Institute for
Interlaboratory Studies

Results of Proficiency Test
Gasoline (premium)
May 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: ing. A. Ouwerkerk
Correctors: ing. R.J Starink & ing. M. Meijer
Approved by: ing. A.S. Noordman-de Neef

Report: iis22B03

August 2022

CONTENTS

1 INTRODUCTION

Since 2020 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Gasoline (premium) based on the latest version of EN228 every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Gasoline (premium).
The interlaboratory study on Gasoline (premium) contains also round robins for the determination of Dry Vapour Pressure Equivalent (DVPE) and RON/MON.

In this interlaboratory study registered for participation:
- 28 laboratories in 24 countries for regular analyzes in Gasoline (premium) iis22B03
- 18 laboratories in 14 countries on Gasoline (premium) DVPE iis22B03DVPE
- 18 laboratories in 15 countries on Gasoline (premium) RON & MON iis22B03RON

In total 32 laboratories in 25 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 this Gasoline (premium) proficiency test 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 Gasoline, see table below.

Sample ID	PT ID	Quantity	Purpose
#22070	iis22B03	1x 1 L	Regular analyzes
#22071	iis22B03DVPE	1x 1 L (75% filled)	DVPE
#22072	iis22B03RON	2x 1 L	RON/MON analyzes

Table 1: Gasoline samples used in PT iis22B03

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 samples for the PT Gasoline (premium) and PT Gasoline (premium) RON/MON a batch of approximately 120 liters of Gasoline (premium quality) was obtained from the local market. After homogenization 35 and 45 amber glass bottles of 1 L were filled and labelled #22070 and #22072 respectively.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ASTM D4052 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/m^3
sample 1	726.95
sample 2	726.99
sample 3	726.96
sample 4	727.03
sample 5	727.00
sample 6	726.95
sample 7	726.96
sample 8	726.95

Table 2: homogeneity test results of subsamples #22070 and #22072

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)	0.45

Table 3: evaluation of the repeatability of subsamples #22070 and #22072

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples #22070 and #22072 was assumed.

For the preparation of the sample for the determination of DVPE in Gasoline (premium) PT a batch of approximately 35 liters of Gasoline (premium quality) was obtained from the local market. After homogenization 35 amber glass bottles of 1 L were filled with approximately 750 mL Gasoline (premium) and labelled #22071.
The homogeneity of the subsamples was checked by the determination of DVPE in accordance with ASTM D5191 on 8 stratified randomly selected subsamples.

	DVPE in psi
sample #22071-1	11.59
sample #22071-2	11.56
sample #22071-3	11.59
sample #22071-4	11.63
sample #22071-5	11.60
sample #22071-6	11.57
sample #22071-7	11.62
sample #22071-8	11.57

Table 4: homogeneity test results of subsamples #22071

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)	0.07
reference test method	D5191:20
0.3 x R (reference test method)	0.11

Table 5: evaluation of the repeatability of subsamples #22071

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 April 6, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Gasoline 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 #22070: API Gravity, Appearance, Aromatics by FIA (without oxygenates correction), Aromatics by GC (%V/V and %M/M), Benzene, Copper Corrosion 3 hrs at 50 °C, Density at 15 °C, Distillation at 760 mmHg (IBP, Temparature at 10%, 50%, 90% evaporated, FBP, % evap. at 70 °C (E70), % evap. at 100 °C (E100), % evap. at 150 °C (E150), Distillation Residue, Distillation Loss), Doctor Test, Gum (solvent washed), Lead as Pb, Manganese as Mn, Olefins by FIA (without oxygenates correction), Olefins by GC (%V/V and %M/M), Oxidation Stability, Oxygenates (Methanol, Ethanol, iso-Propyl alcohol, iso-Butyl alcohol, tert-Butyl alcohol, Ethers (C5 or more C atoms), DIPE, ETBE, MTBE, TAME, Sum of Other Oxygenates, Oxygen content) and Sulfur.
On sample #22071 it was requested to determine Total Vapour Pressure and Dry Vapour Pressure Equivalent (DVPE).
On sample #22072 it was requested to determine RON and MON.

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 test 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 of this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other 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 of appendix 1.

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

	$\lvert z \rvert$	< 1	good
1 <	$\lvert z \rvert$	< 2	satisfactory
2 <	$\lvert z \rvert$	< 3	questionable
3 <	$\lvert z \rvert$		unsatisfactory

4 EVALUATION

In this proficiency test no problems were encountered with the dispatch of the samples.
For the round with the regular analyzes five participants reported test results after the final reporting date and one other participant was not able to report any test results. For the PT on DVPE three participants reported test results after the final reporting date and one other participant was not able to report any test results. For the PT on RON/MON four 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 31 participants reported 453 numerical test results. Observed were 32 outlying test results, which is 7.1%. 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.

sample #22070

API Gravity: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D4052:22.

Appearance: This determination was not problematic. Seventeen participants agreed on the appearance as Clear and Bright.

Aromatics by FIA (without oxygenates correction): This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN15553:21.
To improve the reproducibility close attention should be paid to the identification of the chromatographic boundaries. EN15553 mentions in §9.4: “With some oxygenate blended fuels another red band can appear several centimetres above the reddish or brown alcohol/aromatic boundary, this shall be ignored.”

Aromatics by GC: This determination was very problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the requirements of ISO22854-A:21. Regretfully, no precision data is available for the determination in %M/M. Therefore, no z-scores are calculated. One statistical outlier was observed in the test results reported in %M/M. The calculated reproducibility is much higher in comparison with last year’s PT.

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

Copper Corrosion: This determination was not problematic. All reporting participants agreed on classification 1 (1a/1b).

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: This determination was not problematic for five of the eight reported distillation parameters. In total ten statistical outliers were observed and two other test results were excluded. The calculated reproducibilities of 50% and 90% evaporated, Final Boiling Point and % evaporated at 100 °C and 150 °C after rejection of the suspect data are in agreement with the requirements of ISO3405:19 automatic mode. The calculated reproducibilities for IBP, temperature at 10% evaporated and % evaporated at 70 °C are not in agreement.

Doctor Test: This determination was not problematic. All reporting participants agreed on the absence of Mercaptans and reported Negative.

Gum (solvent washed): This determination was not problematic. Two statistical oultliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO6246:17/AMD1:19.

Lead as Pb: This determination may not be problematic. Nine reporting participants agreed on a level of <2.5 mg/L. Therefore, no z-scores are calculated.

Manganese as Mn: This determination may not be problematic. Seven reporting participants agreed on a level of <2.0 mg/L. Therefore, no z-scores are calculated.

Olefins by FIA (without oxygenates correction): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of EN15553:21.

Olefins by GC: The determination in %V/V was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO22854-A:21. Regretfully, no precision data is available for the determination in %M/M. Therefore, no z-scores are calculated. One statistical outlier was observed in the test results reported in %M/M. The calculated reproducibility is much higher in comparison with last year’s PT.

Oxidation Stability: This determination was not problematic. Nine reporting participants agreed on an Oxidation Stability of >240 minutes. Therefore, no z-scores are calculated.

Ethanol: This determination may not be problematic. Almost all reporting participants agreed on a level of <0.2 %V/V. Therefore, no z-scores are calculated.

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

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

All other Oxygenates are below the detection limit and therefore not further evaluated.
The reported test results are listed in appendix 2.

Oxygen content: 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 ISO22854-A:21.

Sulfur: 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 ISO20846:19.

sample #22071

Total Vapour Pressure: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of D5191:20.

DVPE (acc. to D5191): The total Vapour Pressure can be converted to Dry Vapour Pressure Equivalent (DVPE) according to D5191. This conversion was also problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of D5191:20.

sample #22072

RON: The determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO5164:14.

MON: The determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of 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		9	63.05	0.13	0.71
Appearance		17	C&B	n.a.	n.a.
Aromatics by FIA *)	%V/V	13	26.1	4.8	3.7
Aromatics by GC in %V/V	%V/V	11	23.3	2.5	1.2
Aromatics by GC in %M/M	%M/M	9	27.4	3.5	n.a.
Benzene	%V/V	19	0.36	0.06	0.03
Copper Corrosion 3 hrs at 50 °C		17	1 (1a/1b)	n.a.	n.a.
Density at 15 °C	kg/m^3	21	727.2	0.8	1.5
Initial Boiling Point	°C	23	26.3	6.4	4.7
Temp. at 10% evaporated	°C	23	40.9	5.6	4.0
Temp. at 50% evaporated	°C	24	84.8	3.9	4.0
Temp. at 90% evaporated	°C	22	138.8	2.6	5.3
Final Boiling Point	°C	23	161.5	3.1	7.1
% evap.at 70 °C, E70	%V/V	19	38.2	3.7	2.7
% evap. at 100 °C, E100	%V/V	17	60.9	0.8	2.2
% evap.at 150 °C, E150	%V/V	17	96.6	1.1	1.3
Doctor Test		10	Negative	n.a.	n.a.
Gum (solvent washed)	mg/100mL	7	0.70	0.97	2.24
Lead as Pb	mg/L	9	<2.5	n.e.	n.e.
Manganese as Mn	mg/L	7	<2.0	n.e.	n.e.
Olefins by FIA *)	%V/V	13	8.2	3.1	2.9
Olefins by GC in %V/V	%V/V	11	8.3	2.4	1.5
Olefins by GC in %M/M	%M/M	9	7.8	2.5	n.a.
Oxidation Stability	minutes	9	>240	n.e.	n.e.
Ethanol	%V/V	13	<0.2	n.e.	n.e.
Ethers (C5 or more C atoms)	%V/V	11	12.7	0.8	0.7
MTBE	%V/V	14	12.6	0.9	0.5
Oxygen content	%M/M	16	2.4	0.2	0.2
Sulfur	mg/kg	21	7.6	2.3	2.3

Table 6: reproducibilities of tests on sample #22070

*) without oxygenates correction

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Vapour Pressure	kPa	12	86.26	1.85	1.11
DVPE acc. to D5191	kPa	17	79.43	1.73	1.04

Table 7: reproducibilities of tests on sample #22071

Parameter	unit	n	average	2.8 * sd	R(lit)
RON		15	98.3	1.0	0.7
MON		12	87.9	1.2	0.9

Table 8: reproducibilities of tests on sample #22072

Without further statistical calculations, it can be concluded that for many tests there is not 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 MAY 2022 WITH PREVIOUS PTS

	May 2022	April 2021	April 2020
Number of reporting laboratories	31	24	20
Number of test results	453	467	439
Number of statistical outliers	32	25	19
Percentage of statistical outliers	7.1%	5.4%	4.3%

Table 9: 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	May 2022	April 2021	April 2020
API Gravity	++	++	++
Aromatics by FIA *)	-	-	-
Aromatics by GC	--	-	+/-
Benzene	--	-	+
Density at 15 °C	+	++	+
Distillation	+	+	+
Gum (solvent washed)	++	n.e.	+
Olefins by FIA *)	+/-	+/-	-
Olefins by GC	-	+	+
Ethanol	n.e.	++	+
Ethers (C5 or more C atoms)	-	+/-	+/-
ETBE	n.e.	++	n.e.
MTBE	-	-	+/-

Determination	May 2022	April 2021	April 2020
Oxygen content	-	++	+
Sulfur	+/-	-	-
Total Vapour Pressure	-	--	-
DVPE (acc. to D5191)	-	-	-
RON	-	-	-
MON	-	-	-

Table 10: comparison of determinations to the reference test methods

*) without oxygenates correction

The following performance categories were used:

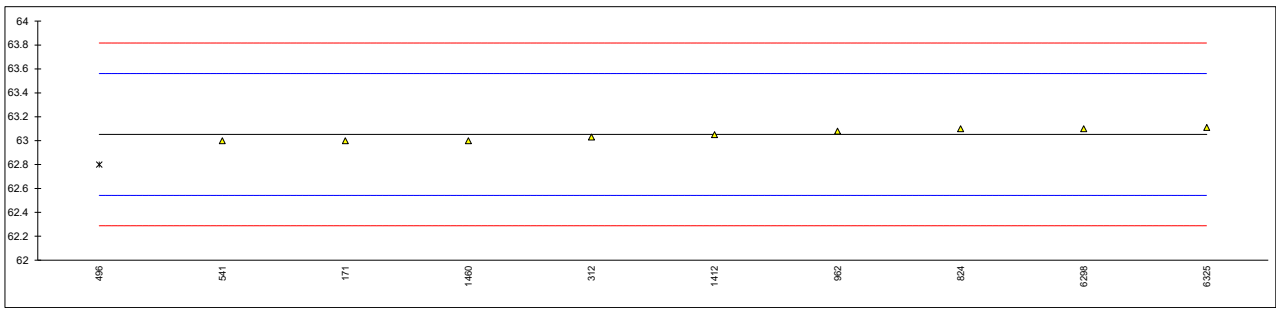
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test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

