at all.

For the Total Contamination PT: 2 participants reported the test result after the final reporting date and 3 participants did not report any test results at all.

For the Metals in Biodiesel PT: 1 participant reported the test results after the final reporting date and 4 participants did not report any test results at all.

For the Filter Blocking PT: 1 participant reported a result after the final reporting date and 6 participants did not report any test results at all.

Finally, in total 449 numerical test results were reported by the participants. Observed were 11 outlying results, which is 2.5%. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section, the reported test results are discussed per sample and per test. The specified test methods and requirements ASTM D6751:15 and additional tests (e.g. EN14214:12+A1:14/AC:14) which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These methods are also in the tables together with the reported data. The abbreviations, used in these tables, are listed in appendix 3.

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

In the iis PT reports, ASTM methods are referred to with a number (e.g. D6371) and an added designation for the year that the method was adopted or revised (e.g. D6371:05). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g.

D6371:05(2010)). In the results tables of Appendix 1 only the method number and year of adoption or revision e.g. D6371:05 will be used.

For Biodiesel B100 sample #17065

Acid Number: (ASTM) This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D664:11ae1 (method B).

Cloud Point: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D2500:16b.

CFPP: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6371:16.

Carbon Residue on 100%: All reported results were near or below the applicable lower limit of D4530:15 (0.1%M/M). Therefore no significant conclusions were drawn.

Copper Strip Corrosion: No problems have been observed. All participants agreed on a test result of 1.

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

Flash Point PMcc: This determination was not problematic. No statistical outliers were observed, but three test results were excluded from statistical calculations as the used test method is not comparable with ASTM D93. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D93C:15.

Iodine Value: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of EN14111:03.

Kin.Visco. at 40°C: The determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D445:17.

Oxidation Stability: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of EN15751:14.

- Sulphated Ash: All reported results were near or below the applicable lower limit of ASTM D874:13a and/or ISO3987:10 (0.005% M/M). Therefore no significant conclusions were drawn.
- Sulphur: This determination was problematic at a low level of 1.6 mg/kg. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D5453:16e1.
- Water: This determination was not problematic. Three statistical outliers were observed. However the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D6304:16e1.
- Water and Sediment: All reported results were near or below the applicable lower limit of ASTM D2709:96(2011). Therefore no significant conclusions were drawn.
- Distillation: Only three laboratories reported test results, therefore no significant conclusions were drawn.
- Methanol: This determination was problematic for a number of laboratories. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of EN14110:03.
- mono-Glycerides: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6584:13.
- di-Glycerides: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6584:13.
- tri-Glycerides: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6584:13.
- Free Glycerine: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6584:13.
- Total Glycerine: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6584:13.

For Biodiesel B100 sample #17066: Cetane Number

Cetane Number: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D613:16a.

Derived Cetane Number: In total only three laboratories reported test results, therefore no significant conclusions were drawn.

For Biodiesel B100 sample #17067: Metals

Calcium and Magnesium: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not 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. The samples were spiked with Phosphorus. The average recovery of Phosphorus (theoretical increment of 8.99 mg/kg) may be excellent: "less than 100%". The actual blank concentration for Phosphorus is unknown.

Potassium All reported results were near or below the applicable lower limit of EN14214:14. Therefore no significant conclusions were drawn.

Sodium This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of EN14214:12+A1:2014/AC:2014 and with the requirements of EN14108:03. The samples were spiked with Sodium. The average recovery of Sodium (theoretical increment of 5.99 mg/kg) may be satisfactory: "less than 79%". The actual blank concentration for Sodium is unknown.

Potassium and Sodium: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of EN14538:06.

For Biodiesel B100 sample #17068: Particulate Contamination

Total Contamination: As this proficiency test was ASTM based, the intention was to evaluate the Total contamination against ASTM D7321. Regrettably, the majority of the laboratories reported to have used EN12662 as test method. Therefore it was decided to evaluate the test results for ASTM D7321 and EN12662 separately, which have significant differences and may produce different test results.

ASTM D7321: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D7321:14.

EN12662: This determination was very problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirements of EN12662:98. The test results vary over a large range: <6 – 63.1 mg/kg.

For Biodiesel B100 sample #17069: CSFT&FBT

Filter Blocking Potential by Cold Soak test: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D7501:12a. The test results vary over a large range: 83 – 196 mg/kg.

Filter Blocking Tendency: This determination may be problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D2068:14 (or IP387-B, which is identical). The low number of reported test results may partly explain the large variation.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant standard and the reproducibility as found for the group of laboratories that participated. The reproducibilities derived from literature standards (in casu the ASTM, EN, ISO and IP standards) and the calculated reproducibilities of the samples (see appendix 1) are compared in the next table.

Parameter	unit	n	average	R (Calc.)	R (lit)
Acid Number (D664-B)	mg KOH/g	23	0.37	0.11	0.12
Cloud Point	°C	28	-6.2	5.1	5
Cold Filter Plugging Point	°C	23	-21.4	4.2	4.7
Carbon Residue on 100% FAME	%M/M	15	<0.1	n.a.	n.a.
Copper Strip Corrosion		22	1	n.a.	n.a.
Density at 15°C	kg/m ³	35	882.0	0.4	0.5
Flash Point (PMcc) ASTM	°C	27	157.9	15.2	14.7
Iodine Value	g I ₂ /100g	18	111.6	6.8	5
Kin. Viscosity at 40°C	mm ² /s	28	4.435	0.050	0.099
Oxidation Stability EN15751	hours	18	7.4	1.3	1.8
Sulphated Ash	%M/M	12	<0.005	n.a.	n.a.
Sulphur	mg/kg	21	1.6	1.3	0.8
Water	mg/kg	30	358	87	575
Water and Sediment	%V/V	11	<0.05	n.a.	n.a.
Distillation at 10mm Hg					
80% recovered	°C	3	(353.5)	(1.4)	(4.6)
90% recovered	°C	3	(355.2)	(1.9)	(4.6)
95% recovered	°C	3	(359.7)	(8.0)	(4.6)
Methanol	%M/M	12	0.029	0.005	0.009
mono-Glycerides	%M/M	14	0.270	0.159	0.204
di-Glycerides	%M/M	14	0.090	0.046	0.083
tri-Glycerides	%M/M	13	0.042	0.049	0.122
Free Glycerine	%M/M	11	0.003	0.004	0.005
Total Glycerine	%M/M	14	0.089	0.040	0.049

Table 11: comparison of the observed and target reproducibilities of Biodiesel B100 sample #17065 (results between brackets are for information only)

Parameter	unit	n	average	R (Calc.)	R (lit)
Cetane Number		4	51.6	4.3	4.3
DCN (D7668)		1	n.a.	n.a.	n.a.
DCN (D6890)		2	55.0	n.a.	n.a.

Table 12: comparison of the observed and target reproducibilities of Biodiesel B100 sample #17066

Parameter	unit	n	average	R (Calc.)	R (lit)
sum Calcium and Magnesium	mg/kg	12	12.6	5.8	3.1
Phosphorus	mg/kg	9	9.0	2.8	1.8
Potassium	mg/kg	9	<1	n.a.	n.a.
Sodium	mg/kg	11	4.7	2.5	3.4
Sum Potassium and Sodium	mg/kg	11	5.0	2.2	1.9

Table 13: comparison of the observed and target reproducibilities of Biodiesel B100 sample #17067

Parameter	Unit	n	average	R (Calc.)	R (lit)
Particulate Contamination (D7321)	mg/L	4	25.4	11.2	7.4
Total Contamination (EN12662)	mg/kg	11	15.0	13.6	4.5

Table 14: comparison of the observed and target reproducibilities of Biodiesel B100 sample #17068

Parameter	Unit	n	average	R (Calc.)	R (lit)
Filter Blocking Potential by CST	s	7	138	104	50
Filter Blocking Tendency		5	5.2	2.5	1.7

Table 15: comparison of the observed and target reproducibilities of Biodiesel B100 sample #17069

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 relevant standards. The problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF MAY 2017 WITH PREVIOUS PTS

	May 2017	May 2016	October 2015	April 2015
Type of FAME	Rapeseed	Rapeseed	Rapeseed	Rapeseed
Number of reporting labs	38	54	54	60
Number of results reported	449	596	788	965
Number of statistical outliers	11	25	19	23
Percentage statistical outliers	2.5%	4.2%	2.4%	2.4%

Table 16: comparison with previous proficiency tests

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

Determination	May 2017	May 2016	October 2015	April 2015
Acid Number (D664-B)	+/-	+	+	++
Cloud Point	+/-	--	+	+
Cold Filter Plugging Point	+	-	++	+/-
Carbon Residue on 100% FAME	n.e.	n.e.	(-)	n.e.
Density at15°C	+	++	++	+/-
Flash Point PMcc ASTM	+/-	+/-	-	+
Iodine Value	-	+/-	+	+/-
Kin. Viscosity at 40°C	++	++	+/-	-
Oxidation Stability	+	+	++	++
Sulphated Ash	n.e.	n.e.	n.e.	(--)
Sulphur	-	+	+	+
Water	++	++	+	++
Distillation (80, 90 and 95% rec.)	(+)	-	n.e.	n.e.
Methanol	++	-	-	-
mono-Glycerides	++	++	+	+
di-Glycerides	++	++	+/-	+/-
tri-Glycerides	++	++	+	++
Free Glycerine	+	++	++	+
Total Glycerine	+	+	+	+

Table 17 : comparison of group performances against the standard requirements

Determination	May 2017	May 2016	October 2015	April 2015
Cetane Number	+/-	n.e.	n.e.	n.e.
DCN	n.e.	n.e.	n.e.	n.e.
Sum of Calcium and Magnesium	-	+/-	-	-
Phosphorus	-	--	--	--
Potassium	n.e.	++	++	++
Sodium	+	+	+	+
Sum of Potassium and Sodium	-	--	n.e.	n.e.
Particle contamination	--	n.e.	n.e.	n.e.
Total Contamination	--	--	-	-
Filter Blocking Potential by CST	--	+/-	n.e.	n.e.
Filter Blocking Tendency	-	-	n.e.	n.e.

