Institute for
Interlaboratory Studies

Results of Proficiency Test
Biogasoline E10
June 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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CONTENTS

1 INTRODUCTION

Since 2009 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Biogasoline E10 based on the latest version of EN228 and ASTM D4814 every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Biogasoline E10.

In this interlaboratory study registered for participation:
- 50 participants in 20 countries for the regular analyzes in Biogasoline E10 iis22B04
- 44 participants in 18 countries for the TVP/DVPE analyzes iis22B04DVPE
- 29 participants in 17 countries for the RON/MON analyzes iis22B04RON

In total 52 laboratories in 20 countries registered for participation in one or more proficiency tests, see appendix 4 for the number of participants per country. In this report the results of the Biogasoline E10 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 three different samples of Biogasoline E10, see table below.

Sample ID	PT ID	Quantity	Purpose
#22090	iis22B04	1x 1 L	Regular analyzes
#22091	iis22B04DVPE	1x 1 L 75% filled	TVP/DVPE
#22092	iis22B04RON	2x 1 L	RON/MON

Table 1: Biogasoline E10 samples used in PT iis22B04

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 a batch of approximately 145 liters of Biogasoline E10 was obtained from a local petrol supplier. After homogenization 75 amber glass bottles of 1 L were filled and labelled #22090.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/m^3
sample #22090-1	728.33
sample #22090-2	728.34
sample #22090-3	728.36
sample #22090-4	728.34
sample #22090-5	728.32
sample #22090-6	728.39
sample #22090-7	728.39
sample #22090-8	728.35

Table 2: homogeneity test results of subsamples #22090

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)	0.07
reference test method	ISO12185:96
0.3 x R (reference test method)	0.45

Table 3: evaluation of the repeatability of subsamples #22090

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

For the preparation of the sample for the analyzes of TVP/DVPE in Biogasoline E10 the remaining part of the batch for the samples for the regular round was used. After homogenization 85 amber bottles of 1 L were 75% filled and labelled #22091.
The homogeneity of the subsamples was checked by determination of Dry Vapor Pressure Equivalent in accordance with ASTM D5191 on 8 stratified randomly selected subsamples.

	DVPE in psi
sample #22091-1	11.92
sample #22091-2	11.98
sample #22091-3	11.98
sample #22091-4	11.98
sample #22091-5	11.95
sample #22091-6	12.01
sample #22091-7	11.99
sample #22091-8	11.98

Table 4: homogeneity test results of subsamples #22091

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.

	DVPE in psi
r (observed)	0.08
reference test method	D5191:20
0.3 x R (reference test method)	0.11

Table 5: evaluation of the repeatability of subsamples #22090

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

For the preparation of the sample for the analyzes of RON/MON in Biogasoline E10 a batch of approximately 90 L of Biogasoline E10 was made available from the retain materials from earlier PTs on Biogasoline E10. After homogenization 80 amber bottles of 1 L were filled and labelled #22092.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/m^3
sample #22092-1	734.46
sample #22092-2	734.60
sample #22092-3	734.49
sample #22092-4	734.48
sample #22092-5	734.45
sample #22092-6	734.47
sample #22092-7	734.55
sample #22092-8	734.47

Table 6: homogeneity test results of subsamples #22092

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)	0.15
reference test method	ISO12185:96
0.3 x R (reference test method)	0.45

Table 7: evaluation of the repeatability of subsamples #22090

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 May 4, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Biogasoline E10 packed in amber glass bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on sample #22090: API Gravity, Appearance, Aromatics (by FIA and GC), Benzene, Copper corrosion 3 hrs at 50 °C, Density at 15 °C, Distillation at 760 mmHg (IBP, 10%, 50% and 90% recovered, FBP, % evaporated at 70 °C, 100 °C and 150 °C), Doctor test, Gum (solvent washed), Lead as Pb, Manganese as Mn, Mercaptan Sulfur as S, Olefins (by FIA and GC), Oxidation Stability, Oxygenates (DIPE, ETBE, Ethanol, Ethers (C5 only), Ethers (C5 or more C atoms), Ethers (C6 or more C atoms), Isobutanol, Isopropanol, Methanol, MTBE, TAME, tert. Butanol and other Oxygenates), Oxygen content and Sulfur.
On sample #22091 it was requested to determine Total Vapor Pressure and to calculate DVPE (in accordance with ASTM D5191 and EPA requirements). The formulas were given in the letter of instructions.

On sample #22092 it was requested to determine RON and MON (EN228 correction not applied).

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

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

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendices 1 and 2 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyzes). Additional or corrected test results are used for data analysis and the original test results are placed under 'Remarks' in the result tables in appendices 1 and 2. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

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

First, the normality of the distribution of the various data sets per determination was checked by means of the Lilliefors-test, a variant of the Kolmogorov-Smirnov test and by the calculation of skewness and kurtosis. Evaluation of the three normality indicators in combination with the visual evaluation of the graphic Kernel density plot, lead to judgement of the normality being either 'unknown', 'OK', 'suspect' or 'not OK'. After removal of outliers,

this check was repeated. If a data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

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

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

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

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

3.2 GRAPHICS

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

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

3.3 Z-SCORES

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

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

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples.
For the regular Biogasoline E10 round four participants reported test results after the final reporting date and four other participants were not able to report any test results.
For the TVP/DVPE analyzes in Biogasoline E10 two participants reported test results after the final reporting date and four other participants were not able to report any test results.
For the RON/MON analyzes in Biogasoline E10 one participant reported test results after the final reporting date and five other participants were not able to report any test results.
Not all participants were able to report all tests requested.
In total 48 participants reported 831 numerical test results. Observed were 43 outlying test results, which is 5.2%. 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 5.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D3831) and an added designation for the year that the test method was adopted or revised (e.g. D3831:12). When a method has been reapproved an “R” will be added and the year of approval (e.g. D3831:12R17).

sample #22090

API Gravity: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D4052:22.

Appearance: This determination was not problematic. All reporting participants agreed about the appearance as Pass (Clear and Bright).

Aromatics by FIA: 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 ASTM D1319:20a.

Aromatics by GC: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ISO22854-A:21.

Benzene: This determination was problematic. Five statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO22854-A:21.

Copper corrosion: This determination was not problematic. All reporting participants agreed on a test result of 1 (1a).

Density at 15 °C: 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 ISO12185:96 and ASTM D4052:22.

Distillation at 760 mmHg: This determination may be problematic depending on the distillation parameter. Over eight distillation parameters thirteen statistical outliers were observed. Almost all calculated reproducibilities after rejection of the statistical outliers are in agreement with the requirements of ASTM D86:20b automated mode, only 50% evaporated is not in agreement. Almost all parameters with known requirements are also in agreement with ASTM D86:20b manual mode, only 50% evaporated is not in agreement.

Doctor test: This determination was not problematic. All reporting participants agreed on a test result of “Negative”.

Gum (solvent washed): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D381:22.

Lead as Pb: This determination was not problematic. All reporting participants agreed on a concentration near or below the application range of 2.5 mg/L of ASTM D3237:17. Therefore, no z-scores are calculated.

Manganese as Mn: This determination was not problematic. All reporting participants agreed on a concentration <2 mg/L. Therefore, no z-scores are calculated.

Mercaptans Sulfur: This determination was not problematic. Almost all reporting participants agreed on a concentration near or below the application range of 0.0003 %M/M of ASTM D3227:16. Therefore, no z-scores are calculated.

Olefins by FIA: 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 ASTM D1319:20a.

Olefins by GC: 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 ISO22854-A:21.

Oxidation Stability: This determination was not problematic. All reporting participants agreed on a test result >360 minutes.

Ethanol: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ISO22854-A:21.

Ethers (C5 only): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO22854-A:21.

Ethers (C5 or more C atoms): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO22854-A:21.

Ethers (C6 or more C atoms): This determination was not problematic. All reporting participants agreed on a concentration <1 %V/V. Therefore, no z-scores are calculated.

MTBE: This determination was problematic. Two statistical outliers were observed. Almost all reporting participants agreed on a concentration near or below the reproducibility range of ISO22854-A:21 for the component MTBE. In 2021 a new version of ISO22854 was published which contains a reproducibility for MTBE. In previous iis PTs with Biogasoline E10 iis had used the reproducibility for Oxygenated compounds (as individual component or group). However, the reproducibility for MTBE is stricter than the former reproducibility of Oxygenated compounds. Therefore, the reproducibility of Oxygenated compounds is mentioned in appendix 1 for comparison. Because the reproducibility of MTBE is so strict no z-scores are calculated.

The concentration of the other oxygenates were near or below the application range of ISO22854-A:21. Therefore, no z-scores are calculated. The reported test results are listed in appendix 2.

Oxygen content: This determination was problematic. Ono statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ISO22854-A:21.

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

sample #22091

TVP: 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 D5191:20 and EN13016-1:18.

DVPE (ASTM D5191): The conversion of the measured Total Vapor Pressure (TVP) to the corresponding Dry Vapor Pressure Equivalent (DVPE) as described in the ASTM D5191 was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5191:20 and EN13016-1:18.

DVPE (EPA calculation): The conversion of the measured Total Vapor Pressure (TVP) to the corresponding U.S. EPA guidelines (CFR 2021 title 40, vol. 19, part 80, §80.46) was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5191:20 and EN13016-1:18.

sample #22092

RON: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D2699-A:21, ASTM D2699-C:21 and ISO5164:14.

MON: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D2700-A:22, ASTM D2700-C:22 and ISO5163:14.

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)
API Gravity		19	62.66	0.18	0.70
Appearance		20	Pass	n.a.	n.a.
Aromatics by FIA	%V/V	12	22.2	5.7	3.7
Aromatics by GC	%V/V	25	19.4	1.0	1.0
Benzene	%V/V	30	0.62	0.05	0.03
Copper corrosion 3 hrs at 50 °C		25	1 (1a)	n.a.	n.a.
Density at 15 °C	kg/m^3	42	728.5	0.5	1.5
Initial Boiling Point	°C	42	29.5	4.5	4.7
10% evaporated	°C	42	46.3	2.4	3.6
50% evaporated	°C	41	73.4	5.7	3.9
90% evaporated	°C	39	132.4	2.1	5.7
Final Boiling Point	°C	43	166.7	5.8	7.1
% evaporated at 70 °C	%V/V	38	48.4	1.8	2.0
% evaporated at 100 °C	%V/V	37	61.2	1.5	1.8
% evaporated at 150 °C	%V/V	37	96.4	0.9	1.1
Doctor test		18	Negative	n.a.	n.a.
Gum (solvent washed)	mg/100mL	13	0.55	1.14	2.09
Lead as Pb	mg/L	16	<2.5	n.e.	n.e.
Manganese as Mn	mg/L	15	<2	n.e.	n.e.
Mercaptans Sulfur as S	%M/M	11	<0.0003	n.e.	n.e.
Olefins by FIA	%V/V	11	20.0	5.5	5.0
Olefins by GC	%V/V	24	18.4	1.5	2.7
Oxidation Stability	minutes	18	>360	n.e.	n.e.
Ethanol	%V/V	36	9.2	0.6	0.4
Ethers C5	%V/V	16	0.61	0.12	0.37
Ethers C5 or more C atoms	%V/V	17	0.60	0.13	0.37
Ethers C6 or more C atoms	%V/V	12	<1	n.e.	n.e.
MTBE	%V/V	23	0.62	0.11	(0.04)
Oxygen content	%M/M	30	3.6	0.3	0.2
Sulfur	mg/kg	38	8.0	2.5	2.4

Table 8 reproducibilities of tests on sample #22090

For results between brackets no z-scores are calculated.

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Vapor Pressure	psi	26	12.88	0.24	0.37
DVPE acc.to ASTM D5191	psi	33	11.90	0.17	0.36
DVPE acc.to EPA	psi	16	11.98	0.20	0.36

Table 9: reproducibilities of tests on sample #22091

Parameter	unit	n	average	2.8 * sd	R(lit)
RON		21	96.4	0.7	0.7
MON		22	85.5	0.9	0.9

Table 10: reproducibilities of tests on sample #22092

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

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

	June 2022	June 2021	June 2020	May 2019	May 2018
Number of reporting laboratories	48	52	54	50	53
Number of test results	831	940	960	918	1032
Number of statistical outliers	43	40	53	31	45
Percentage of statistical outliers	5.2%	4.3%	5.5%	3.4%	4.4%

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 in the following table.

Determination	June 2022	June 2021	June 2020	May 2019	May 2018
API Gravity	++	++	++	+	++
Aromatics by FIA	-	-	+	+	-
Aromatics by GC	+/-	+	+/-	-	-
Benzene	-	-	+/-	-	+/-
Density at 15 °C	++	++	+	+	+
Distillation at 760 mmHg	+	+	+	+	+/-
Gum (solvent washed)	+	++	+	+	+
Mercaptans as S	n.e.	n.e.	++	+/-	+/-
Olefins by FIA	-	+	+	+/-	+/-
Olefins by GC	+	+	++	++	+

Determination	June 2022	June 2021	June 2020	May 2019	May 2018
Ethanol	-	-	+/-	+/-	-
Ethers	++	++	++	+	+/-
MTBE	(--)	++	++	-	++
Oxygen content	-	-	+	+/-	+/-
Sulfur	+/-	+	+	+	+/-
Total Vapor Pressure	+	+	+	+/-	+
DVPE acc.to ASTM D5191	++	+	+	+/-	+
DVPE acc.to EPA	+	+	+	+/-	+
RON	+/-	-	-	-	+/-
MON	+/-	+	+/-	-	+/-

Table 12: comparison of determinations to the reference test methods

The following performance categories were used:

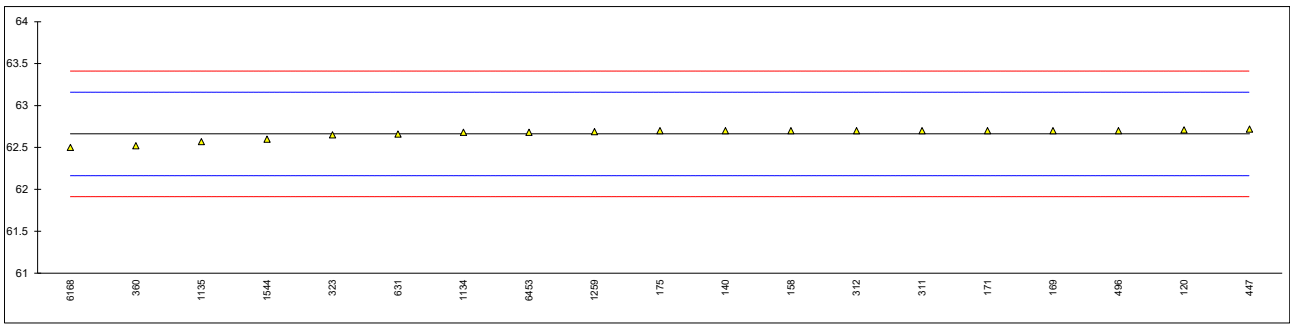
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test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

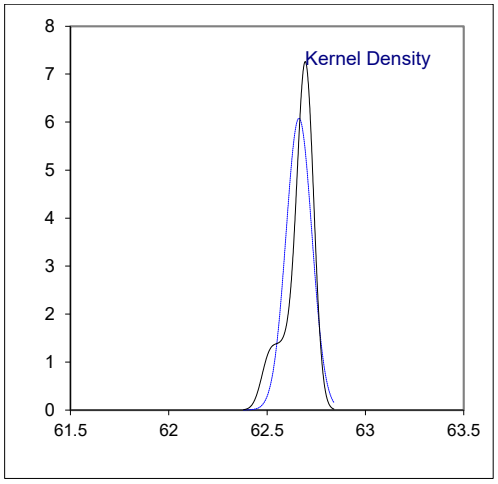
APPENDIX 1

Determination of API Gravity on sample #22090;

