Institute for
Interlaboratory Studies

Results of Proficiency Test
Gasoil (premium)
April 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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Report: iis22G02

July 2022

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1 INTRODUCTION

Over the past years more and more diesel fuels are marketed with higher cetane numbers and additional cleaning agents and some synthetic content. These fuels are called premium diesel. The demand for these premium diesel fuels is increasing.
Since 2020 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Gasoil (premium) based on the latest version of EN590 every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Gasoil (premium).

In this interlaboratory study registered for participation:
- 28 laboratories in 21 countries for regular analyzes in Gasoil (premium) iis22G02
- 11 laboratories in 9 countries for CN and DCN analyzes in Gasoil (premium) iis22G02CN
- 12 laboratories in 9 countries for Total Contamination in Gasoil (premium) iis22G02TC

In total 28 laboratories in 21 countries registered for participation in one or more proficiency tests, see appendix 2 for the number of participants per country. In this report the results of this Gasoil (premium) 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 Gasoil (premium), see table below.

Samples	PT ID	Quantity	Purpose
#22055	iis22G02	1 x 1L + 1x 0.5L	Regular analyzes
#22056	iis22G02CN	4 x 1L	Cetane Number and DCN
#22057	iis22G02TC	1 x 1L	Total Contamination

Table 1: Gasoil (premium) samples used in PT iis22G02

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

A batch of approximately 200 liters of Gasoil (premium) was obtained from the local market. After homogenisation 45 amber glass bottles of 1L and 45 amber glass bottles of 0.5 L were filled and labelled #22055 and 70 amber glass bottles of 1L were filled and labelled #22056. The homogeneity of the subsamples was checked by the determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/m^3
sample 1	830.52
sample 2	830.49
sample 3	830.56
sample 4	830.51
sample 5	830.58
sample 6	830.55
sample 7	830.55
sample 8	830.54

Table 2: homogeneity test results of subsamples #22055 and #22056

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)	0.08
reference test method	ISO12185:96
0.3 x R (reference test method)	0.15

Table 3: evaluation of the repeatability of subsamples #22055 and #22056

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 Gasoil (premium) Total Contamination a batch of approximately 50 liters Gasoil (premium) was obtained from the local market. A defined volume of freshly prepared and well shaken dust suspension of Arizona Dust material in an oil was added to an 1L empty bottle by means of a calibrated pipette. The addition was checked by weighing the bottle before and after the addition. In total 20 bottles were prepared and subsequently filled up to 1L with Gasoil (premium). Finally, the subsamples were labelled #22057.

Depending on the registration of the participant the appropriate set of PT samples was sent on March 16, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Gasoil (premium) 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 #22055: Total Acid Number, Ash content, Calculated Cetane Index (four variables), Cloud Point, Cold Filter Plugging Point (CFPP), Carbon Residue (micro method) on 10% distillation residue, Copper Corrosion 3hrs at 50 °C, Density at 15 °C, Distillation at 760 mmHg (IBP, 10 %, 50 %, 90 %, 95 % recovered, FBP and Volume at 250 °C and 350 °C), FAME, Flash Point PMcc, Kinematic Viscosity at 40 °C, Lubricity by HFRR at 60 °C, Manganese as Mn, Nitrogen, Aromatic Hydrocarbons (Polycyclic, Mono, Di, Tri+ and Total), Pour Point (Manual and Automated), Sulfur and Water.
On sample #22056 was requested to determine: Cetane Number and Derived Cetane Number (EN15195 and EN16715).
On sample #22057 was requested to determine: Total Contamination.

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

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

3 RESULTS

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

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

3.1 STATISTICS

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

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

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

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

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

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

3.2 GRAPHICS

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

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

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements (dereived 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:

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

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

Absolute values for z<2 are very common and absolute values for z>3 are very rare. 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 no problems were encountered with the dispatch of the samples.
For the regular Gasoil (premium) PT two participants reported test results after the final reporting date and two other participants were not able to report any test results.
For the PT on Cetane Number in Gasoil (premium) one participant reported test results after the final reporting date and two other participants were not able to report any test results.
For the PT on Total Contamination in Gasoil (premium) two participants reported test results after the final reporting date and one other participant was not able to report any test results.
Not all participants were able to report all tests requested.
In total 26 participants reported 500 numerical test results. Observed were 17 outlying test results, which is 3.4 %. In proficiency studies, outlier percentages of 3%-7.5% are quite normal.

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

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section the reported test results are discussed per sample and per test. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 3.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D5950) and an added designation for the year that the test method was adopted or revised (e.g. D5950:14). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D5950:14(2020)). In the results tables of appendix 1 only the test method number and year of adoption or revision e.g. D5950:14 will be used.

sample #22055

Total Acid Number: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D974:21.

Ash content: This determination was not problematic. Almost all reporting participants agreed on a concentration lower than 0.001%M/M. Therefore, no z-scores are calculated.

Calculated Cetane Index, four variables: Regretfully, no reproducibility is mentioned in procedure A of ASTM D4737:10(2016) nor in the equivalent test methods ISO4264 and IP380. Therefore, iis has estimated a reproducibility for Calculated Cetane Index by Four Variable Equation based from previous iis Gasoil PTs. This work done in 2019 has been reported in iis memo 1904 available on www.iisnl.com.
This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the reproducibility of iis memo 1904.

Cloud Point: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO3015:19.
Please note test method EN23015 is withdrawn per 2019.

Cold Filter Plugging Point (CFPP): 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 EN116:15.

Carbon Residue (micro method) on 10% distillation residue: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO10370:14.

Copper Corrosion 3hrs at 50 °C: This determination was not problematic. All reporting laboratories agreed on a 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.

Distillation at 760 mmHg: This determination was not problematic. Two statistical outliers were observed over eight parameters. All calculated reproducibilities after rejection of the statistical outliers are in agreement with the requirements of ISO3405:19 for automated mode. When compared to the requirements of ISO3405:19 manual mode, only the calculated reproducibiliteis for 95% rec. and FBP are not in agreement, all other parameters are in agreement.

FAME: 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 mode B of EN14078:14.

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

Kinematic Viscosity at 40 °C: 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 ISO3104:20.

Lubricity by HFRR at 60 °C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of modes A or B of ISO12156-1:18.

Manganese as Mn: This determination was not problematic. The consensus value was below the application range of EN16576:14. Therefore, no z-scores are calculated.

Nitrogen: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of ASTM D4629:17.

Polycyclic Aromatic Hydrocarbons: 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 EN12916:16.

Mono Aromatic Hydrocarbons: 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 EN12916:16.

Di Aromatic Hydrocarbons: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of EN12916:16.

Tri+ Aromatic Hydrocarbons: 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 EN12916:16.

Total Aromatic Hydrocarbons: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of EN12916:16.

Pour Point Manual: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO3016:19.

Pour Point Automated 3 °C interval: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements ASTM D5950:14(2020).

Sulfur: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ISO20846:19.

Water: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ISO12937:00.

sample #22056

Cetane Number: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO5165:20.

Derived Cetane Number (DCN) EN15195: For Derived Cetane Number (DCN) and Ignition Delay (ID) no test results were reported.

Derived Cetane Number (DCN) EN16715: This determination was not problematic. No statistical outliers were observed over three parameters. All the calculated reproducibilities are in full agreement with the requirements of EN16715:15.

sample #22057

Total Contamination: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN12662:14.

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)
Total Acid Number	mg KOH/g	14	0.043	0.041	0.04
Ash content	%M/M	9	<0.001	n.e.	n.e.
Calc. Cetane Index four variables		19	51.41	0.49	0.91
Cloud Point	°C	17	-9.4	1.5	4
Cold Filter Plugging Point	°C	13	-20.5	4.2	4.2
Carbon Residue on 10% residue	%M/M	11	0.015	0.020	0.018
Copper Corrosion, 3 hrs at 50 °C		19	1 (1a)	n.a.	n.a.
Density at 15 °C	kg/m^3	24	830.5	0.3	0.5
Initial Boiling Point	°C	22	162.0	5.7	8.9
Temp at 10% recovery	°C	21	192.5	2.9	4.2
Temp at 50% recovery	°C	21	259.1	2.2	3.0
Temp at 90% recovery	°C	21	328.2	3.3	4.9
Temp at 95% recovery	°C	21	341.2	7.6	8.3
Final Boiling Point	°C	22	351.0	7.6	7.1
Volume at 250 °C	%V/V	20	44.6	1.3	2.7
Volume at 350 °C	%V/V	13	96.7	1.5	2.7
FAME	%V/V	11	6.83	0.59	0.50
Flash Point PMcc	°C	21	55.2	3.7	3.9
Kinematic Viscosity at 40 °C	mm^2/s	20	2.322	0.037	0.027

Parameter	unit	n	average	2.8 * sd	R(lit)
Lubricity by HFRR at 60 °C	µm	14	187	30	80
Manganese as Mn	mg/L	3	<0.5	n.e.	n.e.
Nitrogen	mg/kg	9	14.2	9.6	3.2
Polycyclic Aromatic Hydrocarbons	%M/M	11	1.40	0.31	0.72
Mono Aromatic Hydrocarbons	%M/M	9	19.1	0.5	2.4
Di Aromatic Hydrocarbons	%M/M	13	1.32	0.34	0.39
Tri^{+} Aromatic Hydrocarbons	%M/M	11	0.11	0.17	0.52
Total Aromatic Hydrocarbons	%M/M	11	20.7	1.2	2.5
Pour Point Manual	°C	10	-27.2	4.9	9
Pour Point Automated Δ3 °C	°C	8	-27.0	0.0	6.1
Sulfur	mg/kg	20	7.6	1.7	2.0
Water	mg/kg	17	54.8	24.6	50.9

Table 4: reproducibilities of tests on sample #22055

Parameter	unit	n	average	2.8 * sd	R(lit)
Cetane Number		6	51.2	1.5	4.2
DCN (EN15195)		0	n.e.	n.e.	n.e.
Ignition Delay (EN15195)	ms	0	n.e.	n.e.	n.e.
DCN (EN16715)		4	51.1	1.5	1.4
Ignition Delay (EN16715)	ms	4	3.11	0.17	0.17
Combustion Delay (EN16715)	ms	4	4.66	0.14	0.14
Total Contamination	mg/kg	11	37.2	14.9	10.2

Table 5: reproducibilities of tests on samples #22056 and #22057

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 APRIL 2022 WITH PREVIOUS PTS

	April 2022	April 2021	April 2020
Number of reporting laboratories	26	29	30
Number of test results	500	553	618
Number of statistical outliers	17	21	15
Percentage of statistical outliers	3.4%	3.8%	2.4%

Table 6: 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 test was compared to the requirements of the reference test methods. The conclusions are given the following table.

Parameter	April 2022	April 2021	April 2020
Total Acid Number	+/-	+	+
Ash content	n.e.	n.e.	++
Calc. Cetane Index four variables	+	+	+
Cloud Point	++	++	+
Cold Filter Plugging Point	+/-	-	-
Carbon Residue on 10% residue	+/-	--	+/-
Density at 15 °C	+	++	++
Distillation at 760 mmHg	+	-	+
FAME	-	+	+/-
Flash Point PMcc	+/-	n.e.	+
Kinematic Viscosity at 40 °C	-	-	+/-
Lubricity by HFRR at 60 °C	++	+	+
Manganese as Mn	n.e.	n.e.	n.e.
Nitrogen	--	+	-
Polycyclic Aromatic Hydrocarbons	++	+/-	+
Mono, Di and Tri^{+} Aromatic HCs	++	+	+
Total Aromatic Hydrocarbons	++	+	++
Pour Point	+	+	+
Sulfur	+	+/-	+
Water	++	+	++
Cetane Number	++	+	+
DCN (EN15195)	n.e.	n.e.	-
DCN (EN16715)	+/-	-	-
Total Contamination	-	-	-

Table 7: comparison determinations to the reference test methods

The following performance categories were used:

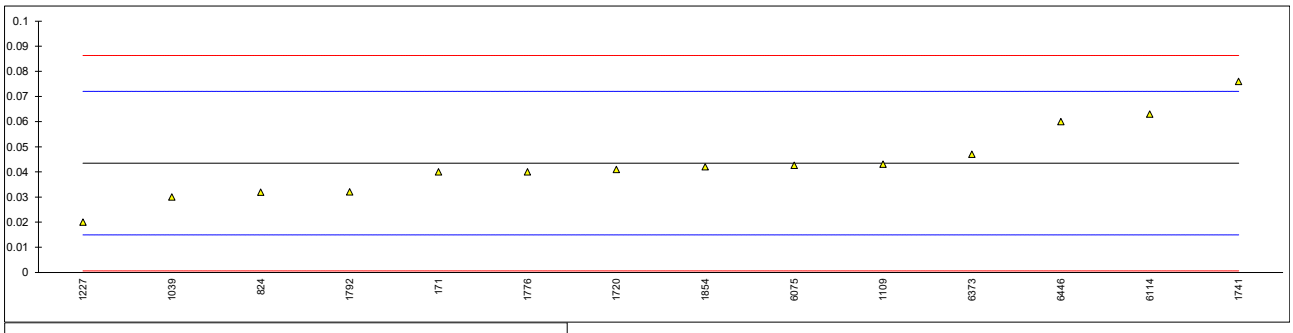
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals to the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test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

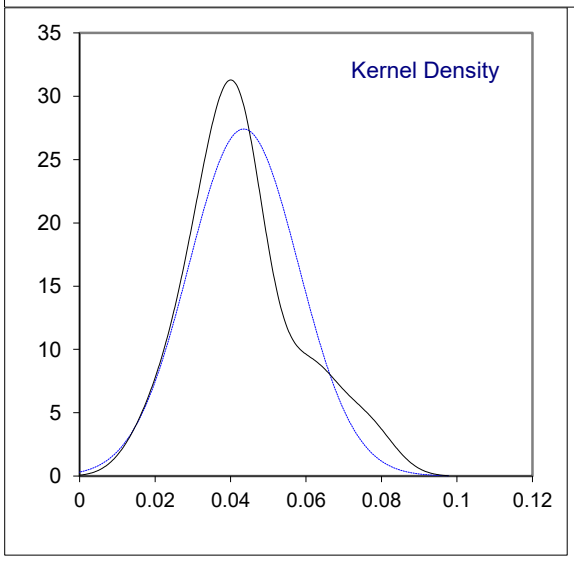
APPENDIX 1

Determination of Total Acid Number on sample #22055; result in mg KOH/g

lab	method	value	mark	z(targ)	remarks
171	D974	0.04		-0.24	
223		-----		-----	
492		-----		-----	
496		-----		-----	
541	D974	<0.10		-----	
824	D974	0.0319		-0.81	
962		-----		-----	
1039	D664-A	0.03		-0.94	
1109	D974	0.043		-0.03	
1126		-----		-----	
1143		-----		-----	
1227	D974	0.02		-1.64	
1720	D974	0.041		-0.17	
1741	ISO6619	0.076		2.28	
1776	D664-A	0.04		-0.24	
1792	D664-A	0.032		-0.80	
1854	D974	0.042		-0.10	
6028		-----		-----	
6075	D974	0.0426		-0.06	
6114	D664-A	0.063		1.37	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	D974	0.047		0.25	
6378		-----		-----	
6406		-----		-----	
6446	ISO6618	0.06		1.16	
6447		-----		-----	

normality	OK
n	14
outliers	0
mean (n)	0.04346
st.dev. (n)	0.014561
R(calc.)	0.04077
st.dev.(D974:21)	0.014286
R(D974:21)	0.04