Table 18 : comparison of group performances against the standard requirements

* Signs between brackets are for assigned values below the application range of the respective reference test method and therefore should be used with due care

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

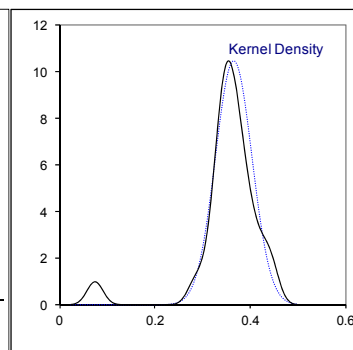
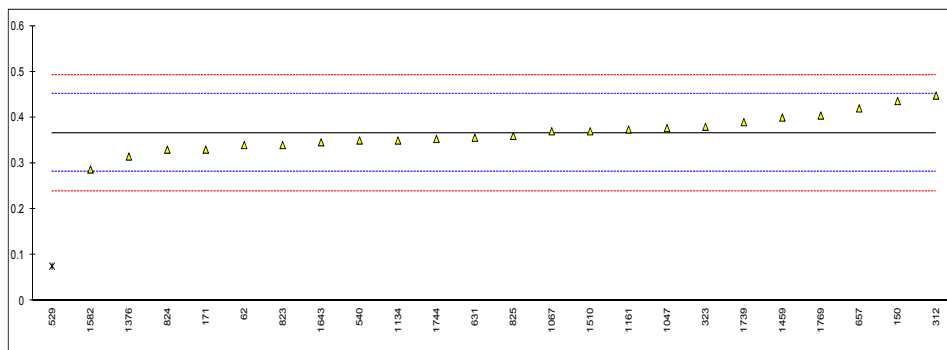
- ++: group performed much better than the standard
- + : group performed better than the standard
- +/-: group performance equals the standard
- : group performed worse than the standard
- : group performed much worse than the standard
- n.e.: not evaluated

APPENDIX 1

Determination of Acid Number total conform ASTM spec. on sample #17065; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
62	D664-B	0.34		-0.62	
120		----		----	
150	D664-B	0.436		1.65	
171	D664-B	0.33		-0.86	
312	EN14104	0.448		1.93	
323	EN14104	0.38		0.32	
333		----		----	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529	D664	0.0757	R(0.01)	-6.87	
540	D664-B	0.35		-0.39	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631	D974	0.356		-0.25	
657	D664-B	0.42		1.27	
823	D664-B	0.34		-0.62	
824	D664-B	0.33		-0.86	
825	D664-B	0.36		-0.15	
1033		----		----	
1047	EN14104	0.377		0.25	
1067	EN14104	0.37		0.09	
1134	D664-B	0.35		-0.39	
1161	D664-B	0.374		0.18	
1199		----		----	
1376	D664-B	0.315		-1.21	
1459	D664-B	0.40		0.80	
1494		----		----	
1510	D974	0.37		0.09	
1582	D664-B	0.2867		-1.88	
1634		----		----	
1643	D664-A	0.346		-0.48	
1739	EN14104	0.39		0.56	
1744	D664-B	0.3533		-0.31	
1769	D664-B	0.40440		0.90	
6069		----		----	

normality OK
n 23
outliers 1
mean (n) 0.36637
st.dev. (n) 0.038257
R(calc.) 0.10712
R(D664B:11ae1) 0.11845

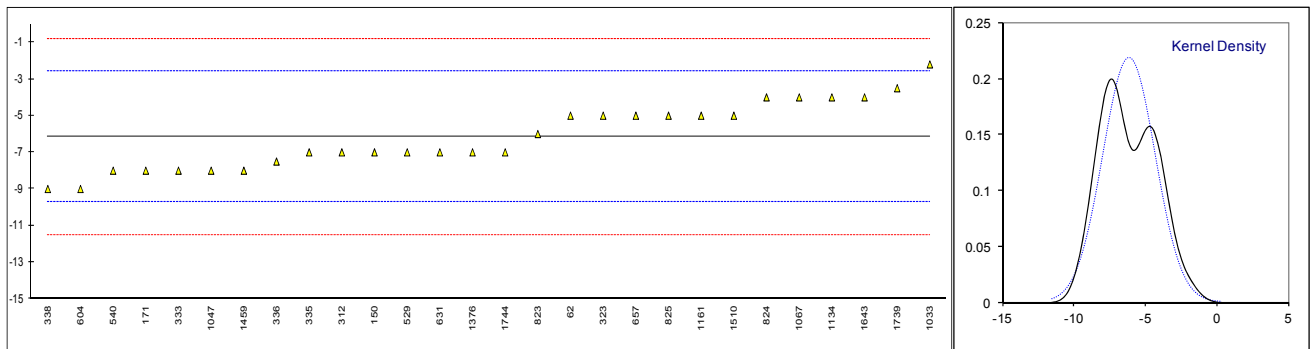


Determination of Cloud Point on sample #17065; results in °C

lab	method	Value	mark	z(targ)	remarks
62	D2500	-5.0	C	0.64	First reported 0
120		----		----	
150	D5771	-7.0		-0.48	
171	D2500	-8		-1.04	
312	D2500	-7		-0.48	
323	EN23015	-5		0.64	
333	D2500	-8		-1.04	
335	D2500	-7		-0.48	
336	D2500	-7.5		-0.76	
337		----		----	
338	EN23015	-9		-1.60	
511		----		----	
529	D2500	-7		-0.48	
540	D2500	-8		-1.04	
556		----		----	
558		----		----	
604	D2500	-9		-1.60	
621		----		----	
631	D2500	-7		-0.48	
657	D2500	-5		0.64	
823	D2500	-6		0.08	
824	D2500	-4		1.20	
825	D2500	-5		0.64	
1033	D7689	-2.2		2.21	
1047	ISO3015	-8		-1.04	
1067	EN23015	-4		1.20	
1134	IP219	-4.0		1.20	
1161	D2500	-5		0.64	
1199		----		----	
1376	D2500	-7		-0.48	
1459	EN23015	-8		-1.04	
1494		----		----	
1510	D2500	-5		0.64	
1582		----		----	
1634		----		----	
1643	D2500	-4		1.20	
1739	EN23015	-3.5		1.48	
1744	D2500	-7		-0.48	
1769		----		----	
6069		----		----	

normality OK
n 28
outliers 0
mean (n) -6.15
st.dev. (n) 1.819
R(calc.) 5.09
R(D2500:16b) 5

Compare R(EN23015/ISO3015) = 6

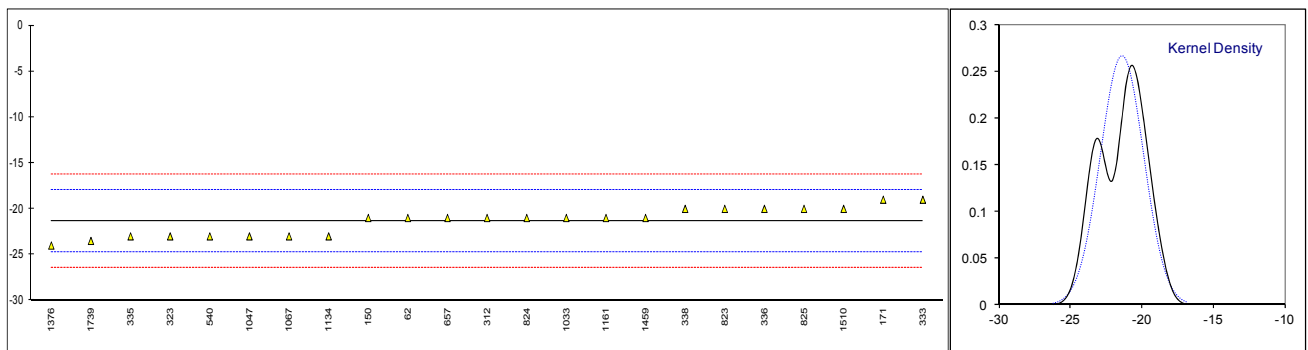


Determination of Cold Filter Plugging Point on sample #17065; results in °C

lab	method	value	mark	z(targ)	remarks
62	D6371	-21.0	C	0.22	First reported -16
120		----		----	
150	D6371	-21.0		0.22	
171	D6371	-19		1.40	
312	D6371	-21		0.22	
323	EN116	-23		-0.97	
333	D6371	-19		1.40	
335	D6371	-23		-0.97	
336	EN116	-20		0.81	
337		----		----	
338	EN116	-20		0.81	
511		----		----	
529		----		----	
540	D6371	-23		-0.97	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	IP309	-21		0.22	
823	D6371	-20		0.81	
824	D6371	-21		0.22	
825	D6371	-20		0.81	
1033	IP309	-21		0.22	
1047	EN116	-23		-0.97	
1067	EN116	-23		-0.97	
1134	EN116	-23.0		-0.97	
1161	EN116	-21		0.22	
1199		----		----	
1376	D6371	-24		-1.56	
1459	EN116	-21		0.22	
1494		----		----	
1510	IP309	-20		0.81	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN116	-23.5		-1.26	
1744		----		----	
1769		----		----	
6069		----		----	

normality OK
n 23
outliers 0
mean (n) -21.37
st.dev. (n) 1.494
R(calc.) 4.18
R(D6371:16) 4.73

Compare R(EN14241:12) = 2.94



Determination of Carbon Residue on 100% FAME on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62	D4530	<0.10		----	
120		----		----	
150	D4530	<0.01		----	
171	D4530	<0.10		----	
312		----		----	
323	EN10370	<0.10		----	
333		----		----	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540		----		----	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631	D4530	0.0099		-0.03	
657	D4530	0.01		-0.03	
823	D4530	0.02		0.17	
824	D4530	<0.1		----	
825	D4530	L0.05		----	
1033		----		----	
1047	EN10370	0.011		-0.01	
1067	ISO10370	< 0.10		----	
1134	D4530	<0.01		----	
1161	D4530	0.02		0.17	
1199		----		----	
1376	D4530	0.00		-0.23	
1459		----		----	
1494		----		----	
1510	D4530	0.01		-0.03	
1582		----		----	
1634		----		----	
1643		----		----	
1739		----		----	
1744		----		----	
1769		----		----	
6069		----		----	
	normality	unknown			
	n	15			
	outliers	0			
	mean (n)	<0.1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D4530:15)	n.a.			Application range: 0.1 – 0.3%M/M

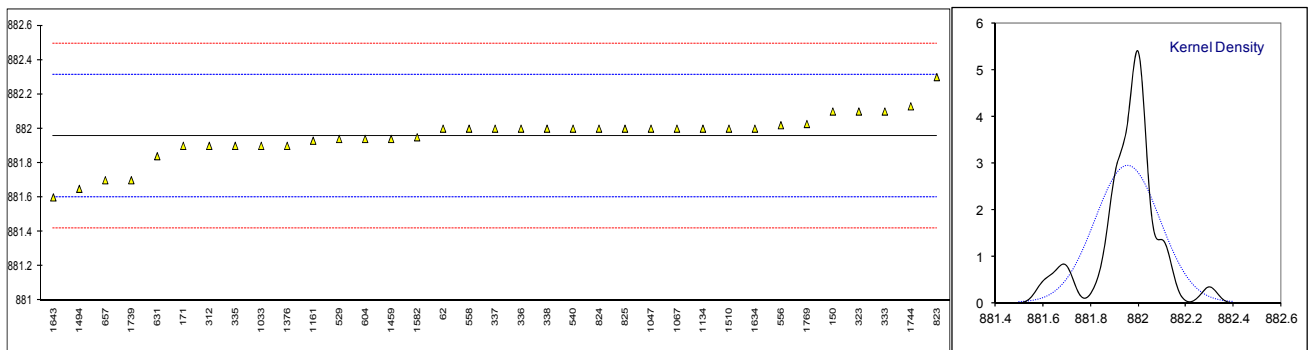
Determination of Copper Strip Corrosion 3 hrs/50°C on sample #17065

lab	method	value	mark	z(targ)	remarks
62	D130	1b		----	
120		----		----	
150	D130	1a		----	
171	D130	1a		----	
312		----		----	
323	D130	1A		----	
333		----		----	
335	D130	1b		----	
336	D130	1		----	
337		----		----	
338		----		----	
511		----		----	
529	D130	1A		----	
540	D130	1a		----	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631	D130	1A		----	
657	D130	1A		----	
823	D130	1a		----	
824	D130	1a		----	
825	D130	1A		----	
1033	IP154	1b		----	
1047	ISO2160	1a		----	
1067	ISO2160	1A		----	
1134	D130	1A		----	
1161	ISO2160	1a		----	
1199		----		----	
1376	D130	1b		----	
1459		----		----	
1494		----		----	
1510	IP154	1A		----	
1582		----		----	
1634	D130	1a		----	
1643		----		----	
1739	ISO2160	1a		----	
1744		----		----	
1769		----		----	
6069		----		----	
	normality	n.a.			
	n	22			
	outliers	n.a.			
	mean (n)	1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(lit)	n.a.			

