Results of Proficiency Test
Gasoline (premium)
April 2020

CONTENTS

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1   INTRODUCTION

Over the past years, more and more gasoline fuels are marketed with higher octane numbers and additional cleaning agents and some synthetic content. These fuels are called premium gasoline. The demand for these premium gasoline fuels is increasing. Therefore, the Institute for Interlaboratory Studies (iis) decided during the annual proficiency testing program of 2019/2020 to organize a new proficiency scheme for Gasoline (premium) in accordance with the latest applicable version of EN228. The interlaboratory study on Gasoline (premium) contains also PTs for the determination of Dry Vapour Pressure Equivalent (DVPE) and RON/MON.

In total 25 laboratories in 17 different countries registered for this PT. From this group 20 laboratories also registered for the PT on DVPE and 16 laboratories registered for the PT of RON/MON. See appendix 5 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: 1 liter bottle with Gasoline (premium) labelled #20060 for the round with regular analyzes and/or 1 liter bottle with Gasoline (premium) (± 750 mL filled) labelled #20061 for the DVPE round and/or 2 times a 1 liter bottle with Gasoline (premium) labelled #20062 for the RON/MON round. 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

GASOLINE (PREMIUM) SAMPLES REGULAR ROUND AND FOR RON/MON

The necessary bulk material of approximately 200 liter of a Gasoline (premium) was purchased from the local market. After homogenization 64 amber glass bottles of 1L for the round with the regular analyzes were filled and labelled #20060. Immediately after, 84 amber glass bottles of 1L for the RON/MON round were filled and labelled #20062.
The homogeneity of the subsamples #20060 and #20062 was checked by determination of Density at 15°C in accordance with test method ASTM D4052 on 8 stratified randomly selected subsamples.

	Density at 15°C in kg/m³
Sample 1	725.26
Sample 2	725.34
Sample 3	725.28
Sample 4	725.33
Sample 5	725.38
Sample 6	725.30
Sample 7	725.29
Sample 8	725.41

Table 1: homogeneity test results of subsamples #20060 and #20062

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/m³
r (observed)	0.14
reference test method	ISO12185:96
0.3 x R (reference test method)	0.45

Table 2: evaluation of the repeatability of subsamples #20060 and #20062

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples #20060 and #20062 was assumed.

GASOLINE (PREMIUM) – SAMPLE FOR DVPE

The remaining bulk material of the round for regular analyzes and the round for RON/MON was homogenized and 58 glass bottles of 1L were filled with approximately 750 mL Gasoline (premium) for the DVPE round and labelled #20061. The homogeneity of the subsamples #20061 was checked by determination of DVPE according to D5191 in psi on 5 stratified randomly selected samples and converted to kPa.

	DVPE in kPa
Sample 1	93.43
Sample 2	93.70
Sample 3	93.29
Sample 4	93.50
Sample 5	93.50

Table 3: homogeneity test results of subsamples #20061

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 kPa
r (observed)	0.42
reference test method	EN13016-1:18
0.3 x R (reference test method)	0.47

Table 4: evaluation of repeatability of subsamples #20061

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples of #20061 was assumed.

Depending on the registration of the participant the appropriate set of PT samples was sent on March 18, 2020. 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 #20060: API Gravity, Appearance, Aromatics by FIA and by GC (%V/V and %M/M), Benzene, Copper Corrosion 3hrs at 50°C, Density at 15°C, Distillation at 760 mmHg, Doctor Test, Existent Gum (solvent washed), Lead, Manganese, Olefins by FIA and 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 #20061: Air Saturated Vapour Pressure (ASVP) and Dry Vapour Pressure Equivalent (DVPE) and on sample #20062: 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. Also, some analytical details were asked.

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 appropriate reference test methods that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3   RESULTS

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

According to ISO5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. 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 was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

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

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

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

The z-scores were calculated according to:

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

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

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

Serious problems wee encountered with the dispatch of the samples due to COVID-19 pandemic. Therefore, the reporting time on the data entry portal was extended with another three weeks. Finally, for all three rounds, four participants did not report any test results at all. For the round with the regular analyzes, one other participant did not report any test results and for and for the RON/MON round also another participant did not report any test results at all.
In total 20 participants reported in total 439 numerical test results. Observed were 19 outlying test results, which is 4.3%. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

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

4.1   EVALUATION PER SAMPLE AND PER TEST

In this section the 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. The abbreviations, used in these tables, are explained in appendix 6.

Regarding the Aromatics and Olefins determination by FIA only one participant reported a lot number of fluorescent indicator, which according to ASTM D1319:19 paragraph 7.2.1 should

not be used. This participant performed EN15553. Method EN15553 does not have such a statement and does not restrict the use of certain lot numbers of FIA gel. However, the test results of this participant were in line with the results of the total group.

Sample #20060

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 D4052:18a.

Appearance: No problems have been observed with this determination. Fifteen participants agreed on the appearance as Clear and Bright or Pass.

Aromatics by FIA: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN15553:07.
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 may appear several centimetres above the reddish or brown alcohol/aromatic boundary and this shall be ignored."

Aromatics by GC: The determination in %V/V was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO22854-A:16.
Regretfully for the determination in %M/M no precision data is available. Therefore, no z-scores were calculated. No statistical outliers were observed in the test results reported in %M/M.

Benzene: 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 ISO22854-A:16.

Copper Corrosion: No problems have been observed in this determination, all reporting participants agreed on a test result of 1 (1a).

Density at 15°C: 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 ISO12185:96.

Distillation: The distillation was not problematic for all eight reported distillation parameters. In total eight statistical outliers were observed. All calculated reproducibilities after rejection of the statistical outliers are in (full) agreement with the requirements of ISO3405:19 automatic or manual modes.

Doctor Test: No problems have been observed, all reporting participants agreed on the absence of Mercaptans.

Existent Gum (solvent washed): This determination was not problematic. No statistical outliers were observed, but one test result was excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ISO6246:17.

Lead: Six reporting participants agreed on a level of <2.5 mg/L. Therefore, no z-scores were calculated.

Manganese: Eight reporting participants agreed on a level of <0.5 mg/L. Therefore, no z-scores were calculated.

Olefins by FIA: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN15553:07.

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:16. Regretfully, no precision data is available for the determination in %M/M. Therefore, no z-scores were calculated. One statistical outlier was observed in the test results reported in %M/M.

Oxidation stability: Seven reporting participants agreed on an Oxidation Stability of >900 minutes. Therefore, no z-scores were calculated.

Ethanol: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO22854-A:16.

Ethers (C5 or more): This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO22854-A:16.

MTBE: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO22854-A:16.

Other Oxygenates: 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 not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ISO22854-A:16.

Sulfur: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ISO20846:19 and ASTM D5453:19A.

Sample #20061

ASVP: This determination problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of EN13016-1:18.

DVPE: The Air Saturated Vapour Pressure (ASVP) can be converted to Dry Vapour Pressure Equivalent (DVPE) according to EN13016-1. This conversion was also problematic. One test result was excluded, for this laboratory reported to have performed ASTM D6378, which is a different test that predicts the DVPE value as if measured according to ASTM D5191. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of EN13016-1:18.

Sample #20062

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

MON: The determination was problematic. No statistical outliers were observed. However, 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 relevant 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 literature reference test methods (in casu ASTM, EN and ISO reference test methods) are presented in the next tables.

Parameter	unit	n	average	2.8 * sd	R (lit)
API Gravity		10	63.4	0.3	0.7
Appearance		15	C&B	n.a.	n.a.
Aromatics by FIA	%V/V	7	25.8	4.5	3.7
Aromatics by GC	%V/V	14	22.8	1.3	1.2
Aromatics by GC	%M/M	12	27.5	1.3	n.a.
Benzene	%V/V	15	0.36	0.03	0.04
Copper Corrosion 3hrs at 50°C		16	1 (1a)	n.a.	n.a.
Density at 15°C	kg/m^3	17	725.6	0.9	1.5
Initial Boiling Point	°C	16	24.1	3.6	4.7
Temp. at 10% evaporated	°C	17	39.5	2.7	4.0
Temp. at 50% evaporated	°C	16	83.2	2.7	4.1
Temp. at 90% evaporated	°C	15	138.3	1.7	5.3

Parameter	unit	n	average	2.8 * sd	R (lit)
Final Boiling Point	°C	16	160.9	1.4	7.1
%volume at 70°C	%V/V	17	39.1	3.0	2.7
%volume at 100°C	%V/V	16	61.2	2.2	2.2
%volume at 150°C	%V/V	14	96.6	1.4	1.3
Doctor Test		8	Negative	n.a.	n.a.
Existent Gum (solvent washed)	mg/100mL	5	0.6	1.4	2.1
Lead as Pb	mg/L	6	<2.5	n.a.	n.a.
Manganese as Mn	mg/L	8	<0.5	n.a.	n.a.
Olefins by FIA	%V/V	7	8.2	4.2	2.9
Olefins by GC	%V/V	12	8.3	0.8	1.5
Olefins by GC	%M/M	10	7.8	0.5	n.a.
Oxidation Stability	minutes	7	>900	n.a.	n.a.
Ethanol	%V/V	12	0.12	0.30	0.35
Ethers (C5 or more C atoms)	%V/V	9	12.66	0.62	0.67
MTBE	%V/V	11	12.55	0.66	0.67
Oxygen content	%M/M	14	2.4	0.2	0.3
Sulfur	mg/kg	17	6.8	3.1	2.1

Table 5: reproducibilities of tests on sample #20060

Parameter	unit	n	average	2.8 * sd	R (lit)
ASVP	kPa	13	100.07	2.51	1.58
DVPE acc. to EN13016-1	kPa	15	92.65	2.60	1.58

Table 6: reproducibilities of tests on sample #20061

Parameter	unit	n	average	2.8 * sd	R (lit)
RON		11	98.3	1.0	0.7
MON		11	88.0	1.4	0.9

Table 7: reproducibilities of tests on sample #20062

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

4.3 OVERVIEW OF THE PROFICIENCY TEST OF APRIL 2020

	April 2020
Number of reporting laboratories	20
Number of test results	439
Number of statistical outliers	19
Percentage of statistical outliers	4.3%

Table 8: comparison with previous proficiency tests

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.

The performance of the determinations of the proficiency tests was compared against the requirements of the respective reference test methods. The conclusions are given in the following table.

Determination	April 2020
API Gravity	++
Aromatics by FIA	-
Aromatics by GC	+/-
Benzene	+
Density at 15°C	+
Distillation	+
Existent Gum (solvent washed)	+
Olefins by FIA	-
Olefins by GC	+
Ethanol	+
Ethers (C5 or more C atoms)	+/-
MTBE	+/-
Oxygen content	+
Sulfur	-
ASVP	-
DVPE (acc. to EN13016-1)	-
RON	-
MON	-

Table 9: comparison determinations against the reference test methods

The following performance categories were used:

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

4.4   EVALUATION OF THE ANALYTICAL DETAILS

The participants were requested to report analytical details about the automated distillation. The reason for this is that gasolines containing Ethanol may give an azeotropic curve in the distillation and some equipment will note this, while others do not. However, in this sample Ethanol is not present and the group performed well in the distillation test, so no conclusions could be drawn about the effect of Ethanol in Gasoline on automated distillation.

APPENDIX 1

Determination of API Gravity on sample #20060;

lab	method	value	mark	z(targ)	remarks
312	D4052	63.54		0.38	
496	D4052	61.9435	G(0.01)	-5.76	
541	D4052	63.51		0.27	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D287	63.51		0.27	
1140	D287	63.5379		0.38	
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491		-----		-----	
1634		-----		-----	
1776		-----		-----	
1881		-----		-----	
1995	D4052	63.3		-0.54	
6005	ISO12185	63.29		-0.58	
6018		-----		-----	
6075		-----		-----	
6201	D1298	63.3		-0.54	
6262	D4052	63.55		0.42	
6279		-----		-----	
6291	D4052	63.54		0.38	
6299		-----		-----	
6308	ISO12185	63.323		-0.45	

	normality	OK
	n	10
	outliers	1
	mean (n)	63.440
	st.dev. (n)	0.1187
	R(calc.)	0.332
	st.dev.(D4052:18a)	0.2597
	R(D4052:18a)	0.727

