



Institute for
Interlaboratory Studies

Results of Proficiency Test Gasoline (premium) May 2023

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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

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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 2022/2023 it was decided to continue the round robin for the analysis of Gasoline (premium).

In this interlaboratory study registered for participation:

- 31 laboratories in 27 countries for regular analyzes in Gasoline (premium) iis23B03
- 19 laboratories in 17 countries on DVPE analyzes in Gasoline (premium) iis23B03DVPE
- 17 laboratories in 16 countries on RON and MON analyzes in Gasoline (premium) iis23B03RON

In total 33 laboratories in 28 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
#23065	iis23B03	1x 1 L	Regular analyzes
#23066	iis23B03DVPE	1x 1 L (75% filled)	DVPE
#23067	iis23B03RON	2x 1 L	RON/MON analyzes

Table 1: Gasoline premium samples used in PT iis23B03

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 regular analyzes in premium Gasoline and for RON/MON analyzes in premium Gasoline a batch of approximately 100 liters of Gasoline (premium quality) was obtained from the local market. After homogenization 40 and 45 amber glass bottles of 1 L were filled and labelled #23065 and #23067 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	738.50
sample 2	738.44
sample 3	738.38
sample 4	738.49
sample 5	738.45
sample 6	738.50
sample 7	738.45
sample 8	738.42

Table 2: homogeneity test results of subsamples #23065 and #23067

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)	0.12
reference test method	ISO12185:96
0.3 x R (reference test method)	0.45

Table 3: evaluation of the repeatability of subsamples #23065 and #23067

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 determination of DVPE in premium Gasoline a batch of approximately 40 liters of Gasoline (premium quality) was obtained from the local market. After homogenization 45 amber glass bottles of 1 L were filled with 750 mL Gasoline (premium quality) and labelled #23066.

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 #23066-1	13.5
sample #23066-2	13.5
sample #23066-3	13.5
sample #23066-4	13.5
sample #23066-5	13.5
sample #23066-6	13.6
sample #23066-7	13.6
sample #23066-8	13.6

Table 4: homogeneity test results of subsamples #23066

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)	0.1
reference test method	D5191:22
0.3 x R (reference test method)	0.1

Table 5: evaluation of the repeatability of subsamples #23066

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 5, 2023. 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 #23065: 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, Temp. 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 #23066 it was requested to determine Total Vapor Pressure and Dry Vapor Pressure Equivalent (DVPE).

On sample #23067 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:

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

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

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

The usual interpretation of z-scores is as follows:

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

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Therefore, the reporting time on the data entry portal was extended with another week. For the round with the regular analyzes one participant reported test results after the extended reporting date and seven other participants were not able to report any test results. For the PT on DVPE one participant reported test results after the extended reporting date and four other participants were not able to report any test results. For the PT on RON/MON one participant reported test results after the extended reporting date and five other participants were not able to report any test results. Not all participants were able to report all tests requested.

In total 26 participants reported 399 numerical test results. Observed were 16 outlying test results, which is 4.0%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

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

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section the reported test results are discussed per sample and per test. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 5.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D4052) and an added designation for the year that the test method was adopted or revised (e.g. D4052:22).

sample #23065

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

Appearance: This determination was not problematic. All 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.

Aromatics by GC: This determination in %V/V was not problematic. No statistical outliers were observed. The calculated reproducibility is 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.

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

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

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

Distillation at 760 mmHg: This determination was not problematic for five of the eight reported distillation parameters. In total fourteen statistical outliers were observed. The calculated reproducibilities of temperature at 90% evaporated, Final Boiling Point and % evaporated at 70 °C, 100 °C and 150 °C after rejection of the statistical outliers are in agreement with the requirements of ISO3405:19 automatic mode. The calculated reproducibilities for IBP, temperature at 10% evaporated and 50% evaporated are not in agreement. When compared to the manual mode only the calculated reproducibility for IBP and FBP are 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. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO6246:17/AMD1:19.

Lead as Pb: This determination may not be problematic. Eight 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. Nine reporting participants agreed on a level of <0.5 mg/L. Therefore, no z-scores are calculated.

Olefins by FIA (without oxygenates correction): 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 EN15553:21.

Olefins by GC: The determination in %V/V was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is 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. No statistical outliers were observed in the test results reported in %M/M.

Oxidation Stability: This determination was not problematic. Nine reporting participants agreed on an Oxidation Stability of >360 minutes. Therefore, no z-scores are calculated.

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

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

The participants agreed on a concentration near or below the limit of detection for all other Oxygenates mentioned in paragraph 2.6. Therefore, no z-scores are calculated for these elements. The reported test results are given in appendix 2.

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

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

sample #23066

Total Vapor Pressure: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of D5191:22.

DVPE (acc. to D5191): The Total Vapor Pressure can be converted to Dry Vapor Pressure Equivalent (DVPE) according to D5191. This conversion was also very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of D5191:22.

sample #23067

RON: The determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ISO5164:14.

MON: The determination was problematic. No statistical outliers were observed. The calculated reproducibility 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		10	59.9	0.4	0.6
Appearance		17	Cl. and Br.	n.a.	n.a.
Aromatics by FIA *)	%V/V	7	33.1	5.4	3.7
Aromatics by GC in %V/V	%V/V	15	31.7	1.1	1.6
Aromatics by GC in %M/M	%M/M	8	37.5	1.2	n.a.
Benzene	%V/V	17	0.37	0.05	0.03
Copper Corrosion 3 hrs at 50 °C		17	1 (1a)	n.a.	n.a.
Density at 15 °C	kg/m ³	20	739.1	1.9	1.5
Initial Boiling Point	°C	22	25.9	5.4	4.7
Temp. at 10% evaporated	°C	22	41.5	6.4	4.3
Temp. at 50% evaporated	°C	20	97.3	4.9	4.0
Temp. at 90% evaporated	°C	19	139.3	5.3	5.2
Final Boiling Point	°C	22	167.8	4.2	7.1
% evap.at 70 °C, E70	%V/V	14	30.9	1.9	2.7
% evap. at 100 °C, E100	%V/V	13	53.1	0.9	2.2
% evap.at 150 °C, E150	%V/V	12	95.8	0.8	1.3
Doctor Test		11	Negative	n.a.	n.a.
Gum (solvent washed)	mg/100mL	10	0.63	1.24	2.17
Lead as Pb	mg/L	8	<2.5	n.e.	n.e.
Manganese as Mn	mg/L	9	<0.5	n.e.	n.e.
Olefins by FIA *)	%V/V	6	11.4	2.9	3.5
Olefins by GC in %V/V	%V/V	13	10.3	0.6	1.7
Olefins by GC in %M/M	%M/M	10	9.3	0.5	n.a.
Oxidation Stability	minutes	9	>360	n.e.	n.e.
Ethers (C5 or more C atoms)	%V/V	14	7.6	0.5	0.5
MTBE	%V/V	17	7.5	0.6	0.3
Oxygen content	%M/M	17	1.4	0.1	0.2
Sulfur	mg/kg	21	5.2	3.0	1.9

Table 6: reproducibilities of tests on sample #23065

*) without oxygenates correction

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Vapor Pressure	kPa	10	100.2	2.8	1.3
DVPE acc. to D5191	kPa	15	92.6	2.5	1.2

Table 7: reproducibilities of tests on sample #23066

Parameter	unit	n	average	2.8 * sd	R(lit)
RON		12	98.8	1.0	0.7
MON		11	87.9	1.4	0.9

Table 8: reproducibilities of tests on sample #23067

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 MAY 2023 WITH PREVIOUS PTS

	May 2023	May 2022	April 2021	April 2020
Number of reporting laboratories	26	31	24	20
Number of test results	399	453	467	439
Number of statistical outliers	16	32	25	19
Percentage of statistical outliers	4.0%	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 2023	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.	n.e.	++	+
Ethers (C5 or more C atoms)	+	-	+/-	+/-
ETBE	n.e.	n.e.	++	n.e.
MTBE	-	-	-	+/-

Determination	May 2023	May 2022	April 2021	April 2020
Oxygen content	+	-	++	+
Sulfur	-	+/-	-	-
Total Vapor 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:

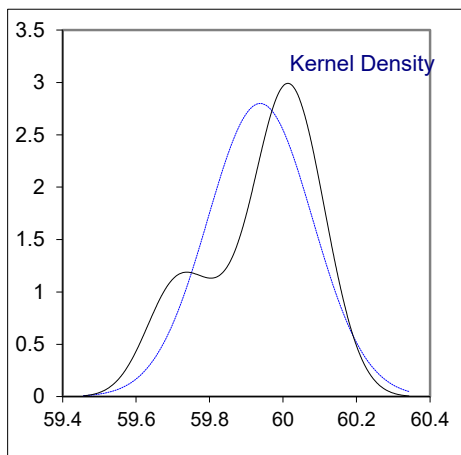
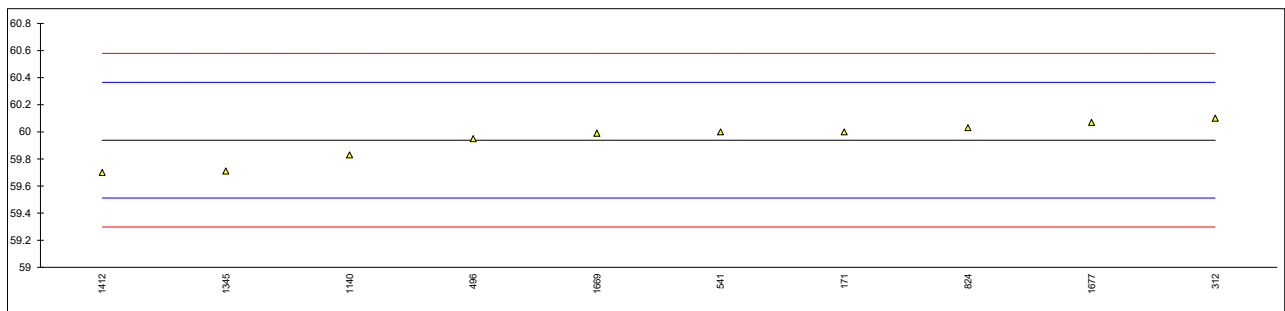
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- : group performed worse than the reference test method
- : group performed much worse than the reference test method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

APPENDIX 1

Determination of API Gravity on sample #23065;

lab	method	value	mark	z(targ)	remarks
171	D4052	60.0		0.29	
223		----		----	
300		----		----	
312	ISO12185	60.1		0.76	
496	D4052	59.95		0.06	
541	D4052	60.0		0.29	
824	ISO12185	60.03		0.43	
1039		----		----	
1059		----		----	
1126		----		----	
1140	D287	59.83		-0.51	
1150		----		----	
1194		----		----	
1237		----		----	
1272		----		----	
1320		----		----	
1345	D4052	59.71		-1.07	
1399		----		----	
1412	D4052	59.70		-1.11	
1460		----		----	
1669	D4052	59.99		0.24	
1677	D4052	60.07		0.62	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	

normality OK
n 10
outliers 0
mean (n) 59.938
st.dev. (n) 0.1426
R(calc.) 0.399
st.dev.(D4052:22) 0.2135
R(D4052:22) 0.598