Determination of Density at 15°C on sample #17065; results in kg/m³

lab	method	value	mark	z(targ)	remarks
62	D4052	882.0		0.25	
120		-----		-----	
150	D4052	882.1		0.81	
171	D4052	881.9		-0.31	
312	D4052	881.9		-0.31	
323	D4052	882.1		0.81	
333	D4052	882.1		0.81	
335	D4052	881.9		-0.31	
336	D4052	882.0		0.25	
337	D4052	882.0		0.25	
338	ISO12185	882.0		0.25	
511		-----		-----	
529	D4052	881.94		-0.09	
540	D4052	882.0	C	0.25	First reported 0.882 kg/m3
556	D4052	882.02		0.36	
558	D4052	882.0		0.25	
604	D4052	881.94		-0.09	
621		-----		-----	
631	D4052	881.84		-0.65	
657	D4052	881.7		-1.43	
823	D4052	882.3		1.93	
824	D4052	882.0		0.25	
825	D4052	882.0		0.25	
1033	IP365	881.9		-0.31	
1047	ISO12185	882.0		0.25	
1067	ISO12185	882.0		0.25	
1134	IP365	882.0		0.25	
1161	ISO12185	881.93		-0.15	
1199		-----		-----	
1376	D4052	881.9		-0.31	
1459	ISO12185	881.94		-0.09	
1494	D4052	881.65		-1.71	
1510	IP365	882.0		0.25	
1582	D4052	881.95		-0.03	
1634	ISO12185	882.0		0.25	
1643	D4052	881.6		-1.99	
1739	ISO3675	881.7		-1.43	
1744	D4052	882.13		0.97	
1769	D4052	882.027		0.40	
6069		-----		-----	

normality suspect
n 35
outliers 0
mean (n) 881.956
st.dev. (n) 0.1358
R(calc.) 0.380
R(ISO12185:96) 0.5

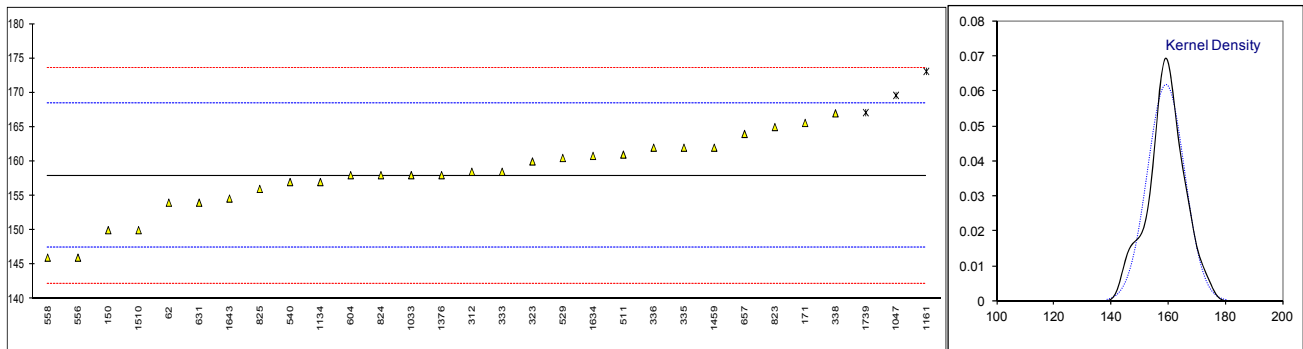


Determination of Flash Point (PMcc) conform ASTM spec. on sample #17065; results in °C

lab	method	value	mark	z(targ)	remarks
62	D93-C	154		-0.74	
120		----		----	
150	D93-C	150.0		-1.51	
171	D93-C	165.6		1.47	
312	D93-C	158.5		0.11	
323	D93-C	160.0		0.40	
333	D93-C	158.5		0.11	
335	D93-C	162.0		0.78	
336	D93-C	162.0		0.78	
337		----		----	
338	ISO2719-C	167.0		1.73	
511	D93-C	161.0		0.59	
529	D93-C	160.5		0.49	
540	D93-C	157.0		-0.17	
556	NBR14598	146	C	-2.27	First reported 139
558	D93-C	146.0		-2.27	
604	D93-C	158		0.02	
621		----		----	
631	D93-A	154.0		-0.74	
657	D93-C	164.0		1.16	
823	D93-C	165.0		1.35	
824	D93-C	158.0		0.02	
825	D93-C	156.0		-0.36	
1033	ISO2719-A	158.0		0.02	
1047	ISO3679	169.6	ex	2.23	Result excluded, test method is not comparable with D93
1067	ISO3679	> 140		----	
1134	D93-A	157.0		-0.17	
1161	ISO3679	173.1	ex	2.89	Result excluded, test method is not comparable with D93
1199		----		----	
1376	D93-A	158.0		0.02	
1459	D93-C	162.0		0.78	
1494		----		----	
1510	D93-A	150.0		-1.51	
1582		----		----	
1634	D93-C	160.8		0.55	
1643	D93-C	154.6		-0.63	
1739	ISO3679	167.1	ex	1.75	Result excluded, test method is not comparable with D93
1744		----		----	
1769		----		----	
6069		----		----	

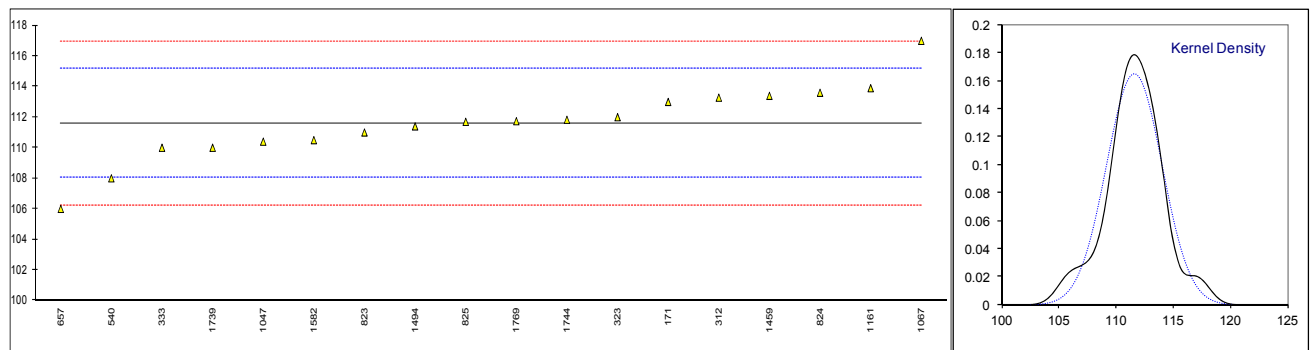
normality OK
n 27
outliers 0 (+3excl)
mean (n) 157.907
st.dev. (n) 5.423
R(calc.) 15.185
R(D93C:15) 14.7

Compare R(ISO2719C:16) = 14.7



Determination of Iodine Value conform EN spec. on sample #17065; results in g I₂/100g

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150		----		----	
171	EN14111	113		0.79	
312	EN14111	113.28		0.94	
323	EN14111	112		0.23	
333	EN14111	110		-0.89	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14111	108		-2.01	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14111	106		-3.13	
823	EN14111	111.0		-0.33	
824	EN14111	113.6		1.12	
825	EN14111	111.7		0.06	
1033		----		----	
1047	EN14111	110.4		-0.67	
1067	EN14111	117		3.03	
1134		----		----	
1161	EN14111	113.9		1.29	
1199		----		----	
1376		----		----	
1459	EN14111	113.4		1.01	
1494	EN14111	111.40		-0.11	
1510		----		----	
1582	EN14111	110.5		-0.61	
1634		----		----	
1643		----		----	
1739	EN14111	110		-0.89	
1744	EN14111	111.831		0.13	
1769	EN14111	111.738		0.08	
6069		----		----	
normality		suspect			
n		18			
outliers		0			
mean (n)		111.60			
st.dev. (n)		2.417			
R(calc.)		6.76			
R(EN14111:03)		5			

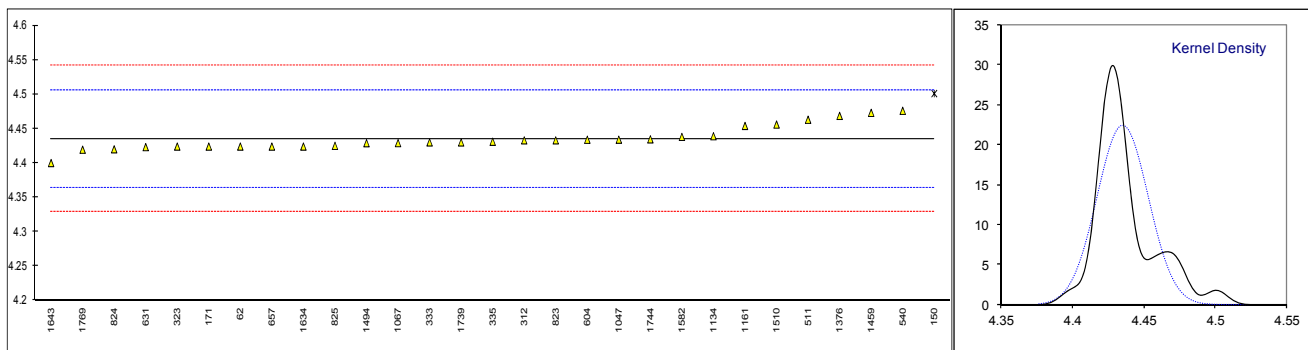


Determination of Kinematic Viscosity at 40°C on sample #17065; results in mm²/s

lab	method	value	mark	z(targ)	remarks
62	D445	4.424		-0.32	
120		----		----	
150	D445	4.501	R(0.05)	1.85	
171	D445	4.424		-0.32	
312	D445	4.433	C	-0.07	First reported 4.578
323	ISO3104	4.424		-0.32	
333	D445	4.430		-0.15	
335	D445	4.431		-0.13	
336		----		----	
337		----		----	
338		----		----	
511	D445	4.463		0.78	
529		----		----	
540	D445	4.476		1.14	
556		----		----	
558		----		----	
604	D445	4.4339		-0.04	
621		----		----	
631	D445	4.4231		-0.35	
657	D445	4.424		-0.32	
823	D445	4.433		-0.07	
824	D445	4.420		-0.44	
825	D445	4.425		-0.29	
1033		----		----	
1047	ISO3104	4.434		-0.04	
1067	ISO3104	4.429		-0.18	
1134	IP71	4.439		0.10	
1161	ISO3104	4.454		0.52	
1199		----		----	
1376	D7042	4.4686		0.93	
1459	D7042	4.473		1.06	
1494	D445	4.4289		-0.18	
1510	D445	4.456		0.58	
1582	D445	4.4380		0.07	
1634	D445	4.424		-0.32	
1643	D445	4.4		-1.00	
1739	ISO3104	4.430		-0.15	
1744	D445	4.4345		-0.03	
1769	D445	4.41938		-0.45	
6069		----		----	

normality OK
n 28
outliers 1
mean (n) 4.43544
st.dev. (n) 0.017795
R(calc.) 0.04983
R(D445:17) 0.09935

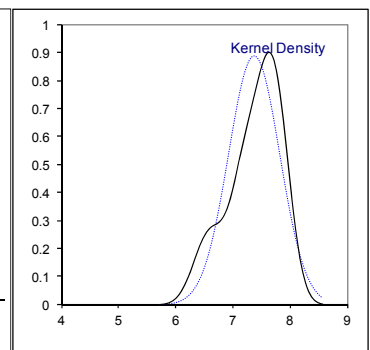
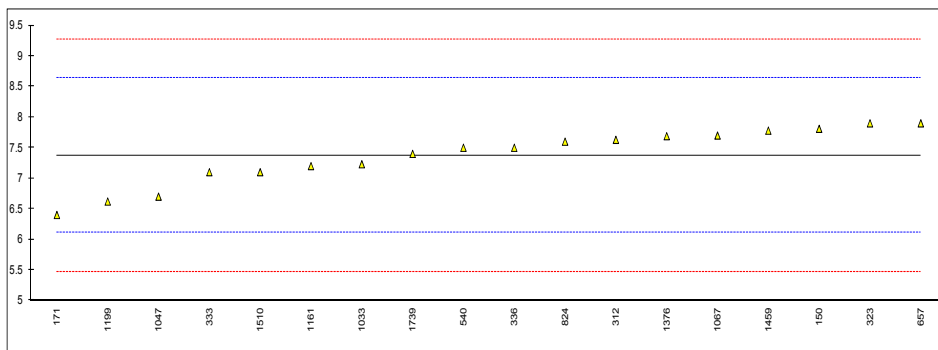
Compare R(EN14214:12) = 0.04457