Kernel Density
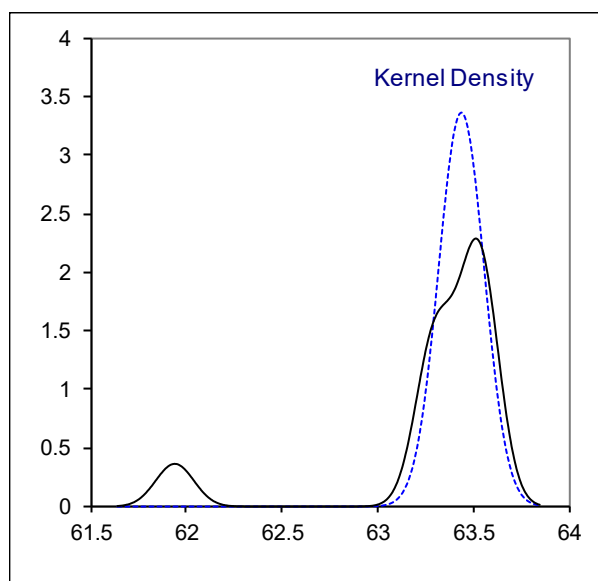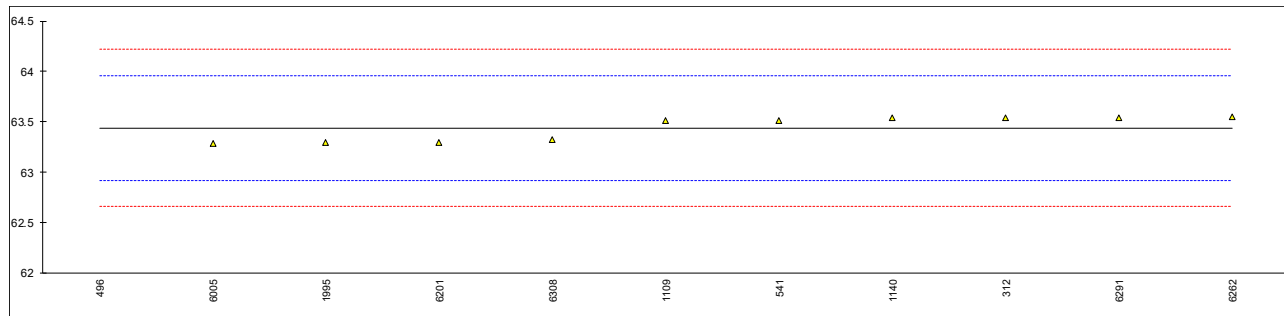
Determination of Appearance on sample #20060;

lab	method	value	mark	z(targ)	remarks
312	Visual	Br&Cl		-----	
496	Visual	c + b		-----	
541	D4176	C&B		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D4176	Pass		-----	
1140	Visual	C&B		-----	
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491	Visual	Clear&Bright		-----	
1634	Visual	C&B		-----	
1776		-----		-----	
1881		-----		-----	
1995	Visual	Clear & Bright		-----	
6005	Visual	Clear & Bright		-----	
6018	Visual	Clear & Bright		-----	
6075		-----		-----	
6201	D4176	Pass		-----	
6262	Visual	Bright & Clear		-----	
6279		-----		-----	
6291	Visual	Bright&Clear		-----	
6299	Visual	Clear, bright and visually free		-----	
6308	Visual	Clear and Bright		-----	
	n	15			
	mean (n)	Clear & Bright			

Determination of Aromatics by FIA (without oxygenates correction) on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	Lotnr. *	remarks
312	EN15553	24.34		-1.08	3000000976	
496	D1319	28.80		2.30	3000000901	
541		-----		-----	-----	
914		-----		-----	-----	
962		-----		-----	-----	
963		-----		-----	-----	
1109	D1319	24.07		-1.28	3000000941	
1140		-----		-----	-----	
1194	D1319	25.66		-0.08	-----	
1205		-----		-----	-----	
1399		-----		-----	-----	
1491		-----		-----	-----	
1634		-----		-----	-----	
1776		-----		-----	-----	
1881		-----		-----	-----	
1995		-----		-----	-----	
6005		-----		-----	-----	
6018		-----		-----	-----	
6075		-----		-----	-----	
6201		-----		-----	-----	
6262		-----		-----	-----	
6279		-----		-----	-----	
6291	EN15553	26.10		0.25	-----	
6299	EN15553	26.5		0.55	3000000852	
6308	EN15553	24.9		-0.66	3000000859	

normality	unknown	
n	7	
outliers	0	
mean (n)	25.77	
st.dev. (n)	1.609	
R(calc.)	4.50	
st.dev.(EN15553:07)	1.321	
R(EN15553:07)	3.7	

*) Test method ASTM D1319 describes in paragraph 7.2.1 not to report results for Jet Fuel, Diesel Fuel and Gasoline obtained with these six lotnumbers of Fluorescent Indicator Dyed Gel: 3000000975 to 3000000980. EN15553 does not contain such a statement and does not restrict the use of FIA Gel.
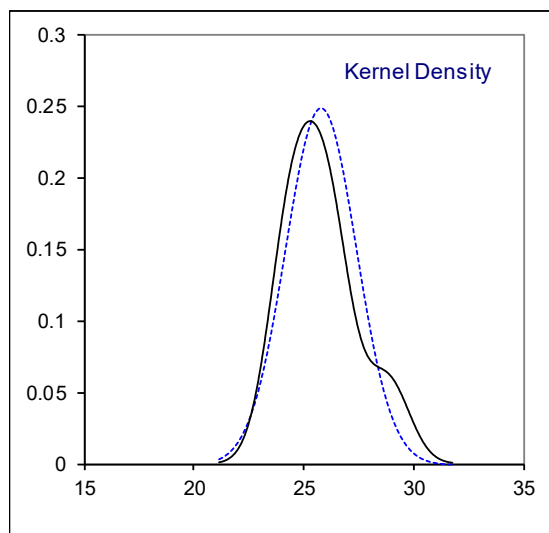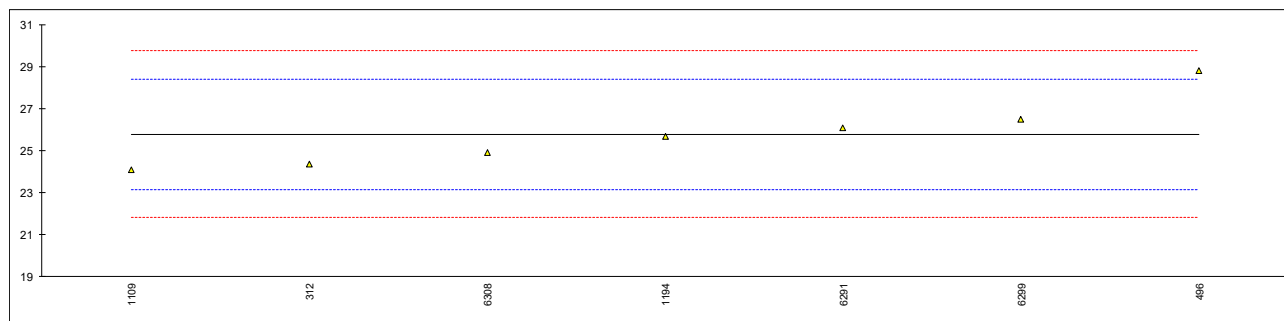
Determination of Aromatics by GC on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	22.92		0.24	
496	ISO22854-A	22.77		-0.12	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	23.02		0.48	
1140	IP566	22.56		-0.62	
1194		-----		-----	
1205		-----		-----	
1399		23.43		1.47	
1491	In house	22.1		-1.73	
1634	ISO22854-A	23.615		1.91	
1776	ISO22854-A	23.43		1.47	
1881		-----		-----	
1995	D6839	22.74		-0.19	
6005		-----		-----	
6018	ISO22854-A	22.68		-0.33	
6075		-----		-----	
6201	ISO22854-A	22.86		0.10	
6262	ISO22854-A	22.28		-1.29	
6279		-----		-----	
6291	ISO22854-A	22.82		0.00	
6299		-----		-----	
6308	ISO22854-A	22.23		-1.41	

normality	OK
n	14
outliers	0
mean (n)	22.818
st.dev. (n)	0.4542
R(calc.)	1.272
st.dev.(ISO22854-A:16)	0.4161
R(ISO22854-A:16)	1.165
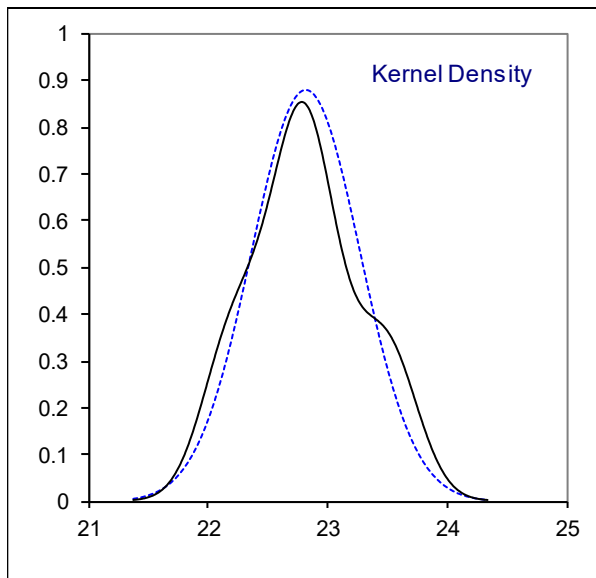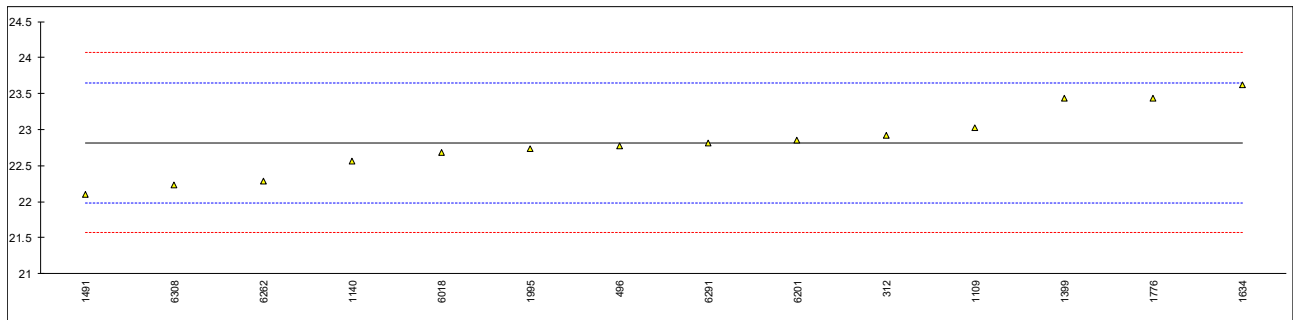
Determination of Aromatics by GC on sample #20060; results in %M/M

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	27.59		-----	
496	ISO22854-A	27.43		-----	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	27.72		-----	
1140	IP566	27.19		-----	
1194		-----		-----	
1205		-----		-----	
1399		28.19		-----	
1491		-----		-----	
1634	ISO22854-A	28.395		-----	
1776		-----		-----	
1881		-----		-----	
1995	D6839	27.42		-----	
6005		-----		-----	
6018	ISO22854-A	27.37		-----	
6075		-----		-----	
6201	ISO22854-A	27.56		-----	
6262	ISO22854-A	26.92		-----	
6279		-----		-----	
6291	ISO22854-A	27.49		-----	
6299		-----		-----	
6308	ISO22854-A	26.81		-----	

normality	OK
n	12
outliers	0
mean (n)	27.507
st.dev. (n)	0.45
R(calc.)	1.273
st.dev.(lit)	n.a.
R(lit)	n.a.

Kernel Density
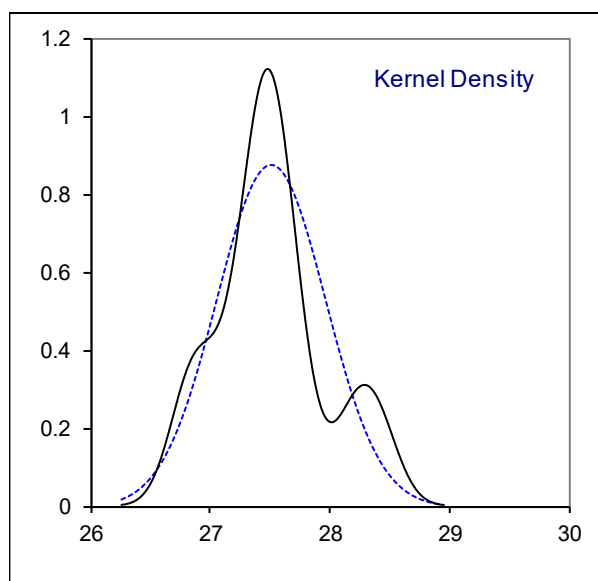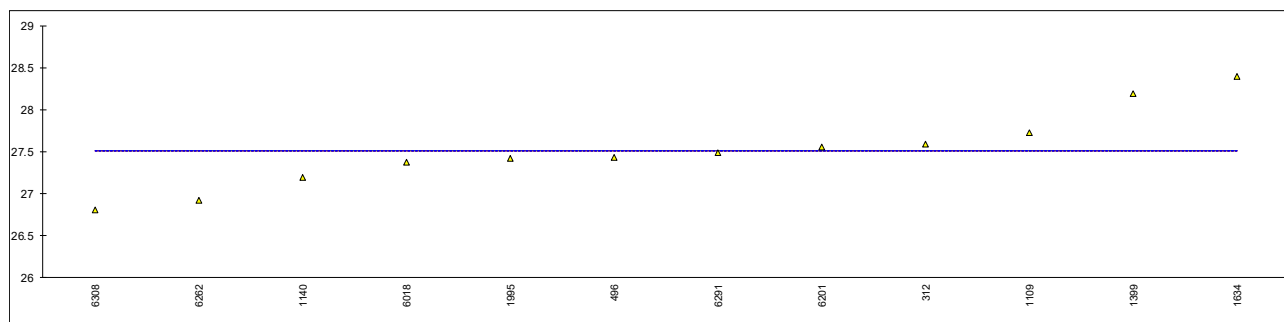
Determination of Benzene on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	0.36		-0.22	
496	ISO22854-A	0.370		0.48	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D3606	0.387		1.67	
1140	IP566	0.36		-0.22	
1194	D6277	0.433	G(0.01)	4.89	
1205		-----		-----	
1399		0.37		0.48	
1491	EN238	0.35		-0.92	
1634	ISO22854-A	0.36		-0.22	
1776	ISO22854-A	0.37		0.48	
1881		-----		-----	
1995	D6839	0.36		-0.22	
6005		-----		-----	
6018	ISO22854-A	0.36		-0.22	
6075		-----		-----	
6201	ISO22854-A	0.37		0.48	
6262	ISO22854-A	0.36		-0.22	
6279		-----		-----	
6291	ISO22854-A	0.35		-0.92	
6299	EN238	0.37		0.48	
6308	ISO22854-A	0.35		-0.92	