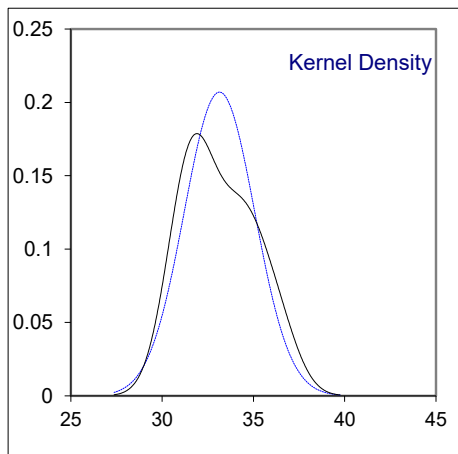
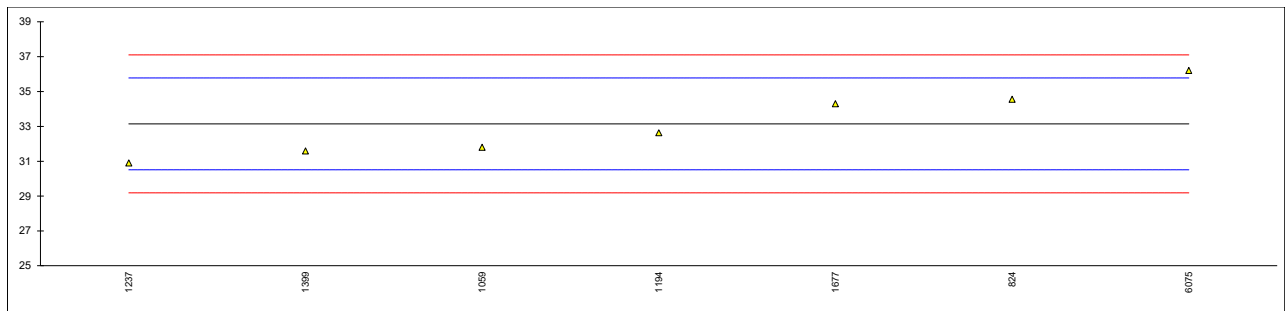
Determination of Appearance on sample #23065;

lab	method	value	mark	z(targ)	remarks
171	D4176	Clear & Bright		----	
223	Visual	Clear & Bright		----	
300		----		----	
312	Visual	br&cl		----	
496	Visual	clear & bright		----	
541	D4176	Pass (Clear & Bright)		----	
824	Visual	Clear & Bright		----	
1039	D4176	Clear & Bright		----	
1059	Visual	clear & bright		----	
1126		----		----	
1140	Visual	C+B		----	
1150		----		----	
1194		----		----	
1237		----		----	
1272		----		----	
1320		----		----	
1345	D4176	clear & bright		----	
1399	Visual	Pass C&B		----	
1412	D4176	C&B		----	
1460		----		----	
1669	Visual	c&B		----	
1677	Visual	Clear and Bright		----	
1720		----		----	
6075	Visual	Clear and Bright		----	
6238		----		----	
6332	Visual	Clear and Bright		----	
6378	Visual	Clear and Bright		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
	n	17			
	mean (n)	Clear and Bright			

Determination of Aromatics by FIA (without oxygenates correction) on sample #23065; results in %V/V

lab	method	value	mark	z(targ)	remarks
171		----		----	
223		----		----	
300		----		----	
312		----		----	
496		----		----	
541		----		----	
824	D1319	34.56		1.07	
1039		----		----	
1059	EN15553	31.8		-1.02	
1126		----		----	
1140		----		----	
1150		----		----	
1194	D1319	32.63		-0.39	
1237	EN15553	30.9		-1.70	
1272		----		----	
1320		----		----	
1345		----		----	
1399	D1319	31.59		-1.17	
1412		----		----	
1460		----		----	
1669		----		----	
1677	D1319	34.3		0.88	
1720		----		----	
6075	EN15553	36.21		2.32	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	

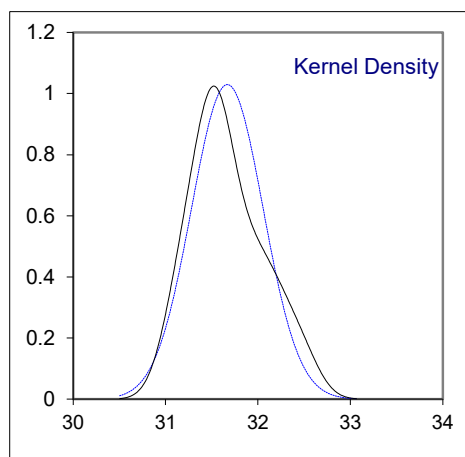
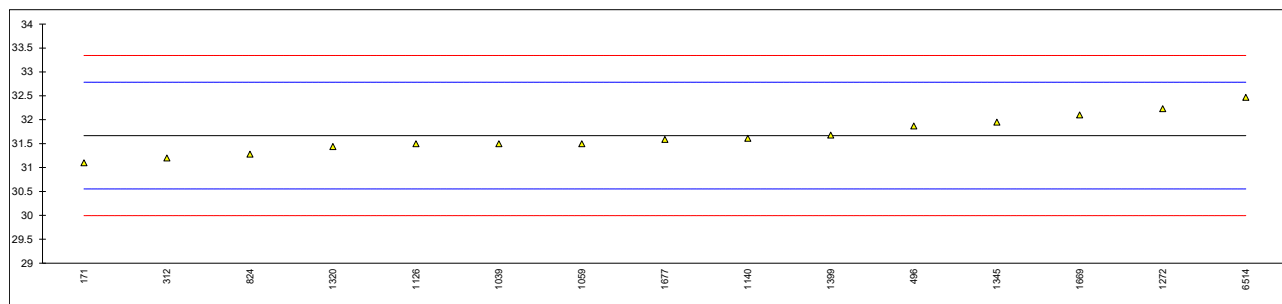
normality unknown
n 7
outliers 0
mean (n) 33.141
st.dev. (n) 1.9263
R(calc.) 5.394
st.dev.(EN15553:21) 1.3214
R(EN15553:21) 3.7



Determination of Aromatics by GC on sample #23065; results in %V/V

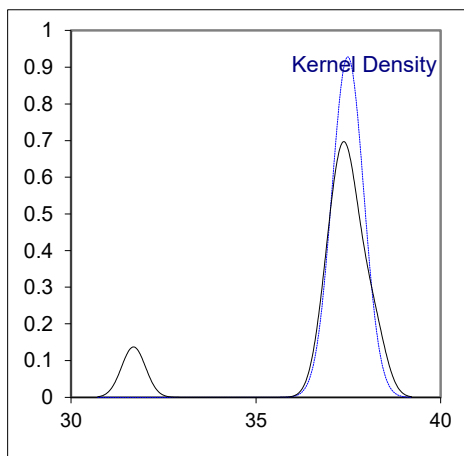
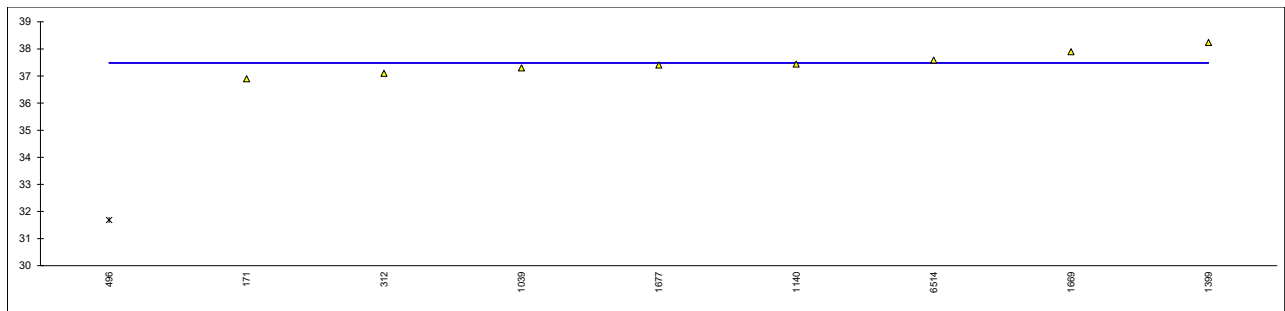
lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	31.1		-1.02	
223		----		----	
300		----		----	
312	ISO22854-A	31.2		-0.84	
496	ISO22854-A	31.87		0.36	
541		----		----	
824	D5580	31.28		-0.69	
1039	ISO22854-A	31.50		-0.30	
1059	ISO22854-A	31.5		-0.30	
1126	ISO22854-A	31.50	C	-0.30	First reported 37.35
1140	ISO22854-A	31.61		-0.10	
1150		----		----	
1194		----		----	
1237		----		----	
1272	ISO22854-A	32.23		1.01	
1320	ISO22854-A	31.44		-0.41	
1345	D6730	31.949	C	0.50	First reported 28.692
1399	D5443	31.68		0.02	
1412		----		----	
1460		----		----	
1669	ISO22854-A	32.1		0.77	
1677	D6839	31.59		-0.14	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	32.47		1.44	
6524		----		----	
6530		----		----	
7002		----		----	

normality OK
n 15
outliers 0
mean (n) 31.668
st.dev. (n) 0.3877
R(calc.) 1.085
st.dev.(ISO22854-A:21) 0.5584
R(ISO22854-A:21) 1.563



Determination of Aromatics by GC on sample #23065; results in %M/M

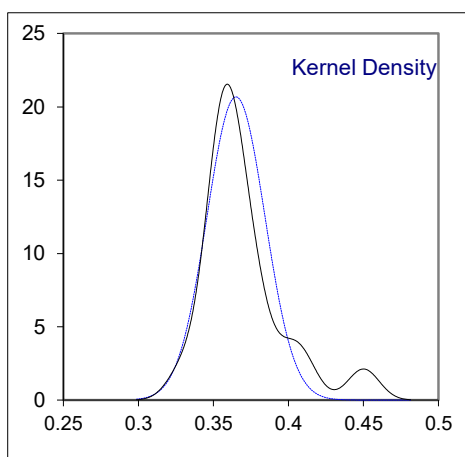
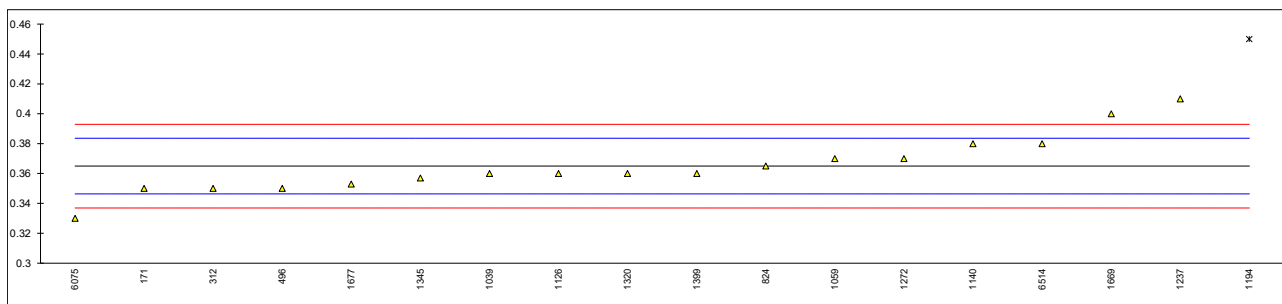
lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	36.9		----	
223		----		----	
300		----		----	
312	ISO22854-A	37.1		----	
496	ISO22854-A	31.69	G(0.01)	----	
541		----		----	
824		----		----	
1039	ISO22854-A	37.30		----	
1059		----		----	
1126		----		----	
1140	ISO22854-A	37.44		----	
1150		----		----	
1194		----		----	
1237		----		----	
1272		----		----	
1320		----		----	
1345		----		----	
1399	D5443	38.245		----	
1412		----		----	
1460		----		----	
1669	ISO22854-A	37.9		----	
1677	D6839	37.41		----	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	37.59		----	
6524		----		----	
6530		----		----	
7002		----		----	
normality		OK			
n		8			
outliers		1			
mean (n)		37.486			
st.dev. (n)		0.4298			
R(calc.)		1.203			
st.dev.(lit)		n.a.			
R(lit)		n.a.			