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D4052	62.71		0.19	
140	D4052	62.7		0.15	
150		-----		-----	
158	D4052	62.7		0.15	
159		-----		-----	
169	D4052	62.7		0.15	
171	D4052	62.7		0.15	
175	D4052	62.7		0.15	
311	D4052	62.70		0.15	
312	D4052	62.70		0.15	
323		62.65		-0.05	
328		-----		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	D4052	62.52		-0.57	
447	D4052	62.72		0.23	
467		-----		-----	
496	D4052	62.7		0.15	
511		-----		-----	
631	D4052	62.66		-0.01	
1026		-----		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	D4052	62.68		0.07	
1135	D4052	62.57		-0.37	
1191		-----		-----	
1259	D4052	62.69		0.11	
1299		-----		-----	
1320		-----		-----	
1443		-----		-----	
1544	D4052	62.60		-0.25	
1556		-----		-----	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142		-----		-----	
6168	D4052	62.5		-0.65	
6404		-----		-----	
6452		-----		-----	
6453	ISO12185	62.68	C	0.07	first reported 0.728058

normality	suspect
n	19
outliers	0
mean (n)	62.662
st.dev. (n)	0.0656
R(calc.)	0.184
st.dev.(D4052:22)	0.2495
R(D4052:22)	0.698


64
63.5
63
62.5
62
61.5
61
6168
360
1135
1544
323
631
1134
6453
1259
175
140
158
312
311
171
169
496
120
447


Kernel Density
8
7
6
5
4
3
2
1
0
61.5
62
62.5
63
63.5

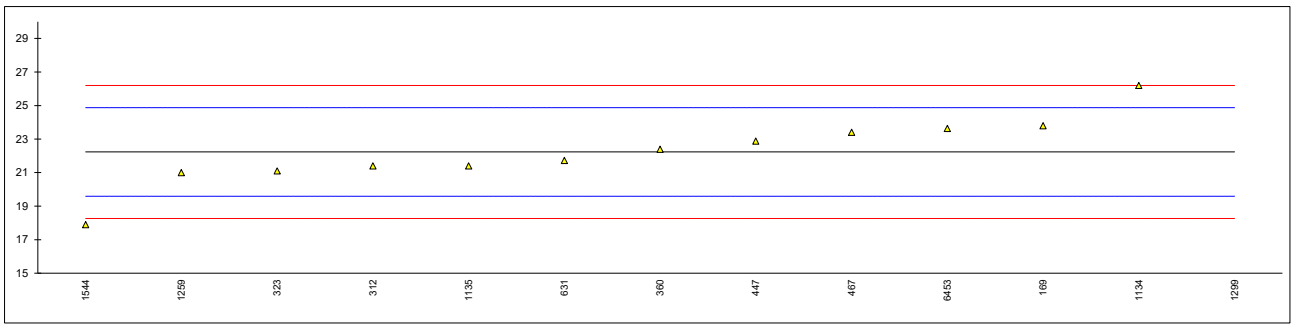
Determination of Appearance on sample #22090;

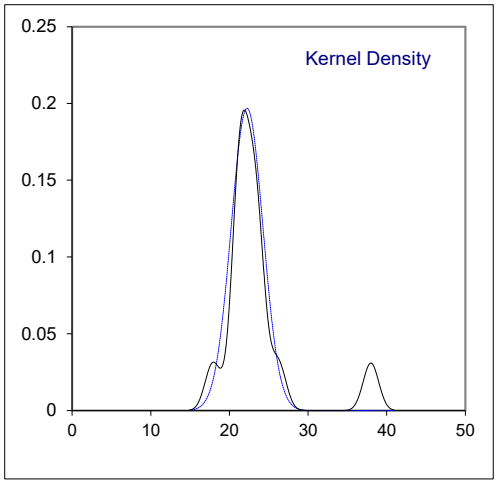
lab	method	value	mark	z(targ)	remarks
62		-----		----	
120	D4176	Clear & Bright		----	
140		-----		----	
150		-----		----	
158	D4176	C&B		----	
159		-----		----	
169	Visual	Pass		----	
171	Visual	Clear & Bright		----	
175	D4176	Pass		----	
311		-----		----	
312	D4176	pass		----	
323		CBL		----	
328		-----		----	
333		-----		----	
334		-----		----	
335		-----		----	
337		-----		----	
338		-----		----	
360	EN228	clear and bright		----	
447	Visual	Clear & Bright		----	
467		-----		----	
496	Visual	clear & bright		----	
511		-----		----	
631	D4176	Pass		----	
1026		Bright & Clear		----	
1033		-----		----	
1082		-----		----	
1126		-----		----	
1134	D4176	Clear & Bright		----	
1135	D4176	Clear & Bright		----	
1191		-----		----	
1259		-----		----	
1299	Visual	Cl&Br		----	
1320		-----		----	
1443		-----		----	
1544		clear & bright		----	
1556	Visual	C&B		----	
1634		C&B		----	
1656		-----		----	
1706		-----		----	
1776		-----		----	
1807		-----		----	
1810		-----		----	
1811		-----		----	
2146		-----		----	
6142		C&B		----	
6168	D4176	C&B		----	
6404		-----		----	
6452		-----		----	
6453		-----		----	
	n	20			
	mean (n)	Pass (Clear & Bright)			

Determination of Aromatics by FIA (without oxygenates correction) on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169	D1319	23.8		1.18	
171		-----		-----	
175		-----		-----	
311		-----		-----	
312	EN15553	21.4		-0.63	
323		21.1		-0.86	
328		-----		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	D1319	22.4		0.12	
447	D1319	22.880		0.49	
467	D1319	23.4		0.88	
496		-----		-----	
511		-----		-----	
631	In house	21.73		-0.38	
1026		-----		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	D1319	26.2		3.00	
1135	D1319	21.4	C	-0.63	first reported 23.6
1191		-----		-----	
1259	D1319	21.0		-0.94	
1299	D1319	38.0	D(0.01)	11.93	
1320		-----		-----	
1443		-----		-----	
1544	EN15553	17.90		-3.28	
1556		-----		-----	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142		-----		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		23.63		1.05	

normality	suspect
n	12
outliers	1
mean (n)	22.24
st.dev. (n)	2.026
R(calc.)	5.67
st.dev.(D1319:20a)	1.321
R(D1319:20a)	3.7

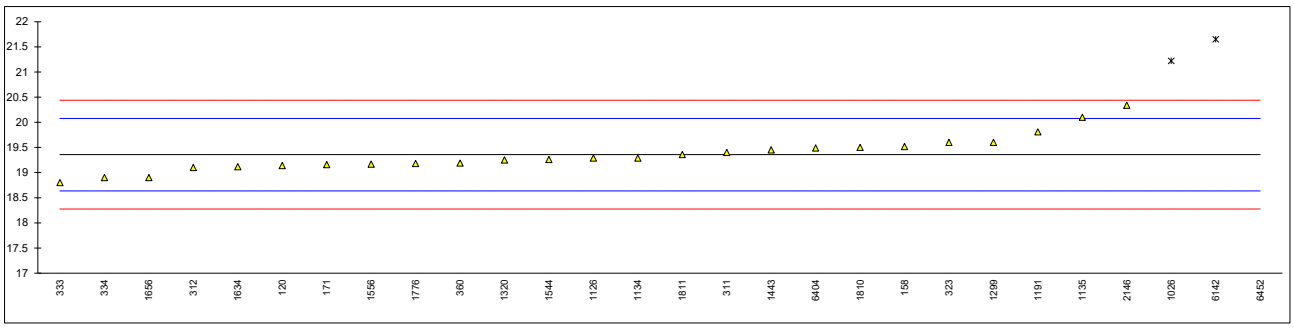

29
27
25
23
21
19
17
15
1544
1259
323
312
1135
631
360
447
467
6453
169
1134
1299

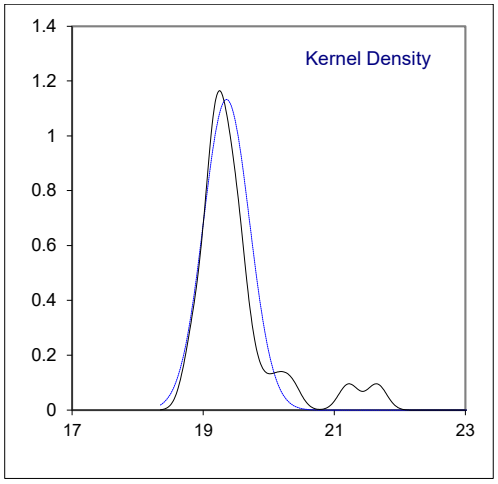

Kernel Density
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40
50

Determination of Aromatics by GC on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5769	19.14	C	-0.60	first reported 17.43
140		-----		-----	
150		-----		-----	
158	D5580	19.52		0.45	
159		-----		-----	
169		-----		-----	
171	ISO22854-A	19.16		-0.55	
175		-----		-----	
311	ISO22854-A	19.4		0.12	
312	ISO22854-A	19.1		-0.71	
323		19.6		0.67	
328		-----		-----	
333	ISO22854-A	18.8		-1.54	
334	ISO22854-A	18.9		-1.27	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO22854-A	19.19		-0.46	
447		-----		-----	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631		-----		-----	
1026	ISO22854-A	21.22	R(0.01)	5.17	
1033		-----		-----	
1082		-----		-----	
1126	ISO22854-A	19.29		-0.19	
1134	ISO22854-A	19.29		-0.19	
1135	ISO22854-A	20.1	C	2.06	first reported 22.7
1191	ISO22854-A	19.81		1.26	
1259		-----		-----	
1299	ISO22854-A	19.6		0.67	
1320	ISO22854-A	19.25	C	-0.30	first reported 21.05
1443	ISO22854-A	19.45		0.26	
1544	ISO22854-A	19.26		-0.27	
1556	ISO22854-A	19.17		-0.52	
1634	ISO22854-A	19.12		-0.66	
1656	ISO22854-A	18.90		-1.27	
1706		-----		-----	
1776	ISO22854-A	19.18		-0.49	
1807		-----		-----	
1810	ISO22854-A	19.50		0.40	
1811	ISO22854-A	19.36		0.01	
2146	ISO22854-A	20.34		2.73	
6142	ISO22854-A	21.65	R(0.01)	6.36	
6168		-----		-----	
6404	ISO22854-A	19.49		0.37	
6452	ISO22854-A	26.11	R(0.01)	18.73	
6453		-----		-----	

normality	not OK
n	25
outliers	3
mean (n)	19.357
st.dev. (n)	0.3522
R(calc.)	0.986
st.dev.(ISO22854-A:21)	0.3605
R(ISO22854-A:21)	1.009

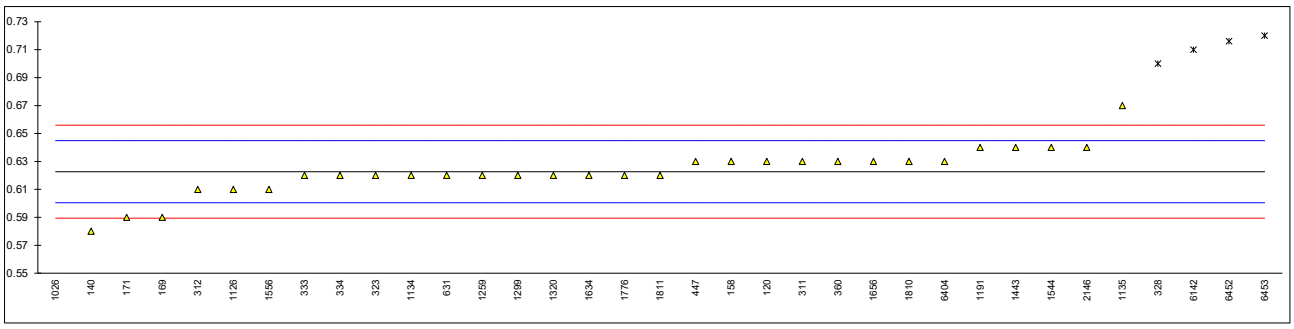

22
21.5
21
20.5
20
19.5
19
18.5
18
17.5
17
333
334
1656
312
1634
120
171
1556
1776
360
1320
1544
1126
1134
1811
311
1443
6404
1810
158
323
1299
1191
1135
2146
1026
6142
6452

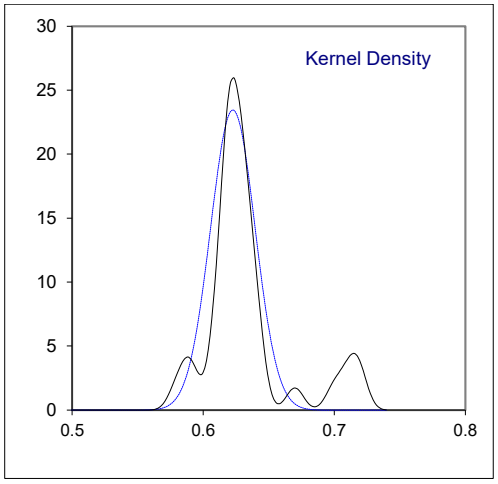

Kernel Density
1.4
1.2
1
0.8
0.6
0.4
0.2
0
17
19
21
23

Determination of Benzene on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D3606	0.63		0.66	
140	D3606	0.58		-3.85	
150		-----		-----	
158	D3606	0.63		0.66	
159		-----		-----	
169	D3606	0.59		-2.95	
171	ISO22854-A	0.59		-2.95	
175		-----		-----	
311	ISO22854-A	0.63		0.66	
312	ISO22854-A	0.61		-1.14	
323		0.62		-0.24	
328	EN238	0.7	R(0.05)	6.98	
333	ISO22854-A	0.62		-0.24	
334	ISO22854-A	0.62		-0.24	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO22854-A	0.63		0.66	
447	EN238	0.63		0.66	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631	D6277	0.62		-0.24	
1026	ISO22854-A	0.07	R(0.01)	-49.88	
1033		-----		-----	
1082		-----		-----	
1126	ISO22854-A	0.61		-1.14	
1134	ISO22854-A	0.62		-0.24	
1135	ISO22854-A	0.67	C	4.27	first reported 0.61
1191	ISO22854-A	0.64		1.56	
1259	EN12177	0.62		-0.24	
1299	ISO22854-A	0.62		-0.24	
1320	ISO22854-A	0.62	C	-0.24	first reported 0.67
1443	ISO22854-A	0.64		1.56	
1544	ISO22854-A	0.640		1.56	
1556	ISO22854-A	0.61		-1.14	
1634	ISO22854-A	0.62		-0.24	
1656	ISO22854-A	0.63		0.66	
1706		-----		-----	
1776	ISO22854-A	0.62		-0.24	
1807		-----		-----	
1810	ISO22854-A	0.63		0.66	
1811	ISO22854-A	0.62		-0.24	
2146	ISO22854-A	0.64		1.56	
6142	ISO22854-A	0.71	R(0.05)	7.88	
6168		-----		-----	
6404	ISO22854-A	0.63		0.66	
6452	D6277	0.716	R(0.05)	8.42	
6453	D6277	0.72	C,R(0.05)	8.78	first reported 0.77

normality	not OK
n	30
outliers	5
mean (n)	0.623
st.dev. (n)	0.0170
R(calc.)	0.048
st.dev.(ISO22854-A:21)	0.0111
R(ISO22854-A:21)	0.031


0.73
0.71
0.69
0.67
0.65
0.63
0.61
0.59
0.57
0.55
1026 140 171 169 312 1126 1556 333 334 323 1134 631 1259 1299 1320 1634 1776 1811 447 158 120 311 360 1656 1810 6404 1191 1443 1544 2146 1135 328 6142 6452 6453


Kernel Density
30
25
20
15
10
5
0
0.5
0.6
0.7
0.8

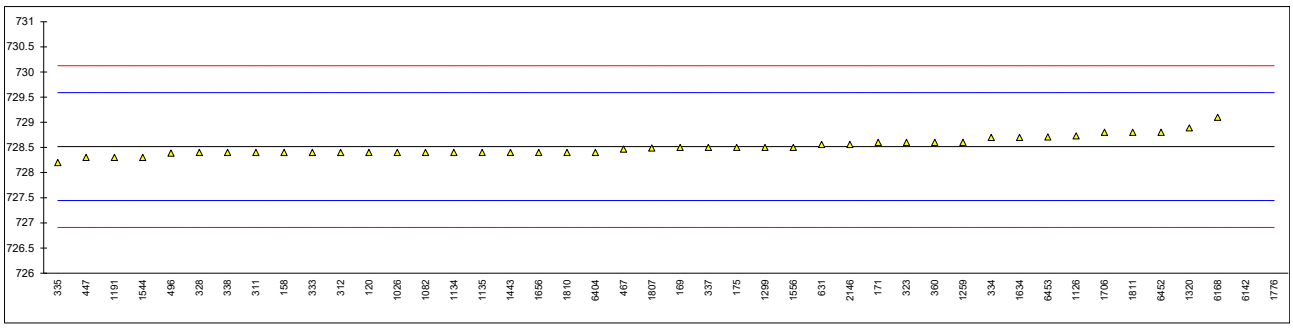
Determination of Copper corrosion 3 hrs at 50 °C on sample #22090