Determination of Oxidation Stability Induction period on sample #17065; results in hours

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150	EN15751	7.81		0.68	
171	EN15751	6.4		-1.54	
312	EN15751	7.63		0.40	
323	EN15751	7.9		0.83	
333	EN15751	7.1		-0.43	
335		----		----	
336	EN15751	7.5		0.20	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14112	7.5		0.20	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN15751	7.9		0.83	
823		----		----	
824	EN15751	7.6		0.35	
825		----		----	
1033	EN15751	7.23		-0.23	
1047	EN15751	6.7		-1.06	
1067	EN14112	7.7		0.51	
1134		----		----	
1161	EN14112	7.2		-0.28	
1199	EN14112	6.62		-1.19	
1376	EN14112	7.69		0.50	
1459	EN15751	7.78		0.64	
1494		----		----	
1510	EN14112	7.1		-0.43	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN14112	7.4		0.04	
1744		----		----	
1769		----		----	
6069		----		----	
normality		OK			
n		18			
outliers		0			
mean (n)		7.376			
st.dev. (n)		0.4496			
R(calc.)		1.259			
R(EN15751:14)		1.777			

Compare R(EN14114:03) = 2.148

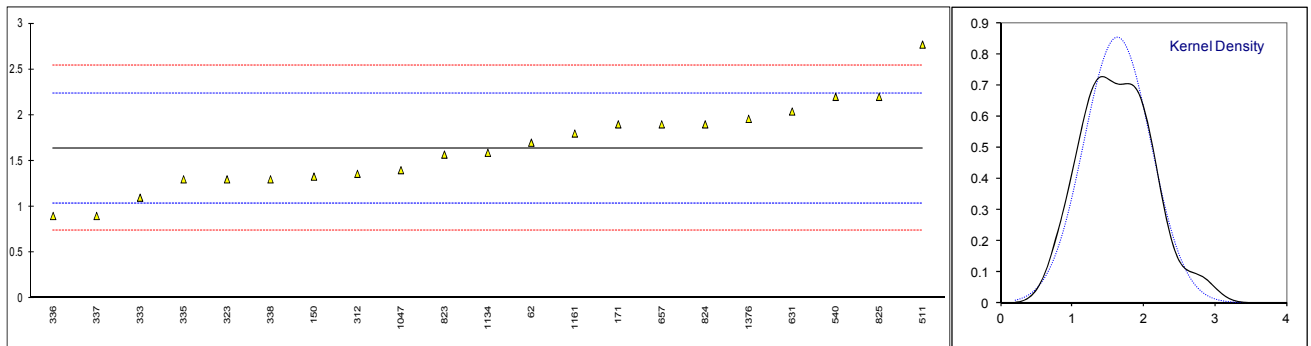


Determination of Sulphated Ash on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150	D874	<0.005		----	
171	D874	<0.005		----	
312		----		----	
323	ISO3987	0.006		----	
333		----		----	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511	D874	0.0021		----	
529		----		----	
540	D874	<0.005		----	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631	D874	0.0018		----	
657	D874	0.002		----	
823	D874	0.001		----	
824	D874	<0.005		----	
825	D874	0.0005		----	
1033		----		----	
1047	ISO3987	<0,005		----	
1067	ISO3987	< 0.005		----	
1134		----		----	
1161	ISO3987	<0,005		----	
1199		----		----	
1376		----		----	
1459		----		----	
1494		----		----	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739	ISO3987	<0.01		----	
1744		----		----	
1769		----		----	
6069		----		----	
	normality	unknown			
	n	12			
	outliers	n.a.			
	mean (n)	<0.005			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D874:13a)	n.a.			

Determination of Sulphur on sample #17065; results in mg/kg

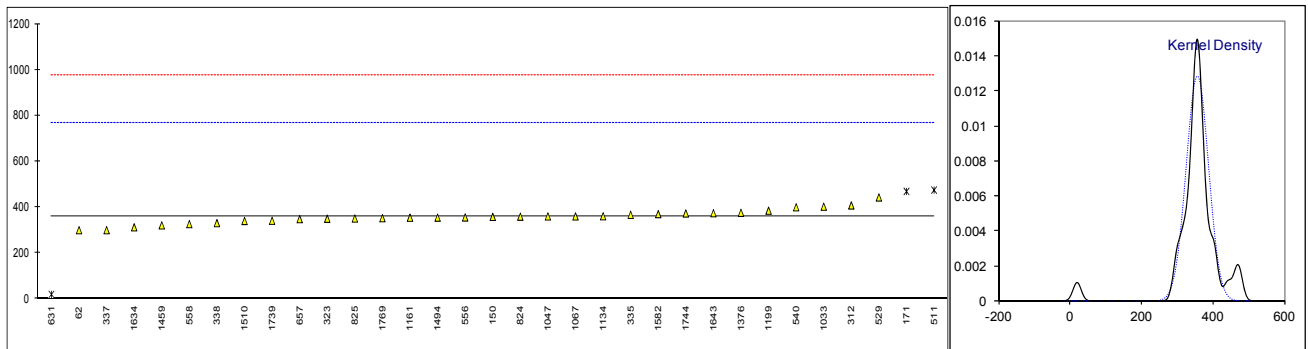
lab	method	value	mark	z(targ)	remarks
62	D5453	1.7		0.20	
120		----		----	
150	D5453	1.33		-1.03	
171	D5453	1.9		0.87	
312	D5453	1.36		-0.93	
323	D5453	1.3		-1.13	
333	D5453	1.1		-1.80	
335	ISO20846	1.3		-1.13	
336	D5453	0.9		-2.46	
337	D5453	0.9		-2.46	
338	ISO20846	1.3		-1.13	
511	D5453	2.77		3.77	
529		----		----	
540	D5453	2.2		1.87	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631	D4294	2.04	C	1.34	First reported 4.04
657	D5453	1.9		0.87	
823	D5453	1.57		-0.23	
824	D5453	1.9		0.87	
825	D5453	2.2		1.87	
1033		----		----	
1047	ISO20846	1.4		-0.80	
1067	ISO20846	< 3.0		----	
1134	D5453	1.59		-0.16	
1161	ISO20846	1.80		0.54	
1199	ISO20884	<5.0		----	
1376	D5453	1.96		1.07	
1459	ISO8754	<5		----	
1494		----		----	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739		----		----	
1744		----		----	
1769		----		----	
6069		----		----	
normality		OK			
n		21			
outliers		0			
mean (n)		1.639			
st.dev. (n)		0.4675			
R(calc.)		1.309			
R(D5453:16e1)		0.840			Application range: 1 – 8000 mg/kg
compare	R(ISO20846:11)	1.304			Application range: 3 – 500 mg/kg



Determination of Water content by KF on sample #17065; results in mg/kg

lab	method	value	mark	z(targ)	remarks
62	D6304-A	300		-0.28	
120		----		----	
150	D6304-A	358		0.00	
171	D6304-A	469	R(0.05)	0.54	
312	ISO12937	408		0.24	
323	ISO12937	350		-0.04	
333		----		----	
335	ISO12937	367		0.04	
336		----		----	
337	D6304-A	300		-0.28	
338	ISO12937	330.71		-0.13	
511	D6304-A	475.04	R(0.05)	0.57	
529	D6304	442.91		0.41	
540	D6304-A	400		0.21	
556	D6304-A	355.6		-0.01	
558	D6304-A	326.43		-0.15	
604		----		----	
621		----		----	
631	D6304-B	19.7	R(0.01)	-1.65	
657	D6304-A	348		-0.05	
823		----		----	
824	D6304-A	359		0.01	
825	D6304-A	351		-0.03	
1033	IP438	402.49		0.22	
1047	ISO12937	360		0.01	
1067	ISO12937	360		0.01	
1134	IP438	360.67		0.01	
1161	ISO12937	354.541		-0.02	
1199	ISO12937	385		0.13	
1376	D6304-A	375.8		0.09	
1459	ISO12937	321		-0.18	
1494	E203	354.71		-0.01	
1510	IP438	340		-0.09	
1582	ISO12937	370.0		0.06	
1634	ISO12937	312.5		-0.22	
1643	ISO6296	374		0.08	
1739	ISO12937	341		-0.08	
1744	E203	373		0.07	
1769	ISO12937	352.2050		-0.03	
6069		----		----	

normality suspect
n 30
outliers 3
mean (n) 357.79
st.dev. (n) 31.082
R(calc.) 87.03
R(D6304:16e1) 575.24



Determination of Water and sediment on sample #17065; results in %V/V

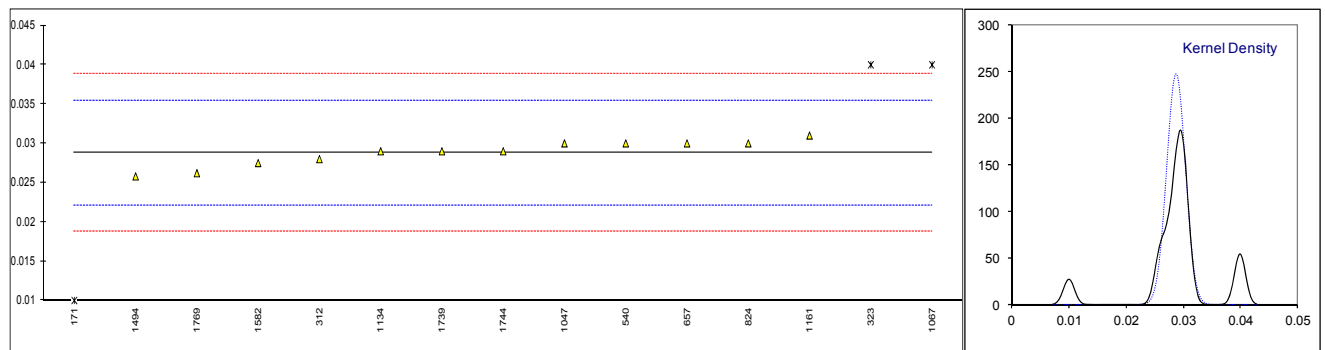
lab	method	value	mark	z(targ)	remarks
62	D2709	<0.05		----	
120		----		----	
150		----		----	
171	D2709	<0.01		----	
312		----		----	
323	D2709	0.005		----	
333		----		----	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529	D2709	0.005		----	
540	D2709	<0.05		----	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631	D2709	<0.01		----	
657	D2709	<0.01		----	
823	D2709	<0.05		----	
824	D2709	<0.01		----	
825	D2709	0		----	
1033		----		----	
1047		----		----	
1067		----		----	
1134		----		----	
1161		----		----	
1199		----		----	
1376	D2709	0		----	
1459		----		----	
1494		----		----	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739		----		----	
1744		----		----	
1769		----		----	
6069		----		----	
	normality	n.a.			
	n	11			
	outliers	n.a.			
	mean (n)	<0.05			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D2709:16)	n.a.			