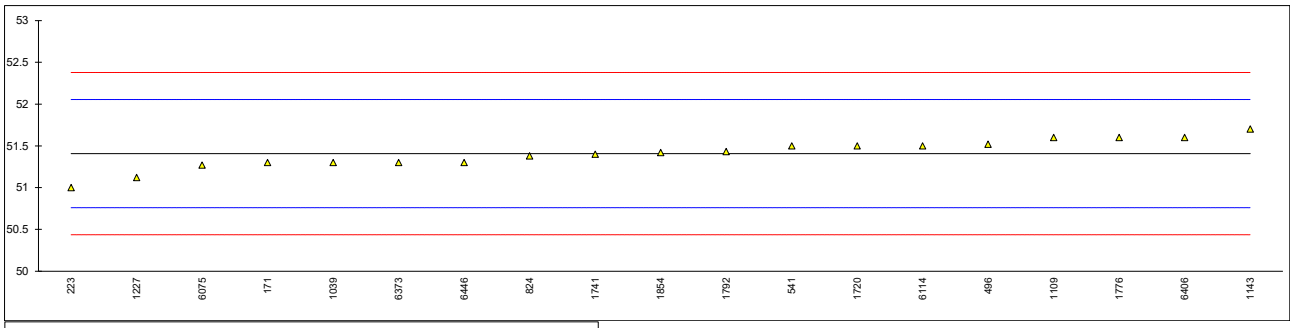
Determination of Ash content on sample #22055; result in %M/M

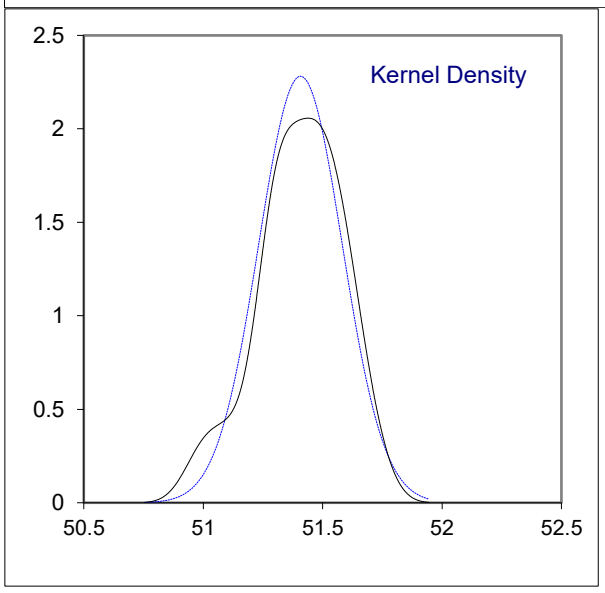
lab	method	value	mark	z(targ)	remarks
171	D482	<0.001		-----	
223		-----		-----	
492		-----		-----	
496	ISO6245	0.0002		-----	
541	ISO6245	<0.001		-----	
824	ISO6245	0.0006		-----	
962		-----		-----	
1039	ISO6245	0.002		-----	
1109	D482	0.000		-----	
1126		-----		-----	
1143		-----		-----	
1227		-----		-----	
1720		-----		-----	
1741	ISO6245	0.0004		-----	
1776		-----		-----	
1792	ISO6245	0.001		-----	
1854	ISO6245	0.002		-----	
6028		-----		-----	
6075		-----		-----	
6114	ISO6245	0.001		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	ISO6245	<0.001		-----	
6378		-----		-----	
6406		-----		-----	
6446		-----		-----	
6447		-----		-----	
	n	9			
	mean (n)	<0.001			

Determination of Calculated Cetane Index, four variables on sample #22055

lab	method	value	mark	z(targ)	remarks
171	D4737-A	51.3		-0.33	
223	D4737-A	51.0		-1.26	
492		-----		-----	
496	D4737-A	51.52		0.35	
541	D4737-A	51.5		0.29	
824	D4737-A	51.38		-0.08	
962		-----		-----	
1039	D976	51.3		-0.33	
1109	D4737-A	51.6		0.59	
1126		-----		-----	
1143	ISO4264	51.7		0.90	
1227	D4737-A	51.12		-0.89	
1720	D4737-A	51.5	C	0.29	first reported 49.90
1741	ISO4264	51.4		-0.02	
1776	ISO4264	51.6		0.59	
1792	ISO4264	51.43		0.07	
1854		51.42		0.04	
6028		-----		-----	
6075	ISO4264	51.27		-0.42	
6114	ISO4264	51.5		0.29	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	ISO4264	51.3		-0.33	
6378		-----		-----	
6406	ISO4264	51.6		0.59	
6446	ISO4264	51.3		-0.33	
6447		-----		-----	

normality	OK
n	19
outliers	0
mean (n)	51.407
st.dev. (n)	0.1749
R(calc.)	0.490
st.dev.(iis memo 1904)	0.3239
R(iis memo 1904)	0.907

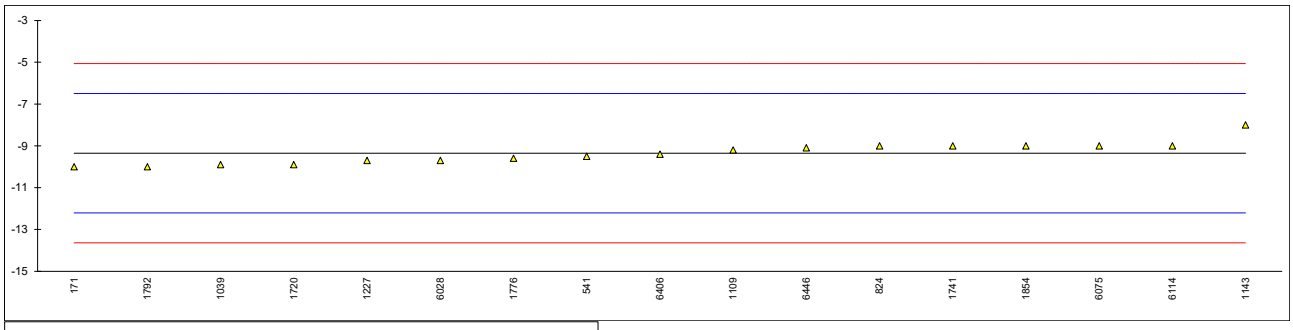


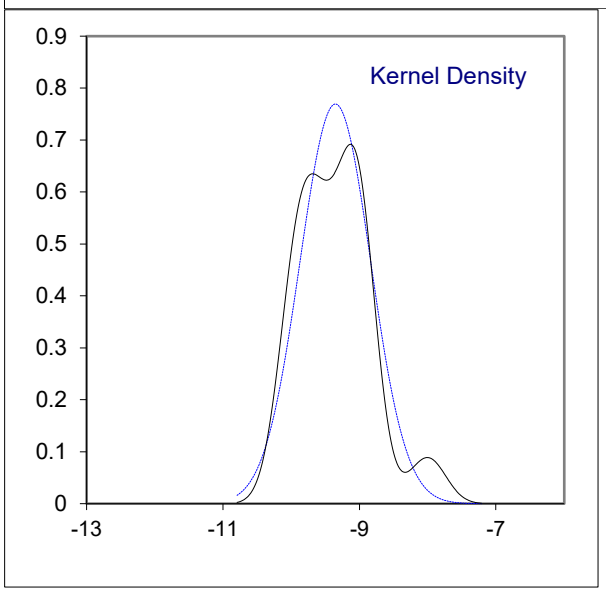


Determination of Cloud Point on sample #22055; result in °C

lab	method	value	mark	z(targ)	remarks
171	D2500	-10		-0.45	
223		-----		-----	
492		-----		-----	
496		-----		-----	
541	D5771	-9.5		-0.10	
824	ISO3015	-9		0.25	
962		-----		-----	
1039	ISO3015	-9.9		-0.38	
1109	D5773	-9.2		0.11	
1126		-----		-----	
1143	ISO3015	-8		0.95	
1227	D2500	-9.7		-0.24	
1720	D5773	-9.9	C	-0.38	first reported 9.9
1741	ISO3015	-9		0.25	
1776	ISO3015	-9.6		-0.17	
1792	D2500	-10		-0.45	
1854	ISO3015	-9		0.25	
6028	D2500	-9.7		-0.24	
6075	ISO3015	-9		0.25	
6114	ISO3015	-9		0.25	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373		-----		-----	
6378		-----		-----	
6406	EN23015	-9.4		-0.03	
6446	D2500	-9.1		0.18	
6447		-----		-----	

normality	suspect
n	17
outliers	0
mean (n)	-9.35
st.dev. (n)	0.519
R(calc.)	1.45
st.dev.(ISO3015:19)	1.429
R(ISO3015:19)	4

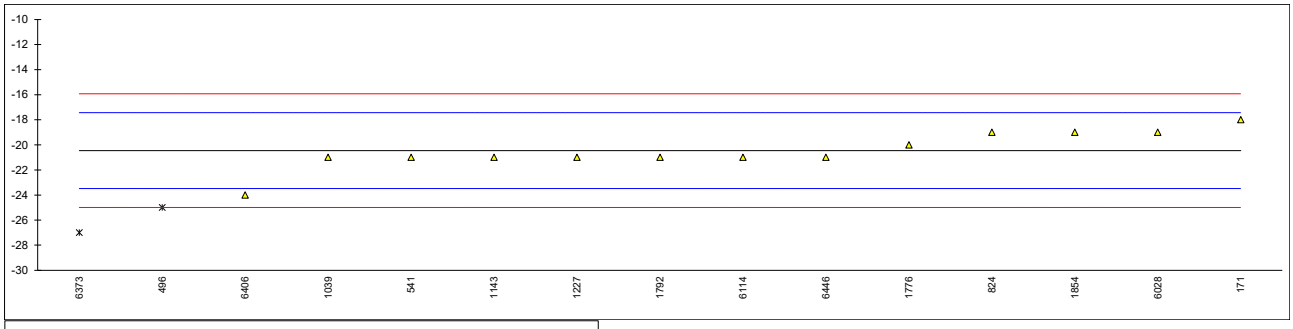


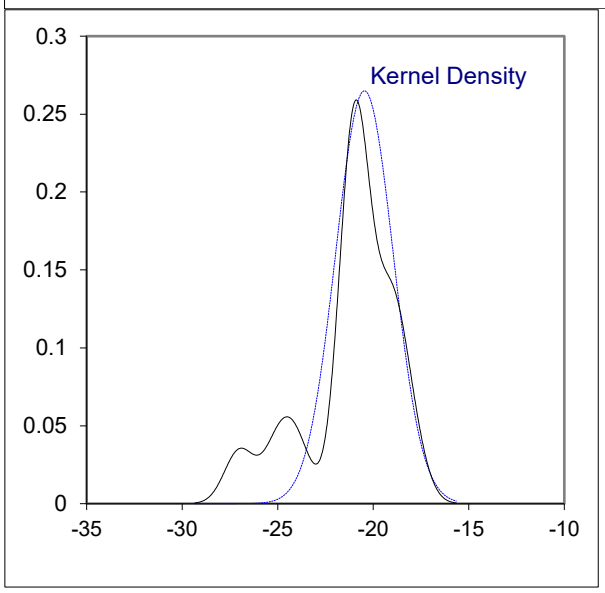


Determination of Cold Filter Plugging Point (CFPP) on sample #22055; result in °C

lab	method	value	mark	z(targ)	remarks
171	D6371	-18		1.63	
223		-----		-----	
492		-----		-----	
496	EN116	-25	DG(0.05)	-3.01	
541	EN116	-21		-0.36	
824	EN116	-19		0.97	
962		-----		-----	
1039	EN116	-21		-0.36	
1109		-----		-----	
1126		-----		-----	
1143	EN116	-21		-0.36	
1227	EN116	-21		-0.36	
1720		-----		-----	
1741		-----		-----	
1776	EN116	-20		0.31	
1792	EN116	-21		-0.36	
1854	EN116	-19		0.97	
6028	EN116	-19		0.97	
6075		-----		-----	
6114	EN116	-21		-0.36	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN116	-27	DG(0.05)	-4.33	
6378		-----		-----	
6406	EN116	-24		-2.34	
6446	EN116	-21		-0.36	
6447		-----		-----	

normality	suspect
n	13
outliers	2
mean (n)	-20.46
st.dev. (n)	1.506
R(calc.)	4.22
st.dev.(EN116:15)	1.510
R(EN116:15)	4.23

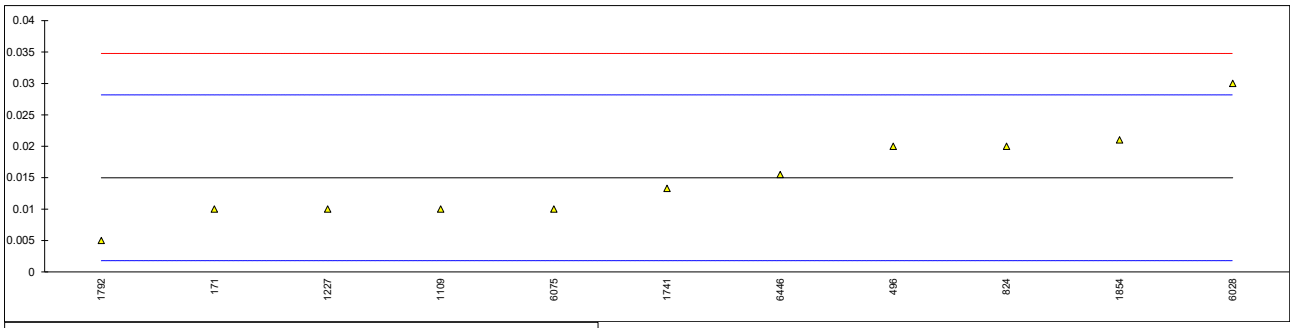


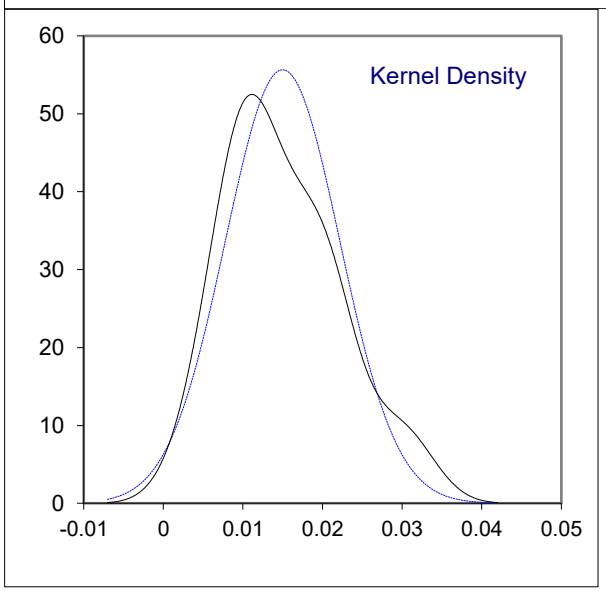


Determination of Carbon Residue (micro method) on 10% distillation residue on sample #22055; result in %M/M

lab	method	value	mark	z(targ)	remarks
171	D189	0.01		-0.75	
223		-----		-----	
492		-----		-----	
496	ISO10370	0.02		0.76	
541	ISO10370	<0.1		-----	
824	ISO10370	0.02		0.76	
962		-----		-----	
1039	ISO10370	<0.10		-----	
1109	D4530	0.01		-0.75	
1126		-----		-----	
1143		-----		-----	
1227	D4530	0.01		-0.75	
1720		-----		-----	
1741	ISO10370	0.0133		-0.25	
1776		-----		-----	
1792	ISO10370	0.005		-1.51	
1854	ISO10370	0.021		0.91	
6028	ISO10370	0.03		2.27	
6075	ISO10370	0.010		-0.75	
6114	ISO10370	<0.10		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	ISO10370	<0.10		-----	
6378		-----		-----	
6406		-----		-----	
6446	ISO10370	0.0155		0.08	
6447		-----		-----	

normality	OK
n	11
outliers	0
mean (n)	0.01498
st.dev. (n)	0.007170
R(calc.)	0.02008
st.dev.(ISO10370:14)	0.006604
R(ISO10370:14)	0.01849