Determination of Benzene on sample #23065; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	0.35		-1.61	
223		----		----	
300		----		----	
312	ISO22854-A	0.35		-1.61	
496	ISO22854-A	0.35		-1.61	
541		----		----	
824	D5580	0.365		0.00	
1039	ISO22854-A	0.36		-0.54	
1059	ISO22854-A	0.37		0.54	
1126	ISO22854-A	0.36	C	-0.54	First reported 0.43
1140	ISO22854-A	0.38		1.61	
1150		----		----	
1194	D6277	0.45	G(0.05)	9.12	
1237	EN238	0.41		4.83	
1272	ISO22854-A	0.37		0.54	
1320	ISO22854-A	0.36		-0.54	
1345	D6730	0.357		-0.86	
1399	D5580	0.36		-0.54	
1412		----		----	
1460		----		----	
1669	ISO22854-A	0.4		3.75	
1677	D3606	0.353		-1.29	
1720		----		----	
6075	EN238	0.33		-3.75	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	0.38		1.61	
6524		----		----	
6530		----		----	
7002		----		----	

normality suspect
n 17
outliers 1
mean (n) 0.365
st.dev. (n) 0.0193
R(calc.) 0.054
st.dev.(ISO22854-A:21) 0.0093
R(ISO22854-A:21) 0.026



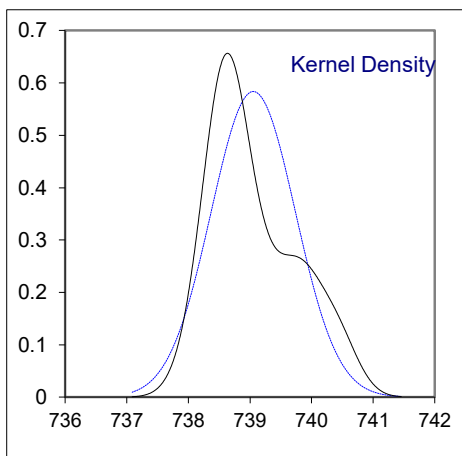
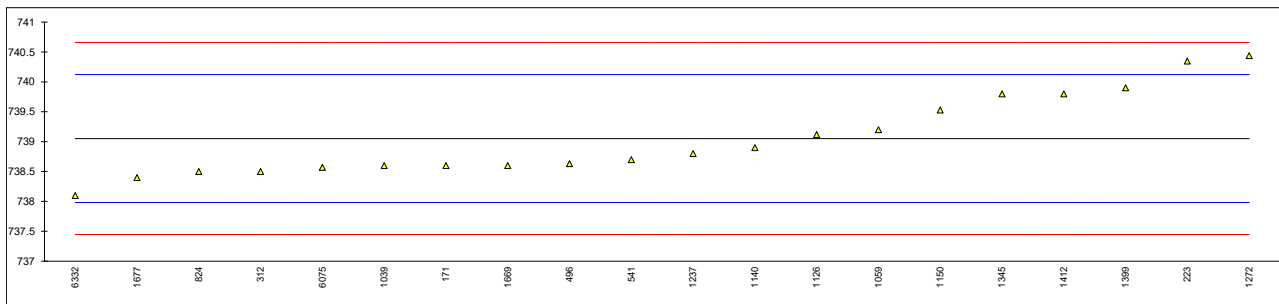
Determination of Copper Corrosion 3 hrs at 50 °C on sample #23065;

lab	method	value	mark	z(targ)	remarks
171	D130	1a		----	
223		----		----	
300		----		----	
312	ISO2160	1a		----	
496	ISO2160	1a		----	
541	D130	1a		----	
824	D130	1a		----	
1039	ISO2160	1A		----	
1059	ISO2160	1a		----	
1126		----		----	
1140	IP154	1A		----	
1150	ISO2160	1a		----	
1194		----		----	
1237		----		----	
1272	ISO2160	1a		----	
1320		----		----	
1345	D130	1a		----	
1399	D130	1		----	
1412	D130	1a		----	
1460		----		----	
1669	ISO2160	1a		----	
1677	D130	1a		----	
1720		----		----	
6075	ISO2160	1A		----	
6238		----		----	
6332	D130	1A		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
	n	17			
	mean (n)	1 (1a)			

Determination of Density at 15 °C on sample #23065; results in kg/m³

lab	method	value	mark	z(targ)	remarks
171	ISO12185	738.6		-0.84	
223	D4052	740.35		2.42	
300		-----		-----	
312	ISO12185	738.5		-1.03	
496	ISO12185	738.63		-0.79	
541	D4052	738.7		-0.66	
824	ISO12185	738.5		-1.03	
1039	ISO12185	738.6		-0.84	
1059	ISO12185	739.2		0.28	
1126	ISO12185	739.12		0.13	
1140	IP365	738.9		-0.28	
1150	ISO12185	739.53		0.89	
1194		-----		-----	
1237	ISO12185	738.8		-0.47	
1272	ISO12185	740.44		2.59	
1320		-----		-----	
1345	D4052	739.8		1.40	
1399	D4052	739.9		1.58	
1412	D4052	739.8		1.40	
1460		-----		-----	
1669	ISO12185	738.6		-0.84	
1677	D4052	738.4		-1.22	
1720		-----		-----	
6075	ISO12185	738.57		-0.90	
6238		-----		-----	
6332	D4052	738.1		-1.78	
6378		-----		-----	
6514		-----		-----	
6524		-----		-----	
6530		-----		-----	
7002		-----		-----	

normality OK
n 20
outliers 0
mean (n) 739.052
st.dev. (n) 0.6836
R(calc.) 1.914
st.dev.(ISO12185:96) 0.5357
R(ISO12185:96) 1.5



Determination of Distillation at 760 mmHg on sample #23065; results in °C

lab	method	IBP	mark	10% eva	mark	50% eva	mark	90% eva	mark	FBP	mark
171	D86-automated	21.5		39.9		96.5		138.1		166.8	
223	D86-automated	25.68		43.31		84.6	C,R(1)	140.52		170.7	
300		----		----		----		----		----	
312	D86-automated	24.0		39.2		96.4		137.9		165.2	
496	ISO3405-automated	27.2		42.3		96.6		138.8		167.7	
541	D86-automated	25.6		41.8		96.5		138.1		166.6	
824	ISO3405-automated	25.2		40.5		96.7		138.6		167.2	
1039	ISO3405-automated	24.9		39.9		96.6		138.3		168.5	
1059	ISO3405-automated	24.8		39.3		95.8		138.0		166.3	
1126		25.2		38.2		96.3		138.2		168.3	
1140	IP123-automated	24.1		39.8		96.2		138.6		168.6	
1150	ISO3405-automated	24.3		44.5		98.6	C	142.55	C	166.65	
1194		----		----		----		----		----	
1237	ISO3405-automated	26.5		39.5		95.8		137.7		168.4	
1272	ISO3405-automated	26.80		45.3		101.2	C	146.5	C,DG(5)	168.3	
1320		----		----		----		----		----	
1345	D86-automated	25.1		42.7		97.5	C	141.5	C	169.7	
1399	D86-automated	28.3		38.6		95.7		138.2		168.7	
1412	D86-manual	25.0		43.5		100.0		142.5	C	169.0	
1460		----		----		----		----		----	
1669	D86-automated	25.4		43.2		100.2		143.8		166.4	
1677	D86-automated	26.7		43.2		96.6		139.2		169.1	
1720		----		----		----		----		----	
6075		25.8		39.1		96.4		138.9		169.9	
6238		----		----		----		----		----	
6332	D86-manual	29		46		----	W	----	W	168.3	
6378	D86-manual	27.5		42.5		100.0		146.0	DG(5)	165.0	
6514		30.8		40.9		95.5		137.5		167.0	
6524		----		----		----		----		----	
6530		----		----		----		----		----	
7002		----		----		----		----		----	
	normality	suspect		OK		suspect		suspect		OK	
	n	22		22		20		19		22	
	outliers	0		0		1		2		0	
	mean (n)	25.881		41.510		97.255		139.314		167.83	
	st.dev. (n)	1.9425		2.2728		1.7340		1.8934		1.4827	
	R(calc.)	5.439		6.364		4.855		5.301		4.152	
	st.dev.(ISO3405-A:19)	1.6786		1.5324		1.4443		1.8470		2.5357	
	R(ISO3405-A:19)	4.7		4.291		4.044		5.172		7.1	
	Compare										
	R(ISO3405-M:19)	5.6		4.472		4.116		3.225		7.2	