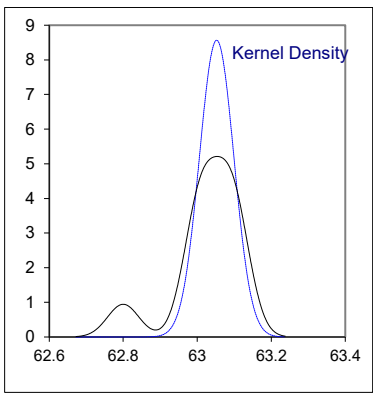
APPENDIX 1

Determination of API Gravity on sample #22070;

lab	method	value	mark	z(targ)	remarks
171	D4052	63.0		-0.21	
223		-----		-----	
312	D4052	63.03		-0.09	
496	D4052	62.8	G(0.01)	-0.99	
541	D4052	63.0		-0.21	
824	ISO12185	63.1		0.19	
962	D4052	63.08		0.11	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399		-----		-----	
1412	D4052	63.05		-0.01	
1460	D4052	63.0		-0.21	
1549		-----		-----	
1550		-----		-----	
6028		-----		-----	
6075		-----		-----	
6232		-----		-----	
6298	D4052	63.1		0.19	
6325	ISO12185	63.11		0.23	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	

normality	OK
n	9
outliers	1
mean (n)	63.052
st.dev. (n)	0.0466
R(calc.)	0.130
st.dev.(D4052:22)	0.2546
R(D4052:22)	0.713





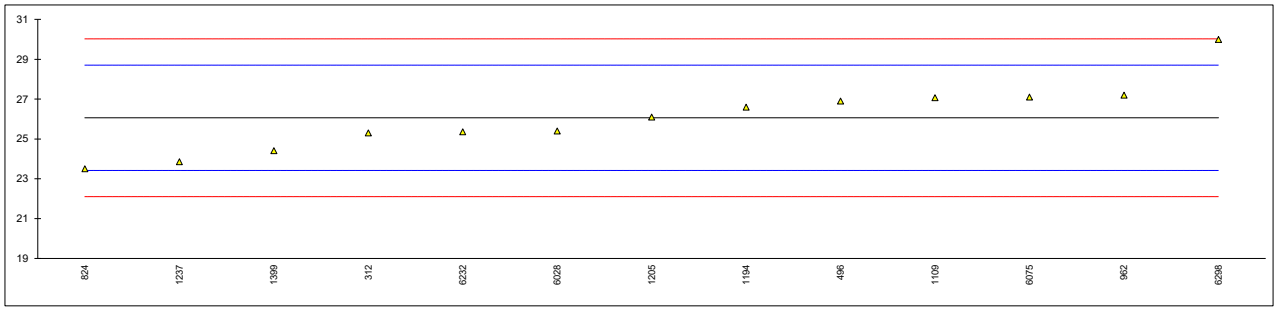
Determination of Appearance on sample #22070;

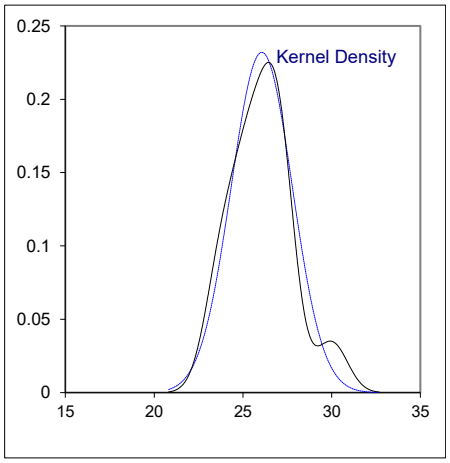
lab	method	value	mark	z(targ)	remarks
171	D4176	Clear and Bright		-----	
223	Visual	Jaune-pāle		-----	
312	Visual	br&cl		-----	
496	Visual	clear & bright		-----	
541	D4176	Clear and Bright		-----	
824	Visual	Clear & Bright		-----	
962	Visual	Clear & Bright		-----	
1039	D4176	Clear & Bright		-----	
1109	D4176	Pass		-----	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399	Visual	Pass		-----	
1412	Visual	Clear&Bright		-----	
1460	Visual	Clear & Bright		-----	
1549		-----		-----	
1550		-----		-----	
6028	D4176	Clear&Bright		-----	
6075	Visual	clear & bright		-----	
6232		-----		-----	
6298	Visual	Bright & Clear		-----	
6325	D4176	Cl & Br		-----	
6332	Visual	Clear and Bright		-----	
6346		-----		-----	
6378	Visual	Clear and Bright.		-----	
6404		-----		-----	
6457		-----		-----	
	n	17			
	mean (n)	Clear and Bright			

Determination of Aromatics by FIA (without oxygenates correction) on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
312	EN15553	25.3		-0.58	
496	EN15553	26.9		0.63	
541		-----		-----	
824	D1319	23.5		-1.94	
962	D1319	27.2		0.86	
1039		-----		-----	
1109	D1319	27.07		0.76	
1126		-----		-----	
1194	D1319	26.6		0.41	
1205	D1319	26.1		0.03	
1237	EN15553	23.86		-1.67	
1399	D1319	24.42		-1.24	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028	D1319	25.4		-0.50	
6075	EN15553	27.10	C	0.79	first reported 31.99
6232	In house	25.36		-0.53	
6298	D1319	30.0		2.98	
6325		-----		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	

normality	suspect
n	13
outliers	0
mean (n)	26.062
st.dev. (n)	1.7202
R(calc.)	4.817
st.dev.(EN15553:21)	1.3214
R(EN15553:21)	3.7

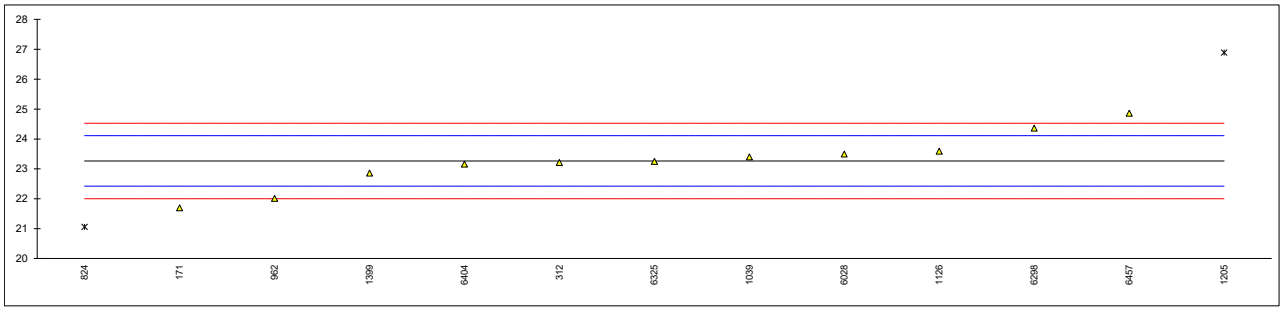


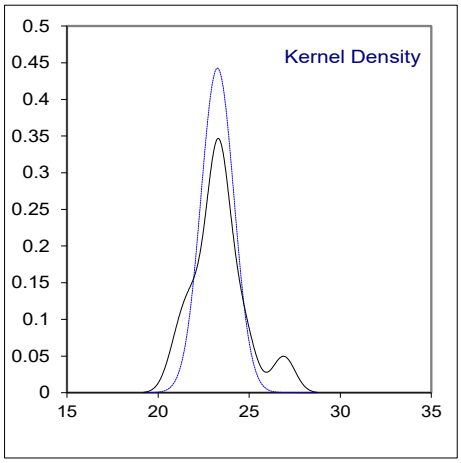


Determination of Aromatics by GC on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	21.7		-3.69	
223		-----		-----	
312	ISO22854-A	23.21		-0.13	
496		-----		-----	
541		-----		-----	
824	D5580	21.06	G(0.01)	-5.21	
962	D6839	22.01		-2.96	
1039	ISO22854	23.4		0.32	
1109		-----		-----	
1126	ISO22854	23.59		0.77	
1194		-----		-----	
1205	D8071	26.894	G(0.01)	8.58	
1237		-----		-----	
1399	D6839	22.86		-0.95	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028	ISO22854	23.5		0.56	
6075		-----		-----	
6232		-----		-----	
6298	D5580	24.36		2.59	
6325	ISO22854-A	23.25		-0.03	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	23.16		-0.24	
6457	D6730	24.86		3.77	

normality	OK
n	11
outliers	2
mean (n)	23.264
st.dev. (n)	0.9014
R(calc.)	2.524
st.dev.(ISO22854-A:21)	0.4233
R(ISO22854-A:21)	1.185

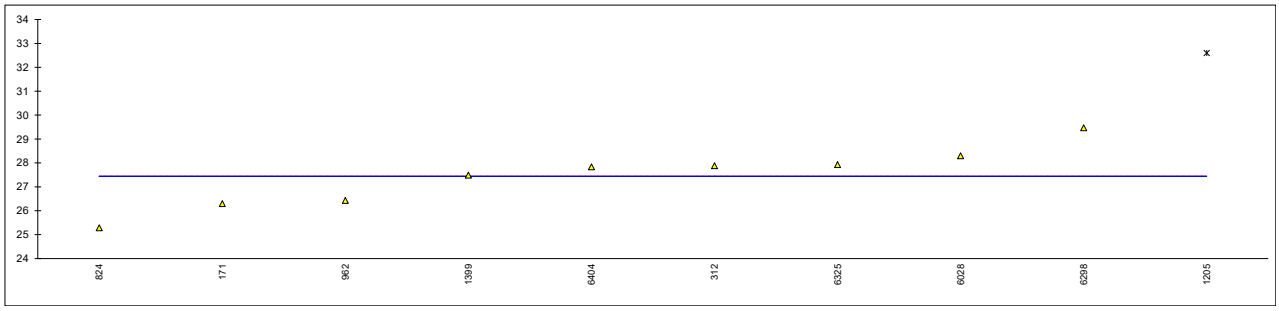


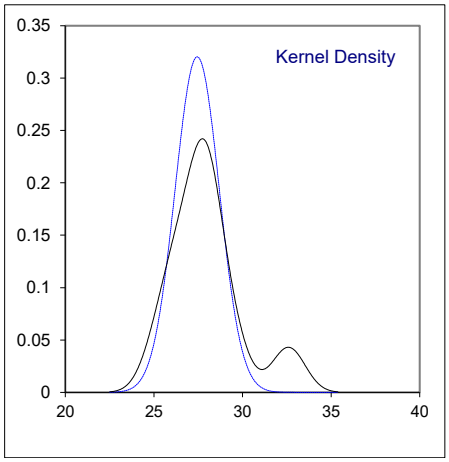


Determination of Aromatics by GC on sample #22070; results in %M/M

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	26.3		-----	
223		-----		-----	
312	ISO22854-A	27.89		-----	
496		-----		-----	
541		-----		-----	
824	D5580	25.29		-----	
962	D6839	26.43		-----	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1194		-----		-----	
1205	D8071	32.597	G(0.05)	-----	
1237		-----		-----	
1399	D6839	27.495		-----	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028		28.3		-----	
6075		-----		-----	
6232		-----		-----	
6298	D5580	29.47		-----	
6325	ISO22854-A	27.93		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	27.84		-----	
6457		-----		-----	

	normality	OK
	n	9
	outliers	1
	mean (n)	27.438
	st.dev. (n)	1.2454
	R(calc.)	3.487
	st.dev.(lit)	n.a.
	R(lit)	n.a.
compare		
	R(iis21B03)	1.613