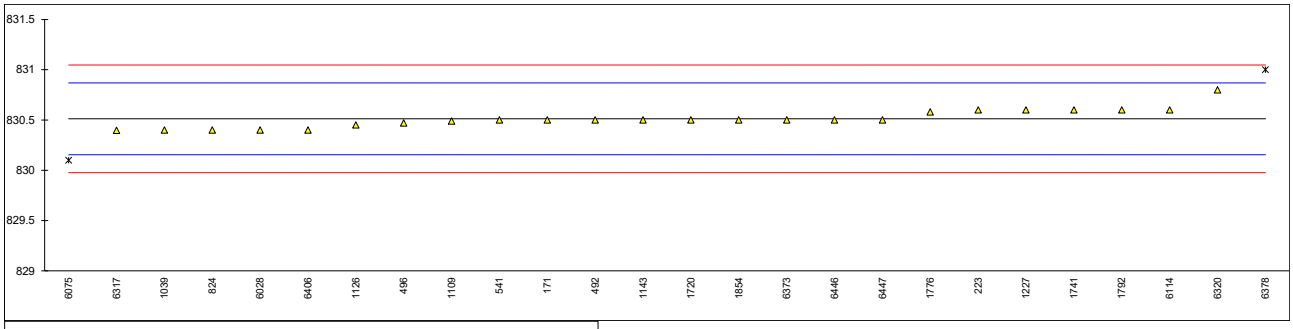
Determination of Copper Corrosion, 3 hrs at 50 °C on sample #22055

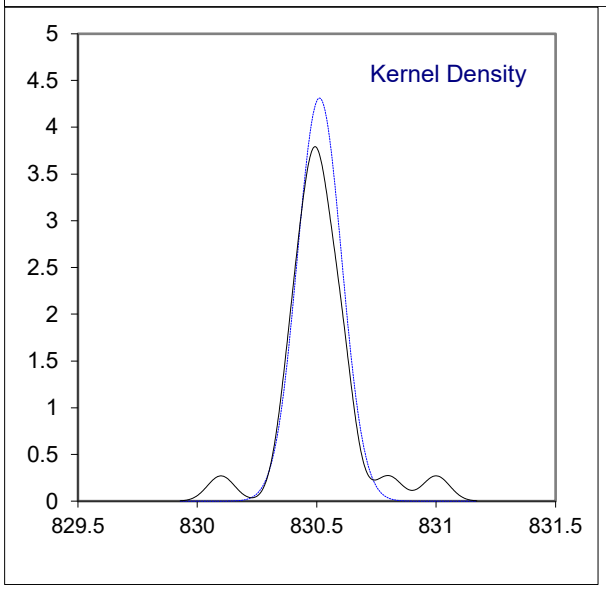
lab	method	value	mark	z(targ)	remarks
171	D130	1a		-----	
223		-----		-----	
492		-----		-----	
496	ISO2160	1a		-----	
541	D130	1a		-----	
824	D130	1a		-----	
962		-----		-----	
1039	ISO2160	1A		-----	
1109	D130	1a		-----	
1126		-----		-----	
1143	ISO2160	1 a		-----	
1227	D130	1A		-----	
1720	D130	1 a		-----	
1741	ISO2160	Class 1a		-----	
1776		-----		-----	
1792	D130	1a		-----	
1854		1A		-----	
6028	ISO2160	1a		-----	
6075	ISO2160	1a		-----	
6114	ISO2160	1a		-----	
6274		-----		-----	
6317	D130	1a		-----	
6320		-----		-----	
6373	D130	1A		-----	
6378		-----		-----	
6406	ISO2160	1A		-----	
6446	ISO2160	1A		-----	
6447		-----		-----	
	n	19			
	mean (n)	1 (1a)			

Determination of Density at 15 °C on sample #22055; result in kg/m^3

lab	method	value	mark	z(targ)	remarks
171	D4052	830.5		-0.07	
223	D4052	830.6		0.49	
492	D4052	830.5		-0.07	
496	ISO12185	830.47		-0.23	
541	ISO12185	830.50		-0.07	
824	ISO12185	830.4		-0.63	
962		-----		-----	
1039	ISO12185	830.4		-0.63	
1109	D4052	830.49		-0.12	
1126	ISO12185	830.45		-0.35	
1143	ISO12185	830.5		-0.07	
1227	D4052	830.6		0.49	
1720	D4052	830.5		-0.07	
1741	ISO12185	830.6		0.49	
1776	ISO12185	830.58	C	0.38	first reported 830.1
1792	D4052	830.6		0.49	
1854	ISO12185	830.5		-0.07	
6028	ISO12185	830.4		-0.63	
6075	ISO12185	830.1	C,G(0.01)	-2.31	first reported 831.1
6114	ISO12185	830.6		0.49	
6274		-----		-----	
6317	D4052	830.3975		-0.64	
6320	ISO3675	830.8	C	1.61	first reported 829.8
6373	ISO12185	830.5		-0.07	
6378	D1298	831.0	C,G(0.05)	2.73	first reported 831.2
6406	ISO12185	830.4		-0.63	
6446	D4052	830.5		-0.07	
6447	D4052	830.5		-0.07	

normality	not OK
n	24
outliers	2
mean (n)	830.512
st.dev. (n)	0.0925
R(calc.)	0.259
st.dev.(ISO12185:96)	0.1786
R(ISO12185:96)	0.5

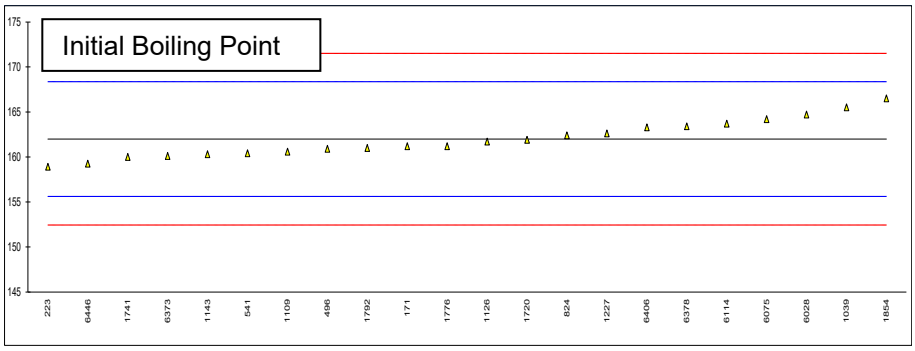


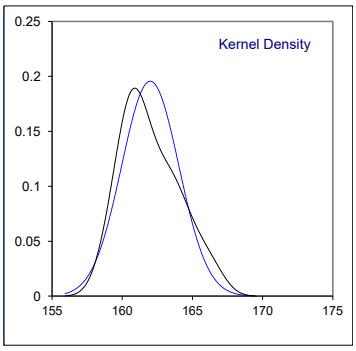


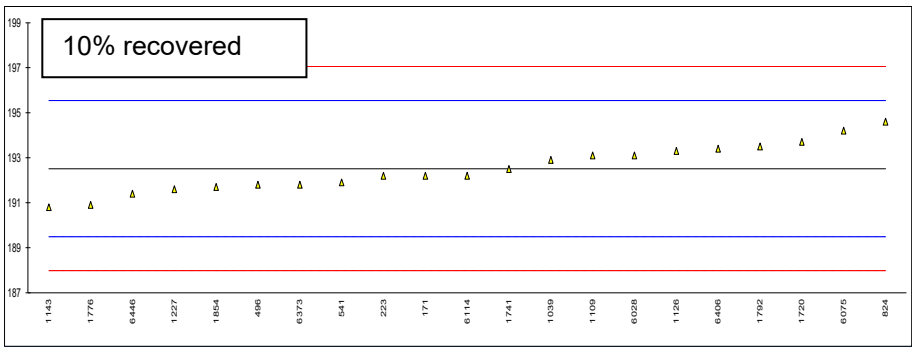
Determination of Distillation at 760 mmHg on sample #22055; result in °C

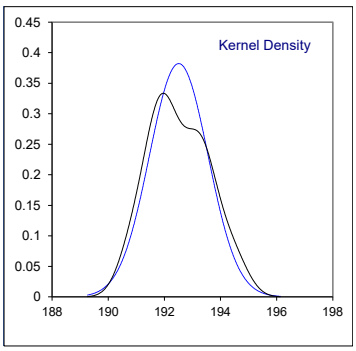
lab	method	IBP	10%rec	50%rec	90%rec	95%rec	FBP
171	D86-automated	161.2	192.2	258.6	327.6	340.0	348.5
223	D86	158.9	192.2	257.6	328.4	N/A	350.1
492		-----	-----	-----	-----	-----	-----
496	ISO3405-automated	160.9	191.8	260.0	329.4	342.8	352.6
541	ISO3405-automated	160.42	191.9	259.89	329.99	345.43	351.61
824	D86-automated	162.4	194.6	258.3	325.5	340.1	347.5
962		-----	-----	-----	-----	-----	-----
1039	D2887a	165.5	192.9	258.5	328.8	340.2	351.9
1109	D86-automated	160.6	193.1	259.8	328.5	341.7	352.2
1126		161.7	193.3	259.6	327.8	341.7	355.0
1143		160.3 C	190.8 C	258.9	328.9	341.6	352.4
1227	D86-automated	162.6	191.6	258.3	328.9	342.1	351.5
1720	D86-automated	161.9	193.7	259.6	327.8	340.4	353.1
1741		160.0	192.5	259.4	327.8	340.3	350.0
1776	ISO3405-automated	161.2	190.9	257.3	325.9	338.2	346.4
1792	ISO3405-automated	161.0	193.5	259.3	326.6	337.6	349.9
1854	ISO3405	166.5	191.7	259.6	330.0	346.9	353.7
6028	ISO3405	164.7	193.1	259.7	327.5	340.0	351.1
6075	ISO3405-automated	164.2	194.2	259.4	329.0 C	334.7	344.1
6114	ISO3405-automated	163.7	192.2	260.0	329.3	343.9	353.2
6274		-----	-----	-----	-----	-----	-----
6317		-----	-----	-----	-----	-----	-----
6320		-----	-----	-----	-----	-----	-----
6373	ISO3405-automated	160.1	191.8	259.2	327.6	340.1	350.9
6378	D86-manual	163.4 C	-----	-----	-----	344.7 C	354.5 C
6406	D86-automated	163.3	193.4	259.7	328.4	341.0	353.3
6446	ISO3405-automated	159.25	191.40	258.85	327.60	340.75	348.55
6447		-----	-----	-----	-----	-----	-----
	normality	OK	OK	OK	OK	suspect	OK
	n	22	21	21	21	21	22
	outliers	0	0	0	0	0	0
	mean (n)	161.99	192.51	259.12	328.16	341.15	351.00
	st.dev. (n)	2.040	1.044	0.772	1.192	2.703	2.706
	R(calc.)	5.71	2.92	2.16	3.34	7.57	7.58
	st.dev.(ISO3405-A:19)	3.182	1.513	1.071	1.758	2.949	2.536
	R(ISO3405-A:19)	8.91	4.24	3.00	4.92	8.26	7.10
	compare						
	R(ISO3405-M:19)	5.64	4.38	4.06	4.22	4.84	3.93

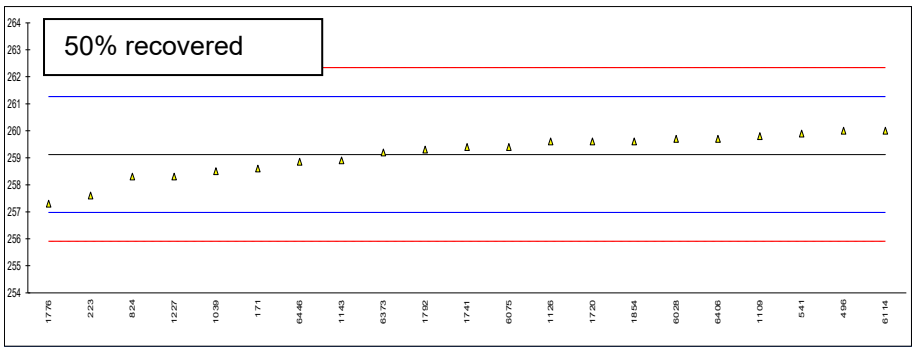
Lab 1143 first reported 169.3, 197.8 respectively
Lab 6075 first reported 323.4
Lab 6378 first reported 169.5, 350.0, 362.0 respectively