normality	suspect
n	15
outliers	1
mean (n)	0.363
st.dev. (n)	0.0099
R(calc.)	0.028
st.dev.(ISO22854-A:16)	0.0143
R(ISO22854-A:16)	0.04
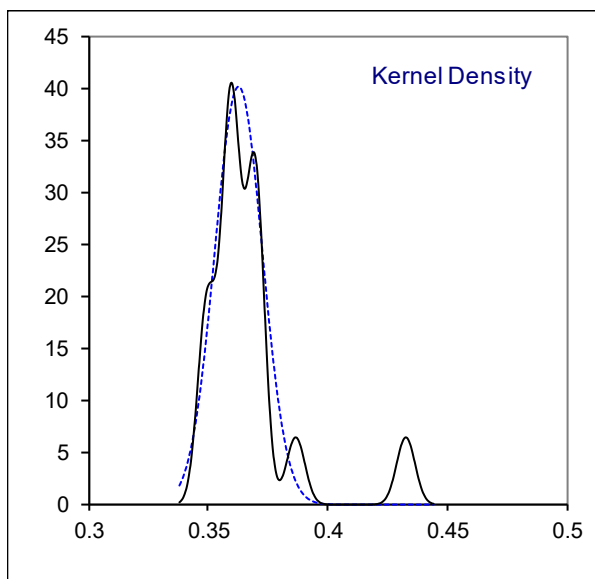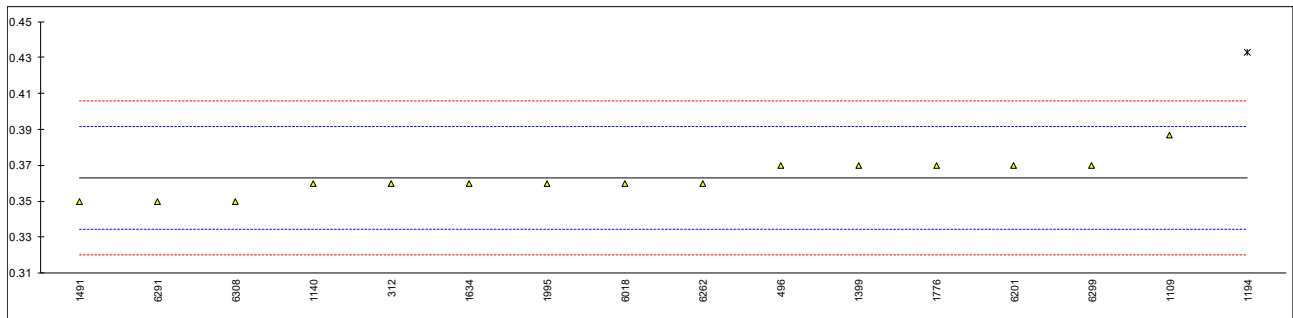
Determination of Copper Corrosion 3hrs at 50°C on sample #20060;

lab	method	value	mark	z(targ)	remarks
312	D130	1a		-----	
496	ISO2160	1a		-----	
541	D130	1a		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D130	1a		-----	
1140	IP154	1A		-----	
1194		-----		-----	
1205		-----		-----	
1399	D130	1		-----	
1491	ISO2160	1a		-----	
1634	ISO2160	1a		-----	
1776		-----		-----	
1881		-----		-----	
1995	D130	1a		-----	
6005	ISO2160	1a		-----	
6018	ISO2160	1a		-----	
6075		-----		-----	
6201	D130	1A		-----	
6262	D130	1A		-----	
6279		-----		-----	
6291	ISO2160	1A		-----	
6299	ISO2160	1a		-----	
6308	ISO2160	1A		-----	
	n	16			
	mean (n)	1 (1a)			

Determination of Density at 15°C on sample #20060; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
312	ISO12185	725.3		-0.47	
496	ISO12185	729.96	G(0.01)	8.23	
541	ISO12185	725.42		-0.25	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D4052	725.39		-0.30	
1140	IP365	725.5000		-0.10	
1194		-----		-----	
1205	ISO12185	725.53		-0.04	
1399		-----		-----	
1491	ISO12185	725.26		-0.54	
1634	ISO12185	725.5		-0.10	
1776	ISO12185	725.2		-0.66	
1881	ISO12185	725.4		-0.28	
1995	D4052	726.2	C	1.21	first reported: 0.762 kg/m^3
6005	ISO12185	726.2		1.21	
6018	ISO12185	725.5		-0.10	
6075		-----		-----	
6201	ISO12185	725.8		0.46	
6262	D4052	725.3		-0.47	
6279		-----		-----	
6291	D4052	725.3		-0.47	
6299	ISO12185	725.48		-0.13	
6308	ISO12185	726.1		1.02	

normality	suspect
n	17
outliers	1
mean (n)	725.55
st.dev. (n)	0.324
R(calc.)	0.91
st.dev.(ISO12185:96)	0.536
R(ISO12185:96)	1.5

Kernel Density
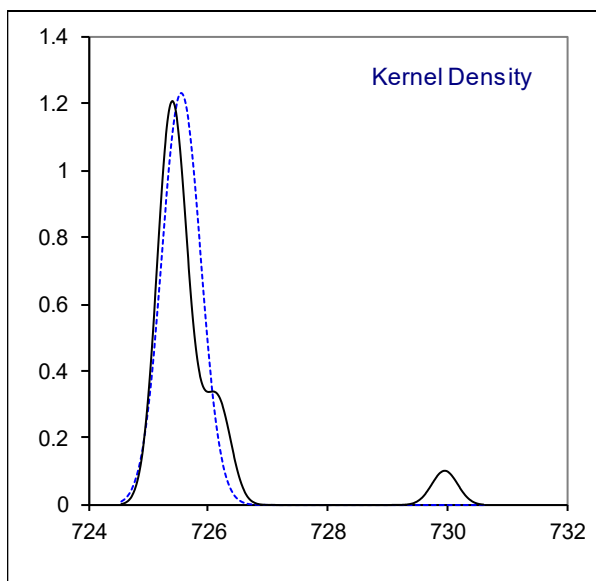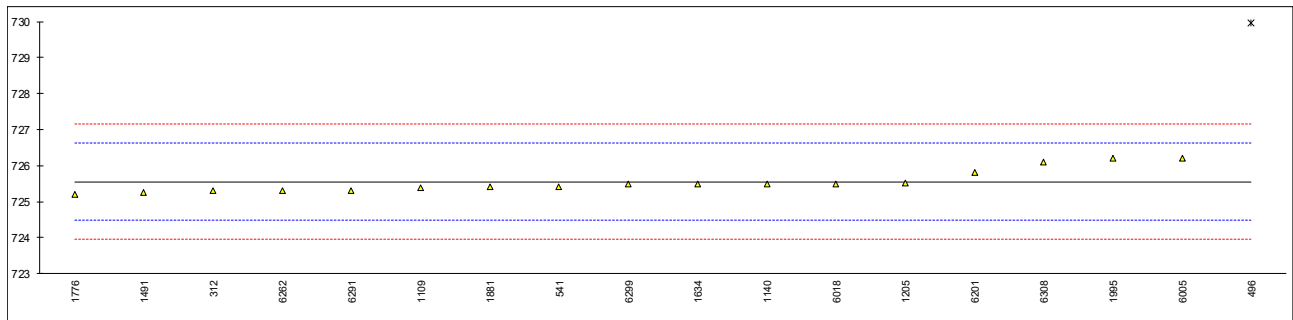
Determination of Distillation at 760 mmHg on sample #20060; results in °C

lab	method	IBP	mark	10% eva	mark	50% eva	mark	90% eva	mark	FBP	mark
312	D86-automated	23.5		39.2		83.2		138.5		160.6	
496	ISO3405-automated	26.5		40.1		83.5		138.0		161.7	
541	D86-automated	22.20		40.13		83.74		138.10		160.91	
914		-----		-----		-----		-----		-----	
962		-----		-----		-----		-----		-----	
963		-----		-----		-----		-----		-----	
1109	D86-automated	24.9		38.2		82.3		138.0		161.7	
1140	D86-automated	25.5		38.8		81.6		137.6		160.8	
1194		-----		-----		-----		-----		-----	
1205		24.7		39.0		82.9		138.6		160.5	
1399	D86-automated	29.8	G5	40.1		84.7		139.9		170.7	G1
1491	ISO3405-automated	23.9		38.7		82.3		138.1		161.0	
1634	ISO3405-automated	24.5		39.3		83.7		138.7		161.6	
1776	ISO3405-automated	24.9		39.5		83.0		137.8		161.1	
1881		-----		-----		-----		-----		-----	
1995	D86-automated	-----	W	-----	W	-----	W	-----	W	-----	W
6005	ISO3405-automated	23.0		41.2		85.5		141.3	DG1	160.1	
6018	ISO3405-automated	23.2		41.7		86.8	G5	141.4	DG1	161.6	
6075		-----		-----		-----		-----		-----	
6201	D86-automated	22.9		38.3		82.5		137.8		160.5	
6262	D86-automated	22.9		39.4		83.2		138.4		160.5	
6279		-----		-----		-----		-----		-----	
6291		23.6		39.5		83.5		138.8		161.0	
6299	ISO3405-automated	22.9		39.7		83.5		138.1		160.3	
6308	ISO3405-automated	26.4		38.5		82.2		137.6		160.9	
	normality	OK		OK		OK		not OK		OK	
	n	16		17		16		15		16	
	outliers	1		0		1		2		1	
	mean (n)	24.09		39.49		83.21		138.27		160.93	
	st.dev. (n)	1.302		0.953		0.971		0.590		0.509	
	R(calc.)	3.64		2.67		2.72		1.65		1.43	
	st.dev.(ISO3405-A:19)	1.679		1.427		1.449		1.908		2.536	
	R(ISO3405-A:19)	4.7		4.00		4.06		5.34		7.1	
Compare											
	R(ISO3405-M:19)	5.6		4.05		4.14		3.47		7.2	

Lab 1995 first reported for IBP: 34, for 10% evap: 46, for 50% evap: 79, for 90% evap: 138 and for FBP: 155