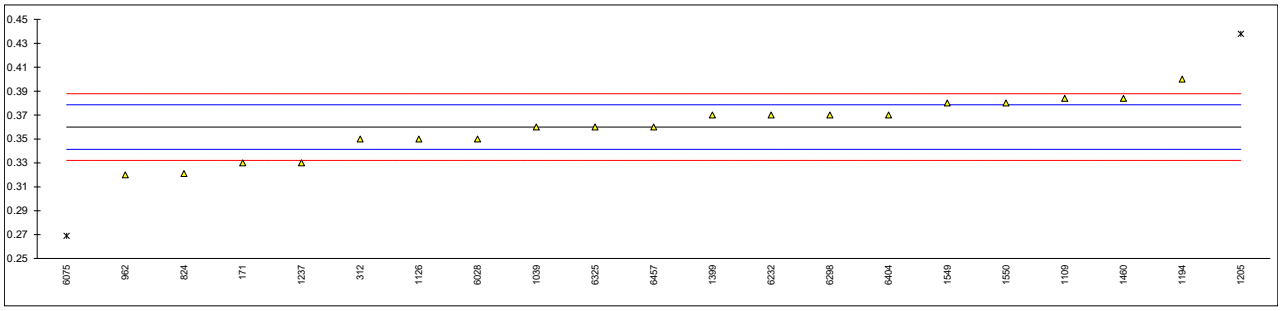


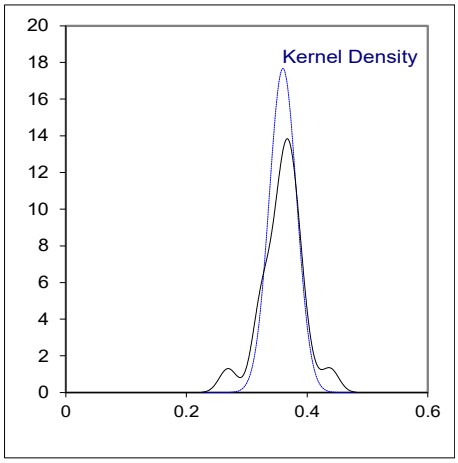


Determination of Benzene on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	0.33		-3.22	
223		-----		-----	
312	ISO22854-A	0.35		-1.07	
496		-----		-----	
541		-----		-----	
824	D5580	0.321		-4.19	
962	D5580	0.32		-4.30	
1039	ISO22854	0.36		0.01	
1109	D3606	0.384		2.59	
1126	ISO22854	0.35		-1.07	
1194	D6277	0.4		4.31	
1205	D8071	0.438	R(0.01)	8.40	
1237	EN238	0.33		-3.22	
1399	D6839	0.37		1.08	
1412		-----		-----	
1460	In house	0.384		2.59	
1549	D6277	0.38		2.16	
1550	D6277	0.38		2.16	
6028	EN238	0.35		-1.07	
6075	EN238	0.269	C,R(0.01)	-9.79	first reported 0.303
6232	D6277	0.37		1.08	
6298	D5580	0.37		1.08	
6325	ISO22854-A	0.36		0.01	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	0.37		1.08	
6457	D6730	0.36		0.01	

normality	OK
n	19
outliers	2
mean (n)	0.360
st.dev. (n)	0.0226
R(calc.)	0.063
st.dev.(ISO22854-A:21)	0.0093
R(ISO22854-A:21)	0.026





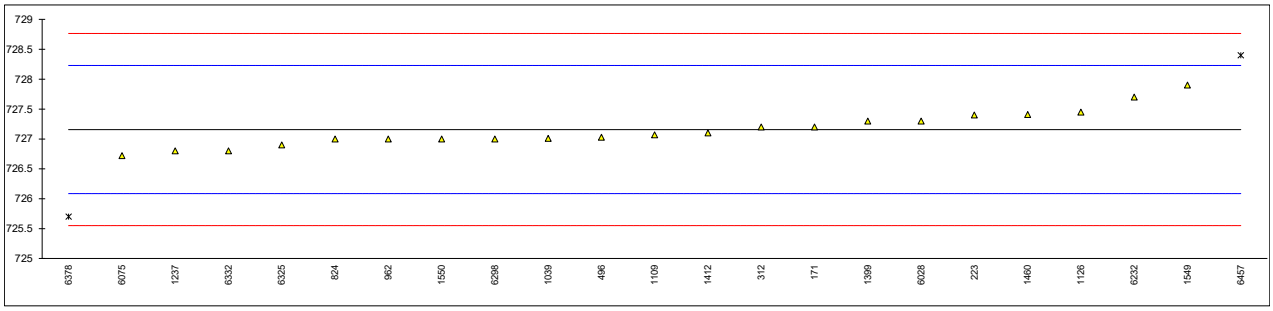
Determination of Copper Corrosion 3 hrs at 50 °C on sample #22070;

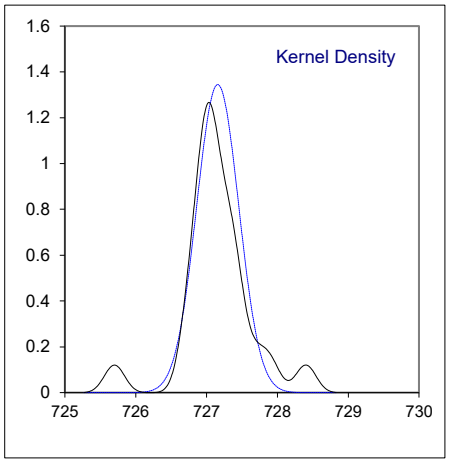
lab	method	value	mark	z(targ)	remarks
171	D130	1a		-----	
223		-----		-----	
312	D130	1a		-----	
496	D130	1a		-----	
541	D130	1a		-----	
824	D130	1a	C	-----	first reported 0.39
962	D130	1A		-----	
1039	ISO2160	1A		-----	
1109	D130	1a		-----	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399	D130	1		-----	
1412	D130	1a		-----	
1460	D130	1a		-----	
1549		-----		-----	
1550		-----		-----	
6028	ISO2160	1a		-----	
6075	ISO2160	1a		-----	
6232	D130	1a		-----	
6298	D130	1A		-----	
6325	D130	1a		-----	
6332	D130	1B		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	
	n	17			
	mean (n)	1 (1a/1b)			

Determination of Density at 15 °C on sample #22070; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
171	ISO12185	727.2		0.08	
223	D4052	727.4		0.45	
312	ISO12185	727.2		0.08	
496	ISO12185	727.03		-0.24	
541		-----		-----	
824	ISO12185	727.0		-0.29	
962	D4052	727.0		-0.29	
1039	ISO12185	727.01		-0.27	
1109	D4052	727.07		-0.16	
1126	ISO12185	727.45		0.55	
1194		-----		-----	
1205		-----		-----	
1237	ISO12185	726.8		-0.67	
1399	D4052	727.3		0.27	
1412	D4052	727.1		-0.11	
1460	D4052	727.41		0.47	
1549	ISO12185	727.9		1.39	
1550	ISO12185	727.0	C	-0.29	first reported 728.0
6028	ISO12185	727.3		0.27	
6075	ISO12185	726.72		-0.82	
6232	ISO12185	727.7	C	1.01	first reported 730.1
6298	D4052	727.0		-0.29	
6325	ISO12185	726.9		-0.48	
6332	D4052	726.8		-0.67	
6346		-----		-----	
6378	D1298	725.7	C,R(0.05)	-2.72	first reported 723.9
6404		-----		-----	
6457	D4052	728.4	R(0.05)	2.32	reported 0.7284 kg/m^3

normality	OK
n	21
outliers	2
mean (n)	727.157
st.dev. (n)	0.2966
R(calc.)	0.831
st.dev.(ISO12185:96)	0.5357
R(ISO12185:96)	1.5

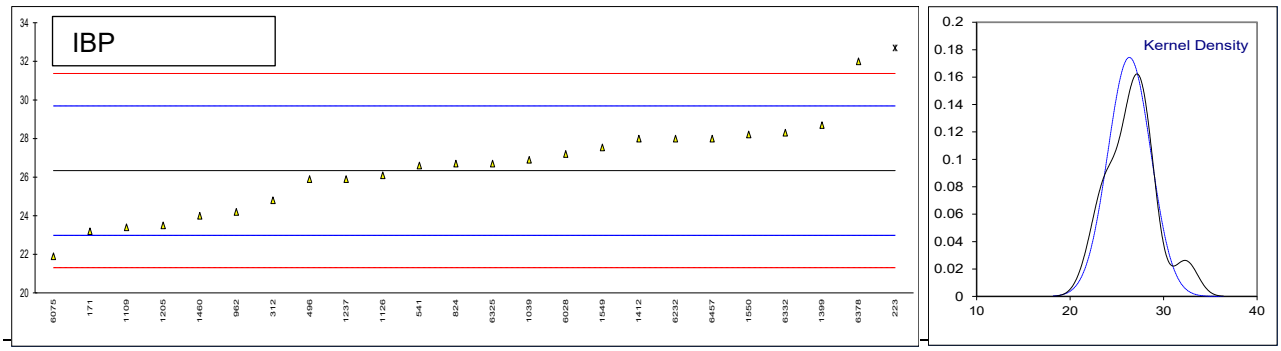


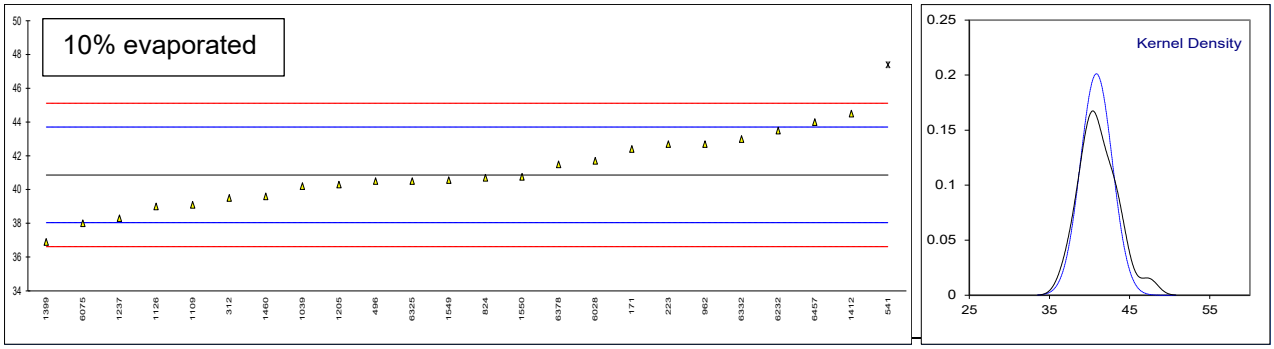


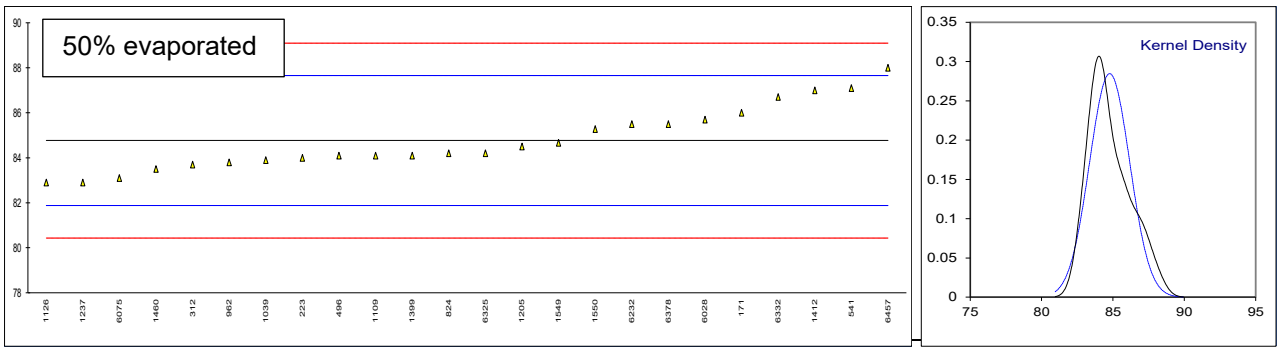
Determination of Distillation at 760 mmHg on sample #22070; results in °C