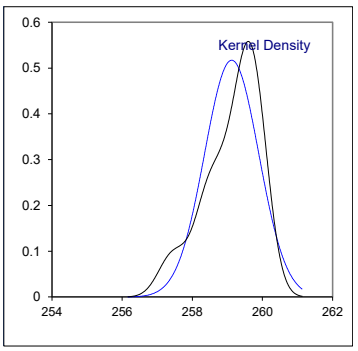


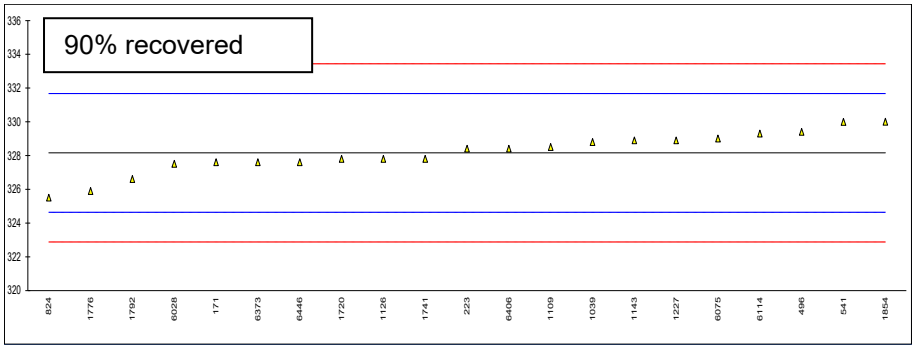


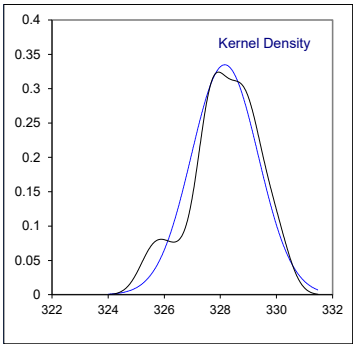


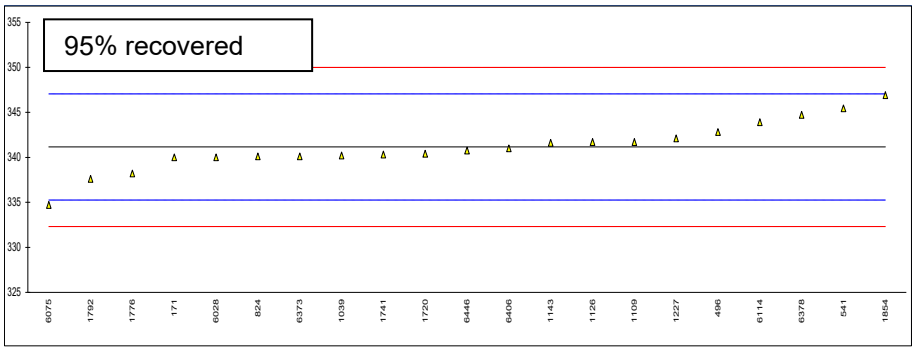


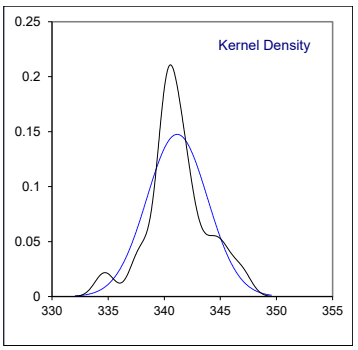

50% recovered

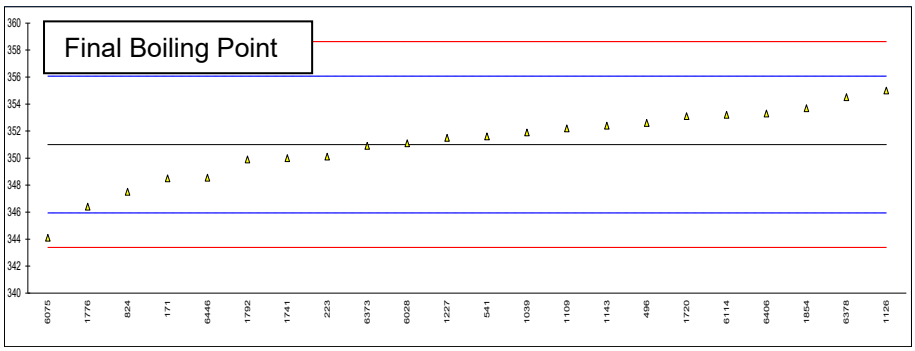

Kernel Density

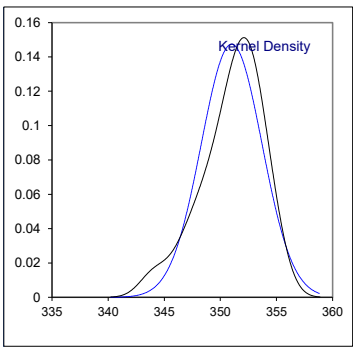

90% recovered


Kernel Density


95% recovered


Kernel Density


Final Boiling Point

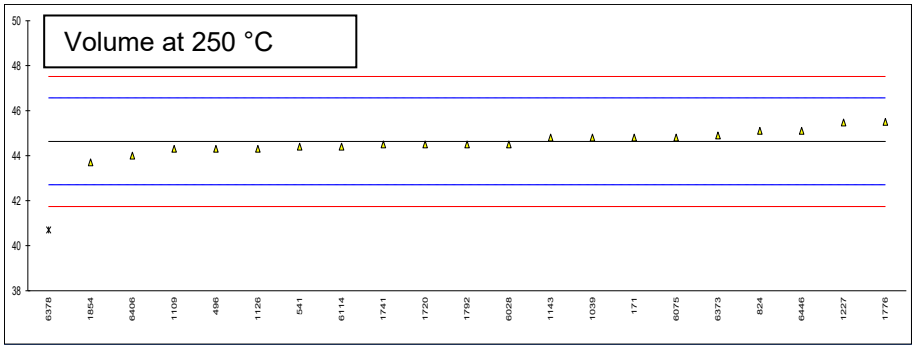

Kernel Density

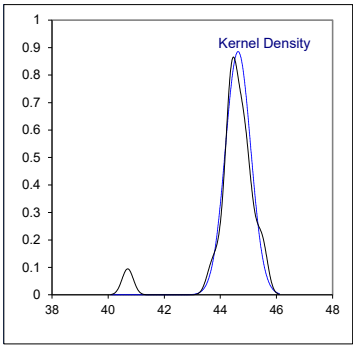
z-scores Distillation on sample #22055

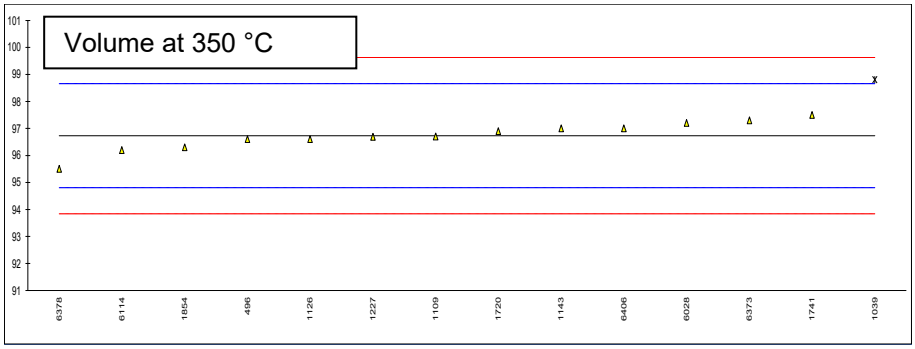
lab	IBP	10%rec	50%rec	90%rec	95%rec	FBP
171	-0.25	-0.21	-0.49	-0.32	-0.39	-0.99
223	-0.97	-0.21	-1.42	0.14	-----	-0.36
492	-----	-----	-----	-----	-----	-----
496	-0.34	-0.47	0.82	0.71	0.56	0.63
541	-0.49	-0.41	0.72	1.04	1.45	0.24
824	0.13	1.38	-0.77	-1.51	-0.36	-1.38
962	-----	-----	-----	-----	-----	-----
1039	1.10	0.26	-0.58	0.37	-0.32	0.35
1109	-0.44	0.39	0.63	0.20	0.19	0.47
1126	-0.09	0.52	0.45	-0.20	0.19	1.58
1143	-0.53	-1.13	-0.21	0.42	0.15	0.55
1227	0.19	-0.60	-0.77	0.42	0.32	0.20
1720	-0.03	0.78	0.45	-0.20	-0.25	0.83
1741	-0.63	-0.01	0.26	-0.20	-0.29	-0.40
1776	-0.25	-1.07	-1.70	-1.28	-1.00	-1.82
1792	-0.31	0.65	0.17	-0.89	-1.20	-0.43
1854	1.42	-0.54	0.45	1.05	1.95	1.06
6028	0.85	0.39	0.54	-0.37	-0.39	0.04
6075	0.69	1.11	0.26	0.48	-2.19	-2.72
6114	0.54	-0.21	0.82	0.65	0.93	0.87
6274	-----	-----	-----	-----	-----	-----
6317	-----	-----	-----	-----	-----	-----
6320	-----	-----	-----	-----	-----	-----
6373	-0.59	-0.47	0.07	-0.32	-0.36	-0.04
6378	0.44	-----	-----	-----	1.20	1.38
6406	0.41	0.59	0.54	0.14	-0.05	0.91
6446	-0.86	-0.74	-0.25	-0.32	-0.14	-0.97
6447	-----	-----	-----	-----	-----	-----

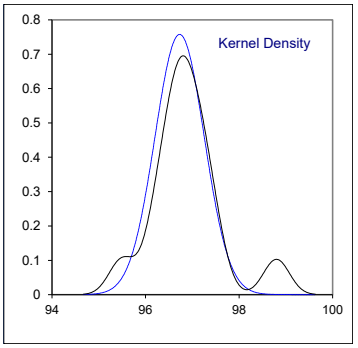
Determination of Distillation on sample #22055; result in %V/V

lab	method	Vol.250 °C	mark	z(targ)	Vol.350 °C	mark	z(targ)	remarks
171	D86-automated	44.8		0.17	-----		-----	
223	D86	N/A		-----	N/A		-----	
492		-----		-----	-----		-----	
496	ISO3405-automated	44.3		-0.35	96.6		-0.13	
541	ISO3405-automated	44.4		-0.24	-----		-----	
824	D86-automated	45.1		0.48	-----		-----	
962		-----		-----	-----		-----	
1039	D2887a	44.8		0.17	98.8	G(0.05)	2.15	
1109	D86-automated	44.3		-0.35	96.7		-0.03	
1126		44.3		-0.35	96.6		-0.13	
1143		44.8		0.17	97.0		0.28	
1227	D86-automated	45.47		0.87	96.69		-0.04	
1720	D86-automated	44.5		-0.14	96.9		0.18	
1741		44.5		-0.14	97.5		0.80	
1776	ISO3405-automated	45.5		0.90	-----		-----	
1792	ISO3405-automated	44.5		-0.14	-----		-----	
1854	ISO3405	43.7		-0.97	96.3		-0.45	
6028	ISO3405	44.5		-0.14	97.2		0.49	
6075	ISO3405-automated	44.8		0.17	-----		-----	
6114	ISO3405-automated	44.4		-0.24	96.2		-0.55	
6274		-----		-----	-----		-----	
6317		-----		-----	-----		-----	
6320		-----		-----	-----		-----	
6373	ISO3405-automated	44.9		0.28	97.3	C	0.59	first reported 80.5
6378	D86-manual	40.7	C,R(0.01)	-4.08	95.5		-1.28	first reported 39.5
6406	D86-automated	44.0		-0.66	97.0		0.28	
6446	ISO3405-automated	45.1		0.48	-----	W	-----	reported 74.7
6447		-----		-----	-----		-----	
	normality	OK			suspect			
	n	20			13			
	outliers	1			1			
	mean (n)	44.63			96.73			
	st.dev. (n)	0.450			0.527			
	R(calc.)	1.26			1.47			
	st.dev.(ISO3405-A:19)	0.964			0.964			
	R(ISO3405-A:19)	2.70			2.70			
	compare							
	R(ISO3405-M:19)	2.57			2.18			





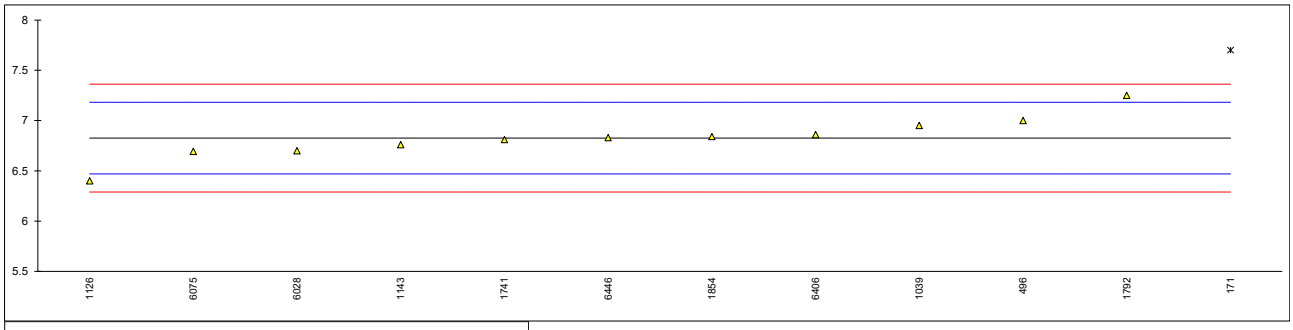


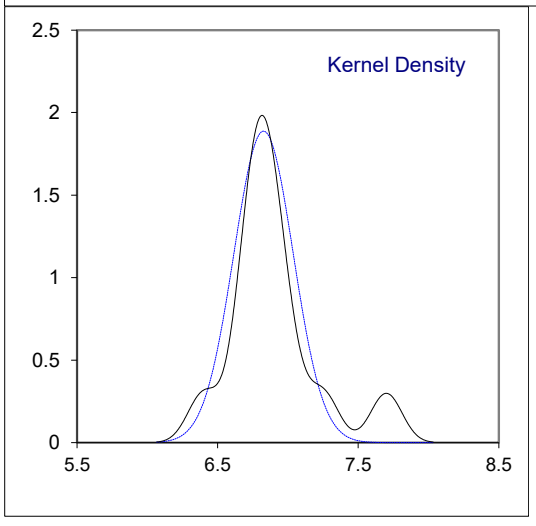


Determination of FAME on sample #22055; result in %V/V

lab	method	value	mark	z(targ)	remarks
171	D7371	7.70	G(0.05)	4.89	
223		-----		-----	
492		-----		-----	
496	EN14078-B	7.0		0.97	
541		-----		-----	
824		-----		-----	
962		-----		-----	
1039	EN14078-B	6.95		0.69	
1109		-----		-----	
1126	EN14078-A	6.4		-2.39	
1143	EN14078-B	6.76		-0.37	
1227		-----		-----	
1720		-----		-----	
1741	EN14078-B	6.81		-0.09	
1776		-----		-----	
1792	EN14078-B	7.25		2.37	
1854	EN14078	6.84		0.07	
6028	EN14078	6.7		-0.71	
6075	EN14078-B	6.693		-0.75	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373		-----		-----	
6378		-----		-----	
6406	EN14078-B	6.86		0.19	
6446	EN14078-B	6.83		0.02	
6447		-----		-----	

normality	suspect	
n	11	
outliers	1	
mean (n)	6.827	
st.dev. (n)	0.2113	
R(calc.)	0.592	
st.dev.(EN14078-B:14)	0.1786	
R(EN14078-B:14)	0.500	application range: 3-20 %V/V
compare		
R(EN14078-A:14)	0.364	application range: 0.05-3 %V/V