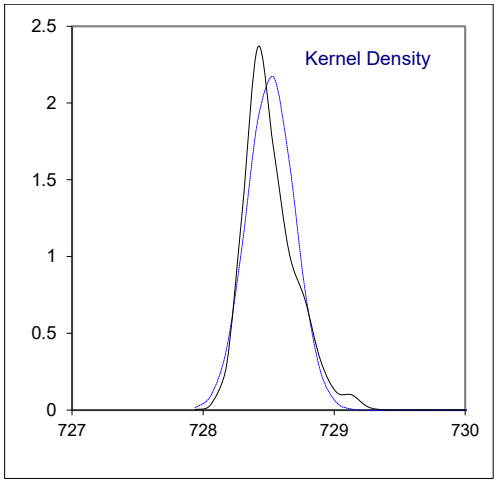
lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D130	1a		-----	
140	D130	1a		-----	
150		-----		-----	
158	D130	1a		-----	
159		-----		-----	
169	D130	1A		-----	
171	D130	1a		-----	
175		-----		-----	
311	D130	1A		-----	
312	D130	1a		-----	
323		1A		-----	
328	D130	1		-----	
333		-----		-----	
334	ISO2160	1		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO2160	1A		-----	
447	D130	1A		-----	
467	ISO2160	1a		-----	
496		-----		-----	
511	D130	1a		-----	
631	D130	1a		-----	
1026	ISO2160	1A		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	D130	1a		-----	
1135	D130	1A		-----	
1191		-----		-----	
1259		-----		-----	
1299	D130	1A		-----	
1320		-----		-----	
1443	ISO2160	1a		-----	
1544	ISO2160	1a		-----	
1556		1a		-----	
1634	ISO2160	1a		-----	
1656	ISO2160	1		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142		-----		-----	
6168	D130	1a		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	
	n	25			
	mean (n)	1 (1a)			

Determination of Density at 15 °C on sample #22090; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D4052	728.4		-0.22	
140		-----		-----	
150		-----		-----	
158	D4052	728.4		-0.22	
159		-----		-----	
169	D4052	728.5		-0.03	
171	D4052	728.6		0.16	
175	D4052	728.5		-0.03	
311	D4052	728.4		-0.22	
312	ISO12185	728.4		-0.22	
323		728.6		0.16	
328	ISO12185	728.4		-0.22	
333	ISO12185	728.4		-0.22	
334	ISO12185	728.7		0.34	
335	ISO12185	728.2		-0.59	
337	ISO12185	728.5		-0.03	
338	ISO12185	728.4		-0.22	
360	ISO12185	728.6		0.16	
447	D4052	728.3		-0.40	
467	ISO12185	728.47		-0.09	
496	ISO12185	728.39		-0.24	
511		-----		-----	
631	D4052	728.56		0.08	
1026	D4052	728.4		-0.22	
1033		-----		-----	
1082	ISO12185	728.4		-0.22	
1126	ISO12185	728.73		0.40	
1134	D4052	728.4		-0.22	
1135	ISO12185	728.4		-0.22	
1191	ISO12185	728.3		-0.40	
1259	ISO12185	728.6		0.16	
1299	D4052	728.5		-0.03	
1320	ISO12185	728.89		0.70	
1443	ISO12185	728.4		-0.22	
1544	ISO12185	728.30		-0.40	
1556	ISO12185	728.50		-0.03	
1634	ISO12185	728.7		0.34	
1656	ISO12185	728.4		-0.22	
1706	IP365	728.8		0.53	
1776	ISO12185	758.2	R(0.01)	55.41	
1807	ISO12185	728.49		-0.05	
1810	ISO12185	728.4	C	-0.22	first reported 729.2
1811	ISO12185	728.8	C	0.53	first reported 729.9
2146	ISO12185	728.56		0.08	
6142	ISO12185	736.3	R(0.01)	14.53	
6168	D4052	729.1		1.09	
6404	ISO12185	728.4		-0.22	
6452	ISO12185	728.80		0.53	
6453	ISO12185	728.71		0.36	

normality	not OK
n	42
outliers	2
mean (n)	728.517
st.dev. (n)	0.1826
R(calc.)	0.511
st.dev.(ISO12185:96)	0.5357
R(ISO12185:96)	1.5
compare	
R(D4052:22)	2.627

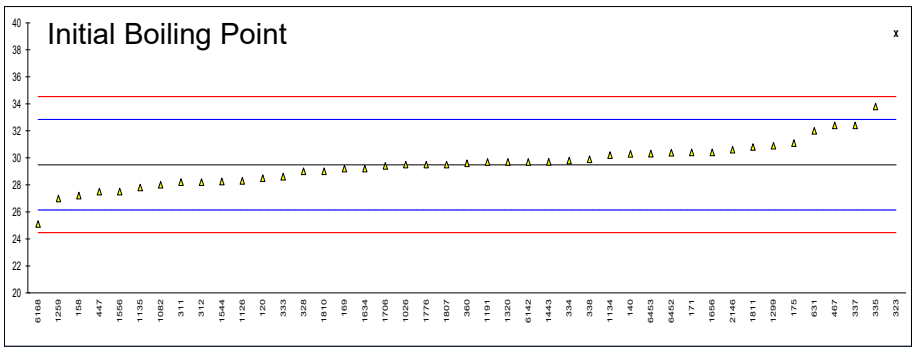

731
730.5
730
729.5
729
728.5
728
727.5
727
726.5
726
335 447 1191 1544 496 328 338 311 158 333 312 120 1026 1082 1134 1135 1443 1656 1810 6404 467 1807 169 337 175 1299 1556 631 2146 171 323 360 1259 334 1634 6453 1126 1706 1811 6452 1320 6168 6142 1778

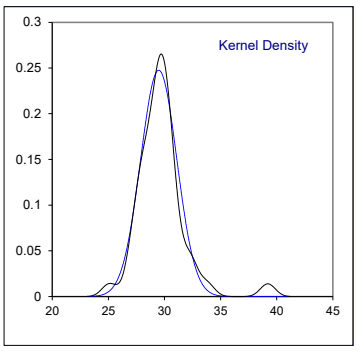

Kernel Density
2.5
2
1.5
1
0.5
0
727
728
729
730

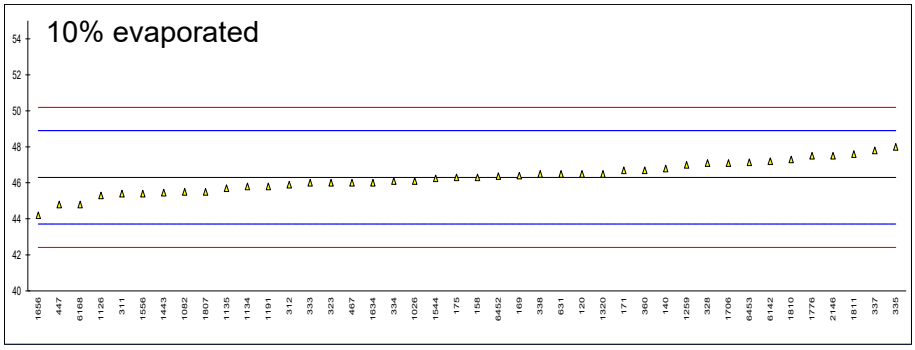
Determination of Distillation at 760 mmHg on sample #22090; results in °C

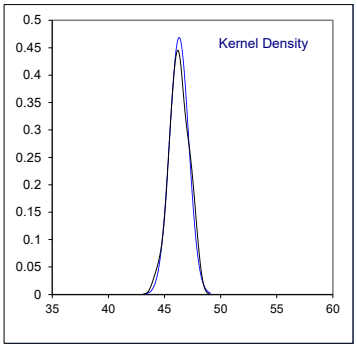
lab	method	IBP	mark	10% eva	mark	50% eva	mark	90% eva	mark	FBP	mark
62		-----		-----		-----		-----		-----	
120	D86-automated	28.5		46.5		72.3		131.9		167.1	
140	D86	30.3		46.8		73.3		133.2		167.0	
150		-----		-----		-----		-----		-----	
158	D86-automated	27.2		46.3		71.9		132.6		164.2	
159		-----		-----		-----		-----		-----	
169	D86-automated	29.2		46.4		72.8		132.2		170.1	
171	D86-automated	30.4		46.7		72.2		132.7		169.2	
175	D86-automated	31.1		46.3		72.0		132.0		166.9	
311	D86-automated	28.2		45.4		71.6		131.6		165.3	
312	D86-automated	28.2		45.9		71.4		131.8		164.4	
323		39.2	R1	46		73.3		132.3		166.9	
328	D86-automated	29.0		47.1		73.0		131.6		166.1	
333	ISO3405-automated	28.6		46.0		72.6		133.0		167.4	
334	D86-automated	29.8		46.1		74.2		132.6		164.2	
335	D86-automated	33.8		48.0		74.1		134.3		162.6	
337		32.4		47.8		74.5		132.7		162.4	
338	ISO3405-automated	29.9		46.5		72.7		132.2		166.0	
360	ISO3405-automated	29.6		46.7		73.1		132.0		166.1	
447	D86-automated	27.5		44.8		71.2		131.8		167.6	
467	D86-automated	32.4		46.0		73.3		132.4		171.1	
496		-----		-----		-----		-----		-----	
511		-----		-----		-----		-----		-----	
631	D86-manual	32.0		46.5		77.5		132.0	C	168.5	
1026	ISO3405-automated	29.5		46.1		81.0	R5	132.0		168.1	
1033		-----		-----		-----		-----		-----	
1082	ISO3405-automated	28.0		45.5		71.3		131.8		166.5	
1126		28.3		45.3		70.5		132.0		167.8	
1134	D86-automated	30.2		45.8		72.0		132.4		167.8	
1135	D86-automated	27.8		45.7		71.8		132.1		167.0	
1191	ISO3405-automated	29.7		45.8		72.1		132.4		167.8	
1259	D86-automated	27.0		47.0		74.1		130.8		166.9	
1299	D86-automated	30.9		-----		-----		-----		168.6	
1320	D86-automated	29.7		46.5		72.7		131.8		165.3	
1443	ISO3405-automated	29.71		45.46		73.00		132.0		162.45	
1544	ISO3405-automated	28.25		46.25		72.05		132.1		163.45	
1556	ISO3405-automated	27.5		45.4		71.2		132.3		166.0	
1634	D86-automated	29.2		46.0		76.3		132.8		166.1	
1656	ISO3405-automated	30.4		44.2		70.8		131.8		165.6	
1706		29.4		47.1		73.7		132.1		165.7	
1776	ISO3405-automated	29.5		47.5		76.2		134.3		167.1	
1807		29.5		45.5		72.7		131.8		166.9	
1810	D86-automated	29.0		47.3		74.8		133.7		167.1	
1811	D86-automated	30.8		47.6		75.1		132.8		166.9	
2146	ISO3405-automated	30.6		47.5		75.1		131.9		168.3	
6142	ISO3405-automated	29.7		47.2		78.5		135.6	R1	168.9	
6168	D86-automated	25.1		44.8		71.9		134.2		172.1	
6404		-----		-----		-----		-----		-----	
6452		30.38		46.37		77.65		137.9	R1	165.72	
6453	ISO3405-automated	30.31		47.14		78.3	C	137.4	C,R1	168.32	
	normality	suspect		OK		suspect		not OK		OK	
	n	42		42		41		39		43	
	outliers	1		0		1		3		0	
	mean (n)	29.49		46.31		73.39		132.36		166.73	
	st.dev. (n)	1.612		0.851		2.052		0.752		2.081	
	R(calc.)	4.51		2.38		5.74		2.11		5.83	
	st.dev.(D86-A:20b)	1.679		1.296		1.381		2.043		2.536	
	R(D86-A:20b)	4.7		3.63		3.87		5.72		7.1	
	compare										
	R(D86-M:20b)	5.6		3.53		3.87		4.05		7.2	

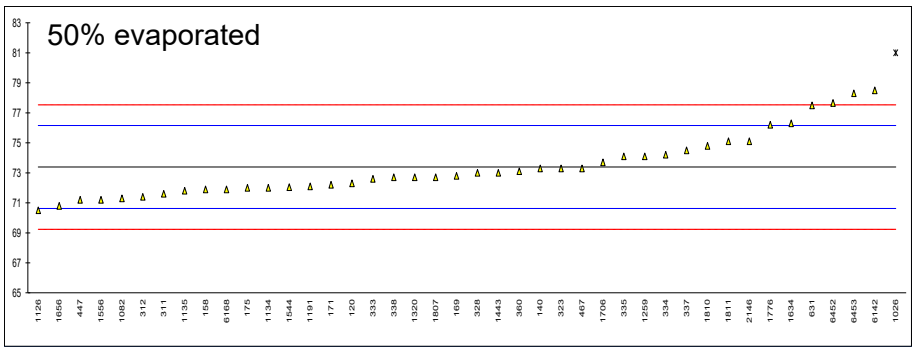
Lab 631 first reported 135.0
Lab 6453 first reported 79.72 and 139.50 respectively