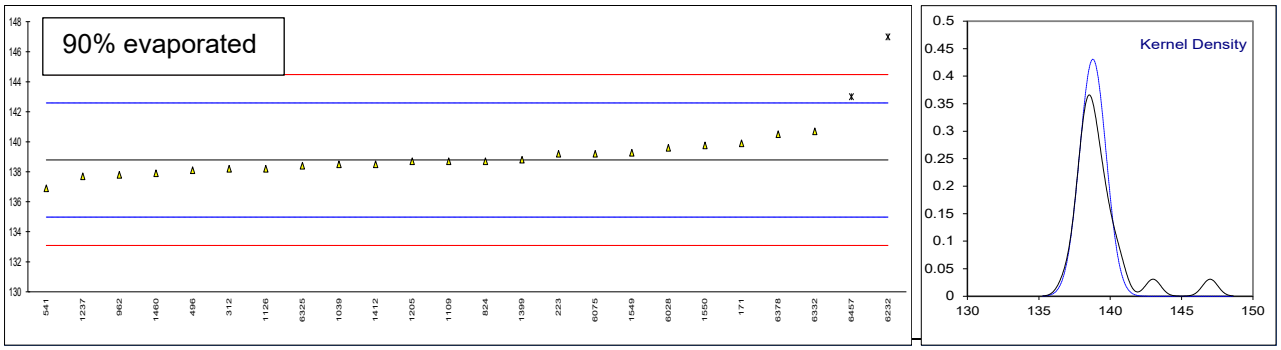
lab	method	IBP	mark	10% eva	mark	50% eva	mark	90% eva	mark	FBP	mark
171	D86-automated	23.2		42.4		86.0		139.9		161.6	
223	D86-automated	32.7	R(1)	42.7		84		139.2		161.1	
312	D86-automated	24.8		39.5		83.7		138.2		161.0	
496	ISO3405-automated	25.9		40.5		84.1		138.1		162.6	
541	D86	26.6		47.4	R(1)	87.1		136.9		159.9	
824	D86-automated	26.7		40.7		84.2		138.7		160.8	
962	D86-automated	24.2		42.7		83.8		137.8		161.8	
1039	ISO3405-automated	26.9		40.2		83.9		138.5		162.6	
1109	D86-automated	23.4		39.1		84.1		138.7		161.9	
1126	ISO3405-automated	26.1		39.0		82.9		138.2		162.2	
1194		-----		-----		-----		-----		-----	
1205	D86-automated	23.5		40.3		84.5		138.7		162.3	
1237		25.9		38.3		82.9		137.7		161.5	
1399	D86-automated	28.7		36.9		84.1		138.8		-----	
1412	D86-manual	28.0		44.5	C	87.0		138.5		161.0	
1460	D86-automated	24.0		39.6		83.5		137.9		162.0	
1549	ISO3405-automated	27.54		40.56		84.66		139.27		158.96	
1550	ISO3405-automated	28.21		40.76		85.28		139.76		158.96	
6028	ISO3405	27.2		41.7		85.7		139.6		161.4	
6075	ISO3405-automated	21.9		38.0		83.1		139.2		160.5	
6232	D86-manual	28.0		43.5	C	85.5		147.0	C,R(1)	163.0	
6298		-----		-----		-----		-----		-----	
6325	D86-automated	26.7		40.5		84.2		138.4		161.7	
6332	D86-manual	28.3		43.0		86.7		140.7		161.7	
6346		-----		-----		-----		-----		-----	
6378	D86-manual	32		41.5		85.5		140.5		163.0	
6404		-----		-----		-----		-----		-----	
6457	D86	28		44		88		143	R(1)	162	
	normality	OK		OK		OK		OK		OK	
	n	23		23		24		22		23	
	outliers	1		1		0		2		0	
	mean (n)	26.337		40.866		84.768		138.783		161.457	
	st.dev. (n)	2.2882		1.9824		1.4015		0.9262		1.0969	
	R(calc.)	6.407		5.551		3.924		2.593		3.071	
	st.dev.(ISO3405-A:19)	1.6786		1.4188		1.4449		1.8995		2.5357	
	R(ISO3405-A:19)	4.7		3.973		4.046		5.319		7.1	

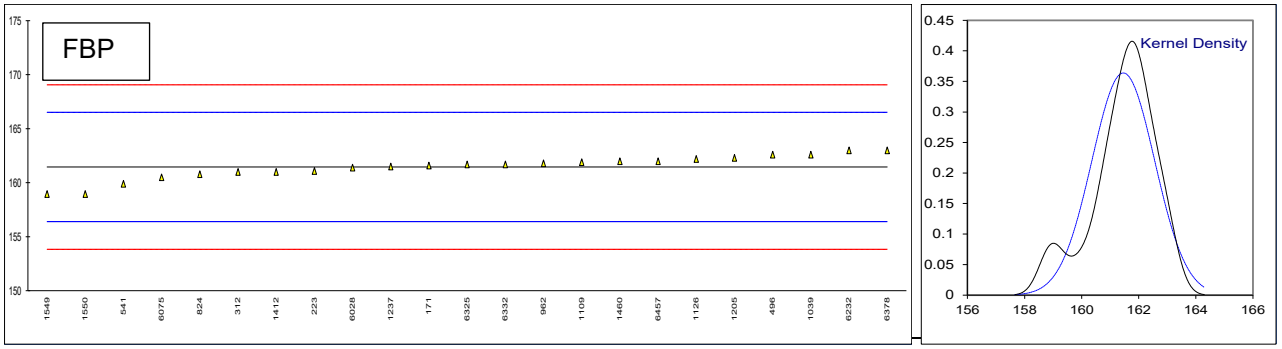
Lab 1412 first reported 47
Lab 6232 first reported for temp. at 10% evaporated 46.5 and for temp. at 90% evaporated 144.5


IBP
Kernel Density


10% evaporated
Kernel Density


50% evaporated
Kernel Density

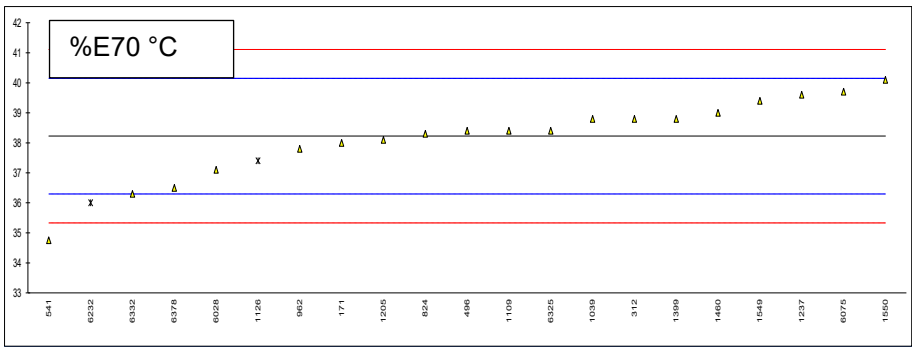

90% evaporated
Kernel Density

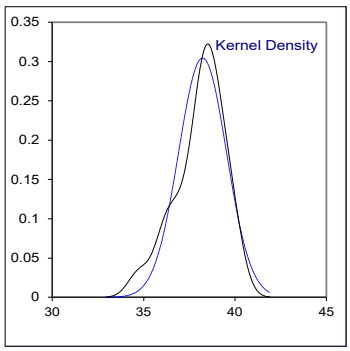

FBP
Kernel Density

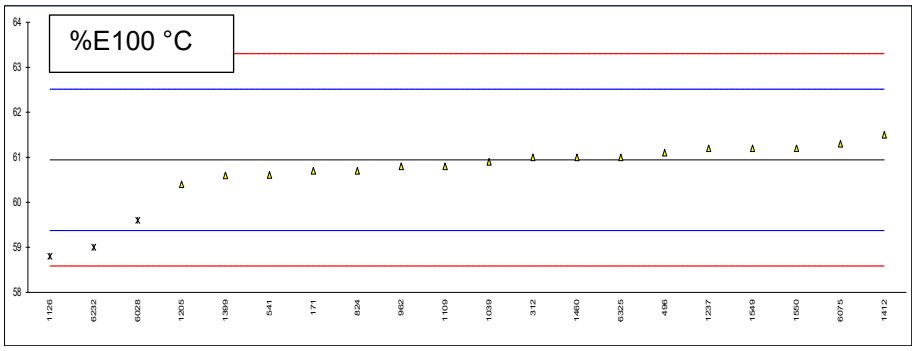
Determination of Distillation at 760 mmHg on sample #22070; results in %V/V ---continued---

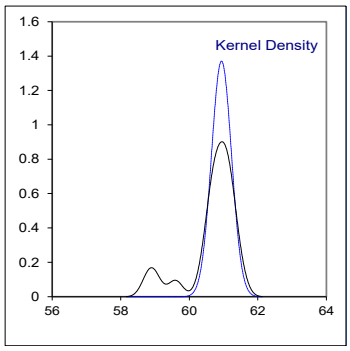
lab	method	%E70°C	mark	%E100°C	mark	%E150°C	mark	%residue	mark	%loss	mark
171	D86-automated	38.0		60.7		96.9		1.0		1.2	
223	D86-automated	-----		-----		-----		-----		-----	
312	D86-automated	38.8		61.0		96.7		1.0		1.8	
496	ISO3405-automated	38.4		61.1		96.9		1.0		2.3	
541	D86	34.75		60.61		96.08		1.0		1.5	
824	D86-automated	38.3		60.7		96.6		1.0		2.1	
962	D86-automated	37.8		60.8		96.9		1.0		0.7	
1039	ISO3405-automated	38.8		60.9		96.8		1.0		2.1	
1109	D86-automated	38.4		60.8		96.6		0.8		3.3	
1126	ISO3405-automated	37.4	ex	58.8	DG(1)	94.3	DG(1)	0.9		2.5	
1194		-----		-----		-----		-----		-----	
1205	D86-automated	38.1		60.4		96.7		1.0		1.9	
1237		39.6		61.2		96.6		1.0		3.8	
1399	D86-automated	38.8		60.6		96.3		1.0		2.7	
1412	D86-manual	-----		61.5		94.5	C,DG(1)	-----		-----	
1460	D86-automated	39.0		61.0		97.0		1.0		3.0	
1549	ISO3405-automated	39.40		61.20		96.80		1.0		1.6	
1550	ISO3405-automated	40.1		61.2		96.8		1.1		1.6	
6028	ISO3405	37.1		59.6	G(1)	96.0		1.7		1.4	
6075	ISO3405-automated	39.7		61.3		96.6		1.0		2.3	
6232	D86-manual	36.0	C, ex	59.0	C,DG(1)	93.5	C,G(1)	1.0		1.0	
6298		-----		-----		-----		-----		-----	
6325	D86-automated	38.4		61.0		95.6		1.0		1.7	
6332	D86-manual	36.3		-----		-----		0.9		1.1	
6346		-----		-----		-----		-----		-----	
6378	D86-manual	36.5		-----		-----		0.9		-----	
6404		-----		-----		-----		-----		-----	
6457	D86-automated	-----		-----		-----		1.0		2.90	
	normality	suspect		OK		suspect					
	n	19		17		17					
	outliers	0+2ex		3		3					
	mean (n)	38.224		60.942		96.581					
	st.dev. (n)	1.3107		0.2910		0.3779					
	R(calc.)	3.670		0.815		1.058					
	st.dev.(ISO3405-A:19)	0.9643		0.7857		0.4643					
	R(ISO3405-A:19)	2.7		2.2		1.3					

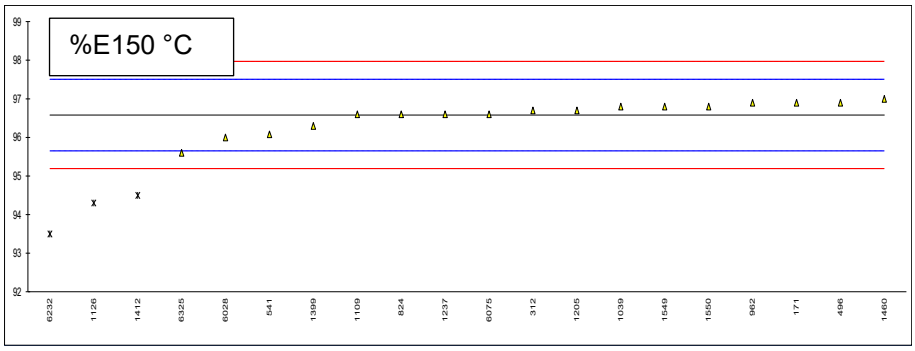
Lab 1126 test result excluded as statistical outliers in related parameters
Lab 1412 first reported for %E150 °C: 95.5,
Lab 6232 test result excluded as statistical outliers in related parameters, first reported %E70 °C: 32.5 ,for %E100 °C: 57 and for %E150 °C: 91.5