Determination of Distillation at 10 mm Hg, % recovered as AET on sample #17065; results in °C

lab	method	80% rec	mark	z(targ)	90% rec	mark	z(targ)	95% rec	mark	z(targ)
62		----		----	----		----	----		----
120		----		----	----		----	----		----
150		----		----	----		----	----		----
171	D1160	353		----	355		----	358		----
312		----		----	----		----	----		----
323		----		----	----		----	----		----
333		----		----	----		----	----		----
335		----		----	----		----	----		----
336		----		----	----		----	----		----
337		----		----	----		----	----		----
338		----		----	----		----	----		----
511		----		----	----		----	----		----
529		----		----	----		----	----		----
540		----		----	----		----	----		----
556		----		----	----		----	----		----
558		----		----	----		----	----		----
604		----		----	----		----	----		----
621		----		----	----		----	----		----
631		----		----	----		----	----		----
657		----		----	----		----	----		----
823		----		----	----		----	----		----
824		----		----	----		----	----		----
825		----		----	----		----	----		----
1033		----		----	----		----	----		----
1047		----		----	----		----	----		----
1067		----		----	----		----	----		----
1134	D1160	354		----	356		----	358		----
1161	D1160	353.53		----	354.71		----	362.94		----
1199		----		----	----		----	----		----
1376		----		----	----		----	----		----
1459		----		----	----		----	----		----
1494		----		----	----		----	----		----
1510		----		----	----		----	----		----
1582		----		----	----		----	----		----
1634		----		----	----		----	----		----
1643		----		----	----		----	----		----
1739		----		----	----		----	----		----
1744		----		----	----		----	----		----
1769		----		----	----		----	----		----
6069		----		----	----		----	----		----
	normality	unknown			unknown			unknown		
	n	3			3			3		
	outliers	n.a.			n.a.			n.a.		
	mean (n)	(353.51)			(355.24)			(359.65)		
	st.dev. (n)	(0.500)			(0.677)			(2.852)		
	R(calc.)	(1.40)			(1.89)			(7.99)		
	R(D1160:15)	(4.64)			(4.64)			(4.64)		

Determination of Methanol on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	Remarks
62		----		----	
120		----		----	
150		----		----	
171	EN14110	0.01	G(0.01)	-5.62	
312	EN14110	0.028		-0.24	
323	EN14110	0.04	DG(0.01)	3.35	
333		----		----	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14110	0.03		0.36	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14110	0.03		0.36	
823		----		----	
824	EN14110	0.03		0.36	
825		----		----	
1033		----		----	
1047	EN14110	0.03		0.36	
1067	EN14110	0.04	DG(0.01)	3.35	
1134	EN14110	0.029		0.06	
1161	EN14110	0.031		0.66	
1199		----		----	
1376		----		----	
1459		----		----	
1494	EN14110	0.0258		-0.89	
1510		----		----	
1582	EN14110	0.0275		-0.39	
1634		----		----	
1643		----		----	
1739	EN14110	0.029		0.06	
1744	EN14110	0.029		0.06	
1769	EN14110	0.0262		-0.78	
6069		----		----	
normality		OK			
n		12			
outliers		3			
mean (n)		0.0288			
st.dev. (n)		0.00162			
R(calc.)		0.0045			
R(EN14110:03)		0.0094			

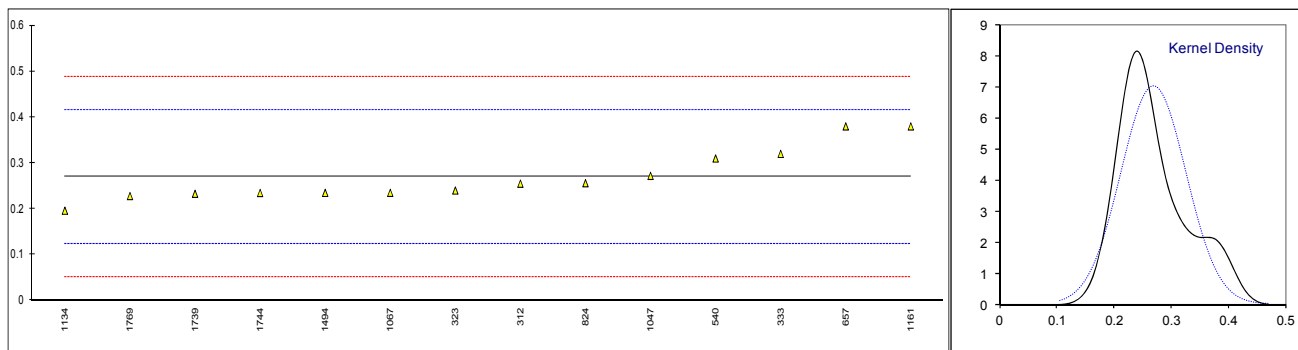


Determination of mono-Glycerides, total on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150		----		----	
171		----		----	
312	EN14105	0.255		-0.20	
323	EN14103	0.24		-0.41	
333	EN14105	0.32		0.69	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14105	0.31		0.55	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14105	0.38		1.51	
823		----		----	
824	D6584	0.256		-0.19	
825		----		----	
1033		----		----	
1047	EN14105	0.272		0.03	
1067	EN14105	0.235		-0.47	
1134	EN14105	0.196		-1.01	
1161	EN14105	0.38	C	1.51	First reported 0.56
1199		----		----	
1376		----		----	
1459		----		----	
1494	D6584	0.2349		-0.48	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN14105	0.2329		-0.50	
1744	D6584	0.23471		-0.48	
1769	D6584	0.2280		-0.57	
6069		----		----	

normality suspect
n 14
outliers 0
mean (n) 0.2696
st.dev. (n) 0.05680
R(calc.) 0.1590
R(D6584:13) 0.2041

Compare R(EN14105) = 0.1157

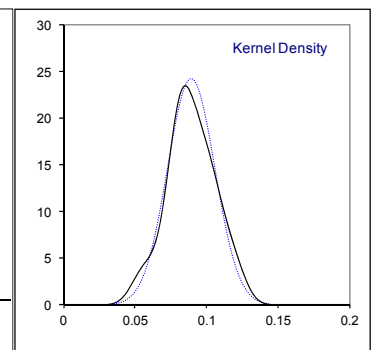
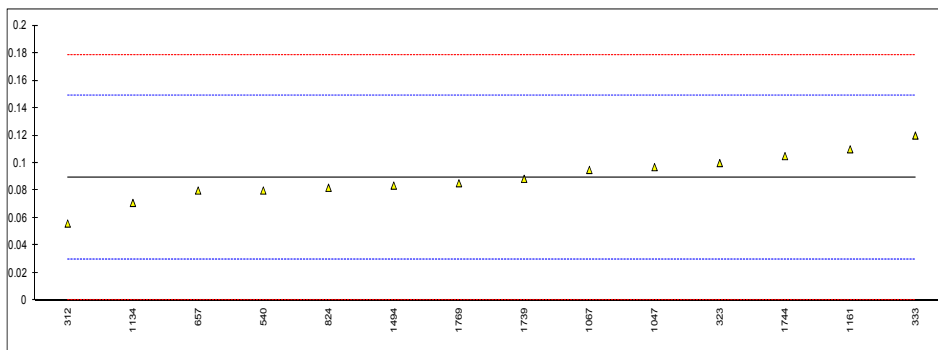


Determination of di-Glycerides, total on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150		----		----	
171		----		----	
312	EN14105	0.056		-1.13	
323	EN14103	0.10		0.35	
333	EN14105	0.12		1.03	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14105	0.08		-0.32	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14105	0.08		-0.32	
823		----		----	
824	D6584	0.082		-0.25	
825		----		----	
1033		----		----	
1047	EN14105	0.097		0.25	
1067	EN14105	0.095		0.18	
1134	EN14105	0.071		-0.62	
1161	EN14105	0.11		0.69	
1199		----		----	
1376		----		----	
1459		----		----	
1494	D6584	0.0836		-0.20	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN14105	0.0885		-0.03	
1744	D6584	0.10503		0.52	
1769	D6584	0.0853		-0.14	
6069		----		----	

normality OK
n 14
outliers 0
mean (n) 0.0895
st.dev. (n) 0.01651
R(calc.) 0.0462
R(D6584:13) 0.0831

Compare R(EN14105) = 0.0458

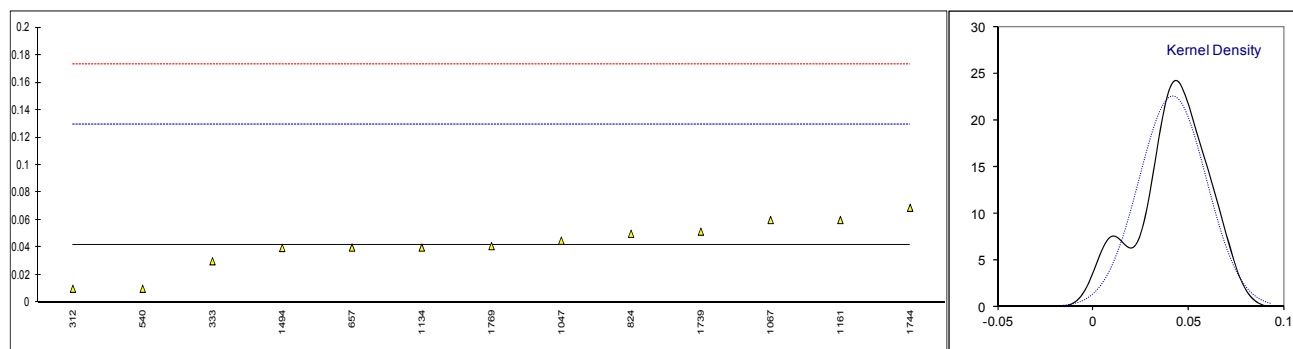


Determination of tri-Glycerides, total on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150		----		----	
171		----		----	
312	EN14105	0.010		-0.73	
323	EN14103	<0.10		----	
333	EN14105	0.03		-0.27	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14105	0.01		-0.73	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14105	0.04		-0.05	
823		----		----	
824	D6584	0.050		0.18	
825		----		----	
1033		----		----	
1047	EN14105	0.045		0.07	
1067	EN14105	0.060		0.41	
1134	EN14105	0.040		-0.05	
1161	EN14105	0.060		0.41	
1199		----		----	
1376		----		----	
1459		----		----	
1494	D6584	0.0397		-0.05	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN14105	0.05155		0.22	
1744	D6584	0.06890		0.62	
1769	D6584	0.0410		-0.02	
6069		----		----	

normality OK
n 13
outliers 0
mean (n) 0.0420
st.dev. (n) 0.01766
R(calc.) 0.0494
R(D6584:13) 0.1224

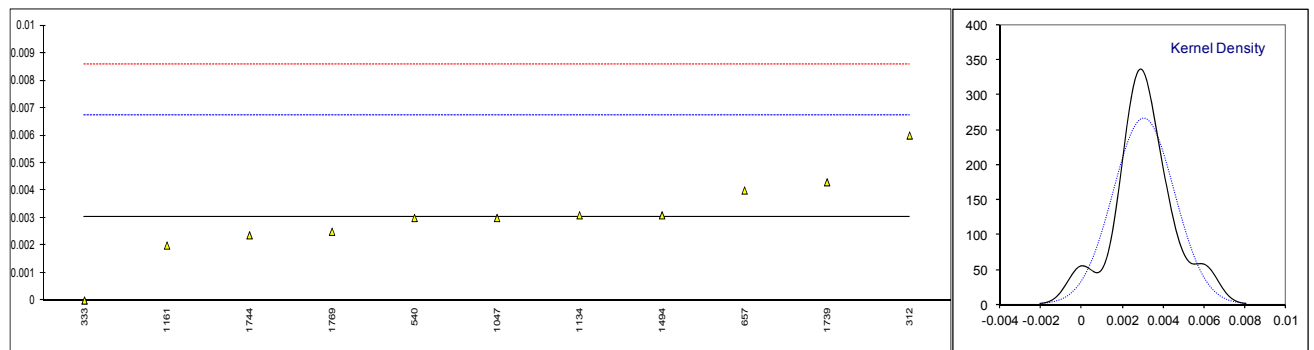
Compare R(EN14105) = 0.0654



Determination of Free Glycerine on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150		----		----	
171		----		----	
312	EN14105	0.006		1.60	
323	EN14103	<0.001		----	
333	EN14105	0.000		-1.64	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	D6584	0.003		-0.02	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14105	0.004		0.52	
823		----		----	
824	D6584	<0.005		----	
825		----		----	
1033		----		----	
1047	EN14105	0.003		-0.02	
1067	EN14105	< 0.010		----	
1134	EN14105	0.0031		0.04	
1161	EN14105	0.002		-0.56	
1199		----		----	
1376		----		----	
1459		----		----	
1494	D6584	0.0031		0.04	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN14105	0.0043		0.68	
1744	D6584	0.00237		-0.36	
1769	D6584	0.0025		-0.29	
6069		----		----	
normality		suspect			
n		11			
outliers		0			
mean (n)		0.00303			
st.dev. (n)		0.001495			
R(calc.)		0.00419			
R(D6584:13)		0.00519			