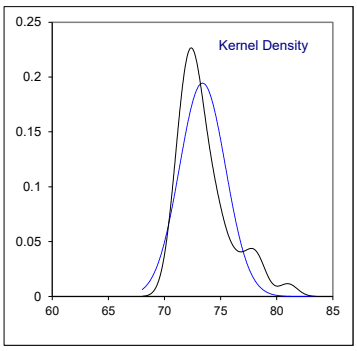

Initial Boiling Point

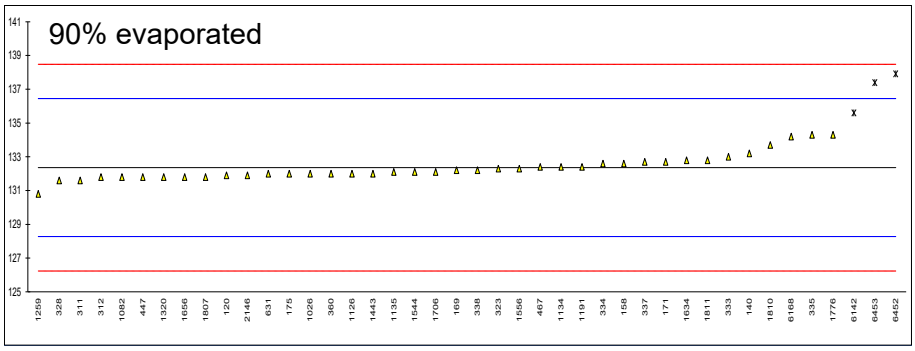

Kernel Density

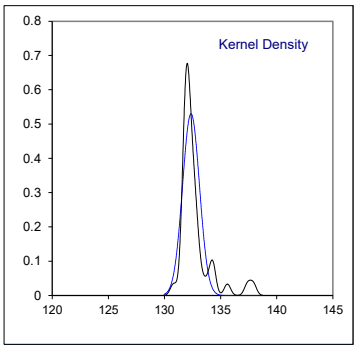

10% evaporated

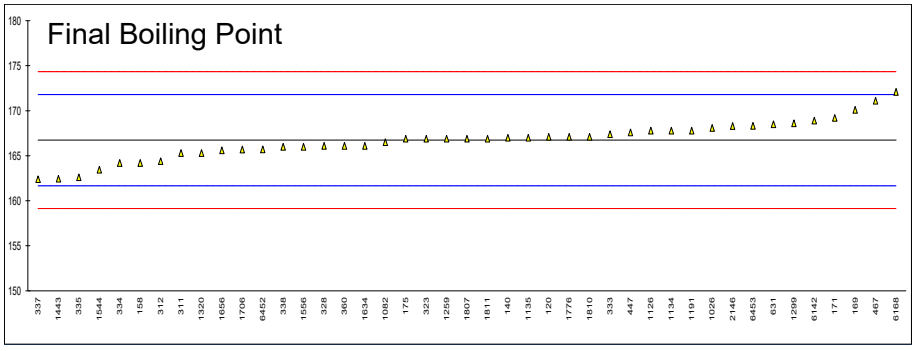

Kernel Density

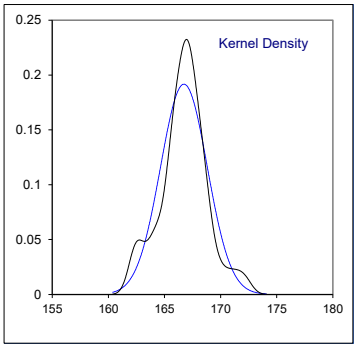

50% evaporated


Kernel Density


90% evaporated


Kernel Density

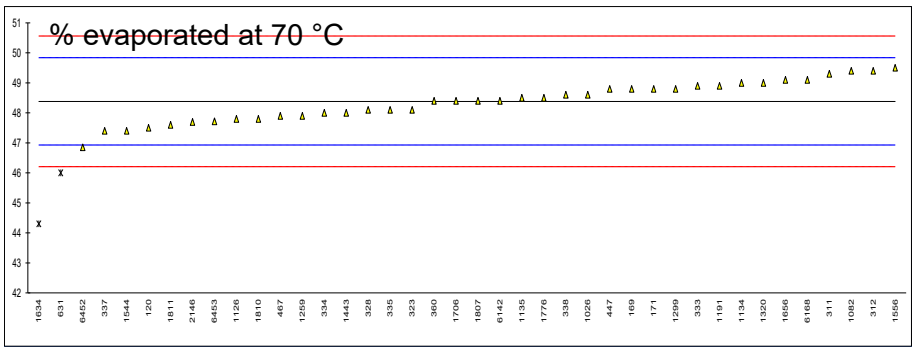

Final Boiling Point

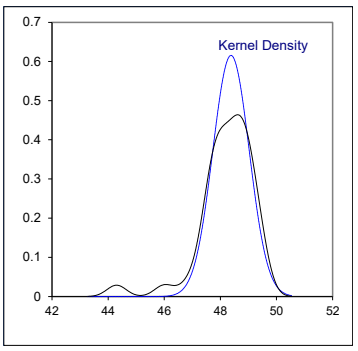

Kernel Density

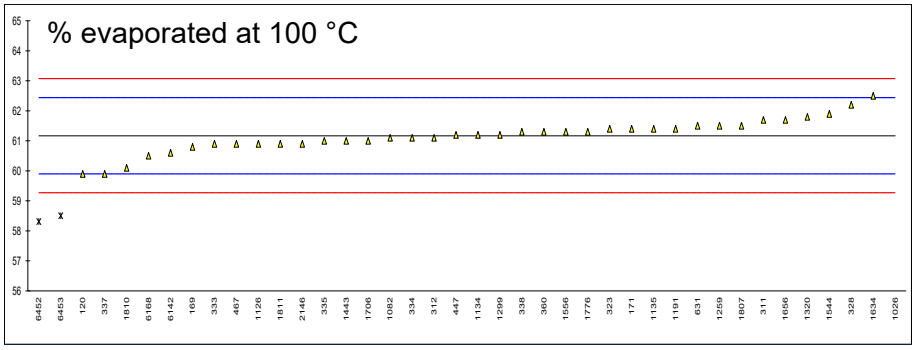
Determination of Distillation at 760 mmHg on sample #22090; results in %V/V

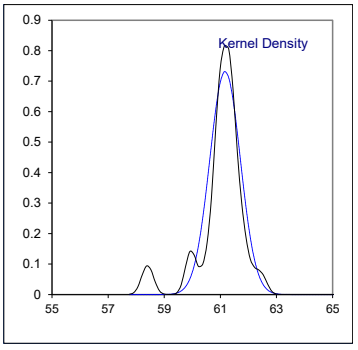
lab	method	%evap. 70 °C	mark	%evap. 100 °C	mark	%evap. 150 °C	mark	residue	mark
62		-----		-----		-----		-----	
120	D86-automated	47.5		59.9		95.1	R5	1.0	
140	D86	-----		-----		-----		2.3	
150		-----		-----		-----		-----	
158		-----		-----		-----		-----	
159		-----		-----		-----		-----	
169	D86-automated	48.8		60.8		96.5		1.0	
171	D86-automated	48.8		61.4		96.4		1.0	
175	D86-automated	-----		-----		-----		1.2	
311	D86-automated	49.3		61.7		96.6		0.8	
312	D86-automated	49.4		61.1		96.5		1.0	
323		48.1		61.4		96.2		1	
328	D86-automated	48.1		62.2		96.7		1.0	
333	ISO3405-automated	48.9		60.9		96.0		2.4	
334	D86-automated	48.0		61.1		96.4		1.2	
335	D86-automated	48.1		61.0		95.6		1.0	
337		47.4		59.9		96.6		1.0	
338	ISO3405-automated	48.6		61.3		96.7		1.0	
360	ISO3405-automated	48.4		61.3		96.5		1.0	
447	D86-automated	48.8		61.2		96.7		0.7	
467	D86-automated	47.9		60.9		96.3		0.8	
496		-----		-----		-----		-----	
511		-----		-----		-----		-----	
631	D86-manual	46.0	R5	61.5	C	96.0	C	0.4	
1026	ISO3405-automated	48.6		96.5	R1	96.7		0.9	
1033		-----		-----		-----		-----	
1082	ISO3405-automated	49.4		61.1		96.5		0.9	
1126		47.8		60.9	C	96.5	C	1.1	
1134	D86-automated	49.0		61.2		96.3		1.0	
1135	D86-automated	48.5		61.4		96.5		1.0	
1191	ISO3405-automated	48.9		61.4		96.4		1.1	
1259	D86-automated	47.9		61.5		97.4		1.0	
1299	D86-automated	48.8		61.2		96.6		1.0	
1320	D86-automated	49.0		61.8		96.5		1.0	
1443	ISO3405-automated	48.00		61.00		95.80	C	1.0	
1544	ISO3405-automated	47.40		61.90		95.75		1.10	
1556	ISO3405-automated	49.5		61.3		96.5		1.0	
1634	D86-automated	44.3	R1	62.5		96.7		0.9	
1656	ISO3405-automated	49.1		61.7		96.5		1.0	
1706		48.4		61.0		96.6		-----	
1776	ISO3405-automated	48.5		61.3		96.6		1.0	
1807		48.4		61.5		96.6		1.0	
1810	D86-automated	47.8		60.1		96.2		1.0	
1811	D86-automated	47.6		60.9		96.3		1.0	
2146	ISO3405-automated	47.7		60.9		96.4		1.0	
6142	ISO3405-automated	48.4		60.6		96.5		1.0	
6168	D86-automated	49.1		60.5		95.7		1.0	
6404		-----		-----		-----		-----	
6452		46.85		58.31	R1	93.50	R1	1.20	
6453	ISO3405-automated	47.72		58.5	C,R1	94.3	C,R1	1.12	
	normality	OK		suspect		suspect			
	n	38		37		37			
	outliers	2		3		3			
	mean (n)	48.38		61.17		96.41			
	st.dev. (n)	0.649		0.545		0.339			
	R(calc.)	1.82		1.52		0.95			
	st.dev.(D86-A:20b)	0.726		0.634		0.383			
	R(D86-A:20b)	2.03		1.78		1.07			
	compare								
	R(D86-M:20b)	unknown		unknown		unknown			

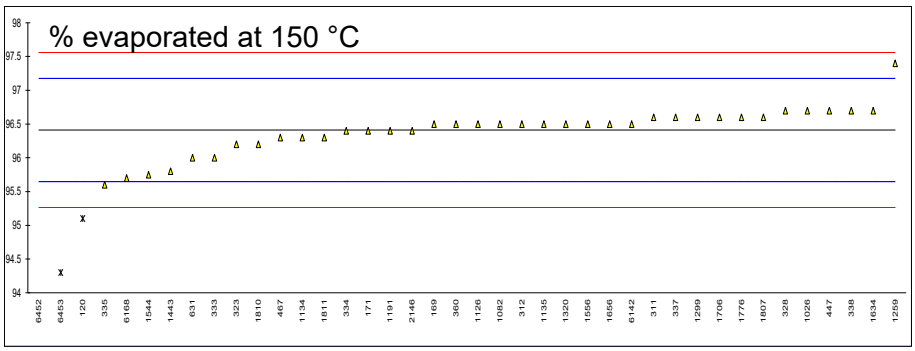
Lab 631 first reported 59.0 and 94.0 respectively
Lab 1126 first reported 59.0 and 94.6 respectively
Lab 1443 first reported 94.85
Lab 6453 first reported 57.95 and 93.38 respectively

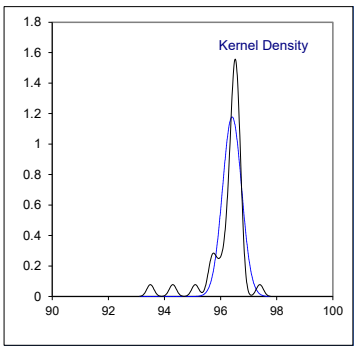

% evaporated at 70 °C


Kernel Density


% evaporated at 100 °C


Kernel Density


% evaporated at 150 °C


Kernel Density

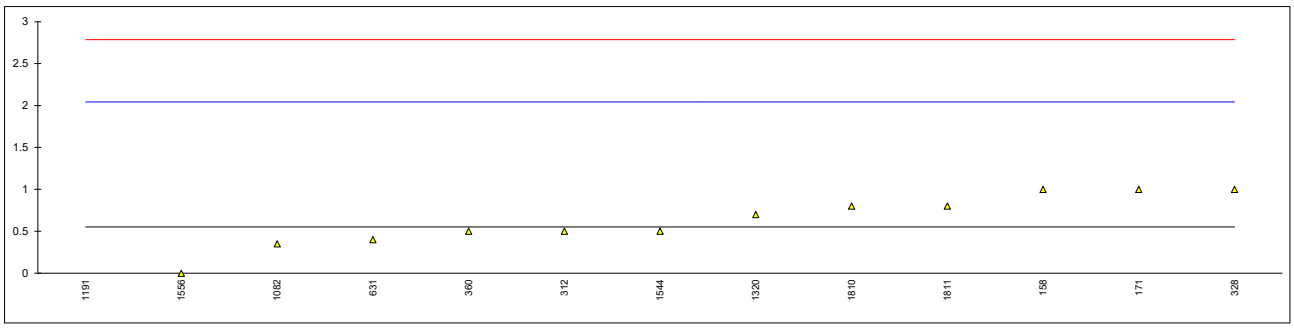
Determination of Doctor test on sample #22090;

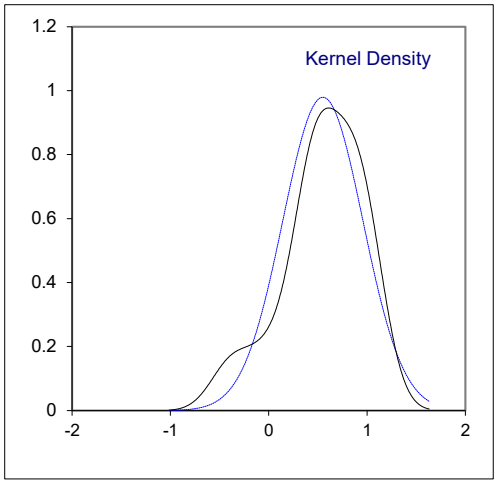
lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D4952	Negative[Sweet]		-----	
140	D4952	Negative		-----	
150		-----		-----	
158	D4952	Negative		-----	
159		-----		-----	
169		-----		-----	
171	D4952	Negative		-----	
175		-----		-----	
311		-----		-----	
312	IP30	negative		-----	
323		neg		-----	
328	D4952	NEGATIVE		-----	
333		-----		-----	
334	D4952	negative		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	D4952	negative		-----	
447	D4952	Negative		-----	
467	IP30	negative, mercaptans absent		-----	
496		-----		-----	
511		-----		-----	
631		-----		-----	
1026	D4952	Negative		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	D4952	Negative/Negative		-----	
1135	IP30	Negative		-----	
1191		-----		-----	
1259		-----		-----	
1299		-----		-----	
1320	D4952	NEGATIV		-----	
1443		-----		-----	
1544	D4952	negative		-----	
1556	D4952	Negative		-----	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142	IP30	Negative		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	
	n	18			
	mean (n)	Negative			

Determination of Gum (solvent washed) on sample #22090; results in mg/100mL

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140	D381	<0.5		-----	
150		-----		-----	
158	D381	1.0		0.60	
159		-----		-----	
169	D381	<0.5		-----	
171	D381	1.0		0.60	
175		-----		-----	
311	D381	<0.5		-----	
312	D381	0.5		-0.07	
323		<0.5		-----	
328	D381	1.0		0.60	
333		-----		-----	
334	D381	<0.5		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	D381	0.5		-0.07	
447	D381	<0.5		-----	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631	D381	0.4		-0.20	
1026	ISO6246	<0.5		-----	
1033		-----		-----	
1082	ISO6246	0.35		-0.27	
1126		-----		-----	
1134		-----		-----	
1135	D381	<0.5		-----	
1191	ISO6246	-0.38		-1.25	
1259	ISO6246	<0,5		-----	
1299	D381	<0.5		-----	
1320	D381	0.7		0.20	
1443		-----		-----	
1544	ISO6246	0.50		-0.07	
1556	ISO6246	0.0		-0.74	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810	ISO6246	0.8		0.33	
1811	D381	0.80		0.33	
2146		-----		-----	
6142		-----		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	

normality	OK
n	13
outliers	0
mean (n)	0.55
st.dev. (n)	0.407
R(calc.)	1.14
st.dev.(D381:22)	0.745
R(D381:22)	2.09


3
2.5
2
1.5
1
0.5
0
1191
1556
1082
631
360
312
1544
1320
1810
1811
158
171
328


Kernel Density
1.2
1
0.8
0.6
0.4
0.2
0
-2
-1
0
1
2

Determination of Lead as Pb on sample #22090; results in mg/L

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140	D3237	<2.5		-----	
150		-----		-----	
158	D3237	<2.5		-----	
159		-----		-----	
169		-----		-----	
171	D3237	<2.5		-----	
175		-----		-----	
311		-----		-----	
312	EN237	<2.5		-----	
323		<2.5		-----	
328		-----		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	INH-12	<2.5		-----	
447	IP428	<2.5		-----	
467		-----		-----	
496		-----		-----	
511	D3237	<2.5		-----	
631	D3237	<2.5		-----	
1026		-----		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134		-----		-----	
1135	D3237	<2.5		-----	
1191	D8110	0.00014566		-----	
1259		-----		-----	
1299	EN237	0.0006		-----	
1320		-----		-----	
1443	EN237	<2,5		-----	
1544	EN237	0.0		-----	
1556		-----		-----	
1634		-----		-----	
1656	EN237	<2.5		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146	In house	<2		-----	
6142		-----		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	
	n	16			
	mean (n)	<2.5			application range D3237:17: 2.5 – 25 mg/L

Determination of Manganese as Mn on sample #22090; results in mg/L

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140	D3831	<0.25		-----	
150		-----		-----	
158	D3831	<0.25		-----	
159		-----		-----	
169		-----		-----	
171	D3831	<0.25		-----	
175		-----		-----	
311		-----		-----	
312	EN16136	<0.5		-----	
323		<0.50		-----	
328		-----		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	EN16136	<0.50		-----	
447	EN16135	<2.0		-----	
467	EN16136	<0,5		-----	
496		-----		-----	
511		-----		-----	
631	D3831	<2		-----	
1026		-----		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134		-----		-----	
1135	D3831	<0.25		-----	
1191	D8110	0.0065547		-----	
1259		-----		-----	
1299		-----		-----	
1320		-----		-----	
1443	EN16135	<2,0		-----	
1544	EN16136	0.0		-----	
1556		-----		-----	
1634		-----		-----	
1656	EN16135	<2		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146	In house	<1		-----	
6142		-----		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	
	n	15			
	mean (n)	<2			application range D3831:12R17: 0.25 – 40 mg/L