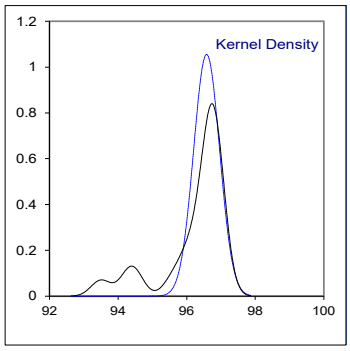

%E70 °C


Kernel Density


%E100 °C


Kernel Density


%E150 °C


Kernel Density

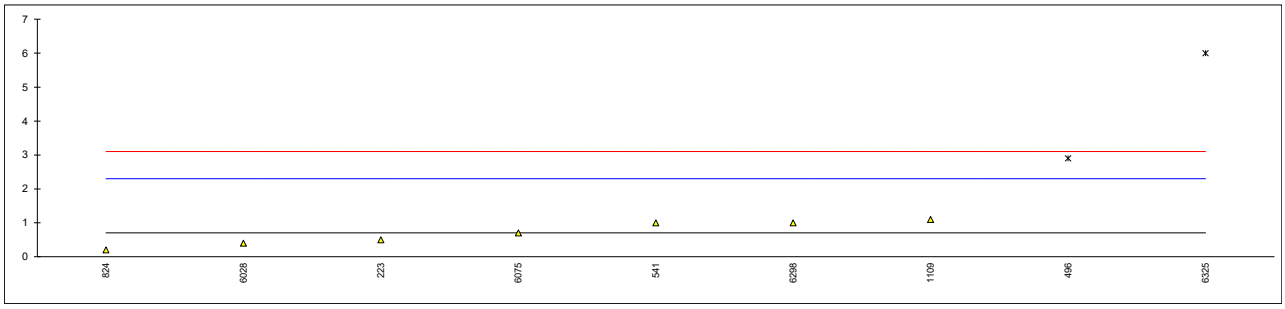
Determination of Doctor Test on sample #22070;

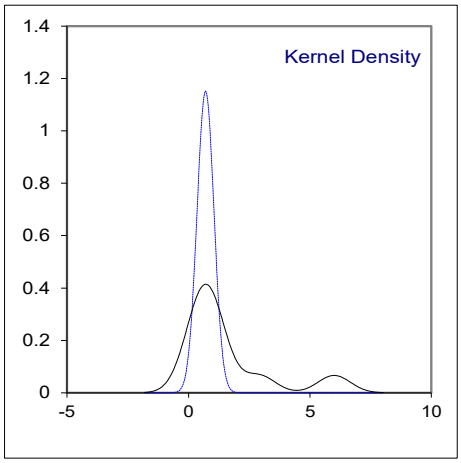
lab	method	value	mark	z(targ)	remarks
171	D4952	Negative		-----	
223		-----		-----	
312	IP30	negative		-----	
496		-----		-----	
541		-----		-----	
824	D4952	Negative		-----	
962	D4952	Negative		-----	
1039	D4952	negative		-----	
1109	IP30	Negative		-----	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399	IP30	Negative		-----	
1412	D4952	negative		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028		-----		-----	
6075		-----		-----	
6232		-----		-----	
6298	IP30	Negative		-----	
6325	IP30	negative		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	
	n	10			
	mean (n)	Negative			

Determination of Gum (solvent washed) on sample #22070; results in mg/100mL

lab	method	value	mark	z(targ)	remarks
171	D381	<0.5		-----	
223	D381	0.5		-0.25	
312	D381	<0.5		-----	
496	D381	2.9	G(0.01)	2.75	
541	D381	1.0		0.37	
824	ISO6246	0.2		-0.62	
962	D381	<0.5		-----	
1039	ISO6246	<1		-----	
1109	D381	1.10		0.50	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399		-----		-----	
1412		-----		-----	
1460	D381	<0.5		-----	
1549		-----		-----	
1550		-----		-----	
6028	ISO6246	0.4		-0.37	
6075	ISO6246	0.7		0.00	
6232		-----		-----	
6298	D381	1.0		0.37	
6325	D381	6	C,G(0.01)	6.62	first reported 13
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	

normality	OK
n	7
outliers	2
mean (n)	0.700
st.dev. (n)	0.3464
R(calc.)	0.970
st.dev.(ISO6246:17/AMD1:19)	0.8003
R(ISO6246:17/AMD1:19)	2.241





Determination of Lead as Pb on sample #22070; results in mg/L

lab	method	value	mark	z(targ)	remarks
171	D3237	<2.5		-----	
223		-----		-----	
312	EN237	<2.5		-----	
496		-----		-----	
541	D3237	<2.5		-----	
824	D3237	<0.25		-----	
962	D3237	<2.5		-----	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1194		9.9		-----	Possibly a false positive test result?
1205		-----		-----	
1237		-----		-----	
1399	IP352	<0.002		-----	
1412		-----		-----	
1460	D3237	<2.5		-----	
1549		-----		-----	
1550		-----		-----	
6028		-----		-----	
6075		-----		-----	
6232	D5059	< 2.5		-----	
6298		-----		-----	
6325	D3237	<2.5		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	
	n	9			
	mean (n)	<2.5			

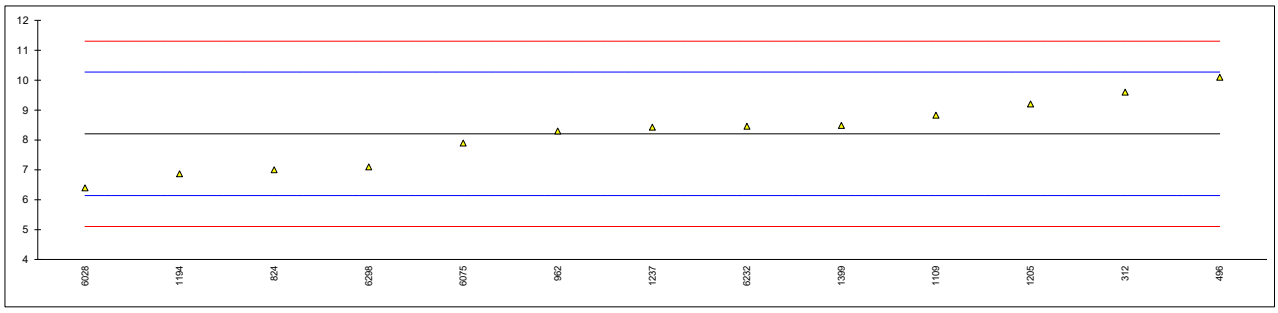
Determination of Manganese as Mn on sample #22070; results in mg/L

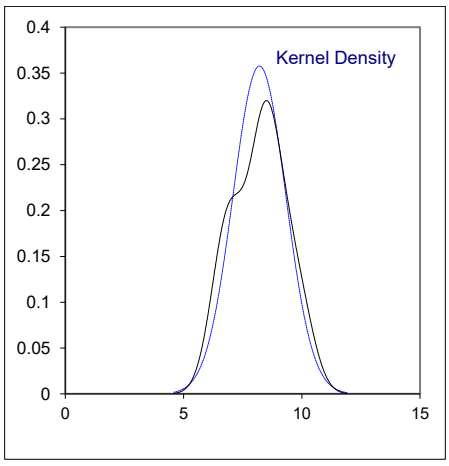
lab	method	value	mark	z(targ)	remarks
171	D3831	<0.25		-----	
223		-----		-----	
312	EN16136	<0.5		-----	
496		-----		-----	
541	D3831	<0.25		-----	
824		-----		-----	
962	D3831	<2.0		-----	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399	In house	<0.002		-----	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028	EN16136	0.2		-----	
6075		-----		-----	
6232		-----		-----	
6298		-----		-----	
6325	EN16136	<2.0		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	
	n	7			
	mean (n)	<2.0			

Determination of Olefins by FIA (without oxygenates correction) on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171		-----		-----	
223		-----		-----	
312	EN15553	9.6		1.35	
496	EN15553	10.1		1.83	
541		-----		-----	
824	D1319	7.0		-1.17	
962	D1319	8.3		0.09	
1039		-----		-----	
1109	D1319	8.83		0.60	
1126		-----		-----	
1194	D1319	6.87		-1.29	
1205	D1319	9.2		0.96	
1237	EN15553	8.43		0.22	
1399	D1319	8.49		0.27	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028	D1319	6.4		-1.75	
6075	EN15553	7.90		-0.30	
6232	In house	8.46		0.25	
6298	D1319	7.1		-1.07	
6325		-----		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	

normality	OK
n	13
outliers	0
mean (n)	8.21
st.dev. (n)	1.115
R(calc.)	3.12
st.dev.(EN15553:21)	1.034
R(EN15553:21)	2.89

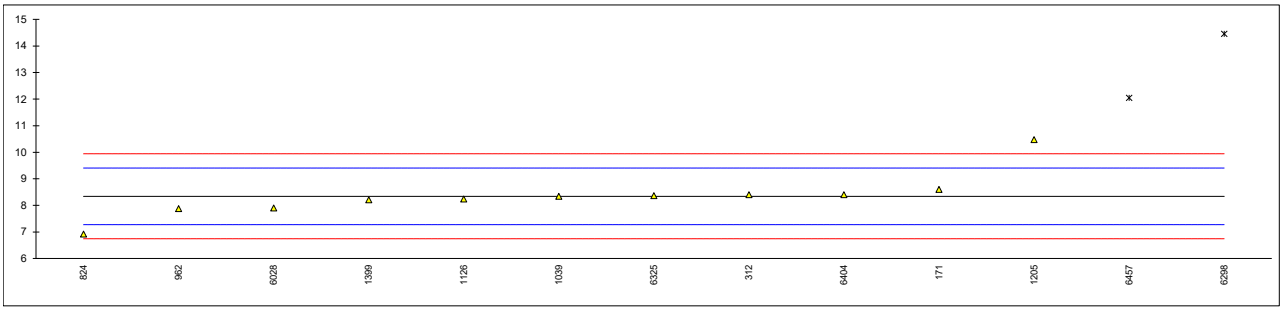


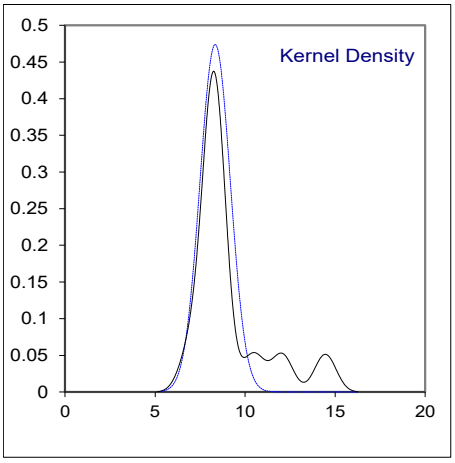


Determination of Olefins by GC on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	8.6		0.49	
223		-----		-----	
312	ISO22854-A	8.4		0.11	
496		-----		-----	
541		-----		-----	
824	D6839	6.92		-2.66	
962	D6839	7.88		-0.86	
1039	ISO22854	8.34		0.00	
1109		-----		-----	
1126	ISO22854	8.24		-0.19	
1194		-----		-----	
1205	D8071	10.475		4.01	
1237		-----		-----	
1399	D6839	8.21		-0.24	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028	ISO22854	7.9		-0.82	
6075		-----		-----	
6232		-----		-----	
6298	D6730	14.457	G(0.05)	11.48	
6325	ISO22854-A	8.37		0.06	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	8.40		0.11	
6457	D6730	12.05	G(0.05)	6.96	

normality	not OK
n	11
outliers	2
mean (n)	8.340
st.dev. (n)	0.8416
R(calc.)	2.356
st.dev.(ISO22854-A:21)	0.5330
R(ISO22854-A:21)	1.493