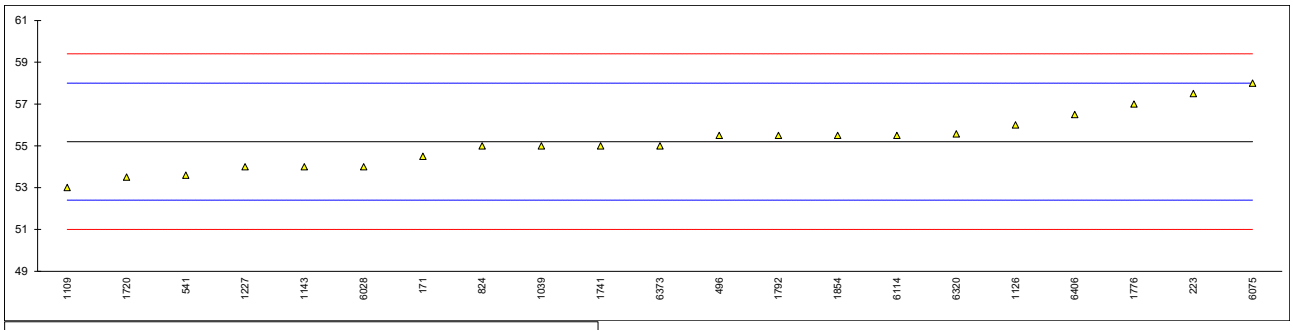


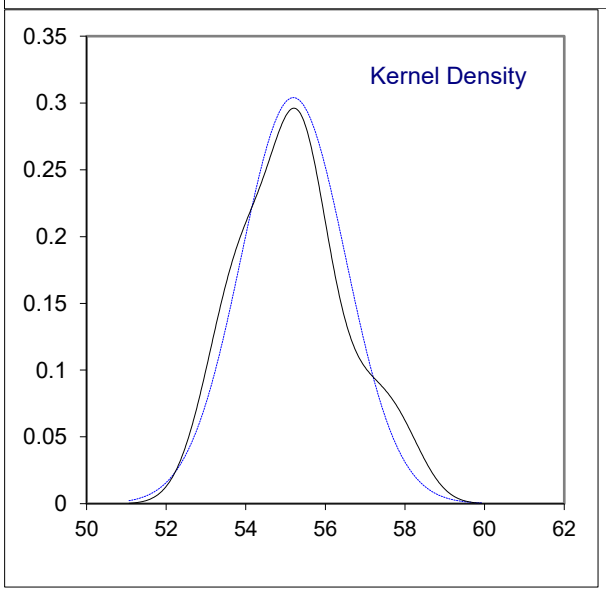


Determination of Flash Point PMcc on sample #22055; result in °C

lab	method	value	mark	z(targ)	remarks
171	D93-A	54.5		-0.50	
223	D93-A	57.5		1.64	
492		-----		-----	
496	ISO2719-A	55.5		0.22	
541	ISO2719-A	53.6		-1.14	
824	ISO2719-A	55.0		-0.14	
962		-----		-----	
1039	ISO2719-A	55.0		-0.14	
1109	D93-A	53.0		-1.57	
1126	ISO2719-A	56		0.57	
1143	ISO2719-A	54.0		-0.86	
1227	D93-A	54	C	-0.86	first reported 64
1720	D93-A	53.5		-1.21	
1741	ISO2719-A	55.0		-0.14	
1776	ISO2719-A	57.0		1.29	
1792	ISO2719-A	55.5		0.22	
1854	ISO2719	55.5		0.22	
6028	ISO2719	54.0		-0.86	
6075	ISO2719-A	58.0		2.00	
6114	ISO2719-A	55.5		0.22	
6274		-----		-----	
6317		-----		-----	
6320	ISO2719-A	55.57		0.27	
6373	D93-A	55.0		-0.14	
6378		-----		-----	
6406	ISO2719-A	56.5		0.93	
6446		-----	W	-----	test result withdrawn, reported 66.5
6447		-----		-----	

normality	OK
n	21
outliers	0
mean (n)	55.199
st.dev. (n)	1.3126
R(calc.)	3.675
st.dev.(ISO2719-A:16)	1.3997
R(ISO2719-A:16)	3.919

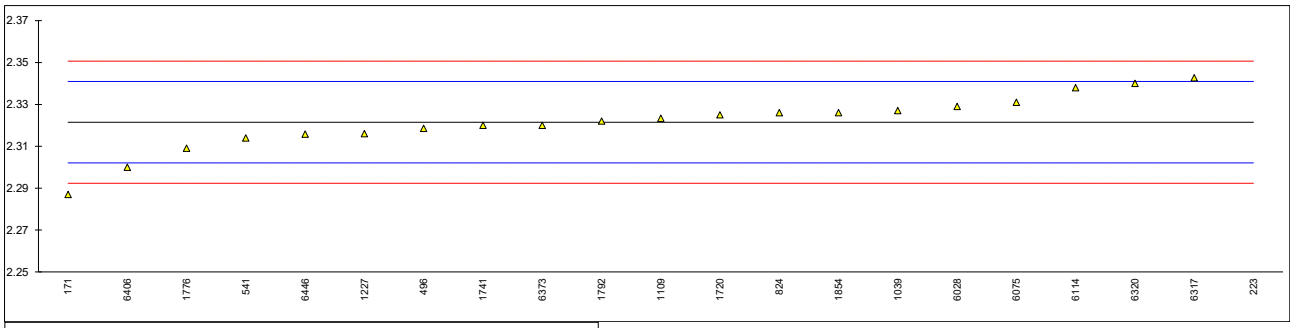


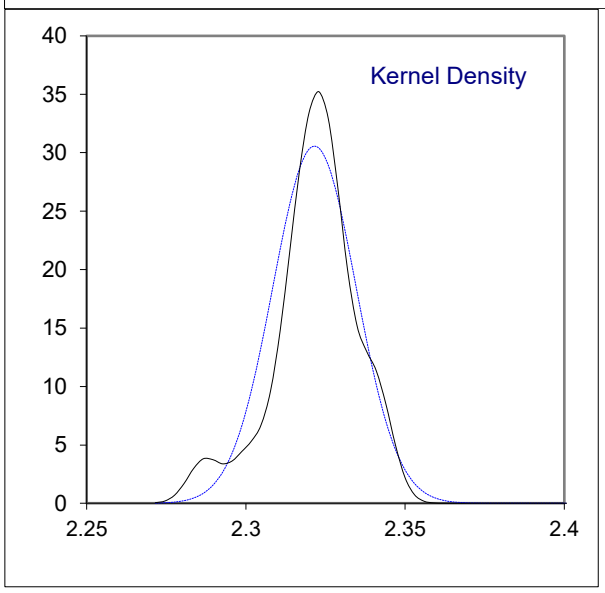


Determination of Kinematic Viscosity at 40 °C on sample #22055; result in mm²/s

lab	method	value	mark	z(targ)	remarks
171	D445	2.287		-3.55	
223	D445	3.025	C,R(0.01)	72.32	first reported 2.57
492		-----		-----	
496	ISO3104	2.3185		-0.31	
541	ISO3104	2.314		-0.77	
824	ISO3104	2.326		0.46	
962		-----		-----	
1039	ISO3104	2.327		0.56	
1109	D445	2.3233		0.18	
1126		-----		-----	
1143		-----		-----	
1227		2.316		-0.57	
1720	D7042	2.325		0.36	
1741	ISO3104	2.320		-0.16	
1776	ISO3104	2.309		-1.29	
1792	ISO3104	2.322		0.05	
1854	ISO3104	2.326		0.46	
6028	ISO3104	2.329		0.77	
6075	ISO3104	2.331		0.98	
6114	ISO3104	2.338		1.69	
6274		-----		-----	
6317	D7042	2.3427		2.18	
6320	ISO3104	2.34		1.90	
6373	D445	2.320		-0.16	
6378		-----		-----	
6406	ISO3104	2.300		-2.21	
6446	ISO3104	2.3158		-0.59	
6447		-----		-----	

normality	suspect
n	20
outliers	1
mean (n)	2.3215
st.dev. (n)	0.01305
R(calc.)	0.0366
st.dev.(ISO3104:20)	0.00973
R(ISO3104:20)	0.0272

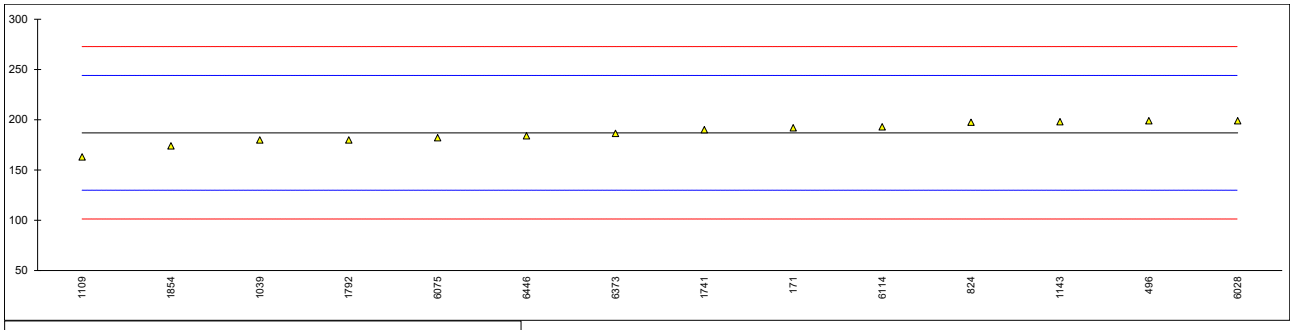


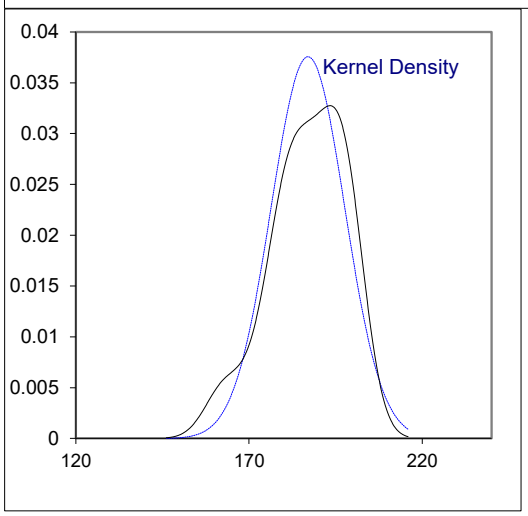


Determination of Lubricity by HFRR at 60 °C on sample #22055; result in µm

lab	method	value	mark	z(targ)	Corrected	remarks
171	D6079	192		0.18	-----	
223		-----		-----	-----	
492		-----		-----	-----	
496	D6079	199		0.42	No	
541		-----		-----	-----	
824	ISO12156-1 (2006)	197.5		0.37	No	
962		-----		-----	-----	
1039	ISO12156-1 (2006)	180		-0.25	No	
1109	IP450	163		-0.84	Yes	
1126		-----		-----	-----	
1143	ISO12156-1-A	198		0.39	No	
1227		-----		-----	-----	
1720		-----		-----	-----	
1741	ISO12156-1-B	190		0.11	No	
1776		-----		-----	-----	
1792	ISO12156-1-B	180		-0.25	No	
1854	ISO12156-1	174		-0.46	-----	
6028	ISO12156-1	199		0.42	-----	
6075	ISO12156-1-A	182		-0.18	No	
6114	ISO12156-1-B	193		0.21	Yes	
6274		-----		-----	-----	
6317		-----		-----	-----	
6320		-----		-----	-----	
6373	ISO12156-1 (2006)	186.5		-0.02	Yes	
6378		-----		-----	-----	
6406		-----		-----	-----	
6446	ISO12156-1-A	184		-0.11	-----	
6447		-----		-----	-----	

	normality	OK	
	n	14	
	outliers	0	
	mean (n)	187.000	
	st.dev. (n)	10.6211	
	R(calc.)	29.739	
	st.dev.(ISO12156-1-A:18)	28.5714	
	R(ISO12156-1-A:18)	80	(digital camera)
	compare		
	R(ISO12156-1-B:18)	90	(visual)
	R(D6079:18)	80	





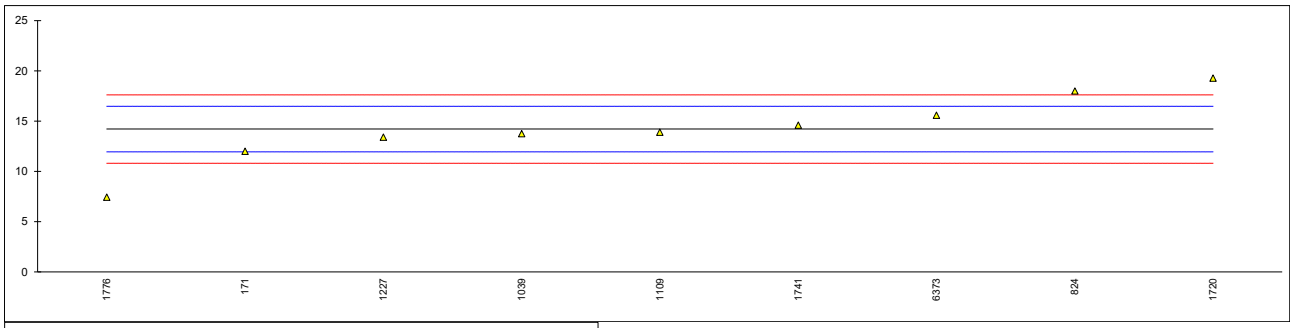
Determination of Manganese as Mn on sample #22055; result in mg/L

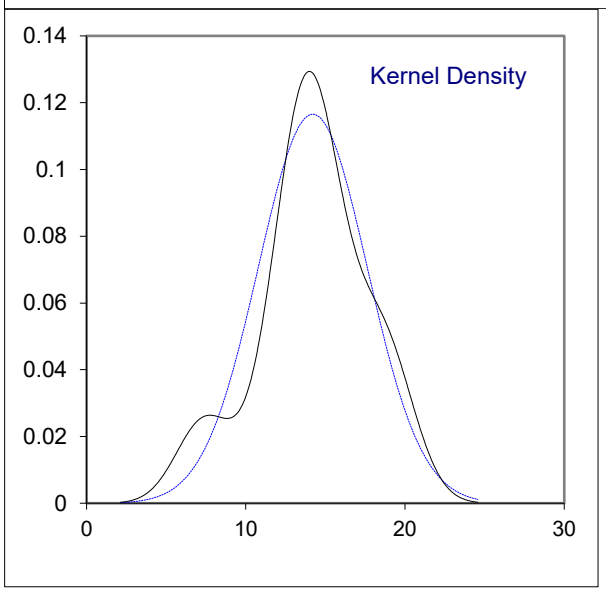
lab	method	value	mark	z(targ)	remarks
171	D3831	<2.5		-----	
223		-----		-----	
492		-----		-----	
496		-----		-----	
541		-----		-----	
824		-----		-----	
962		-----		-----	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1143	EN16576	0.17		-----	
1227		-----		-----	
1720		-----		-----	
1741	EN16576	<1,0		-----	
1776		-----		-----	
1792		-----		-----	
1854		-----		-----	
6028	EN16576	<0.01		-----	
6075		-----		-----	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN16576	0.07		-----	
6378		-----		-----	
6406		-----		-----	
6446		-----		-----	
6447		-----		-----	
	n	3			
	mean (n)	<0.5			application range EN16576:14 : 0.5 - 7 mg/L