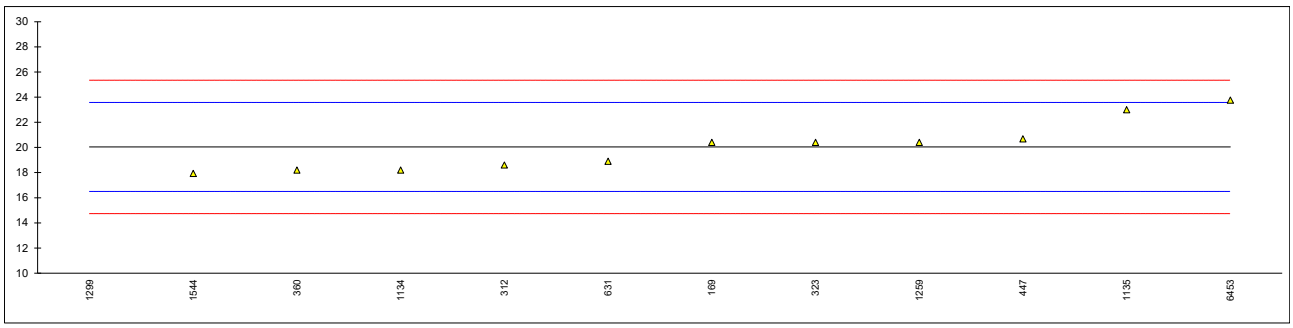
Determination of Mercaptans Sulfur as S on sample #22090; results in %M/M

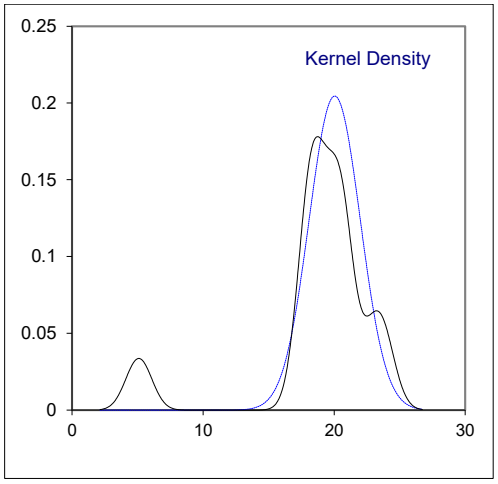
lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	D3227	<0.0003		-----	
175		-----		-----	
311		-----		-----	
312	D3227	<0.0003		-----	
323		<0.0003		-----	
328		-----		-----	
333		-----		-----	
334	D3227	<0.0003		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	D3227	<0.0003		-----	
447		-----		-----	
467		-----		-----	
496	D3227	0.00005		-----	
511		-----		-----	
631		-----		-----	
1026	D3227	0.0002		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134		-----		-----	
1135	D3227	<0.0003		-----	
1191	ISO3012	0.000051		-----	
1259	D3227	0.00017		-----	
1299		-----		-----	
1320		-----		-----	
1443		-----		-----	
1544	UOP163	0.00035		-----	
1556		-----		-----	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142	IP342	0.0001		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	
	n	11			
	mean (n)	<0.0003			application range D3227:16: 0.0003 – 0.01%

Determination of Olefins by FIA (without oxygenates correction) on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169	D1319	20.4		0.20	
171		-----		-----	
175		-----		-----	
311		-----		-----	
312	EN15553	18.6		-0.82	
323		20.4		0.20	
328		-----		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	D1319	18.2		-1.04	
447	D1319	20.690		0.36	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631	In house	18.9		-0.65	
1026		-----		-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	D1319	18.2		-1.04	
1135	D1319	23.0		1.67	
1191		-----		-----	
1259	D1319	20.4		0.20	
1299	D1319	5.1	D(0.01)	-8.45	
1320		-----		-----	
1443		-----		-----	
1544	EN15553	17.93		-1.19	
1556		-----		-----	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142		-----		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		23.77		2.11	

normality	OK
n	11
outliers	1
mean (n)	20.04
st.dev. (n)	1.951
R(calc.)	5.46
st.dev.(D1319:20a)	1.770
R(D1319:20a)	4.95

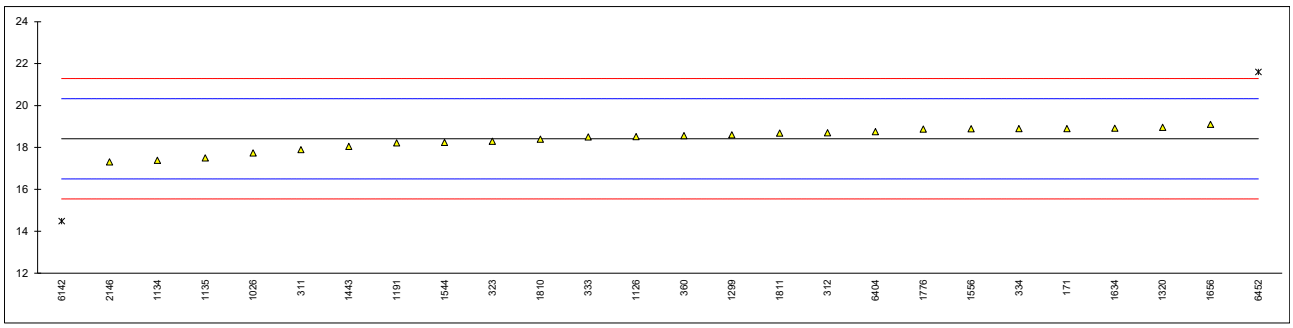

30
28
26
24
22
20
18
16
14
12
10
1299
1544
360
1134
312
631
169
323
1259
447
1135
6453

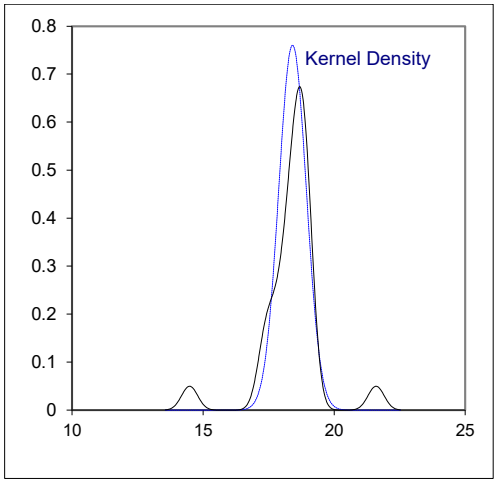

Kernel Density
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30

Determination of Olefins by GC on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	ISO22854-A	18.9		0.51	
175		-----		-----	
311	ISO22854-A	17.9		-0.54	
312	ISO22854-A	18.7		0.30	
323		18.3		-0.12	
328		-----		-----	
333	ISO22854-A	18.5		0.09	
334	ISO22854-A	18.9		0.51	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO22854-A	18.57		0.16	
447		-----		-----	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631		-----		-----	
1026	ISO22854-A	17.74		-0.70	
1033		-----		-----	
1082		-----		-----	
1126	ISO22854-A	18.52		0.11	
1134	ISO22854-A	17.388		-1.07	
1135	ISO22854-A	17.5	C	-0.96	first reported 17.8
1191	ISO22854-A	18.22		-0.20	
1259		-----		-----	
1299	ISO22854-A	18.6		0.19	
1320	ISO22854-A	18.96	C	0.57	first reported 17.52
1443	ISO22854-A	18.05		-0.38	
1544	ISO22854-A	18.24		-0.18	
1556	ISO22854-A	18.89		0.50	
1634	ISO22854-A	18.92		0.53	
1656	ISO22854-A	19.10		0.72	
1706		-----		-----	
1776	ISO22854-A	18.88		0.49	
1807		-----		-----	
1810	ISO22854-A	18.4		-0.01	
1811	ISO22854-A	18.69		0.29	
2146	ISO22854-A	17.31		-1.15	
6142	ISO22854-A	14.49	R(0.01)	-4.10	
6168		-----		-----	
6404	ISO22854-A	18.76		0.36	
6452	ISO22854-A	21.60	R(0.01)	3.33	
6453		-----		-----	

normality	OK
n	24
outliers	2
mean (n)	18.414
st.dev. (n)	0.5248
R(calc.)	1.470
st.dev.(ISO22854-A:21)	0.9562
R(ISO22854-A:21)	2.677


24
22
20
18
16
14
12
6142
2146
1134
1135
1026
311
1443
1191
1544
323
1810
333
1126
360
1299
1811
312
6404
1776
1556
334
171
1634
1320
1656
6452


Kernel Density
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10
15
20
25

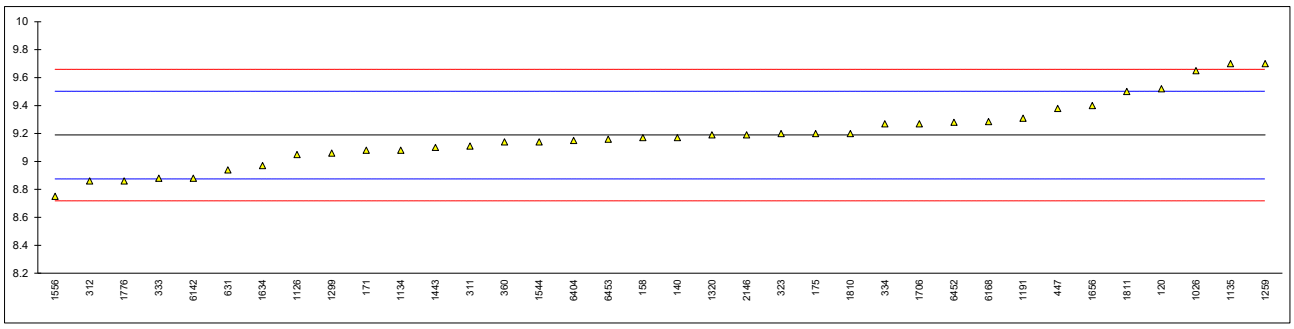
Determination of Oxidation Stability on sample #22090; results in minutes

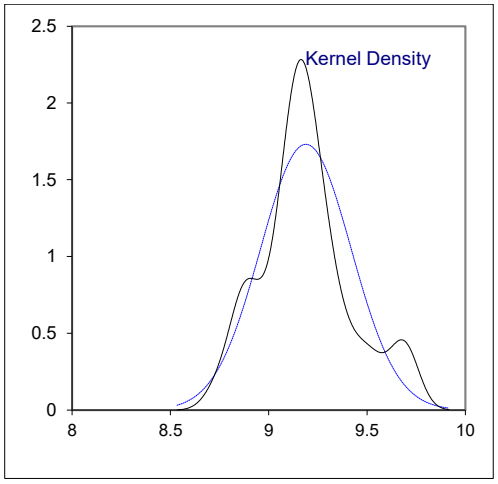
lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120		-----		-----	
140	D525	>900		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	D525	>900		-----	
175		-----		-----	
311	D525	>900		-----	
312	D525	>900		-----	
323		900		-----	
328	D525	>900		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO7536	>900		-----	
447	D525	>900		-----	
467		-----		-----	
496	ISO7536	>900		-----	
511		-----		-----	
631	D525	>900		-----	
1026		-----		-----	
1033		-----		-----	
1082	ISO7536	1000.88		-----	
1126		-----		-----	
1134		-----		-----	
1135	ISO7536	>900		-----	
1191	ISO7536	1077.54		-----	
1259		-----		-----	
1299	D525	840		-----	
1320	D525	899		-----	
1443	ISO7536	>900		-----	
1544	ISO7536	>900		-----	
1556	ISO7536	910		-----	
1634		-----		-----	
1656		-----		-----	
1706		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811		-----		-----	
2146		-----		-----	
6142		-----		-----	
6168		-----		-----	
6404		-----		-----	
6452		-----		-----	
6453		-----		-----	
	n	18			
	mean (n)	>360			

Determination of Ethanol on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5599	9.52		2.11	
140	D5599	9.17		-0.12	
150		-----		-----	
158	D4815	9.17	C	-0.12	first reported 9.99 %M/M
159		-----		-----	
169		-----		-----	
171	ISO22854-A	9.08		-0.69	
175	D5599	9.20		0.07	
311		9.11		-0.50	
312	ISO22854-A	8.86		-2.10	
323		9.2		0.07	
328		-----		-----	
333	ISO22854-A	8.88		-1.97	
334	ISO22854-A	9.27		0.52	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO22854-A	9.14		-0.31	
447	IP466	9.38		1.22	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631	D5845	8.94		-1.59	
1026	ISO22854-A	9.65		2.94	
1033		-----		-----	
1082		-----		-----	
1126		9.05		-0.88	
1134	ISO22854-A	9.08		-0.69	
1135	ISO22854-A	9.7	C	3.26	first reported 9.1
1191	ISO22854-A	9.31		0.77	
1259	EN13132	9.7		3.26	
1299	ISO22854-A	9.06		-0.82	
1320	ISO22854-A	9.19	C	0.01	first reported 9.87
1443	ISO22854-A	9.10		-0.57	
1544	ISO22854-A	9.14		-0.31	
1556	ISO22854-A	8.75		-2.80	
1634	ISO22854-A	8.97		-1.40	
1656	ISO22854-A	9.4		1.35	
1706	In house	9.27		0.52	
1776	ISO22854-A	8.86		-2.10	
1807		-----		-----	
1810		9.2		0.07	
1811	ISO22854-A	9.5		1.98	
2146	ISO22854-A	9.19		0.01	
6142		8.88		-1.97	
6168	D5845	9.2859		0.62	
6404	ISO22854-A	9.15		-0.25	
6452	D5845	9.28		0.58	
6453	D5845	9.16		-0.18	

normality	OK
n	36
outliers	0
mean (n)	9.189
st.dev. (n)	0.2305
R(calc.)	0.645
st.dev.(ISO22854-A:21)	0.1568
R(ISO22854-A:21)	0.439

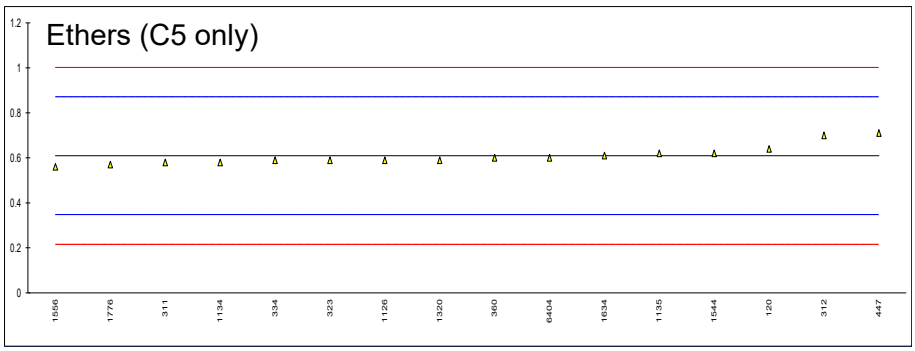

10
9.8
9.6
9.4
9.2
9
8.8
8.6
8.4
8.2
1556
312
1776
333
6142
631
1634
1126
1299
171
1134
1443
311
360
1544
6404
6453
158
140
1320
2146
323
175
1810
334
1706
6452
6168
1191
447
1656
1811
120
1026
1135
1259

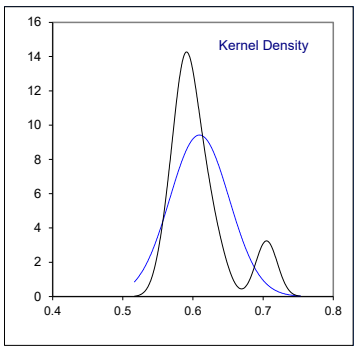

Kernel Density
2.5
2
1.5
1
0.5
0
8
8.5
9
9.5
10

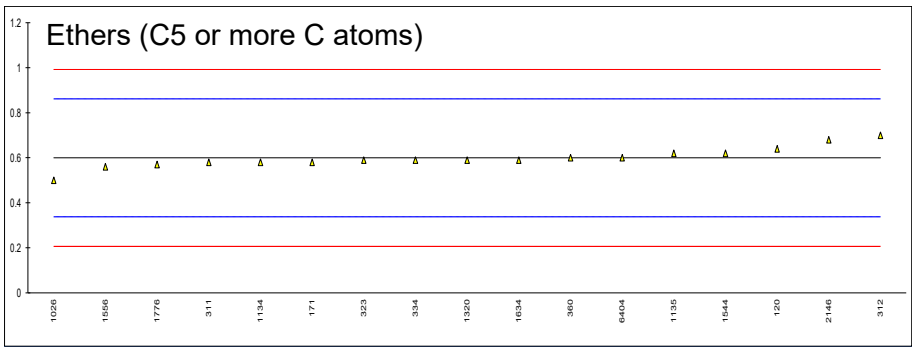
Determination of Ethers (C5 only, C5 or more C atoms and C6 or more C atoms) on sample #22090; results in %V/V