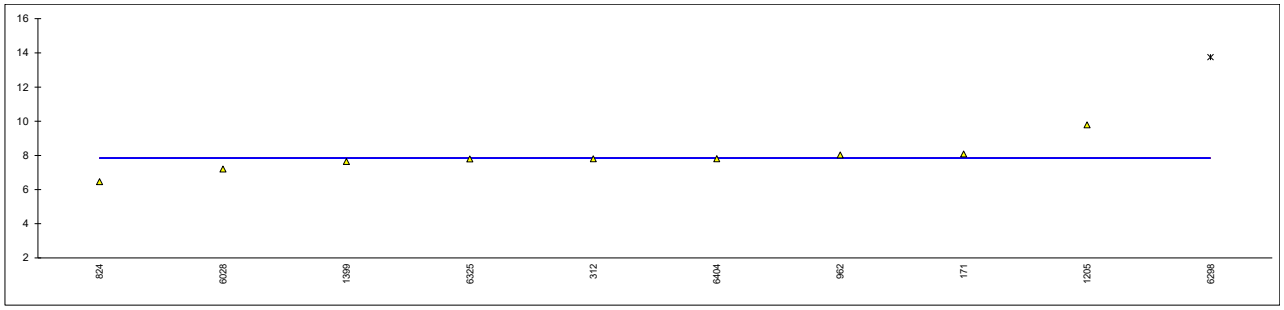


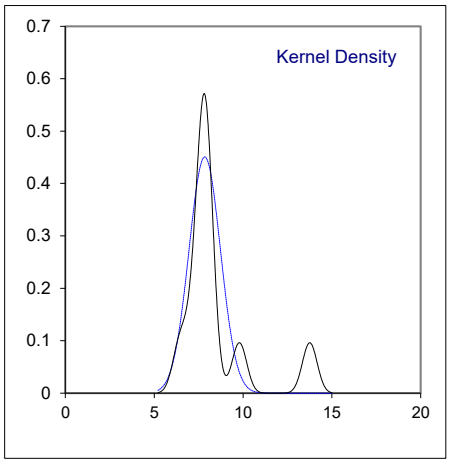


Determination of Olefins by GC on sample #22070; results in %M/M

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	8.08		-----	
223		-----		-----	
312	ISO22854-A	7.8		-----	
496		-----		-----	
541		-----		-----	
824	D6839	6.46		-----	
962	D6839	8.03		-----	
1039		-----		-----	
1109		-----		-----	
1126		-----		-----	
1194		-----		-----	
1205	D8071	9.793		-----	
1237		-----		-----	
1399	D6839	7.64		-----	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028		7.2		-----	
6075		-----		-----	
6232		-----		-----	
6298	D6730	13.756	G(0.01)	-----	
6325	ISO22854-A	7.79		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	7.81		-----	
6457		-----		-----	

	normality	not OK
	n	9
	outliers	1
	mean (n)	7.845
	st.dev. (n)	0.8851
	R(calc.)	2.478
	st.dev.(lit)	n.a.
	R(lit)	n.a.
Compare		
	R(iis21B02)	0.601





Determination of Oxidation Stability on sample #22070; results in minutes

lab	method	value	mark	z(targ)	remarks
171	D525	>240		-----	
223		-----		-----	
312	D525	>900		-----	
496		-----		-----	
541		-----		-----	
824	D525	>900		-----	
962	D525	>480		-----	
1039	ISO7536	>900		-----	
1109	D525	>900		-----	
1126		-----		-----	
1194		-----		-----	
1205		-----		-----	
1237		-----		-----	
1399		-----		-----	
1412		-----		-----	
1460		-----		-----	
1549		-----		-----	
1550		-----		-----	
6028	ISO7536	>360		-----	
6075		-----		-----	
6232		-----		-----	
6298	D525	>900		-----	
6325	D525	>900		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457		-----		-----	
	n	9			
	mean (n)	>240			

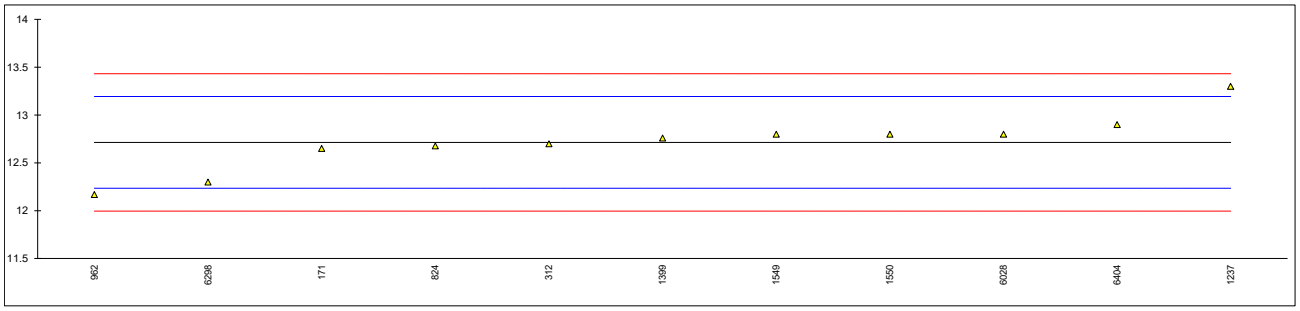
Determination of Ethanol on sample #22070; results in %V/V

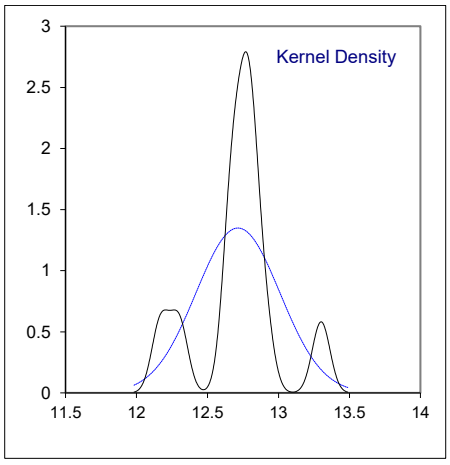
lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	0.06		-----	
223		-----		-----	
312	ISO22854-A	<0.10		-----	
496		-----		-----	
541		-----		-----	
824	D4815	<0.2		-----	
962	D4815	<0.2		-----	
1039	ISO22854	0.07		-----	
1109		-----		-----	
1126	ISO22854	<0.02		-----	
1194	D5845	0.2	C	-----	first reported 1.13
1205		0.060		-----	
1237		0.24		-----	
1399	D6839	0.00		-----	
1412		-----		-----	
1460		-----		-----	
1549	D5845	<1,5		-----	
1550	D5845	<1.5		-----	
6028		-----		-----	
6075		-----		-----	
6232	D5845	0.085		-----	
6298	D4815	<0.20		-----	
6325	ISO22854-A	0.07		-----	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	0.04		-----	
6457		-----		-----	
	n	13			
	mean (n)	<0.2			

Determination of Ethers (C5 or more C atoms) on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	12.65		-0.27	
223		-----		-----	
312	ISO22854-A	12.7		-0.06	
496		-----		-----	
541		-----		-----	
824	D4815	12.678		-0.15	
962	D4815	12.17		-2.27	
1039	ISO22854	-----		-----	
1109		-----		-----	
1126	ISO22854	<0.02		<-52.98	possibly a false negative test result?
1194	D5845	-----		-----	
1205		-----		-----	
1237		13.30		2.45	
1399	D6839	12.76		0.19	
1412		-----		-----	
1460		-----		-----	
1549	D5845	12.8		0.36	
1550	D5845	12.8		0.36	
6028		12.8		0.36	
6075		-----		-----	
6232	D5845	-----		-----	
6298	D4815	12.30		-1.73	
6325	ISO22854-A	<0.10	C	<-52.65	first reported 0.04; possibly a false negative test result?
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	12.9	C	0.78	first reported 0.07
6457		-----		-----	

normality	suspect
n	11
outliers	0
mean (n)	12.714
st.dev. (n)	0.2958
R(calc.)	0.828
st.dev.(ISO22854-A:21)	0.2395
R(ISO22854-A:21)	0.671

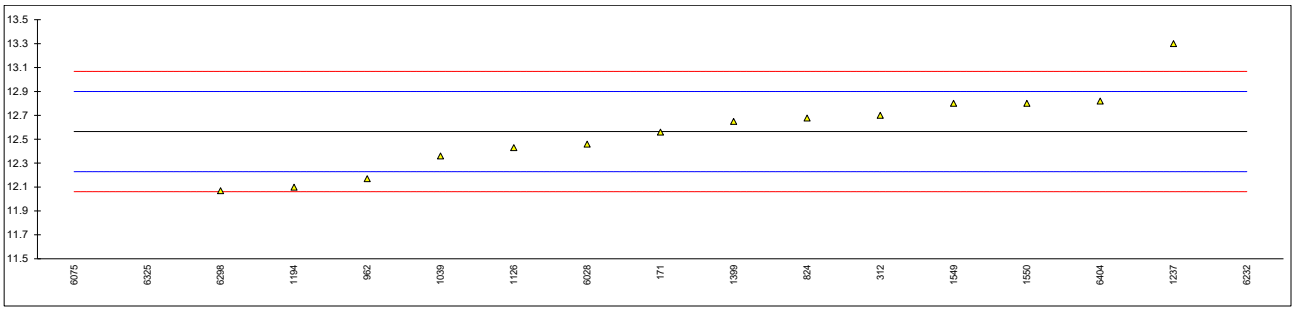


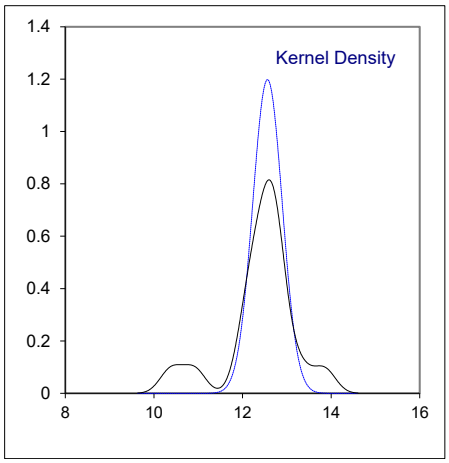


Determination of MTBE on sample #22070; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	12.56		-0.02	
223		-----		-----	
312	ISO22854-A	12.70	C	0.81	first reported <0.10
496		-----		-----	
541		-----		-----	
824	D4815	12.678		0.68	
962	D4815	12.17		-2.35	
1039	ISO22854	12.36		-1.22	
1109		-----		-----	
1126	ISO22854	12.43		-0.80	
1194	D5845	12.10		-2.77	
1205		-----		-----	
1237		13.30		4.39	
1399	D6839	12.65		0.51	
1412		-----		-----	
1460		-----		-----	
1549	D5845	12.8		1.41	
1550	D5845	12.8		1.41	
6028		12.46		-0.62	
6075		10.39	DG(0.01)	-12.96	
6232	D5845	13.85	G(0.05)	7.66	
6298	D4815	12.07		-2.95	
6325	ISO22854-A	10.91	DG(0.01)	-9.86	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	12.82		1.52	
6457		-----		-----	

normality	OK
n	14
outliers	3
mean (n)	12.564
st.dev. (n)	0.3331
R(calc.)	0.933
st.dev.(ISO22854-A:21)	0.1678
R(ISO22854-A:21)	0.470