Lab 223 first reported 88.66

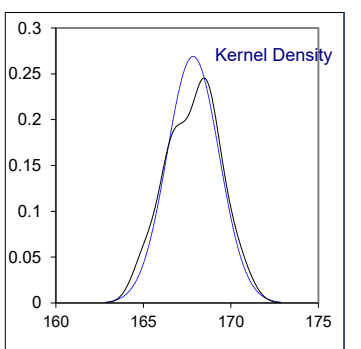
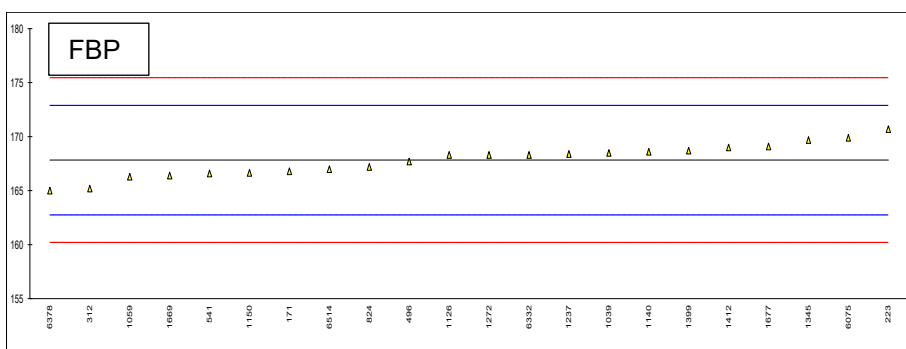
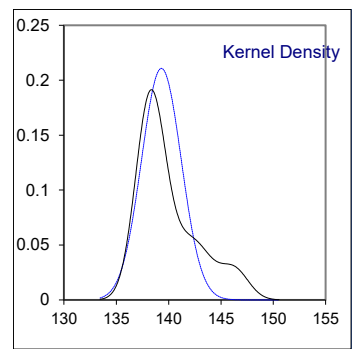
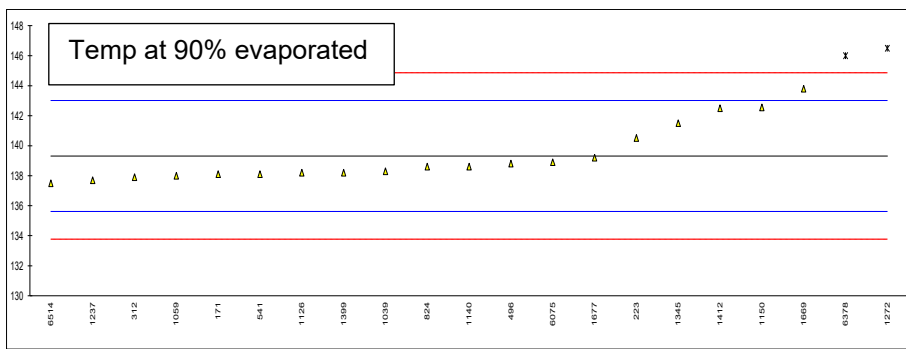
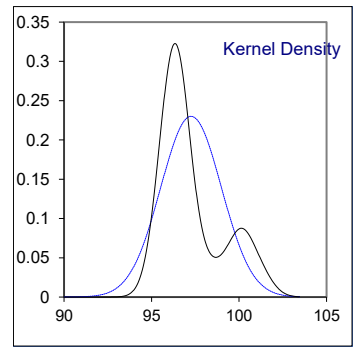
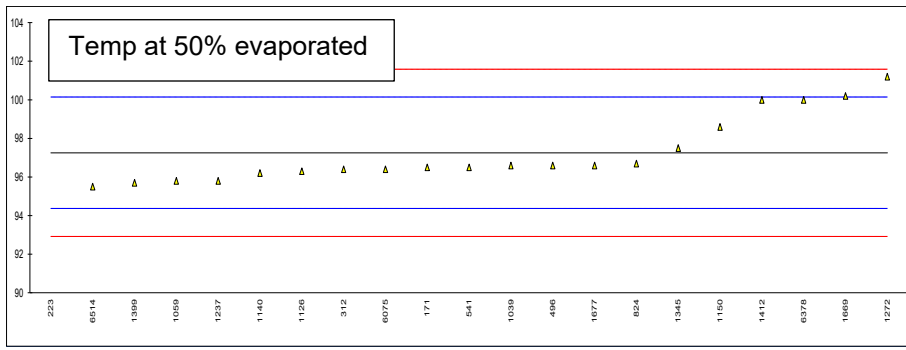
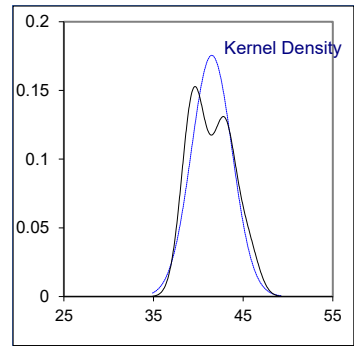
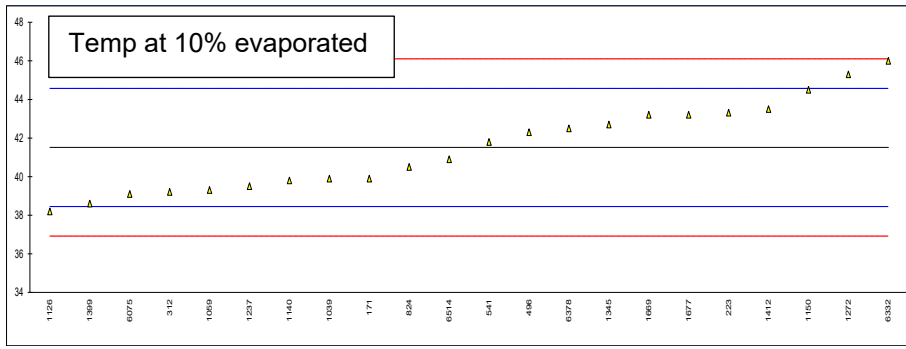
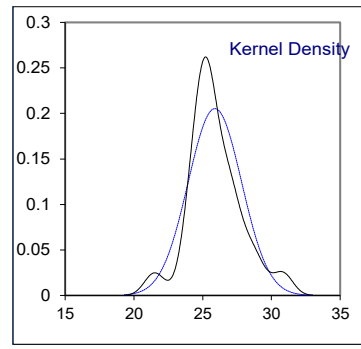
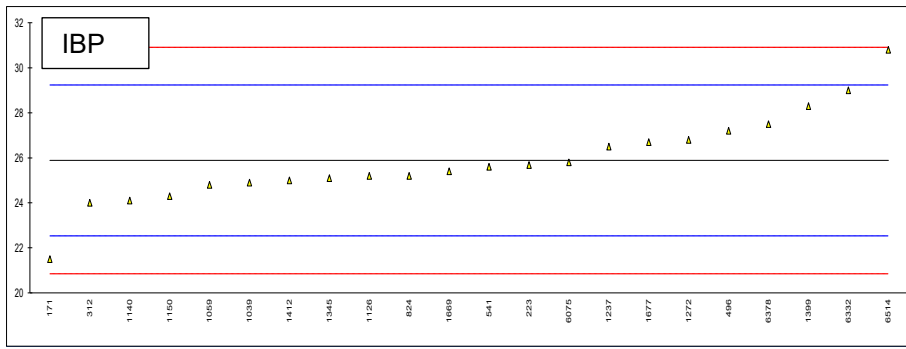
Lab 1150 first reported 100.6 and 145.55 respectively

Lab 1272 first reported 102.1 and 146.6 respectively

Lab 1345 first reported 99.6 and 144.6 respectively

Lab 1412 first reported 145.0

Lab 6332 test result withdrawn, reported 100 and 144.3 respectively



Determination of Distillation at 760 mmHg on sample #23065; results in %V/V ---continued---

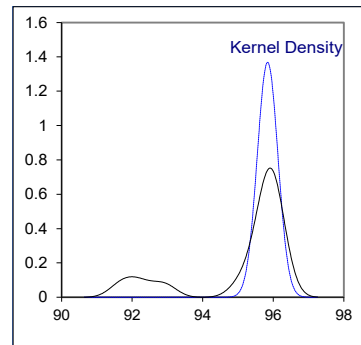
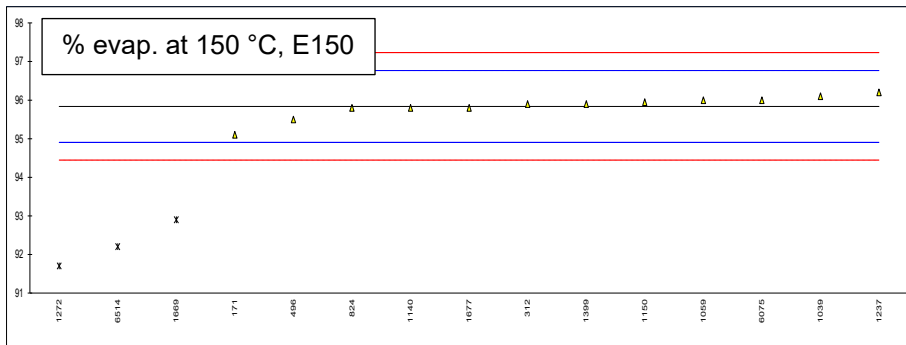
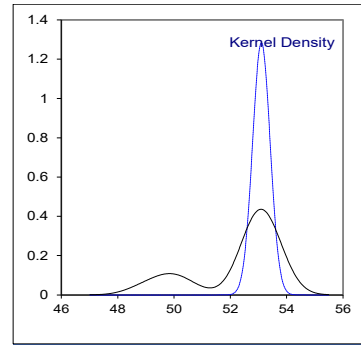
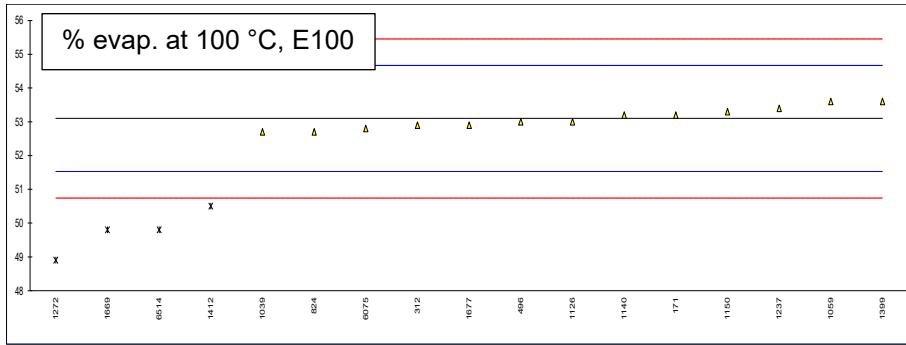
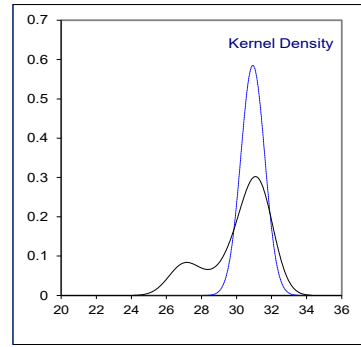
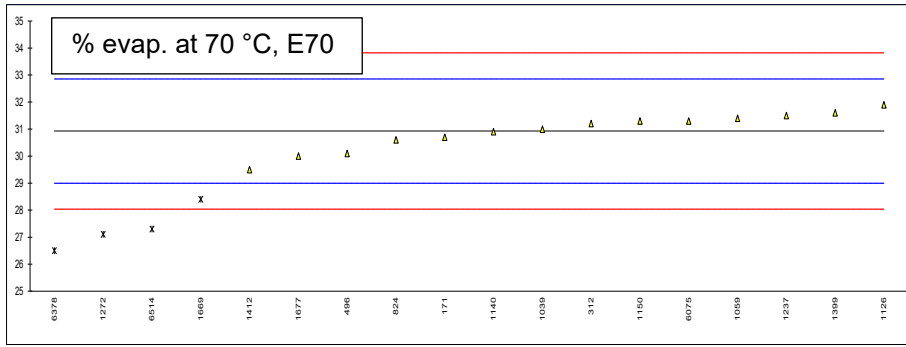
lab	method	%E70 °C	mark	%E100 °C	mark	%E150 °C	mark	%residue	mark	%loss	mark
171	D86-automated	30.7	C	53.2		95.1		1.0		2.6	
223		----		----		----		----		----	
300		----		----		----		----		----	
312	D86-automated	31.2		52.9		95.9		1.0		2.9	
496	ISO3405-automated	30.1		53.0		95.5		1.0		2.7	
541		----		----		----		1.0		2.6	
824	ISO3405-automated	30.6		52.7		95.8		1.0		3.2	
1039	ISO3405-automated	31.0		52.7		96.1		0.9		3.5	
1059	ISO3405-automated	31.4		53.6		96.0		1.0		4.0	
1126		31.9		53.0		----	W	1.1		4.6	
1140	IP123-automated	30.9		53.2		95.8		1.0		2.9	
1150	ISO3405-automated	31.3		53.3		95.95		1.0		2.4	
1194		----		----		----		----		----	
1237	ISO3405-automated	31.5		53.4		96.2		1.0		4.4	
1272	ISO3405-automated	27.1	C,G(1)	48.9	C,G(1)	91.7	C,DG(1)	1.0		1.4	
1320		----		----		----		----		----	
1345		----		----		----		----		----	
1399	D86-automated	31.6		53.6		95.9		1.0		2.6	
1412	D86-manual	29.5		50.5	G(1)	----		----		----	
1460		----		----		----		----		----	
1669	D86-automated	28.4	G(1)	49.8	G(1)	92.9	DG(1)	1.0		3.3	
1677	D86-automated	30.0		52.9		95.8		1.1		2.4	
1720		----		----		----		----		----	
6075		31.3		52.8		96.0		1.0		4.2	
6238		----		----		----		----		----	
6332		----	W	----	W	----	W	0.8		----	W
6378	D86-manual	26.5	G(1)	----		----		1.1		1.9	
6514		27.3	G(1)	49.8	G(1)	92.2	DG(1)	1.0		4.3	
6524		----		----		----		----		----	
6530		----		----		----		----		----	
7002		----		----		----		----		----	
	normality	OK		OK		not OK					
	n	14		13		12					
	outliers	4		4		3					
	mean (n)	30.929		53.100		95.838					
	st.dev. (n)	0.6821		0.3109		0.2916					
	R(calc.)	1.910		0.871		0.817					
	st.dev.(ISO3405-A:19)	0.9643		0.7857		0.4643					
	R(ISO3405-A:19)	2.7		2.2		1.3					