Compare R(EN14105) = 0.00666

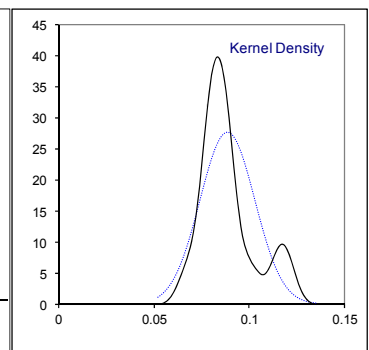
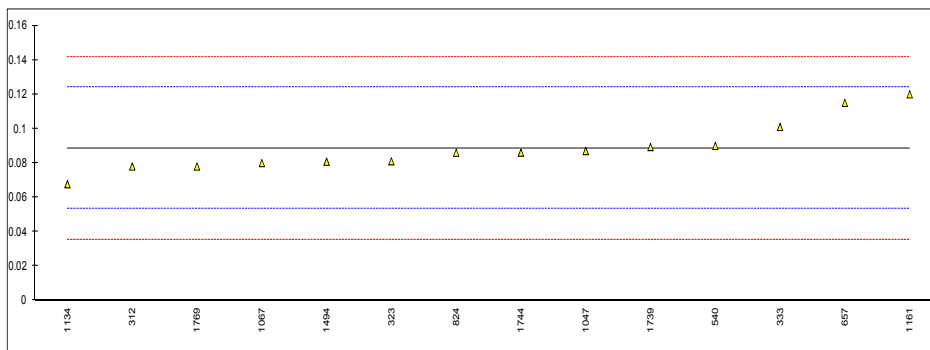


Determination of Total Glycerine on sample #17065; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		----		----	
120		----		----	
150		----		----	
171		----		----	
312	EN14105	0.078		-0.60	
323	EN14103	0.081		-0.43	
333	EN14105	0.101		0.70	
335		----		----	
336		----		----	
337		----		----	
338		----		----	
511		----		----	
529		----		----	
540	EN14105	0.09		0.08	
556		----		----	
558		----		----	
604		----		----	
621		----		----	
631		----		----	
657	EN14105	0.115		1.50	
823		----		----	
824	D6584	0.086		-0.15	
825		----		----	
1033		----		----	
1047	EN14105	0.087		-0.09	
1067	EN14105	0.080		-0.48	
1134	EN14105	0.0677		-1.18	
1161	EN14105	0.12	C	1.78	First reported 0.162
1199		----		----	
1376		----		----	
1459		----		----	
1494	D6584	0.0808		-0.44	
1510		----		----	
1582		----		----	
1634		----		----	
1643		----		----	
1739	EN14105	0.0893		0.04	
1744	D6584	0.08603		-0.14	
1769	D6584	0.0780		-0.60	
6069		----		----	

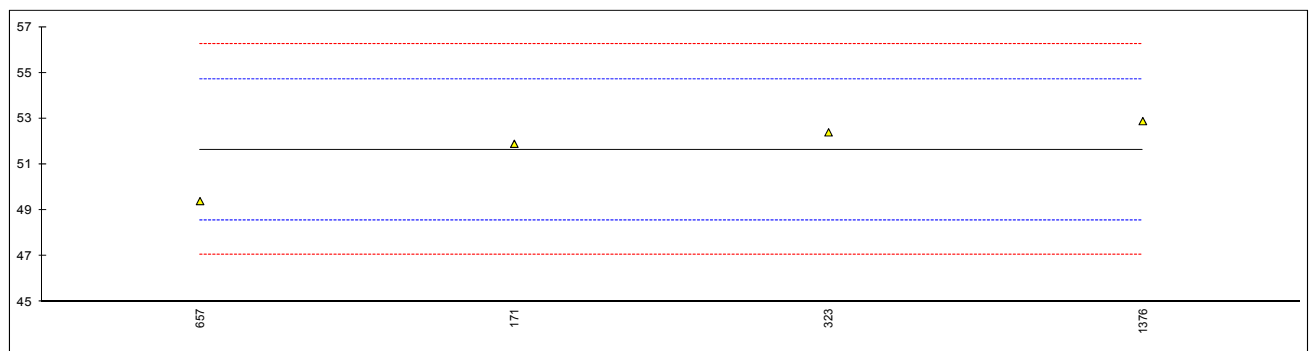
normality suspect
n 14
outliers 0
mean (n) 0.0886
st.dev. (n) 0.01444
R(calc.) 0.0404
R(D6584:13) 0.0494

Compare R(EN14105) = 0.0284



Determination of Cetane Number on sample #17066

lab	method	value	mark	z(targ)	remarks
120		----		----	
150		----		----	
171	D613	51.9		0.16	
323	D613	52.4		0.49	
657	D613	49.4		-1.46	
1067		----		----	
1107		----		----	
1134		----		----	
1161		----		----	
1376	D613	52.89		0.81	
	normality	unknown			
	n	4			
	outliers	0			
	mean (n)	51.648			
	st.dev. (n)	1.5519			
	R(calc.)	4.345			
	R(D613:16a)	4.3			



Determination of Derived Cetane Number (D7668) of sample #17066

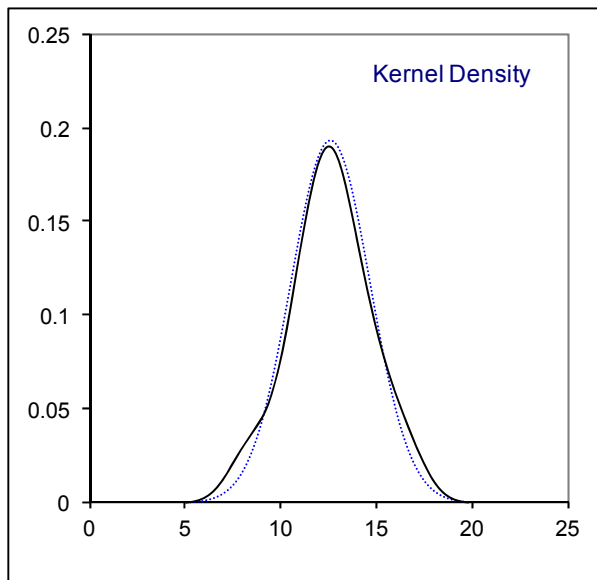
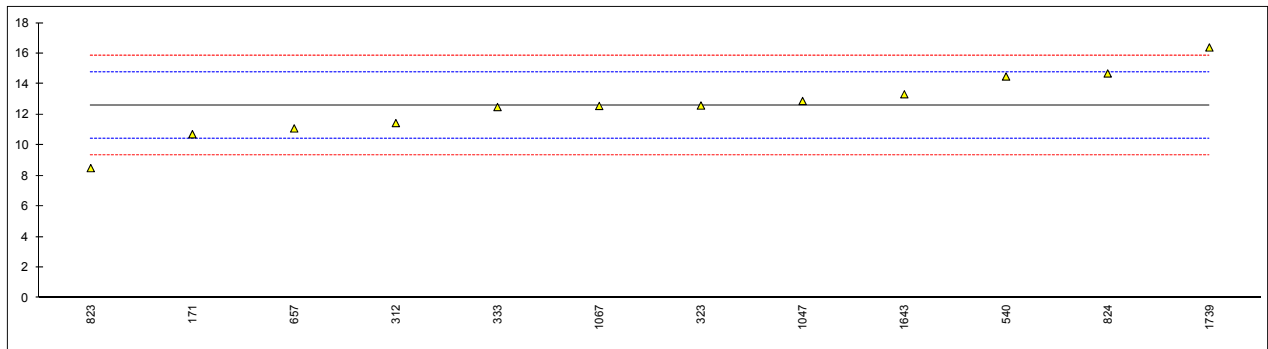
lab	method	DCN	mark	z(targ)	ID	mark	z(targ)	CD	mark	z(targ)	Wall Temp.
120		----		----	----		----	----		----	----
150		----		----	----		----	----		----	----
171		----		----	----		----	----		----	----
323		----		----	----		----	----		----	----
657		----		----	----		----	----		----	----
1067		----		----	----		----	----		----	----
1107	D7668	52.09		----	3.3330		----	4.5788		----	603.31
1134		----		----	----		----	----		----	----
1161		----		----	----		----	----		----	----
1376		----		----	----		----	----		----	----
	normality	n.a.			n.a.			n.a.			
	n	n.a.			n.a.			n.a.			
	outliers	n.a.			n.a.			n.a.			
	mean (n)	n.a.			n.a.			n.a.			
	st.dev. (n)	n.a.			n.a.			n.a.			
	R(calc.)	n.a.			n.a.			n.a.			
	R(D7668:14a)	n.a.			n.a.			n.a.			

Determination of Derived Cetane Number (D6890) of sample #17066

lab	method	DCN	mark	z(targ)	ID	mark	z(targ)	CD	mark	z(targ)	Wall Temp.
120		----		----	----		----	----		----	----
150		----		----	----		----	----		----	----
171		----		----	----		----	----		----	----
323		----		----	----		----	----		----	----
657		----		----	----		----	----		----	----
1067	D6890	54.66		----	3.717		----	----		----	579.5
1107		----		----	----		----	----		----	----
1134		----		----	----		----	----		----	----
1161	ISO15195	55.32		----	3.669		----	----		----	585.1
1376		----		----	----		----	----		----	----
	normality	n.a.			n.a.			n.a.			
	n	2			2			n.a.			
	outliers	n.a.			n.a.			n.a.			
	mean (n)	54.99			3.693			n.a.			
	st.dev. (n)	n.a.			n.a.			n.a.			
	R(calc.)	n.a.			n.a.			n.a.			
	R(D6890:16)	n.a.			n.a.			n.a.			