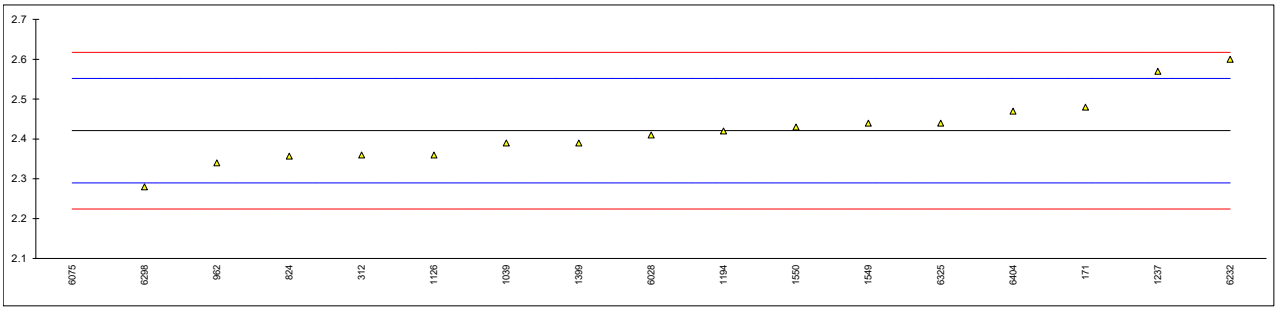


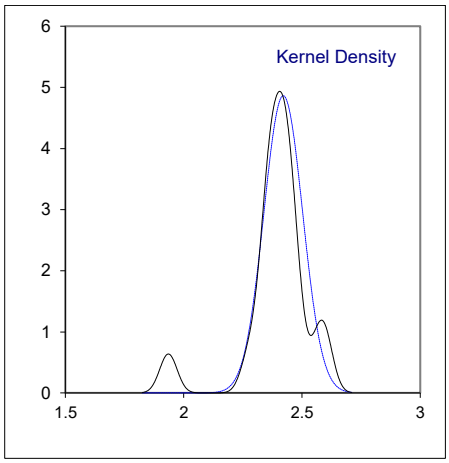


Determination of Oxygen content on sample #22070; results in %M/M

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	2.48		0.90	
223		-----		-----	
312	ISO22854-A	2.36		-0.93	
496		-----		-----	
541		-----		-----	
824	D4815	2.357		-0.98	
962	D4815	2.34		-1.24	
1039	ISO22854	2.39		-0.47	
1109		-----		-----	
1126	ISO22854	2.36		-0.93	
1194	D5845	2.42		-0.02	
1205		-----		-----	
1237		2.57		2.27	
1399	D6839	2.39		-0.47	
1412		-----		-----	
1460		-----		-----	
1549	D5845	2.44		0.29	
1550	D5845	2.43		0.14	
6028	ISO22854	2.41		-0.17	
6075	D4815	1.935	G(0.01)	-7.41	
6232	D5845	2.6	C	2.73	first reported 2.8
6298	D4815	2.28		-2.15	
6325	ISO22854-A	2.44		0.29	
6332		-----		-----	
6346		-----		-----	
6378		-----		-----	
6404	ISO22854-A	2.47		0.75	
6457		-----		-----	

normality	OK
n	16
outliers	1
mean (n)	2.421
st.dev. (n)	0.0820
R(calc.)	0.230
st.dev.(ISO22854-A:21)	0.0656
R(ISO22854-A:21)	0.184

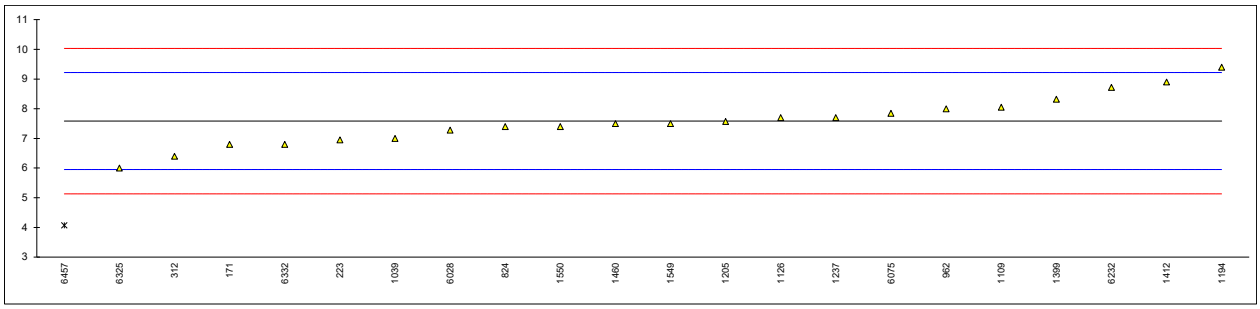


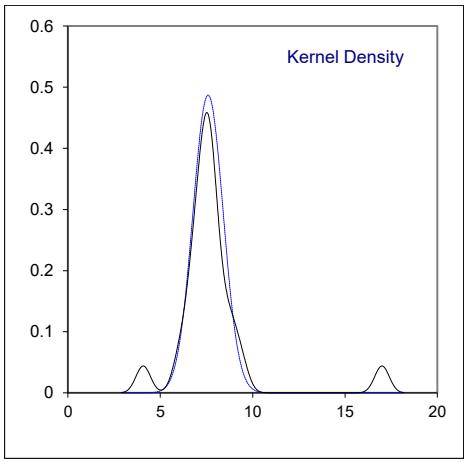


Determination of Sulfur on sample #22070; results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	ISO20846	6.8		-0.96	
223	D4294	6.9500		-0.78	
312	ISO20846	6.4		-1.45	
496		-----		-----	
541	ISO20846	<3		<-5.61	Possibly a false negative test result?
824	D5453	7.4		-0.22	
962	D5453	8.0		0.51	
1039	ISO20846	7.00		-0.71	
1109	D7039	8.05		0.57	
1126	ISO20846	7.7		0.14	
1194	D7220/IP532	9.4		2.23	
1205	ISO20846	7.57		-0.02	
1237	ISO20846	7.70		0.14	
1399	D5453	8.32		0.90	
1412	D5453	8.9		1.61	
1460	D5453	7.5		-0.10	
1549	ISO20884	7.5		-0.10	
1550	ISO20884	7.4		-0.22	
6028	ISO20846	7.28		-0.37	
6075	ISO20846	7.85		0.33	
6232	D2622	8.72		1.39	
6298	D4294	<17		<11.53	
6325	ISO20846	6.0		-1.94	
6332	D5453	6.8		-0.96	
6346		-----		-----	
6378		-----		-----	
6404		-----		-----	
6457	D5453	4.07	R(0.01)	-4.30	

normality	OK
n	21
outliers	1
mean (n)	7.583
st.dev. (n)	0.8188
R(calc.)	2.293
st.dev.(ISO20846:19)	0.8165
R(ISO20846:19)	2.286

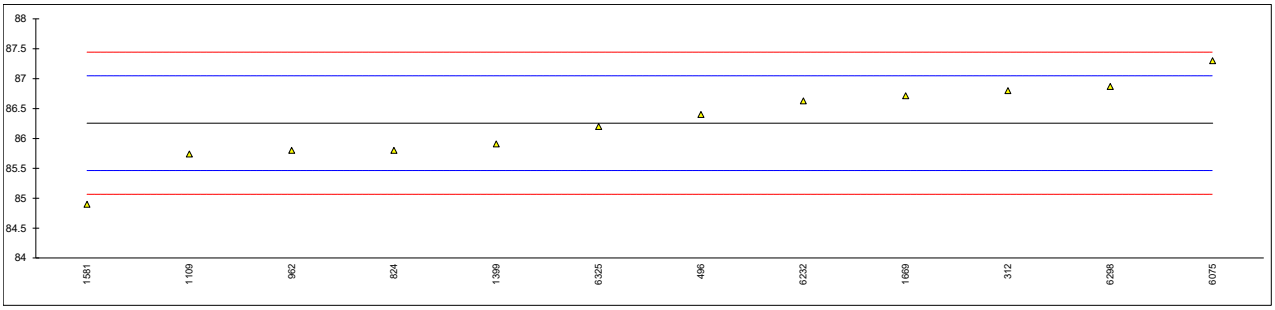


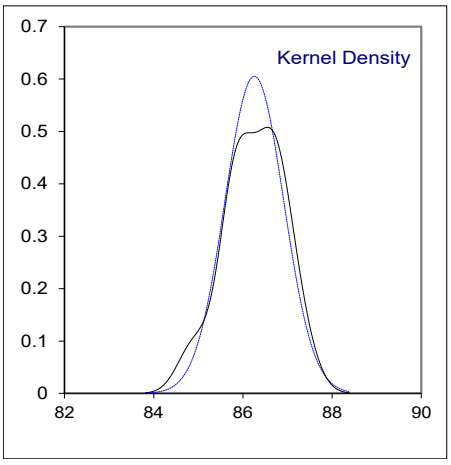


Determination of Total Vapour Pressure on sample #22071; results in kPa

lab	method	value	mark	z(targ)	remarks
312	D5191	86.8		1.37	
496	EN13016-1	86.4		0.36	
541		-----		-----	
824	D5191	85.8		-1.15	
962	D5191	85.8		-1.15	
1039		-----		-----	
1109	D5191	85.74		-1.30	
1194		-----		-----	
1399	D5191	85.91		-0.87	
1460		-----		-----	
1581	D5191	84.9		-3.42	
1669	D5191	86.7150		1.16	
1730		-----		-----	
6028		-----		-----	
6075	EN13016-1	87.3		2.64	
6232	EN13016-1	86.63		0.95	
6298	D5191	86.87		1.55	
6325	D5191	86.2		-0.14	

normality	OK
n	12
outliers	0
mean (n)	86.255
st.dev. (n)	0.6591
R(calc.)	1.845
st.dev.(D5191:20)	0.3964
R(D5191:20)	1.110

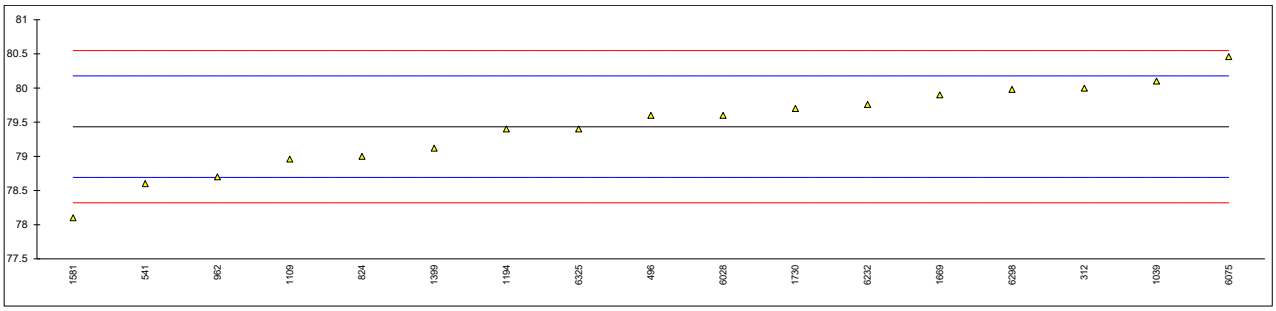


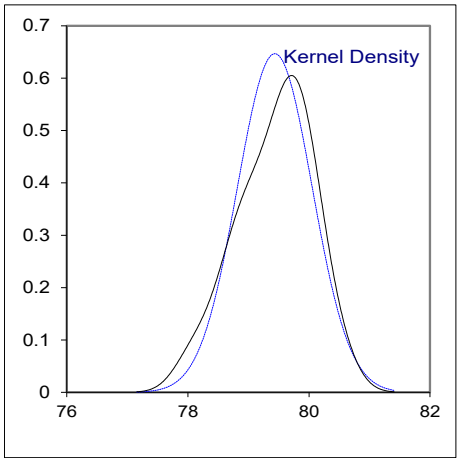


Determination of DVPE (acc. to D5191) on sample #22071; results in kPa

lab	method	value	mark	z(targ)	remarks
312	D5191	80.0		1.52	
496	EN13016-1	79.6		0.45	
541	D5191	78.6		-2.24	
824	D5191	79.0		-1.17	
962	D5191	78.7		-1.98	
1039	EN13016-1	80.1		1.79	
1109	D5191	78.96		-1.28	
1194	EN13016-1	79.4		-0.09	
1399	D5191	79.12		-0.85	
1460		-----		-----	
1581	D5191	78.1		-3.59	
1669	D5191	79.90		1.25	
1730	EN13016-1	79.7		0.72	
6028	EN13016-1	79.6		0.45	
6075	EN13016-1	80.46		2.76	
6232	EN13016-1	79.76		0.88	
6298	D5191	79.98		1.47	
6325	D5191	79.4		-0.09	

normality	OK
n	17
outliers	0
mean (n)	79.434
st.dev. (n)	0.6170
R(calc.)	1.728
st.dev.(D5191:20)	0.3717
R(D5191:20)	1.041