Lab 171 first reported 28.1

Lab 1126 test result withdrawn, reported 91.2

Lab 1272 first reported 26.5, 48.3, 91.4 respectively

Lab 6332 test result withdrawn, reported 27.3, 50, 92 and 7.2 respectively



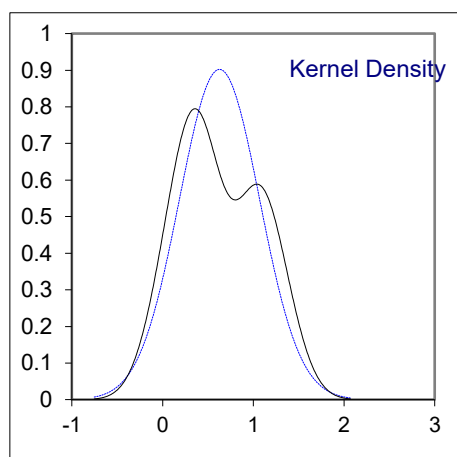
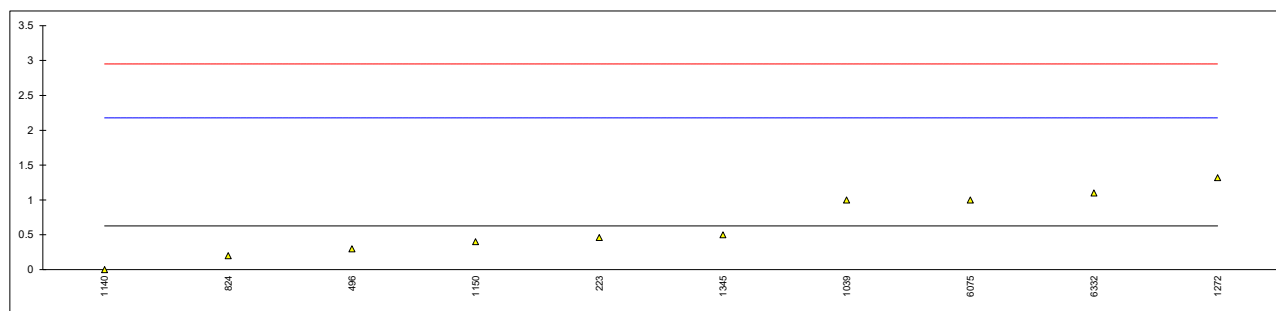
Determination of Doctor Test on sample #23065;

lab	method	value	mark	z(targ)	remarks
171	D4952	negative		----	
223		----		----	
300		----		----	
312	ISO5275	neg		----	
496	ISO5275	negative		----	
541		----		----	
824	D4952	Negative		----	
1039	D4952	neg.		----	
1059	ISO5275	negative		----	
1126		----		----	
1140	IP30	Negative		----	
1150		----		----	
1194		----		----	
1237		----		----	
1272		----		----	
1320		----		----	
1345	D4952	negative		----	
1399	IP30	Negative		----	
1412	D4952	Negative		----	
1460		----		----	
1669		----		----	
1677	IP30	Negative		----	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
	n	11			
	mean (n)	Negative			

Determination of Gum (solvent washed) on sample #23065; results in mg/100mL

lab	method	value	mark	z(targ)	remarks
171	D381	<0.5		----	
223	D381	0.46		-0.22	
300				----	
312	ISO6246	<0.5		----	
496	ISO6246	0.3		-0.42	
541	D381	<0.5		----	
824	D381	0.2		-0.55	
1039	ISO6246	1		0.48	
1059	ISO6246	<0,5		----	
1126				----	
1140	IP131	0.00		-0.81	
1150	ISO6246	0.4		-0.29	
1194				----	
1237				----	
1272	ISO6246	1.32		0.89	
1320				----	
1345	D381	0.5		-0.17	
1399				----	
1412	D381	<1.0		----	
1460				----	
1669	ISO6246	<1.0		----	
1677	D381	< 0.5		----	
1720				----	
6075	ISO6246	1		0.48	
6238				----	
6332	D381	1.1		0.61	
6378				----	
6514				----	
6524				----	
6530				----	
7002				----	

normality OK
n 10
outliers 0
mean (n) 0.628
st.dev. (n) 0.4422
R(calc.) 1.238
st.dev.(ISO6246:17/AMD1:19) 0.7747
R(ISO6246:17/AMD1:19) 2.169



Determination of Lead as Pb on sample #23065; results in mg/L

lab	method	value	mark	z(targ)	remarks
171	D3237	<2.5		----	
223		----		----	
300		----		----	
312	EN237	<2.5		----	
496	EN237	0.645		----	
541		----		----	
824	D3237	<2.5		----	
1039		----		----	
1059	EN13723	<2,5		----	
1126		----		----	
1140	In house	2.00		----	
1150		----		----	
1194		10.43		----	Possibly a false positive test result?
1237		----		----	
1272	IP352	<2,5		----	
1320		----		----	
1345		----		----	
1399	D5059	<2.6		----	
1412		----		----	
1460		----		----	
1669	EN237	<3.0		----	
1677	EN237	< 2.5		----	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
	n	8			
	mean (n)	<2.5			

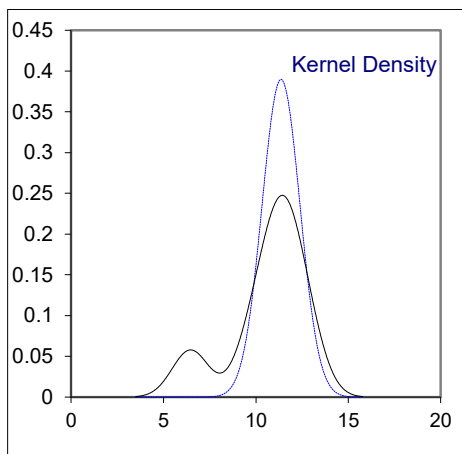
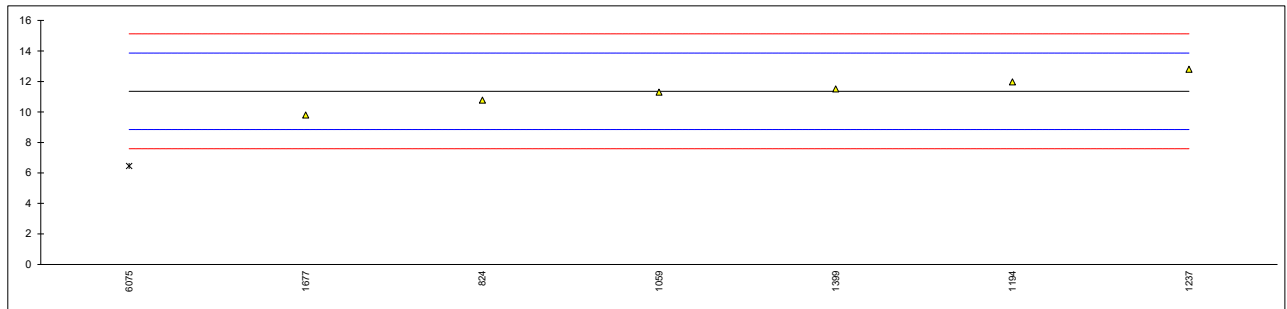
Determination of Manganese as Mn on sample #23065; results in mg/L

lab	method	value	mark	z(targ)	remarks
171	D3831	<0.25		----	
223		----		----	
300		----		----	
312	EN16136	<0.5		----	
496	EN16136	<0.50		----	
541		----		----	
824		----		----	
1039		----		----	
1059		----		----	
1126		----		----	
1140	EN16136	0.39		----	
1150		----		----	
1194		----		----	
1237		----		----	
1272	EN16135	<0,5		----	
1320		----		----	
1345		----		----	
1399	D5059	<0.26		----	
1412	EN16136	<0.5		----	
1460		----		----	
1669	EN16136	<0.50		----	
1677	D3831	< 0.25		----	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
	n	9			
	mean (n)	<0.5			

Determination of Olefins by FIA (without oxygenates correction) on sample #23065; results in %V/V

lab	method	value	mark	z(targ)	remarks
171		----		----	
223		----		----	
300		----		----	
312		----		----	
496		----		----	
541		----		----	
824	D1319	10.78		-0.46	
1039		----		----	
1059	EN15553	11.3		-0.05	
1126		----		----	
1140		----		----	
1150		----		----	
1194	D1319	11.97		0.49	
1237	EN15553	12.8		1.15	
1272		----		----	
1320		----		----	
1345		----		----	
1399	D1319	11.505		0.12	
1412		----		----	
1460		----		----	
1669		----		----	
1677	D1319	9.8		-1.24	
1720		----		----	
6075	EN15553	6.46	G(0.05)	-3.90	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	

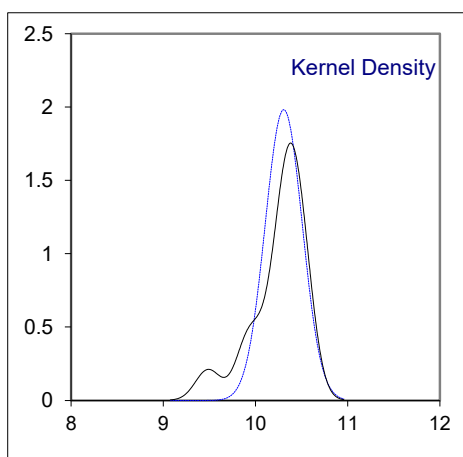
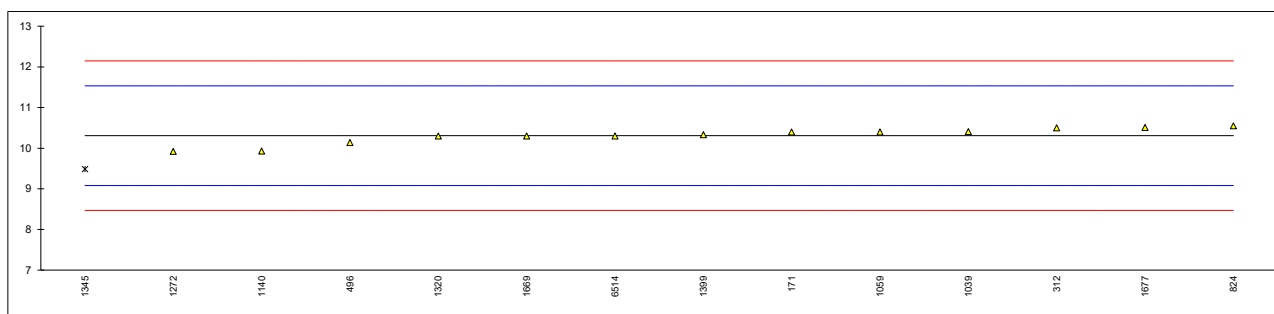
normality unknown
n 6
outliers 1
mean (n) 11.36
st.dev. (n) 1.024
R(calc.) 2.87
st.dev.(EN15553:21) 1.256
R(EN15553:21) 3.52