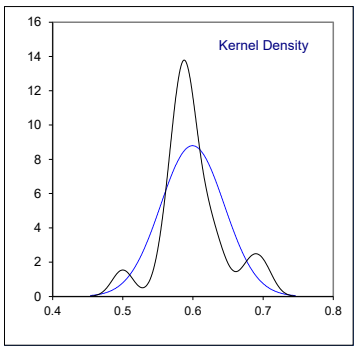
lab	method	C5	mark	z(targ)	C5 or more	mark	z(targ)	C6 or more	mark	z(targ)
62		-----		-----	-----		-----	-----		-----
120	D5599	0.64	C	0.23	0.64	C	0.31	0.00		-----
140		-----		-----	-----		-----	-----		-----
150		-----		-----	-----		-----	-----		-----
158		-----		-----	-----		-----	-----		-----
159		-----		-----	-----		-----	-----		-----
169		-----		-----	-----		-----	-----		-----
171		-----		-----	0.58		-0.15	-----		-----
175		-----		-----	-----		-----	-----		-----
311		0.58		-0.22	0.58		-0.15	<0.01		-----
312	ISO22854-A	0.7		0.69	0.7		0.77	<0.1		-----
323		0.59		-0.15	0.59		-0.07	<0.10		-----
328		-----		-----	-----		-----	-----		-----
333		-----		-----	-----		-----	-----		-----
334	ISO22854-A	0.59		-0.15	0.59		-0.07	<0.80		-----
335		-----		-----	-----		-----	-----		-----
337		-----		-----	-----		-----	-----		-----
338		-----		-----	-----		-----	-----		-----
360	ISO22854-A	0.60		-0.07	0.60		0.00	<0.99		-----
447	IP466	0.71		0.77	-----		-----	-----		-----
467		-----		-----	-----		-----	-----		-----
496		-----		-----	-----		-----	-----		-----
511		-----		-----	-----		-----	-----		-----
631		-----		-----	-----		-----	-----		-----
1026		-----		-----	0.5		-0.76	-----		-----
1033		-----		-----	-----		-----	-----		-----
1082		-----		-----	-----		-----	-----		-----
1126		0.59		-0.15	-----		-----	-----		-----
1134	ISO22854-A	0.58		-0.22	0.58		-0.15	0.00		-----
1135	ISO22854-A	0.62	C	0.08	0.62	C	0.16	<0.1	C	-----
1191		-----		-----	-----		-----	-----		-----
1259		-----		-----	-----		-----	-----		-----
1299		-----		-----	<0.80		-----	-----		-----
1320	ISO22854-A	0.59	C	-0.15	0.59	C	-0.07	-----		-----
1443		-----		-----	<0.99		-----	-----		-----
1544	ISO22854-A	0.620		0.08	0.620		0.16	0.00		-----
1556	ISO22854-A	0.56		-0.38	0.56		-0.30	0		-----
1634	ISO22854-A	0.61	C	0.00	0.59		-0.07	0.13		-----
1656		-----		-----	-----		-----	-----		-----
1706		-----		-----	-----		-----	-----		-----
1776	ISO22854-A	0.57		-0.30	0.57		-0.22	-----		-----
1807		-----		-----	-----		-----	-----		-----
1810		-----		-----	-----		-----	-----		-----
1811		-----		-----	-----		-----	-----		-----
2146		-----		-----	0.68		0.62	-----		-----
6142		-----		-----	-----		-----	-----		-----
6168		-----		-----	-----		-----	-----		-----
6404	ISO22854-A	0.60		-0.07	0.60		0.00	0		-----
6452		-----		-----	-----		-----	-----		-----
6453		-----		-----	-----		-----	-----		-----
	normality	not OK			suspect			n.a.		
	n	16			17			12		
	outliers	0			0					
	mean (n)	0.609			0.599			<1		
	st.dev. (n)	0.0423			0.0453					
	R(calc.)	0.119			0.127					
	st.dev.(ISO22854-A:21)	0.1310			0.1309			application range:		
	R(ISO22854-A:21)	0.367			0.367			0.61 – 9.85 %V/V		

Lab 120 first reported 0.00 and 0.00 respectively
Lab 1135 first reported 0.6, 0.7 and 0.1 respectively
Lab 1320 first reported 0.62 and 0.62 respectively
Lab 1634 first reported 0.46


Ethers (C5 only)
1.2
1
0.8
0.6
0.4
0.2
0
1556
1776
311
1134
334
323
1126
1320
360
6404
1634
1135
1544
120
312
447

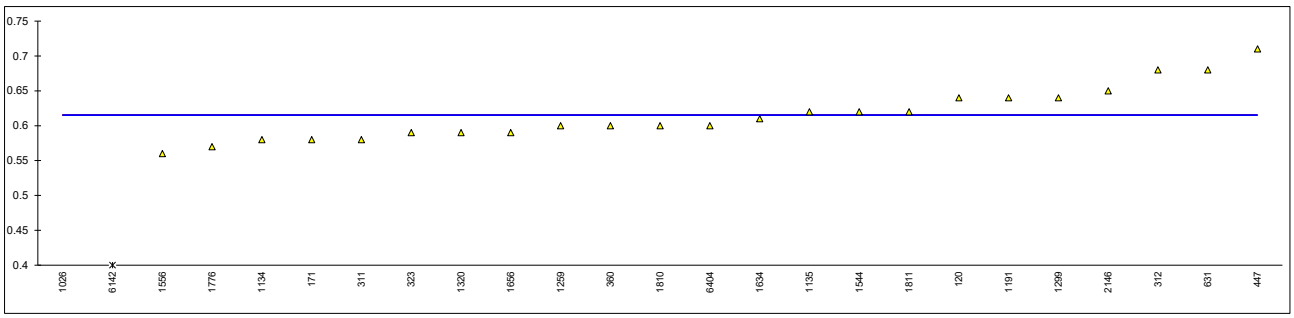

Kernel Density
16
14
12
10
8
6
4
2
0
0.4
0.5
0.6
0.7
0.8

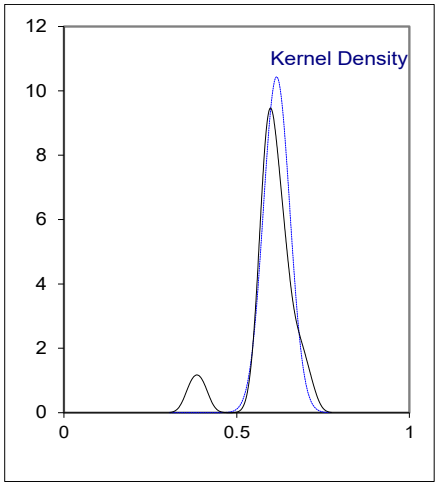

Ethers (C5 or more C atoms)
1.2
1
0.8
0.6
0.4
0.2
0
1026
1556
1776
311
1134
171
323
334
1320
1634
360
6404
1135
1544
120
2146
312


Kernel Density
16
14
12
10
8
6
4
2
0
0.4
0.5
0.6
0.7
0.8

Determination of MTBE on sample #22090; results in %V/V

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5599	0.64	C	-----	first reported 0.00
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	ISO22854-A	0.58		-----	
175		-----		-----	
311		0.58		-----	
312	ISO22854-A	0.68		-----	
323		0.59		-----	
328		-----		-----	
333	ISO22854-A	<0.80		-----	
334	ISO22854-A	<0.80		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO22854-A	0.60		-----	
447	IP466	0.71		-----	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631	D5845	0.68		-----	
1026	ISO22854-A	0.37	R(0.01)	-----	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	ISO22854-A	0.58		-----	
1135	ISO22854-A	0.62	C	-----	first reported 0.6
1191	ISO22854-A	0.64		-----	
1259	EN13132	0.6		-----	
1299	ISO22854-A	0.64		-----	
1320	ISO22854-A	0.59	C	-----	first reported 0.62
1443	ISO22854-A	<0,99		-----	
1544	ISO22854-A	0.620		-----	
1556	ISO22854-A	0.56		-----	
1634	ISO22854-A	0.61	C	-----	first reported 0.46
1656	ISO22854-A	0.59		-----	
1706		-----		-----	
1776	ISO22854-A	0.57		-----	
1807		-----		-----	
1810		0.6		-----	
1811	ISO22854-A	0.62		-----	
2146	ISO22854-A	0.65		-----	
6142		0.4	R(0.01)	-----	
6168		-----		-----	
6404	ISO22854-A	0.60		-----	
6452	D5845	<0.1		-----	possibly a false negative test result?
6453		-----		-----	
	normality	OK			
	n	23			
	outliers	2			
	mean (n)	0.615			
	st.dev. (n)	0.0382			
	R(calc.)	0.107			
	st.dev.(ISO22854-A:21)	(0.0150)			
	R(ISO22854-A:21)	(0.042)			application range of MTBE: 0.99-15.70
	compare				
	R(ISO22854-A:21)	(0.37)			appl. range of oxygenates as individual comp.: 0.61-9.85

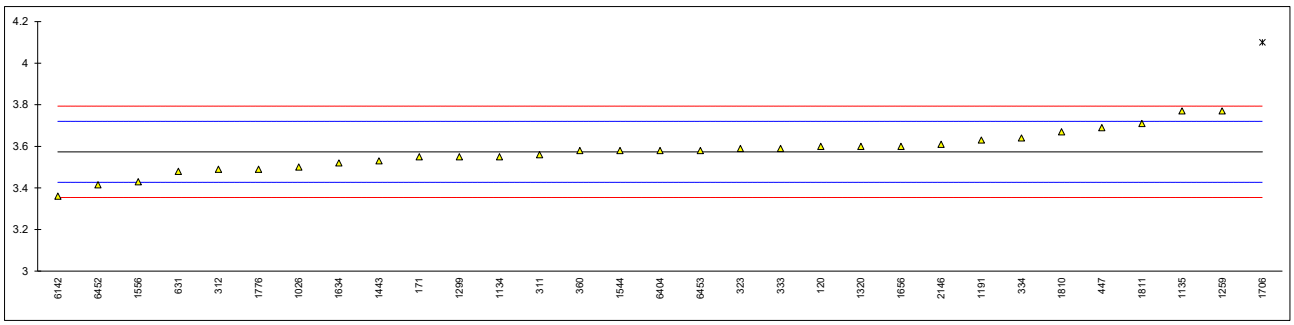

0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
1026
6142
1556
1776
1134
171
311
323
1320
1656
1259
360
1810
6404
1634
1135
1544
1811
120
1191
1299
2146
312
631
447

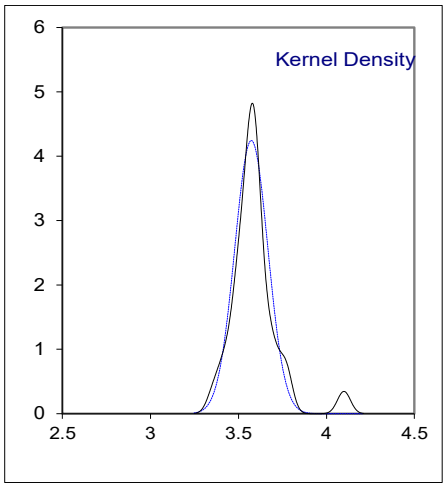

Kernel Density
12
10
8
6
4
2
0
0
0.5
1

Determination of Oxygen content on sample #22090; results in %M/M

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5599	3.60		0.36	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	ISO22854-A	3.55		-0.33	
175		-----		-----	
311	ISO22854-A	3.56		-0.19	
312	ISO22854-A	3.49		-1.15	
323		3.59		0.22	
328		-----		-----	
333	ISO22854-A	3.59		0.22	
334	ISO22854-A	3.64		0.90	
335		-----		-----	
337		-----		-----	
338		-----		-----	
360	ISO22854-A	3.58		0.08	
447	EN13132	3.69		1.59	
467		-----		-----	
496		-----		-----	
511		-----		-----	
631	D5845	3.48		-1.28	
1026	ISO22854-A	3.50		-1.01	
1033		-----		-----	
1082		-----		-----	
1126		-----		-----	
1134	ISO22854-A	3.55		-0.33	
1135	ISO22854-A	3.77	C	2.68	first reported 3.57
1191	ISO22854-A	3.63		0.77	
1259	EN13132	3.77		2.68	
1299	ISO22854-A	3.55		-0.33	
1320	ISO22854-A	3.60	C	0.36	first reported 3.81
1443	ISO22854-A	3.53		-0.60	
1544	ISO22854-A	3.580		0.08	
1556	ISO22854-A	3.43		-1.96	
1634	ISO22854-A	3.52		-0.74	
1656	ISO22854-A	3.6		0.36	
1706	In house	4.1	R(0.01)	7.19	
1776	ISO22854-A	3.49		-1.15	
1807		-----		-----	
1810	ISO22854-A	3.67		1.31	
1811	ISO22854-A	3.71		1.86	
2146	ISO22854-A	3.61		0.49	
6142	ISO22854-A	3.36		-2.92	
6168		-----		-----	
6404	D5622	3.58		0.08	
6452	D5845	3.415		-2.17	
6453	D5845	3.58		0.08	

normality	OK
n	30
outliers	1
mean (n)	3.574
st.dev. (n)	0.0940
R(calc.)	0.263
st.dev.(ISO22854-A:21)	0.0732
R(ISO22854-A:21)	0.205

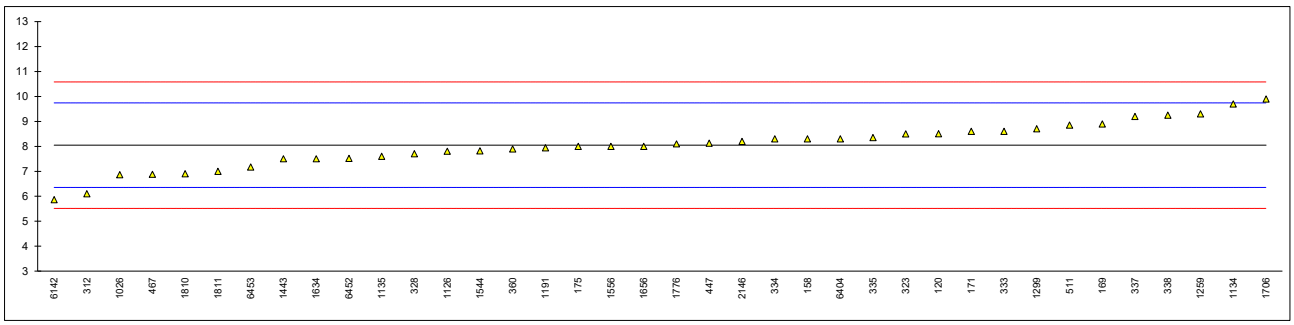

4.2
4
3.8
3.6
3.4
3.2
3
6142
6452
1556
631
312
1776
1026
1634
1443
171
1299
1134
311
360
1544
6404
6453
323
333
120
1320
1656
2146
1191
334
1810
447
1811
1135
1259
1706