Determination of Nitrogen on sample #22055; result in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D4629	12		-1.95	
223		-----		-----	
492		-----		-----	
496		-----		-----	
541		-----		-----	
824	D4629	18		3.34	
962		-----		-----	
1039	D4629	13.75		-0.41	
1109	D4629	13.9		-0.28	
1126		-----		-----	
1143		-----		-----	
1227		13.4		-0.72	
1720	D4629	19.28	C	4.47	first reported 20.13
1741	D4629	14.6		0.34	
1776	D4629	7.44		-5.98	
1792		-----		-----	
1854		-----		-----	
6028		-----		-----	
6075		-----		-----	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	D4629	15.58		1.20	
6378		-----		-----	
6406		-----		-----	
6446		-----		-----	
6447		-----		-----	

normality	suspect
n	9
outliers	0
mean (n)	14.22
st.dev. (n)	3.424
R(calc.)	9.59
st.dev.(D4629:17)	1.134
R(D4629:17)	3.17



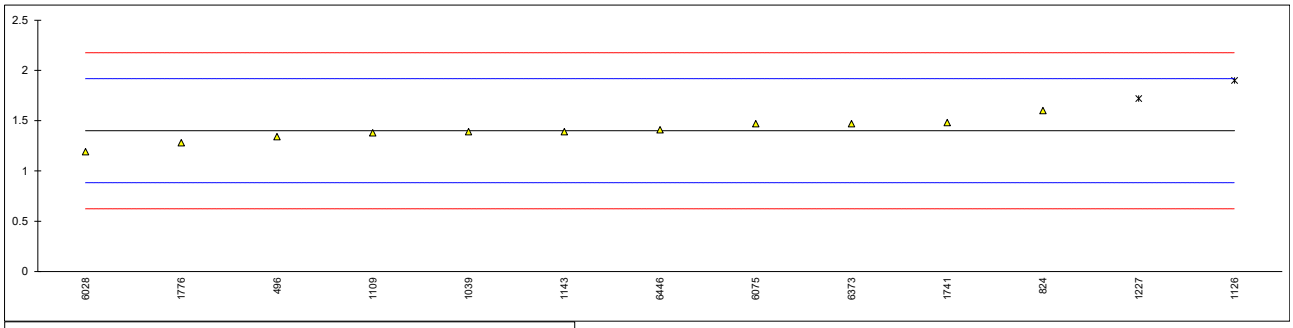


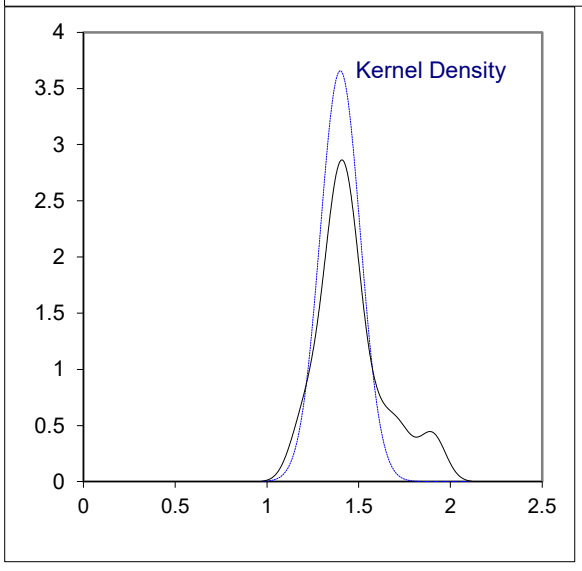
Determination of Polycyclic Aromatic Hydrocarbons [1)] on sample #22055; result in %M/M

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
492		-----		-----	
496	EN12916	1.34		-0.23	
541		-----		-----	
824	EN12916	1.6		0.77	
962		-----		-----	
1039	D6379	1.39		-0.04	
1109	IP391	1.38		-0.08	
1126		1.9	DG(0.05)	1.93	
1143	EN12916	1.39		-0.04	
1227		1.72	DG(0.05)	1.24	
1720		-----		-----	
1741		1.48		0.31	
1776	EN12916	1.28		-0.46	
1792		-----		-----	
1854		-----		-----	
6028	EN12916	1.19		-0.81	
6075	EN12916	1.47		0.27	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN12916	1.47	C	0.27	first reported 2.34
6378		-----		-----	
6406		-----		-----	
6446	EN12916	1.41		0.04	
6447		-----		-----	

normality	OK
n	11
outliers	2
mean (n)	1.400
st.dev. (n)	0.1091
R(calc.)	0.305
st.dev.(EN12916:16)	0.2586
R(EN12916:16)	0.724

[1)]Definition from EN12916: %Polycyclic Aromatic Hydrocarbons = sum of %di and %tri+ Aromatic Hydrocarbons

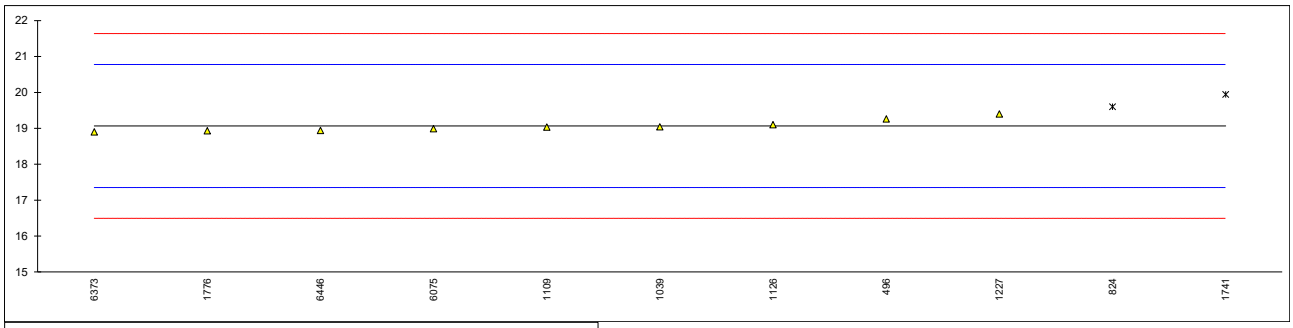


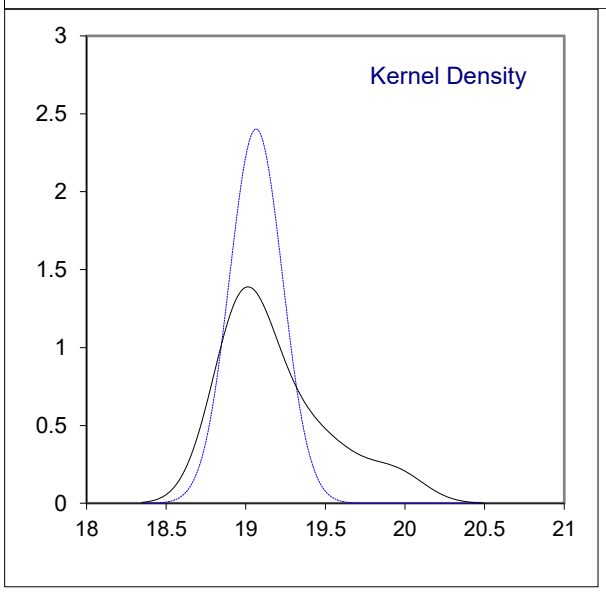


Determination of Mono Aromatic Hydrocarbons on sample #22055; result in %M/M

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
492		-----		-----	
496	EN12916	19.26		0.23	
541		-----		-----	
824	EN12916	19.6	DG(0.05)	0.62	
962		-----		-----	
1039	D6379	19.04		-0.03	
1109	IP391	19.03		-0.04	
1126		19.1		0.04	
1143		-----		-----	
1227		19.40		0.39	
1720		-----		-----	
1741		19.94	DG(0.05)	1.02	
1776	EN12916	18.92837		-0.16	
1792		-----		-----	
1854		-----		-----	
6028		-----		-----	
6075	EN12916	18.99		-0.09	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN12916	18.90	C	-0.19	first reported 22.2
6378		-----		-----	
6406		-----		-----	
6446	EN12916	18.94		-0.15	
6447		-----		-----	

normality	suspect
n	9
outliers	2
mean (n)	19.065
st.dev. (n)	0.1660
R(calc.)	0.465
st.dev.(EN12916:16)	0.8576
R(EN12916:16)	2.401

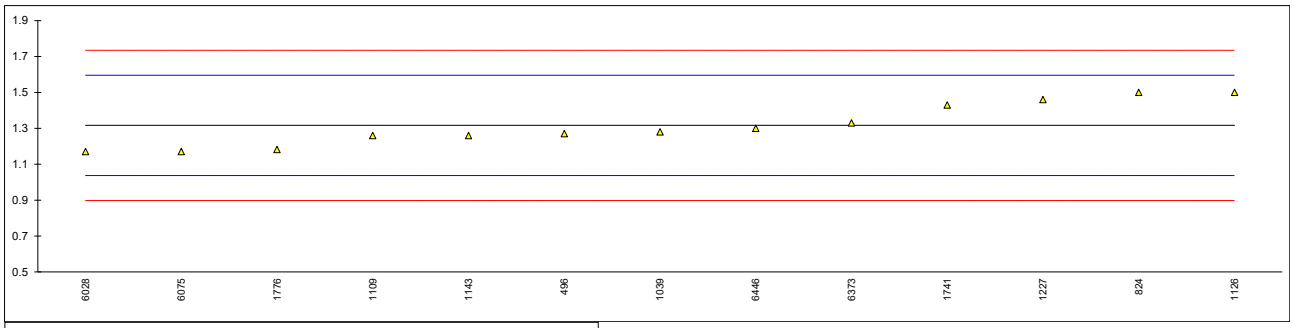


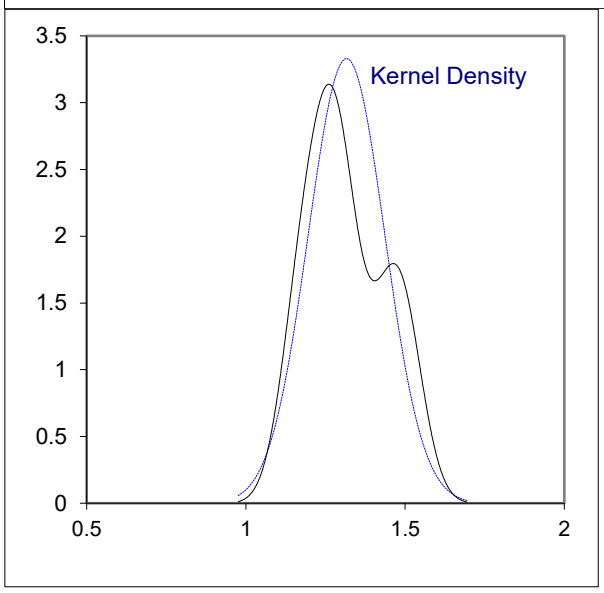


Determination of Di Aromatic Hydrocarbons on sample #22055; result in %M/M

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
492		-----		-----	
496	EN12916	1.27		-0.33	
541		-----		-----	
824	EN12916	1.5		1.32	
962		-----		-----	
1039	D6379	1.28		-0.26	
1109	IP391	1.26		-0.40	
1126		1.5		1.32	
1143	EN12916	1.26		-0.40	
1227		1.46		1.03	
1720		-----		-----	
1741		1.43		0.81	
1776	EN12916	1.18207		-0.96	
1792		-----		-----	
1854		-----		-----	
6028	EN12916	1.17		-1.05	
6075	EN12916	1.17		-1.05	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN12916	1.33	C	0.10	first reported 2.11
6378		-----		-----	
6406		-----		-----	
6446	EN12916	1.30		-0.12	
6447		-----		-----	

normality	OK
n	13
outliers	0
mean (n)	1.316
st.dev. (n)	0.1198
R(calc.)	0.335
st.dev.(EN12916:16)	0.1396
R(EN12916:16)	0.391

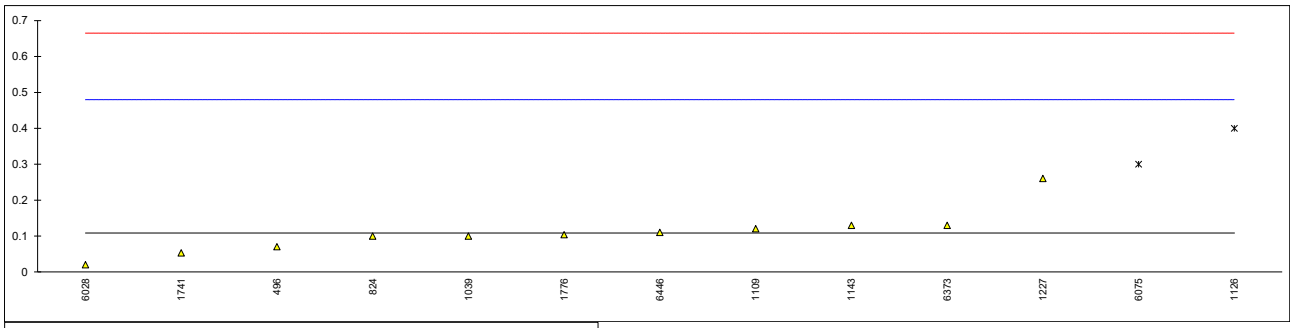


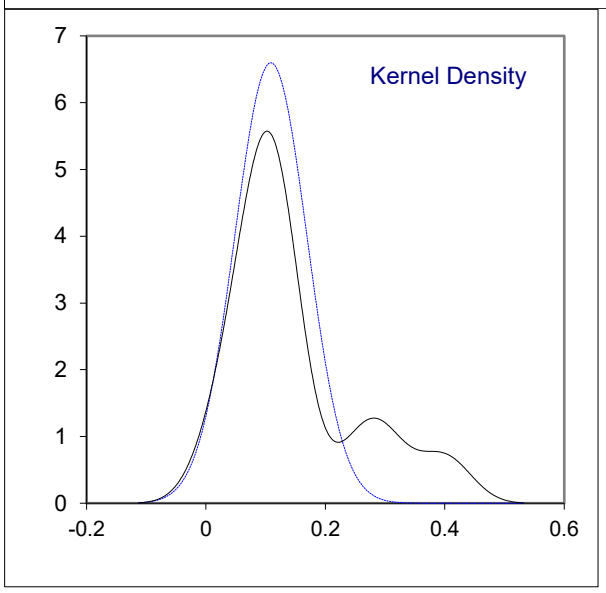


Determination of Tri+ Aromatic Hydrocarbons on sample #22055; result in %M/M

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
492		-----		-----	
496	EN12916	0.07		-0.21	
541		-----		-----	
824	EN12916	0.1		-0.05	
962		-----		-----	
1039	D6379	0.10		-0.05	
1109	IP391	0.12		0.06	
1126		0.4	DG(0.05)	1.57	
1143	EN12916	0.13		0.11	
1227		0.26		0.82	
1720		-----		-----	
1741		0.053		-0.30	
1776	EN12916	0.103724		-0.03	
1792		-----		-----	
1854		-----		-----	
6028	EN12916	0.02		-0.48	
6075	EN12916	0.30	DG(0.05)	1.03	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN12916	0.13	C	0.11	first reported 0.23
6378		-----		-----	
6406		-----		-----	
6446	EN12916	0.11		0.01	
6447		-----		-----	

normality	not OK
n	11
outliers	2
mean (n)	0.109
st.dev. (n)	0.0605
R(calc.)	0.169
st.dev.(EN12916:16)	0.1854
R(EN12916:16)	0.519