IBP

10% Evaporated

50% Evaporated

90% Evaporated

FBP
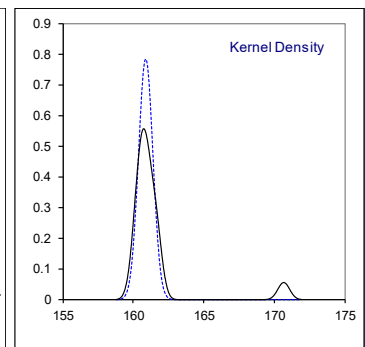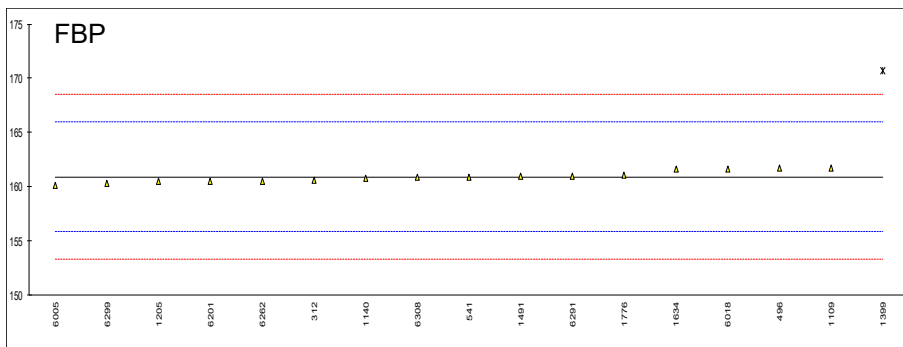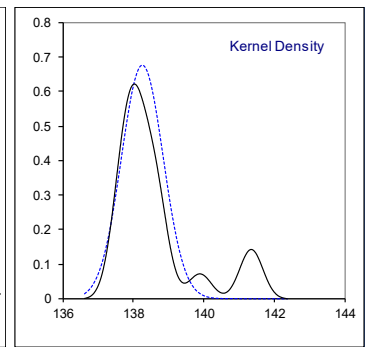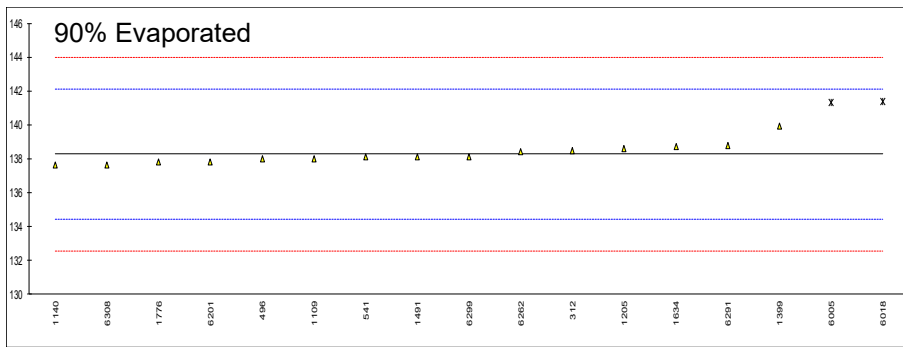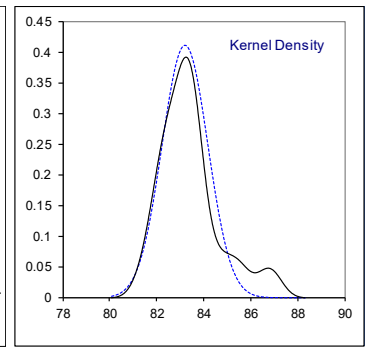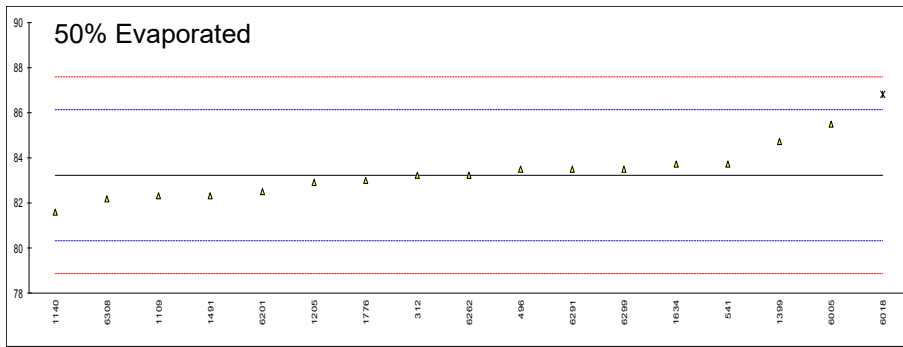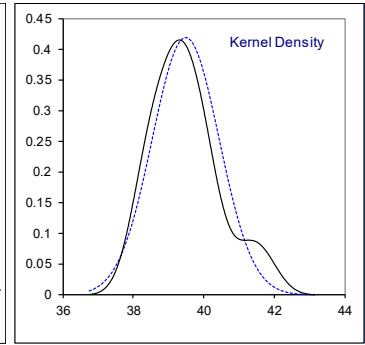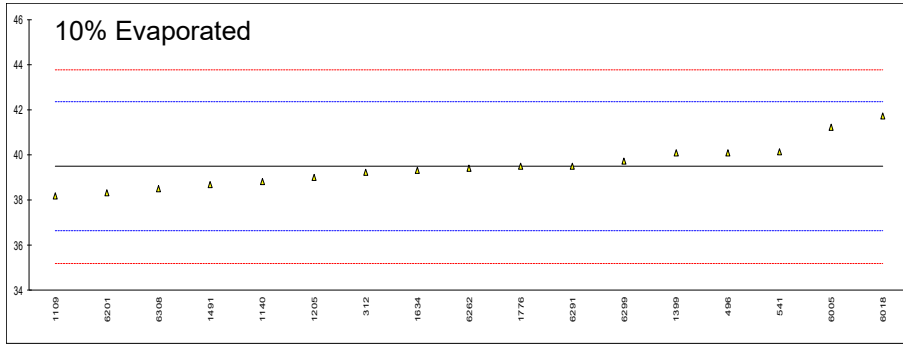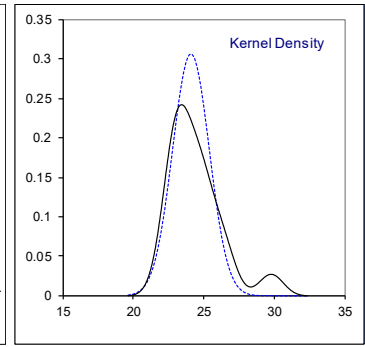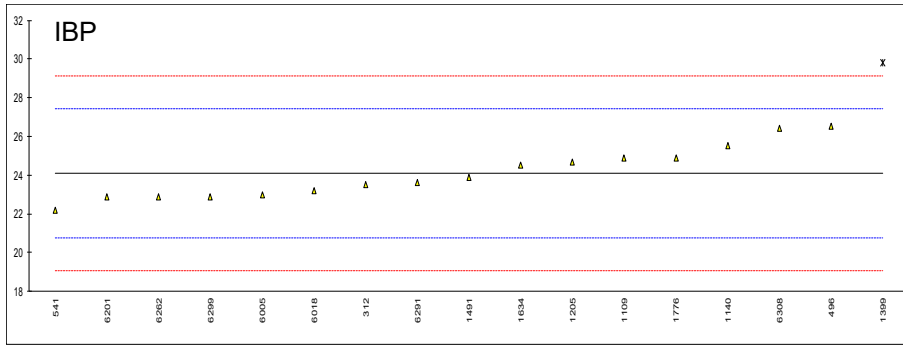
Determination of Distillation at 760 mmHg on sample #20060; results in %V/V ---continued---

| lab	method	%E70°C	mark	%E100°C	mark	%E150°C	mark	%residue	mark	%loss	mark
312	D86-automated	39.2		61.3		96.8		1.0		1.6	
496	ISO3405-automated	38.9		61.4		96.9		1.0		2.4	
541	D86-automated	38.75		61.48		95.77		1.0		1.0	
914		-----		-----		-----		-----		-----	
962		-----		-----		-----		-----		-----	
963		-----		-----		-----		-----		-----	
1109	D86-automated	40.0		61.8		96.9		0.8		3.5	
1140	D86-automated	40.8		62.4		97.0		1.0		2.4	
1194		-----		-----		-----		-----		-----	
1205		39.5		61.6		96.5		1.0		2.3	
1399	D86-automated	38.2		60.4		96.3		1.0		1.8	
1491	ISO3405-automated	40.0		61.6		96.8		0.8		1.6	
1634	ISO3405-automated	38.9		61.1		96.7		1.0		1.5	
1776	ISO3405-automated	39.4		61.6		96.5		1.0		1.7	
1881		-----		-----		-----		-----		-----	
1995	D86-automated	-----	W	-----	W	-----	W	-----	W	-----	W
6005	ISO3405-automated	37.7		59.5		94.3	DG5	0.9		2.5	
6018	ISO3405-automated	36.6		58.7	G5	94.7	DG5	0.9		2.0	
6075		-----		-----		-----		-----		-----	
6201	D86-automated	39.8		61.9		97.1		1.0		1.9	
6262	D86-automated	39.2		60.8		96.7		1		1	
6279		-----		-----		-----		-----		-----	
6291		39.0		61.1		96.6		1.6		2.0	
6299	ISO3405-automated	37.7		59.6		95.3		0.9		1.7	
6308	ISO3405-automated	40.3		61.7		-----	W	0.9		1.6	
	normality	OK		OK		not OK					
	n	17		16		14					
	outliers	0		1		2					
	mean (n)	39.06		61.20		96.56					
	st.dev. (n)	1.057		0.792		0.493					
	R(calc.)	2.96		2.22		1.38					
	st.dev.(ISO3405-A:19)	0.964		0.786		0.464					
	R(ISO3405-A:19)	2.7		2.2		1.3					
Compare											
	R(ISO3405-M:19)	unknown		unknown		unknown					

Lab 1995 first reported for %E70°C: 35.2, for %E100°C: 62.5, for %E150°C: 96.55, for % residue: 1.0 and for % loss: 1.5
Lab 6308 first reported for %E150°C: 100

%E70°C

%E100°C

%E150°C
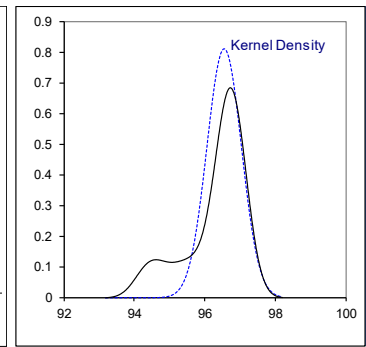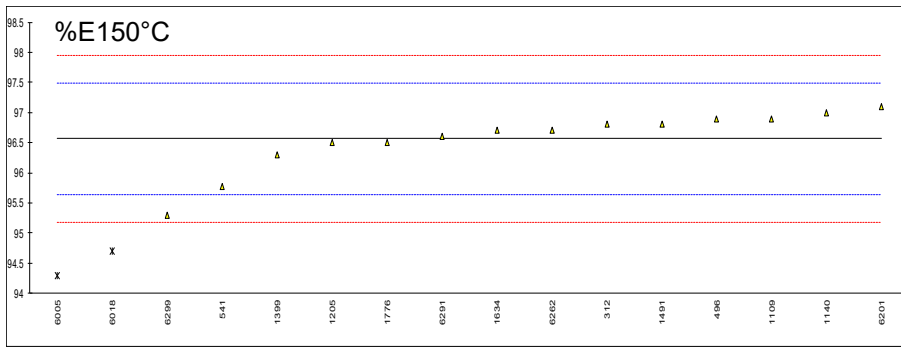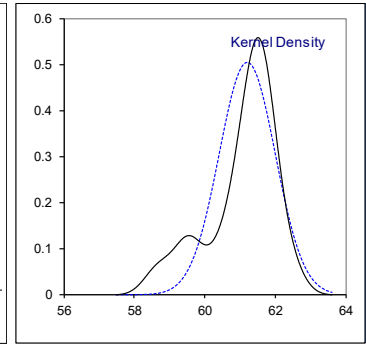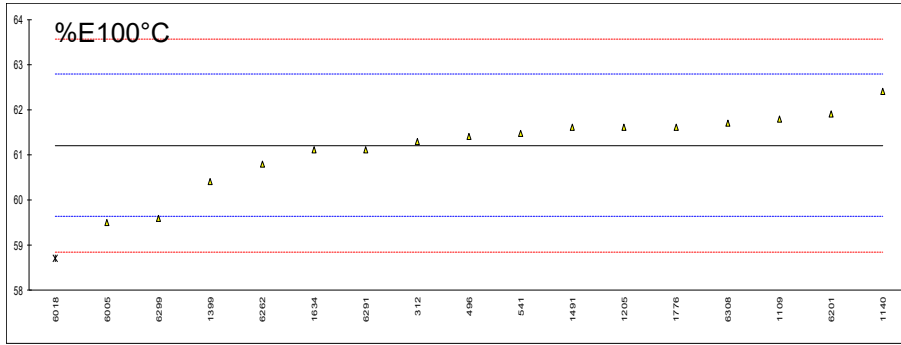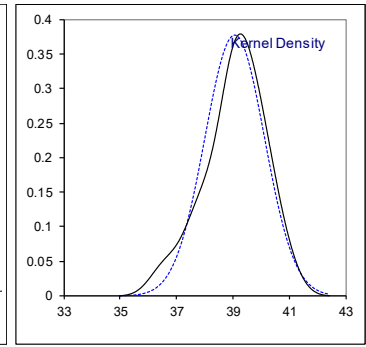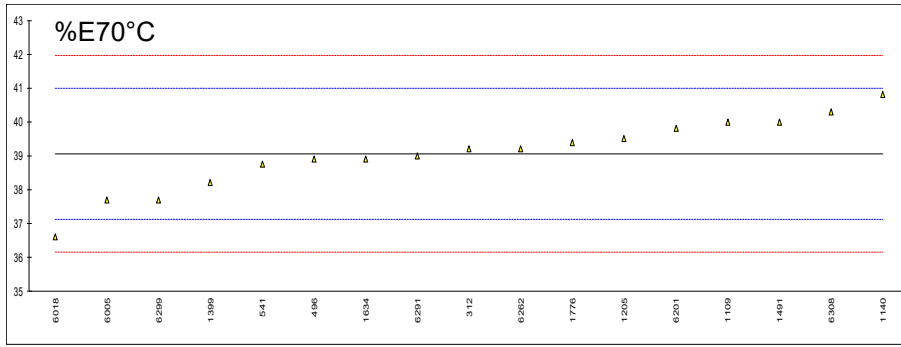
Determination of Doctor Test on sample #20060;

lab	method	value	mark	z(targ)	remarks
312	IP30	Negative		-----	
496	D4952	negative		-----	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	IP30	Negative		-----	
1140	IP30	NEGATIVE		-----	
1194		-----		-----	
1205		-----		-----	
1399	IP30	Negative		-----	
1491		-----		-----	
1634		-----		-----	
1776		-----		-----	
1881		-----		-----	
1995		-----		-----	
6005		-----		-----	
6018		-----		-----	
6075		-----		-----	
6201		-----		-----	
6262	D4952	Negative		-----	
6279		-----		-----	
6291	D4952	negative		-----	
6299		-----		-----	
6308	IP30	Negative		-----	
	n	8			
	mean (n)	negative			