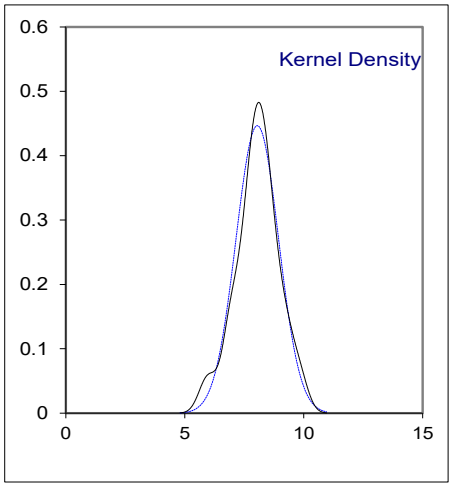

Kernel Density
6
5
4
3
2
1
0
2.5
3
3.5
4
4.5

Determination of Sulfur on sample #22090; results in mg/kg

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D2622	8.51		0.55	
140		-----		-----	
150		-----		-----	
158	D2622	8.3		0.30	
159		-----		-----	
169	D5453	8.9		1.01	
171	D5453	8.6		0.66	
175	D5453	8.0		-0.05	
311		-----		-----	
312	ISO20846	6.1		-2.30	
323		8.5		0.54	
328	ISO20846	7.7		-0.41	
333	ISO20846	8.6		0.66	
334	ISO20846	8.3		0.30	
335	ISO20846	8.354		0.36	
337	ISO20846	9.2		1.37	
338	ISO20846	9.245		1.42	
360	ISO20846	7.9		-0.17	
447	IP490	8.128		0.10	
467	ISO20846	6.88		-1.38	
496		-----		-----	
511	D5453	8.85		0.95	
631		-----		-----	
1026	ISO20846	6.86		-1.40	
1033		-----		-----	
1082		-----		-----	
1126	ISO20846	7.8		-0.29	
1134	IP490	9.6997		1.96	
1135	ISO20846	7.6		-0.53	
1191	ISO20846	7.9417		-0.12	
1259	ISO20846	9.3		1.48	
1299	ISO20884	8.7		0.77	
1320		-----		-----	
1443	ISO20884	7.5		-0.65	
1544	ISO20846	7.82		-0.27	
1556	ISO20884	8.0		-0.05	
1634	ISO20846	7.5		-0.65	
1656	ISO20846	8.0		-0.05	
1706	ISO20884	9.9		2.19	
1776	ISO20846	8.10		0.06	
1807		-----		-----	
1810	D5453	6.9		-1.36	
1811	ISO20846	7.0		-1.24	
2146	ISO20846	8.2		0.18	
6142	ISO20846	5.86		-2.59	
6168		-----		-----	
6404	ISO20846	8.3		0.30	
6452	ISO20846	7.52		-0.62	
6453	ISO20846	7.17		-1.04	

normality	OK
n	38
outliers	0
mean (n)	8.046
st.dev. (n)	0.8933
R(calc.)	2.501
st.dev.(ISO20846:19)	0.8454
R(ISO20846:19)	2.367

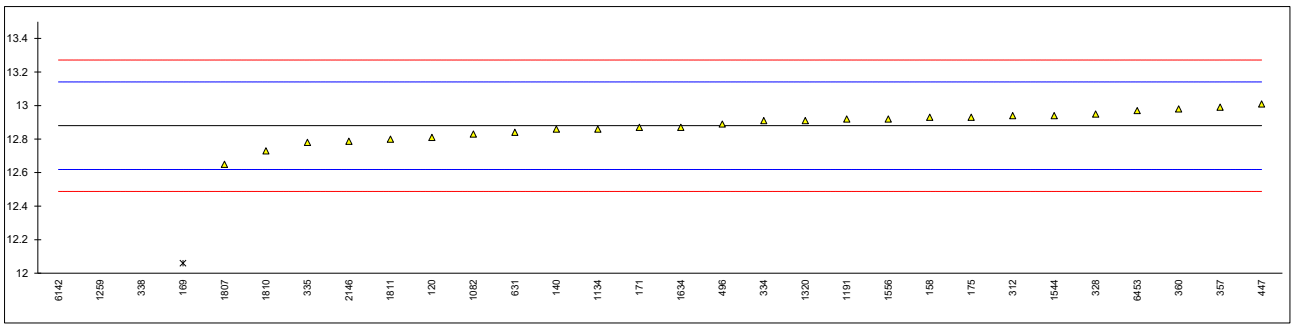

13
12
11
10
9
8
7
6
5
4
3
6142
312
1026
467
1810
1811
6453
1443
1634
6452
1135
328
1126
1544
360
1191
175
1556
1656
1776
447
2146
334
158
6404
335
323
120
171
333
1299
511
169
337
338
1259
1134
1706

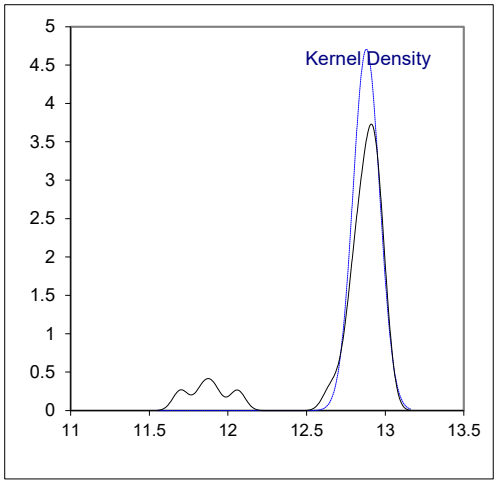

Kernel Density
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5
10
15

Determination of Total Vapor Pressure on sample #22091; results in psi

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5191	12.81		-0.53	
140	D5191	12.86		-0.15	
150		-----		-----	
158	D5191	12.93		0.38	
159		-----		-----	
169	D5191	12.06	R(0.01)	-6.27	
171	D5191	12.87		-0.08	
175	D5191	12.93		0.38	
311		-----		-----	
312	D5191	12.94		0.46	
323		-----		-----	
328	D5191	12.95		0.54	
333		-----		-----	
334	D5191	12.91		0.23	
335	D5191	12.78		-0.76	
337		-----		-----	
338	EN13016-1	11.91	R(0.01)	-7.42	
357	D5191	12.99		0.84	
360	EN13016-1	12.98		0.77	
447	D5191	13.01		1.00	
496	D5191	12.89		0.08	
631	D5191	12.84		-0.31	
1026		-----		-----	
1033		-----		-----	
1082	EN13016-1	12.83		-0.38	
1134	D5191	12.86		-0.15	
1191	EN13016-1	12.92		0.31	
1259	D5191	11.84	R(0.01)	-7.96	
1299		-----		-----	
1320	D5191	12.91		0.23	
1544	EN13016-1	12.94		0.46	
1556	EN13016-1	12.92		0.31	
1634	EN13016-1	12.87		-0.08	
1656		-----		-----	
1776		-----		-----	
1807	EN13016-1	12.65		-1.76	
1810	EN13016-1	12.73		-1.15	
1811	D5191	12.8		-0.61	
1984		-----		-----	
2146	EN13016-1	12.787		-0.71	
6142	EN13016-1	11.70	R(0.01)	-9.03	
6452		-----		-----	
6453	EN13016-1	12.97	C	0.69	first reported 81.982 kPa

normality	OK
n	26
outliers	4
mean (n)	12.880
st.dev. (n)	0.0848
R(calc.)	0.237
st.dev.(D5191:20)	0.1307
R(D5191:20)	0.366
compare	
R(EN13016-1:18)	0.229

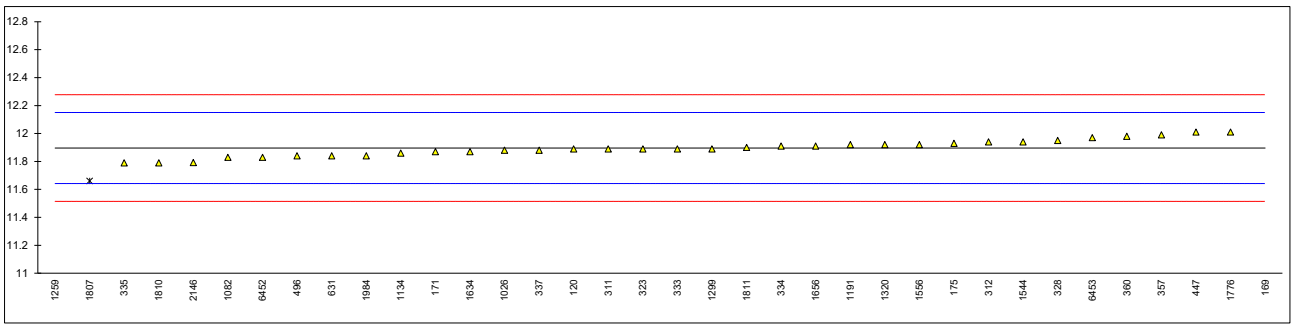

13.4
13.2
13
12.8
12.6
12.4
12.2
12
6142
1259
338
169
1807
1810
335
2146
1811
120
1082
631
140
1134
171
1634
496
334
1320
1191
1556
158
175
312
1544
328
6453
360
357
447

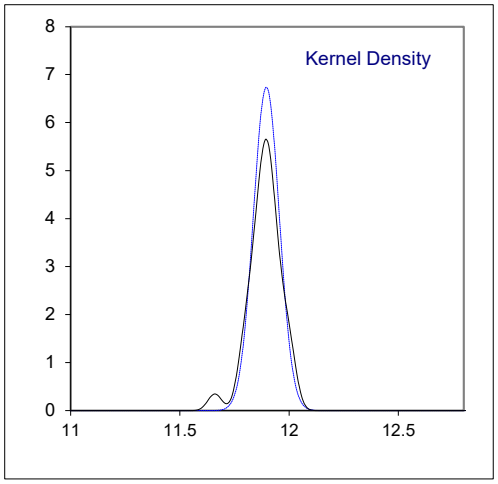

Kernel Density
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
11
11.5
12
12.5
13
13.5

Determination of DVPE acc. to ASTM D5191 on sample #22091; results in psi

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5191	11.89		-0.05	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169	D5191	12.98	E,R(0.01)	8.53	calculation difference, iis calculated 11.09
171	D5191	11.87		-0.20	
175	D5191	11.93		0.27	
311	D5191	11.89		-0.05	
312	D5191	11.94		0.35	
323	D5191	11.89		-0.05	
328	D5191	11.95		0.43	
333	EN13016-1	11.89		-0.05	
334	D5191	11.91		0.11	
335	D5191	11.79		-0.83	
337	EN13016-1	11.88		-0.12	
338		-----		-----	
357	D5191	11.99		0.74	
360	EN13016-1	11.98		0.66	
447	D5191	12.01		0.90	
496	D5191	11.84		-0.44	
631	D5191	11.84		-0.44	
1026	D5191	11.88		-0.12	
1033		-----		-----	
1082	EN13016-1	11.83		-0.52	
1134	D5191	11.86		-0.28	
1191	EN13016-1	11.92		0.19	
1259	D5191	10.87	R(0.01)	-8.07	
1299	D5191	11.89		-0.05	
1320	D5191	11.92		0.19	
1544	EN13016-1	11.94		0.35	
1556	EN13016-1	11.92		0.19	
1634	EN13016-1	11.87		-0.20	
1656	EN13016-1	11.91		0.11	
1776	EN13016-1	12.01		0.90	
1807	EN13016-1	11.66	R(0.05)	-1.86	
1810	EN13016-1	11.79		-0.83	
1811	D5191	11.9		0.03	
1984	EN13016-1	11.84		-0.44	
2146	EN13016-1	11.792		-0.82	
6142		-----		-----	
6452	EN13016-1	11.83		-0.52	
6453		11.97		0.58	

normality	OK
n	33
outliers	3
mean (n)	11.896
st.dev. (n)	0.0592
R(calc.)	0.166
st.dev.(D5191:20)	0.1271
R(D5191:20)	0.356
compare	
R(EN13016-1:18)	0.229

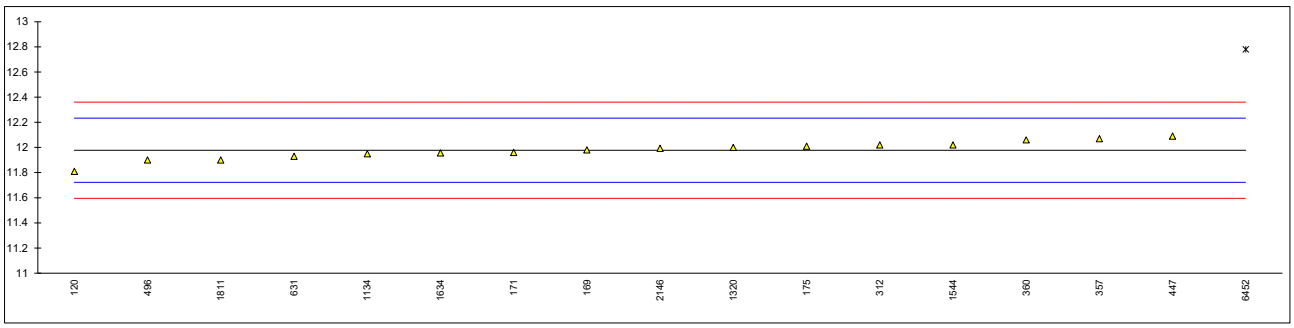

12.8
12.6
12.4
12.2
12
11.8
11.6
11.4
11.2
11
1259
1807
335
1810
2146
1082
6452
496
631
1984
1134
171
1634
1026
337
120
311
323
333
1299
1811
334
1656
1191
1320
1556
175
312
1544
328
6453
360
357
447
1776
169

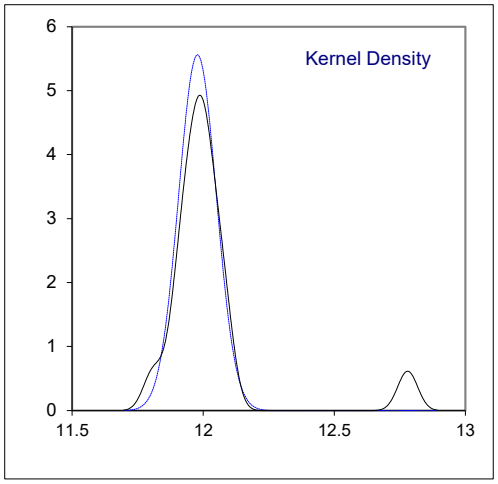

Kernel Density
8
7
6
5
4
3
2
1
0
11
11.5
12
12.5

Determination of DVPE acc. to EPA on sample #22091; results in psi

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D5191	11.81		-1.32	
140		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169	D5191	11.98	E	0.01	calculation difference, iis calculated 11.18
171	D5191	11.96		-0.14	
175	D5191	12.01		0.25	
311		-----		-----	
312	D5191	12.02		0.33	
323		-----		-----	
328		-----		-----	
333		-----		-----	
334		-----		-----	
335		-----		-----	
337		-----		-----	
338		-----		-----	
357	D5191	12.07		0.72	
360	EN13016-1	12.06		0.64	
447	D5191	12.09		0.88	
496	D5191	11.9		-0.61	
631	D5191	11.93		-0.38	
1026		-----		-----	
1033		-----		-----	
1082		-----		-----	
1134	D5191	11.95		-0.22	
1191		-----		-----	
1259		-----		-----	
1299		-----		-----	
1320	D5191	12.0		0.17	
1544	EN13016-1	12.02		0.33	
1556		-----		-----	
1634	EN13016-1	11.9565		-0.17	
1656		-----		-----	
1776		-----		-----	
1807		-----		-----	
1810		-----		-----	
1811	D5191	11.9		-0.61	
1984		-----		-----	
2146	EN13016-1	11.993		0.12	
6142		-----		-----	
6452	EN13016-1	12.78	G(0.01)	6.29	
6453		-----		-----	

normality	OK
n	16
outliers	1
mean (n)	11.978
st.dev. (n)	0.0718
R(calc.)	0.201
st.dev.(D5191:20)	0.1274
R(D5191:20)	0.357
compare	
R(EN13016-1:18)	0.229

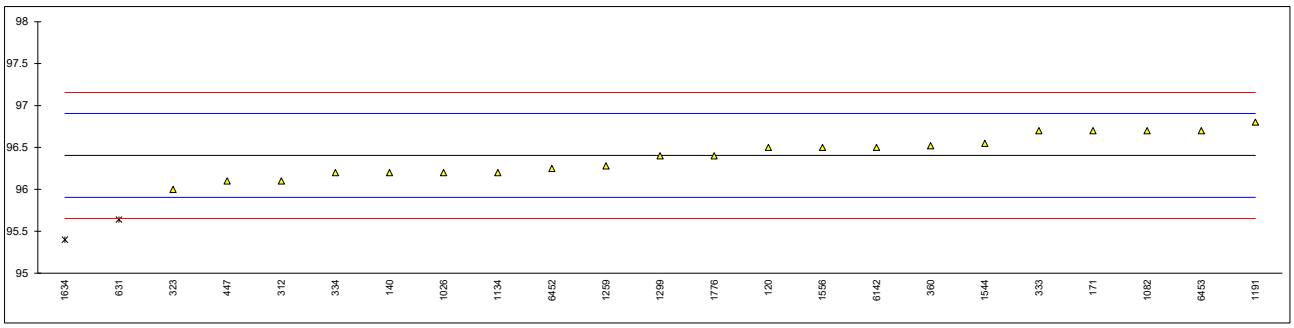

13
12.8
12.6
12.4
12.2
12
11.8
11.6
11.4
11.2
11
120
496
1811
631
1134
1634
171
169
2146
1320
175
312
1544
360
357
447
6452