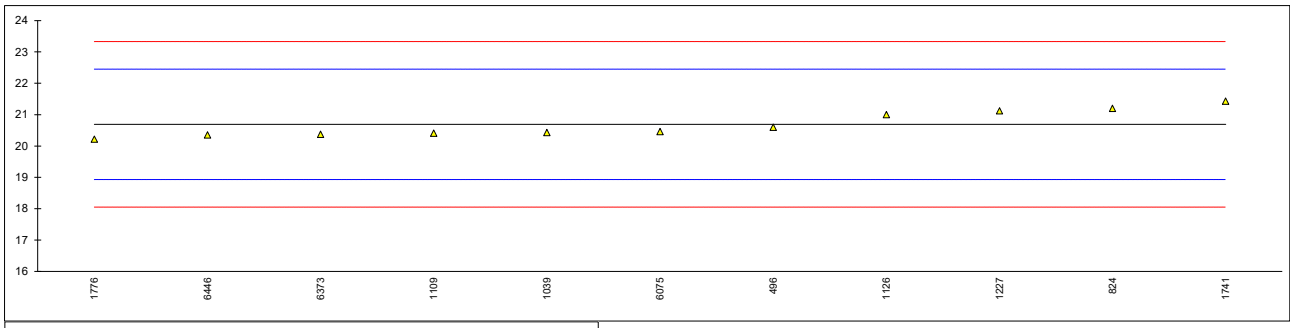


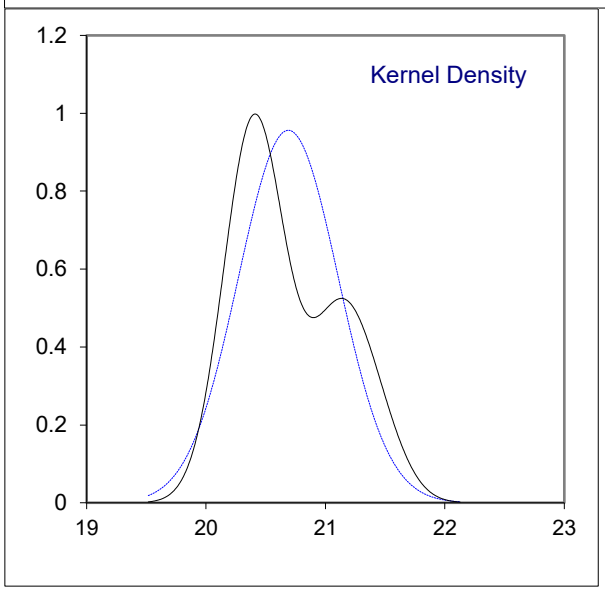


Determination of Total Aromatic Hydrocarbons on sample #22055; result in %M/M

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
492		-----		-----	
496	EN12916	20.60		-0.10	
541		-----		-----	
824	EN12916	21.2		0.58	
962		-----		-----	
1039	D6379	20.43		-0.29	
1109	IP391	20.41		-0.32	
1126		21.0		0.35	
1143		-----		-----	
1227		21.12		0.49	
1720		-----		-----	
1741		21.43		0.84	
1776	EN12916	20.21416		-0.54	
1792		-----		-----	
1854		-----		-----	
6028		-----		-----	
6075	EN12916	20.46		-0.26	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	EN12916	20.37	C	-0.36	first reported 24.54
6378		-----		-----	
6406		-----		-----	
6446	EN12916	20.35		-0.39	
6447		-----		-----	

normality	OK
n	11
outliers	0
mean (n)	20.689
st.dev. (n)	0.4171
R(calc.)	1.168
st.dev.(EN12916:16)	0.8802
R(EN12916:16)	2.465

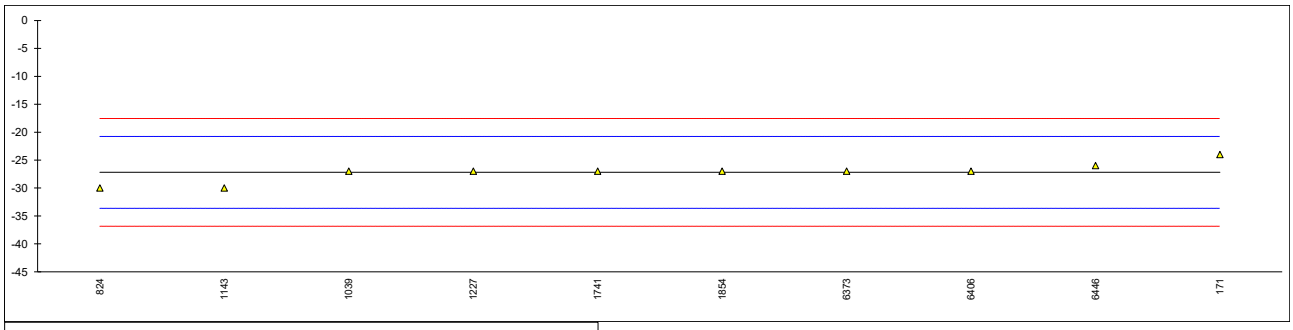


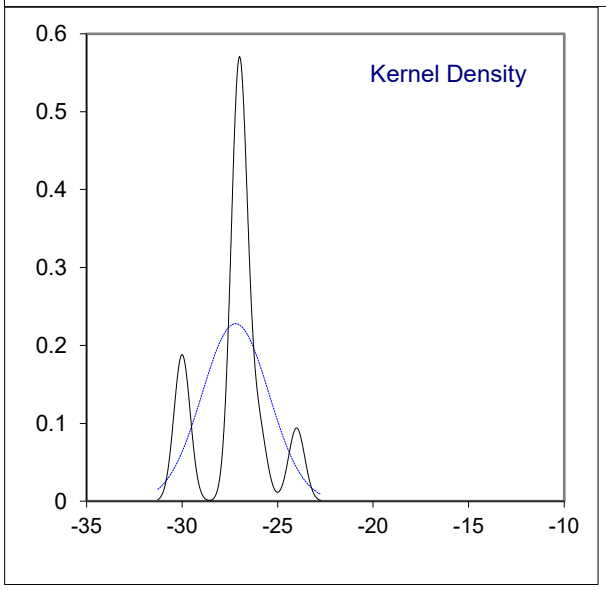


Determination of Pour Point Manual on sample #22055; result in °C

lab	method	value	mark	z(targ)	remarks
171	D97	-24		1.00	
223		-----		-----	
492		-----		-----	
496		-----		-----	
541		-----		-----	
824	ISO3016-manual	-30		-0.87	
962		-----		-----	
1039	ISO3016-automated	-27		0.06	
1109		-----		-----	
1126		-----		-----	
1143	ISO3016-manual	-30		-0.87	
1227	D97	-27		0.06	
1720		-----		-----	
1741	ISO3016-manual	-27		0.06	
1776		-----		-----	
1792	ISO3016-manual	<-21		-----	
1854	ISO3016	-27		0.06	
6028		-----		-----	
6075		-----		-----	
6114		-----		-----	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	D97	-27		0.06	
6378		-----		-----	
6406	ISO3016-manual	-27		0.06	
6446	ISO3016-automated	-26		0.37	
6447		-----		-----	

normality	OK
n	10
outliers	0
mean (n)	-27.20
st.dev. (n)	1.751
R(calc.)	4.90
st.dev.(ISO3016:19)	3.214
R(ISO3016:19)	9

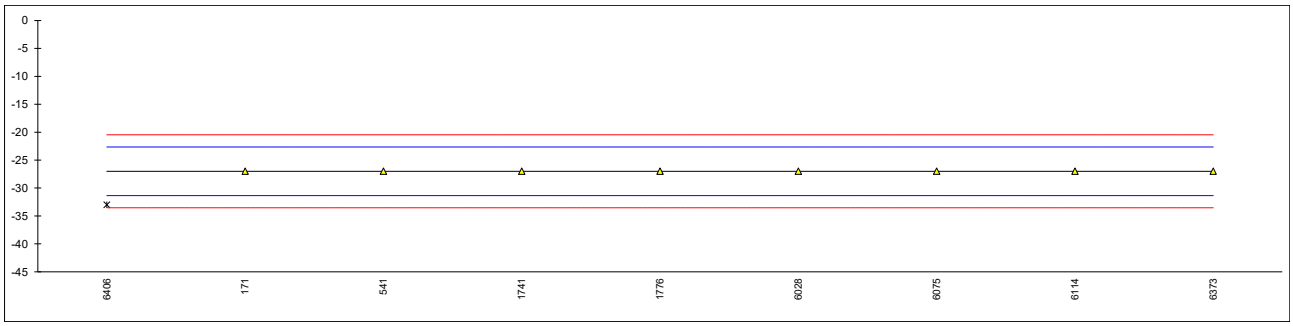




Determination of Pour Point Automated, 3 °C interval on sample #22055; result in °C

lab	method	value	mark	z(targ)	remarks
171	D5950	-27		0.00	
223		-----		-----	
492		-----		-----	
496		-----		-----	
541	D5950	-27		0.00	
824		-----		-----	
962		-----		-----	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1143		-----		-----	
1227		-----		-----	
1720		-----		-----	
1741	D5950	-27		0.00	
1776	D5950	-27		0.00	
1792		-----		-----	
1854		-----		-----	
6028	D5950	-27.0		0.00	
6075		-27		0.00	
6114	D5950	-27		0.00	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	D5950	-27		0.00	
6378		-----		-----	
6406	D6749	-33	G(0.01)	-2.75	
6446		-----		-----	
6447		-----		-----	

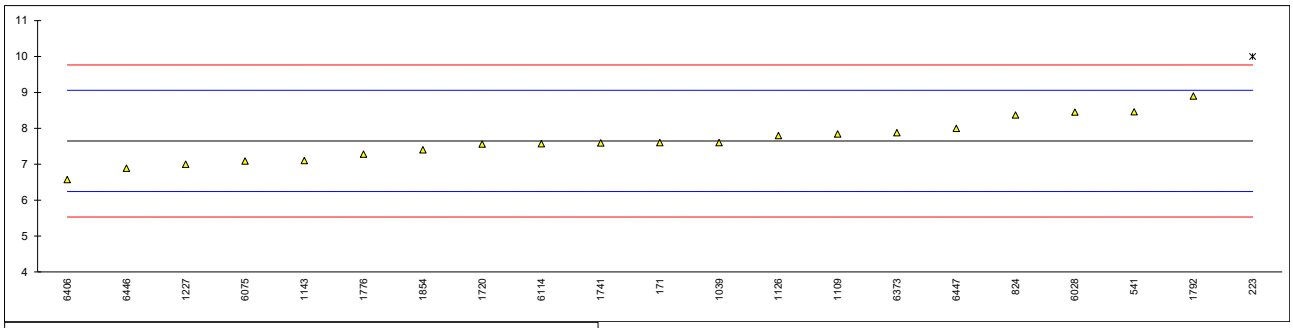
normality	
n	8
outliers	1
mean (n)	-27.00
st.dev. (n)	0.000
R(calc.)	0.00
st.dev.(D5950:14)	2.179
R(D5950:14)	6.1

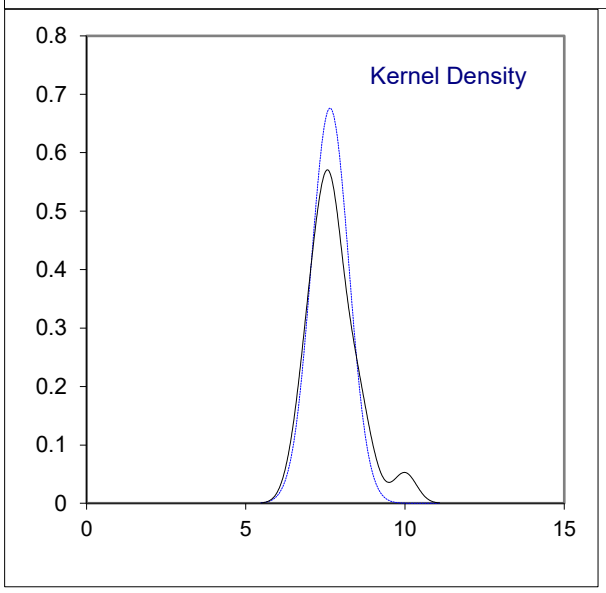


Determination of Sulfur on sample #22055; result in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D5453	7.6		-0.07	
223	D4294	10.0	C,R(0.05)	3.33	first reported 4.9
492		-----		-----	
496		-----		-----	
541	ISO20846	8.46		1.15	
824	ISO20846	8.37		1.02	
962		-----		-----	
1039	ISO20884	7.6		-0.07	
1109	D7039	7.84		0.27	
1126	ISO20846	7.8		0.22	
1143	ISO20846	7.10		-0.78	
1227	D5453	7	C	-0.92	first reported -7
1720	D5453	7.56		-0.12	
1741	ISO20846	7.59		-0.08	
1776	ISO20846	7.28		-0.52	
1792	ISO13032	8.9		1.77	
1854	ISO20846	7.4		-0.35	
6028	ISO20846	8.45		1.14	
6075	ISO20846	7.09		-0.79	
6114	D5453	7.57		-0.11	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	ISO20846	7.88		0.33	
6378		-----		-----	
6406	ISO20846	6.57		-1.53	
6446	ISO20884	6.89		-1.07	
6447	D2622	8		0.50	

normality	OK
n	20
outliers	1
mean (n)	7.648
st.dev. (n)	0.5901
R(calc.)	1.652
st.dev.(ISO20846:19)	0.7059
R(ISO20846:19)	1.977