Determination of Existent Gum (solvent washed) on sample #20060; results in mg/100mL

lab	method	value	mark	z(targ)	remarks
312	D381	0.4		-0.26	
496	ISO6246	1.4		1.05	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D381	<0.5		-----	
1140	IP131	<1.0		-----	
1194		-----		-----	
1205		-----		-----	
1399	D381	<1		-----	
1491	ISO6246	0.2		-0.52	
1634		-----		-----	
1776		-----		-----	
1881		-----		-----	
1995	D381	<0.5		-----	
6005		-----		-----	
6018		-----		-----	
6075		-----		-----	
6201		-----		-----	
6262	D381	<0.5		-----	
6279		-----		-----	
6291	ISO6246	0.8		0.26	
6299	ISO6246	0.2		-0.52	
6308	ISO6246	0	ex	-0.79	test result excluded, for zero is not a real value

normality	unknown
n	5
outliers	0 (+1ex)
mean (n)	0.6
st.dev. (n)	0.51
R(calc.)	1.4
st.dev.(ISO6246:17)	0.76
R(ISO6246:17)	2.1
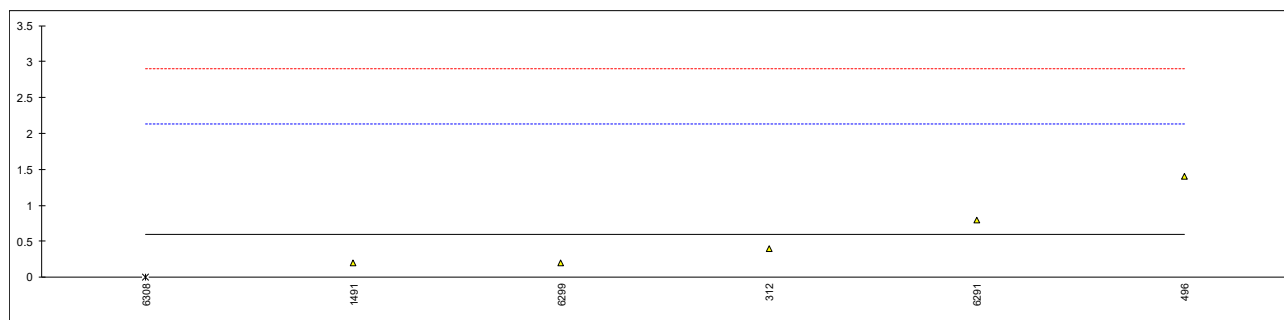
Determination of Lead as Pb on sample #20060; results in mg/L

lab	method	value	mark	z(targ)	remarks
312	EN237	<0.5		-----	
496		-----		-----	
541	D3237	<2.5		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109		-----		-----	
1140	D7111	0.010		-----	
1194		10.7		-----	possible false positive test result?
1205		-----		-----	
1399		-----		-----	
1491		-----		-----	
1634		-----		-----	
1776		-----		-----	
1881		-----		-----	
1995		-----		-----	
6005		-----		-----	
6018		-----		-----	
6075		-----		-----	
6201	EN237	<2,5		-----	
6262		<2.5		-----	
6279		-----		-----	
6291		-----		-----	
6299		-----		-----	
6308	D3237	<2.5		-----	
	n	6			
	mean (n)	<2.5			

Determination of Manganese as Mn on sample #20060; results in mg/L

lab	method	value	mark	z(targ)	remarks
312	EN16136	<0.5		-----	
496	EN16136	0.06		-----	
541	D3831	<0.25		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109		-----		-----	
1140	EN16136	<0.05		-----	
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491		-----		-----	
1634		-----		-----	
1776		-----		-----	
1881		-----		-----	
1995		-----		-----	
6005		-----		-----	
6018		-----		-----	
6075		-----		-----	
6201	EN16135	<0,5		-----	
6262	EN16135	<0.5		-----	
6279		-----		-----	
6291	EN16136	<0,5		-----	
6299		-----		-----	
6308	D3831	<0.25		-----	
	n	8			
	mean (n)	<0.5			

Determination of Olefins by FIA (without oxygenates correction) on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	Lotnr. *	remarks
312	EN15553	8.18		0.00	3000000976	
496	D1319	9.2		0.99	3000000901	
541		-----		-----	-----	
914		-----		-----	-----	
962		-----		-----	-----	
963		-----		-----	-----	
1109	D1319	6.81		-1.33	3000000941	
1140		-----		-----	-----	
1194	D1319	7.16		-0.99	-----	
1205		-----		-----	-----	
1399		-----		-----	-----	
1491		-----		-----	-----	
1634		-----		-----	-----	
1776		-----		-----	-----	
1881		-----		-----	-----	
1995		-----		-----	-----	
6005		-----		-----	-----	
6018		-----		-----	-----	
6075		-----		-----	-----	
6201		-----		-----	-----	
6262		-----		-----	-----	
6279		-----		-----	-----	
6291	EN15553	8.5		0.31	-----	
6299	EN15553	6.6		-1.53	3000000852	
6308	EN15553	10.8		2.54	3000000859	

normality	unknown
n	7
outliers	0
mean (n)	8.18
st.dev. (n)	1.496
R(calc.)	4.19
st.dev.(EN15553:07)	1.031
R(EN15553:07)	2.89

*) Test method ASTM D1319 describes in paragraph 7.2.1 not to report results for Jet Fuel, Diesel Fuel and Gasoline obtained with these six lotnumbers of Fluorescent Indicator Dyed Gel: 3000000975 to 3000000980. EN15553 does not contain such a statement and does not restrict the use of FIA Gel.
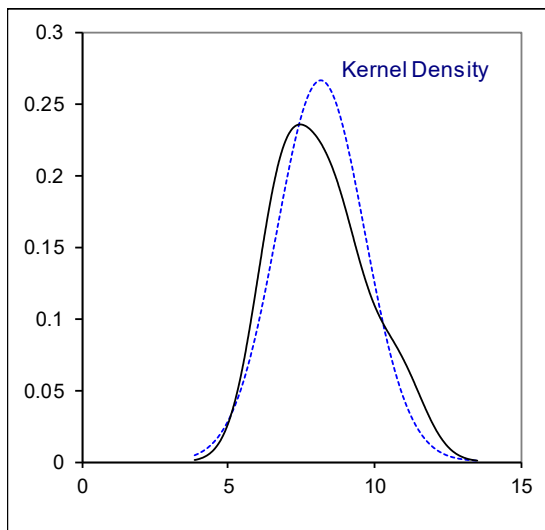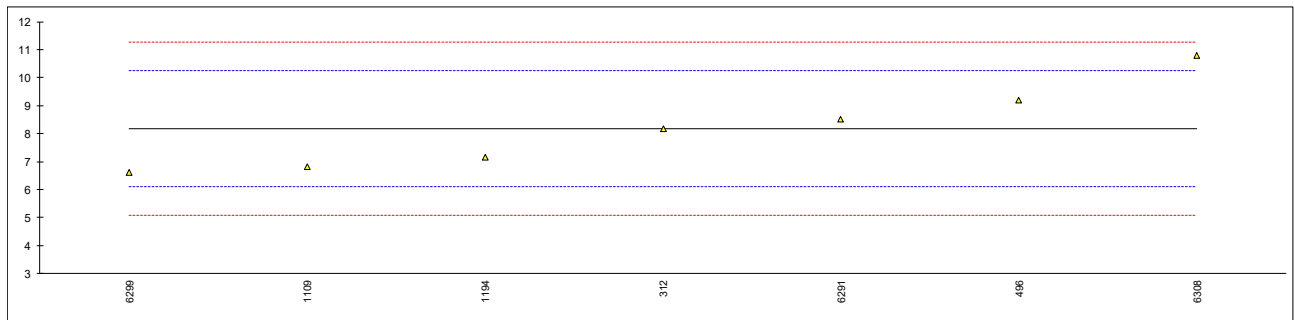
Determination of Olefins by GC on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	8.41		0.14	
496	ISO22854-A	8.30		-0.06	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	8.45		0.22	
1140	IP566	7.88		-0.85	
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491	In house	8.5		0.31	
1634	ISO22854-A	8.365		0.06	
1776	ISO22854-A	7.7		-1.19	
1881		-----		-----	
1995	D6839	8.29		-0.08	
6005		-----		-----	
6018	ISO22854-A	8.56		0.42	
6075		-----		-----	
6201	ISO22854-A	7.02	G(0.05)	-2.47	
6262	ISO22854-A	8.62		0.54	
6279		-----		-----	
6291	ISO22854-A	8.51		0.33	
6299		-----		-----	
6308	ISO22854-A	8.42		0.16	

normality	suspect
n	12
outliers	1
mean (n)	8.334
st.dev. (n)	0.2747
R(calc.)	0.769
st.dev.(ISO22854-A:16)	0.5328
R(ISO22854-A:16)	1.492
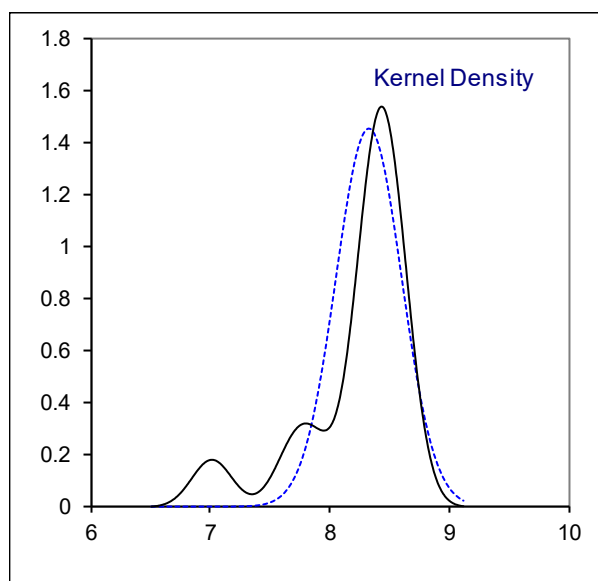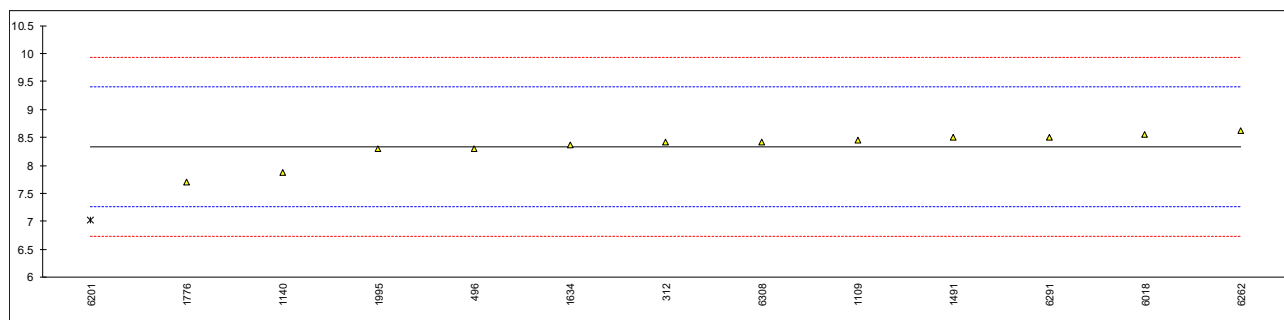
Kernel Density

Determination of Olefins by GC on sample #20060; results in %M/M

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	7.85		-----	
496	ISO22854-A	7.74		-----	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	7.88		-----	
1140	IP566	7.37	C	-----	first reported: 9.35
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491		-----		-----	
1634	ISO22854-A	7.775		-----	
1776		-----		-----	
1881		-----		-----	
1995	D6839	7.72		-----	
6005		-----		-----	
6018	ISO22854-A	7.99		-----	
6075		-----		-----	
6201	ISO22854-A	6.57	G(0.01)	-----	
6262	ISO22854-A	8.05		-----	
6279		-----		-----	
6291	ISO22854-A	7.95		-----	
6299		-----		-----	
6308	ISO22854-A	7.85		-----	

normality	not OK
n	10
outliers	1
mean (n)	7.818
st.dev. (n)	0.1900
R(calc.)	0.532
st.dev.(lit)	n.a.
R(lit)	n.a.
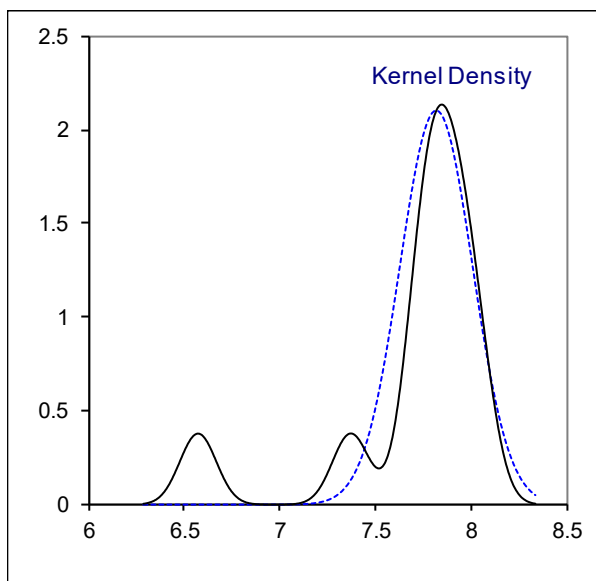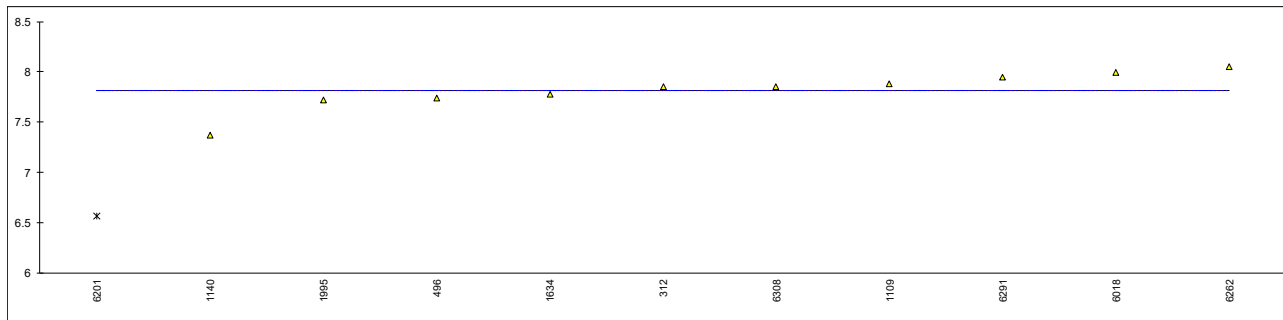
Determination of Oxidation Stability on sample #20060; results in minutes

lab	method	value	mark	z(targ)	remarks
312	D525	>900		-----	
496		-----		-----	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D525	>900		-----	
1140	IP40	>900		-----	
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491		-----		-----	
1634		-----		-----	
1776		-----		-----	
1881		-----		-----	
1995		-----		-----	
6005		-----		-----	
6018		-----		-----	
6075		-----		-----	
6201	D525	>900		-----	
6262	ISO7536	>900		-----	
6279		-----		-----	
6291	D525	>900		-----	
6299		-----		-----	
6308	ISO7536	>900		-----	
	n	7			
	mean (n)	>900			