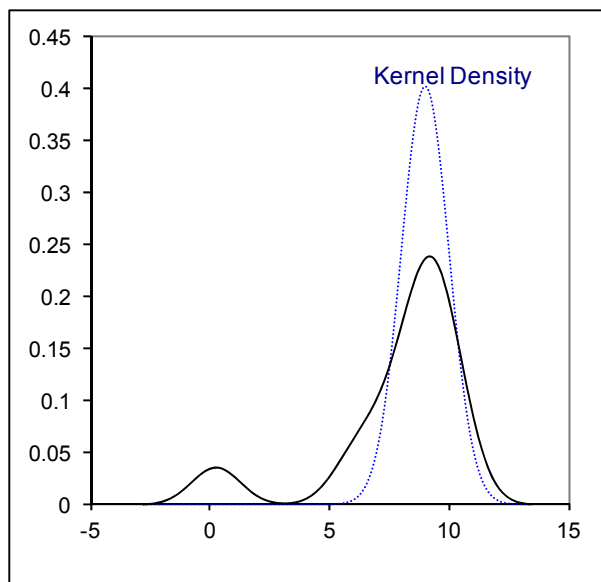
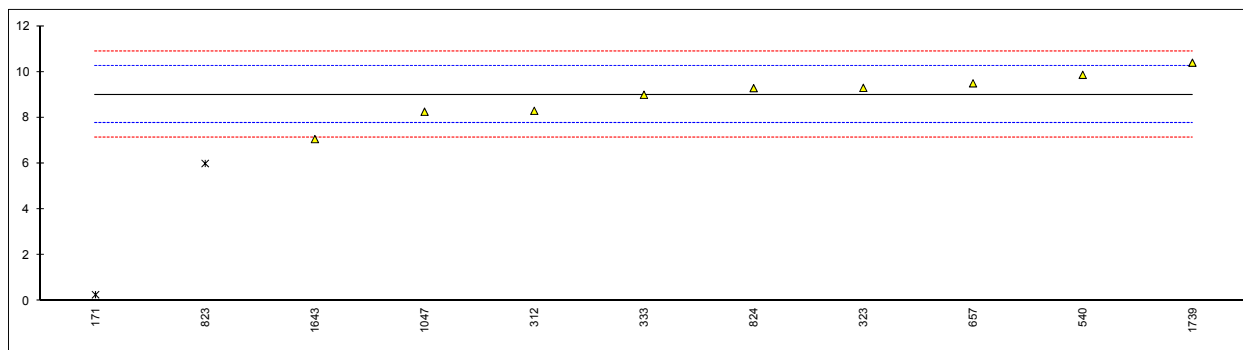
Determination of sum of Calcium and Magnesium (as Ca + Mg) on sample #17067; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		----		----	
150		----		----	
171	EN14538	10.72		-1.72	
312	EN14538	11.45		-1.06	
323	EN14538	12.6		-0.01	
333	EN14538	12.5		-0.10	
391		----		----	
540	EN14538	14.50		1.73	
657	EN14538	11.1		-1.38	
823	EN14538	8.5		-3.75	
824	EN14538	14.7		1.91	
1047	EN14538	12.895		0.26	
1067	EN14538	12.57		-0.03	
1134		----		----	
1643	D5185	13.3360		0.67	
1739	EN14538	16.4		3.47	
normality		OK			
n		12			
outliers		0			
mean (n)		12.606			
st.dev. (n)		2.0674			
R(calc.)		5.789			
R(EN14538:06)		3.064			



Determination of Phosphorus as P on sample #17067; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		----		----	
150		----		----	
171	D4951	0.272	G(0.01)	-13.94	
312	EN14107	8.3		-1.12	
323	EN14107	9.3		0.48	
333	EN14107	9.0		0.00	
391		----		----	
540	EN14107	9.87		1.39	
657	EN14107	9.5		0.80	
823	D4951	6	G(0.05)	-4.79	
824	D4951	9.29		0.47	
1047	EN14107	8.259		-1.18	
1067	EN14107	< 4.0		----	
1134		----		----	
1643	D5185	7.066		-3.09	
1739	EN14107	10.4		2.24	
normality		OK			
n		9			
outliers		2	<u>Spike:</u>		
mean (n)		8.998	8.99		Recovery <100%
st.dev. (n)		0.9950			
R(calc.)		2.786			
R(EN14107:03)		1.753			

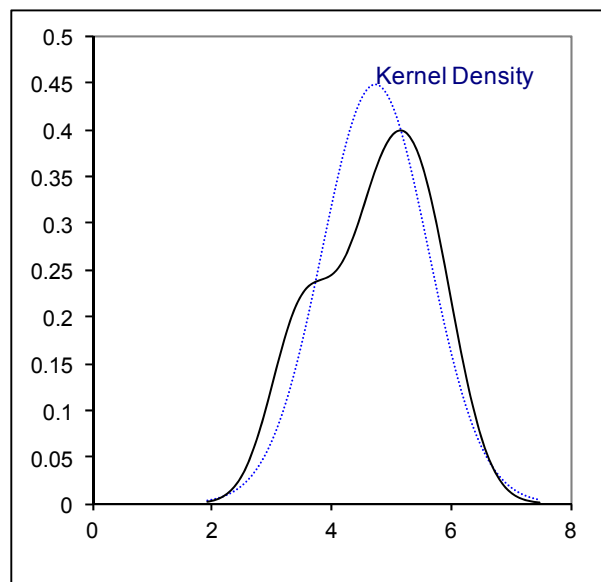
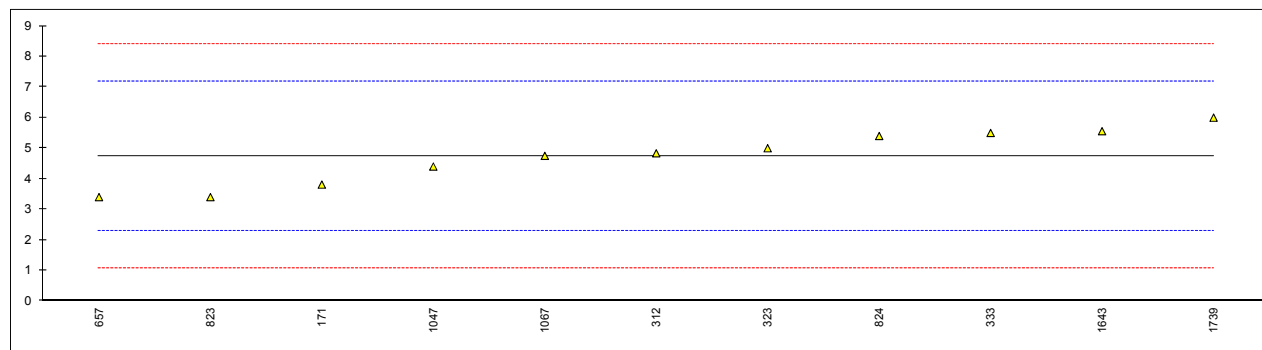


Determination of Potassium as K on sample #17067; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120		----		----	
150		----		----	
171	EN14538	1.46		----	
312	EN14538	<1		----	
323	EN14538	<1.0		----	
333	EN14538	<1.0		----	
391		----		----	
540		----		----	
657	EN14109	<0.5		----	
823	EN14538	0.1		----	
824	EN14538	<1		----	
1047	EN14538	<0,050		----	
1067	EN14538	< 1.0		----	
1134		----		----	
1643		----		----	
1739	EN14538	0.1		----	
	normality	n.a.			
	n	9			
	outliers	n.a.			
	mean (n)	<1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(EN14214:14)	n.a.			

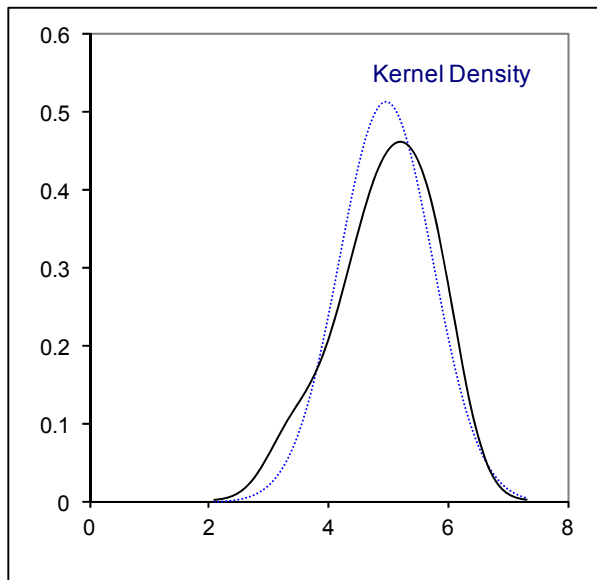
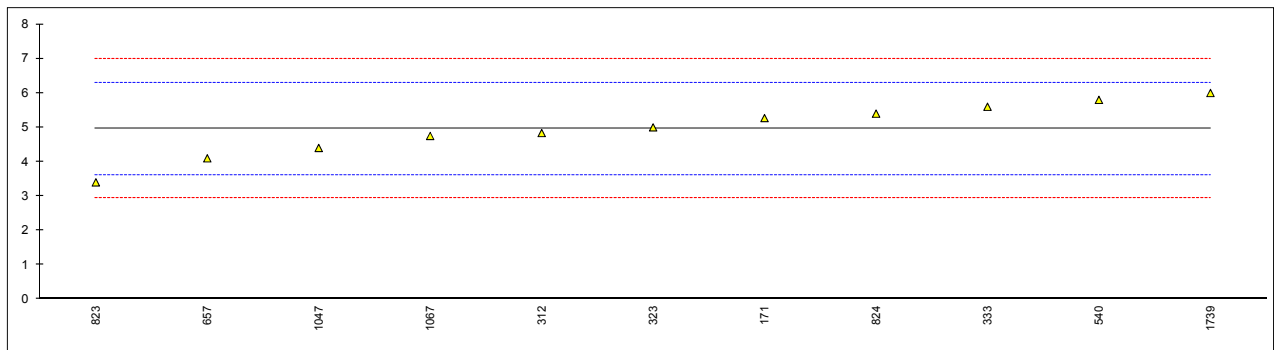
Determination of Sodium as Na on sample #17067; results in mg/kg

lab	method	value	mark	-----	remarks
120				-----	
150				-----	
171	EN14538	3.81			-0.75
312	EN14538	4.835			0.08
323	EN14538	5.0			0.22
333	EN14538	5.5			0.63
391				-----	
540				-----	
657	EN14108	3.4			-1.09
823	EN14538	3.4			-1.09
824	EN14538	5.4			0.55
1047	EN14538	4.401			-0.27
1067	EN14538	4.75			0.01
1134				-----	
1643	D5185	5.557			0.67
1739	EN14538	6.0			1.04
normality		OK			
n		11			
outliers		0		<u>Spike</u>	
mean (n)		4.732		5.99	
st.dev. (n)		0.8897		Recovery <79%	
R(calc.)		2.491			
R(EN14214:14)		3.423		Compare R(EN14108:03) = 2.600	



Determination of sum of Potassium and Sodium (as K + Na) on sample #17067; results in mg/kg

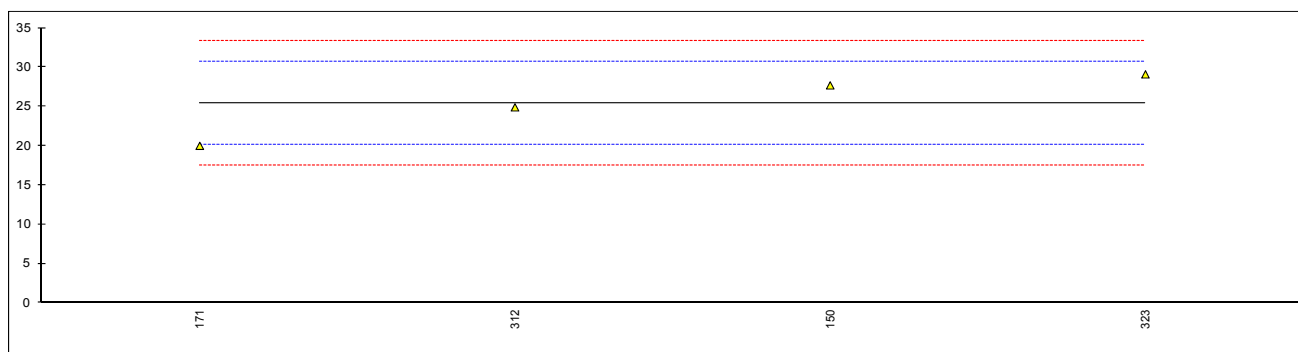
lab	method	value	mark	----	remarks
120		----		----	
150		----		----	
171	EN14538	5.27		0.46	
312	EN14538	4.835		-0.18	
323	EN14538	5.0		0.06	
333	EN14538	5.6		0.95	
391		----		----	
540	EN14538	5.8		1.25	
657	EN14538	4.1		-1.27	
823	EN14538	3.4	E	-2.31	Calculation error?
824	EN14538	5.4		0.65	
1047	EN14538	4.401		-0.83	
1067	EN14538	4.75		-0.31	
1134		----		----	
1643		----		----	
1739	EN14538	6.0	E	1.54	Calculation error?
normality		OK			
n		11			
outliers		0			
mean (n)		4.960			
st.dev. (n)		0.7768			
R(calc.)		2.175			
R(EN14538:06)		1.888			