Determination of Olefins by GC on sample #23065; results in %V/V

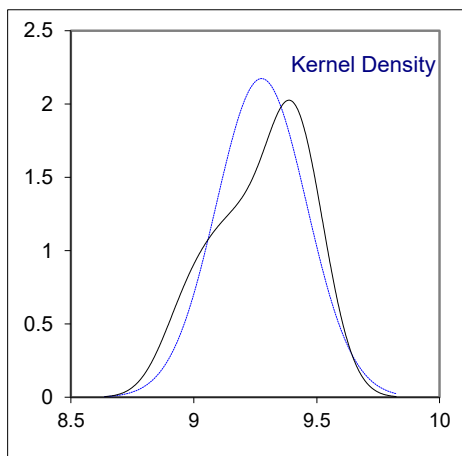
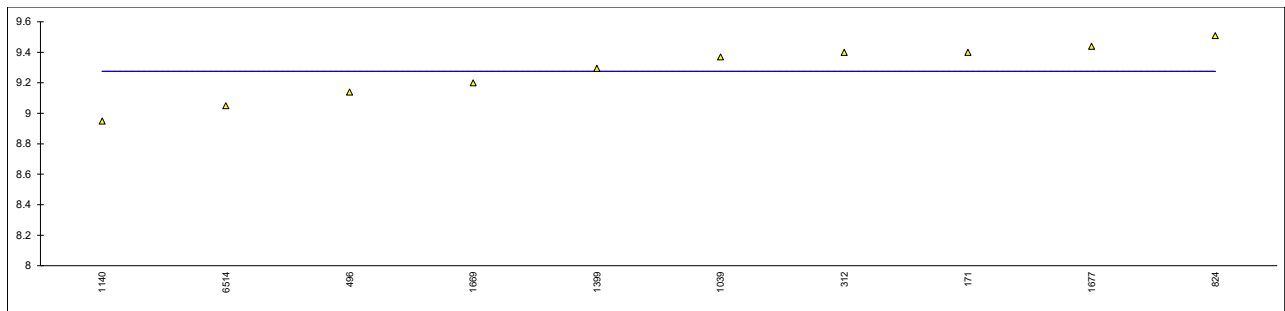
lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	10.4		0.15	
223		----		----	
300		----		----	
312	ISO22854-A	10.5		0.31	
496	ISO22854-A	10.14		-0.27	
541		----		----	
824	D6839	10.55		0.39	
1039	ISO22854-A	10.41		0.17	
1059	ISO22854-A	10.4		0.15	
1126		----		----	
1140	ISO22854-A	9.93		-0.61	
1150		----		----	
1194		----		----	
1237		----		----	
1272	ISO22854-A	9.92		-0.63	
1320	ISO22854-A	10.30		-0.01	
1345	D6730	9.485	G(0.05)	-1.33	
1399	D6839	10.33		0.04	
1412		----		----	
1460		----		----	
1669	ISO22854-A	10.3		-0.01	
1677	D6839	10.51		0.33	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	10.30		-0.01	
6524		----		----	
6530		----		----	
7002		----		----	

normality OK
n 13
outliers 1
mean (n) 10.307
st.dev. (n) 0.2012
R(calc.) 0.563
st.dev.(ISO22854-A:21) 0.6157
R(ISO22854-A:21) 1.724



Determination of Olefins by GC on sample #23065; results in %M/M

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	9.4		----	
223		----		----	
300		----		----	
312	ISO22854-A	9.4		----	
496	ISO22854-A	9.14		----	
541		----		----	
824	D6839	9.51		----	
1039	ISO22854-A	9.37		----	
1059		----		----	
1126		----		----	
1140	ISO22854-A	8.95		----	
1150		----		----	
1194		----		----	
1237		----		----	
1272		----		----	
1320		----		----	
1345		----		----	
1399	D6839	9.295		----	
1412		----		----	
1460		----		----	
1669	ISO22854-A	9.2		----	
1677	D6839	9.44		----	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	9.05		----	
6524		----		----	
6530		----		----	
7002		----		----	
normality		OK			
n		10			
outliers		0			
mean (n)		9.276			
st.dev. (n)		0.1836			
R(calc.)		0.514			
st.dev. (lit)		n.a.			
R(lit)		n.a.			



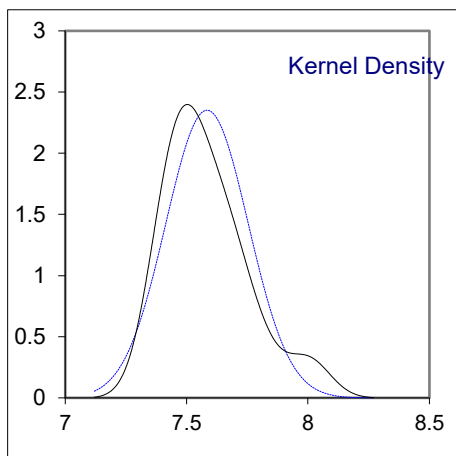
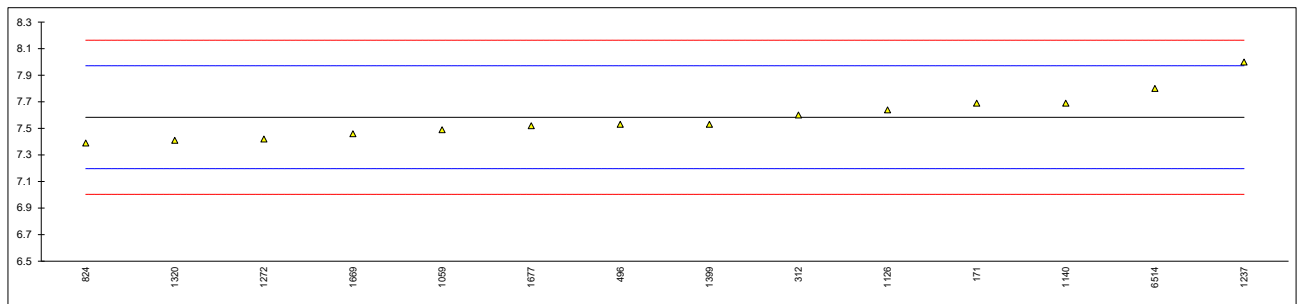
Determination of Oxidation Stability on sample #23065; results in minutes

lab	method	value	mark	z(targ)	remarks
171	D525	>240		----	
223		----		----	
300		----		----	
312	ISO7536	>900		----	
496	ISO7536	>900		----	
541		----		----	
824	D525	>900		----	
1039	ISO7536	>900		----	
1059	ISO7536	>900		----	
1126		----		----	
1140	IP40	>900		----	
1150		----		----	
1194		----		----	
1237		----		----	
1272	ISO7536	>900		----	
1320		----		----	
1345		----		----	
1399		----		----	
1412		----		----	
1460		----		----	
1669	D525	>360		----	
1677	D525	> 900		----	
1720		----		----	
6075		----		----	
6238		----		----	
6332		----		----	
6378		----		----	
6514		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
	n	9			
	mean (n)	>360			

Determination of Ethers (C5 or more C atoms) on sample #23065; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	7.69		0.55	
223		----		----	
300		----		----	
312	ISO22854-A	7.6		0.08	
496	ISO22854-A	7.53		-0.28	
541		----		----	
824	D4815	7.39		-1.00	
1039		----		----	
1059	ISO22854-A	7.49		-0.48	
1126		7.64		0.29	
1140	ISO22854-A	7.69		0.55	
1150		----		----	
1194		----		----	
1237		8.0		2.15	
1272	ISO22854-A	7.42		-0.85	
1320		7.41		-0.90	
1345		----		----	
1399	D4815	7.53		-0.28	
1412		----		----	
1460		----		----	
1669	ISO22854-A	7.46		-0.64	
1677	D6839	7.52		-0.33	
1720		----		----	
6075	EN13132	<0.1		<-38.68	Possibly a false negative test result?
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	7.80		1.12	
6524		----		----	
6530		----		----	
7002		----		----	

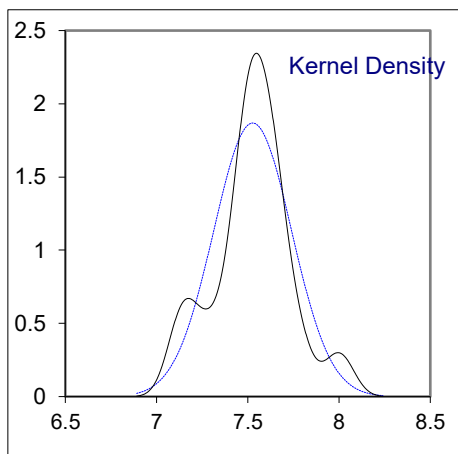
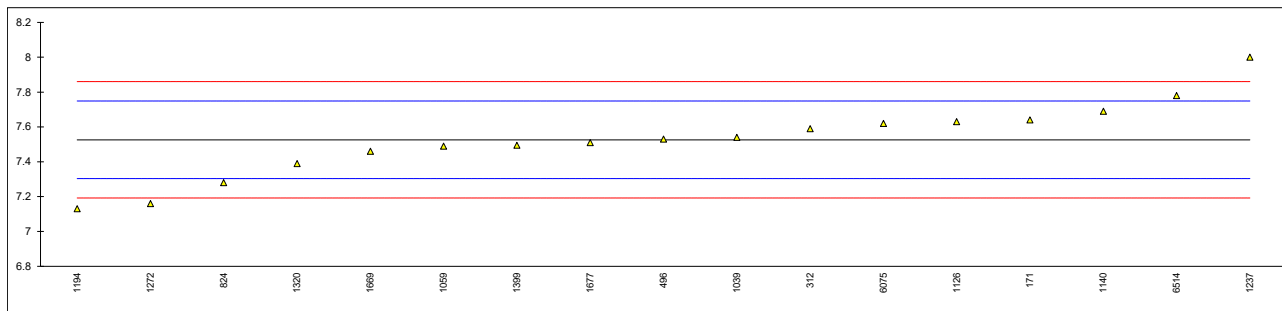
normality not OK
n 14
outliers 0
mean (n) 7.584
st.dev. (n) 0.1697
R(calc.) 0.475
st.dev.(ISO22854-A:21) 0.1935
R(ISO22854-A:21) 0.542



Determination of MTBE on sample #23065; results in %V/V

lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	7.64		1.03	
223		----		----	
300		----		----	
312	ISO22854-A	7.59		0.58	
496	ISO22854-A	7.53		0.04	
541		----		----	
824	D4815	7.28		-2.21	
1039	ISO22854-A	7.54		0.13	
1059	ISO22854-A	7.49		-0.32	
1126		7.63		0.94	
1140	ISO22854-A	7.69		1.48	
1150		----		----	
1194	D5845	7.13		-3.55	
1237		8.0		4.26	
1272	ISO22854-A	7.16	C	-3.28	First reported 7.02
1320		7.39		-1.22	
1345		----		----	
1399	D4815	7.495		-0.27	
1412		----		----	
1460		----		----	
1669	ISO22854-A	7.46		-0.59	
1677	D6839	7.51		-0.14	
1720		----		----	
6075	EN13132	7.62		0.85	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	7.78		2.28	
6524		----		----	
6530		----		----	
7002		----		----	

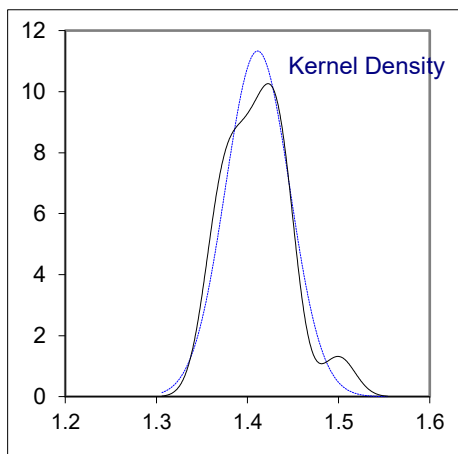
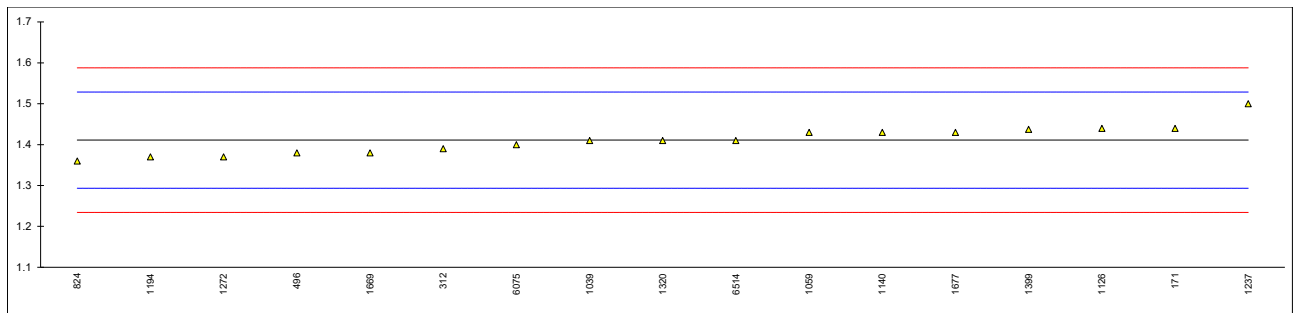
normality OK
n 17
outliers 0
mean (n) 7.526
st.dev. (n) 0.2136
R(calc.) 0.598
st.dev.(ISO22854-A:21) 0.1113
R(ISO22854-A:21) 0.312