Determination of Ethanol on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	0.06		-0.43	
496	EN1601	<0.10		-----	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	0.05		-0.51	
1140	IP566	0.29		1.38	
1194	D5845	0.36		1.94	
1205		-----		-----	
1399		-----		-----	
1491	D5845	<0.8		-----	
1634	ISO22854-A	0.04		-0.59	
1776	ISO22854-A	0.10		-0.12	
1881		-----		-----	
1995	D6839	0.17		0.43	
6005		-----		-----	
6018	ISO22854-A	0.04		-0.59	
6075		-----		-----	
6201	ISO22854-A	0.05		-0.51	
6262	ISO22854-A	0.05		-0.51	
6279		-----		-----	
6291	ISO22854-A	0.05		-0.51	
6299		-----		-----	
6308	ISO22854-A	0.12		0.04	

normality	not OK
n	12
outliers	0
mean (n)	0.115
st.dev. (n)	0.1066
R(calc.)	0.299
st.dev.(ISO22854-A:16)	0.1266
R(ISO22854-A:16)	0.354

Kernel Density
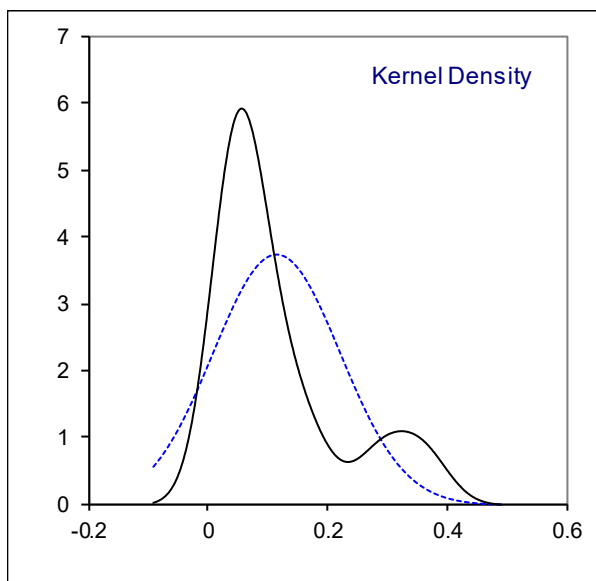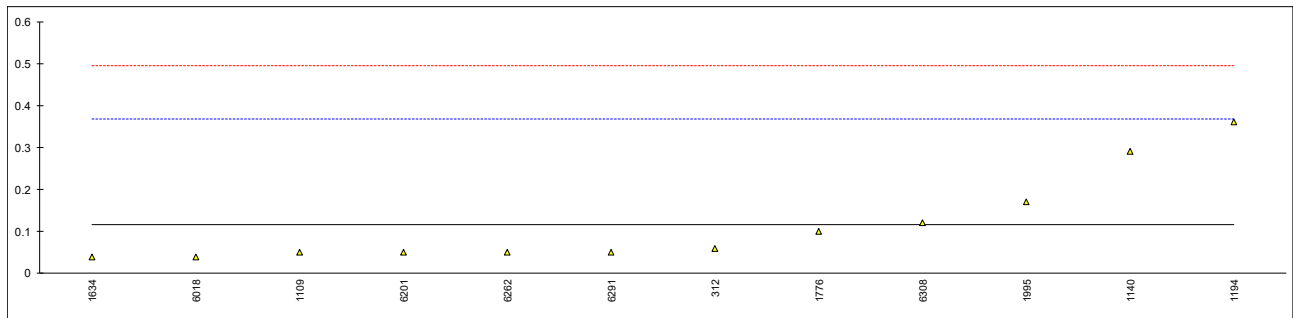
Determination of Ethers (C5 or more C atoms) on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	12.83		0.72	
496	EN1601	13.62	DG(0.05)	4.02	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	12.76		0.43	
1140	IP566	12.62	C	-0.16	first reported 0.00
1194		-----		-----	
1205		-----		-----	
1399		-----		-----	
1491	D5845	14.02	DG(0.05)	5.70	
1634	ISO22854-A	12.535		-0.52	
1776	ISO22854-A	12.34		-1.33	
1881		-----		-----	
1995		-----		-----	
6005		-----		-----	
6018	ISO22854-A	<0,01		<-52.92	possible false negative test result?
6075		-----		-----	
6201	ISO22854-A	13.11		1.89	
6262	ISO22854-A	12.64		-0.08	
6279		-----		-----	
6291	ISO22854-A	12.6		-0.24	
6299		-----		-----	
6308	ISO22854-A	12.49		-0.70	

normality	suspect
n	9
outliers	2
mean (n)	12.658
st.dev. (n)	0.2219
R(calc.)	0.621
st.dev.(ISO22854-A:16)	0.2390
R(ISO22854-A:16)	0.669

Kernel Density
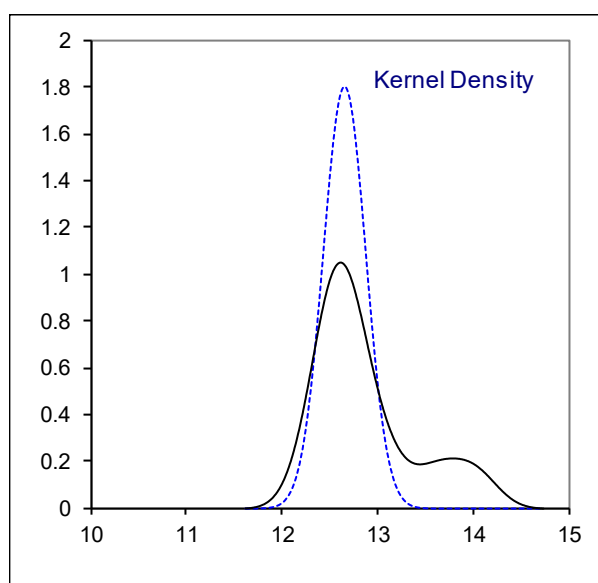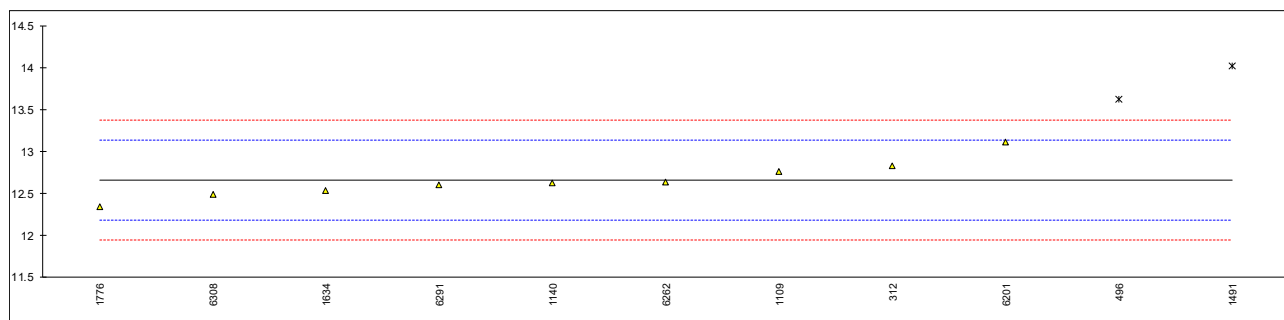
Determination of MTBE on sample #20060; results in %V/V

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	12.80		1.03	
496	EN1601	13.62	DG(0.05)	4.48	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	12.76		0.86	
1140	IP566	12.62		0.28	
1194	D5845	12.3		-1.07	
1205		-----		-----	
1399		-----		-----	
1491	D5845	13.70	DG(0.05)	4.81	
1634	ISO22854-A	12.455		-0.42	
1776	ISO22854-A	12.34		-0.90	
1881		-----		-----	
1995	D6839	12.31		-1.03	
6005		-----		-----	
6018	ISO22854-A	12.32		-0.98	
6075		-----		-----	
6201	ISO22854-A	13.01		1.91	
6262	ISO22854-A	12.62		0.28	
6279		-----		-----	
6291	ISO22854-A	12.56		0.02	
6299		-----		-----	
6308	ISO22854-A	<0.1		-----	

normality	OK
n	11
outliers	2
mean (n)	12.554
st.dev. (n)	0.2354
R(calc.)	0.659
st.dev.(ISO22854-A:16)	0.2381
R(ISO22854-A:16)	0.667

Kernel Density
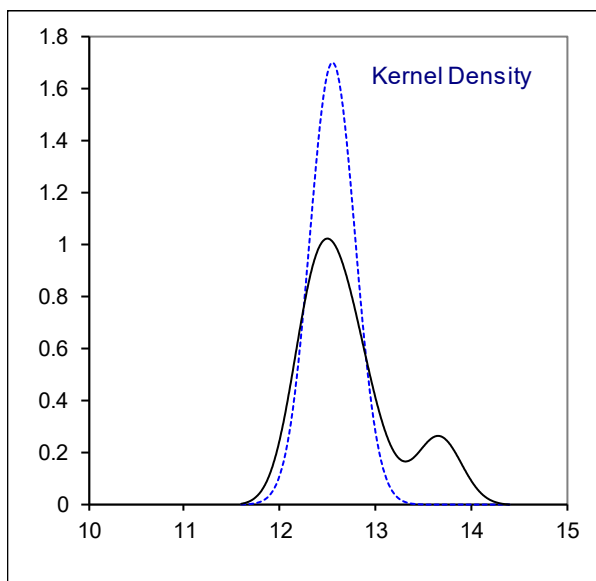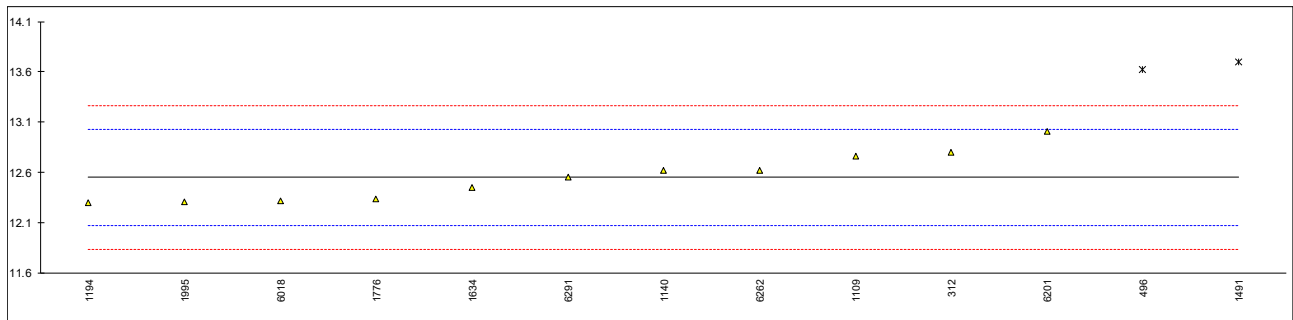
Determination of Oxygen content on sample #20060; results in %M/M

lab	method	value	mark	z(targ)	remarks
312	ISO22854-A	2.42		-0.12	
496	ISO22854-A	2.520		0.78	
541		-----		-----	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D6839	2.41		-0.21	
1140		2.50		0.60	
1194	D5845	2.56		1.14	
1205		-----		-----	
1399		-----		-----	
1491	D5845	2.4		-0.30	
1634	ISO22854-A	2.40		-0.30	
1776	ISO22854-A	2.41		-0.21	
1881		-----		-----	
1995	D6839	2.41		-0.21	
6005		-----		-----	
6018	ISO22854-A	2.36		-0.66	
6075		-----		-----	
6201	ISO22854-A	2.5		0.60	
6262	ISO22854-A	2.42		-0.12	
6279		-----		-----	
6291	ISO22854-A	2.38		-0.48	
6299		-----		-----	
6308	ISO22854-A	2.38		-0.48	

normality	OK
n	14
outliers	0
mean (n)	2.434
st.dev. (n)	0.0606
R(calc.)	0.170
st.dev.(ISO22854-A:16)	0.1107
R(ISO22854-A:16)	0.310