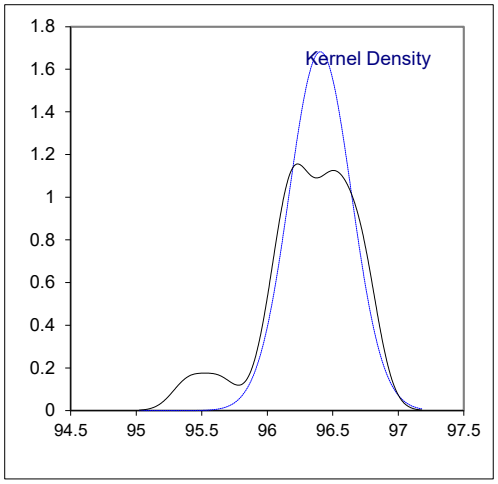

Kernel Density
6
5
4
3
2
1
0
11.5
12
12.5
13

Determination of RON on sample #22092

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D2699	96.5		0.38	
140	D2699	96.2		-0.82	
150		-----		-----	
159		-----		-----	
169		-----		-----	
171	D2699	96.7		1.18	
312	D2699	96.1		-1.22	
323	D2699	96.0		-1.62	
333	D2699	96.7		1.18	
334	D2699	96.2		-0.82	
360	ISO5164	96.52		0.46	
447	D2699	96.1		-1.22	
511		-----		-----	
631	D2699	95.64	DG(0.05)	-3.06	
1026	ISO5164	96.2		-0.82	
1082	ISO5164	96.7		1.18	
1134	D2699	96.2		-0.82	
1191	ISO5164	96.8021409		1.59	
1259	D2699	96.28		-0.50	
1299	D2699	96.4		-0.02	
1320		-----		-----	
1544	ISO5164	96.55		0.58	
1556	ISO5164	96.50		0.38	
1634		95.4	C,DG(0.05)	-4.02	first reported 95.15
1776	ISO5164	96.4		-0.02	
6142	ISO5164	96.5		0.38	
6452		96.25		-0.62	
6453		96.7		1.18	

normality	OK
n	21
outliers	2
mean (n)	96.40
st.dev. (n)	0.237
R(calc.)	0.66
st.dev.(D2699-A:21)	0.250
R(D2699-A:21)	0.7
compare	
R(D2699-C:21)	0.7
R(ISO5164:14)	0.7

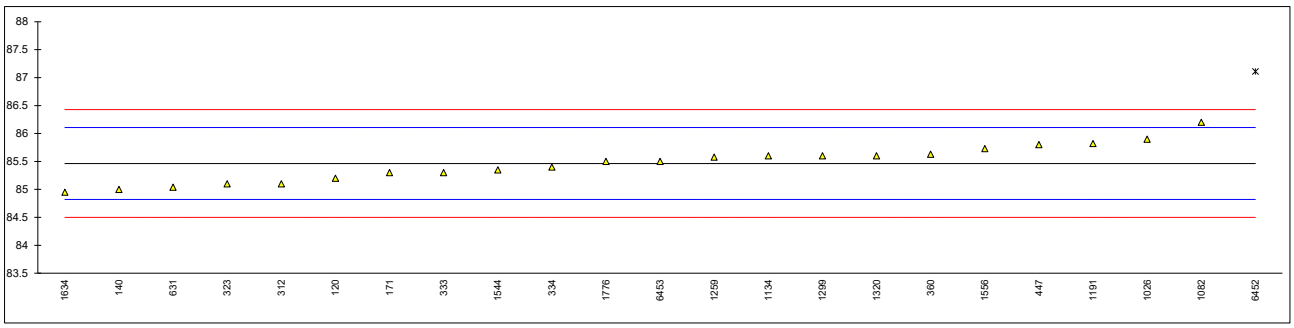

98
97.5
97
96.5
96
95.5
95
1634
631
323
447
312
334
140
1026
1134
6452
1259
1299
1776
120
1556
6142
360
1544
333
171
1082
6453
1191

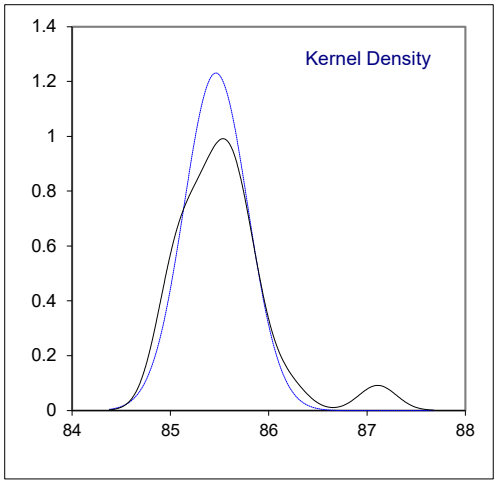

Kernel Density
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
94.5
95
95.5
96
96.5
97
97.5

Determination of MON on sample #22092

lab	method	value	mark	z(targ)	remarks
62		-----		-----	
120	D2700	85.2		-0.82	
140	D2700	85.0		-1.44	
150		-----		-----	
159		-----		-----	
169		-----		-----	
171	D2700	85.3		-0.51	
312	D2700	85.1		-1.13	
323	D2700	85.1		-1.13	
333	D2700	85.3		-0.51	
334	D2700	85.4		-0.20	
360	ISO5163	85.63		0.52	
447	D2700	85.8		1.05	
511		-----		-----	
631	D2700	85.04		-1.32	
1026	ISO5163	85.9		1.36	
1082	ISO5163	86.2		2.29	
1134	D2700	85.6		0.42	
1191	ISO5163	85.818727		1.10	
1259	D2700	85.58		0.36	
1299	D2700	85.6		0.42	
1320	ISO5163	85.6		0.42	
1544	ISO5163	85.35		-0.35	
1556	ISO5163	85.73		0.83	
1634		84.95		-1.60	
1776	ISO5163	85.5		0.11	
6142		-----		-----	
6452		87.11	G(0.01)	5.12	
6453		85.5		0.11	

normality	OK
n	22
outliers	1
mean (n)	85.46
st.dev. (n)	0.324
R(calc.)	0.91
st.dev.(D2700-A:22)	0.321
R(D2700-A:22)	0.9
compare	
R(D2700-C:22)	0.9
R(ISO5163:14)	0.9


88
87.5
87
86.5
86
85.5
85
84.5
84
83.5
1634
140
631
323
312
120
171
333
1544
334
1776
6453
1259
1134
1299
1320
360
1556
447
1191
1026
1082
6452


Kernel Density
1.4
1.2
1
0.8
0.6
0.4
0.2
0
84
85
86
87
88

APPENDIX 2

Determination of other Oxygenates on sample #22090; results in %V/V

lab	DIPE	ETBE	i-BuOH	IPA	MeOH	TAME	t-BuOH	Other Oxygenates
62	-----	-----	-----	-----	-----	-----	-----	-----
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	-----	-----	-----	-----	-----	-----	-----	-----
150	-----	-----	-----	-----	-----	-----	-----	-----
158	-----	-----	-----	-----	-----	-----	-----	-----
159	-----	-----	-----	-----	-----	-----	-----	-----
169	-----	-----	-----	-----	-----	-----	-----	-----
171	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
175	-----	-----	-----	-----	-----	-----	-----	-----
311	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
312	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
323	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
328	-----	-----	-----	-----	-----	-----	-----	-----
333	-----	<0.80	<0.61	<0.61	<0.50	-----	<0.61	<0.61
334	<0.61	<0.80	<0.61	<0.61	<0.50	<0.80	<0.61	<0.80
335	-----	-----	-----	-----	-----	-----	-----	-----
337	-----	-----	-----	-----	-----	-----	-----	-----
338	-----	-----	-----	-----	-----	-----	-----	-----
360	<0.99	<0.99	<0.61	<0.61	<1.05	<0.99	<0.61	<0.61
447	-----	-----	-----	-----	-----	-----	-----	-----
467	-----	-----	-----	-----	-----	-----	-----	-----
496	-----	-----	-----	-----	-----	-----	-----	-----
511	-----	-----	-----	-----	-----	-----	-----	-----
631	0	0	-----	-----	0	0	-----	-----
1026	-----	0.13	0	0	0	-----	0	10.2
1033	-----	-----	-----	-----	-----	-----	-----	-----
1082	-----	-----	-----	-----	-----	-----	-----	-----
1126	-----	-----	-----	-----	-----	-----	-----	-----
1134	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1135	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1191	-----	0.01	0.02	0	0	0	0	-----
1259	-----	-----	-----	-----	-----	-----	-----	-----
1299	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
1320	-----	-----	-----	-----	-----	-----	-----	-----
1443	-----	<0,99	-----	-----	-----	<0,99	-----	-----
1544	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1556	0	0	0	0	0	0	0.05	0
1634	0	0.14	0	0	0	0	0	0.01
1656	-----	-----	-----	-----	-----	-----	-----	-----
1706	-----	0	-----	-----	0	0	-----	-----
1776	-----	<0.01	-----	-----	0.04	-----	-----	-----
1807	-----	-----	-----	-----	-----	-----	-----	-----
1810	-----	-----	-----	-----	-----	-----	-----	-----
1811	-----	-----	-----	-----	-----	-----	-----	-----
2146	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
6142	-----	-----	-----	-----	-----	-----	-----	-----
6168	-----	-----	-----	-----	-----	-----	-----	-----
6404	0	0	0	0	0	0	0	0
6452	-----	<0.1	-----	-----	-----	-----	-----	-----
6453	-----	-----	-----	-----	-----	-----	-----	-----

APPENDIX 3

z-scores of Distillation at 760 mmHg on sample #22090

lab	IBP	10%eva	50%eva	90%eva	FBP	%evap.70 °C	%evap.100 °C	%evap.150 °C
62	-----	-----	-----	-----	-----	-----	-----	-----
120	-0.59	0.15	-0.79	-0.22	0.14	-1.21	-2.00	-3.43
140	0.48	0.38	-0.06	0.41	0.11	-----	-----	-----
150	-----	-----	-----	-----	-----	-----	-----	-----
158	-1.36	0.00	-1.08	0.12	-1.00	-----	-----	-----
159	-----	-----	-----	-----	-----	-----	-----	-----
169	-0.17	0.07	-0.42	-0.08	1.33	0.58	-0.58	0.23
171	0.54	0.30	-0.86	0.17	0.97	0.58	0.36	-0.03
175	0.96	0.00	-1.00	-0.18	0.07	-----	-----	-----
311	-0.77	-0.70	-1.29	-0.37	-0.57	1.27	0.83	0.49
312	-0.77	-0.31	-1.44	-0.27	-0.92	1.40	-0.11	0.23
323	5.79	-0.24	-0.06	-0.03	0.07	-0.39	0.36	-0.55
328	-0.29	0.61	-0.28	-0.37	-0.25	-0.39	1.62	0.75
333	-0.53	-0.24	-0.57	0.31	0.26	0.72	-0.43	-1.08
334	0.19	-0.16	0.59	0.12	-1.00	-0.52	-0.11	-0.03
335	2.57	1.31	0.52	0.95	-1.63	-0.39	-0.27	-2.12
337	1.73	1.15	0.81	0.17	-1.71	-1.35	-2.00	0.49
338	0.24	0.15	-0.50	-0.08	-0.29	0.30	0.20	0.75
360	0.07	0.30	-0.21	-0.18	-0.25	0.03	0.20	0.23
447	-1.19	-1.16	-1.58	-0.27	0.34	0.58	0.05	0.75
467	1.73	-0.24	-0.06	0.02	1.72	-0.66	-0.43	-0.29
496	-----	-----	-----	-----	-----	-----	-----	-----
511	-----	-----	-----	-----	-----	-----	-----	-----
631	1.50	0.15	2.98	-0.18	0.70	-3.28	0.52	-1.08
1026	0.01	-0.16	5.51	-0.18	0.54	0.30	55.68	0.75
1033	-----	-----	-----	-----	-----	-----	-----	-----
1082	-0.89	-0.62	-1.51	-0.27	-0.09	1.40	-0.11	0.23
1126	-0.71	-0.78	-2.09	-0.18	0.42	-0.80	-0.43	0.23
1134	0.42	-0.39	-1.00	0.02	0.42	0.85	0.05	-0.29
1135	-1.01	-0.47	-1.15	-0.13	0.11	0.16	0.36	0.23
1191	0.13	-0.39	-0.93	0.02	0.42	0.72	0.36	-0.03
1259	-1.48	0.54	0.52	-0.76	0.07	-0.66	0.52	2.58
1299	0.84	-----	-----	-----	0.74	0.58	0.05	0.49
1320	0.13	0.15	-0.50	-0.27	-0.57	0.85	0.99	0.23
1443	0.13	-0.65	-0.28	-0.18	-1.69	-0.52	-0.27	-1.60
1544	-0.74	-0.04	-0.97	-0.13	-1.29	-1.35	1.15	-1.73
1556	-1.19	-0.70	-1.58	-0.03	-0.29	1.54	0.20	0.23
1634	-0.17	-0.24	2.11	0.22	-0.25	-5.62	2.10	0.75
1656	0.54	-1.62	-1.87	-0.27	-0.45	0.99	0.83	0.23
1706	-0.05	0.61	0.23	-0.13	-0.41	0.03	-0.27	0.49
1776	0.01	0.92	2.04	0.95	0.14	0.16	0.20	0.49
1807	0.01	-0.62	-0.50	-0.27	0.07	0.03	0.52	0.49
1810	-0.29	0.77	1.02	0.66	0.14	-0.80	-1.69	-0.55
1811	0.78	1.00	1.24	0.22	0.07	-1.08	-0.43	-0.29
2146	0.66	0.92	1.24	-0.22	0.62	-0.94	-0.43	-0.03
6142	0.13	0.69	3.70	1.59	0.85	0.03	-0.90	0.23
6168	-2.61	-1.16	-1.08	0.90	2.12	0.99	-1.06	-1.86
6404	-----	-----	-----	-----	-----	-----	-----	-----
6452	0.53	0.05	3.09	2.72	-0.40	-2.11	-4.51	-7.61
6453	0.49	0.64	3.56	2.47	0.63	-0.91	-4.21	-5.52

APPENDIX 4

Number of participants per country

2 labs in AUSTRIA
2 labs in BELGIUM
3 labs in BULGARIA
1 lab in CANADA
1 lab in CROATIA
2 labs in CZECH REPUBLIC
4 labs in FINLAND
7 labs in FRANCE
1 lab in GERMANY
1 lab in IRELAND
4 labs in NETHERLANDS
2 labs in PERU
1 lab in PHILIPPINES
1 lab in PORTUGAL
2 labs in ROMANIA
1 lab in SLOVAKIA
2 labs in SPAIN
3 labs in SWEDEN
4 labs in UNITED KINGDOM
8 labs in UNITED STATES OF AMERICA

APPENDIX 5

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01), D1	= outlier in Dixon's outlier test
D(0.05), D5	= straggler in Dixon's outlier test
G(0.01), G1	= outlier in Grubbs' outlier test
G(0.05), G5	= straggler in Grubbs' outlier test
DG(0.01), DG1	= outlier in Double Grubbs' outlier test
DG(0.05), DG5	= straggler in Double Grubbs' outlier test
R(0.01), R1	= outlier in Rosner's outlier test
R(0.05), R5	= straggler in Rosner's outlier test
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
8 J.N. Miller, Analyst, 118, 455, (1993)
9 Analytical Methods Committee, Technical Brief, No 4, January 2001
10 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)
11 W. Horwitz and R. Albert, J. AOAC Int, 79.3, 589-621, (1996)
12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)