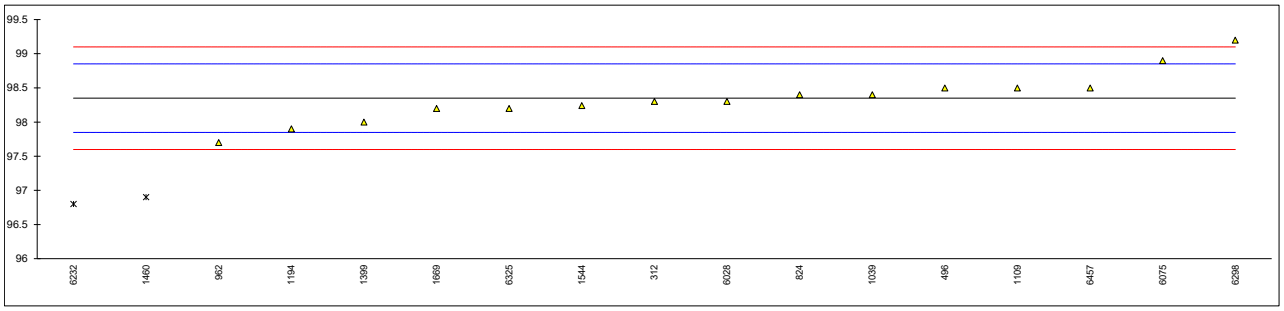


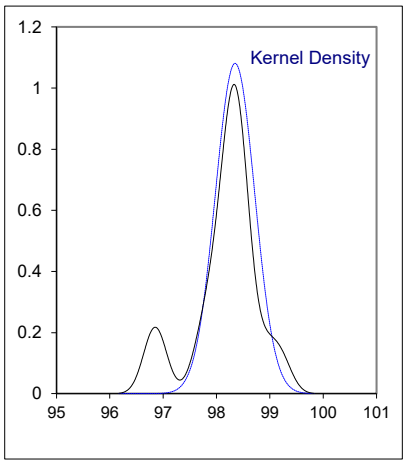


Determination of RON on sample #22072;

lab	method	value	mark	z(targ)	remarks
312	ISO5164	98.3		-0.20	
496	ISO5164	98.5		0.60	
541		-----		-----	
824	D2699	98.4		0.20	
962	D2699	97.7		-2.60	
1039	ISO5164	98.40		0.20	
1109	D2699	98.5		0.60	
1194	D2699	97.9		-1.80	
1399	D2699	98.0		-1.40	
1460	In house	96.9	C,DG(0.05)	-5.80	first reported 96.5
1544	ISO5164	98.24		-0.44	
1669	ISO5164	98.2		-0.60	
6028	ISO5164	98.3		-0.20	
6075	ISO5164	98.90		2.20	
6232	D2699	96.8	C,DG(0.05)	-6.20	first reported 95.86
6298	D2699	99.2		3.40	
6325	D2699	98.2		-0.60	
6457	D2699	98.5		0.60	

normality	suspect
n	15
outliers	2
mean (n)	98.35
st.dev. (n)	0.369
R(calc.)	1.03
st.dev.(ISO5164:14)	0.250
R(ISO5164:14)	0.7

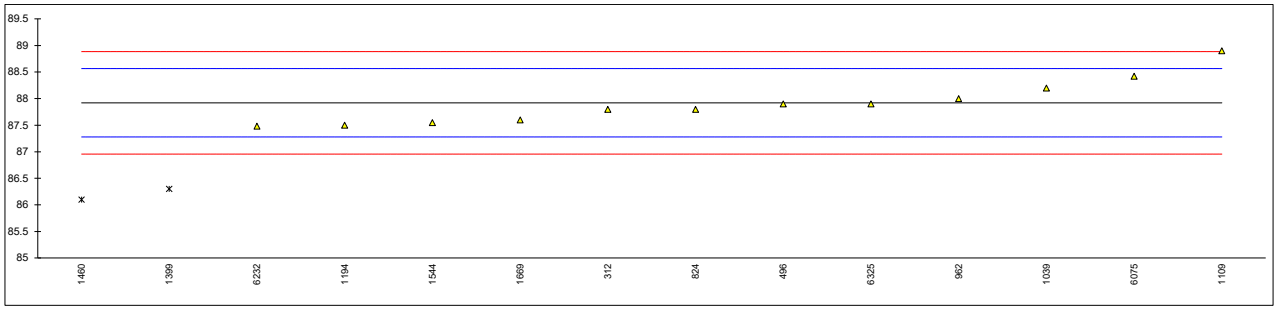


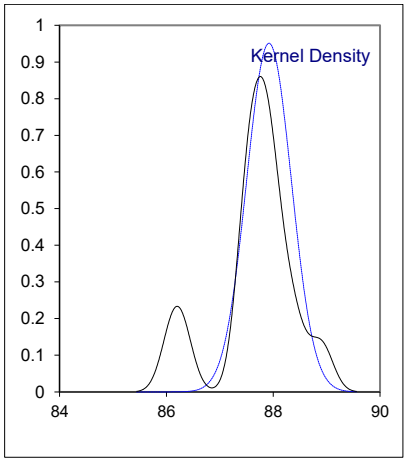


Determination of MON on sample #22072;

lab	method	value	mark	z(targ)	remarks
312	ISO5163	87.8		-0.38	
496	ISO5163	87.9		-0.06	
541		-----		-----	
824	D2700	87.8		-0.38	
962	D2700	88.0		0.25	
1039	ISO5163	88.20		0.87	
1109	D2700	88.9		3.05	
1194	D2700	87.5		-1.31	
1399	D2700	86.3	DG(0.05)	-5.04	
1460	In house	86.1	C,DG(0.05)	-5.66	first reported 86
1544	ISO5163	87.55		-1.15	
1669	ISO5163	87.6		-1.00	
6028		-----		-----	
6075	ISO5163	88.42		1.55	
6232	D2700	87.48		-1.37	
6298		-----		-----	
6325	D2700	87.9		-0.06	
6457		-----		-----	

normality	not OK
n	12
outliers	2
mean (n)	87.92
st.dev. (n)	0.419
R(calc.)	1.17
st.dev.(ISO5163:14)	0.321
R(ISO5163:14)	0.9





APPENDIX 2

Determination of Other Oxygenates on sample #22070; results in %V/V

lab	MeOH	i-PrOH	i-BuOH	t-buOH	DIPE	ETBE	TAME	Sum of Other Oxygenates
171	0.07	<0.01	<0.01	<0.01	0.04	0.05	<0.01	0.17
223	-----	-----	-----	-----	-----	-----	-----	-----
312	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1
496	-----	-----	-----	-----	-----	-----	-----	-----
541	-----	-----	-----	-----	-----	-----	-----	-----
824	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2 C
962	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-----
1039	0.08	-----	-----	-----	-----	0.0	-----	-----
1109	-----	-----	-----	-----	-----	-----	-----	-----
1126	0.10	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	12.52
1194	0	-----	-----	0	0.3	0	0.6	-----
1205	-----	-----	-----	-----	-----	-----	-----	-----
1237	<0,10	<0,10	<0.10	<0.10	<0,10	<0,10	<0,10	<0,10
1399	0.00	0.00	0.00	0.00	0.00	0.11	0.00	-----
1412	-----	-----	-----	-----	-----	-----	-----	-----
1460	-----	-----	-----	-----	-----	-----	-----	-----
1549	<1,7	-----	-----	<1,6	<1,2	<2,0	<1,5	-----
1550	<1.7	-----	-----	<1.6	<1.2	<2.0	<1.5	-----
6028	-----	0.12	-----	-----	-----	-----	0.34	-----
6075	-----	-----	-----	-----	-----	-----	-----	-----
6232	0.13	-----	-----	-----	-----	0	0	-----
6298	<0.20	<0.20	<0.20	<0.20	0.23	<0.20	<0.20	<0.20
6325	<0.01	0.04	0.03	<0.01	0.03	1.47	<0.01	0.05
6332	-----	-----	-----	-----	-----	-----	-----	-----
6346	-----	-----	-----	-----	-----	-----	-----	-----
6378	-----	-----	-----	-----	-----	-----	-----	-----
6404	0.10	0	0	0	0	0	0	-----
6457	-----	-----	-----	-----	-----	-----	-----	-----

Lab 824 first reported 12.678

APPENDIX 3

z-scores Distillation at 760 mmHg

lab	IBP	10% eva	50% eva	90% eva	FBP	%E70°C	%E100°C	%E150°C
171	-1.87	1.08	0.85	0.59	0.06	-0.23	-0.31	0.69
223	3.79	1.29	-0.53	0.22	-0.14	-----	-----	-----
312	-0.92	-0.96	-0.74	-0.31	-0.18	0.60	0.07	0.26
496	-0.26	-0.26	-0.46	-0.36	0.45	0.18	0.20	0.69
541	0.16	4.60	1.61	-0.99	-0.61	-3.60	-0.42	-1.08
824	0.22	-0.12	-0.39	-0.04	-0.26	0.08	-0.31	0.04
962	-1.27	1.29	-0.67	-0.52	0.14	-0.44	-0.18	0.69
1039	0.34	-0.47	-0.60	-0.15	0.45	0.60	-0.05	0.47
1109	-1.75	-1.24	-0.46	-0.04	0.17	0.18	-0.18	0.04
1126	-0.14	-1.31	-1.29	-0.31	0.29	-0.85	-2.73	-4.91
1194	-----	-----	-----	-----	-----	-----	-----	-----
1205	-1.69	-0.40	-0.19	-0.04	0.33	-0.13	-0.69	0.26
1237	-0.26	-1.81	-1.29	-0.57	0.02	1.43	0.33	0.04
1399	1.41	-2.79	-0.46	0.01	-----	0.60	-0.43	-0.61
1412	0.99	2.56	1.54	-0.15	-0.18	-----	0.71	-4.48
1460	-1.39	-0.89	-0.88	-0.46	0.21	0.81	0.07	0.90
1549	0.72	-0.22	-0.07	0.26	-0.98	1.22	0.33	0.47
1550	1.12	-0.07	0.35	0.51	-0.98	1.95	0.33	0.47
6028	0.51	0.59	0.64	0.43	-0.02	-1.17	-1.71	-1.25
6075	-2.64	-2.02	-1.15	0.22	-0.38	1.53	0.46	0.04
6232	0.99	1.85	0.51	4.33	0.61	-2.31	-2.47	-6.64
6298	-----	-----	-----	-----	-----	-----	-----	-----
6325	0.22	-0.26	-0.39	-0.20	0.10	0.18	0.07	-2.11
6332	1.17	1.50	1.34	1.01	0.10	-1.99	-----	-----
6346	-----	-----	-----	-----	-----	-----	-----	-----
6378	3.37	0.45	0.51	0.90	0.61	-1.79	-----	-----
6404	-----	-----	-----	-----	-----	-----	-----	-----
6457	0.99	2.21	2.24	2.22	0.21	-----	-----	-----

APPENDIX 4

Number of participants per country

1 lab in ARGENTINA
1 lab in AUSTRALIA
1 lab in AUSTRIA
1 lab in AZERBAIJAN
1 lab in BELGIUM
1 lab in BOSNIA and HERZEGOVINA
3 labs in BULGARIA
1 lab in CYPRUS
1 lab in EGYPT
1 lab in GERMANY
2 labs in GREECE
1 lab in KENYA
1 lab in KOREA, Republic of
1 lab in MALI
1 lab in MARTINIQUE
3 labs in NETHERLANDS
2 labs in SAUDI ARABIA
1 lab in SLOVENIA
1 lab in SOUTH AFRICA
2 labs in SPAIN
1 lab in TANZANIA
1 lab in TUNISIA
1 lab in UGANDA
1 lab in UNITED ARAB EMIRATES
1 lab in UNITED STATES OF AMERICA

APPENDIX 5

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), G(1)	= outlier in Grubbs' outlier test
G(0.05), G(5)	= straggler in Grubbs' outlier test
DG(0.01), DG(1)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01), R(1)	= 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
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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)
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