Kernel Density
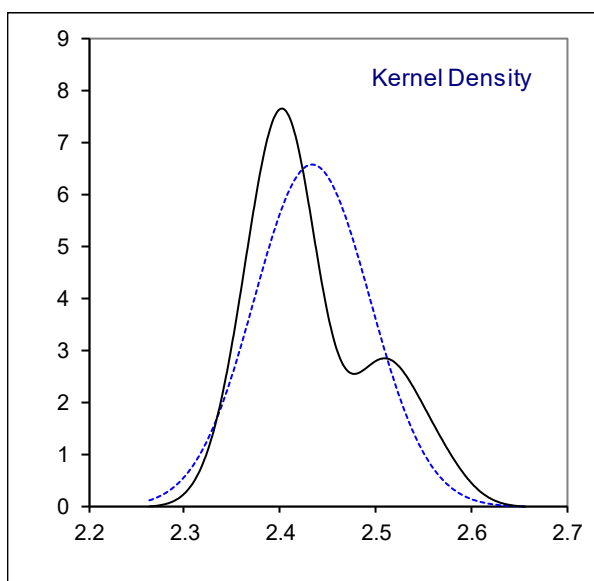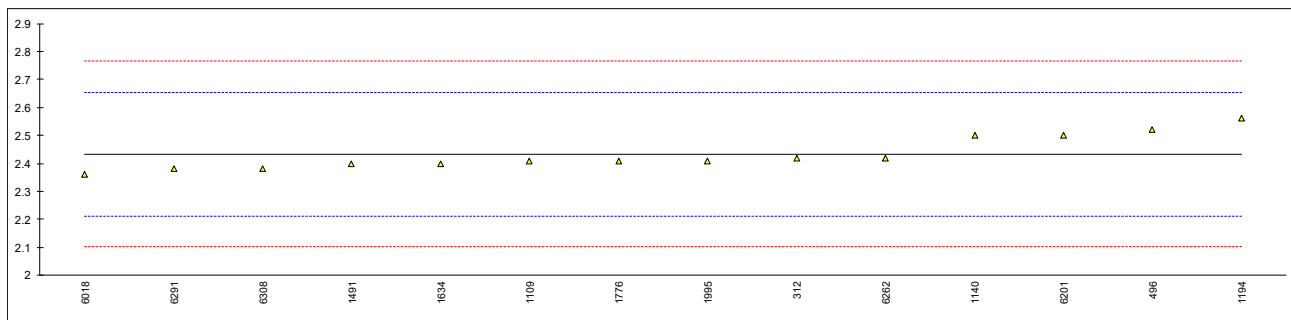
Determination of Sulfur on sample #20060; results in mg/kg

lab	method	value	mark	z(targ)	remarks
312	D5453	8.39		2.10	
496	ISO20846	2.81	G(0.05)	-5.18	
541	ISO20846	5.66		-1.46	
914		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D7039	7.33		0.71	
1140	D5453	4.18		-3.40	
1194	D7220/IP532	13.06	G(0.01)	8.19	
1205	ISO20846	7.38		0.78	
1399		-----		-----	
1491	ISO20846	7.12		0.44	
1634	ISO20846	6.4		-0.50	
1776	ISO20846	6.4		-0.50	
1881	ISO20846	7.50		0.94	
1995	D5453	5.88		-1.18	
6005	ISO20846	7.08		0.39	
6018	ISO20846	6.43		-0.46	
6075		-----		-----	
6201	ISO20846	7.89		1.44	
6262	ISO20846	6.405		-0.49	
6279		-----		-----	
6291	D5453	5.46		-1.73	
6299	ISO20846	7.6		1.07	
6308	ISO20846	8.2		1.85	

	normality	OK
	n	17
	outliers	2
	mean (n)	6.783
	st.dev. (n)	1.0902
	R(calc.)	3.053
	st.dev.(ISO20846:19)	0.7665
	R(ISO20846:19)	2.146
Compare		
	R(D5453:19A)	2.436
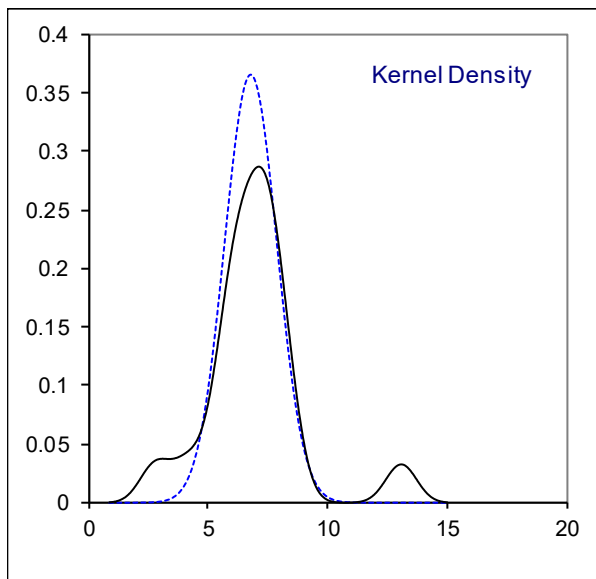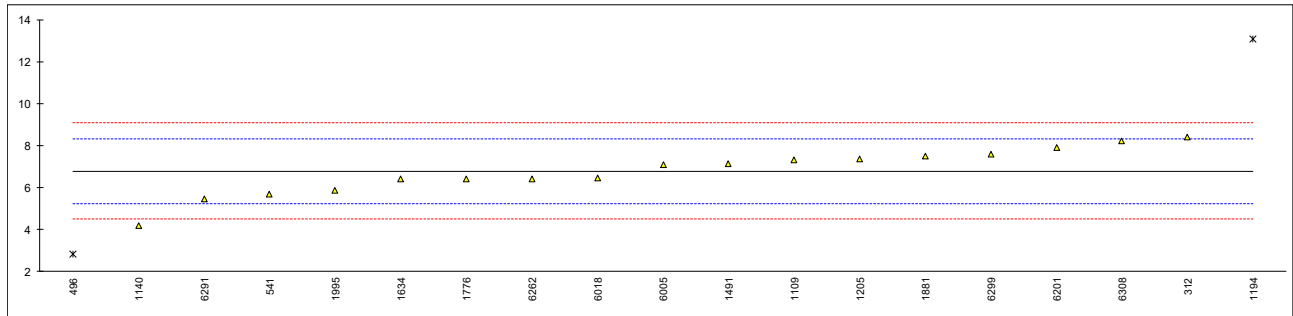
Determination of ASVP on sample #20061; results in kPa

lab	method	value	mark	z(targ)	remarks
312	EN13016-1	100.6		0.95	
496	EN13016-1	99.7		-0.65	
541		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D5191	98.61		-2.58	
1194		-----		-----	
1491	EN13016-1	100.02		-0.08	
1634	EN13016-1	100.1		0.06	
1776		-----		-----	
1881	EN13016-1	99.7		-0.65	
6005	EN13016-1	99.6		-0.82	
6018	EN13016-1	100.3		0.42	
6075		-----		-----	
6201	EN13016-1	100.85		1.39	
6262	EN13016-1	101.3		2.19	
6279		-----		-----	
6291	EN13016-1	101.67		2.84	
6299	EN13016-1	98.7		-2.42	
6308	EN13016-1	99.7		-0.65	

normality	OK	
n	13	
outliers	0	
mean (n)	100.065	
st.dev. (n)	0.8971	
R(calc.)	2.512	
st.dev.(EN13016-1:18)	0.5643	
R(EN13016-1:18)	1.58	

Kernel Density
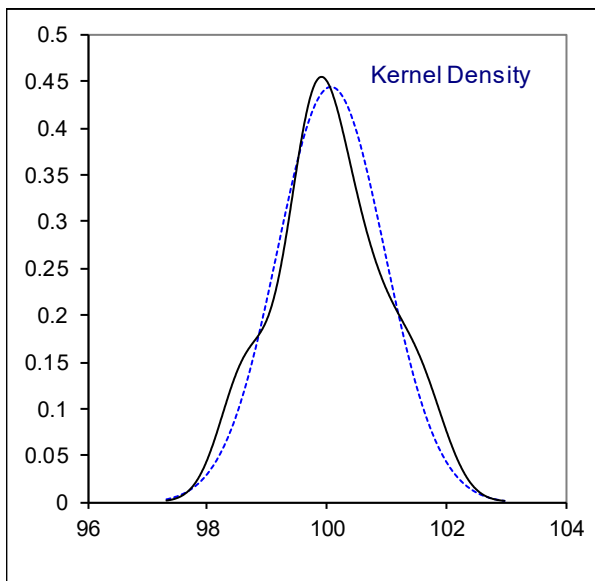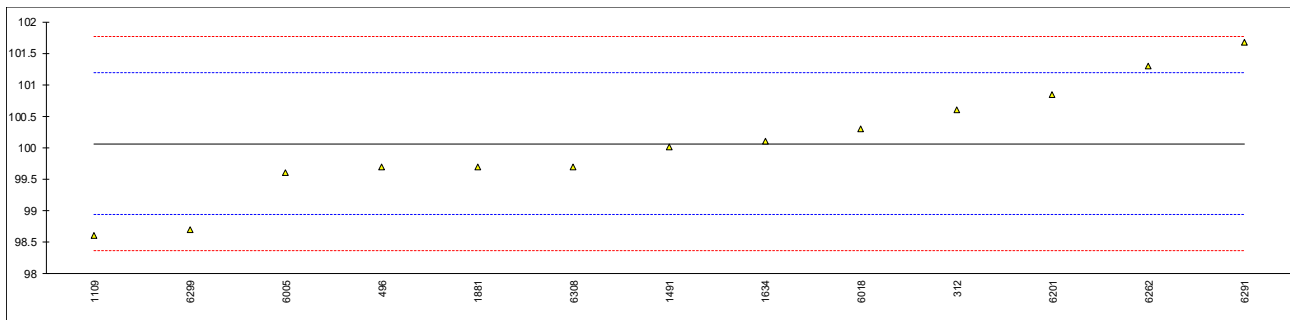
Determination of DVPE (acc. to EN13016-1) on sample #20061; results in kPa

lab	method	value	mark	z(targ)	remarks
312	EN13016-1	93.3		1.16	
496	EN13016-1	92.5		-0.26	
541	D6378	95.56	ex	5.16	test result excluded, see paragraph 4.1
962		-----		-----	
963		-----		-----	
1109	D5191	91.38		-2.24	
1194	EN13016-1	92.56		-0.15	
1491	EN13016-1	92.74		0.17	
1634	EN13016-1	92.8		0.27	
1776	EN13016-1	91.0		-2.92	
1881	EN13016-1	92.4		-0.44	
6005	EN13016-1	92.3		-0.61	
6018	EN13016-1	93.0		0.63	
6075		-----		-----	
6201	EN13016-1	93.5		1.51	
6262	EN13016-1	94.0		2.40	
6279		-----		-----	
6291	EN13016-1	94.32		2.97	
6299	EN13016-1	91.4		-2.21	
6308	EN13016-1	92.5		-0.26	

normality	OK	
n	15	
outliers	0 (+1ex)	
mean (n)	92.647	
st.dev. (n)	0.9276	
R(calc.)	2.597	
st.dev.(EN13016-1:18)	0.5643	
R(EN13016-1:18)	1.58	
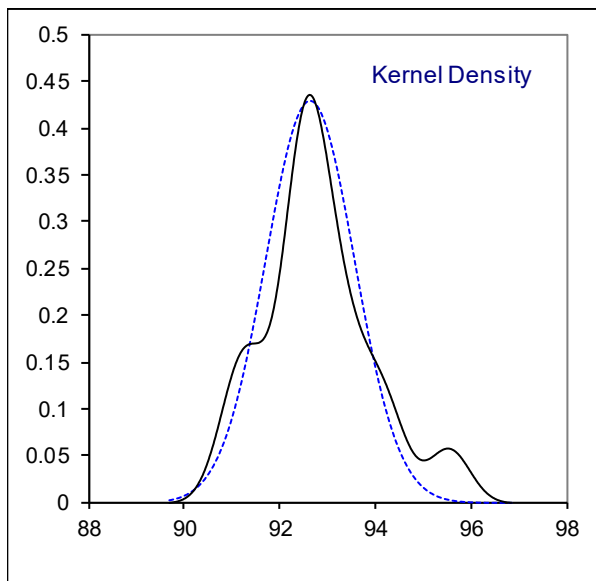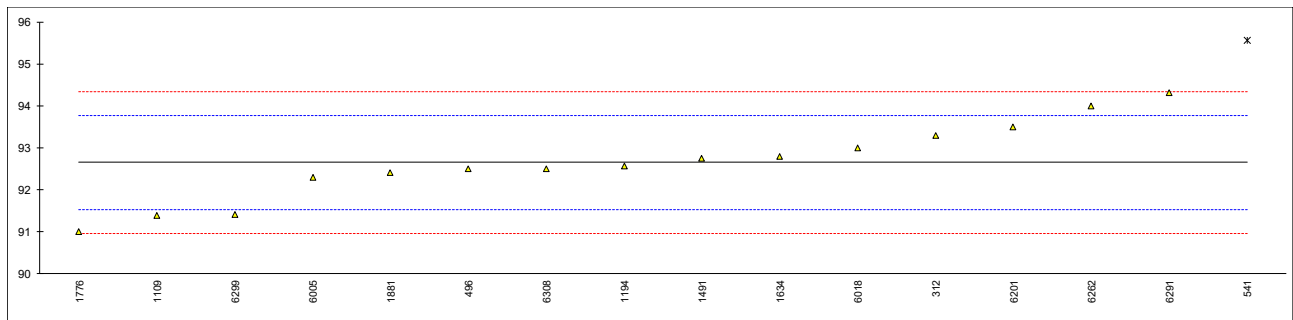
Determination of RON on sample #20062;

lab	method	value	mark	z(targ)	remarks
312	ISO5164	98.23		-0.28	
496	ISO5164	97.7		-2.40	
541		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D2699	98.2		-0.40	
1194	D2699	98.47		0.68	
1491	In house	99.0		2.80	
1634		97.85		-1.80	
1776	ISO5164	98.5		0.80	
1881	D2699	98.34		0.16	
6075		-----		-----	
6201	ISO5164	98.3		0.00	
6262	D2699	98.4		0.40	
6279		-----		-----	
6291	ISO5164	98.3		0.00	

normality	suspect
n	11
outliers	0
mean (n)	98.30
st.dev. (n)	0.339
R(calc.)	0.95
st.dev.(ISO5164:14)	0.25
R(ISO5164:14)	0.7