Determination of Particulate Contamination on sample #17068; results in mg/L

lab	method	value	mark	z(targ)	Vol. filtered (ml)	No. of filtrations	remarks
150	D7321	27.7	C	0.86	400	1	First reported 43.75
171	D7321	20.0		-2.06	400	1	
312	D7321	24.9		-0.20	400	----	
323	D7321	29.1		1.40	380	----	
335		----		----	----	----	
337		----		----	----	----	
540		----		----	----	----	
657		----		----	----	----	
823		----		----	----	----	
1033		----		----	----	----	
1067		----		----	----	----	
1134		----		----	----	----	
1161		----		----	----	----	
1582		----		----	----	----	
1739		----		----	----	----	
1744		----		----	----	----	

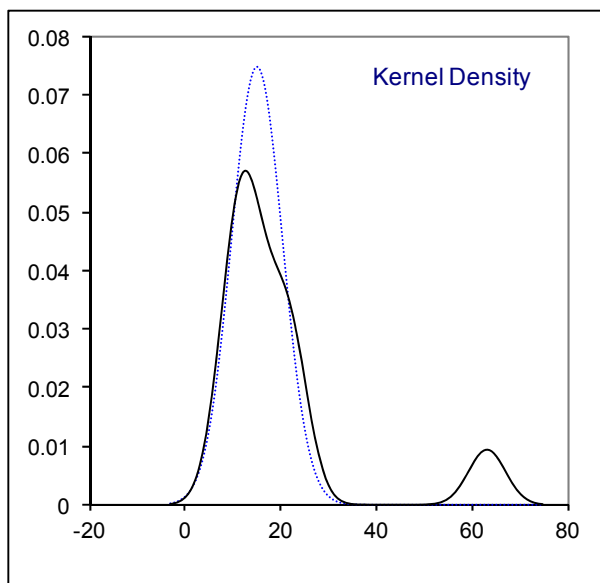
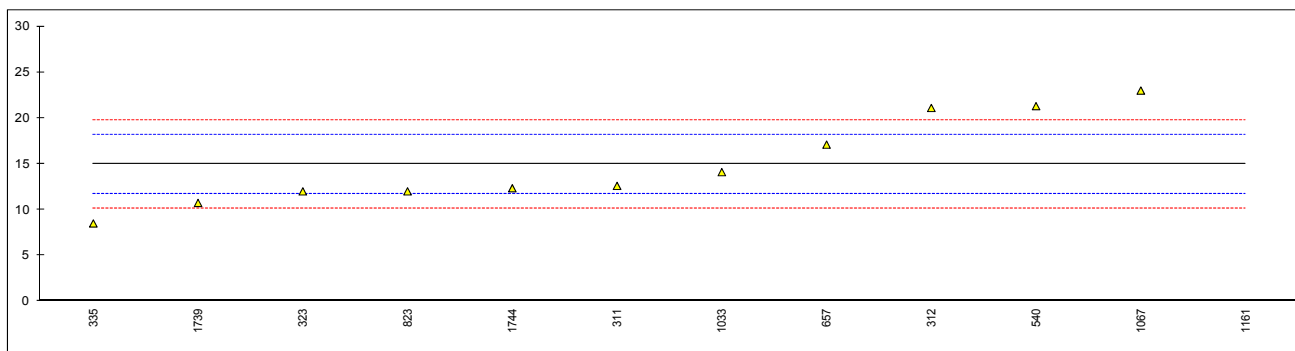
normality unknown
n 4
outliers 0
mean (n) 25.425
st.dev. (n) 4.0161
R(calc.) 11.245
R(D7321:14) 7.374



Determination of Total Contamination (EN12662) on sample #17068; results in mg/kg

lab	method	value	mark	z(targ)	Vol. filtered (ml)	stopped after	remarks
150				----	----	----	
171	EN12662:2008	<6.0		----	220	----	False negative test result?
311	EN12662:2008	12.6		-1.48			
312	EN12662:1998	21.1		3.81			
323	EN12662:1998	12.0		-1.86	350	4	
335	EN12662:1998	8.5		-4.04			
337				----	----	----	
540	EN12662:1998	21.3		3.94	400	25	
657	EN12662:2014	17.1		1.32	300	1.0	see note below
823	EN12662:1998	12		-1.86	300		
1033	EN12662:2008	14.1		-0.55	298		
1067	EN12662:1998	23		5.00	355	2	
1134				----	----	----	
1161	EN12662:2014	63.1	G(0.01)	29.98			see note below
1582				----	----	----	
1739	EN12662:1998	10.74		-2.64			
1744	EN12662:2008	12.345		-1.64	800		
	normality	OK					
	n	11					
	outliers	1					
	mean (n)	14.98					
	st.dev. (n)	4.872					
	R(calc.)	13.64					
	R(EN12662:98)	4.49					

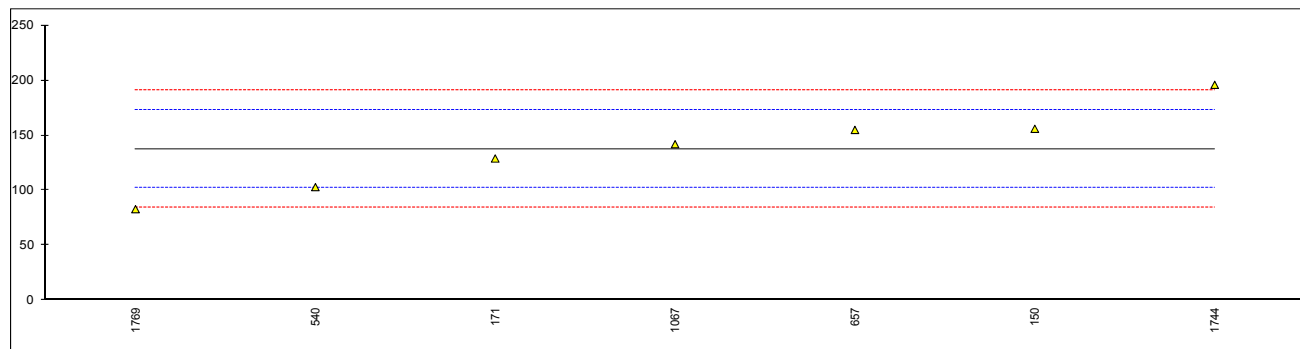
EN12662:2014 may not applicable to FAME (B100) according to CEN/TC 19; instead either method EN12662:1998 or EN12662:2008 is recommended to be used.



Determination of Filter Blocking Potential by Cold Soak Filterability Test (CSFT) on sample #17069; results in s

lab	method	value	mark	z(targ)	Vol. at time >720sec	remarks
120		----		----	----	
150	D7501	156		1.03	----	
171	D7501	129		-0.49	----	
323		----		----	----	
336		----		----	----	
540	D7501	103		-1.95	0	
657	D7501	155		0.97	----	
823		----		----	----	
1033		----		----	----	
1067	D7501	142		0.24	----	
1095		----		----	----	
1134		----		----	----	
1739		----		----	----	
1744	D7501	196		3.27	0	
1769	D7501	82.93		-3.07	----	
6069		----		----	----	

normality unknown
n 7
outliers 0
mean (n) 137.70
st.dev. (n) 37.263
R(calc.) 104.34
R(D7501:12a) 49.94

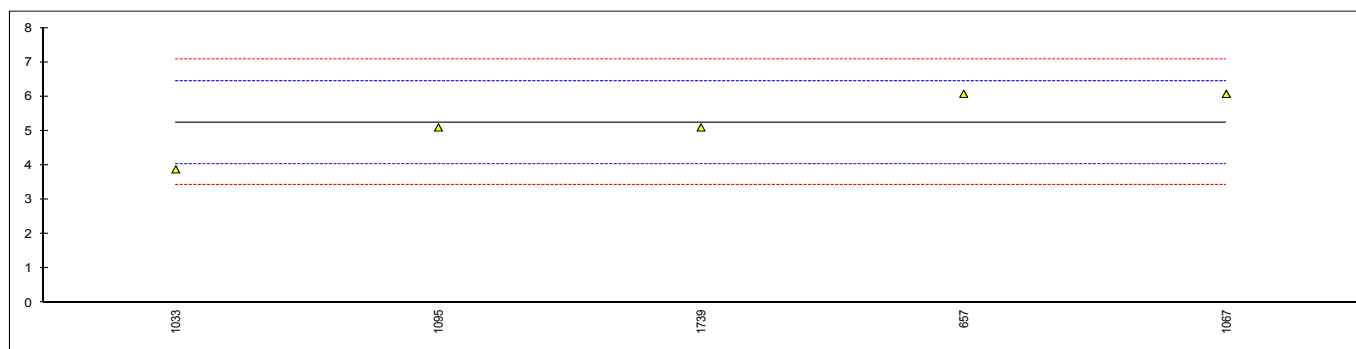


Determination of Filter Blocking Tendency (FBT) on sample #17069

lab	method	value	mark	z(targ)	press. end test (kPa)	vol. pumped (ml)	Remarks
120		----		----	----	----	
150		----		----	----	----	
171		----		----	----	----	
323		----		----	----	----	
336		----		----	----	----	
540		----		----	----	----	
657	D2068-C	6.08		1.37	----	50	
823		----		----	----	----	
1033	IP387-B	3.88		-2.26	105	----	
1067	IP387-B	6.08		1.37	105	50	
1095	D2068-B	5.10		-0.24	105	60	
1134		----		----	----	----	
1739	IP387-B	5.10		-0.24	105	60	
1744		----		----	----	----	
1769		----		----	----	----	
6069		----		----	----	----	

normality unknown
 n 5
 outliers 0
 mean (n) 5.248
 st.dev. (n) 0.9083
 R(calc.) 2.543
 R(D2068:14) 1.697

Lab 1033: also reported 1.20 (IP-PM-EA) as an FBT result



APPENDIX 2

Number of participants per country

1 lab in ARGENTINA
2 labs in BELGIUM
2 labs in BRAZIL
1 lab in CANADA
5 labs in COLOMBIA
6 labs in FRANCE
1 lab in HONG KONG
1 lab in INDONESIA
1 lab in ITALY
1 lab in MALAYSIA
1 lab in MEXICO
3 labs in NETHERLANDS
1 lab in PERU
1 lab in PHILIPPINES
1 lab in POLAND
3 labs in PORTUGAL
1 lab in SINGAPORE
3 labs in SOUTH KOREA
1 lab in SWEDEN
1 lab in TURKEY
3 labs in UNITED KINGDOM
3 labs in UNITED STATES OF AMERICA
1 lab in URUGUAY

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
ex	= test result excluded from the statistical evaluation
E	= probably an error in calculations
U	= test result probably reported in different unit
n.a.	= not applicable
n.d.	= not determined
fr.	= first reported
W	= test result withdrawn on request of the participant
n.e.	= not evaluated
SDS	= Safety Data Sheet

Literature:

- 1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, March 2017
- 2 ASTM E178:02
- 3 ASTM E1301:03
- 4 ISO 5725:86
- 5 ISO 5725, parts 1-6, 1994
- 6 ISO 13528:05
- 7 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
- 8 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
- 9 IP 367:84
- 10 DIN 38402 T41/42
- 11 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
- 12 J.N. Miller, Analyst, 118, 455, (1993)
- 13 Analytical Methods Committee Technical Brief, No4 January 2001
- 14 The Royal Society of Chemistry 2002, Analyst 2002, 127 page1359-1364, P.J. Lowthian and M. Thompson.
- 15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, *Technometrics*, 25(2), pp. 165-172, (1983)