Determination of Oxygen content on sample #23065; results in %M/M

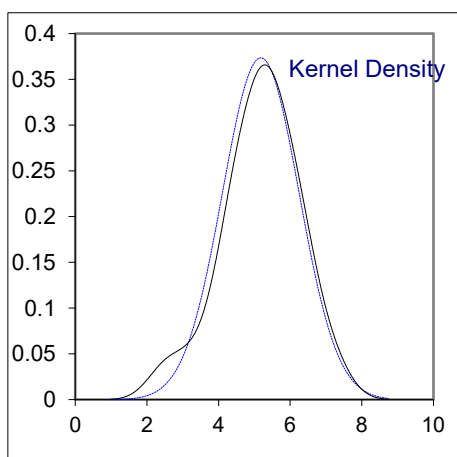
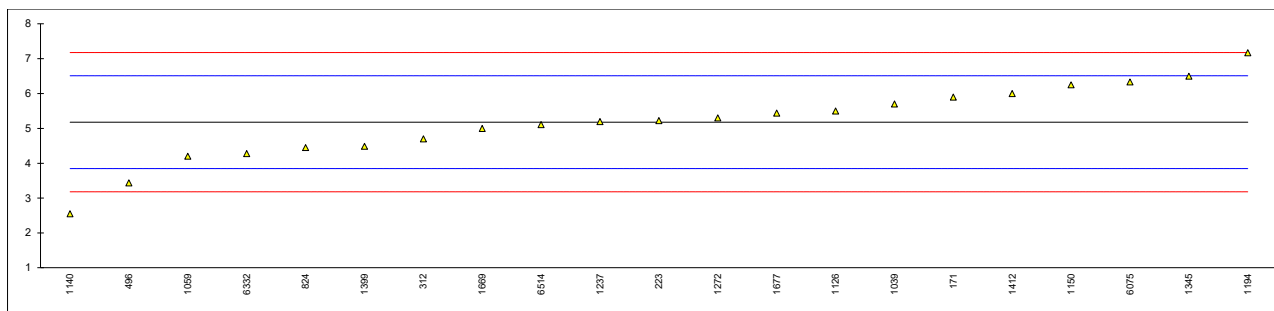
lab	method	value	mark	z(targ)	remarks
171	ISO22854-A	1.44		0.49	
223		----		----	
300		----		----	
312	ISO22854-A	1.39		-0.36	
496	ISO22854-A	1.38		-0.53	
541		----		----	
824	D4815	1.36		-0.87	
1039	ISO22854-A	1.41		-0.02	
1059	ISO22854-A	1.43		0.32	
1126	ISO22854-A	1.44		0.49	
1140	ISO22854-A	1.43		0.32	
1150		----		----	
1194	D5845	1.37		-0.70	
1237		1.5		1.51	
1272	ISO22854-A	1.37		-0.70	
1320	ISO22854-A	1.41		-0.02	
1345		----		----	
1399	D4815	1.4375		0.45	
1412		----		----	
1460		----		----	
1669	EN22854	1.38		-0.53	
1677	D6839	1.43		0.32	
1720		----		----	
6075	EN13132	1.40		-0.19	
6238		----		----	
6332		----		----	
6378		----		----	
6514	ISO22854-A	1.41		-0.02	
6524		----		----	
6530		----		----	
7002		----		----	

normality suspect
n 17
outliers 0
mean (n) 1.411
st.dev. (n) 0.0352
R(calc.) 0.099
st.dev.(ISO22854-A:21) 0.0589
R(ISO22854-A:21) 0.165



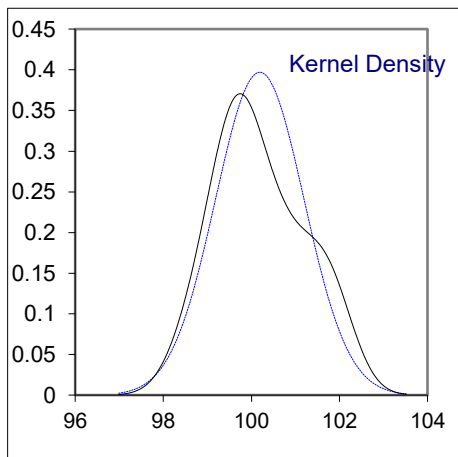
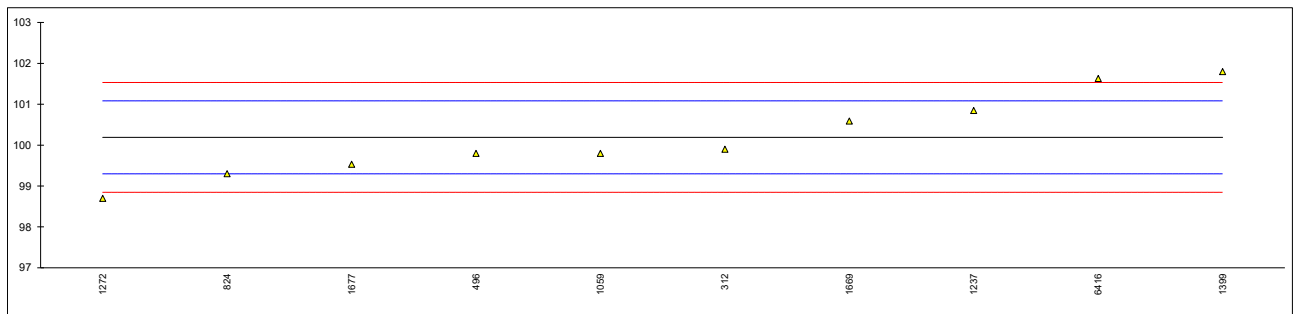
Determination of Sulfur on sample #23065; results in mg/kg

lab	method	value	mark	z(targ)	remarks
171	D5453	5.9		1.09	
223	D4294	5.22		0.06	
300		----		----	
312	ISO20884	4.7		-0.72	
496	ISO20846	3.435		-2.61	
541		----		----	
824	ISO20846	4.45		-1.09	
1039	ISO20846	5.7		0.79	
1059	ISO20846	4.2		-1.47	
1126	ISO20846	5.5		0.49	
1140	D5453	2.55		-3.94	
1150	ISO20884	6.25		1.61	
1194	D7220/IP532	7.17		2.99	
1237	ISO20846	5.195		0.03	
1272	ISO20846	5.3		0.18	
1320		----		----	
1345	D5453	6.5		1.99	
1399	D5453	4.485		-1.04	
1412	D5453	6.0		1.24	
1460		----		----	
1669	ISO20846	5		-0.27	
1677	D5453	5.44		0.40	
1720		----		----	
6075	ISO20846	6.3318		1.73	
6238		----		----	
6332	D5453	4.276		-1.35	
6378		----		----	
6514	ISO20846	5.11		-0.10	
6524		----		----	
6530		----		----	
7002		----		----	
normality		OK			
n		21			
outliers		0			
mean (n)		5.177			
st.dev. (n)		1.0687			
R(calc.)		2.992			
st.dev.(ISO20846:19)		0.6662			
R(ISO20846:19)		1.865			



Determination of Total Vapor Pressure on sample #23066; results in kPa

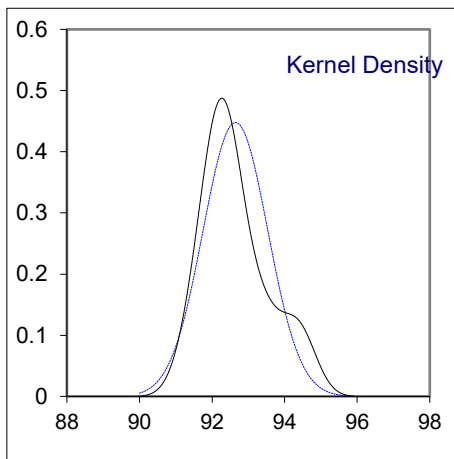
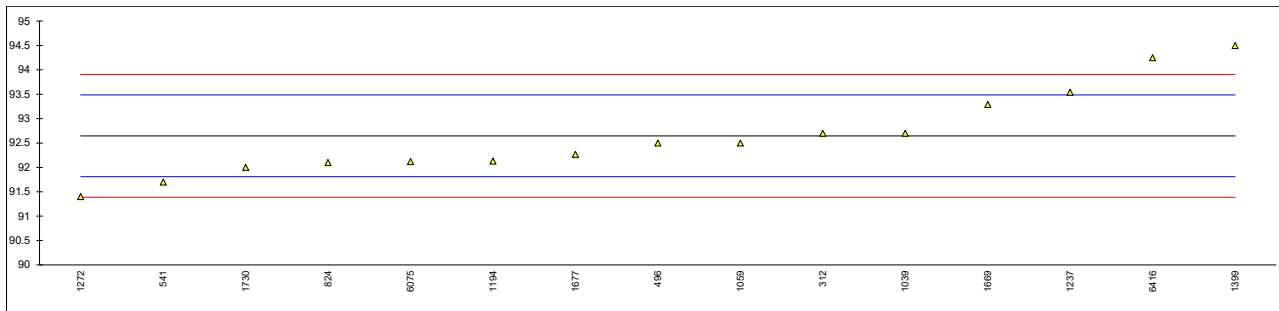
lab	method	value	mark	z(targ)	remarks
312	D5191	99.9		-0.65	
496	D5191	99.8		-0.87	
541		----		----	
824	D5191	99.3		-1.99	
1039		----		----	
1059	EN13016-1	99.8		-0.87	
1194		----		----	
1237	EN13016-1	100.85		1.48	
1272	EN13016-1	98.7		-3.33	
1399	D5191	101.8		3.60	
1669	D5191	100.59		0.90	
1677	D5191	99.53		-1.48	
1720		----		----	
1730		----		----	
6075		----		----	
6238		----		----	
6416	D5191	101.63		3.22	
6530		----		----	
7002		----		----	
normality		OK			
n		10			
outliers		0			
mean (n)		100.190			
st.dev. (n)		1.0054			
R(calc.)		2.815			
st.dev.(D5191:22)		0.4468			
R(D5191:22)		1.251			