Kernel Density
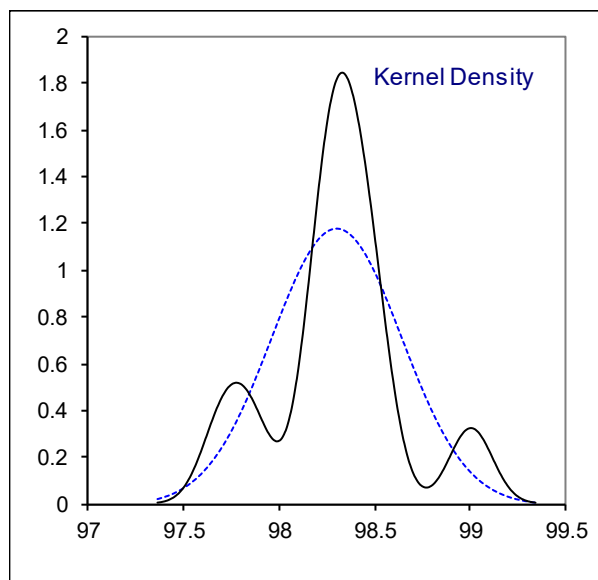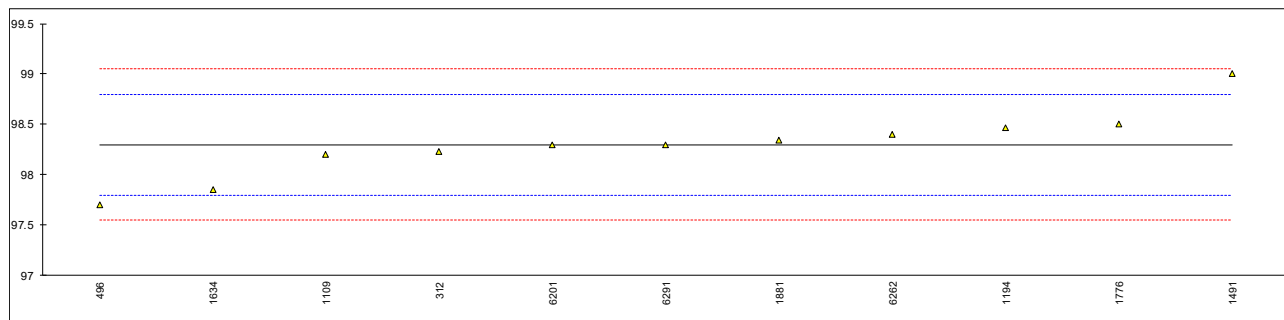
Determination of MON on sample #20062;

lab	method	value	mark	z(targ)	remarks
312	ISO5163	88.14		0.57	
496	ISO5163	87.3		-2.05	
541		-----		-----	
962		-----		-----	
963		-----		-----	
1109	D2700	88.8		2.62	
1194	D2700	87.77		-0.59	
1491	In house	87.9		-0.18	
1634		87.15		-2.51	
1776	ISO5163	87.8		-0.49	
1881	D2700	87.88		-0.24	
6075		-----		-----	
6201	ISO5163	88.7		2.31	
6262	D2700	88.0		0.13	
6279		-----		-----	
6291		88.1		0.44	

normality	OK
n	11
outliers	0
mean (n)	87.96
st.dev. (n)	0.497
R(calc.)	1.39
st.dev.(ISO5163:14)	0.321
R(ISO5163:14)	0.9
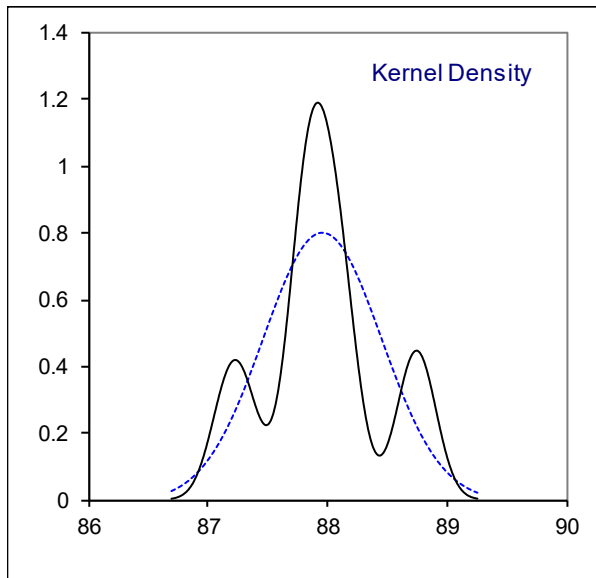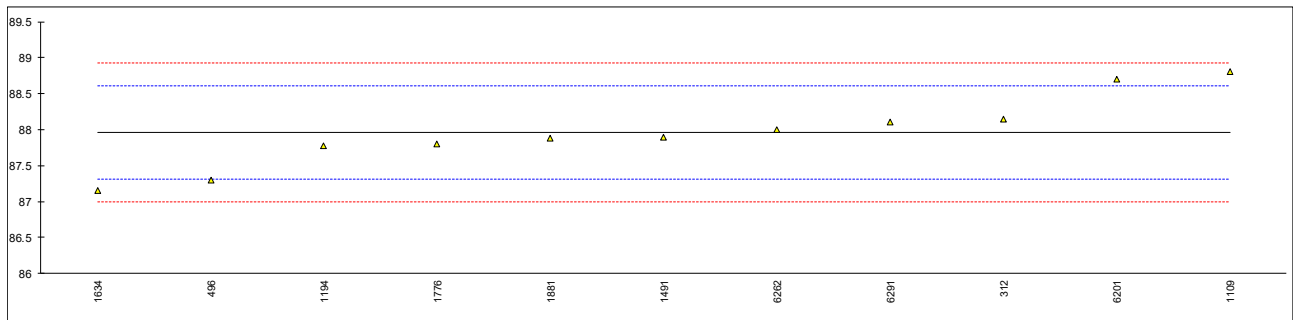
APPENDIX 2

Determination of Other Oxygenates on sample #20060; results in %V/V

lab	MeOH	i-PrOH	i-BuOH	t-buOH	DIPE	ETBE	TAME	Sum of Other Oxygenates	
312	<0.1	<0.1	<0.1	<0.1	<0.1	0.03	<0.1	<0.1	
496	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
541	-----	-----	-----	-----	-----	-----	-----	-----	
914	-----	-----	-----	-----	-----	-----	-----	-----	
962	-----	-----	-----	-----	-----	-----	-----	-----	
963	-----	-----	-----	-----	-----	-----	-----	-----	
1109	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	
1140	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1194	0	-----	-----	0	0.63	0	0.56	-----	
1205	-----	-----	-----	-----	-----	-----	-----	-----	
1399	-----	-----	-----	-----	-----	-----	-----	-----	
1491	<0.8	<0.8	<0.8	1.11	<0.8	<0.8	<0.8	15.52	C
1634	0.09	0	0	0	0.04	0	0	0	
1776	-----	0.30	-----	0.03	-----	-----	-----	0.43	
1881	-----	-----	-----	-----	-----	-----	-----	-----	
1995	-----	-----	0.03	-----	-----	0.16	-----	0.05	
6005	-----	-----	-----	-----	-----	-----	-----	-----	
6018	<0,01	<0,01	<0,01	<0,01	<0,01	0.02	<0,01	<0,01	
6075	-----	-----	-----	-----	-----	-----	-----	-----	
6201	0.07	0	0.03	0	0.03	0	0	0	
6262	0.04	0	0.02	0	0.02	0	0	0	
6279	-----	-----	-----	-----	-----	-----	-----	-----	
6291	0.00	0.03	0.00	0.00	0.00	0.04	0.00	0.0	
6299	-----	-----	-----	-----	-----	-----	-----	-----	
6308	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	

Lab 1776 first reported: 12.77

APPENDIX 3

z-scores distillation

lab	IBP	10% eva	50% eva	90% eva	FBP	%E70°C	%E100°C	%E150°C
312	-0.35	-0.20	-0.01	0.12	-0.13	0.15	0.12	0.51
496	1.43	0.43	0.20	-0.14	0.31	-0.16	0.25	0.73
541	-1.13	0.45	0.37	-0.09	-0.01	-0.32	0.35	-1.71
914	-----	-----	-----	-----	-----	-----	-----	-----
962	-----	-----	-----	-----	-----	-----	-----	-----
963	-----	-----	-----	-----	-----	-----	-----	-----
1109	0.48	-0.90	-0.63	-0.14	0.31	0.98	0.76	0.73
1140	0.84	-0.48	-1.11	-0.35	-0.05	1.81	1.52	0.94
1194	-----	-----	-----	-----	-----	-----	-----	-----
1205	0.36	-0.34	-0.21	0.17	-0.17	0.46	0.50	-0.13
1399	3.40	0.43	1.03	0.86	3.85	-0.89	-1.02	-0.56
1491	-0.12	-0.55	-0.63	-0.09	0.03	0.98	0.50	0.51
1634	0.24	-0.13	0.34	0.23	0.27	-0.16	-0.13	0.30
1776	0.48	0.01	-0.14	-0.24	0.07	0.36	0.50	-0.13
1881	-----	-----	-----	-----	-----	-----	-----	-----
1995	-----	-----	-----	-----	-----	-----	-----	-----
6005	-0.65	1.20	1.58	1.59	-0.33	-1.41	-2.17	-4.87
6018	-0.53	1.55	2.48	1.64	0.27	-2.55	-3.19	-4.01
6075	-----	-----	-----	-----	-----	-----	-----	-----
6201	-0.71	-0.83	-0.49	-0.24	-0.17	0.77	0.88	1.16
6262	-0.71	-0.06	-0.01	0.07	-0.17	0.15	-0.52	0.30
6279	-----	-----	-----	-----	-----	-----	-----	-----
6291	-0.29	0.01	0.20	0.28	0.03	-0.06	-0.13	0.08
6299	-0.71	0.15	0.20	-0.09	-0.25	-1.41	-2.04	-2.72
6308	1.37	-0.69	-0.70	-0.35	-0.01	1.29	0.63	-----

APPENDIX 4

Analytical details automated distillation (e.g. ASTM D86 or ISO3405)

lab	manufacturer **name** of the distillation device	manufacturer **type** of the distillation device
312	Walter Herzog	PAC Optidist
496	PAC - Herzog	Optidist
541	PAC	Optidist
914		
962		
963		
1109	PAC Walter Herzog	OptiDist
1140	PAC	OptiDist
1194		
1205		
1399	OPTIDIST	
1491	PAC/ISL	AD86 5G2
1634		
1776	PAC	Optidist
1881		
1995		
6005	PAC	Factory
6018	PAC	Factory
6075		
6201	PAC	Optidist
6262	PAC	Optidist
6279		
6291		
6299	PAC - OPTIDIST	PAC - OPTIDIST
6308	Anton Paar	Diana

APPENDIX 5

Number of participants per country

```
1 lab in   ARGENTINA
1 lab in   AUSTRALIA
2 labs in  BELGIUM
1 lab in   CYPRUS
1 lab in   EGYPT
1 lab in   FRANCE
1 lab in   GERMANY
1 lab in   INDIA
1 lab in   LITHUANIA
1 lab in   MARTINIQUE
3 labs in  NETHERLANDS
1 lab in   NORTH MACEDONIA
4 labs in  PORTUGAL
2 labs in  SAUDI ARABIA
1 lab in   SOUTH AFRICA
1 lab in   SWEDEN
2 labs in  UNITED KINGDOM
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APPENDIX 6

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) / G1	= outlier in Grubbs' outlier test
G(0.05) / G5	= straggler in Grubbs' outlier test
DG(0.01) / DG1	= outlier in Double Grubbs' outlier test
DG(0.05) / DG5	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= possibly an error in calculations
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 false positive test result?
f-?	= possibly false negative test result?
SDS	= Safety Data Sheet

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9   IP 367:84

10   DIN 38402 T41/42

11   P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)

12   J.N. Miller, Analyst, 118, 455, (1993)

13   Analytical Methods Committee Technical Brief, No 4, January 2001

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