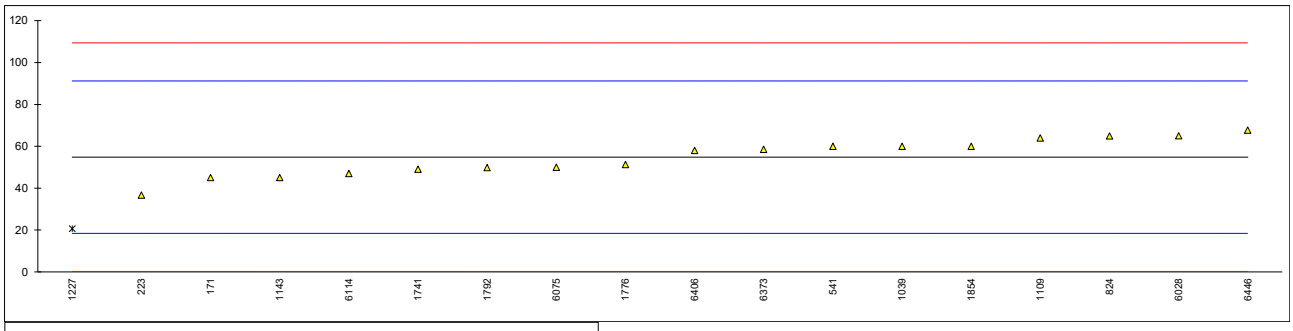


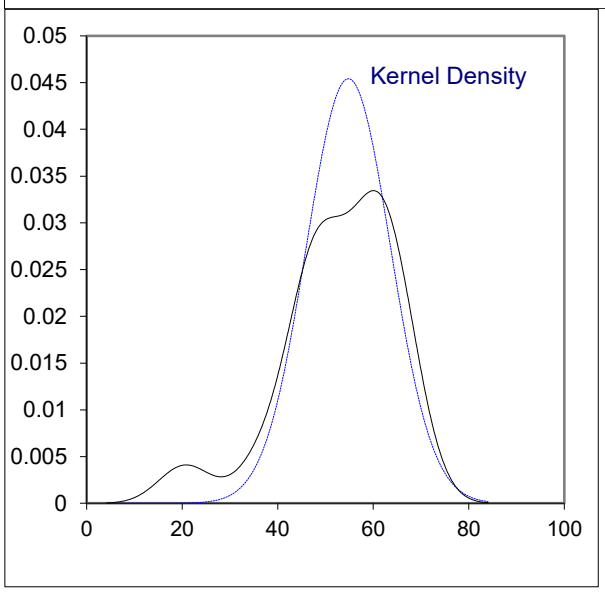


Determination of Water on sample #22055; result in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D6304-A	45		-0.54	
223	D6304-A	36.7		-1.00	
492		-----		-----	
496		-----		-----	
541	ISO12937	60		0.29	
824	ISO12937	64.9		0.55	
962		-----		-----	
1039	ISO12937	60		0.29	
1109	D6304-A	64		0.51	
1126		-----		-----	
1143	ISO12937	45		-0.54	
1227	D6304-A	20.6	G(0.05)	-1.88	
1720		-----		-----	
1741	ISO12937	49		-0.32	
1776	ISO12937	51.3		-0.19	
1792	ISO12937	49.8		-0.28	
1854	ISO12937	60		0.29	
6028	ISO12937	65		0.56	
6075	ISO12937	50		-0.26	
6114	ISO12937	47		-0.43	
6274		-----		-----	
6317		-----		-----	
6320		-----		-----	
6373	ISO12937	58.5		0.20	
6378		-----		-----	
6406	ISO12937	58		0.18	
6446	ISO12937	67.64		0.71	
6447		-----		-----	

normality	OK
n	17
outliers	1
mean (n)	54.81
st.dev. (n)	8.786
R(calc.)	24.60
st.dev.(ISO12937:00)	18.184
R(ISO12937:00)	50.91

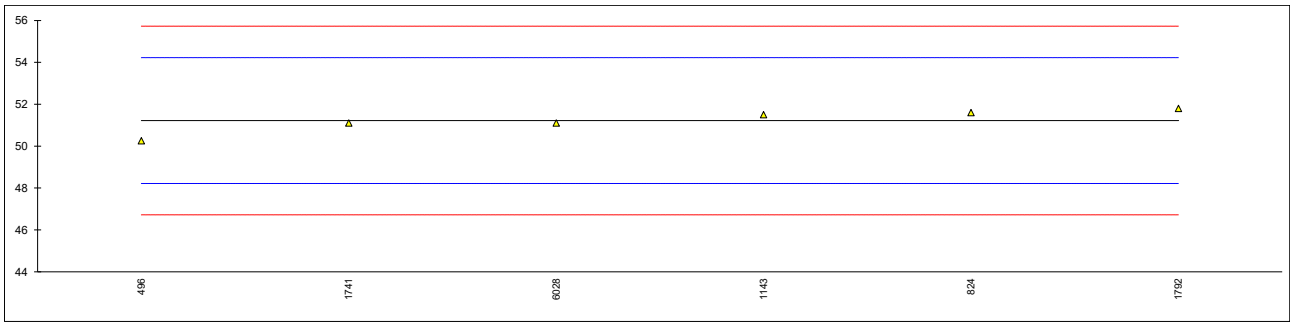




Determination of Cetane Number on sample #22056;

lab	method	value	mark	z(targ)	remarks
496	ISO5165	50.25		-0.65	
824	D613	51.6		0.25	
1039		-----		-----	
1143	In house	51.5		0.18	
1741	ISO5165	51.10		-0.08	
1776		-----		-----	
1792	ISO5165	51.8		0.38	
6028	ISO5165	51.1		-0.08	
6274		-----		-----	
6373		-----		-----	
6406		-----		-----	

normality	unknown
n	6
outliers	0
mean (n)	51.225
st.dev. (n)	0.5529
R(calc.)	1.548
st.dev.(ISO5165:20)	1.5011
R(ISO5165:20)	4.203



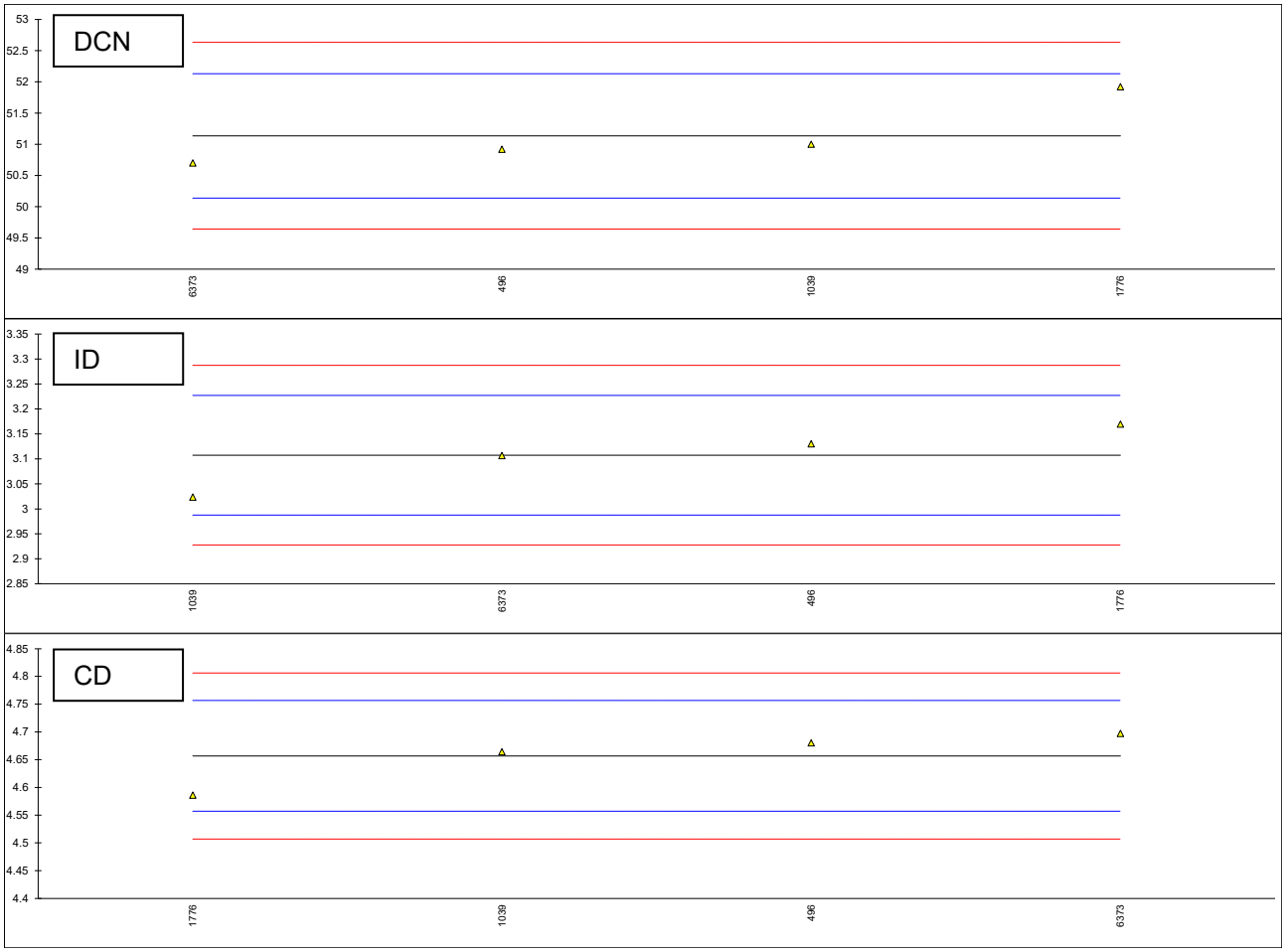
Determination of Derived Cetane Number (EN15195) on sample #22056;

lab	method	DCN	mark	z(targ)	ID (ms)	mark	z(targ)	remarks
496		-----		-----	-----		-----	
824		-----		-----	-----		-----	
1039		-----		-----	-----		-----	
1143		-----		-----	-----		-----	
1741		-----		-----	-----		-----	
1776		-----		-----	-----		-----	
1792		-----		-----	-----		-----	
6028		-----		-----	-----		-----	
6274		-----		-----	-----		-----	
6373		-----		-----	-----		-----	
6406		-----		-----	-----		-----	

Determination of Derived Cetane Number (EN16715) on sample #22056;

lab	method	DCN	mark	z(targ)	ID (ms)	mark	z(targ)	CD (ms)	mark	z(targ)	W. T. (°C)
496	EN16715	50.92		-0.43	3.13		0.38	4.68		0.46	588.9
824		-----		-----	-----		-----	-----		-----	-----
1039	EN16715	51.00		-0.27	3.0234		-1.40	4.6640		0.14	600.60
1143		-----		-----	-----		-----	-----		-----	-----
1741		-----		-----	-----		-----	-----		-----	-----
1776	EN16715	51.92	C	1.58	3.1695	C	1.04	4.5860	C	-1.42	589.5
1792		-----		-----	-----		-----	-----		-----	-----
6028		-----		-----	-----		-----	-----		-----	-----
6274		-----		-----	-----		-----	-----		-----	-----
6373	EN16715	50.70		-0.87	3.1067		-0.01	4.6973		0.81	593.95
6406		-----		-----	-----		-----	-----		-----	-----
	normality	unknown			unknown			unknown			
	n	4			4			4			
	outliers	0			0			0			
	mean (n)	51.135			3.107			4.657			
	st.dev. (n)	0.5385			0.0617			0.0491			
	R(calc.)	1.508			0.173			0.138			
	st.dev.(EN16715:15)	0.4984			0.0599			0.0499			
	R(EN16715:15)	1.396			0.168			0.140			

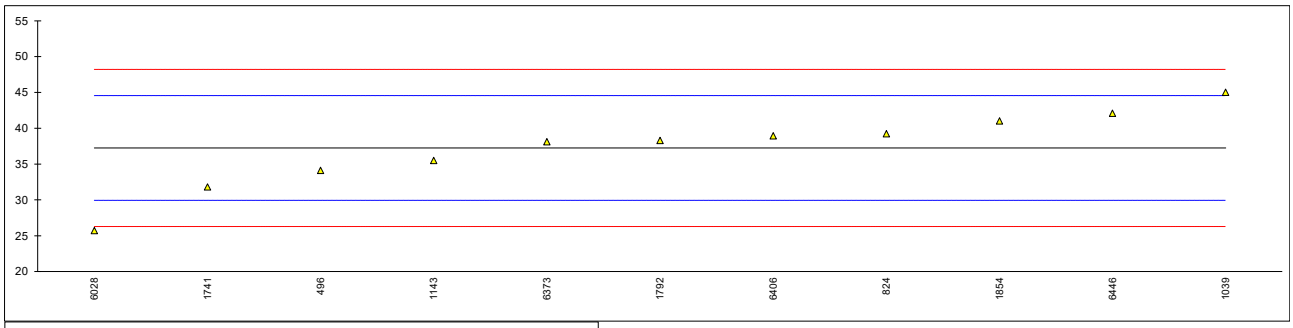
lab1776 first reported 51.58; 3.36; 4.63 respectively

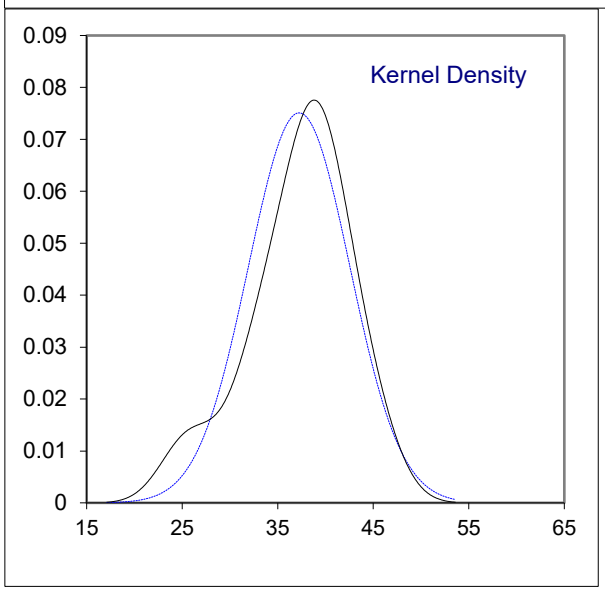


Determination of Total Contamination on sample #22057; result in mg/kg

lab	method	Total C.	mark	z(targ)	incomplete	vol. filtered (mL)	stopped (min)	remarks
496	EN12662:2014	34.1		-0.86	Yes	-----	-----	
824	EN12662:2014	39.23		0.54	Yes	300	6	
1039	EN12662:2014	45.0		2.12	No	448	90	
1143	EN12662:2014	35.5		-0.48	Yes	300	-----	
1741	EN12662:2014	31.8		-1.49	Yes	300	-----	
1792	EN12662:2014	38.3		0.29	Yes	-----	-----	
1854	EN12662	41		1.03	-----	300	-----	
6028	EN12662	25.7		-3.16	-----	-----	-----	
6274		-----		-----	-----	-----	-----	
6373	EN12662:2014	38.1		0.23	Yes	-----	-----	
6406	EN12662:2014	38.93		0.46	Yes	300	-----	
6446	EN12662:2014	42.077	C	1.32	Yes	300	-----	first reported 6.787

normality	suspect
n	11
outliers	0
mean (n)	37.249
st.dev. (n)	5.3111
R(calc.)	14.871
st.dev.(EN12662:14)	3.6553
R(EN12662:14)	10.235





APPENDIX 2

Number of participants per country

1 lab in ARGENTINA
1 lab in AUSTRALIA
1 lab in BELGIUM
1 lab in DENMARK
3 labs in GERMANY
2 labs in GREECE
1 lab in KOREA, Republic of
1 lab in MALI
1 lab in MARTINIQUE
4 labs in NETHERLANDS
1 lab in POLAND
1 lab in SAUDI ARABIA
2 labs in SERBIA
1 lab in SPAIN
1 lab in SUDAN
1 lab in SWEDEN
1 lab in TANZANIA
1 lab in TUNISIA
1 lab in TURKEY
1 lab in UGANDA
1 lab in UNITED STATES OF AMERICA

APPENDIX 3

Abbreviations

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

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
8 J.N. Miller, Analyst, 118, 455, (1993)
9 Analytical Methods Committee, Technical Brief, No 4, January 2001
10 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)
11 W. Horwitz and R. Albert, J. AOAC Int, 79, 3, 589-621, (1996)
12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)
13 iis memo 1904 Precision data of Calculated Cetane Index Four Variables in Gasoil