Determination of DVPE (acc. to D5191) on sample #23066; results in kPa

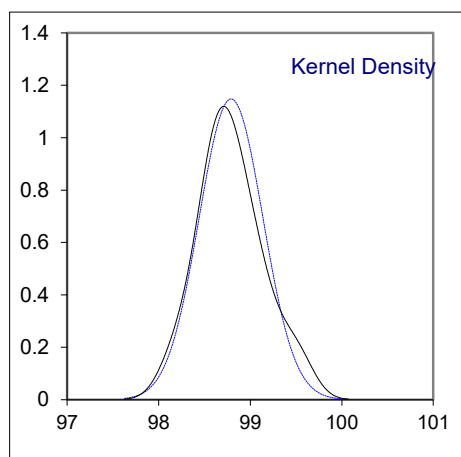
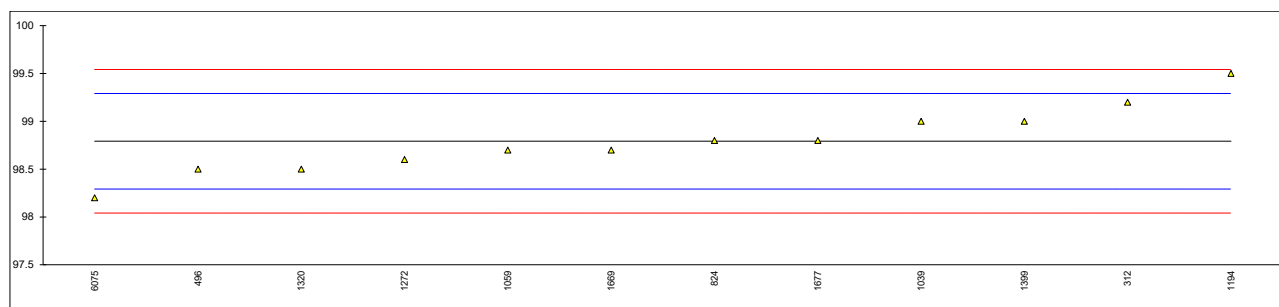
lab	method	value	mark	z(targ)	remarks
312	D5191	92.7		0.13	
496	D5191	92.5		-0.35	
541	D6378	91.7		-2.26	
824	D5191	92.1		-1.30	
1039	EN13016-1	92.7		0.13	
1059	EN13016-1	92.5		-0.35	
1194	EN13016-1	92.13		-1.23	
1237	EN13016-1	93.54		2.13	
1272	EN13016-1	91.4		-2.97	
1399	D5191	94.5		4.42	
1669	D5191	93.29		1.53	
1677	D5191	92.27		-0.90	
1720		----		----	
1730	EN13016-1	92.0		-1.54	
6075	EN13016-1	92.12		-1.26	
6238		----		----	
6416	D5191	94.25		3.82	
6530		----		----	
7002		----		----	

normality OK
 n 15
 outliers 0
 mean (n) 92.647
 st.dev. (n) 0.8912
 R(calc.) 2.495
 st.dev.(D5191:22) 0.4195
 R(D5191:22) 1.175



Determination of RON on sample #23067;

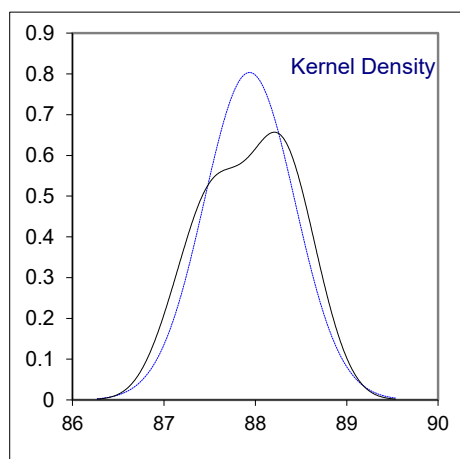
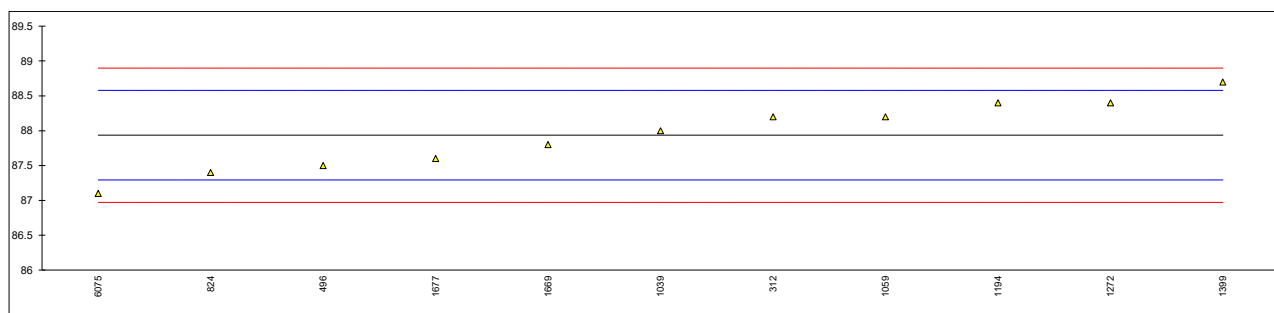
lab	method	value	mark	z(targ)	remarks
312	ISO5164	99.2		1.63	
496	ISO5164	98.5		-1.17	
824	D2699	98.8		0.03	
1039	ISO5164	99.00		0.83	
1059	ISO5164	98.7		-0.37	
1194	D2699	99.5		2.83	
1272	In house	98.6		-0.77	
1320	ISO5164	98.5		-1.17	
1399	D2699	99.0		0.83	
1669	D2699	98.7		-0.37	
1677	D2699	98.8		0.03	
1720		----		----	
6075	ISO5164	98.2		-2.37	
6238		----		----	
6524		----		----	
6530		----		----	
7002		----		----	
normality		OK			
n		12			
outliers		0			
mean (n)		98.79			
st.dev. (n)		0.348			
R(calc.)		0.97			
st.dev.(ISO5164:14)		0.250			
R(ISO5164:14)		0.7			



Determination of MON on sample #23067;

lab	method	value	mark	z(targ)	remarks
312	ISO5163	88.2		0.82	
496	ISO5163	87.5		-1.36	
824	D2700	87.4		-1.67	
1039	ISO5163	88.00		0.20	
1059	ISO5163	88.2		0.82	
1194	D2700	88.4		1.44	
1272	In house	88.4		1.44	
1320		----		----	
1399	D2700	88.7		2.38	
1669	D2700	87.8		-0.42	
1677	D2700	87.6		-1.05	
1720		----		----	
6075	ISO5163	87.1		-2.60	
6238		----		----	
6524		----		----	
6530		----		----	
7002		----		----	

normality OK
n 11
outliers 0
mean (n) 87.94
st.dev. (n) 0.497
R(calc.) 1.39
st.dev.(ISO5163:14) 0.321
R(ISO5163:14) 0.9



APPENDIX 2

Determination of other Oxygenates on sample #23065; results in %V/V

lab	MeOH	EtOH	i-PrOH	i-BuOH	t-BuOH	DIPE	ETBE	TAME	Sum other Oxygen.
171	0.04	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	0.02
223	----	----	----	----	----	----	----	----	----
300	----	----	----	----	----	----	----	----	----
312	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
496	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
541	----	----	----	----	----	----	----	----	----
824	<0.2	<0.2	<0.2	<0.2	0.01	0.07	<0.2	0.04	----
1039	----	0.04	----	----	----	----	----	----	----
1059	<0,20	<0,20	<0,20	<0,20	<0,20	<0,20	<0,20	<0,20	<0,20
1126	0.05	<0,02	0.02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02 C
1140	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1150	----	----	----	----	----	----	----	----	----
1194	0	0	----	----	0	0.53	0	0	----
1237	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
1272	<0,1	<0,1	<0,1	<0,1	<0,1	0.05	0.26 C	<0,1	<0,1
1320	0.08	----	----	----	----	0.02	----	----	0.03
1345	----	----	----	----	----	----	----	----	----
1399	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	7.75
1412	----	----	----	----	----	----	----	----	----
1460	----	----	----	----	----	----	----	----	----
1669	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1677	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1 C
1720	----	----	----	----	----	----	----	----	----
6075	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	----	----
6238	----	----	----	----	----	----	----	----	----
6332	----	----	----	----	----	----	----	----	----
6378	----	----	----	----	----	----	----	----	----
6514	0.00	0.00	0.00	0.03	0.02	0.00	0.02	0	0
6524	----	----	----	----	----	----	----	----	----
6530	----	----	----	----	----	----	----	----	----
7002	----	----	----	----	----	----	----	----	----

Lab 1126 first reported 7.73

Lab 1272 first reported 0.33

Lab 1677 first reported 7.65

APPENDIX 3

z-scores Distillation at 760 mmHg

lab	IBP	10% eva	50% eva	90% eva	FBP	%E70 °C	%E100 °C	%E150 °C
171	-2.61	-1.05	-0.52	-0.66	-0.41	-0.24	0.13	-1.59
223	-0.12	1.17	-8.76	0.65	1.13	----	----	----
300	----	----	----	----	----	----	----	----
312	-1.12	-1.51	-0.59	-0.77	-1.04	0.28	-0.25	0.13
496	0.79	0.52	-0.45	-0.28	-0.05	-0.86	-0.13	-0.73
541	-0.17	0.19	-0.52	-0.66	-0.49	----	----	----
824	-0.41	-0.66	-0.38	-0.39	-0.25	-0.34	-0.51	-0.08
1039	-0.58	-1.05	-0.45	-0.55	0.26	0.07	-0.51	0.57
1059	-0.64	-1.44	-1.01	-0.71	-0.60	0.49	0.64	0.35
1126	-0.41	-2.16	-0.66	-0.60	0.18	1.01	-0.13	----
1140	-1.06	-1.12	-0.73	-0.39	0.30	-0.03	0.13	-0.08
1150	-0.94	1.95	0.93	1.75	-0.47	0.39	0.25	0.24
1194	----	----	----	----	----	----	----	----
1237	0.37	-1.31	-1.01	-0.87	0.22	0.59	0.38	0.78
1272	0.55	2.47	2.73	3.89	0.18	-3.97	-5.35	-8.91
1320	----	----	----	----	----	----	----	----
1345	-0.47	0.78	0.17	1.18	0.74	----	----	----
1399	1.44	-1.90	-1.08	-0.60	0.34	0.70	0.64	0.13
1412	-0.52	1.30	1.90	1.72	0.46	-1.48	-3.31	----
1460	----	----	----	----	----	----	----	----
1669	-0.29	1.10	2.04	2.43	-0.57	-2.62	-4.20	-6.33
1677	0.49	1.10	-0.45	-0.06	0.50	-0.96	-0.25	-0.08
1720	----	----	----	----	----	----	----	----
6075	-0.05	-1.57	-0.59	-0.22	0.81	0.39	-0.38	0.35
6238	----	----	----	----	----	----	----	----
6332	1.86	2.93	----	----	0.18	----	----	----
6378	0.96	0.65	1.90	3.62	-1.12	-4.59	----	----
6514	2.93	-0.40	-1.22	-0.98	-0.33	-3.76	-4.20	-7.83
6524	----	----	----	----	----	----	----	----
6530	----	----	----	----	----	----	----	----
7002	----	----	----	----	----	----	----	----

APPENDIX 4

Number of participants per country

1 lab in ARGENTINA
1 lab in AZERBAIJAN
1 lab in BULGARIA
1 lab in CONGO Brazzaville
1 lab in CHILE
1 lab in CYPRUS
1 lab in ESTONIA
1 lab in ESWATINI
1 lab in GEORGIA
1 lab in GERMANY
2 labs in GREECE
1 lab in IRAN, Islamic Republic of
1 lab in KENYA
1 lab in KINGDOM OF BAHRAIN
1 lab in KOREA, Republic of
1 lab in MALI
1 lab in MARTINIQUE
3 labs in NETHERLANDS
1 lab in SAUDI ARABIA
1 lab in SERBIA
2 labs in SLOVAKIA
2 labs in SLOVENIA
1 lab in SOUTH AFRICA
1 lab in SPAIN
1 lab in SUDAN
1 lab in UGANDA
1 lab in UNITED KINGDOM
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)	= 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) / DG(5)	= 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
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- 7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
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- 9 Analytical Methods Committee, Technical Brief, No 4, January 2001
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